Project Manual

Deliverable #5 / April 30th, 2014

ORCHID HOUSE

Solar Decathlon Europe

國立交通大學 National Chiao Tung University

NCTUNICODE

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Summary of Changes

SUMMARY OF CHANGES

	STATUS	DATE
1. COVER SHEET	REVISED	April 30, 2014
2. SUMMARY OF CHANGES	REVISED	April 30, 2014
3. TABLE OF CONTENTS	REVISED	April 30, 2014
4. RULES AND BUILDING CODE COMPLIANCE CHECKLIST	REVISED	April 30, 2014
5. CONTEST SUPPORT DOCUMENTS		
5.1. Urban Design, Transportation and Affordability Report		
5.1.1 Urban Design Strategy	REVISED	April 30, 2014
5.1.2 Market Viability of the project	REVISED	April 30, 2014
5.1.3 Individual or Collective Housing Building Characteristic	REVISED	April 30, 2014
5.1.4 Transportation and Mobility Strategies	REVISED	April 30, 2014
5.1.5 Affordiblity	REVISED	April 30, 2014
5.1.6 Appendix	REVISED	April 30, 2014
5.2. Architecture Design Narrative		
5.2.1 Architectural and Urban Concepts	REVISED	April 30, 2014
5.2.2 Summary of Reconfigurable Features	REVISED	April 30, 2014
5.2.3 Lighting Design Narrative	REVISED	April 30, 2014
5.3. Engineering and Construction Design Narrative		
5.3.1 Sturctural Design	REVISED	April 30, 2014
5.3.2 Constructive Design	REVISED	April 30, 2014
5.3.3 Plumbing System	REVISED	April 30, 2014
5.3.4 Electrical System Design	REVISED	April 30, 2014
5.3.5 Photovoltaic Systems Design	REVISED	April 30, 2014
5.3.6 Electrical Energy Balance Simulation	REVISED	April 30, 2014
5.3.7 Solar Thermal Design	REVISED	April 30, 2014
5.3.8 Building Intergrated Solar Active Systems	REVISED	April 30, 2014
5.4. Energy Efficiency Design Narrative		
5.4.1 Technical Project Summary	REVISED	April 30, 2014
5.4.2 Comprehensive Energy Analysis and Discussion Report	REVISED	April 30, 2014
5.4.3 Section II - Projected Performance of Final Housing Unit Design	REVISED	April 30, 2014
5.5. Innovation Report	REVISED	April 30, 2014
5.6. Sustainability Report		
5.6.1 Objective	REVISED	April 30, 2014
5.6.2 Urban design, Transportation, and Affordability	REVISED	April 30, 2014
5.6.3 Bioclimatic Strategies	REVISED	April 30, 2014
5.6.4 Construction system	REVISED	April 30, 2014

5.6.5 Materials	REVISED	April 30, 2014
5.6.6 Active system and equipment	REVISED	April 30, 2014
5.6.7 Solar Systems	REVISED	April 30, 2014
5.6.8 Water	REVISED	April 30, 2014
5.6.9 Solid Waste	REVISED	April 30, 2014
5.6.10 Life Cycle Analysis	REVISED	April 30, 2014
5.7. Communications Plan		
5.7.1 Introduction	REVISED	April 30, 2014
5.7.2 Communications Project	REVISED	April 30, 2014
5.7.3 Public Tour Description	REVISED	April 30, 2014
5.7.4 Visual Identity Manual	REVISED	April 30, 2014
5.7.5 Sponsorship Manual	REVISED	April 30, 2014
6. DINNER PARTY MENU	REVISED	April 30, 2014
7. CONTEST WEEK TASKS' PLANNING	REVISED	April 30, 2014
8. COST ESTIMATE AND PROJECT FINANCIAL SUMMARY	REVISED	April 30, 2014
9. SITE OPERATIONS REPORT		
9.1 Objective	REVISED	April 30, 2014
9.1.1 General Data	REVISED	April 30, 2014
9.1.2 Site Operation Coordinators	REVISED	April 30, 2014
9.1.3 Site Operation Coordinators	REVISED	April 30, 2014
9.1.4 Logistic in La Cite Du Soleil	REVISED	April 30, 2014
9.1.5 Logistic outside of La Cite Du Soleil	REVISED	April 30, 2014
9.1.5 Assembly / Disassembly Schedule	REVISED	April 30, 2014
9.1.6 Equipment Requirement Chart	REVISED	April 30, 2014
9.1.7 Assembly & Disassembly	REVISED	April 30, 2014
9.1.8 Site Operations Chart		
10. HEALTH & SAFETY PLAN		
10.1. Health and Safety Plan Precedents and Aim	REVISED	April 30, 2014
10.2. General Data of the Project	REVISED	April 30, 2014
10.1.1 Prototype Builder	REVISED	April 30, 2014
10.1.2 Nature of the Project	REVISED	April 30, 2014
10.1.3 HS Team Coordinator During Design	REVISED	April 30, 2014
10.1.4 Contruction Site in Taiwan	REVISED	April 30, 2014
10.1.5 The Nearest Hospital of Lot	REVISED	April 30, 2014
10.1.6 The Nearest Police Office of Lot	REVISED	April 30, 2014
10.1.7 The Nearest Fire Station of Lot	REVISED	April 30, 2014
10.3 Health and Safety Plan Objectives	REVISED	April 30, 2014
10.4 Conditions of the Site		
10.4.1 Constructive process		
10.4.2 Type and characteristics of the materials and elements	REVISED	April 30, 2014
10.4.3 Site description	REVISED	April 30, 2014
10.4.4 Climate description	REVISED	April 30, 2014
10.4.5 Accesses and paths for vehicles	REVISED	April 30, 2014
10.4.6 Determining factors for the house placing	REVISED	April 30, 2014

10.4.7 Overlaps with the affected services and other circumstances or activities of the environment, able to cause risks during the construction	REVISED	April 30, 2014
10.4.8 Planned activities	REVISED	April 30, 2014
10.4.9 Trades whose intervention is affected by the riskspre-vention	REVISED	April 30, 2014
10.4.10 Auxiliary resources planned for the construction	REVISED	April 30, 2014
10.4.11 Machinery planned for the construction	REVISED	April 30, 2014
10.4.12 Construction site installations	REVISED	April 30, 2014
10.4.13 Characteristics table for the stocks	REVISED	April 30, 2014
10.5 Activities for Risks Prevention	REVISED	April 30, 2014
10.6 Critical Work Phases for Risks Prevention	REVISED	April 30, 2014
11. DETAILED WATER BUDGET	REVISED	April 30, 2014
12. CONSTRUCTION SPECIFICATIONS		
12.1. Structure		
12.1.1 Foundation	REVISED	April 30, 2014
12.1.2 Structrual Floors and Sectionss	REVISED	April 30, 2014
12.2. Architecture		
12.2.1 Enclosure	REVISED	April 30, 2014
12.2.2 Openings	REVISED	April 30, 2014
12.2.3 Partitions	REVISED	April 30, 2014
12.2.4 Finishes	REVISED	April 30, 2014
12.2.5 Appliances	REVISED	April 30, 2014
12.2.6 Furnishings	REVISED	April 30, 2014
12.3. System Installations		
12.3.1 Fire Suppression	REVISED	April 30, 2014
12.3.2 Plumbing	REVISED	April 30, 2014
12.3.3 HVAC	REVISED	April 30, 2014
12.3.4 Eletrical	REVISED	April 30, 2014
13. STRUCTURAL CALCULATIONS	REVISED	April 30, 2014

PROJECT DRAWING ITEMS		STATUS	DATE
1. GENERAL			
GE-001	Cover Sheet	REVISED	April 30, 2014
GE-101	Sheet List 1	REVISED	April 30, 2014
GE-102	Sheet List 2	REVISED	April 30, 2014
GE-103	Sheet List 3	REVISED	April 30, 2014
GE-201	General Symbols	REVISED	April 30, 2014
GE-211	General Abbreviations	REVISED	April 30, 2014
GE-301	Urban Project Location	REVISED	April 30, 2014
GE-310	Urban Proposal Explanation 1	REVISED	April 30, 2014
GE-311	Urban Proposal Explanation 2	REVISED	April 30, 2014
GE-320	Existing Building Drawings and Analysis	REVISED	April 30, 2014
GE-330	Competition Dwelling	REVISED	April 30, 2014
GE-401	Pavilion East Side Rendering	REVISED	April 30, 2014
GE-402	Pavilion West Side Rendering	REVISED	April 30, 2014
2. ARCHITECTURAL			
AR-001	La Cité du Soleil® Plan	REVISED	April 30, 2014
AR-002	Site Plan	REVISED	April 30, 2014
AR-011	Solar Envelope	REVISED	April 30, 2014
AR-014	Architecture Footprint	REVISED	April 30, 2014
AR-017	Measurable Area	REVISED	April 30, 2014
AR-021	Ground Level Plan	REVISED	April 30, 2014
AR-022	Mezzanine Level Plan	REVISED	April 30, 2014
AR-031	Roof Level Plan	REVISED	April 30, 2014
AR-041	Reconfigurable Feature 1	REVISED	April 30, 2014
AR-042	Reconfigurable Feature 2	REVISED	April 30, 2014
AR-043	Reconfigurable Feature 3	REVISED	April 30, 2014
AR-044	Reconfigurable Feature 4	REVISED	April 30, 2014
AR-051	Site Entrance and Exit	REVISED	April 30, 2014
AR-101	Site Elevation	REVISED	April 30, 2014
AR-111	East Elevation	REVISED	April 30, 2014
AR-112	North Elevation	REVISED	April 30, 2014
AR-113	South Elevation	REVISED	April 30, 2014
AR-114	West Elevation	REVISED	April 30, 2014
AR-201	Longitudinal Section 1	REVISED	April 30, 2014
AR-202	Longitudinal Section 2	REVISED	April 30, 2014
AR-203	Longitudinal Section 3	REVISED	April 30, 2014
AR-211	Transversal Section 1	REVISED	April 30, 2014
AR-212	Transversal Section 2	REVISED	April 30, 2014
AR-213	Transversal Section 3	REVISED	April 30, 2014
AR-301	Window Schedule and Details 1	REVISED	April 30, 2014
AR-302	Window Schedule and Details 2	REVISED	April 30, 2014
AR-303	Window Schedule and Details 3	REVISED	April 30, 2014
AR-304	Window Schedule and Details 4	REVISED	April 30, 2014
AR-305	Window Schedule and Details 5	REVISED	April 30, 2014
AR-306	Window Schedule and Details 6	REVISED	April 30, 2014

AR-307	Window Schedule and Details 7	REVISED	April 30, 2014
AR-308	Window Schedule and Details 8	REVISED	April 30, 2014
AR-309	Window Schedule and Details 9	REVISED	April 30, 2014
AR-311	Door Schedule and Details 1	REVISED	April 30, 2014
AR-312	Door Schedule and Details 2	REVISED	April 30, 2014
AR-321	Floor Construction Ground Level	REVISED	April 30, 2014
AR-322	Floor Construction Mezzanine Level	REVISED	April 30, 2014
AR-323	Floor Construction Details Ground Level 1	REVISED	April 30, 2014
AR-324	Floor Construction Details Ground Level 2	REVISED	April 30, 2014
AR-325	Floor Construction Details Ground Level 3	REVISED	April 30, 2014
AR-326	Floor Construction Details Ground Level 4	REVISED	April 30, 2014
AR-327	Floor Construction Details Ground Level 5	REVISED	April 30, 2014
AR-328	Floor Construction Details Mezzanine Level 1	REVISED	April 30, 2014
AR-329	Floor Construction Details Mezzanine Level 2	REVISED	April 30, 2014
AR-330	Floor Construction Details Mezzanine Level 3	REVISED	April 30, 2014
AR-331	Floor Construction Details Mezzanine Level 4	REVISED	April 30, 2014
AR-332	Ceiling Construction Details Mezzanine Level 1	REVISED	April 30, 2014
AR-333	Ceiling Construction Details Mezzanine Level 2	REVISED	April 30, 2014
AR-334	Ceiling Construction Details Mezzanine Level 3	REVISED	April 30, 2014
AR-336	Roof Construction Details	REVISED	April 30, 2014
AR-341	Wall Sections and Construction Details 1	REVISED	April 30, 2014
AR-351	Partitions Details	REVISED	April 30, 2014
AR-361	Joints Details 1	REVISED	April 30, 2014
AR-362	Joints Details 2	REVISED	April 30, 2014
AR-363	Joints Details 3	REVISED	April 30, 2014
AR-364	Joints Details 4	REVISED	April 30, 2014
AR-371	Stair Details 1	REVISED	April 30, 2014
AR-372	Stair Details 2	REVISED	April 30, 2014
AR-401	Green Core Details 1	REVISED	April 30, 2014
AR-402	Green Core Details 2	REVISED	April 30, 2014
AR-403	Green Core Details 3	REVISED	April 30, 2014
AR-404	Green Core Details 4	REVISED	April 30, 2014
AR-411	Blue Wall Details	REVISED	April 30, 2014
AR-421	Smart Skin Details	REVISED	April 30, 2014
AR-431	Thermal Wall Details 1	REVISED	April 30, 2014
AR-432	Thermal Wall Details 2	REVISED	April 30, 2014
AR-433	Thermal Wall Details 3	REVISED	April 30, 2014
AR-434	Thermal Wall Details 4	REVISED	April 30, 2014
AR-435	Thermal Wall Details 5	REVISED	April 30, 2014
AR-436	Thermal Wall Details 6	REVISED	April 30, 2014
AR-437	Thermal Wall Details 7	REVISED	April 30, 2014
AR-438	Thermal Wall Details 8	REVISED	April 30, 2014
AR-439	Thermal Wall Details 9	REVISED	April 30, 2014
AR-440	Thermal Wall Details 10	REVISED	April 30, 2014
AR-441	Thermal Wall Details 11	REVISED	April 30, 2014
AR-442	Thermal Wall Details 12	REVISED	April 30, 2014
AR-443	Thermal Wall Details 13	REVISED	April 30, 2014

3. BIOCLIMATIC ANALYSIS (BA)

BA-001	Taipei Climate Analysis	REVISED	April 30, 2014
BA-002	Taipei Shading Analysis	REVISED	April 30, 2014
BA-003	Taipei Wind Rose Analysis	REVISED	April 30, 2014
BA-004	Versailles Climate Analysis	REVISED	April 30, 2014
BA-005	Versailles Shading Analysis	REVISED	April 30, 2014
BA-006	Versailles Wind Rose Analysis	REVISED	April 30, 2014
BA-011	Bioclimatic Strategies	REVISED	April 30, 2014
BA-012	Natural Ventilation	REVISED	April 30, 2014
BA-013	Solar Chemny	REVISED	April 30, 2014
BA-014	Earth/Vegetation cooling	REVISED	April 30, 2014
BA-015	Evaporative Cooling	REVISED	April 30, 2014
BA-016	Direct Solar Heating	REVISED	April 30, 2014
BA-017	Bioclimatic Drawings Heating	REVISED	April 30, 2014
BA-018	Thermal Wall in Versailles	REVISED	April 30, 2014
BA-019	Thermal Wall in Taipei	REVISED	April 30, 2014
BA-020	Heat Exchanger Preheated by Solar Hot Water	REVISED	April 30, 2014
BA-021	Heat Pump	REVISED	April 30, 2014

4. INTERIORS (IN)

IN-001	Ground Level Floor	REVISED	April 30, 2014
IN-002	Mezzanine Level Floor	REVISED	April 30, 2014
IN-101	Reflected Ceiling	REVISED	April 30, 2014
IN-201	Interior Elevation 1	REVISED	April 30, 2014
IN-202	Interior Elevation 2	REVISED	April 30, 2014
IN-203	Interior Elevation 3	REVISED	April 30, 2014
IN-204	Interior Elevation 4	REVISED	April 30, 2014
IN-205	Interior Elevation 5	REVISED	April 30, 2014
IN-211	Interior Elevation 6	REVISED	April 30, 2014
IN-212	Interior Elevation 7	REVISED	April 30, 2014
IN-301	Ground Level Furnishings	REVISED	April 30, 2014
IN-302	Mezzanine Level Furnishings	REVISED	April 30, 2014
IN-401	Kitchen Plan 1	REVISED	April 30, 2014
IN-402	Kitchen Plan 2	REVISED	April 30, 2014
IN-411	Kitchen Elevations	REVISED	April 30, 2014
IN-421	Kitchen Section 1	REVISED	April 30, 2014
IN-422	Kitchen Section 2	REVISED	April 30, 2014
IN-423	Kitchen Section 3	REVISED	April 30, 2014
IN-501	Bathroom Plan	REVISED	April 30, 2014
IN-511	Bathroom Elevations	REVISED	April 30, 2014
IN-601	Interior Rendering Entrance	REVISED	April 30, 2014
IN-602	Interior Rendering Living Room	REVISED	April 30, 2014
IN-603	Interior Rendering 2nd Floor	REVISED	April 30, 2014
IN-604	Interior Rendering View From Terrace	REVISED	April 30, 2014
IN-701	Workstation Plan	REVISED	April 30, 2014
IN-711	Workstation Elevations	REVISED	April 30, 2014
IN-721	Workstation Sections	REVISED	April 30, 2014

5. STRUCTURAL (ST)

ST-001	Foundation Plan and Details	REVISED	April 30, 2014
ST-002	Structural Floor Unit	REVISED	April 30, 2014
ST-011	Structural Ground Level Plan	REVISED	April 30, 2014

ST-012	Structural Mezzanine Level Plan	REVISED	April 30, 2014
ST-013	Structural Elements Marking Ground Level Plan	REVISED	April 30, 2014
ST-014	Structural Elements Marking Mezzanine Level Plan	REVISED	April 30, 2014
ST-021	Structural Roof Plan	REVISED	April 30, 2014
ST-022	Structural Roof Units	REVISED	April 30, 2014
ST-023	Structural Elements Marking Roof Plan	REVISED	April 30, 2014
ST-101	Structural Longitudinal Sections Frame 1	REVISED	April 30, 2014
ST-102	Structural Longitudinal Sections Frame 2	REVISED	April 30, 2014
ST-103	Structural Longitudinal Sections Frame 3	REVISED	April 30, 2014
ST-104	Structural Longitudinal Sections Frame 4	REVISED	April 30, 2014
ST-111	Structural Transversal Sections Frame A	REVISED	April 30, 2014
ST-112	Structural Transversal Sections Frame A-3	REVISED	April 30, 2014
ST-113	Structural Transversal Sections Frame A-4	REVISED	April 30, 2014
ST-114	Structural Transversal Sections Frame B	REVISED	April 30, 2014
ST-115	Structural Transversal Sections Frame B-1	REVISED	April 30, 2014
ST-116	Structural Transversal Sections Frame C	REVISED	April 30, 2014
ST-117	Structural Transversal Sections Frame C-1	REVISED	April 30, 2014
ST-118	Structural Transversal Sections Frame D	REVISED	April 30, 2014
ST-201	Structural Blow ups	REVISED	April 30, 2014
ST-301	Structural Details	REVISED	April 30, 2014
ST-302	Structural Details Axon	REVISED	April 30, 2014
ST-401	Structural Axon	REVISED	April 30, 2014

6. FIRE PROTECTION (FP)

FP-001	Fire Protection Details	REVISED	April 30, 2014
FP-002	Fire Protection : Ground Level	REVISED	April 30, 2014
FP-003	Fire Protection : Mezzanine Level	REVISED	April 30, 2014
FP-004	Fire Protection Evacuation Path : Ground Level	REVISED	April 30, 2014
FP-005	Fire Protection Evacuation Path : Mezzanine Level	REVISED	April 30, 2014

7. PLUMBING (PL)

PL-001	Plumbing Supply and Removal Ground Level Plan.	REVISED	April 30, 2014
PL-002	Plumbing Supply and Removal Ground Mezzanine Plan.	REVISED	April 30, 2014
PL-011	Gray Water Ground Level	REVISED	April 30, 2014
PL-012	Gray Water Mezzanine Level	REVISED	April 30, 2014
PL-021	Drain / Waste / Vent	REVISED	April 30, 2014
PL-031	Containers and Fill Locations	REVISED	April 30, 2014
PL-101	Schematic diagram in Taiwan	REVISED	April 30, 2014
PL-102	Schematic diagram in Competition	REVISED	April 30, 2014
PL-201	Supply and removal Clean Water Isometric	REVISED	April 30, 2014
PL-202	Supply and removal Hot Water Isometric	REVISED	April 30, 2014
PL-211	Grey water Isometric	REVISED	April 30, 2014
PL-221	Drain/Waste/Vent Isometric	REVISED	April 30, 2014
PL-301	Green Core Irrigation Plan	REVISED	April 30, 2014
PL-302	Green Core Irrigation Elevation 1	REVISED	April 30, 2014
PL-303	Green Core Irrigation Elevation 2	REVISED	April 30, 2014

8. SOLAR WATER HEATING (SW)

SW-001	Solar Water Plan	REVISED	April 30, 2014
SW-101	Solar Water Isometric	REVISED	April 30, 2014
SW-201	Solar Water Schematic	REVISED	April 30, 2014

9. MECHANICAL (ME)

ME-001	HVAC Distribution Plan Ground Level	REVISED	April 30, 2014
ME-002	HVAC Distribution Plan Mezzanine Level	REVISED	April 30, 2014
ME-011	HVAC equipment 1	REVISED	April 30, 2014
ME-012	HVAC equipment 2	REVISED	April 30, 2014
ME-021	Heating	REVISED	April 30, 2014
ME-031	Cooling	REVISED	April 30, 2014
ME-041	Ventilation 1	REVISED	April 30, 2014
ME-042	Ventilation 2	REVISED	April 30, 2014
ME-101	Mechanical room elevations	REVISED	April 30, 2014
ME-201	HVAC System Schematic drawings	REVISED	April 30, 2014
ME-211	Heating mode Schematic drawings 1	REVISED	April 30, 2014
ME-212	Heating mode Schematic drawings 2	REVISED	April 30, 2014
ME-221	Cooling mode Schematic drawings 1	REVISED	April 30, 2014
ME-222	Cooling mode Schematic drawings 2	REVISED	April 30, 2014
ME-231	Controls 1	REVISED	April 30, 2014
ME-232	Controls 2	REVISED	April 30, 2014
ME-301	Isometric Distribution 1	REVISED	April 30, 2014
ME-302	Isometric Distribution 2	REVISED	April 30, 2014

10. ELECTRICAL (EL)

EL-001	Grid interconnection	REVISED	April 30, 2014
EL-201	DC wiring diagram	REVISED	April 30, 2014
EL-301	Power Plan Ground Level	REVISED	April 30, 2014
EL-302	Power Plan Mezzanine Level	REVISED	April 30, 2014
EL-401	Lighting Plan Site	REVISED	April 30, 2014
EL-402	Lighting Plan Ground Level	REVISED	April 30, 2014
EL-403	Lighting Plan Mezzanine Level	REVISED	April 30, 2014
EL-501	One-line Diagram 1	REVISED	April 30, 2014
EL-502	One-line Diagram 2	REVISED	April 30, 2014
EL-503	One-line Diagram 3	REVISED	April 30, 2014
EL-601	AC Circuit layout	REVISED	April 30, 2014
EL-602	AC Circuit layout	REVISED	April 30, 2014
EL-603	AC Circuit layout	REVISED	April 30, 2014

11. PHOTOVOLTAIC SYSTEM (PV)

PV-001	Photovoltaic System: General 1	REVISED	April 30, 2014
PV-002	Photovoltaic System: General 2	REVISED	April 30, 2014
PV-003	Photovoltaic System: General 3	REVISED	April 30, 2014
PV-011	Photovoltaic System: DC circuits	REVISED	April 30, 2014
PV-021	Photovoltaic System: AC citcuits	REVISED	April 30, 2014
PV-031	Photovoltaic System: grounding system	REVISED	April 30, 2014
PV-041	Photovoltaic System: Module Layout	REVISED	April 30, 2014
PV-042	Photovoltaic System: Module String Layout	REVISED	April 30, 2014

12. TELECOMMUNICATIONS AND BUILDING AUTOMATIZATION SYSTEM (BAS)

BAS-001	Wiring Plan Ground Level	REVISED	April 30, 2014
BAS-002	Wiring Plan Mezzanine Level	REVISED	April 30, 2014
BAS-101	Schematic diagram 1	REVISED	April 30, 2014
BAS-102	Schematic diagram 2	REVISED	April 30, 2014
BAS-201	Equipment 1	REVISED	April 30, 2014
BAS-202	Equipment 2	REVISED	April 30, 2014

13. SDE INSTRUMENTATION DRAWINGS (ID)

ID-001	General Monitoring Ground Level	REVISED	April 30, 2014
ID-002	General Monitoring Mezzanine Level	REVISED	April 30, 2014
ID-003	Electricity Meter Connection	REVISED	April 30, 2014
ID-011	Monitoring Panel Room	REVISED	April 30, 2014
ID-021	Electricity Meters Topology	REVISED	April 30, 2014
ID-031	Electricity Meters Connection	REVISED	April 30, 2014
ID-041	House Appliances Ground Level	REVISED	April 30, 2014
ID-042	House Appliances Mezzanine Level	REVISED	April 30, 2014

14. SITE OPERATION (SO)

SO-001	Trucks shipment 1	REVISED	April 30, 2014
SO-011	Trucks Shipment During Assembly Phase 1	REVISED	April 30, 2014
SO-012	Trucks Shipment During Assembly Phase 2	REVISED	April 30, 2014
SO-013	Trucks Shipment During Assembly Phase 3	REVISED	April 30, 2014
SO-014	Trucks Shipment During Assembly Phase 4	REVISED	April 30, 2014
SO-015	Trucks Shipment During Assembly Phase 5	REVISED	April 30, 2014
SO-021	Trucks Shipment During Disassembly Phase 1	REVISED	April 30, 2014
SO-022	Trucks Shipment During Disassembly Phase 2	REVISED	April 30, 2014
SO-023	Trucks Shipment During Disassembly Phase 3	REVISED	April 30, 2014
SO-024	Trucks Shipment During Disassembly Phase 4	REVISED	April 30, 2014
SO-025	Trucks Shipment During Disassembly Phase 5	REVISED	April 30, 2014
SO-101	La Cité du Soleil® Plan	REVISED	April 30, 2014
SO-102	Assembly Lot Plan	REVISED	April 30, 2014
SO-103	Disassembly Lot Plan	REVISED	April 30, 2014
SO-201	Assembly Phase 1	REVISED	April 30, 2014
SO-202	Assembly Phase 2	REVISED	April 30, 2014
SO-203	Assembly Phase 3	REVISED	April 30, 2014
SO-204	Assembly Phase 4	REVISED	April 30, 2014
SO-205	Assembly Phase 5	REVISED	April 30, 2014
SO-206	Assembly Phase 6	REVISED	April 30, 2014
SO-207	Assembly Phase 7	REVISED	April 30, 2014
SO-208	Assembly Phase 8	REVISED	April 30, 2014
SO-209	Assembly Phase 9	REVISED	April 30, 2014
SO-210	Assembly Phase 10	REVISED	April 30, 2014
SO-301	Disassembly Phase 1	REVISED	April 30, 2014
SO-302	Disassembly Phase 2	REVISED	April 30, 2014
SO-303	Disassembly Phase 3	REVISED	April 30, 2014
SO-304	Disassembly Phase 4	REVISED	April 30, 2014
SO-305	Disassembly Phase 5	REVISED	April 30, 2014
SO-306	Disassembly Phase 6	REVISED	April 30, 2014
SO-307	Disassembly Phase 7	REVISED	April 30, 2014
SO-308	Disassembly Phase 8	REVISED	April 30, 2014
SO-309	Disassembly Phase 9	REVISED	April 30, 2014
SO-310	Disassembly Phase 10	REVISED	April 30, 2014

15. HEALTH AND SAFETY (HS)

HS-001	Health and Safety in the lot and surroundings 1	REVISED	April 30, 2014
HS-002	Health and Safety in the lot and surroundings 2	REVISED	April 30, 2014
HS-101	Health and Safety during the Outside Logistic	REVISED	April 30, 2014
HS-201	Health and Safety during the Inside Logistic	REVISED	April 30, 2014
HS-301	Health and Safety during load / unload	REVISED	April 30, 2014

HS-302	Health and Safety Signposting		
HS-303	Health and safety PPE	REVISED	April 30, 2014
HS-401	Health and Safety during Assembly Phase 1	REVISED	April 30, 2014
HS-402	Health and Safety during Assembly Phase 2	REVISED	April 30, 2014
HS-403	Health and Safety during Assembly Phase 3	REVISED	April 30, 2014
HS-404	Health and Safety during Assembly Phase 4	REVISED	April 30, 2014
HS-405	Health and Safety during Assembly Phase 5	REVISED	April 30, 2014
HS-406	Health and Safety during Assembly Phase 6	REVISED	April 30, 2014
HS-407	Health and Safety during Assembly Phase 7	REVISED	April 30, 2014
HS-408	Health and Safety during Assembly Phase 8	REVISED	April 30, 2014
HS-409	Health and Safety during Assembly Phase 9	REVISED	April 30, 2014
HS-410	Health and Safety during Assembly Phase 10	REVISED	April 30, 2014
HS-501	Health and Safety during Maintenance	REVISED	April 30, 2014
HS-601	Health and Safety during Disassembly Phase 1	REVISED	April 30, 2014
HS-602	Health and Safety during Disassembly Phase 2	REVISED	April 30, 2014
HS-603	Health and Safety during Disassembly Phase 3	REVISED	April 30, 2014
HS-604	Health and Safety during Disassembly Phase 4	REVISED	April 30, 2014
HS-605	Health and Safety during Disassembly Phase 5	REVISED	April 30, 2014
HS-606	Health and Safety during Disassembly Phase 6	REVISED	April 30, 2014
HS-607	Health and Safety during Disassembly Phase 7	REVISED	April 30, 2014
HS-608	Health and Safety during Disassembly Phase 8	REVISED	April 30, 2014
HS-609	Health and Safety during Disassembly Phase 9	REVISED	April 30, 2014
HS-610	Health and Safety during Disassembly Phase 10	REVISED	April 30, 2014

16. PUBLIC TOUR (PT)

PT-001	Site accessibility Plan	REVISED	April 30, 2014
PT-002	Site accessibility Elevation	REVISED	April 30, 2014
PT-101	House Tour Plan	REVISED	April 30, 2014
PT-201	House Tour General Information	REVISED	April 30, 2014

3

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Rules and Building Code Compliance Checklist

Table 9: SDE Rules checklist.

Rule Description	Content Requirement(s)	Drawing(s)/ Report(s)
3.2 Team Officers and Contact Information	Team officer's contact information completely fulfilled in Table 1 (SDE WAT)	PR: Page 55
4.3 Lot Conditions and attribution	Drawing(s) showing the storage and unloading areas and corresponding load's calculations	PD: SO-102, 103
4.3 Lot Conditions	Calculations showing the structural design remains compliant even if there is a level difference, and drawing(s) showing shimming methods and materials to be used in case	PM: Page 842
4.4 Footings	Drawing(s) showing the locations and depths of all ground penetrations on the competition site	PD: ST-001
4.4 Footings	Drawing(s) showing the location, contact area and soil-bearing pressure of every component resting directly on the ground	PD: ST-001 PM: Page 842
4.7 Construction Equipment	Drawing(s) showing the assembly and disassembly sequences and the movement of heavy machinery on the competition site and specifications for heavy machinery	PD: ST-201 - 210 PM: Page 524
5.1 Solar Envelope Dimensions	Drawing(s) showing the location of all house and site components relative to the solar envelope	PD: AR-011
6.1 Structural Design Approval	Structural drawings and calculations signed and stamped by a qualified licensed professional	PM: Page 842
6.1 Electrical and Photovoltaic Design Approval	Electrical and Photovoltaic drawings and calculations signed and stamped by a qualified licensed professional	See attached PDF
6.1 Codes Design Compliance	List of the country of origin codes complied, properly signed by the faculty advisor	PM: Page 23
6.2 Architectural Footprint	Drawing(s) showing all information needed by the Rules Officials to digitally measure the architectural footprint	PD: AR-014
6.2 Architectural Footprint	Drawing(s) showing all the reconfigurable features that may increase the footprint if operated during contest week	PD: AR-041, AR-042 AR-043, AR-044
6.3 Measurable Area	Drawing(s) showing the Measurable Area	PD: AR-017
6.4 Entrance and Exit Routes	Drawing(s) showing the accessible public tour route, specifying the entrance and exit from the house to the main street of La Cité du Soleil®	PD: ST-101
7.3 PV Technology Limitations	Specifications and contractor price quote for photovoltaic components	PM: Page 689
7.4 Batteries	Drawing(s) showing the location(s) and quantity of stand-alone, PV-powered devices and corresponding specifications	N/A
7.4 Batteries	Drawing(s) showing the location(s) and quantity of hard-wired battery banks components and corresponding specifications	PD: AR-051 PM: Page 693
7.6 Thermal Energy Storage	Drawing(s) showing the location of thermal energy storage components and corresponding specifications	PD: ME-001 PM: Page 668
7.7 Desiccant Systems	Drawing(s) describing the operation of the desiccant system and corresponding specifications	N/A
7.8 Humidification systems	Specifications for humidification systems and corresponding certifications of the different elements.	N/A
8.1 Containers locations	Drawing(s) showing the location of all the water tanks	PD: PL-001
8.2 Water Delivery	Drawing(s) showing the fill location(s), quantity of water requested at each fill location, tank dimensions, diameter of opening(s) and clearance above the tank(s)	PD: PL-001
8.3 Water Removal	Drawing(s) showing the quantity of water to be removed from each fill location, tank dimensions, diameter of opening(s) and clearance above the tank(s).	PD: PL-001

8.5 Grey water reuse	Specifications for grey water reuse systems	PM: Page 661
8.6 Rainwater Collection	Drawing(s) showing the layout and operation of rainwater collection systems	PM: PL-001
8.8 Thermal Mass	Drawing(s) showing the locations of water-based thermal mass systems and corresponding specifications	PD: AR-051, AR-114 PM: Page 645
8.9 Grey Water Heat Recovery	Specifications for grey water heat recovery systems.	PM: Page 661
9.1 Placement	Drawing(s) showing the location of all vegetation and, if applicable, the movement of vegetation designed as part of an integrated mobile system	PD: AR-002
9.2 Watering Restrictions	Drawings showing the layout and operation of greywater irrigation systems	PD: PL-001
10.2 SDE Sensors' Location and wire routing	Drawing(s) showing the location of bi-directional meters, metering box, sensors, cables and feed-through to pass the instrumentation wires from the interior to the exterior of the house	PD: ID-001, ID-002
11.2 Use of the Solar Decathlon Europe Logo	artwork, and content of all communications materials, including signage	PM: Page 435
11.3 Teams' sponsors & Supporting Institutions	Drawing(s) showing the dimensions, materials, artwork, and content of all communications materials, including signage	PM: Page 435
11.4 Team Uniforms	Drawing(s) showing the artwork, content and design of the team uniform	PM: Page 435
12.4 Public Tour	Drawing(s) showing the public tour route, indicating the dimensions of any difficult point, complying with the accessibility requirements	PD: PT-001 PM: Page 413
20.0 Contest 6: Drying Method	Drawing(s) showing the clothes drying method and the place where the clothes will be dried.	PD: AR-022
20.0 Contest 6: House Functioning	Appliances and corresponding technical specifications.	PD: IN-401 PM: 713 ~
36.5 Photovoltaic systems design	Specifications of PV generators, inverters, wiring, cables, protections, earthing systems, interface with the electricity distribution network	PD: PV-001,PV-002 PV-011,PV-021 PM: Page 689 - 705
36.5 Photovoltaic systems design	Inverters' certificates	PM: Page 691
36.5 Photovoltaic systems design	Maintenance plan for PV generators, supporting structure, inverters, wiring, cables, protections, circuit breakers in case of fire and earthing system. Fire protection systems for PV DC wiring	See attached checklist
36.5 Photovoltaic systems design	The corresponding table "design summary" must be filled out	See attached checklist
51.3 Fire Safety	Specifications for Fire Reaction of Constructive elements, extinguishers and fire resistance of the house's structure.	PM: Page 709
51.3 Fire Safety	Drawings showing compliance with the evacuation of occupants' requirements and fire extinguishers location	PD: FP-001,FP-002
51.4 Safety against falls	Specifications of compliance with the slipperiness degree classes of floors included in House tour	PM: Page 711
51.4 Safety against falls	Drawing(s) showing compliance with conditions	PD: AR-101
	for uneven flooring, floors with different level, Restricted Areas stairs, Public Areas Staircases, Restricted Areas Ramps and Public Areas Ramps	PD: AR-101, AR-361 PT-001, PT-002
51.4 Safety for avoiding trapping and impact risk	Drawing(s) showing compliance with conditions for avoiding trapping and impact risk	PD: AR-307
51.4 Safety against the risk of inadequate lighting	Specifications for level of illumination of house tour areas light fittings	PD: EL-401
51.5 Accessibility for People with Disabilities and Special Needs	Interior and exterior plans showing the entire accessible tour route	PD: PT-001
51.6 Structural Safety	Specifications for the use of dead loads, live loads, safety factors and load combinations in the structural calculations	PM: Page 842

51.7 Electrical and PV Systems	Complete the “Electrical System Design PV Chart and Checklist” Rule 48.	See attached Checklist
51.7 Electrical and PV Systems	Specifications of the wiring, channels, panels and protections of the electrical installation	See attached Checklist
51.7 Electrical and PV Systems	One-line electrical diagram and drawings showing the grounding, execution and paths	PD: EL-501, EL-502 EL-503

國立交通大學
National Chiao Tung University

NCTUNICODE

Certificate of Compliance

I certify that the Orchid House project complies Taiwanese Building Code issued by Taiwan Construction and Planning Agency Ministry of the Interior (CPAMI)

Signed by: Benjamin Tang

Printed Name: Benjamin Tang

Title: Faculty Advisor

Date: 2014.03.03

DELTA

Declaration

We, Delta Electronics, Inc., hereby recognize the Photovoltaic Power System designed for NCTU Unicode Team at Solar Decathlon Europe, Jun. 2014, will comply with the following event regulations or requirements:

- Photovoltaic module meets the standard of IEC 61215
- Capacity of installed photovoltaic power system is 5kWp
- Capacity of battery bank is 6KWh
- Nominal capacity of battery bank inverter is limited to 5000VA

5

Contest Support Documents

5.1 Urban Design, Transportation and Affordability Report

Synopsis

Local Context: Taipei City

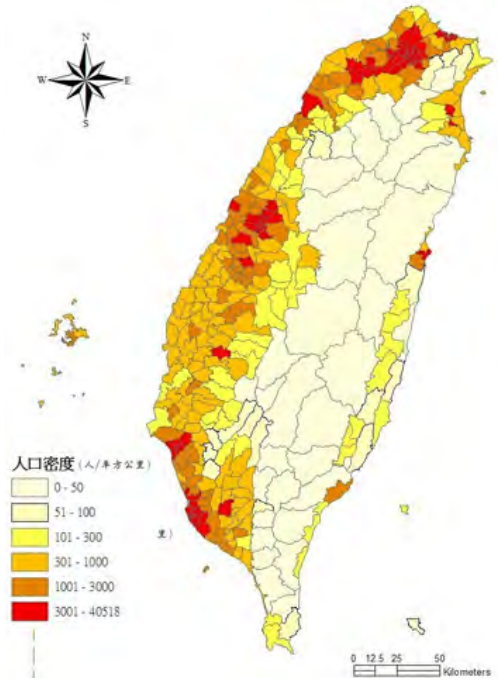
Taipei City Skyline - Urban Context

Taipei Rooftop

Taiwan is a country spanning only 36,193 km2 but with a population of 23.34 million (compare with France's 674,834 km2 and 65.7 million people). The population density is especially high because two-thirds of the island is composed of mountains, and as a result most people live along the coastal areas. It is especially crowded in urban areas, such as the capitol city, Taipei, which is one of the top ten densest cities in the world. In addition to the high population density, Taipei also developed rapidly over the years, both of which contribute to a random assortment of architecture in the city that expands horizontally instead of vertically to conserve space.

However, also as a result of the rapid development, many of the residential buildings were not built to last and have infrastructure that is now rundown or outdated. In recent years, new residential buildings are sky scraper apartments, which are usually only affordable by the wealthy upper class because of the luxury design and locations in the city center.

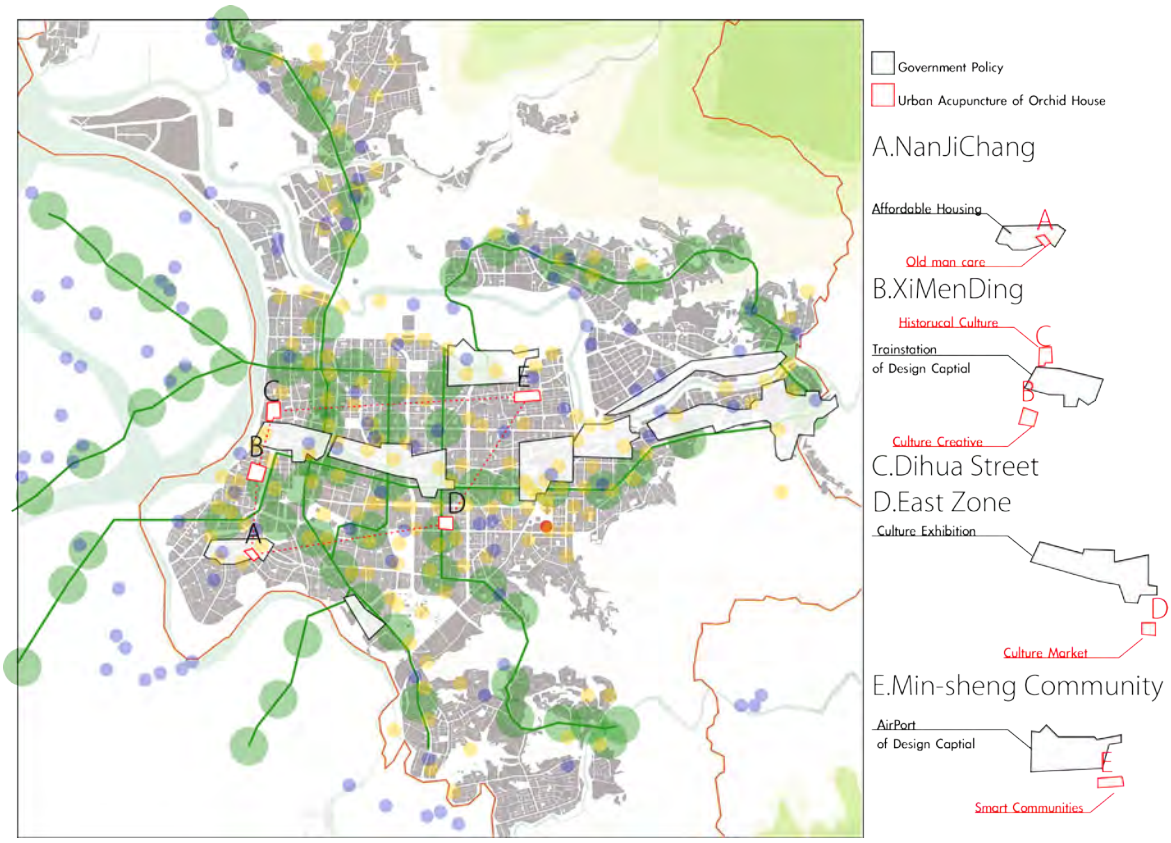
Taipei Urban Crisis



Population Density In Taiwan

This population growth results in the lack of living space and sufficient public amenity, and cause middle classes moving toward the periphery, even outside of city. The majority of these people are young professionals who just graduated from collage whom have worked a few years, and they are not able to afford a house yet. However, most of them works in the city center and commute, and caused major traffic congestions with millions of cars and motorcycle. Consequently, the city is left with a high carbon dioxide pollution, and the decrease living quality.

Taipei Urban Acupuncture

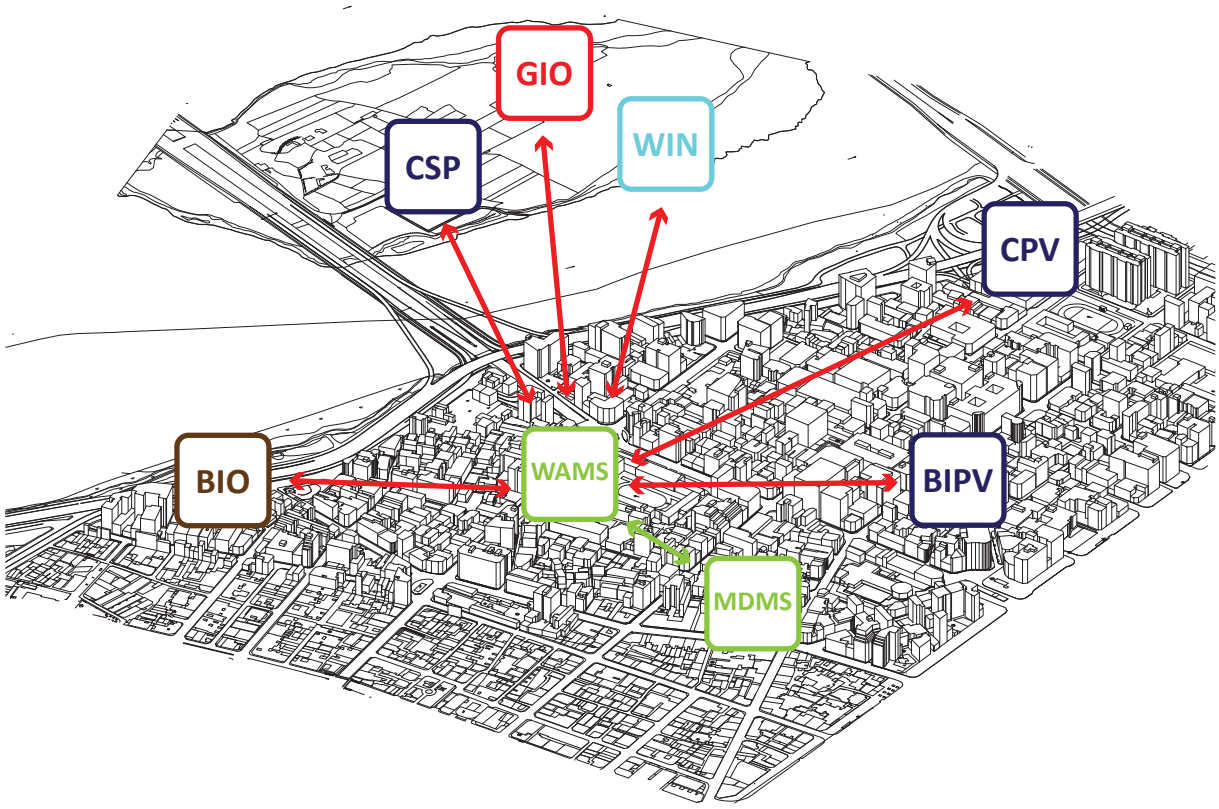


Ximending District

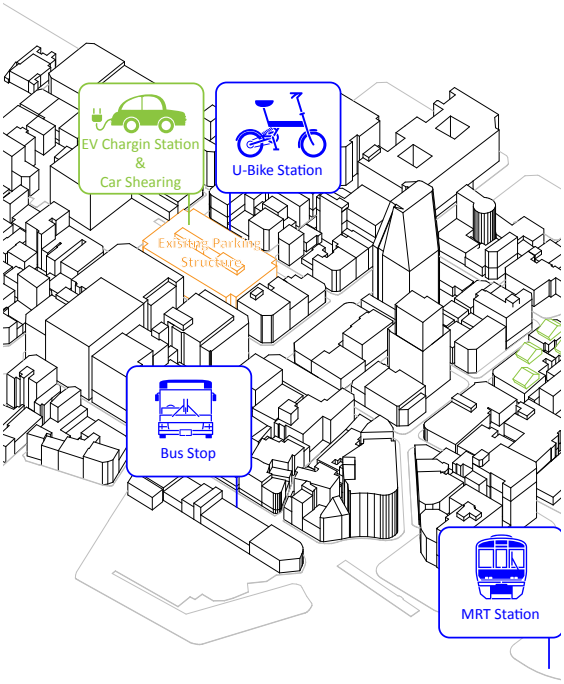
Taipei city population reached its 20-year peak and residential building has been constructed in various types. The majorities are a duplex apartment, which is relatively wide and 4 to 5 story building, and a row house that is extremely narrow and deep single family owned. These two types were constructed during the modern democracy period. Most of flat-roof duplex apartment and row house are facing problems: leakage, heat absorption and no public facilities. Therefore, the illegal make-shift metal roofed shelters have been introduced widely in most of the residential buildings and create unregulated cityscape of Taipei.

For Orchid House urban design strategy, NCTU UNICODE focus districts where the most of duplex apartment and row house are located as the most needed area for urban regeneration to vitalize not only the residential building, but also these districts.

Zero Energy District



Ximending Smart Grid Concept



EV Charging Station

As main focal point of Ximending Zero Energy District plan, NCTU UNICODE proposes not only PV panel implementation to buildings, but also larger scale of renewable energy sources such as CSP (Concentrated Solar Power), Biomass, Wind power and Geothermal. In order for all renewable energy sources to be distributed efficiently, advanced applications of Wide-area-Measurement System (WAMS) is installed one of larger footprint building rooftops, and Data Centre (MDMS) serve all the energy with automation system. Furthermore, AMI (Advanced Metering Infrastructure) is installed to Orchid House Clusters to manage power supply within houses. Please refer Architecture Design Narrative for farther details of AMI integration to housing appliances.

Orchid House Urban Concept

Orchid Cluster in Taipei Urban Context

Orchid Cluster Section

Orchid House extension on existing building in Taipei city plays not only critical role for Ximending zero energy district urban planning, but also to apply new concept of urban regeneration. Almost 50% of residential building in Taipei city are over 30 years old and typically demolished during the renewal planning. However, NCTU UNICODE points out the problem of city re-development organized by government and executed by private developers. The developer tends to acquire larger number of properties to combine the land FAR (Floor Area Ratio) to build up high-rise residential condominium, which is not affordable for average income level and treated as investment target by investors.

Orchid House will proved unique opportunity for not only the building owner, but also the targeted tenants, who needs housing support to pursue their young profession to promote new creative industry in Taipei.

Orchid House Prototype

Orchid House at La Cite du Soleil, Versailles, France

The Orchid House is as much a physical dwelling structure as a mindset for living. NCTU UNICODE hopes to use the Orchid House to revive Taiwan by focusing on urban centres. Urban areas in Taiwan, particularly the capitol city, Taipei, have high population densities and a random assortment of architecture – many buildings are old with rundown facilities. Furthermore, as in all urban cities but even more so because of the particularly high population density, commuter traffic causes extreme congestion, uses a lot of energy, and creates large amounts of pollution. Reviving the city would include not only renovating buildings and improving the residents' quality of life, but also promoting creativity and sustainability.

5.1.1 Urban Design Strategies

Taipei Urban Crisis

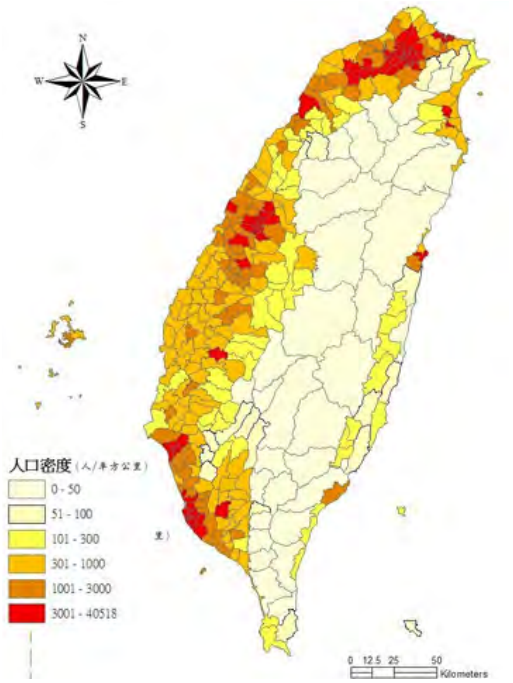
Taipei City General Condition

Settled in Qing Dynasty in 1709, Taipei city started as a trade port and economic centre (the Old Taipei) in Northern Taiwan and stretch outward till what it looks like today as a metropolitan. Area of the City proper is 271.7 sq. km., in which 47.8% is urban areas and 52.2% is non-urban areas. Taipei's rich, drastic natural environment is full of wind, water, mountains, and forests.

Population of Taipei city is 2.68 million with average density of 9,890 populations per sq. km. In urban area, it is 18,000 populations per sq. km. Population would reach 7.01 million when counting the whole metropolitan area including New Taipei City and Keelung. Due to differences in geographic location, economic development of its districts, Taipei's population is not evenly distributed. In 2010, the aging index of Taipei has reached 94.1%.

Four main themes of urban development, based on the 2010-11 Annual Report, Dept. of Urban Development, Taipei City Government:

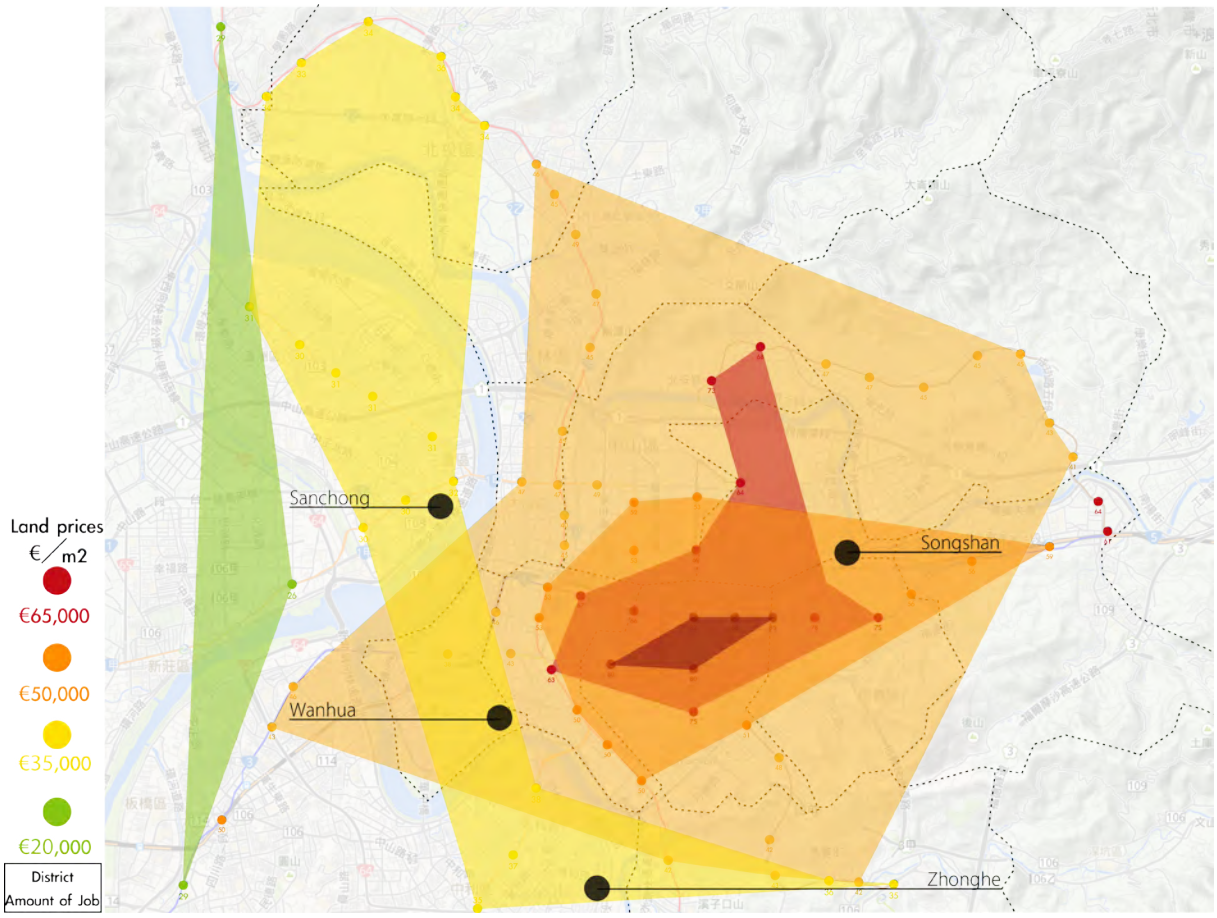
Achieving Sustainable Urban Development: eco-friendly development, low-carbon, energy-saving policies, and encouraging green industry.
Building a Beautiful Waterfront City: increase water-accessibility by newly developed facilities and parks along the riverbanks and water edges.
Urban Renewal to Attract Industry: designating renewal zones, shifting capacity, and reviewing zoning ordinances to attract vendors and industries. As well as establishing Urban Regeneration Stations (URS), which turn idle spaces into vessels for people to create, to learn and to share with others.
Innovative and Efficient Execution: conduct urban development innovatively and efficiently, instead of relying on policy arguing and facing complains from citizens.



Population Density In Taiwan

Population Growth

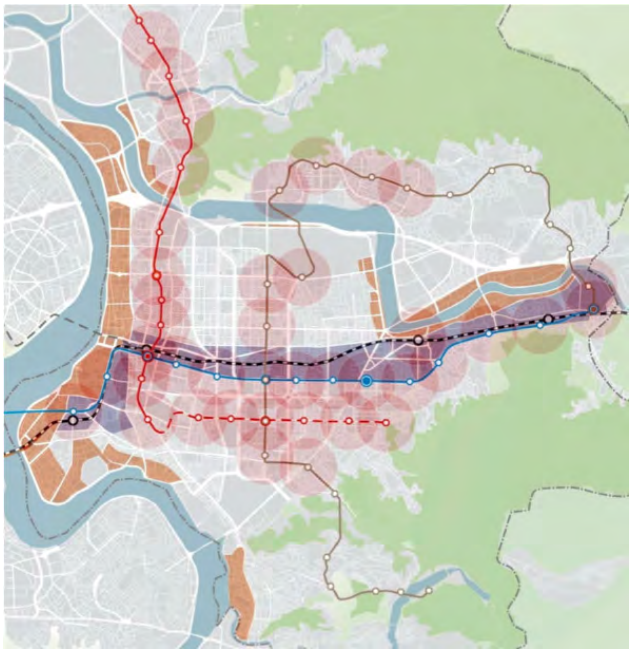
This population growth results in the lack of living space and sufficient public amenity, and cause middle classes moving toward the periphery, even outside of city. The majority of these people are young professionals who just graduated from collage whom have worked a few years, and they are not able to afford a house yet. However, most of them works in the city center and commute, and caused major traffic congestions with millions of cars and motorcycle. Consequently, the city is left with a high carbon dioxide pollution, and the decrease living quality.



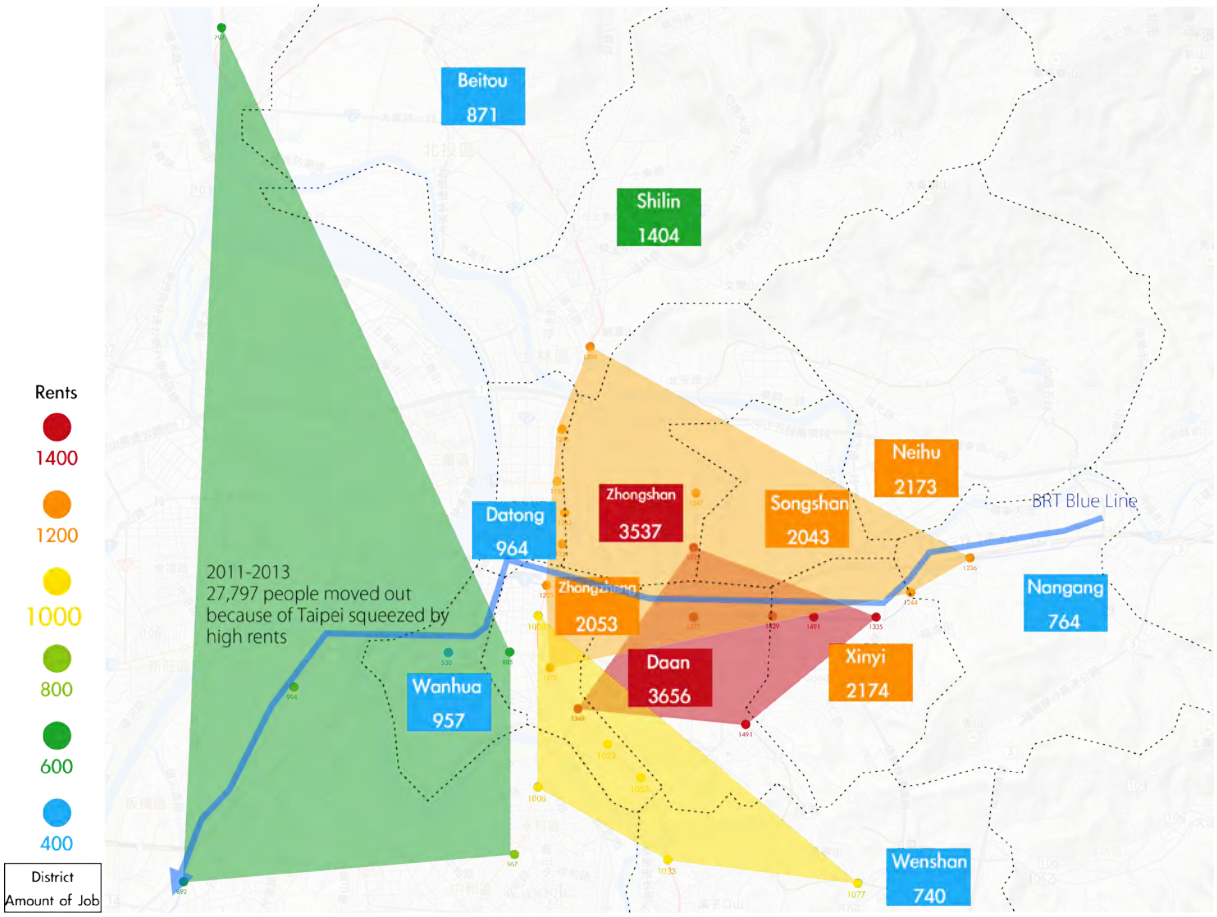
Landprice Mapping of Taipei City

Network of commuting

When examining the statistics for different cities, the study was conducted by the Ministry of Transportation and Communications have found that a car commuter in Taipei City spends an average of NT$13,777 per month, and it can be reduced to NT$1,973 per month if taking public transport. Despite the potential savings, the study found that more than 60 percent of commuters in Taipei would not consider switching from motor vehicles to public transport systems, because many counties and cities have yet to develop a mature public transport network system.



Commutable area by Public Transportation

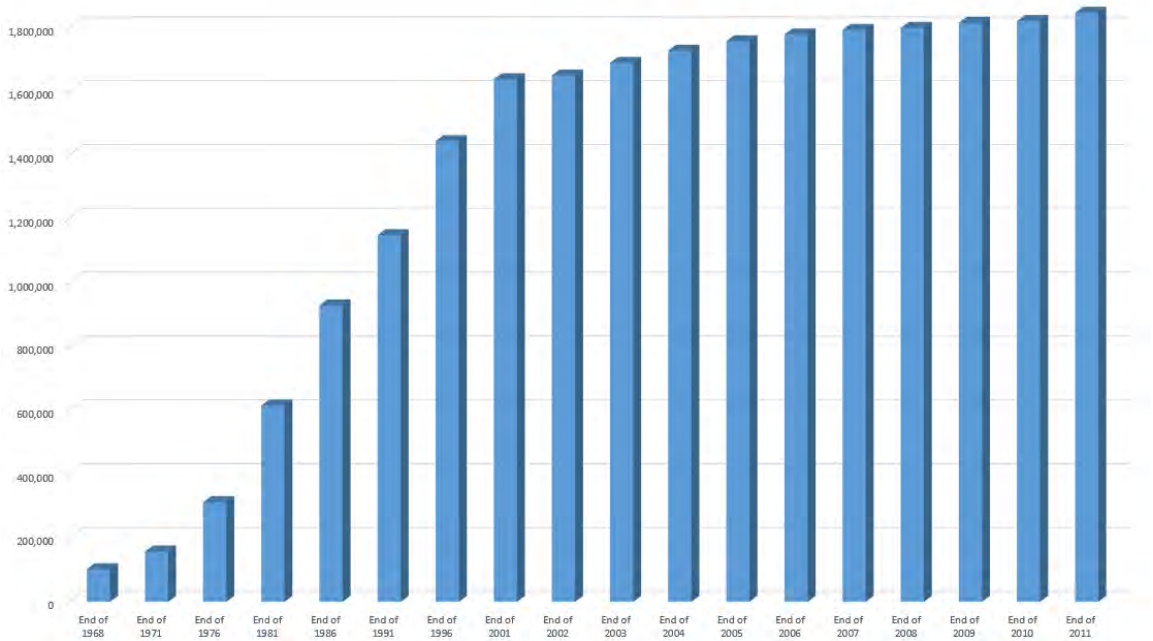


Population Shift Mapping of Taipei City

Uncontrollable Traffic condition

Based on the research by Environmental Protection Administration (EPA), Taiwan is ranked 17th the world and ninth in Asia in terms of its carbon footprint. Each person in Taiwan, on average, produce 10.89 tons of carbon emissions a year, which is more than its Japan and South Korea, and daily per capita carbon footprint of 19.6 kg, almost four times the UN recommendation in 2011.

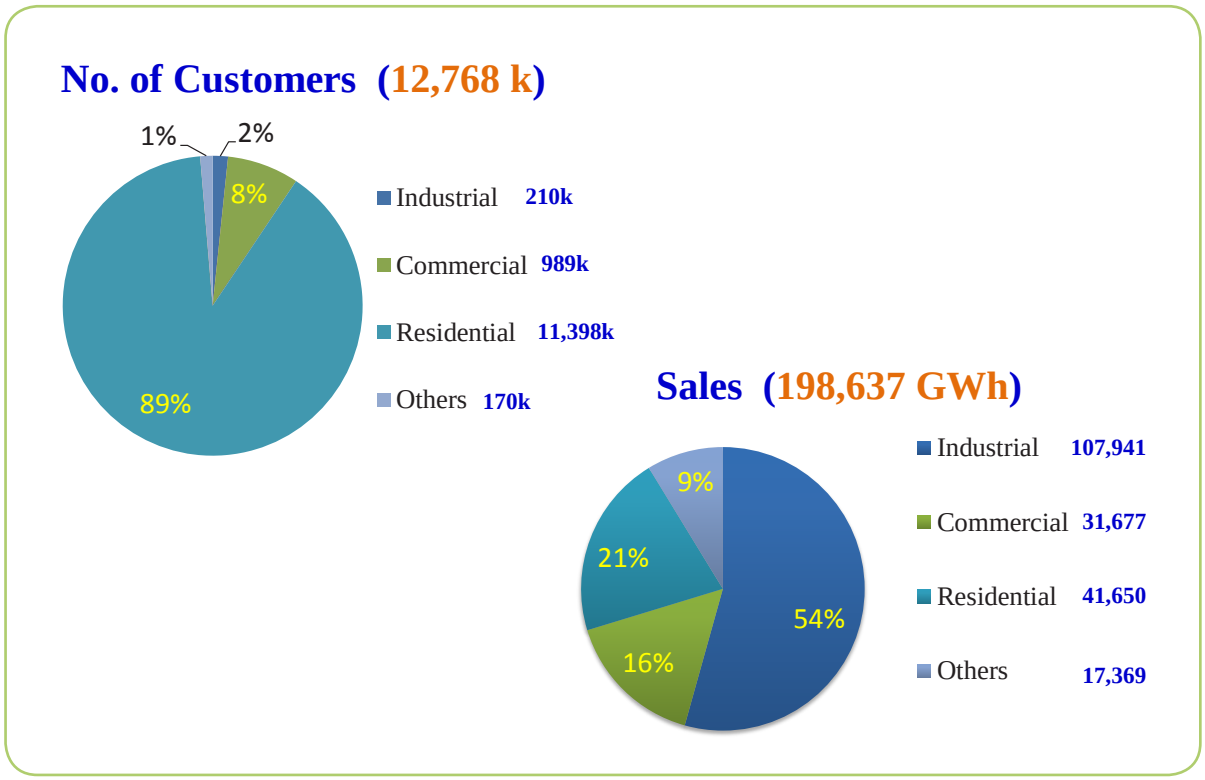
Even though the highest carbon footprint sector is industrial, Taiwanese transport sector contributes its carbon emission by 14% of all. Among this transport sector, the road vehicles including motorcycles, passenger cars and trucks account for approximately 94% of all transport-related carbon dioxide emissions. Vehicle ownership in Taipei shows extremely high growth rate from 1980 to 2000 by 430% for cars and 173% for motorcycles due to the relatively poor level of service of the bus system. These high number of vehicle bring environmental pollution as well as traffic congestion. The average speed of private cars in Taipei city is about 20 kilo meters per hour in peak periods while that of buses is about 10 kilo meter per hour. Taipei city needs new transportation system, which contribute less carbon emission and street congestion.



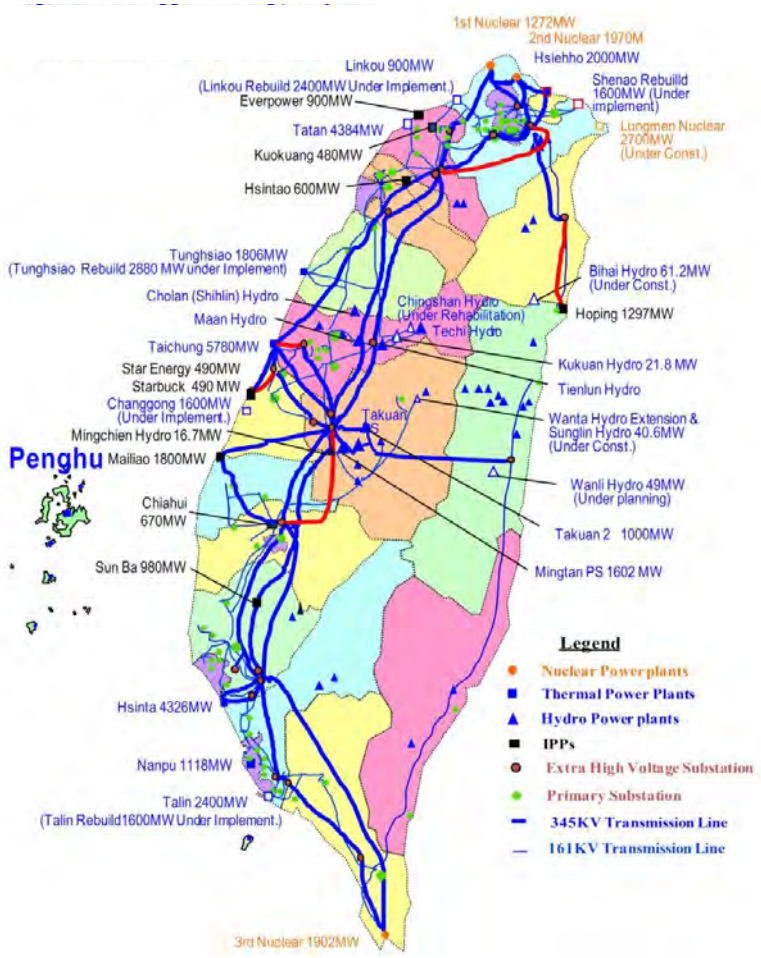
Number of Vechicles in Taipei City
Source: Taipei City Motor Office

Energy Crisis

Taiwan's energy supply is monopoly relying on Taiwan Power system, which is 41,400 MW installed capacity in year 2011. However, the limited natural resources for energy generation, Taiwan relies on 99% of imported resources. Also Taiwan Power has developed isolated system which not yet been connected to other power systems. Recently Taiwan Power has been falling to reflect the costs under government's energy policy.



Taiwan Power System Map
Source: Development of Smart Grid in Taiwan, Frank, Faa-Jeng Lin

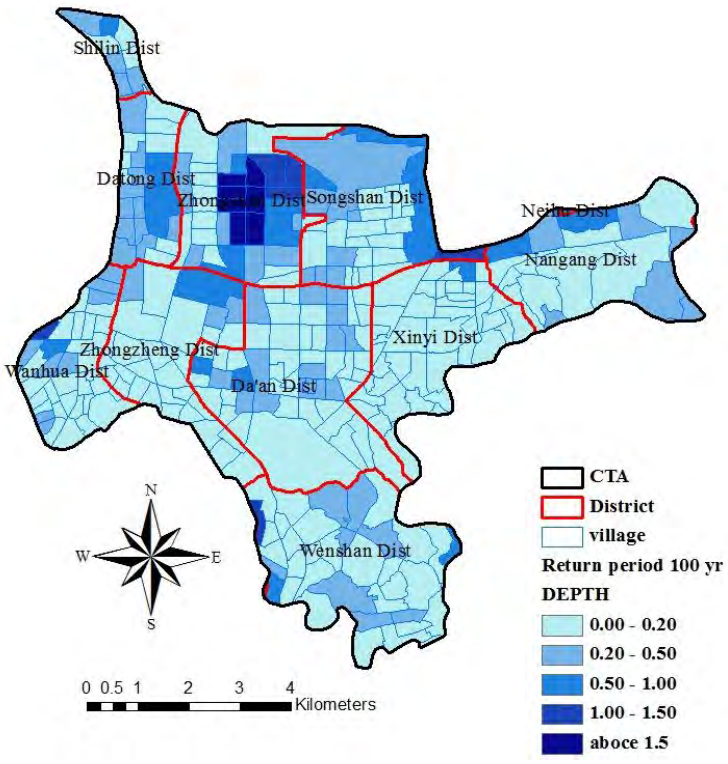


Taiwan Power System Map
Source: Development of Smart Grid in Taiwan, Frank, Faa-Jeng Lin

The main reason why the energy cost is increasing is that nuclear plants in Taiwan are now facing serious reconsideration by government and citizens. Anti-nuclear protesters has started demonstration after nuclear disaster in Fukushima Japan in March 2011 and currently over 68,000 people across major cities against the island's fourth nuclear power plant construction. Since fossil fuels play a major role in the energy supply structure, the energy production costs are depending on too much price difference of the fuels. Taipower has been revising their energy policy to steadily reducing nuclear dependency, replacing nuclear with LNG for base load and promoting renewable energy.

Facing Natural Disasters

In September 16, 2001 Typhoon Nari struck Taiwan and took 91 lives. The typhoon rains overwhelmed existing flood protection capacity some area where there is no regulatory reservoirs, and resulted in major flooding. Taipei city is currently under fear of not only flooding, but also mud slides triggered by over perception onto the mountain along the basin.



Flood Potential Map for a 100-year return period event
Source: Flood Vulnerability and Risk Maps in Taipei City

Vacancy and Equilibrium of Density

Economic change and differences in district development cause impact to population unevenly distributed in the city and some part of the city would vacant, even abandoned. In last decade, Taipei City had established art villages and URS to reactivate certain vintage communities and streets, which had successfully brought back economic to the areas. But for some part of the city the problem remain. For example in Ximending, upper floors of many buildings are still abandoned while business and activities only happen on street level.

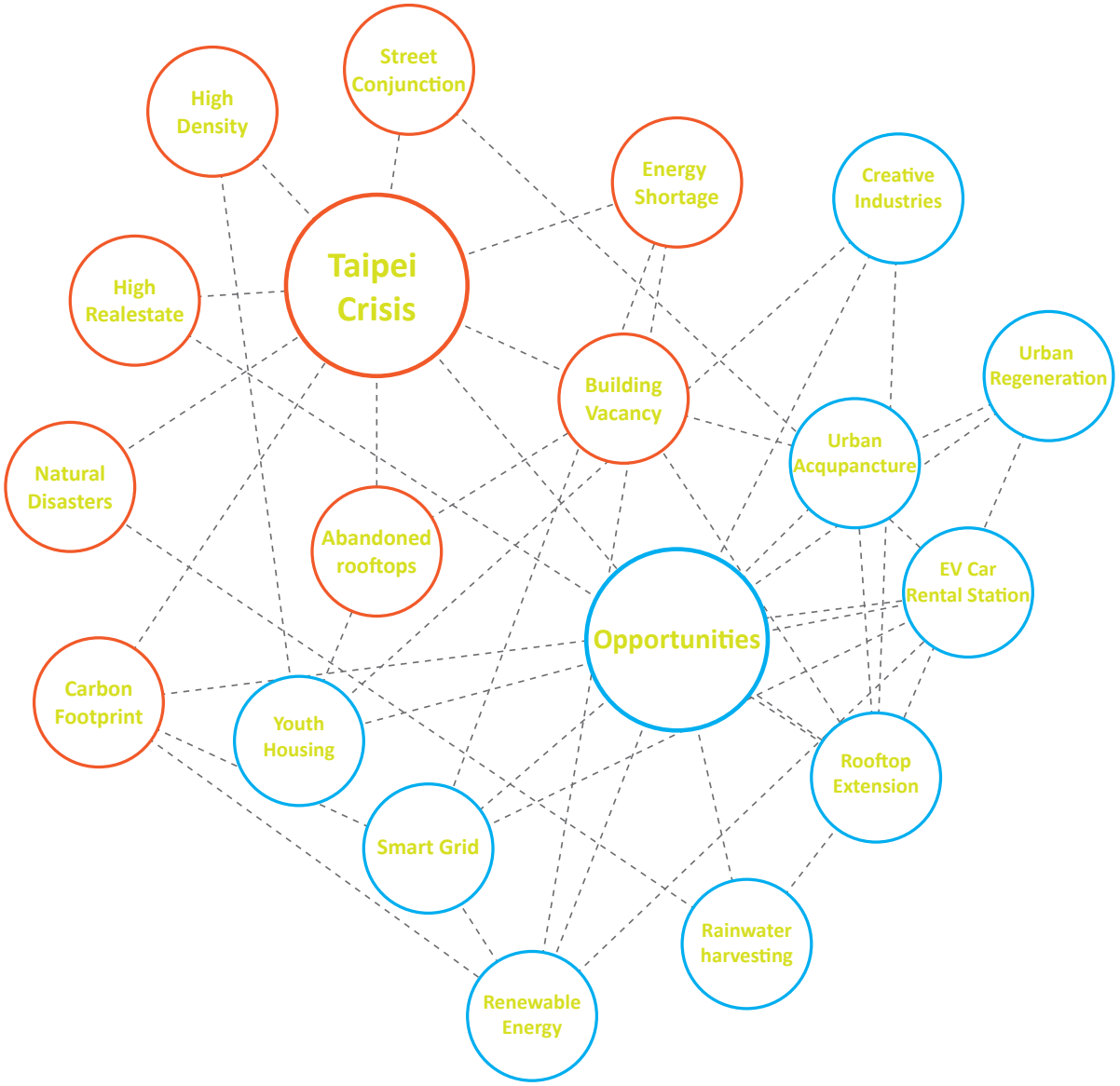
If URS, an urban acupuncture strategy, can bring new life and energy back to old community, a new way of intervention such as Orchid House (or part of it, to be embedded into existing buildings) can be a bold opportunity to the old district.

Opportunities

Turn urban crisis to opportunities

Even though Taipei City is facing a lot of urban crisis, there are still chances to implement and improve for sustainable city development. NCTU UNICODE pays special attention to Taiwanese industrial capacity in high-technologies, unregulated rooftop for new developable urban space and young talented people who can guide Taiwanese industries for next years to come. The cloud diagram shows how each topics in crisis and opportunities are related and can developed in relation. In our urban design strategies, abandoned rooftop space and renewable energy technologies especially play important role.

In following sections, we explain step by step how to apply our urban design strategies to selected locations of Taipei City as well as technologies we try to implement.

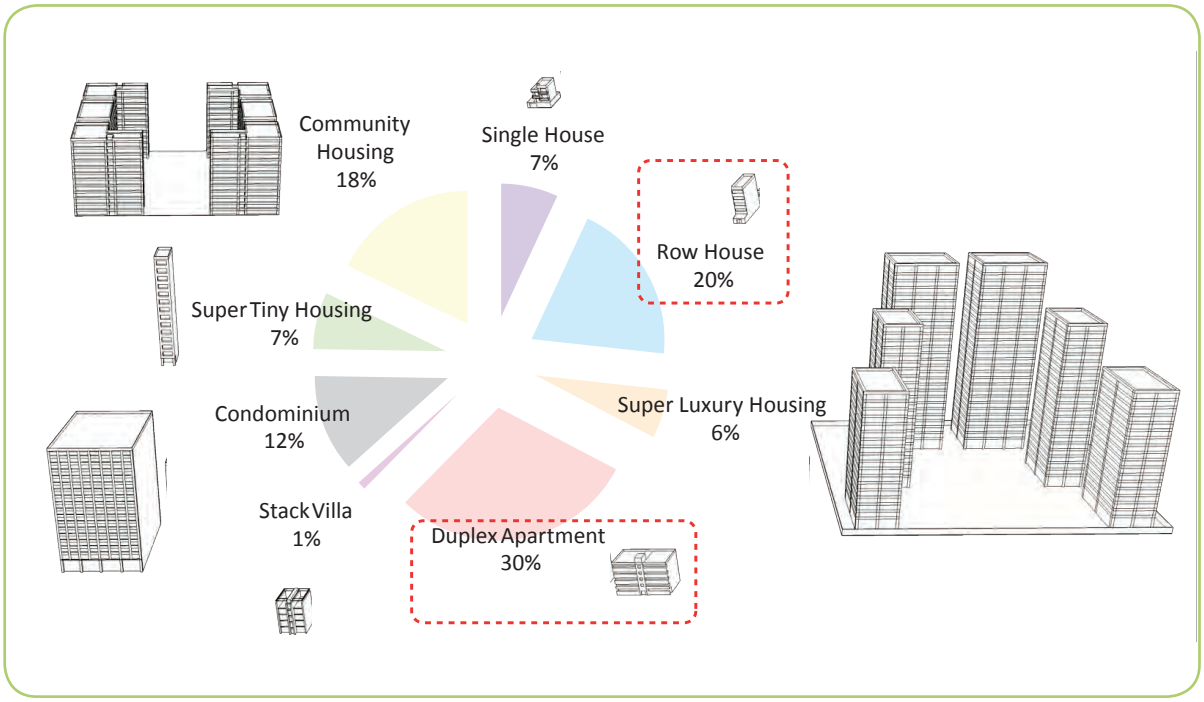


Taipei Crisis and Opportunities Cloud Diagram

Rooftop as New Urban Space

For most of the Taiwanese building, especially in the city, rooftop is usually a forgotten space with minimal activities, if not none, which seem to be irrelevant to our daily life. Some rooftops become the backstage for “unappealing” facilities, such as AC/Ventilation outdoor units, water tanks, pipes and cables, while some become the expansion of our living space. Because of the demands of gaining more living space, most of the rooftops in Taipei were renovated by owner illegally for private or rental purposes. It’s an inevitable struggle between the average citizen, developers, and government, because most of the Asian cities were developed bottom-up by the people, while modern Western cities were mostly designed top-down by the authority.

If we treat rooftop as the new ground for urban space rather than a disease to remove, it could be a new hope to many urban issues.



Taipei Residential building Type

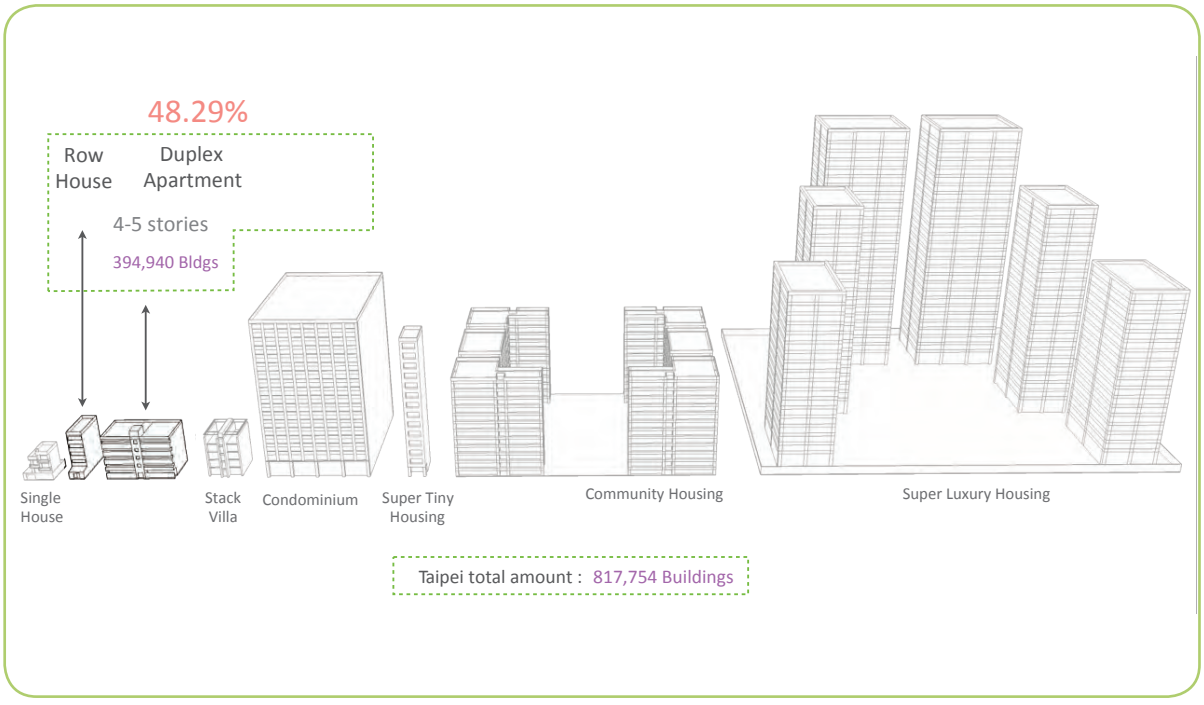
Taipei Residential Building Typologies

Taipei city population reached its 20-year peak and residential building has been constructed in various types. The majorities are a duplex apartment, which is relatively wide and 4 to 5 story building, and a row house that is extremely narrow and deep single family owned. These two types were constructed during the modern democracy period. Most of flat-roof duplex apartment and row house are facing problems: leakage, heat absorption and no public facilities. Therefore, the illegal make-shift metal roofed shelters have been introduced widely in most of the residential buildings and create unregulated cityscape of Taipei.

For Orchid House urban design strategy, NCTU UNICODE focus districts where the most of duplex apartment and row house are located as the most needed area for urban regeneration to vitalize not only the residential building, but also these districts.

Row House

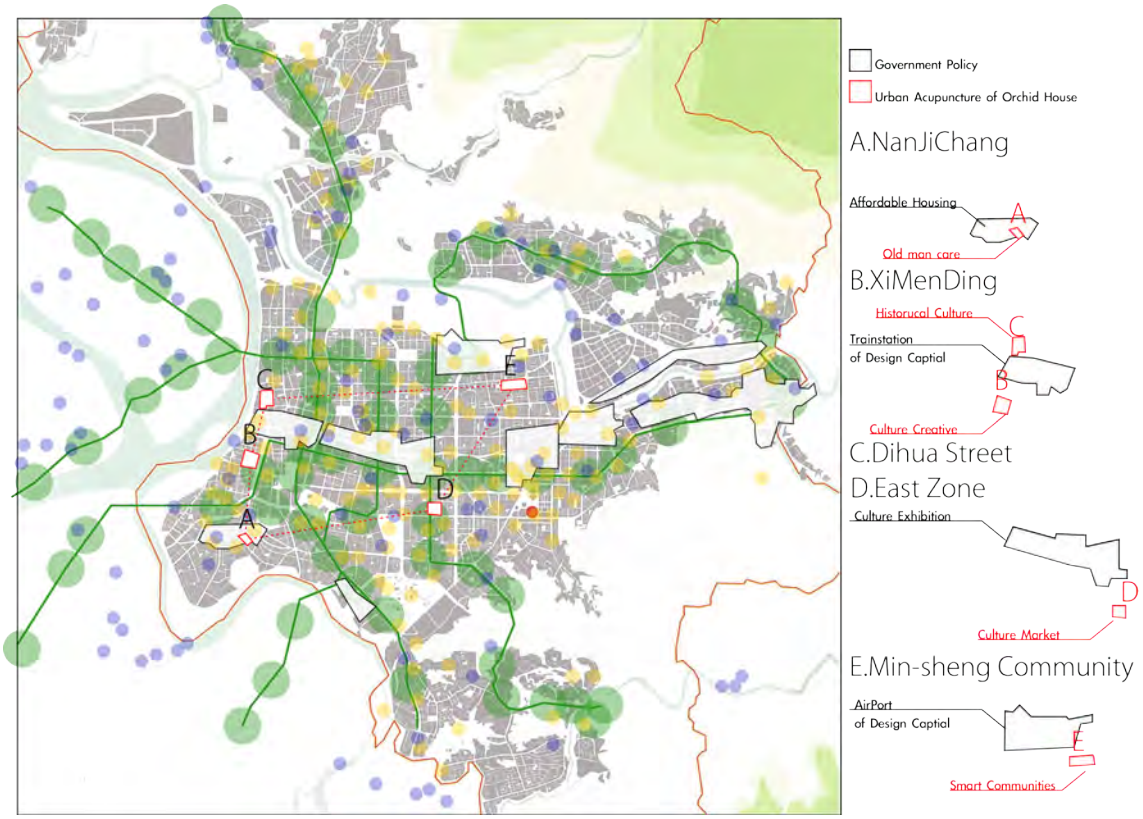
Duplex apartment



Taipei Residential building Type

5 Districts

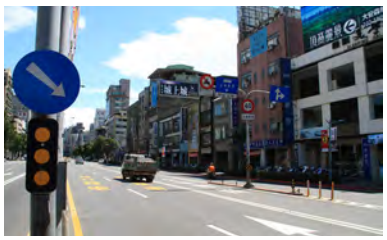
After Taipei residential building typology research, NCTU UNICODE has chosen 5 districts in Taipei for investigating the possibility of incrementing urban regeneration of residential building with new energy solution. The districts are Nan-Ji Chang, Ximending, Di-hua Street, Da'an district and Ming-Sheng Community. These areas are typically developed 30 to 40 years ago, and under the governmental policy of urban regeneration district. Our urban design strategy is to develop these 5 district in phases to demonstrate new energy solution and economy engines with sustainable new city development as urban acupuncture scheme.



Ximending

Nan-Ji Chang

Di-Hua Street



Da'an District

Min-Sheng Community

Urban Design Proposal

Urban acupuncture phases

Taipei city population reached its 20-year peak and residential building has been constructed in various types. The majorities are a duplex apartment, which is relatively wide and 4 to 5 story building, and a row house that is extremely narrow and deep single family owned. These two types were constructed during the modern democracy period. Most of flat-roof duplex apartment and row house are facing problems: leakage, heat absorption and no public facilities. Therefore, the illegal make-shift metal roofed shelters have been introduced widely in most of the residential buildings and create unregulated cityscape of Taipei.

For Orchid House urban design strategy, NCTU UNICODE focus districts where the most of duplex apartment and row house are located as the most needed area for urban regeneration to vitalize not only the residential building, but also these districts.

Taipei Organic Acupuncture
by Marco Casagrande

Ximending	**Phase 1** *Pilot*	Initiate Renewable Energy Policy Initiate Smart Grid Policy (Micro Grid) Initiate Orchid House Cluster Initiate New Economy Engine
Di-hua Street	**Phase 2** *Development*	Install Renewable Energy Source Istall bigger Smart Grid Istall More Orchid House Clusters Invites More Economy Engines
Nan-Ji Chang	**Phase 3** *Implement*	Implement R&D programs for Renewable Energy Implement Smart Grid to most of area of district Increase number of Ochid House Clusters Promote economy eingines
Ming-Sheng Community	**Phase 4** *Enhancement*	Enhance Renewable Energy Technologies Enhance Smart Grid Use Enhance Ochid House Clusters Enhance economy eingines
Da'an District	**Phase 5** *Extension*	Extend Renewable Energy Technologies Extend Smart Grid Use & Area Extend Ochid House Clusters Extend economy eingines

Urban Acqupuncture Phases

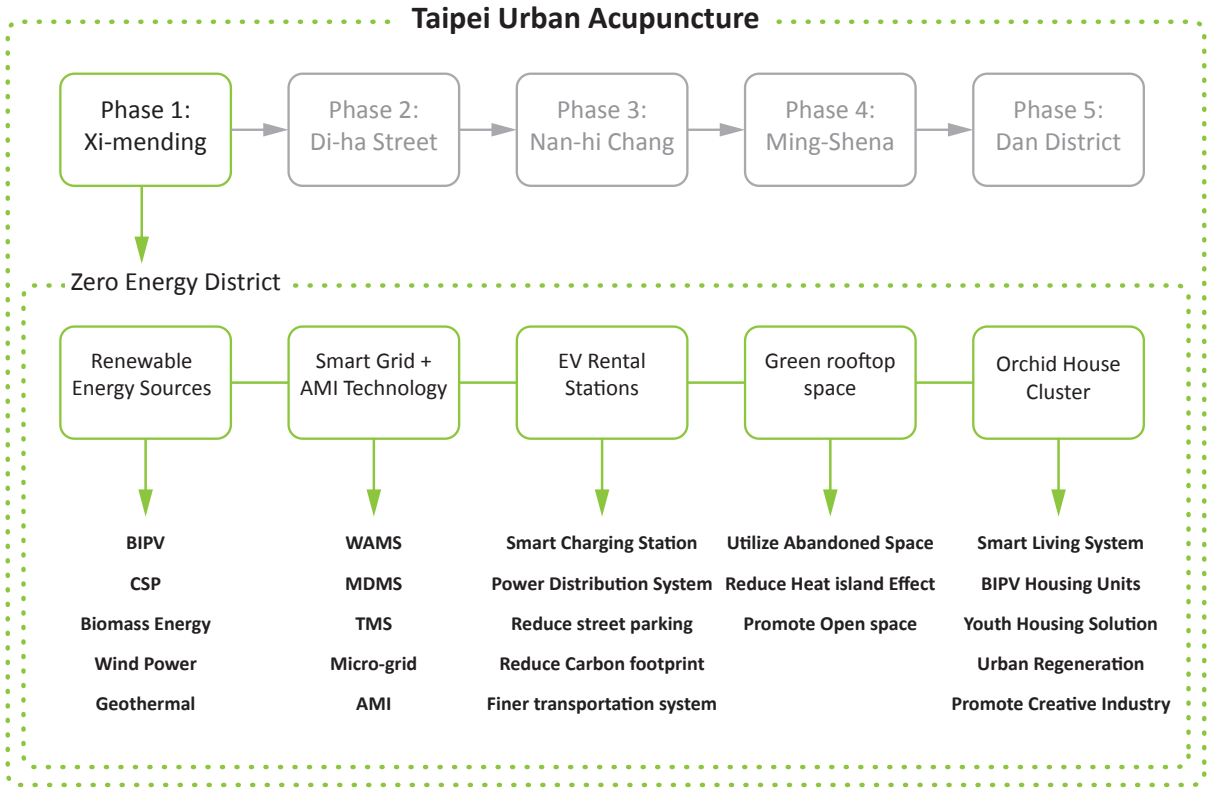
Zero Energy District: Ximending

In order to pursue the urban acupuncture concept, NCTU UNICODE has chosen Ximending district for the first phase of development due to the urgency of renewal needed for this area.

Ximending in Chinese character describe West gate. As its name describes, Ximending was one of the most important location for Taipei development under Japanese governance in the beginning of twenty century. However, newer development has been shifted to East side of Taipei City such as Xing-yi district where Taipei 101 building is located. Ximending area development was not active until the MRT subway system introduced and located metro station after year 2000. Currently Ximending represents the centre of sub-cultural activities such as fashion, movie theatres and shopping malls.

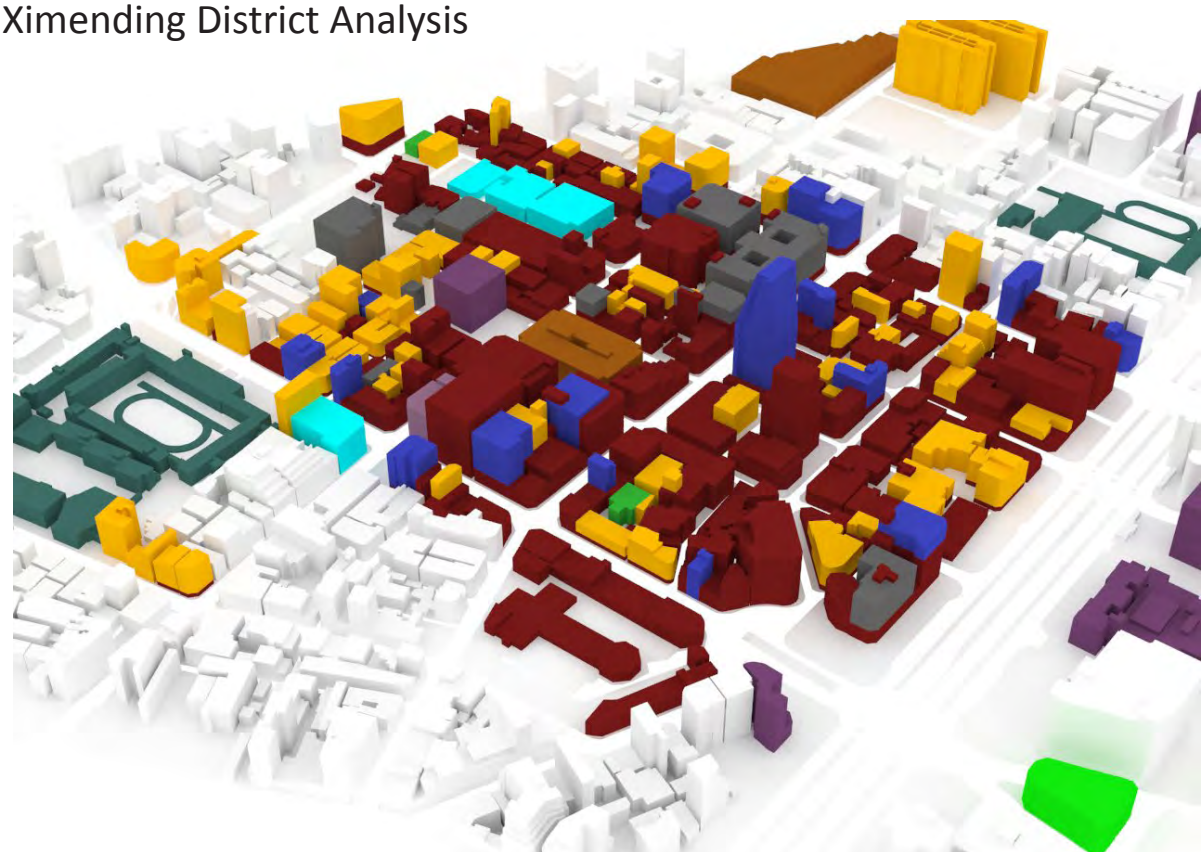
Taipei Urban Acupuncture phase 1 Ximending district includes following schemes as described following diagram:

Incorporating renewable energy sources
Implementing Smart Grid and AMI technology
EV Rental Stations
Green Rooftop Space
Orchid House Cluster

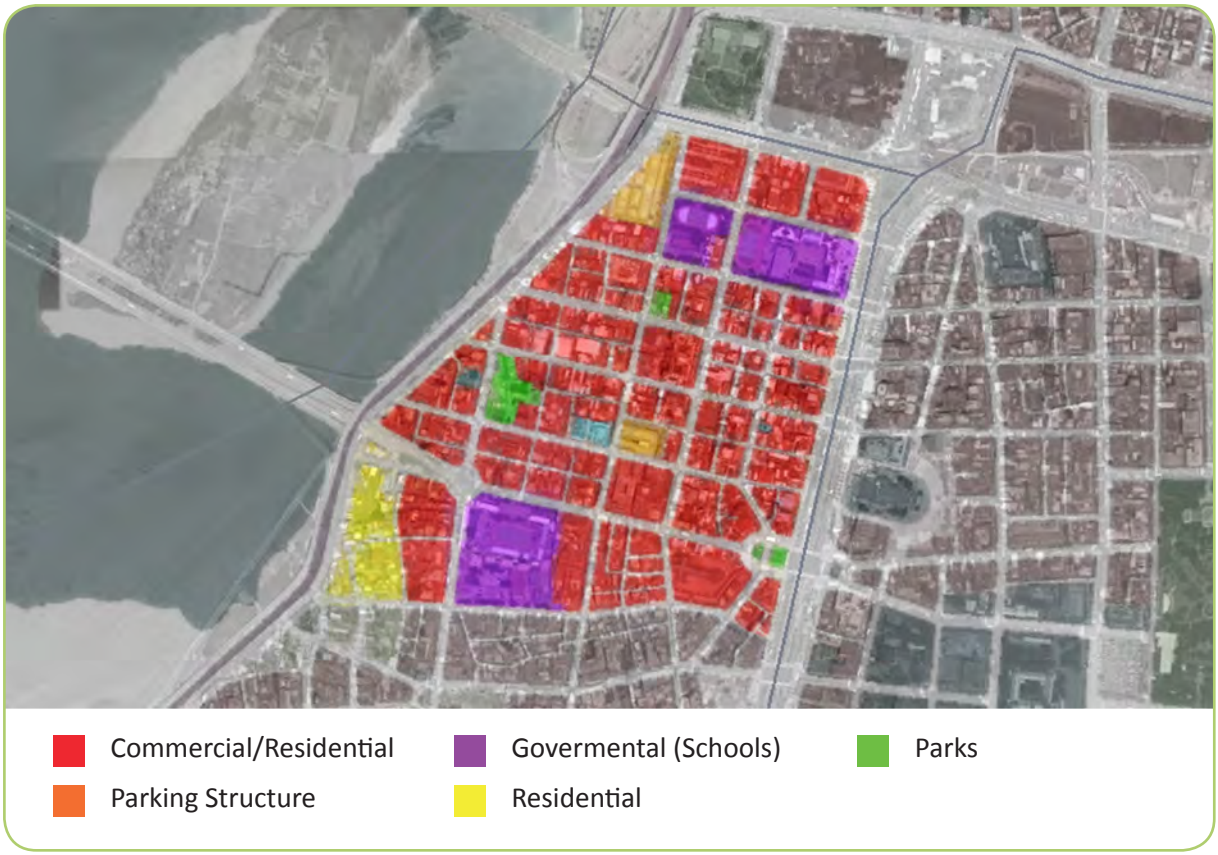


Contents of Urban Proposal at Ximending District

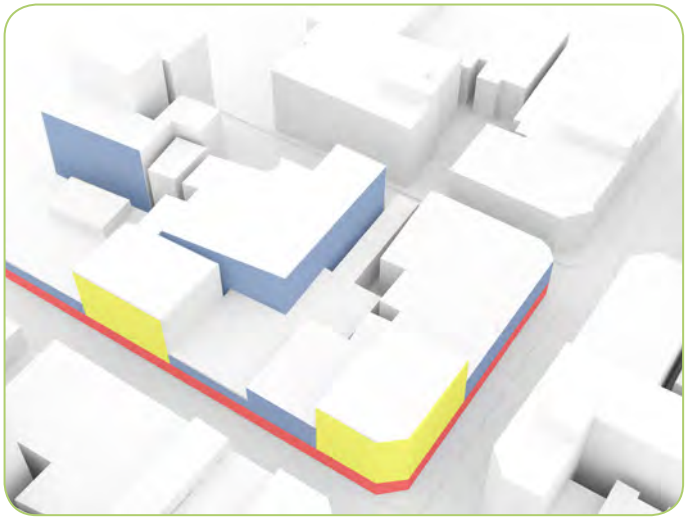
Ximending District Analysis



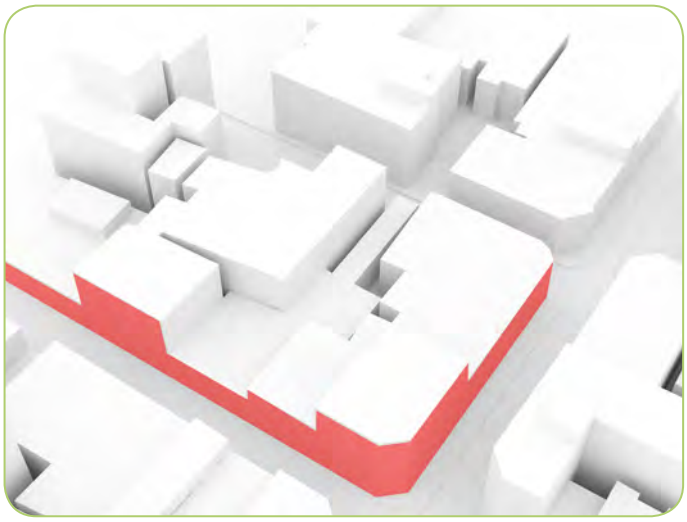
Ximending Zoning 3D Visualization



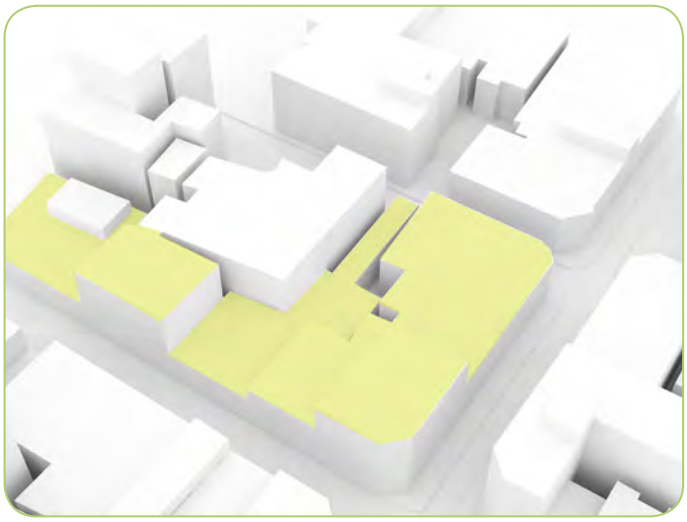
Ximending Zoning Map



1. Programme
- Red: shops
- Yellow: offices
- Blue: residential



2. Alignments and setback
Ximending has a distinct characteristics of the “chamfered” corners



3. Potential rooftop surfaces
The highlighted rooftop area adds up to around x square meters

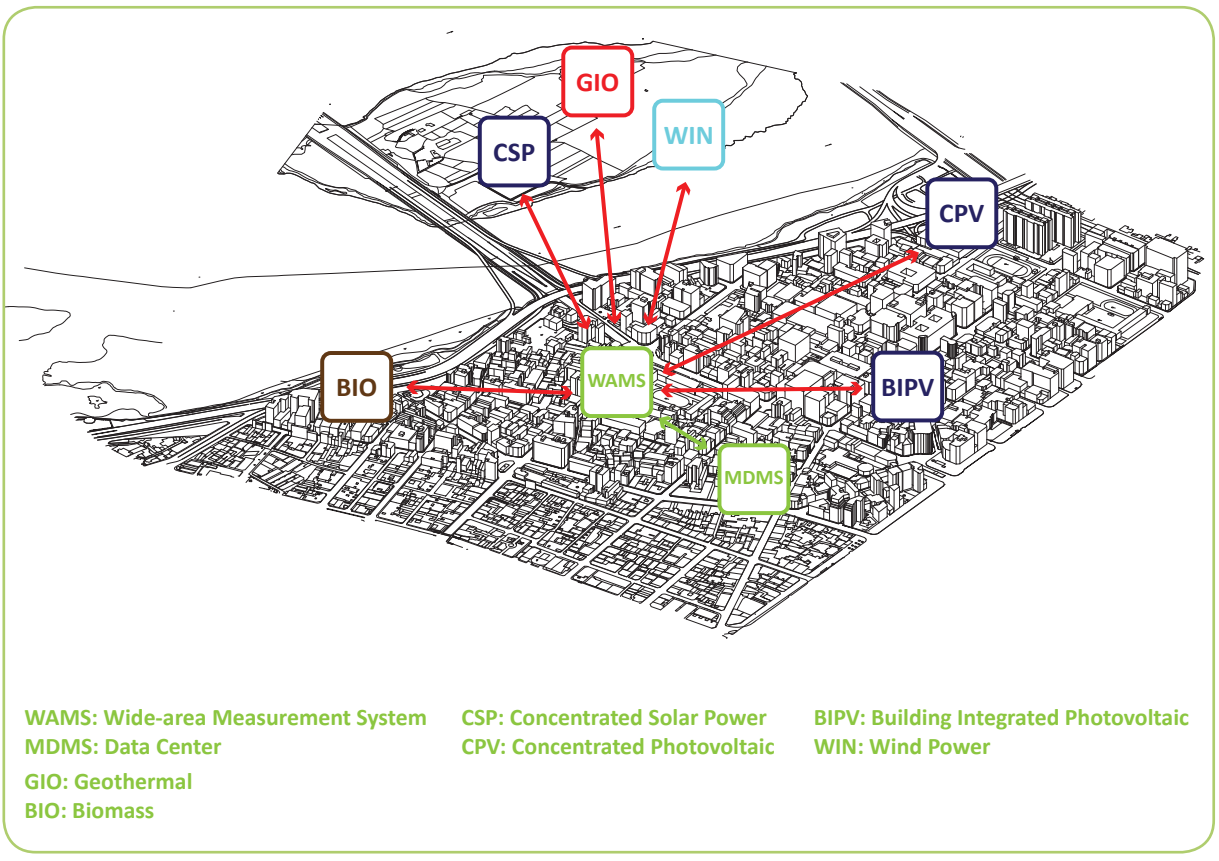
Typical Street Condition of Ximendig

Smart Grid system with AMI (Advanced Metering Infrastructure)

Currently Taiwan National Science Council is developing “National Energy Project” to develop smart grid and AMI (Advanced Metering Infrastructure). Objectives of this project is to use the developed technologies of distribution automation and micro-grid to enhance the total installed capacity of renewable energy, promote smart home energy management technology, and implement smart grid and AMI. NCTU UNICODE’s Orchid House project in Ximending district is following the basic concept and technologies to enhance possibility of planning Zero Energy District.

As main focal point of Ximending Zero Energy District plan, NCTU UNICODE proposes not only PV panel implementation to buildings, but also larger scale of renewable energy sources such as CSP (Concentrated Solar Power), Biomass, Wind power and Geothermal. In order for all renewable energy sources to be distributed efficiently, advanced applications of Wide-area-Measurement System (WAMS) is installed one of larger footprint building rooftops, and Data Centre (MDMS) serve all the energy with automation system. Furthermore, AMI (Advanced Metering Infrastructure) is installed to Orchid House Clusters to manage power supply within houses. Please refer Architecture Design Narrative for farther details of AMI integration to housing appliances.

The Orchid House Cluster acts as a pilot project for further development of smart building energy management technology. Eventually, AMI system will be installed to most of buildings in the district to increase 20% energy usage efficiency from conventional grid system.



WAMS: Wide-area Measurement System
MDMS: Data Center
GIO: Geothermal
BIO: Biomass
CSP: Concentrated Solar Power
CPV: Concentrated Photovoltaic
BIPV: Building Integrated Photovoltaic
WIN: Wind Power

Ximending Smart Grid Concept

Ximending Energy Programme

Smart Grid

330578.5 m2

Investment range about 3000 € / kW

Heliostat / 624 pic

80000 m2 → 20~25GW • h / Year

Energy Comsumption of Ximending

Commercial Facilities: 845

10000~20000 /1kWh/month

Households:287

250~380 /1kWh/month

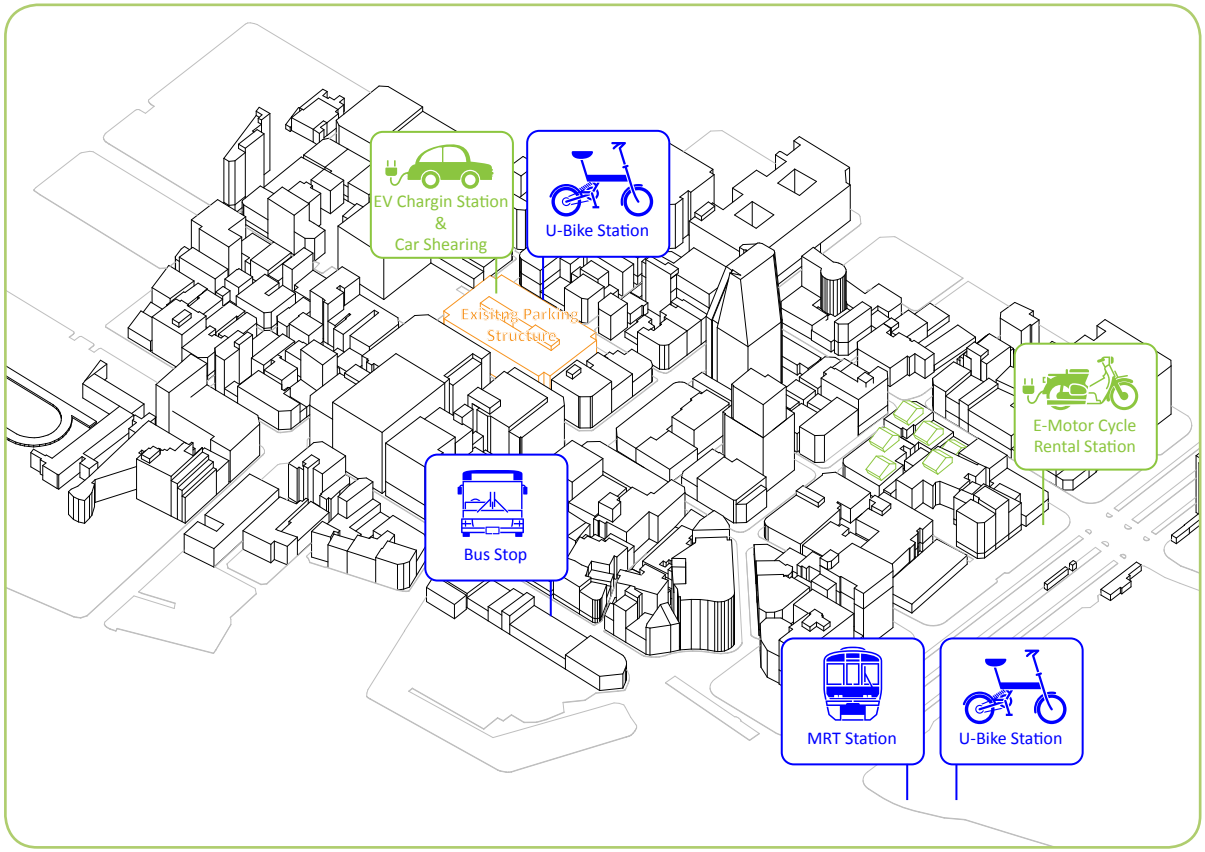
- Commercial Facilities
- Residential (Collection)
- Hotel
- School
- No Use
- Office Building
- Government Agencies
- Parking Lot

Ximending Smart Grid Design

EV Charging Station

As part of Ximending Zero Energy district plan, EV charging station will be installed several locations in the district to promote energy efficient transportation method as well as to reduce carbon footprint in the city. Electric Vehicle station is located inside of existing parking structure and E-motor cycle is installed wider open street space along the main load, in order to utilize existing urban condition of Ximending. Main purpose of this charging station is to promote car/motor-cycle sharing concept in the city as part of public transportations such as Metro system, public bus and U-Bike (sharing bicycle) to reduce dependency of private transportation methods.

All the electric charging station is connected through energy distribution network operation to monitor power supply. These data is shared with online website or smart phone application for user to check the up to date status of availability. Farther detail will be discussed on “Transportation and Mobility Characteristics” section.



Rental EV station integration to existing infrastructure

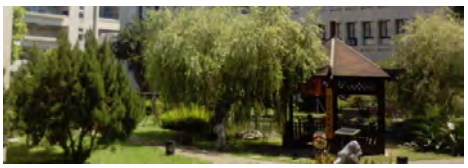
Green Rooftop Addition

Ximending Green Programme

Green Roof

a

b



c

Ximending's Rooftop Area : 254,943.5 m²

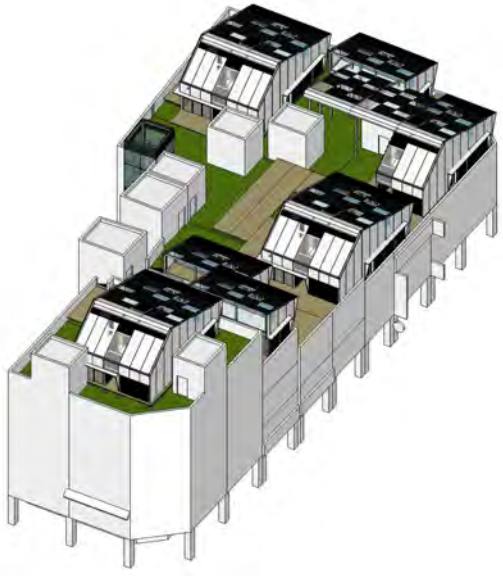
Ximending's Existing Green Area : 20990.8 m²

New Green Rooftop Area : 59893.15 m²

Green Proportion :
(20990.8 + 59893.15) / 254943.5 * 100%
= 31.7%

Orchid Cluster

Orchid Cluster plays one of the most important roles in Taipei Urban Acupuncture plan in terms of regeneration of old city buildings and solving physical building issues such as water proofing of rooftop, newly added building equipment, illegal extension to the building and out-dated building utilities.



Orchid Cluster is not only just an addition to existing building, but also integration of renewable energy source, building infrastructure, new vertical circulation addition and green open space of the rooftop. Newly added elevator shifts add easier accessibility to the rooftop space and also able to regulate it. Electric consumption for the all common utilities are provided through Building Integrated PV panel energy generation.

Farther detail will be discussed on “Individual or collective housing building characteristics” section.

5.1.2 Market viability of the project

1. Crisis 1: Housing Justice in question in face of much protested Urban Renewal Act

Taipei as a capital of Taiwan is in need of urban renewal, however, often receiving protests which claim housing justice.

Since Urban Renewal act was included as one of 10 key service industries in 2009, Urban Renewal cases have taken place in a much faster speed.

Although the intention was for public welfare, including to improve the dilapidated building conditions, overall appearance of in the city or to best make economical use of the land, housing justice has been a much debated topic. Incidents including Wenlin Yuan (2012, in Shihlin district in Taipei) and Dapu(2013 in Miaoli County), one is perceived as a project of benefiting construction company to build high priced high-rise housing complex, while the other one is deemed not respecting long-lived residents' land right and only to pave way for governmental plans (building a science and technology park).

The intended public welfare act was much overshadowed by the social incidents mentioned above. One criticism has included ever heated housing affordability and real estate price increase as a by-product of Urban Renewal act. One urban renewal tactic which touches less upon housing justice, is the face-lift (re-do the exterior walls with new tiling work, etc). This has seemed a valuable effort to vastly improve major street look of capital city, Taipei. However, in so doing, the physical building condition would not be significant improved other than rental cost would be increased , which in turn might drive out commercial tenants who cannot grow their business fast enough to catch up the increase on rent.

Our Urban strategies is named Greater Orchid Project, which plans to respond to the crisis of housing justice issue, and present a solution that aims to tackle affordability, city appearance, and sustainability(both in economic and environmental terms) all at once.

1) Protest Case Study1: Wenlin Yuan

There are two main points when it comes to the Wenlin Yuan urban renewal project. The first is that the Taipei City Government, relying on self-government ordinances and regulations written by itself, forced the use of the whole block as the renewal unit for the project. The other point is that the developer relied on Article 25 of the Urban Renewal Act to force a minority that did not agree to move — in this case the Wang family — to carry out a transformation of rights. When the Wang family refused to submit, the city government hit them with Article 36 of the act and demolished their property on behalf of the developer.

Even more important is the question of whether the renewal of the entire block is the same as the legislative prescription for planning of land for renewal as given in Article 6 of the Urban Renewal Act. Where in that article does it say that the entire block must be used as the unit for urban renewal? The city government has obviously exceeded legal regulations; it violated not only the principle of prohibiting inappropriate contracts, but also the protection of property rights outlined in the Constitution.

2) Protest Casestudy 2: Dapu

On July 18, 2103 four houses in Dapu Borough in Miaoli County's Jhunan Township were demolished against the will of their owners to make way for a controversial science park extension project.
The origins of the Dapu incident can be traced back to 2008, when an optoelectronics company applied to the Miaoli County Government for land on which to build a factory.

The county government, keen to attract investment from the company in question, drew up a plan for the expansion of the Jhunan Science Park, which is a branch of the Hsinchu Science Park, along with designated areas on the periphery of the Jhunan base. Although the company has said that it no longer needs land to build a factory, the county government is still determined to forge ahead with the plan.

To obtain a "dedicated park business area" of 27.98 hectares, the expansion plan demands 154 hectares of new urban planning land. Apart from the core "dedicated park business area," the plan allocates 67.55 hectares for residential zones, 2.88 hectares for a business zone and 1.85 hectares for a scientific and technological commerce zone, and it specifies that this land is to be developed through zone expropriation.

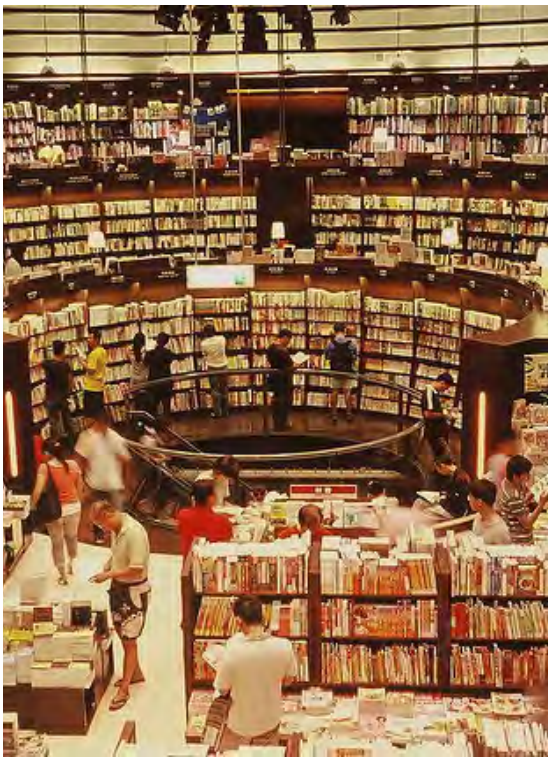
2. Our Goals: (in 10 year & 50 year time)

1) Urban development should not sacrifice locally specific urban characteristics.

For those urban renewal projects receiving most of protests, main reasons questioned include, demolishing memorable urban fabrics only to build unaffordable high-rise housings Among all the five sites, we will discern the unique area potentials with nice balanced view of civic and economic benefits to construct the renew strategies.

From all the chosen 5 sites, taking two for instance, in the exemplified site in Ximending, we will inject filming industry to extend the concentration of existing youngsters' subculture and entertainment businesses as well as revive its old-time folk-music hub for the entire Chinese pop song market across south east Asia. In Nan-ji-chang, seeing the medical and nursing need for the aged population in the existing housing units, we will build health care facilities as a key driver to revitalize this long-forgotten area.

2) We use urban renewal as a key driver to revive undervalued urban spaces and strengthen city marketing.



Competition among countries has been taken over by that among cities. Besides architecture scenes as a typical attraction for visitors, Taipei's main attraction has been mostly about daily life scenes or back street cultures, including micro businesses such as night markets, personal computer and cultural related retailers, etc. In addition, Eslite Bookstore has offered another culture aspect for Taipei city. Since inception 25 years ago, its unique 24 hour operation of a bookstore and lifestyle businesses built around it has helped Taipei to be known for city of reading and create a new type of economies that manifests Taipei's soft power in global competition.

We not only want to revitalize under-utilized urban spaces and areas but also plan to transform identified sites into leading positions in various industries. In the future, in our first exemplified site, Ximending, you may define it as Hollywood for Chinese filming industry. In Nan-ji-chang, a much needed health care model for aging population will be tested out, just to name two sites.

3) Create sustainable business models and sustainable designs.

We not only want to build sustainable buildings as part of urban renewal effort. Moreover, we want to ensure that our Orchid house/cluster proposal is sustainable financially.

The new tenants in the Orchid House will bring in necessary sets of skills to for establishing specific new businesses in respective areas. We would leverage young professional's creativity and passion with experienced industry's experts by aligning new tenants with Venture Capital firms which will not only provide funding but also guide them with necessary business and management insights. Ultimately we want to further ensure the successful rate of from ideas to commercialization and generate powerful new economies. For the long run, we want to greatly reduce the portion governmental funding and supplement it with self-generated revenues from the new built-in economies.

4) Use Orchid House as catalysts both in terms of software and hardware to Foster City development

As part of city marketing efforts, Taipei needs to build an iconic image to be remembered. Roof addition has been built in a large quantity on existing urban dwellings in Taipei. However, public safety, structure soundness, building system quality and most importantly, the appearance of it do not reflect the necessary standard of a modern developed city. The hardware of Orchid house/cluster will reshape the skyline of Taipei without demolishing all the memorable urban textures, the proper urban street scale which inherently exists in most of these identified old neighborhoods will not be dismissed. On the software front, the new passionate youngsters with carefully selected talents will energize these areas by their spirit and professionalism.

5) Taiwan political reality, we should strategically promote politically irrelevant competitive advantages to build up Taiwan's international appearance and competitive edge.

Taiwan's political position has long been a sensitive topic and faced a critical challenge since the rising of China's sizable economic and political power. During the time of political separation between Taiwan and China, Taiwan has developed its global leading position by technology and cultural outputs.

To enhance Taipei's global reputation, we should leverage these assets. After successfully hosting International Flora Expo in Taipei in 2010, and Taipei World Design Expo in 2011, Taipei has continued to gain the opportunities for participating in the international fairs though 2017 Taipei Summer Universidad and 2016 World Design Capital. Through the new economies built within Orchid Clusters, and ecosystem integrated from the local resources and know-how, we will further strengthen Taipei's soft power.

6) In 10 year time, all the five sites with roof clusters will be built and well integrated with the existing building system and urban infrastructure.

We plan to develop each site in terms of hardware construction and new economy incubation to its steady stage in two year timeframe. In 50 year time, when the existing housing together with the added roof spaces approaching the end of its lifecycle, we plan to have them retired. However, a nice urban renewal model by then has proven. Nice old urban form with ideal street scale can remain intact when economy generation can still stay prosperous. So the guidelines may inspire new mix use housing development. With understanding that population growth may be stagnant or even be negative in the next 50years, we don't foresee the need for building more high rises. The areas with retired houses removed will either have new development or release the land for more civic uses and increase necessary green spaces. In addition, the 5 emerging new economies in 5 various sites will be established to a fruitful stage.

3. Our Solutions:

Orchid House & Clusters as a timely response to the crisis:
Extend opportunities provided by governmental housing actions.

1) Software strategies: Defining economic opportunities and strategies to be built in the Orchid Clusters

A. Strategy 1: Extend opportunities provided by governmental supports in entrepreneurship.

Our proposed roof addition through Orchid House, will not only coincide with the governmental policy in place, we also aim to optimize it by connecting to other resources both from the city and central government and leverage the unique conditions that the five representative sites can offer.

In 2013, our Ministry of Economic Affairs, initiated a Star-Up Taiwan plan. The goal is to assist young professionals build their businesses. Acknowledging that to realize a business concept, a business ecosystem needs to be built in a given environment. Appropriate industry know-how and ideas across various disciplines should be exchanged and facilitated so that a start-up idea can attain necessary funding and be commercialized.

Our team seeks to provide a platform through Greater Orchid Project that would extend and combine the above mentioned two governmental efforts. With that, first, young professionals having ideas to start a business will be able to work and live in our Orchid House clusters. Secondly, with below the market rate rent, their disposable income will be increased and thus able to allocate their savings to partially fund their entrepreneurship endeavors. Thus the sense of business ownership and commitment can be strengthened. Thirdly, the sense of community and family bond can be created via properly designed communal spaces.

Therefore, on the work front, all the Orchid House cluster residents will be able to co-work and support necessary knowledge. On the living front, the not-yet-married youngsters will be able to form a pseudo family relationship to look after each other which would also enhance a healthy living. Lastly, the initially heavy reliance on outside funding can be lessened through revenues generated through the newly developed businesses within the Orchid House clusters.

B. Strategy 2: Integrating central government focus and reorganization.

On May 20, 2012, in Taiwan, the Council of Cultural Affairs was upgraded to the Ministry of Culture as part of a larger governmental reorganization. Subsequently, in March 2014, Ministry of Science of Technology was formed from the National Science Council. Both ef-forts have manifested governmental commitment to strengthen Tai-wan's global competitiveness in technological innovation and crea-tive & cultural industries.

In our first exemplified site, Ximending, we aim to create an in-cubator to not only reflect governmental endeavor, discerning oppor-tunities to exercise the power of two fields, technology and culture, but also to highlight the district character of the specific area__ high-ly concentration of youngsters' entertainment businesses.

Therefore, the Orchid House clusters placed here will serve as an incubator for filming industry. UNICODE team sees the specific industry provide abundant opportunities for the integration of cultural and technological resources and talents. With this, we can further elevate the already growing Taiwanese filming industry.

Through new economies built in Orchid Cluster in Ximending, Our goals are to form ecosystem from creativity to commercialization, connect specific local culture to global competition arena, and lever-age the power of the newly created industry to enhance city market-ing. In the near future, when one thinks of filming industry, in the western part of the world, you would think of Hollywood, in the great-er China area, you would come across Ximending.

In this Orchid Cluster, it will function not only as dwelling units for young professionals with filming industry necessary talents. And because of the proximity of living and working spaces, these young talents are able to foster idea cross pollinating and collaboration among various disciplines. At the same time, with centrally arranged supports from properly programmed IT, business management, fi-nancing and public relation facilities, we aim to build an efficient platform to discern ideas with high success potentials and facilitate the necessary dialogue among creative talents and business experts, whereby a well crafted business model would appropriately balance the originality and financial return.

Understanding filming industry's potentials as a new economy driver:

In the 80's Taiwan's filming industry once enjoyed its heyday, the market reach not only commands high box office sales within the local market, but also covers chinese speaking communities in South East Asia. Facing the competition from Hollywood blockbusters and strong movie competitors from Hong Kong, Taiwan's filming industry went into decline in 1994, and collapsed in 1997 worsen by the spiraling levels of piracy. However, in November 2008, the success of Cape No. 7, brought the confidence of Taiwan's filming industry. The movie was the highest gross domestic film, only slightly below the sales in the country's cinematic history to foreign film, Titanic (1997).

Besides the recent success of locally produced movies, Taiwanese films and directors have shined in the major international movie awards. For instance, the director Tsai Ming-liang has won Golden Lion (best picture) for Vive L'Amour at the Venice Film Festival in 1994 and Silver Bear for Outstanding Artistic Achievement for The Wayward Cloud at the 2005 Berlin International Film Festival, just to name a few. The internationally renowned director, Ang Lee, has even proven quality

movies can well balance artistic as well as commercial benefits and pushed Taiwanese movies to the most celebrated film award, the Oscars and showcased the successful collaborations between Taiwan's local crews and international experts, including those from Hollywood.

To ensure the long term and sustainable growth of Taiwanese filming industry, we may not lack of talents. Several issues are stated by various industry experts.

Firstly, the scope of the themes requires further developed to touch wider audience base across different markets. Director Ang Lee, in an interview once pointed out that two dozen movies produced by Taiwan each year tend to be narrow in scope with themes that are not well developed.
"You don't have to shoot a historic epic to have scope," stressing that the most important element is the development of the theme. "You just have to manage your subject in a way so that it can touch the audience deeply," he said. "That's what I meant by scope." said Ang Lee.

Secondly, Culture Minister Lung Ying-tai cited special effects, post production and capital as the areas that need more work. This capital heavy field will be improved once funding channels are better secured.

Thirdly, we need make the films and establish distribution channels that are able to penetrate larger Chinese speaking markets, i.e. Mainland Market.

The China push is part of a wider strategy to develop a commercial film industry in Taiwan, which is renowned for arthouse classics and low-budget genre films, and usually has a less than 5% share of the Hollywood-dominated market.

The GIO (Government Information Office) recently announced a five-year plan to boost the industry including a package of incentives and subsidies totalling $228m. Some of the subsidy is being earmarked for international co-productions.

Moreover, Venture Capitalists, Ho-Li Cultural and Creative VC which is headed by filming industry experienced experts including producer Tian-Chung Ma, has focused their investment in Chinese films with a long term goal to enter the international market. Mr. Ma once said, Taiwan's filming industry does not lack of ideas. However, from idea to a completion of a move, there are many missing links, for instance, no quality talents to improve scripts, etc. Films are a mixture of various arts. It cannot be done by only a few individuals. Therefore, only a platform that encompasses all components of a sound value chain is formed, filming industry's long term development can be enhanced.

To summarize, the underlying talents and built-in program in Orchid Cluster to serve as a future filming industry incubator will have to strengthen the vertical or horizontal integrations of the entire value chain.

2) Hardware strategies:

Defining Facilities in Orchid Clusters:

Seeing the soaring real estate price in Taipei city have posed a critical challenge for recent college graduates and youngsters to optimally allocate their income to attain a quality living in the city, our city government has started building youth housing which is slated to open by 2016. The sizes of this dwelling units range from 24m2, 42 m2, 72m2. In order for the unique housing proposal responding to the most urgent social matter not to be fluctuated in price with the real estate market and thus youth's interest of living would be sacrificed, the newly built housing will only offer rental option. To make it more affordable, it runs at a discount of the market rate, 80%.

By combining the prerequisites of the two plans (Youth Housing and Start-Up Taiwan), as well as considering the required talents needed we have outlined the criteria of our potential target tenants for the exemplified site in Ximending as following:

Age group: between 20-30 year old.

Education:

a. Those who have completed entrepreneurship related certified courses for at least 30 hours provided by local universities, government sponsored or enterprise organized institutions.

b.
With bachelor degrees or equivalent continuing education credits or publications in the following fields, drama, set design, novel writing, script writing, dance, post production, costume design, music, and those deemed required for film production by Orchid House the tenant admission committee.

Ownership: all the residential units only for rental

Income level: prior to moving in Orchid Cluster, individual annual income below €30,000 or family income below €50,000.

The lease length: minimum 3 years, maximum 5 years.

Unit size: Living spaces 24m2, 42 m2, 72 m2

Unit quantity: In each street block (100mx50m) there will be equivalent 10 prototype-size Orchid Houses built and formed into a cluster. To achieve a sufficient urban regeneration scale, we plan to apply Orchid Cluster on 5 street blocks in Ximending area.

Functionality: We will provide co-working and co-living spaces for the following talents and associated functions.

a.Pop music & film score: song writers, producers, and singers, musicians

b. Movie production: screen play writers, directors, actors, postproduction

c. Design related: set design, web page design, branding design, costume design, make-up artists

d. Supporting shared facilities: Spaces for working, these people may not live here. They include but not limited to the following, IT team for app developing, PR team for marketing and event hosting, financial team for fundraising and business training purposes.

Circulation: For each street block (average size 100m * 50m), we will add 3 elevators at proper locations. These elevators are normally only for roof tenants use to provide ideal separation between the existing residents below and the new young talents.

However, when special events are held at the roof, i.e. film preview, live music sharing, etc, the residents below will be invited and encouraged to attend. When accessing the roof is necessary to the existing residents below, they will either use the existing stairways or the elevators will be temporarily shared when these special occasions occur. With building owners' participation in the social events, a sense of community between the new and old residents can be created. Furthermore, the housing owners who have participated in the Greater Orchid Project, after seeing the improvement of their buildings, would actively be the advocators to encourage other potential home owners to join our urban renewal concept.

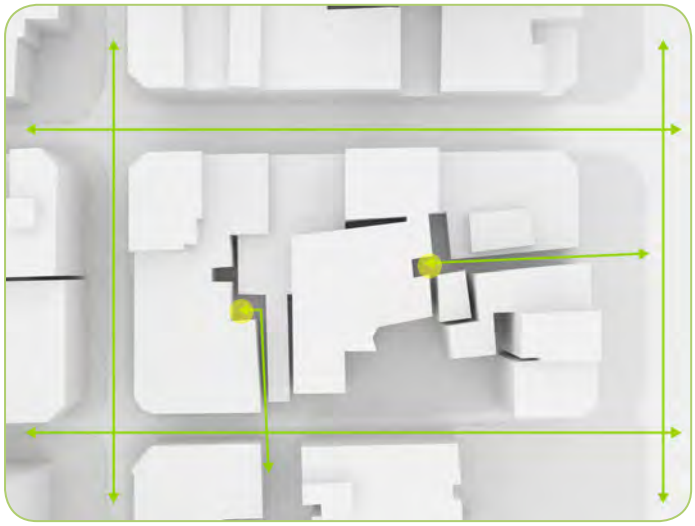
5.1.3 Indivisual or collective housing building charcteristics

The Orchid House team believes that a long term vision for a city must be built from what's within. We carefully select five sites which can critically represent housing development history as well as urban conditions in Taipei.

From west side of Taipei to the east, our sites encompasses those historical houses built during Qing dynasty, which manifested the heyday of all the commercial activities due to the proximity to the main river for transporting goods to those modern housing buildings built during 60's and 70's at heart of modern Taipei Of those buildings, modern living referenced from western cities, was originally portrayed through all clear defined building systems and ideal proportion of outdoor and indoor spaces. Most importantly, their scale in relation to urban context. As time progressed, original building structures can no long suffice ever growing city density and changes of population and its associate demographic structure. Fostered by not strictly reinforced covenant and building regulations then, illegal additions beginning to sprawl all over these buildings. As a result of this, both the residents and their living conditions faced critical challenges. Below we identified 5 critical common flaws of buildings located in these representative sites:

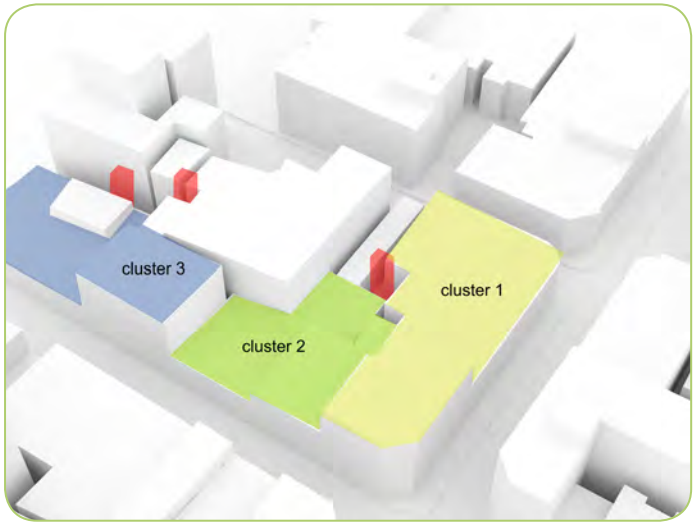
1) Dilapidated waterproof on the roof posed potential leaking problems.
2) Newly-added building equipment (i.e. water tank, solar panels, etc) not being integrated aesthetically and functionally to the existing buildings.
3) Illegal room additions to the roof are not built with public safety and durable tectonics.
4) The valuable outdoor spaces on the roof especially for a high-density city were long being deprived.
5) Many dated piping and building electrical systems not being properly laid out and repaired.

In response to five critical issues above, our Orchid House proposal aims to solve all these urgent issues at once with not only what's being carefully designed in the house but also the outdoor spaces shaped and enclosed by the new structure. We envisage a reclaimed civic space on the roof can offer a valuable social and economic engine to a new Taipei. Collectively, we plan to apply our roof design to all the 5 sites in a phased fashion. By carefully understanding demographics and existing activities within them respectively, the outcome of the Orchid House will not merely a standalone addition to our skyline. They will form into clusters, interdependent social and economic ecosystem not only within but across communities. Most critically, our proposal will become an integral part of the old communities. Finally, they will trigger transformation of old neighborhood to create a unique lifestyle for each one, whereby both newcomers and existing residents can emotionally identify with their own living environment and ultimately a sustainable urban renewal outcome can be arrived.



Pedestrian Circulation

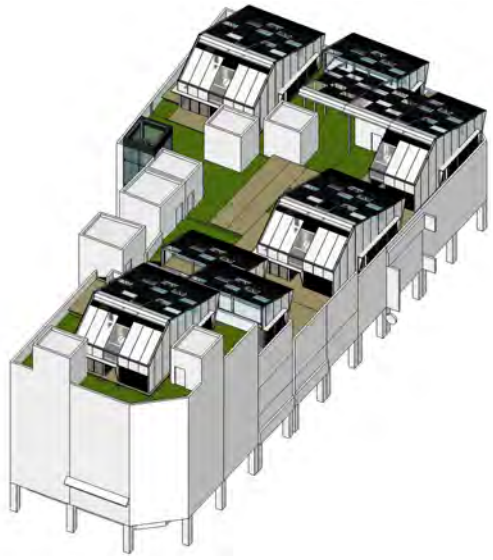
Ximending has several narrow alleys which is good for making a new entrance for the Orchid Cluster



Vertical Circulation

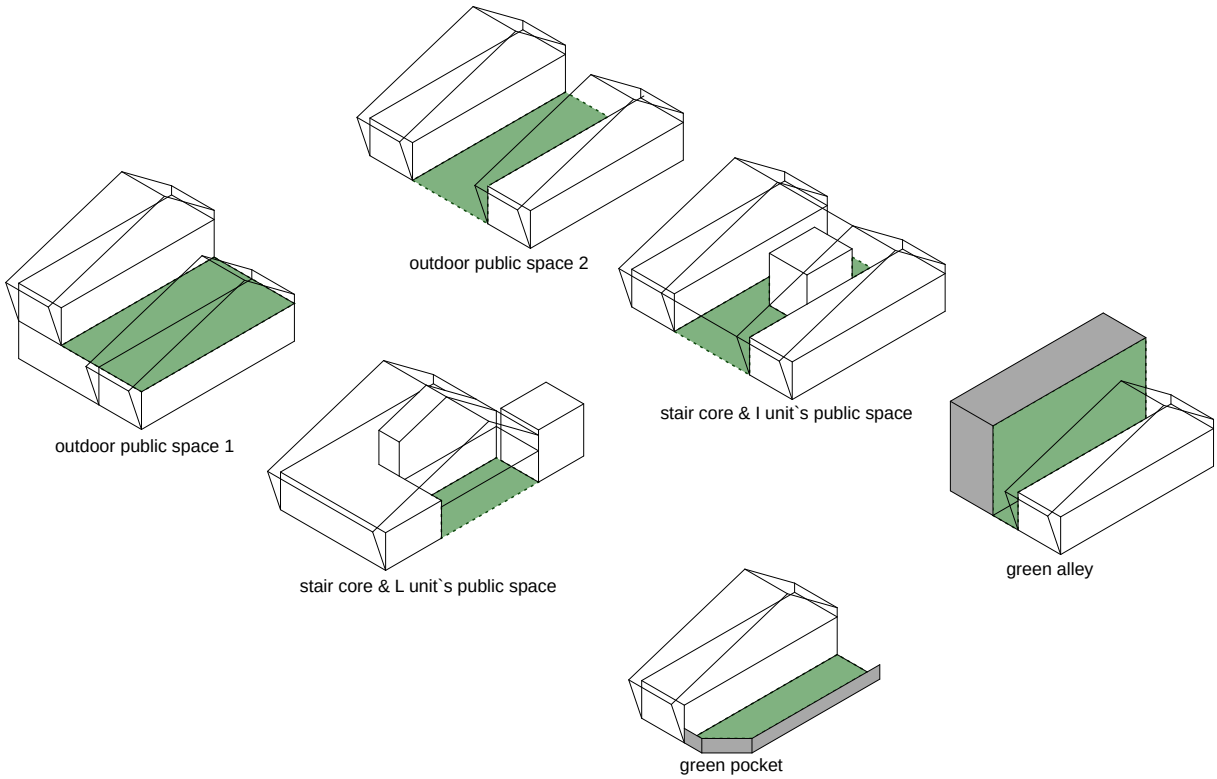
Within the block, 2 locations are identified to locate elevators and staircase

The proposed Orchid House set forth in Architecture section will serve as a prototype. Based on the available lot sizes and specific building conditions, i.e. the shapes of the roof, the locations of the existing elevator or stairway shafts, mechanical rooms, access to the street level, we will form Orchid House into clusters which are inspired by Taiwanese traditional courtyard style housing setup. With properly designated proportion (50% residential, 25% open green area, and 25% circulation space) of outdoor spaces relevant to indoor sizes, we believe that newly created common areas will vastly transform mostly isolated and independent city life. This arrangement also speaks to the need of co-working and co-living lifestyle to foster new businesses being materialized.



In the five selected sites, the buildings used to exemplify our Orchid House Cluster and the economic generating concepts are mix-use in type. Strong commercial activities at street level signify the themes that long help the neighborhoods develop their own characteristics. Bringing the new economies and existing commercial activities together would help the newly developed communities at the roof level arrive a self-sufficient status, which would encourage socializing between the old and new residents but also minimize the traveling costs which often seen as an issue in newly developed area in Taipei. We understand that building hardware such as physical construction for a city is much easier than ensuring the success of complementary commercial activities. By leveraging the economic energies of the existing sites would not only avoid erasing any given characteristics of the areas but also reduce the living expanses of these young professionals.

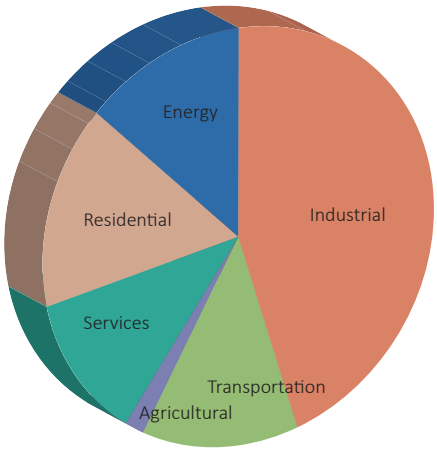
Stair Core
Elevator Core
5F
4F
3F


outdoor public space 2
outdoor public space 1
stair core & I unit`s public space
stair core & L unit`s public space
green alley
green pocket

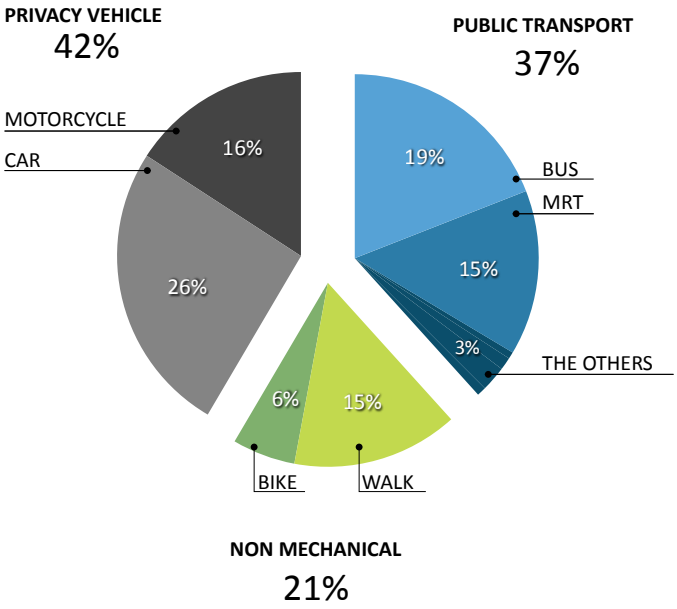
5.1.4 Transportation and Mobility Characteristics

Based on the research by Environmental Protection Administration (EPA), Taiwan is ranked 17th the world and ninth in Asia in terms of its carbon footprint. Each person in Taiwan, on average, produce 10.89 tons of carbon emissions a year, which is more than its Japan and South Korea, and daily per capita carbon footprint of 19.6 kg, almost four times the UN recommendation in 2011.

Even though the highest carbon footprint sector is industrial, Taiwanese transport sector contributes its carbon emission by 14% of all. Among this transport sector, the road vehicles including motorcycles, passenger cars and trucks account for approximately 94% of all transport-related carbon dioxide emissions. Vehicle ownership in Taipei shows extremely high growth rate from 1980 to 2000 by 430% for cars and 173% for motorcycles due to the relatively poor level of service of the bus system. These high number of vehicle bring environmental pollution as well as traffic congestion. The average speed of private cars in Taipei city is about 20 kilometers per hour in peak periods while that of buses is about 10 kilometer per hour. Taipei city needs new transportation system, which contribute less carbon emission and street congestion. NCTU UNICODE propose green e-motor cycle parking system along with the Orchid House ground level for removing street parking and creating more renting e-motor cycle spots in the city.



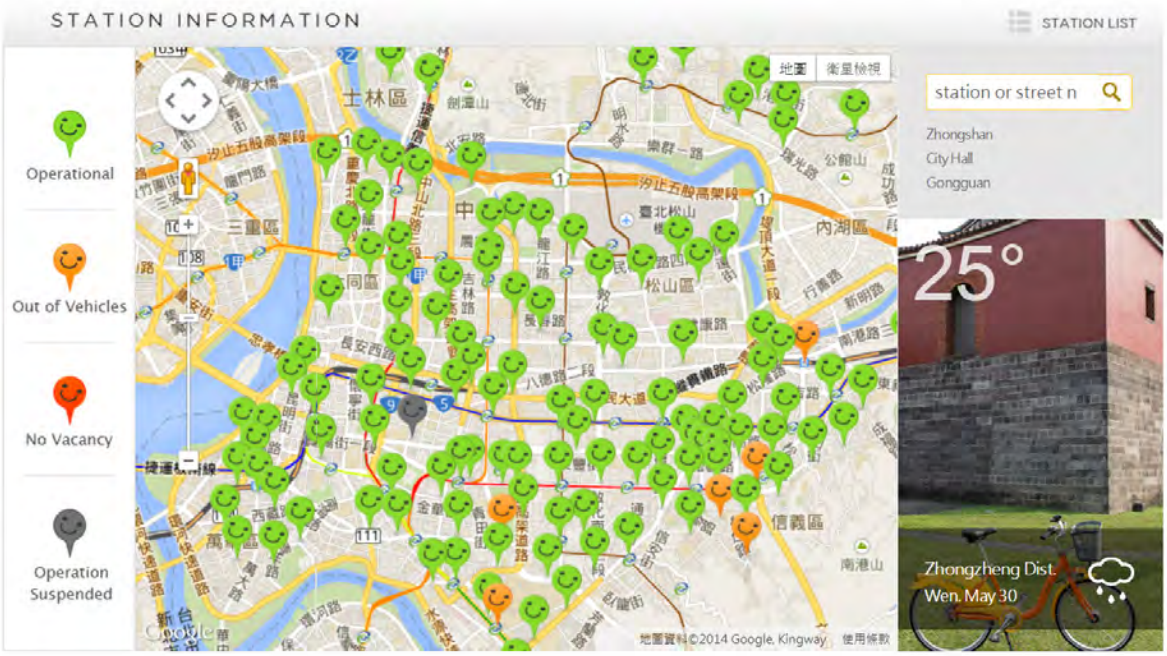
CO2 Emission graph



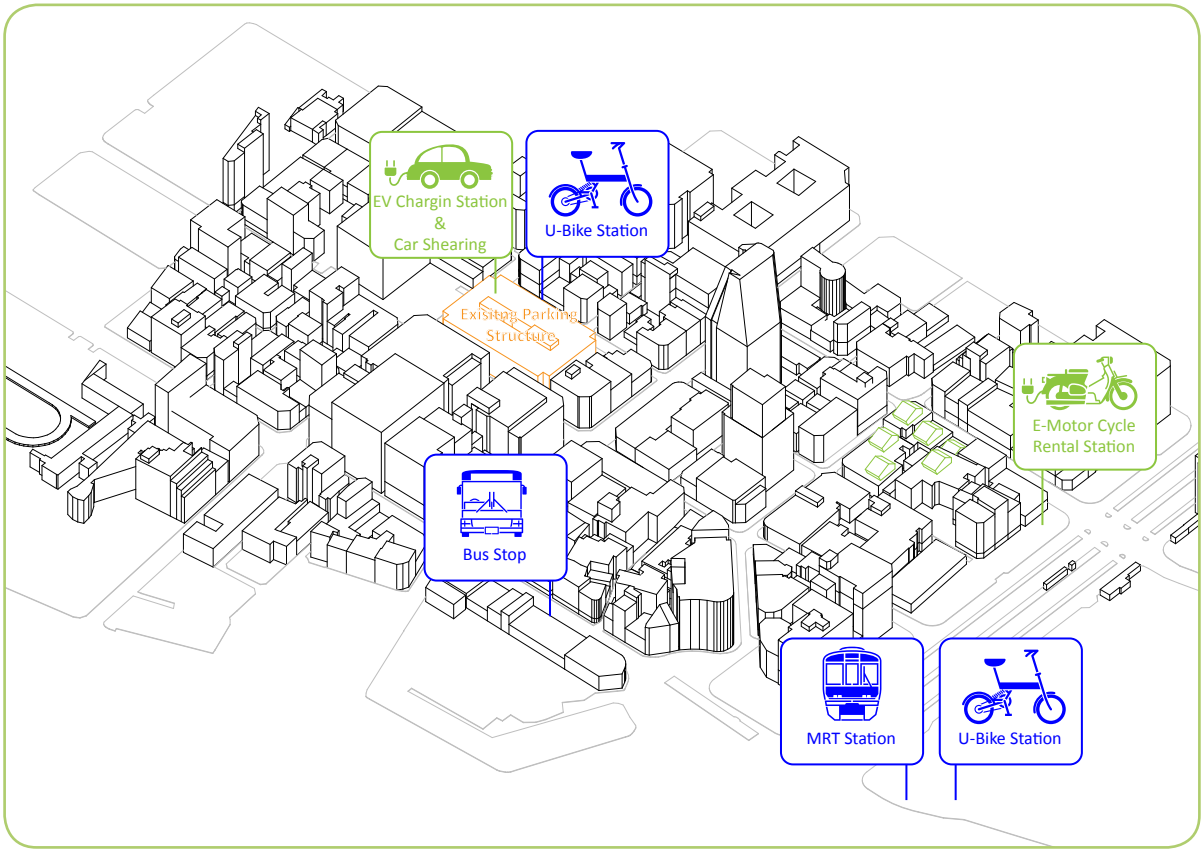
Taipei Traffic Condition

The Taipei traffic condition can be divided into three sectors: public transportation, private vehicles and non-mortared. Private vehicles such as car and motor cycles occupy 42 % followed by public transportation 37% and non-mortared 21 %. However, these private vehicles generate most of carbon dioxide among the transportation sector. Also due to overpopulated cars and motorcycles, Taipei city streets are packed with street parking. It is similar condition as congesting blood vessel in human body.

In order for Taipei city to maintain healthier infrastructure, we need to solve overly populated vehicles in the city by providing better and more convenient public transportation system. U-bike system has been implemented into city public transportation system well since 2009, and the available station has been increasing dramatically. We think adding similar services, but faster in speed will help the city public transportation to be improved.

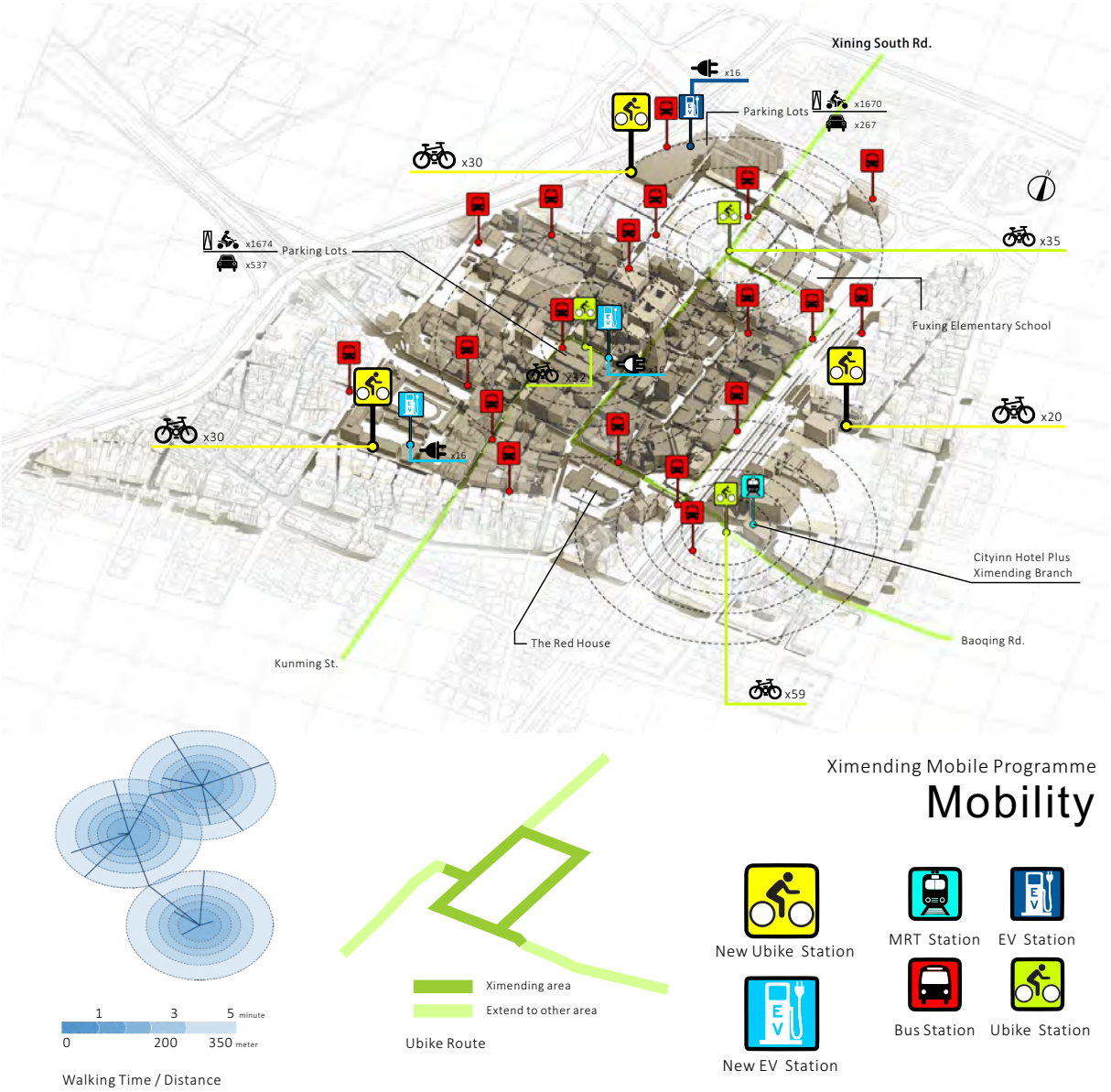


Taipei U-bike System



Rental EV station integration to existing infrastructure

Smart grid system provides Ximending district to be well connected in terms of collecting and sharing what is happing in the district lively, such as traffic data and public transportation. We propose new electric vehicle charging station where people can rent electric car/motorcycles to map the district much finer mesh to be able to access other locations without relying on private transportation methods. These stations are installed in existing parking structures or street open space to avoid conflict between overcrowded street conditions and vehicle availability is shared online website or smart phone application for user to check the up to date status.

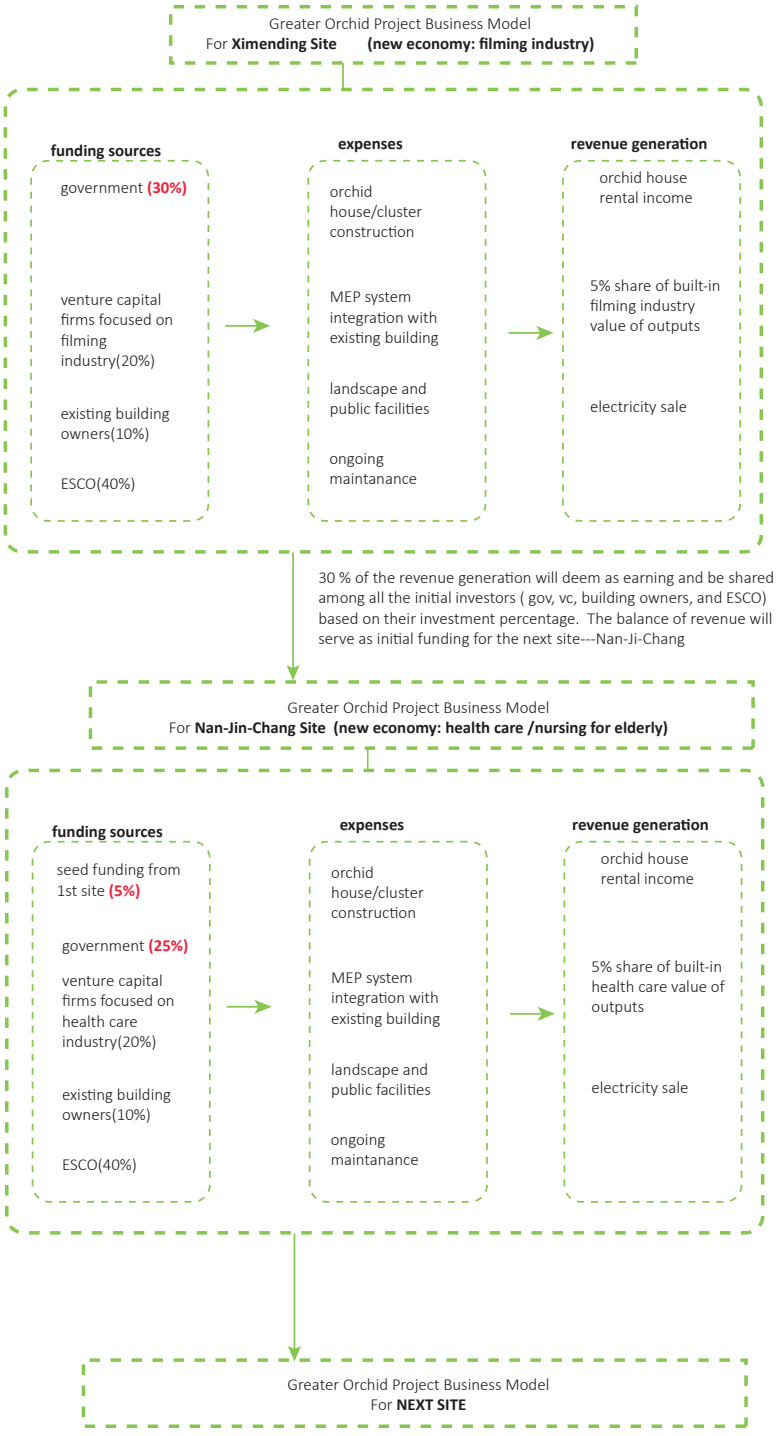


Ximending District-wid public transportation Plan

5.1.5 Affordability

Business Model & Financial Verification

By extending the above mentioned governmental supporting programs, we aim to create joint venture program specifically for Greater Orchid Urban Renewal project. The whole project will be implemented in a phased fashion. The ultimate goal is aiming to create self-sustained business model. In time, the reliance on governmental funding will be gradually lessened one site after another and supplemented by profits generated by Venture Capital funded new economies. See the business model structure below:



Structure of Business Model:

In the following cashflow projection, we assume a 2 year time frame for Ximending site to be completed in 5 street blocks. The projection is built in three categories: (Funding Sources, Expenses, and Revenue).

a. Funding sources/investors:

1. Government fund:

Besides the before mentioned Youth Housing and Start-up's governmental programs, for specific aged buildings, government will also provide matching financial support. The current funding and scope related to renewing old housing buildings are detailed below:

1).Sponsored Targets: Buildings older than 20 years or 7 story-high ones without elevators.

2).Sponsored Items:

i.Adding elevators.

ii.Adding handicapped accessible spaces to even sidewalk level difference.

iii.Repair exterior wall materials, etc.

3).All the above mentioned items, can be sponsored up to 45 % of the total construction cost. However, the sponsored amount cannot exceed €250,000 The Greater Orchid Urban project will take only 30 % matching governmental contribution for our proposed Concept. However, this matching percentage will decrease over time.

2. Venture Capital fund focus on filming Industry:

1).20 % of the project funding will be provided by partnership Venture Capital (VC) firms comprised of experts from filming industry. This portion of the funding will be used as seed funding to boost collaboration amount talents reside in the Orchid houses and assist commercializing ideas. Thus the new economies can be formed.

2).Representative from the VC firms will sit in the Orchid Tenant Selection committee to ensure talent alignment.

3. Existing housing owners:

For old housing renewal, as described in Government fund, Government will only contribute the 45% of the required construction cost, the other 55% will be provided the existing housing owners. In our Greater Orchid Project, with diverse funding sources, the existing owners will only have to provide 10%, which is significantly lower than the urban renewal policies been implemented. This will be an efficient incentive for more owners of old housing suitable for Greater Orchid Project to participate

4. ESCO (Energy Service Company, ESCO):

This typed of companies have been in existence in 15 countries including UK, US and Japan for several years. Recently ESCO is also established in Taiwan. ESCO's main function is to push implementation of energy-saving. By integrating energy saving and loan experts, ESCO is able to customize a service proposal for their clients. The required fees are paid back in an agreed timeframe from the benefits of energy consumption improvement. Because of ESCO's involvement, the clients do not have to borrow the funding, which helps incentivize the collaboration.

In our Greater Orchid Project proposal ESCO will serve as one funding source among others. It's financial contribution will amount to 40%. With this partnership, our project will greatly benefit from their energy specific financial and technological know-how.

b. Expenses:

1. Construction of Orchid House and Clusters & MEP and system integration with existing buildings:

Based on our cost estimate, on average, each Orchid House (size of the prototype) construction cost is €200,000. In each street block (100mx50m) equivalent10 prototype-size Orchid Houses will be built and formed into a cluster. To achieve a sufficient urban regeneration scale, we plan to apply Orchid Cluster on 5 street blocks in Ximending area. We estimate additional 10 % of basic construction cost for MEP system integration and necessary landscape and pubic facility. In addition, for each street block, the required 3 elevators will cost around €90,000 (€ 30,000 each). Therefore, the total construction cost for each street block to implement our design proposal is shown as below(chart #1):

Chart #1

Project Cost				
	unit cost (€)	Quantity	Total(€)	Total 5 street blocks
Orchid House	200,000	10	2,000,000	
MEP integration and landscape	20,000	10	200,000	
Elevators	30,000	3	90,000	
			2,290,000	11,450,000

2. Ongoing Maintenance:

We plan to have 5% of total Orchid House construction to be allowance for ongoing maintenance for the built elements. That amounts to €572,500 (see chart #2)

				Chart #2
Project Expenses				
	unit cost (€)	**Quantity**	**Total(€)**	**Total 5 street blocks**
Orchid House	200,000	10	2,000,000	
MEP integration and landscape	20,000	10	200,000	
Elevators	30,000	3	90,000	
			2,290,000	11,450,000
Ongoing Maintenance (5%)				572,500
Total Expenses on Hardware Construction				12,022,500

c. Revenues:

1. Orchid house rental Income:
Based on the following hypotheses, we are able to build 236 units equivalent 24 m2 (minimum dwelling unit size per Youth House project), annually we are able to obtain €2,097,900 rental income from all 5 street blocks in Ximending (see chart #3&#4):

1. Average block size of exemplified site at Ximending **100mx50m** and build coverage rate **70%**

2. Average current market monthly rent of 24 m2 studio unit in the same area: **€185**

3. Orchid House tenants pay **80 %** of market rate

4. Total Orchid House interior floor area to footprint ratio: **1.62** (based on the prototype of Orchid House)

		Chart #3
Orchid House Total Rentable Area per 100m *50m street block		
Total roof area		5,000.00
Total Coverage Ratio (70%)		3,500.00
FAR (assuming all the implemented orchid house has similar ratio to the prototype)		1.62
Total Floor area		5,670.00
equivalent number of 24m2 dwelling unit		236.25

Chart #4

Rent (Ximending)	Studio Size(m2)	monthly rent(€)	Allowable 24(m2) size unit quantity	Monthly Total rental income per 100m*50m street block(€)	Monthly total 5 blocks rental income(€)	Annual total 5 blocks rental income(€)
Market rate for minimum Unit size (24m2)	24	185				
Orchid House minimum Unit (80% of Market rate)	24	148	236	34,965	174,825	2,097,900

2. Share of new economies generated from orchid clusters:

Greater Orchid House project will receive 5% of value of output from the filming industry built in our clusters, they include the following products, but not limited to:

a) Script writing sale
b) soundtrack sale
c) move scene (those filmed in the orchid house) rental
d) performance agent
e) movie box office sale
f) DVD sale, etc

Based on the data provided by Ministry of Culture for filming industry regarding value of output and growth rate (year 2009 to 2011)as shown below, we can see filming industry is definitely a growing economy and worth further developing.

Assuming Taiwanese filming industry will continue its strong growth and we use the output value figure in 2011" 0.38" billion as a minimum figure, Greater Orchid Project 's annual income from the incubated filming industry will be **€38million**. With that, Greater Orchid House project will have revenue **€18,991,250 annually**. (see chart#5, we assume that 1st is preparation period and will not have value output until the 2nd year)

Chart #5				
Taiwanese Film Industry Value of Output				
		Year		
Industry Classification		**2009**	**2010**	**2011**
Film	Value of Production (Unit:€1 Billion)	0.26975	0.3034	0.379825
	Growth Rate	3.17%	12.47%	25.19%
Assuming Filming Industry on a steady growth. (For the minimum yearly output projection, we use the figure from year of 2011(€)				379,825,000.00
5% of the value output will be Orchid Project's Revenue(€)				18,991,250.00

3. Electricity sales:

In Taiwan, on average, each orchid house generates 9506 kWh/year, projected annual use is 3,436.5; the balance is 6,069.5 kWh/year.

With more than 50% of the electricity not being used within Orchid Houses, we plan to sell it back to Taiwan Power Corporation. Collectively from all the 5 street blocks and sales price per kwh €0.24, the Greater Orchid Project is able to produce €71,772 annually.(see chart #6)

Chart #6					
Revenues 3: Electricity sale					
Electricity Sale back to Taiwan Power Corporation	**Yearly amount (kwh) per orchid house**	**Yearly amount (kwh) per street block**	**Yearly amount (kwh) from all 5 blocks**	**Sales price per kwh (€)**	**Electricity Sales income from entire Ximending site(€)**
Orchid House electricity generation	9,506	95,060	475,300		
Orchid House electricity use within it	3,437	34,365	171,825		
Balance for sale	6,070	60,695	303,475	0.24	71,772

Summary of the cashflow projection (see chart #7, 8, 9):

As demonstrated in the cashflow summary below. In two year time, only with the funding needed for hardware construction, we are able to generate significant amount of revenue. After paying back 30% of the revenue to all the respective initial investors, we still have large enough amount (€16,331,415.57 >€12,595,000) to cover the Orchid Cluster hardware construction (assuming similar scale to Ximending) . The balance of that can add to the seed funding for more cash heavy reliance of the next new economy, in our case, “Health Care” in Nan-Ji-Chang.

Therefore, our cash projection has summarized that assuming 2 years development for each site to mature to a steady stage in new economies, reliance on outside funding will be greater lessened site after site. The self-sufficient financial status can even be achieved earlier, should we can manage to grow the respective new economies more efficiently.

Moreover, compared to the initial funding provided by each investors for the initial construction expenses(see chart #2), in 4 year time, the total amount paid back to them can already recover their invested capital.

			Chart # 7
Cash Flow Projection (in 2 year time frame)			
Assuming Filming Industry will not have value output until year 2			
Funding Needed (€)			
Government	30%	3,778,500.00	
VC	20%	2,519,000.00	
Building owners	10%	1,259,500.00	
ESCO	40%	5,038,000.00	
			12,595,000.00
Expenses(€)			
Orchid House Construction, MEP integration,		11,450,000.00	
On going maintenance(2years)	5%	1,145,000.00	
			12,595,000.00
Revenues(€)			
Rental		4,195,800.00	
Filming Industry		18,991,250.00	
Electricity Sale		143,543.68	
Total			**23,330,593.68**

Chart # 8		
Revenue Balance after payback for investors on the first site		
Percentage to be distributed among investors	30%	6,999,178.10
Cash balance for the following site development(€)	70%	16,331,415.57
For the next site, assuming Urban Renewal scale the same as the Ximending Site, only the balance from it can cover the hardware construction		

Chart # 9				
Payback distribution among investors				
		after first two years	after 4 years	Initial Funding Provided
Government	30%	2,099,753.43	4,199,506.86	3,778,500.00
VC	20%	1,399,835.62	2,799,671.24	2,519,000.00
Building owners	10%	699,917.81	1,399,835.62	1,259,500.00
ESCO	40%	2,799,671.24	5,599,342.48	5,038,000.00

5.2 Architecture Design Narrative

Synopsis

Local Context: Taipei City

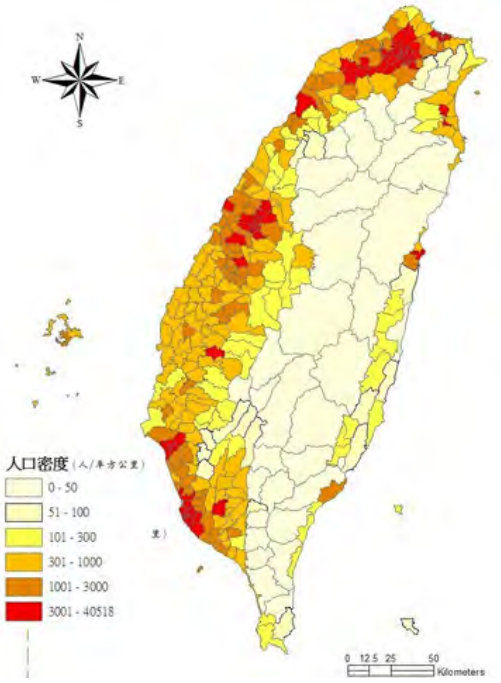
Taipei City Skyline - Urban Context

Taipei Rooftop

Taiwan is a country spanning only 36,193 km2 but with a population of 23.34 million (compare with France's 674,834 km2 and 65.7 million people). The population density is especially high because two-thirds of the island is composed of mountains, and as a result most people live along the coastal areas. It is especially crowded in urban areas, such as the capitol city, Taipei, which is one of the top ten densest cities in the world. In addition to the high population density, Taipei also developed rapidly over the years, both of which contribute to a random assortment of architecture in the city that expands horizontally instead of vertically to conserve space.

However, also as a result of the rapid development, many of the residential buildings were not built to last and have infrastructure that is now rundown or outdated. In recent years, new residential buildings are sky scraper apartments, which are usually only affordable by the wealthy upper class because of the luxury design and locations in the city center.

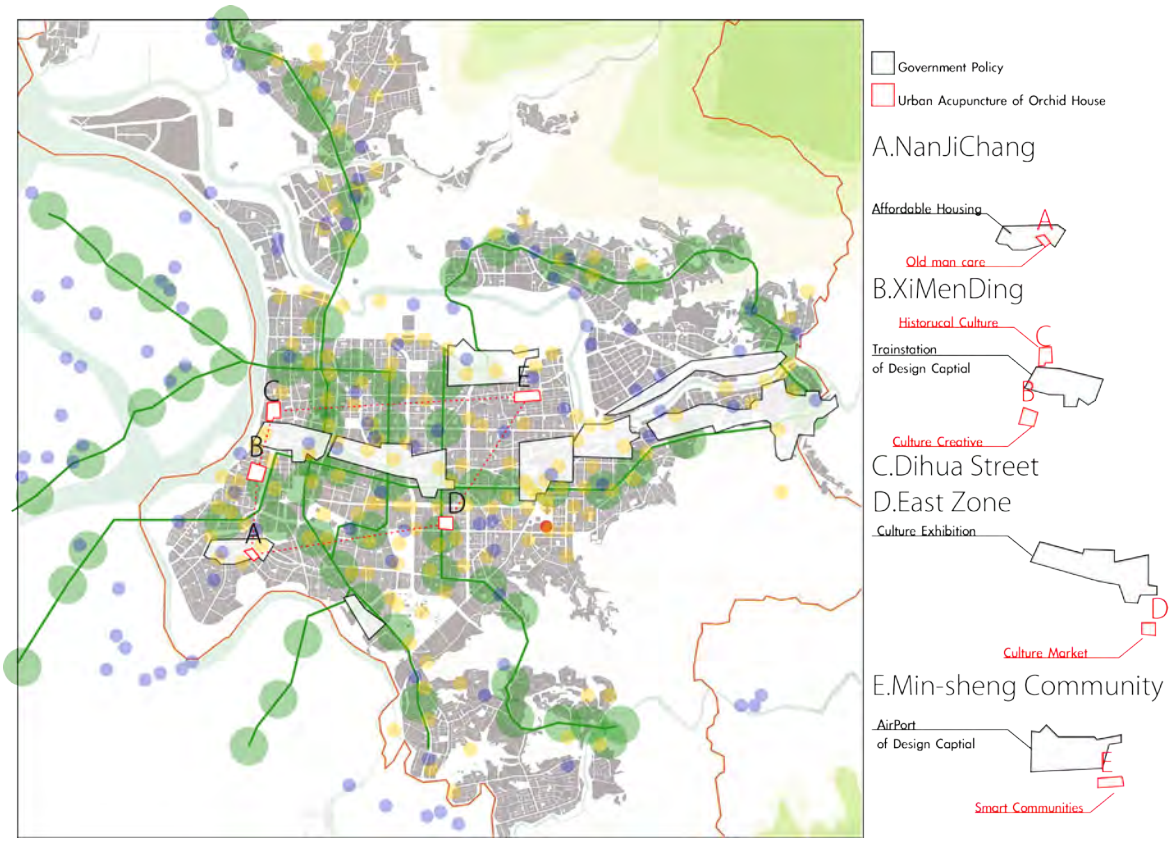
Taipei Urban Crisis



Population Deusity In Taiwan

This population growth results in the lack of living space and sufficient public amenity, and cause middle classes moving toward the periphery, even outside of city. The majority of these people are young professionals who just graduated from collage whom have worked a few years, and they are not able to afford a house yet. However, most of them works in the city center and commute, and caused major traffic congestions with millions of cars and motorcycle. Consequently, the city is left with a high carbon dioxide pollution, and the decrease living quality.

Taipei Urban Acupuncture

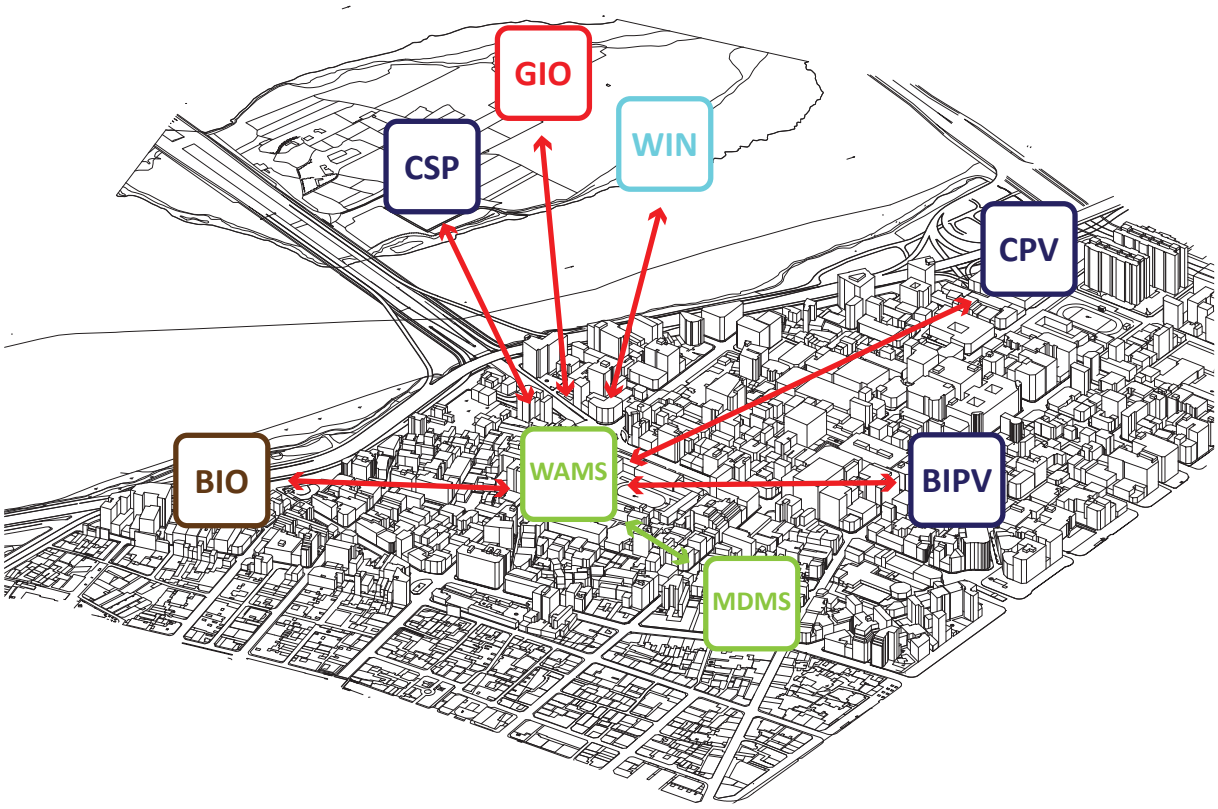


Ximending District

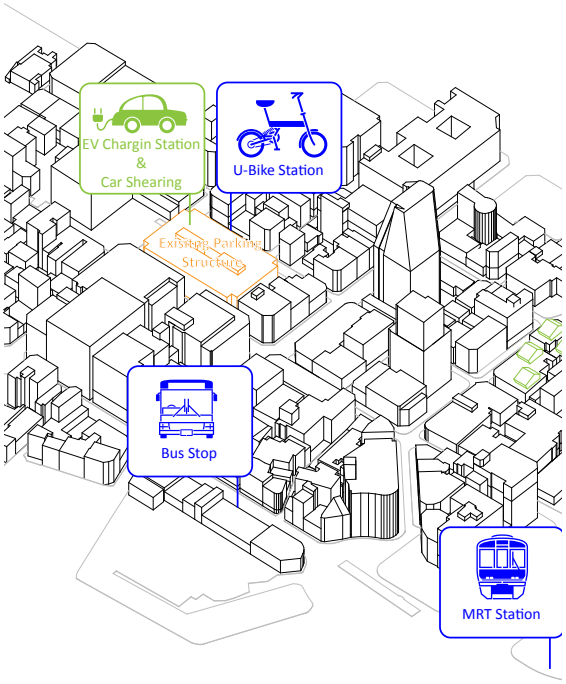
Taipei city population reached its 20-year peak and residential building has been constructed in various types. The majorities are a duplex apartment, which is relatively wide and 4 to 5 story building, and a row house that is extremely narrow and deep single family owned. These two types were constructed during the modern democracy period. Most of flat-roof duplex apartment and row house are facing problems: leakage, heat absorption and no public facilities. Therefore, the illegal make-shift metal roofed shelters have been introduced widely in most of the residential buildings and create unregulated cityscape of Taipei.

For Orchid House urban design strategy, NCTU UNICODE focus districts where the most of duplex apartment and row house are located as the most needed area for urban regeneration to vitalize not only the residential building, but also these districts.

Zero Energy District



Ximending Smart Grid Concept



EV Charging Station

As main focal point of Ximending Zero Energy District plan, NCTU UNICODE proposes not only PV panel implementation to buildings, but also larger scale of renewable energy sources such as CSP (Concentrated Solar Power), Biomass, Wind power and Geothermal. In order for all renewable energy sources to be distributed efficiently, advanced applications of Wide-area-Measurement System (WAMS) is installed one of larger footprint building rooftops, and Data Centre (MDMS) serve all the energy with automation system. Furthermore, AMI (Advanced Metering Infrastructure) is installed to Orchid House Clusters to manage power supply within houses. Please refer Architecture Design Narrative for farther details of AMI integration to housing appliances.

Orchid House Urban Concept

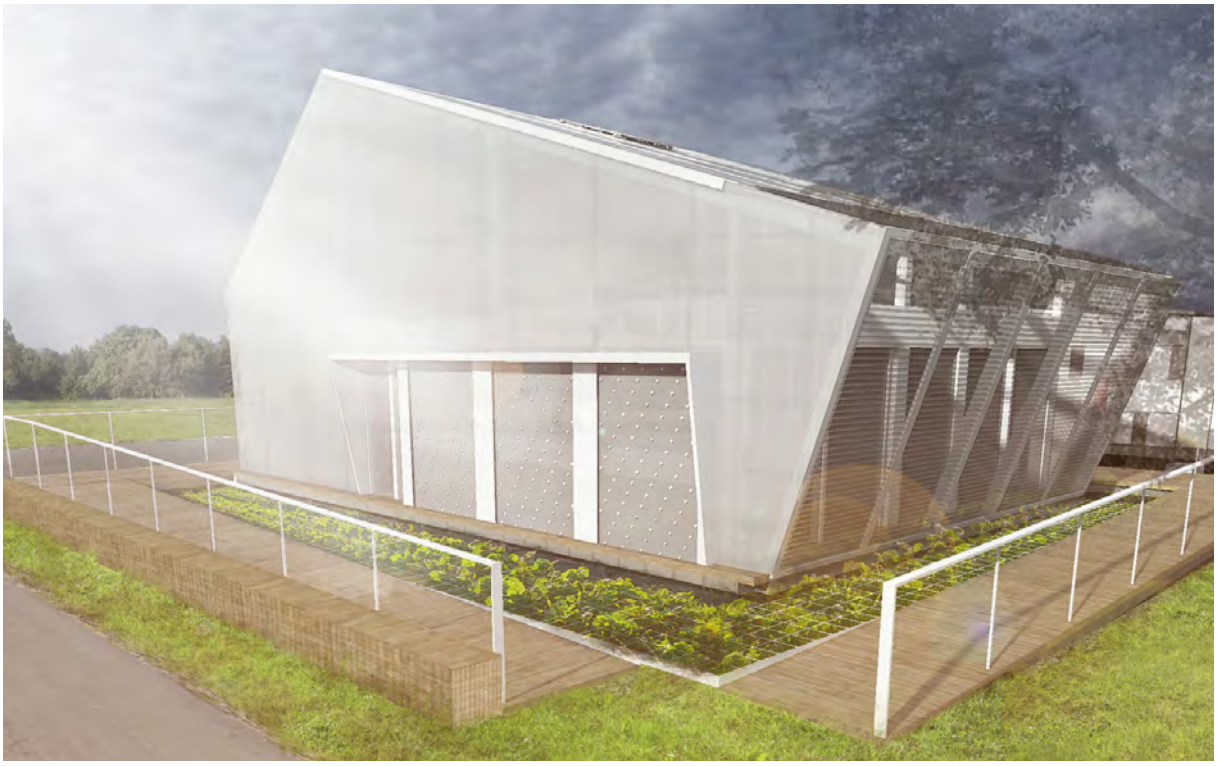
Orchid Cluster in Taipei Urban Context

Orchid Cluster Section

Orchid House extension on existing building in Taipei city plays not only critical role for Ximending zero energy district urban planning, but also to apply new concept of urban regeneration. Almost 50% of residential building in Taipei city are over 30 years old and typically demolished during the renewal planning. However, NCTU UNICODE points out the problem of city re-development organized by government and executed by private developers. The developer tends to acquire larger number of properties to combine the land FAR (Floor Area Ratio) to build up high-rise residential condominium, which is not affordable for average income level and treated as investment target by investors.

Orchid House will proved unique opportunity for not only the building owner, but also the targeted tenants, who needs housing support to pursue their young profession to promote new creative industry in Taipei.

Orchid House Prototype



Orchid House at La Cite du Soleil, Versailles, France

The Orchid House is as much a physical dwelling structure as a mindset for living. NCTU UNICODE hopes to use the Orchid House to revive Taiwan by focusing on urban centres. Urban areas in Taiwan, particularly the capitol city, Taipei, have high population densities and a random assortment of architecture – many buildings are old with rundown facilities. Furthermore, as in all urban cities but even more so because of the particularly high population density, commuter traffic causes extreme congestion, uses a lot of energy, and creates large amounts of pollution. Reviving the city would include not only renovating buildings and improving the residents' quality of life, but also promoting creativity and sustainability.

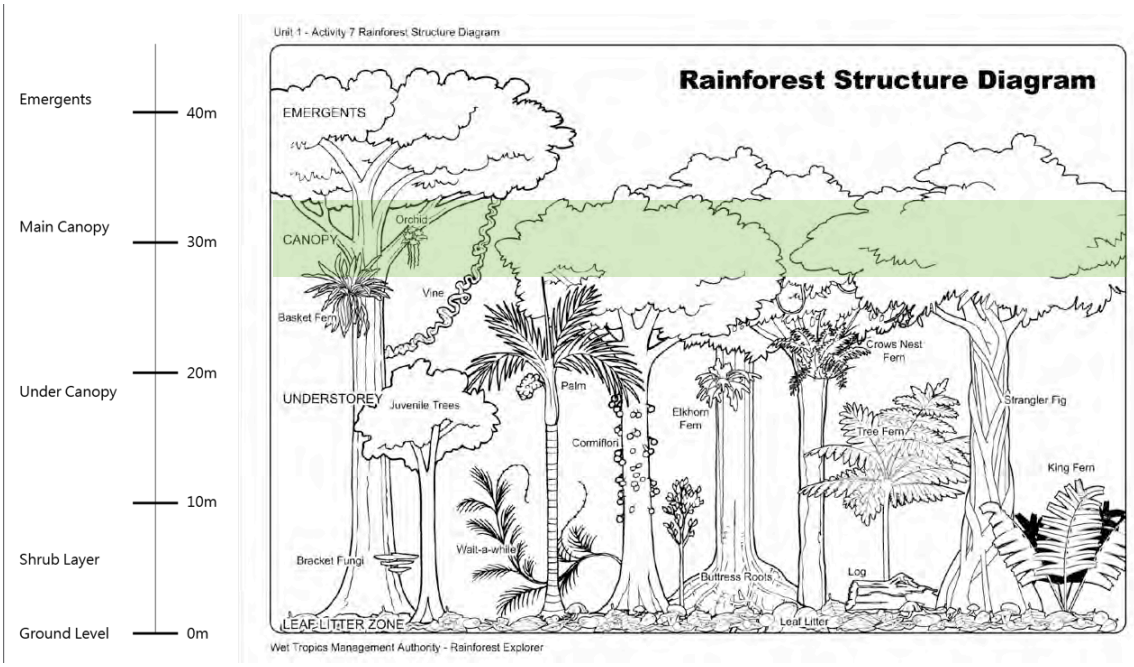
5.2.1 Architectural Concepts

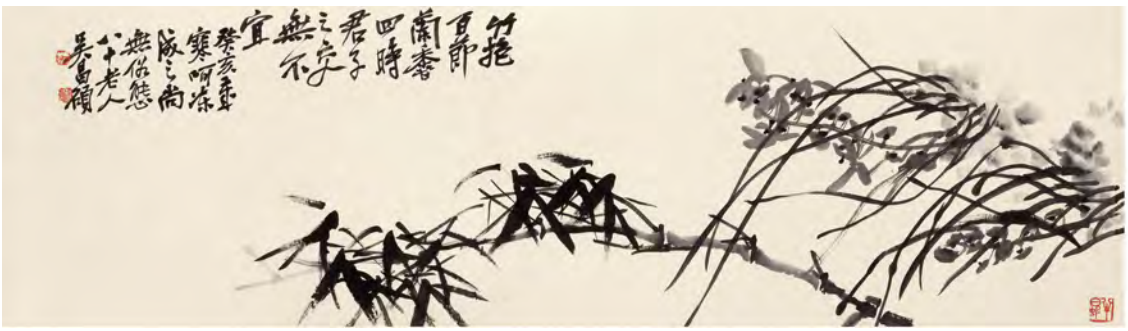
Orchid Inspiration

The architectural design solution of Orchid house responds to the urban issues of Taipei, and team Unicode tries to resolve problems such as heat island effect, excessive amount of storm water run-off, and energy shortage. Thus, the Orchid House will address these issues by providing innovative and forward thinking design, which is inspired by the wild orchids grow right underneath the canopy level.

In the tropical forests of Taiwan, orchid plants flourish by living on tall trees, nourished by the perfect balance of indirect sunlight and run-off rainwater. In the Chinese culture, orchid is often talked about with plum, bamboo and chrysanthemum, as the four gentlemen. It has a deep cultural meaning, and the elegance has inspired us to design a solar house which can be placed on the rooftops of existing houses in Taipei, which collects energy, retain water resource and provide more green plantation. Also, in the traditional Taiwanese rooftops, people often use the additional space to plant orchids. Our project gives the space back to tenants to continue their habits.

The NCTU/UNICODE will combine many sustainable technologies and innovative design solution to create the Orchid House, the first self-sufficient solar house ever built in Taiwan to compete Solar Decathlon Europe 2014.





Painting Of Orchid Chang-Shuo Wu

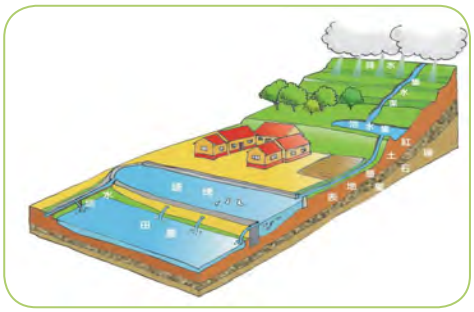
GREEN CORE BLUE SKY POWER HOUSE

Just to harvest sun and wind power is not enough to sustain people's daily functions. Currently, Taiwan is under huge debate over adding the 4th nuclear plants, which consists of two 1350MW capacity reactors. NCTU UNICODE believes that Taiwan's highly advanced institutional research capability and successful high technology industries together can develop a strong yet experimental renewable energy utilization for not only Taiwan, but also other countries and cities in the world.

In a country which natural resource is scarce such as Taiwan, we believe that "blue is the new green". We need to converse water, as it is expected to be the next crises. Taiwanese have long develope some interesting way of increase the efficiency in working, regarding to water supply. "Pi-tang" for example, is a series of wet lands which depends on only gravity to travel through the farm lands, and it has strengthened the agricultural in Taiwan drastically. However, Taiwan already has 96 dams, with total capacity of 2130,700,000 cubic meter worth of clean water, but making dams is not the only solution to reserve water. With Taiwan's abundant rainfall, Taipei basin floods almost every time when there is storm. To ease the city's sewage system, Orchid House provides a new solution to harvesting as much as 20,448 ton/year rain water for irrigation.

water resource

Pi-tang system



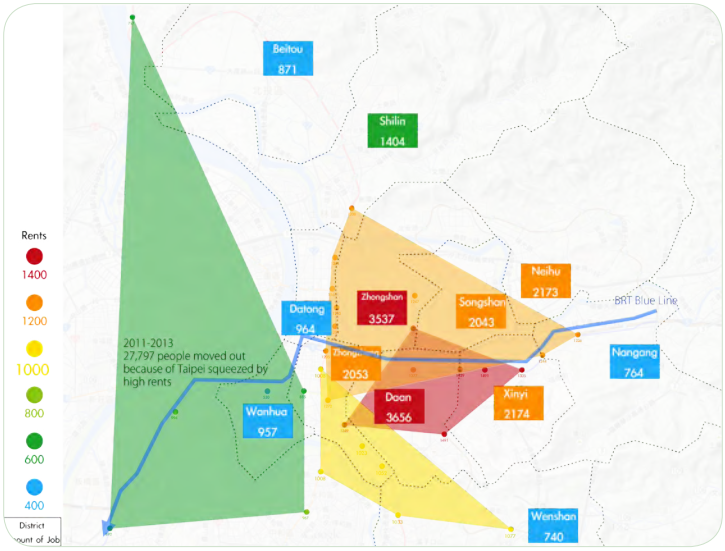
wet land for argriculture

renewable energy

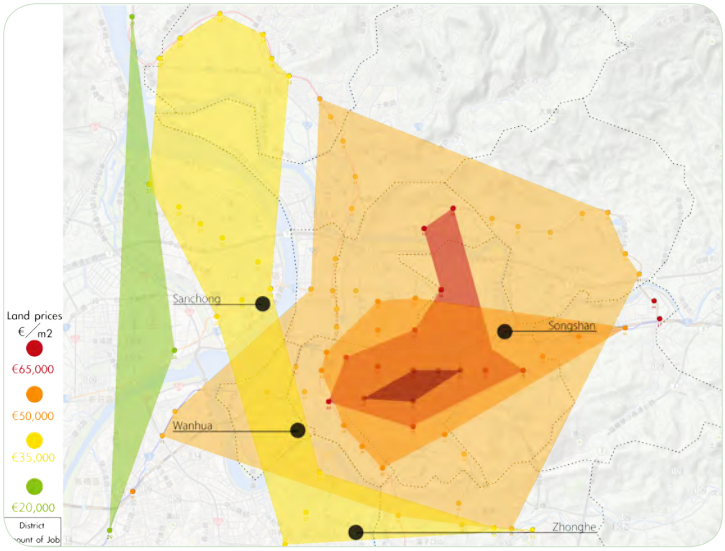
Taipei Context

The development of Taipei city has begun right outside of the “west gate “ of Taipei city, thus resulted in the city’s unbalanced distribution of old buildings and new construction toward the east. Map of Taipei showing the existing city centres stringed up by the Taipei Metro (MRT) mainly in the East-West direction, with several more North-South lines. Since it first began operations in 1996, the system has been effectively reliving Taipei’s traffic congestions problems. At the same time, the system has proved effective as a catalyst of urban renewal, as most tourist traffic goes along it.

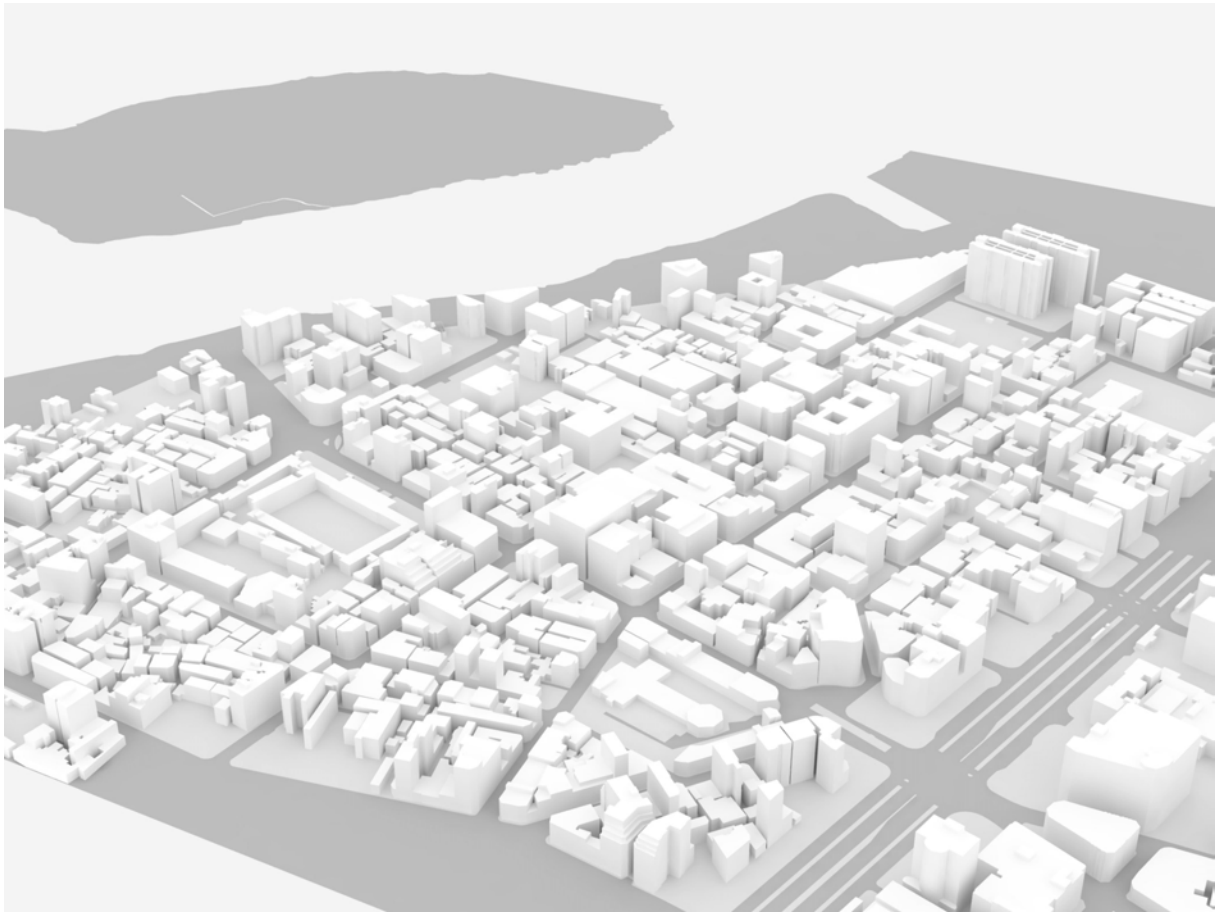
This population growth results in the lack of living space and sufficient public amenity, and cause middle classes moving toward the periphery, even outside of city. The majority of these people are young professionals who just graduated from collage whom have worked a few years, and they are not able to afford a house yet. However, most of them works in the city center and commute, and caused major traffic congestions with millions of cars and motorcycle. Consequently, the city is left with a high carbon dioxide pollution, and the decrease living quality.



Taipei commuter traveling zone



Real-estate value of Taipei city



Ximending district formation

In our urban strategy towards revitalizing the urban environment in Taipei, we have done an exclusive analysis of 5 sites. Within them, Ximending has been chosen to be the first development prototype of Orchid House cluster due to its urgency in terms of urban regeneration.

The goal of inserting Orchid Cluster in the Ximending area is to bring the younger generation back into the city and cut down their commute time. It is essential in the urban regeneration step because the clusters are forming a new economic engine, and the rooftop pockets can be used for both social and working. It is also important to create a neighborhood feeling so the distance between tenants are closer, and the security will be managed by residents.

It is composed of 4-5 story buildings with a chessboard street pattern, planed during the Japanese colonialization as a business district. The historical significance and modern values has formed an interesting cultural blend, and became a perfect place for young adults to gather, exchange information, and share ideas.

Ximending district 3D model

Orchid Cluster - Ximending Site

Aerial photograph of Ximending

In the 1st phase of the urban regeneration, our first acupuncturing point is at Ximending, which is located at the west side of the Taipei main station. It is an ideal site as most of the building are 4-5 story with a lot of vacancy. Our goal is to locate Orchid Cluster on the collective roof and make a new community for the young professionals related to creative industries with focus on movie productions.

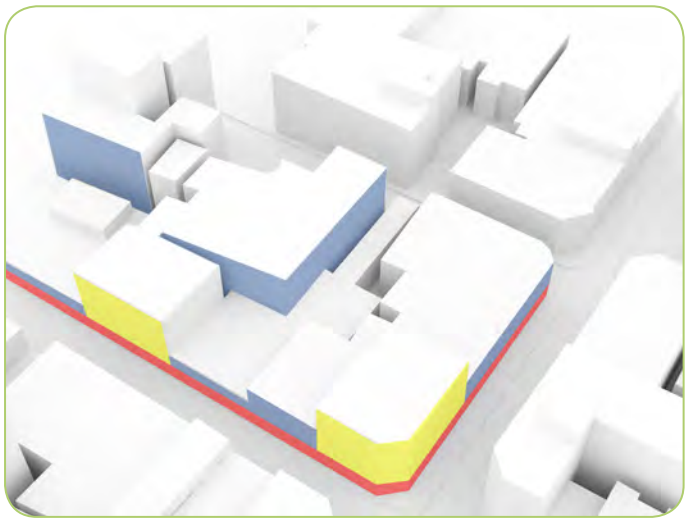
Before 1980, Ximending was considered one of most fashionable and expansive district of Taipei, but it experienced a short period of decline between 1985 – 2000, as Taipei city development progressed eastward. Fortunately, with the newly planned MRT (subway) system at the year of 2000, Ximending enters the phase of recovery. Under the masterplans of Taipei City Government, all storefronts and street-side benches were renovated, and more economic activities have been added. Furthermore, the street's illumination has been improved and more cultural groups and street performers have stationed in the area. The beauty of history and the youth culture interacts here and has become a great mix, resulted an exciting place to be. With young consumer as main target, Ximending becomes the most internationalized zone in Taiwan, and attracts a large number of oversea tourists to experience the real Taiwanese culture.

www.taiwan.net.tw

forum.pchome.com.tw

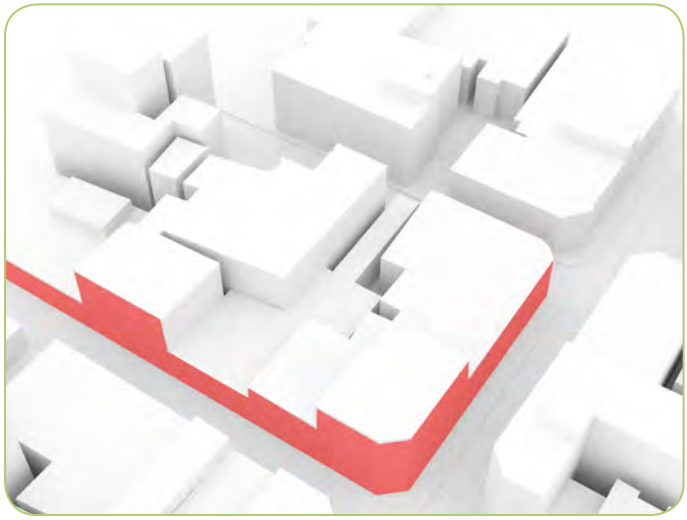
Orchid House will be constructed on top of these old buildings, to recreate rooftop spaces, enhance building structure and revitalize surrounding neighborhood. With the addition of Orchid House, we are estimating another 30 years of life time to be added to the existing buildings.

Cluster Formation



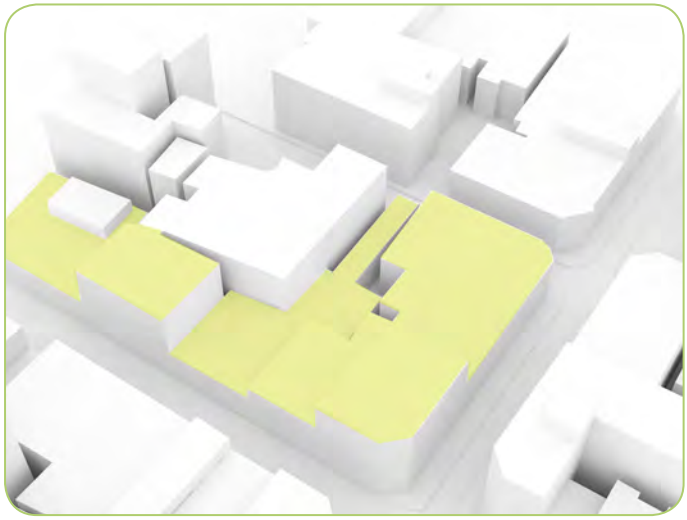
1. Programme

- Red: shops
- Yellow: offices
- Blue: residential



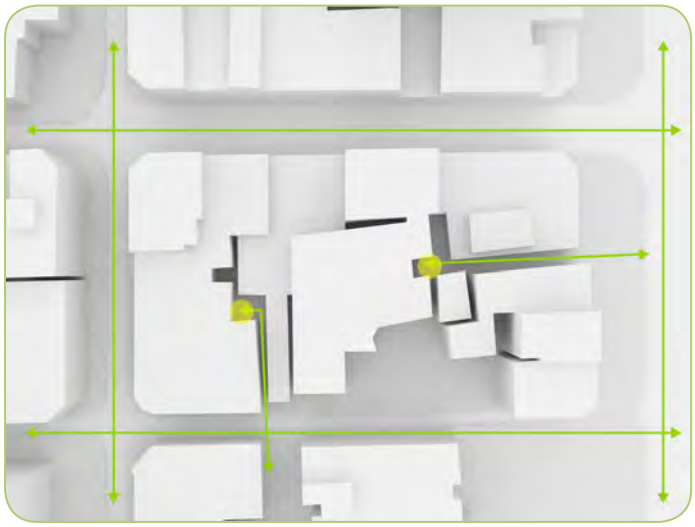
2. Alignments and setback

Ximending has a distinct characteristics of the “chamfered” corners, which allows a better viewing angle when turning



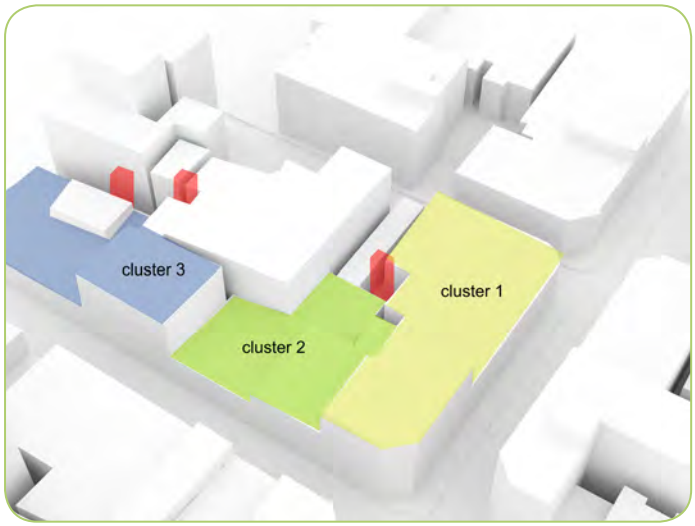
3. Potential rooftop surfaces

The highlighted rooftop area adds up to around 4360 square meters



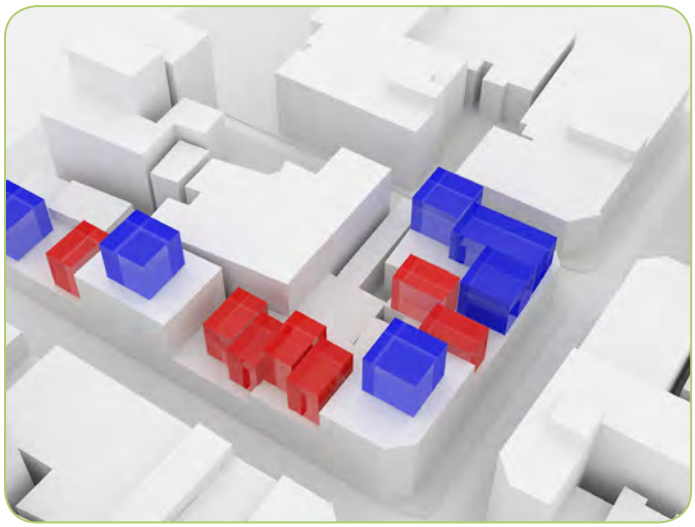
4. Pedestrian Circulation

Ximending has several narrow alleys which is good for making a new entrance for the Orchid Cluster



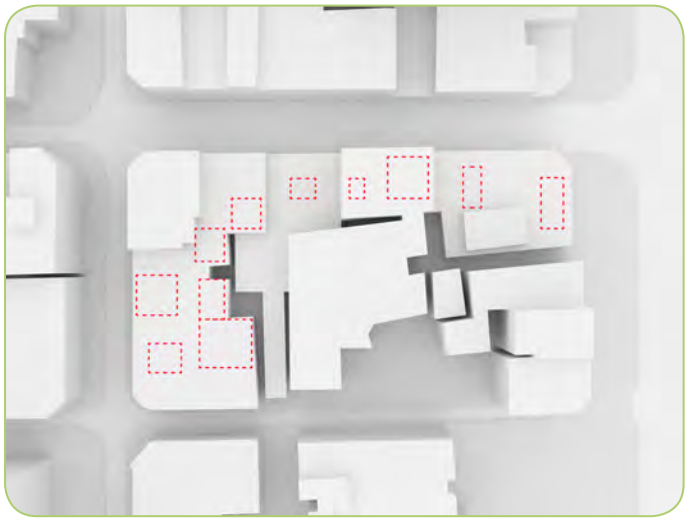
5. Three clusters

Within the block, 3 locations are identified to locate elevators and staircase



6. Cluster Location

Two types of units are placed on the roof:
six one-bedrooms (48sm each)
ten studios (26 sm each)

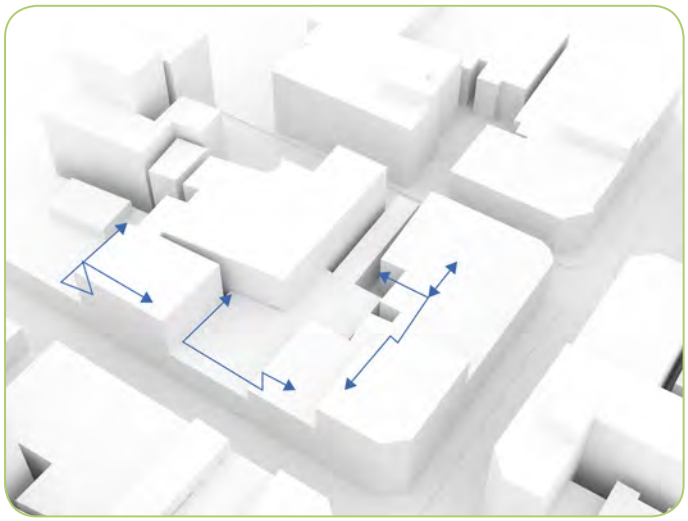


7. Cluster Pockets

To create a balanced rooftop space, several pockets are designed to host seperate meetings

8. Green space

2463 square meter (56.5%) of green space is released from the rooftop for public sharing



9. Outdoor walkway system

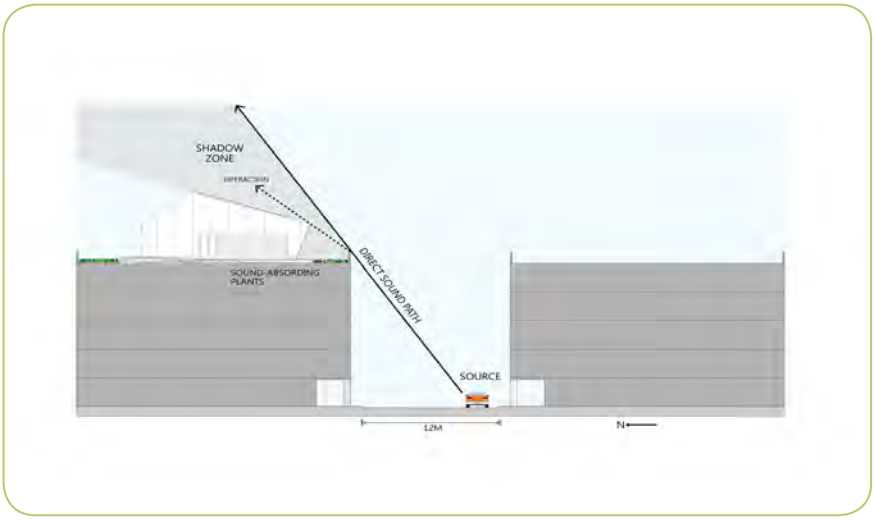
Elevated circulation path connects different levels of rooftop and create community zones

Massing Development

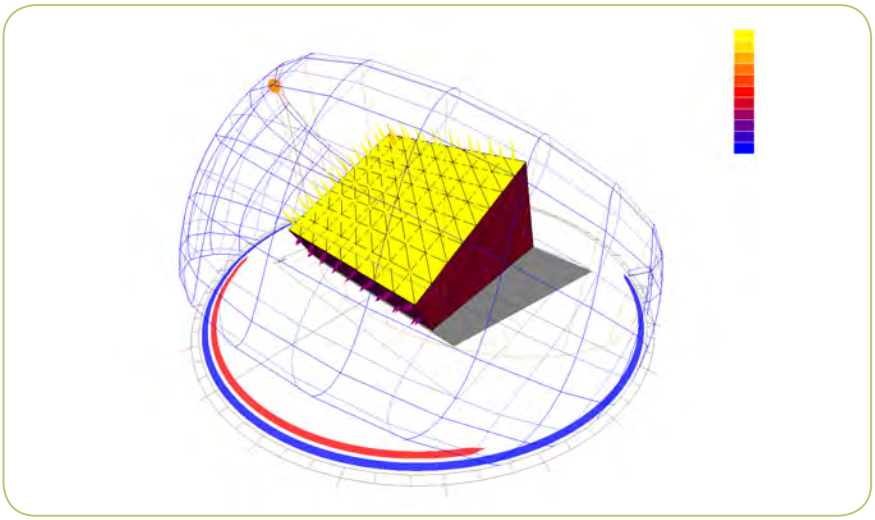
Taiwan suffers from visually unpleasant illegal rooftop structures that are made with metal sheets, and our solar house is an opportunity to solve this problem, along with other social issues and to promote sustainable living. NCTU/UNICODE takes the essence of this natural ecosystem, and regenerates new principles of housing design. The four principles are:

- Adaptable for a rooftop structure
- Functions as a micro eco-system
- Conserves and generates resources
- Combines both passive and active strategies

The geometry of the house begins with a rectangular box, which is then angled to maximize the performance of the house and reduce the heating and cooling loads. Orchid House is inspired by local Taiwanese orchid green-houses and provides a large housing unit made of a small conditioned space (56.92 m^2), surrounded by a larger envelope (147.2 m^2).



Relationship to streetscape



Ecotect Solar Radiant Analysis

Cluster Design

The Orchid House Program: a space for young professionals

The young professionals are selective people that went through team Unicode's application to enjoy the benefit of living in the Orchid House. Thus, the Unicode team propose a 5-year program, so the young professionals have their chance to persue deams. The selected tenant will also join exposition to share their experience living in a green environment, and pass on the (concept) of sustainability to the next groups of tenants.

Taipei has face some serious problems such as generation gap, as younger people can not afford the rent and turn to the periphery of city. This has created a social impact, and our goal is to draw the energy back to the city. However, most middle classes living in Taipei have roommates, and the average living space is around 16.8 m^2 per person. In the Orchid house, the usable area per person has increased to 28 m^2, including some common space to share. It provides the young professionals a higher quality of living environment, which becomes a platform for them to live and work in the unit.

To design for the filming industry related tenants, the Orchid Cluster includes the following programs in the complex:

1. Studio, 1-bedroom, 2-bedrooms
2. Open communal area, completed with seating
3. Small pockets spaces for separate meetings
4. Shared recording studios (smallest unit)

Cluster plans

Housing Type

Orchid House project proposes 2 types of housing plans to allow diversity in user groups.

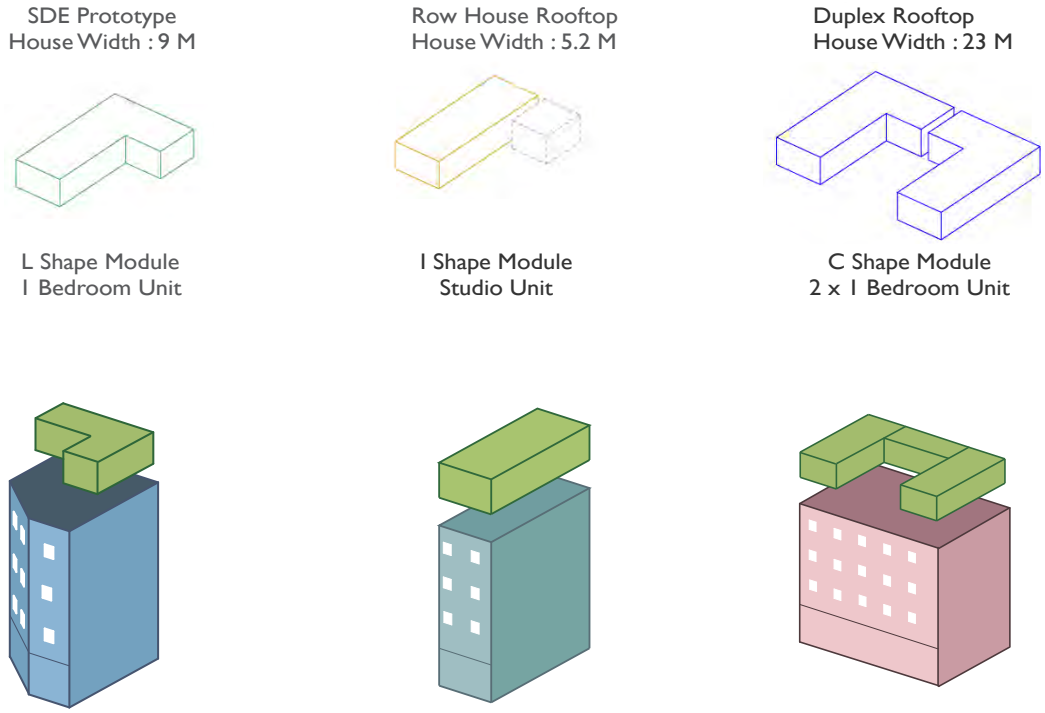


Diagram of row house and duplex roof top configurations

I-shape module

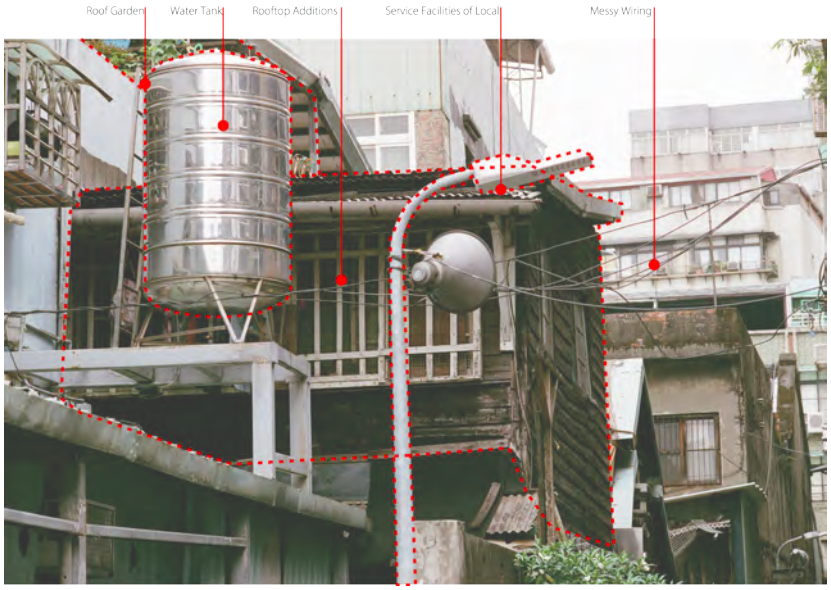
Most of the young professionals in the city will only need a studio space with cheaper rent. It is designed for 1 to 2 people, with a full kitchen and a restroom. The I-shape dwelling can easily fit in the 7-meter wide row house.

L-shape module

This one bedroom apartment is designed to host 2 roommates or a couple, who live and work in the unit. The module can adapt to the 14-meter wide corner building. The second floor mezzanine space provides extra space for office or laundry space.

Building Integration

The collective housing system of the Orchid House does not only add a new addition to the house, but also creates a chance to revamp the old building equipment, extend the building's life time. During the 1990s, Taiwanese economy is quite prosperous and it encouraged investors to develop the city. However, it was done under the pressure of time and money, thus, a lot of construction was rushed and done poorly. Most of the 15 to 20-year old building already have the problems of rusted pipes and insufficient electrical wires, that leads to clogging the sewage pipes, and dangerous electric overload condition. Therefore, it is recommended to change the water and electric equipment every 20 years.



Taipei Housing Condition

Furthermore, leaking rooftop is another major reason that shortens building life cycle. Being an island, Taiwan has a lot of rainfall with high salt content in the air. Before placing the Orchid House, we must first improve the waterproofing on the rooftop to prevent leakage.

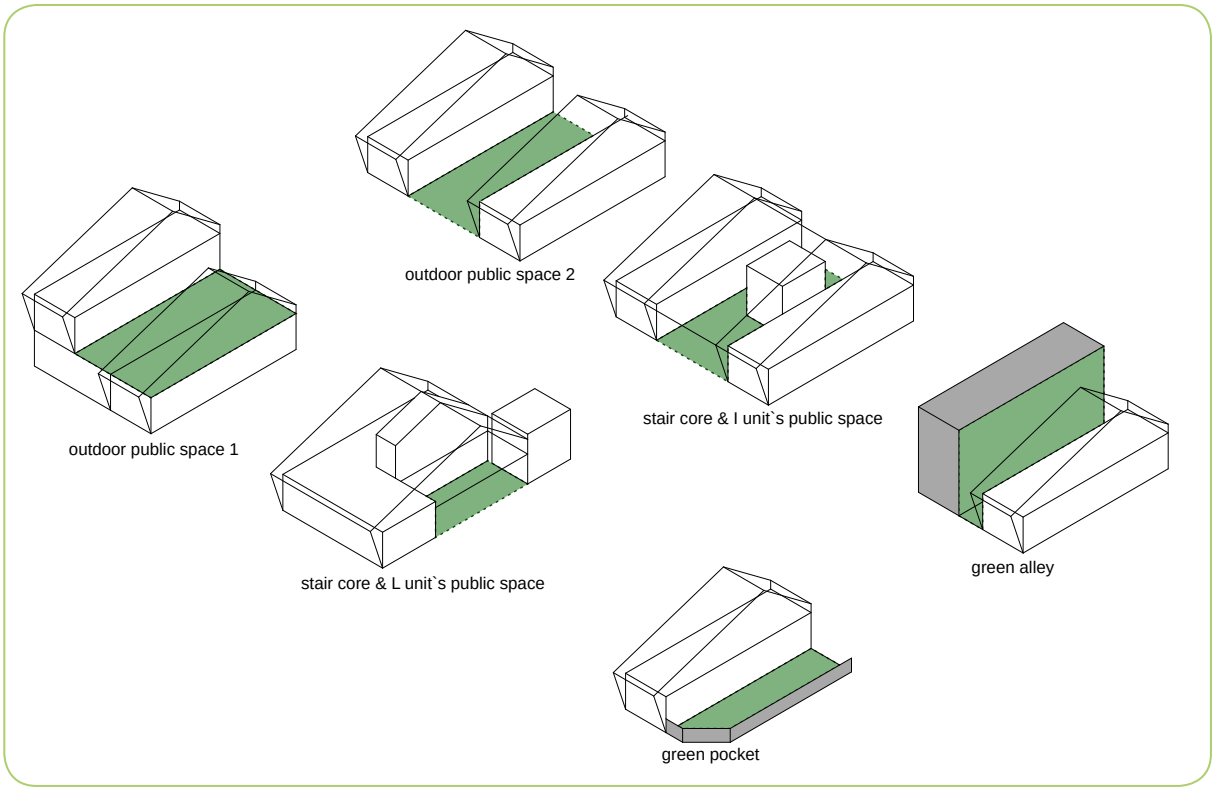
In respond to the 5 critical common flaws of buildings which we have identified in the Taipei sites, the Orchid House aims to:

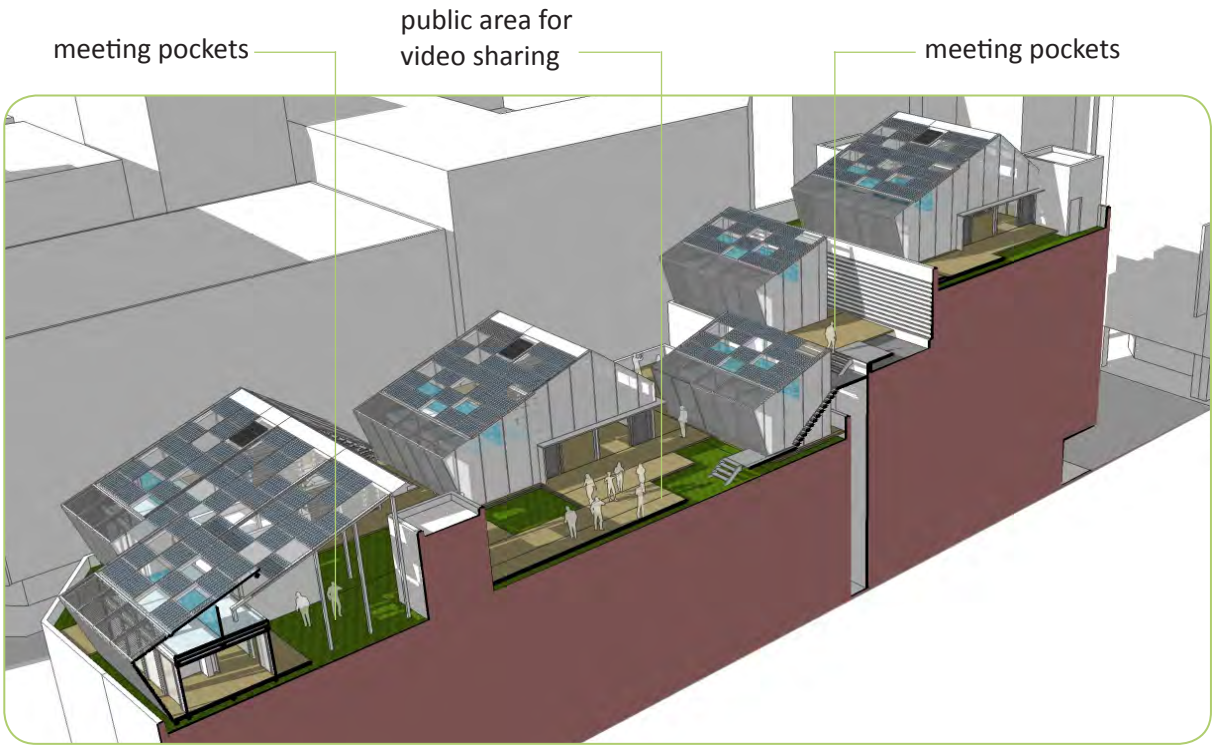
1. Execute water proofing on the roof to avoid potential leaking
2. Relocate building equipment such as water tanks to the mezzanine level of the solar house. Integrate the function to an aesthetically pleasing solution
3. Using prefabricated recycled steel and recyclable polycarbonate sheets to withstand the wind load and frequent earthquake
4. Release partial rooftop space back to the community
5. Repair and integrate old building electrical systems and piping

Transform rooftop into a pleasant environ-ment to promote rooftop usage

The Orchid Cluster is to recreate a community on the collected rooftops, and introduce shared common spaces to encourage interaction between tenants. The Orchid Cluster is to recreate a community on the collected rooftops, and introduce shared common spaces to encourage interaction between tenants. The program includes seating area, common recording studio, and film editing spaces.

Green Spaces and Communal Area

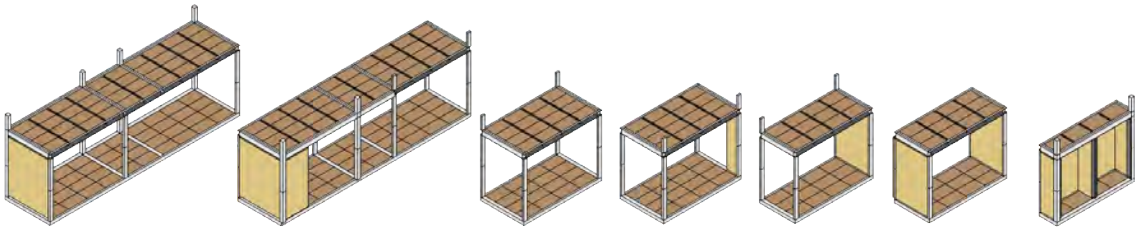




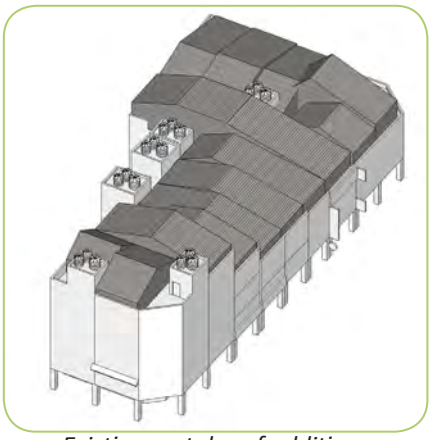
Structural Systems

Prefabrication Steel

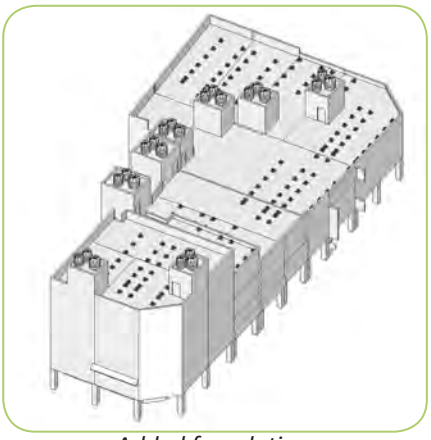
Taiwan is known for dismental abandon ships and recycle to usable steel. Orchid House uses 100% recycled steel for its structural system to reduce carbon emission. All of the structural components are prefabricated at a factory near the Taipei City and transported to the construction site, which means no need for the on-site welding joints or the landfill trash during the construction. Most of the connections will be joined by bolts and nuts, which can be done without special equipment or skill to build the structure. The modules are designed to be transported by trucks and standard containers as standard shipping. This prefabricate methods are applied when the Orchid House is added on to the existing building rooftops in Taipei City to reduce construction cost and time. It is also suitable when the Orchid house is shipped to France by standard containers.



Building Modules

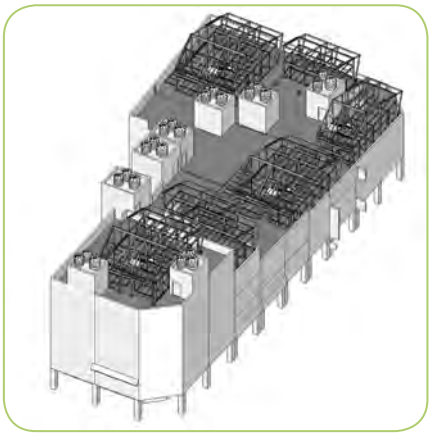


Existing metal roof addition



Added foundation

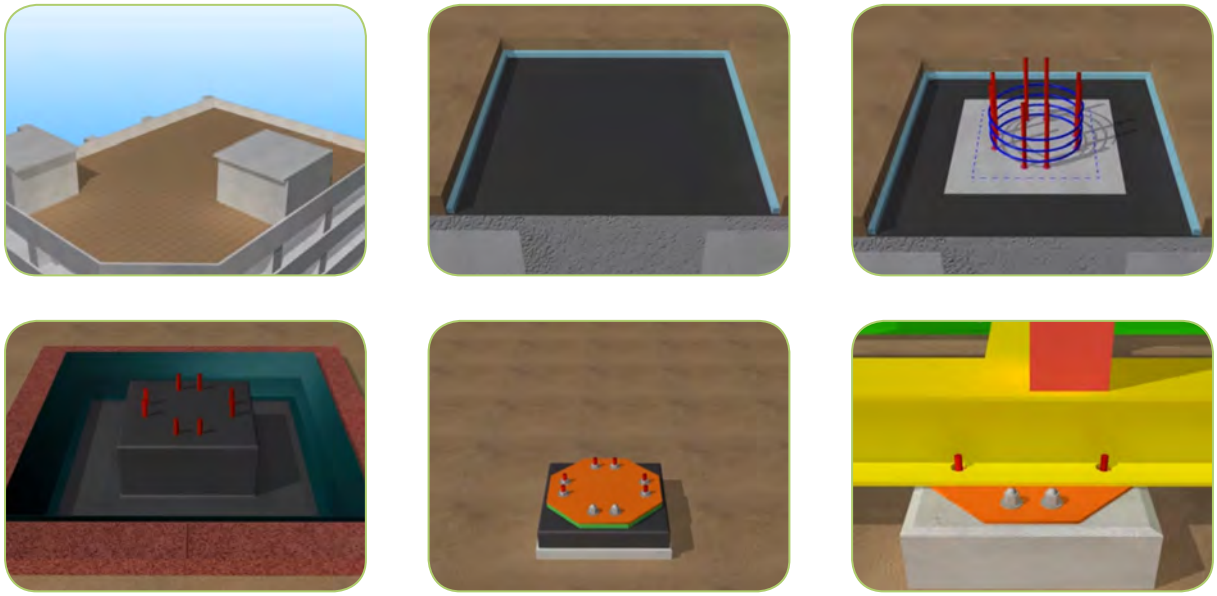
Revamped roofscape



Cluster structure

Foundation

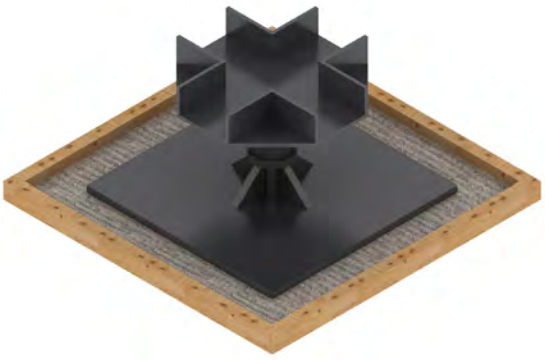
The foundation of the Orchid House is designed to fit on top of the existing local building structure in Taipei. The system extends the existing building's structural grid and requires the Orchid House to extend from it. On the roof tops of the existing buildings, reinforce bars are inserted into the existing concrete columns, and then concrete bases with reinforcement are poured on site to serve as the footing of the Orchid House. Some screw stems are extended from the footing; and steel plates welded at the bottom of the house's columns connect the house to the footings. As a result, the load of the Orchid House will be transferred from the house's steel system to the existing concrete structure that it sits on.



Structural connection between the Orchid House and existing building

Footing

The Orchid House's foundation is also specially designed for the uneven ground condition in Versailles, France and also the existing rooftop in Taiwan. The footing utilizes the sand box with steel adjustable foot for easy leveling without expensive tools or special knowledge. This leveling method also helps shorting the overall construction time and cleaning after the competition. The Orchid House is supported by this 28 special footing and expected to assemble within half a day on site.



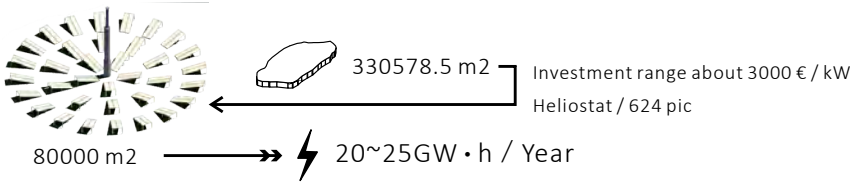
Adjustable Footing in Versailles Site

Smart Grid system with AMI (Advanced Metering Infrastructure)

NCTU UNICODE's Orchid House project in Ximending district is following the basic concept and technologies to enhance possibility of planning Zero Energy District.

As main focal point of Ximending Zero Energy District plan, NCTU UNICODE proposes not only PV panel implementation to buildings, but also larger scale of renewable energy sources such as CSP (Concentrated Solar Power), Biomass, Wind power and Geothermal. In order for all renewable energy sources to be distributed efficiently, advanced applications of Wide-area-Measurement System (WAMS) is installed one of larger footprint building rooftops, and Data Centre (MDMS) serve all the energy with automation system. Furthermore, AMI (Advanced Metering Infrastructure) is installed to Orchid House Clusters to manage power supply within houses. Please refer Architecture Design Narrative for farther details of AMI integration to housing appliances.

The Orchid House Cluster acts as a pilot project for further development of smart building energy management technology. Eventually, AMI system will be installed to most of buildings in the district to increase 20% energy usage efficiency from conventional grid system.



Ximending Energy Programme

Smart Grid

Energy Comsumption of Ximending

Commercial Facilities: 845
10000~20000 /1kWh/month

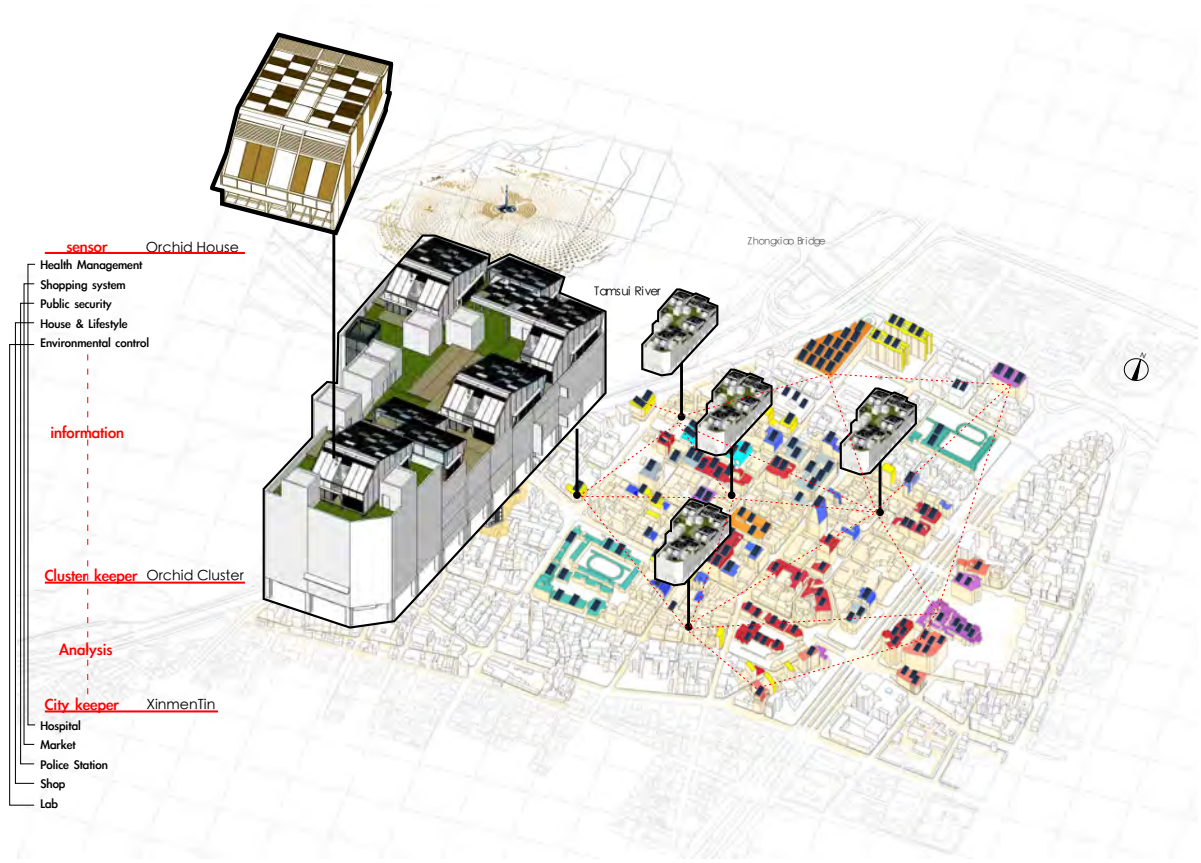
Households:287
250~380 /1kWh/month

- Commercial Facilities
- Residential (Collection)
- Hotel
- School
- No Use
- Office Building
- Government Agencies
- Parking Lot

House Keeper System

Each Orchid House has an automated system, call the “House keeper”. This tablet is an information center that connects to the transportation system and sensor stations, so the tenants can easily receive the real-time data. (image of house keeper) Users can easily track the schedules of trains, subways and buses. They can also view the availability of UBike and EBike rental. The house keeper also manage the indoor comfort, including heating, cooling and lighting systems. The sensor stations gathers data concerning the city, such as air quality and light pollution, and these house keeps can turn into a “city keeper”, and link information nation-wide.

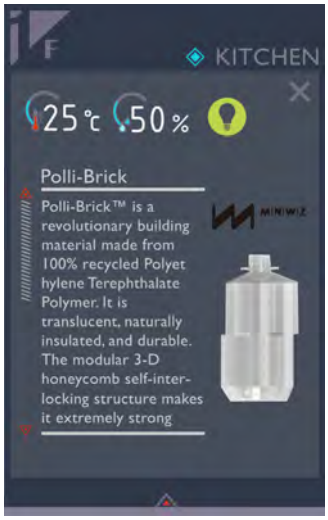
Orchid House is a lot more than just a house. It is a vision to a new lifestyle and a more sustainable future.



House Automated System

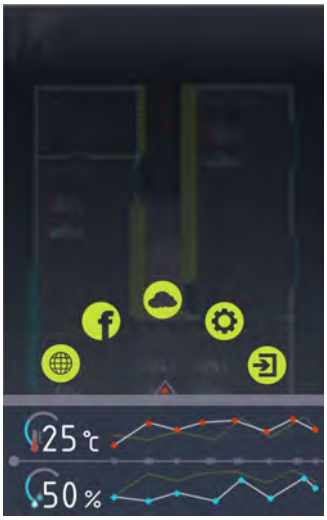
As part of the city keeper system, every house is equipped with a house keeper to assist tenant save time, energy and money. With a smart device, tenant can easily access information for its availabilities. It also provides alternative transportation means so tenants can travel with ease. The system includes:

1. General house information
2. Energy usage
3. Temperature and humidity monitor
4. Map of house condition
5. Alarm system
6. Information to infrastructure

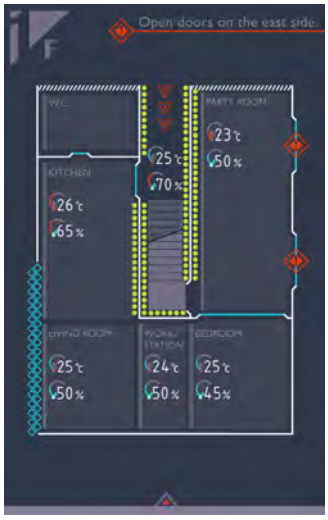


Easy guiding system to access information about the building material and design concept

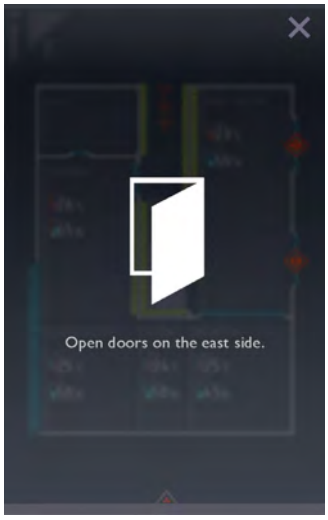
Control lighting, create different atmosphere in the house



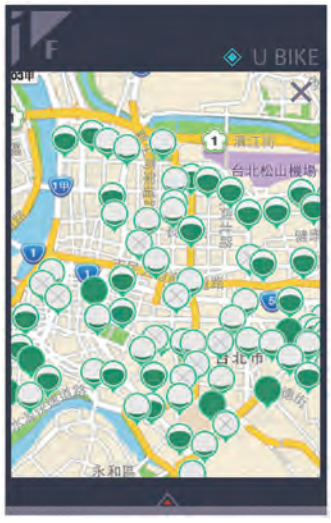
Display real-time temperature and humidity level.



Map of conditions of all openings and affected areas



The alarm system will turn on and display on the screen when the temperature too high or too low



Easy access to the public transportation

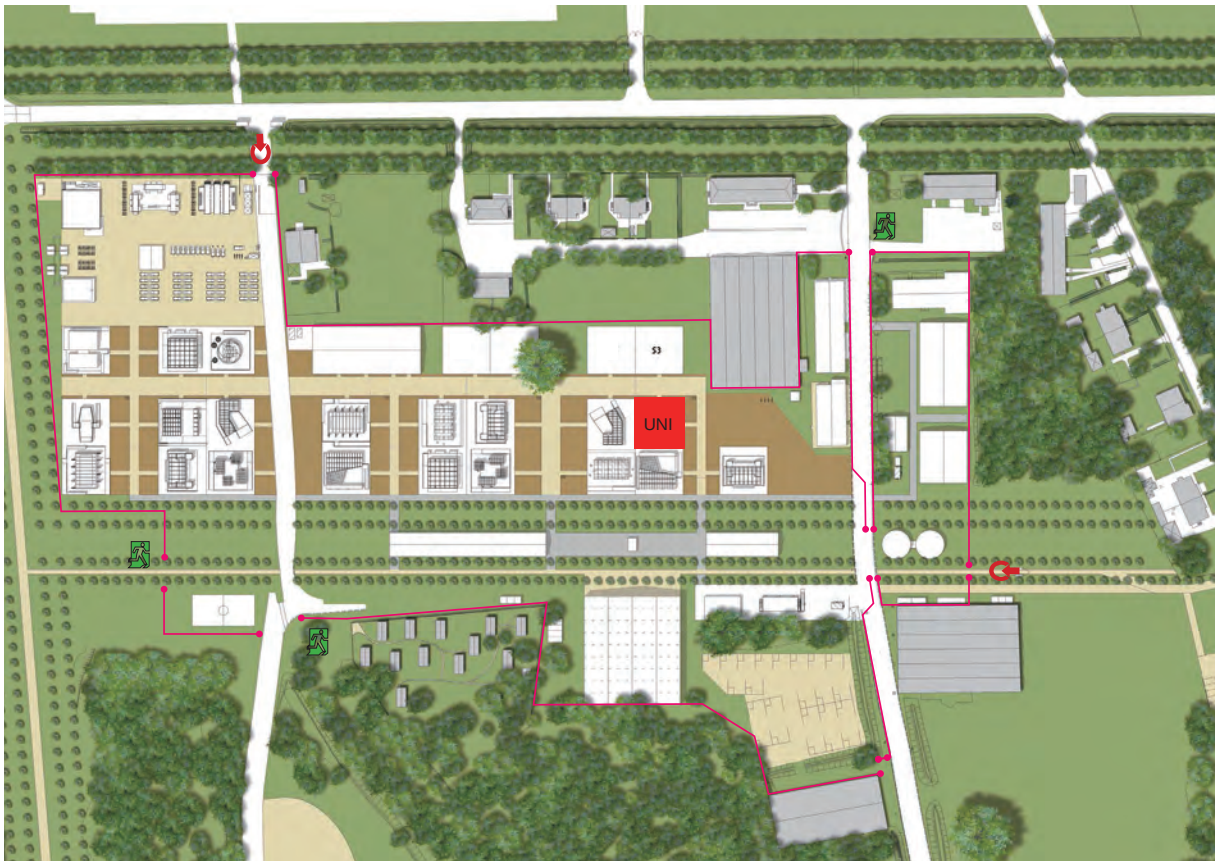
Solar Decathlon Europe 2014 Prototype

In the SDE 2014 competition, Orchid House has taken the L-shape module and modified it to fit in the Versailles competition site. Ground floor include an L-shape living area, with a common terrace for all residence. This common space give back all tenants a place to gather, meet, and social. Residence can use the space freely and host events, which is how rooftops should be used. The mezzanine level is a smaller area for exercise or laundry.

The Orchid House brought to Versailles is part of the entire Orchid Villa, as we envision it to be an urban project.

South West View at La Cité du Soleil®

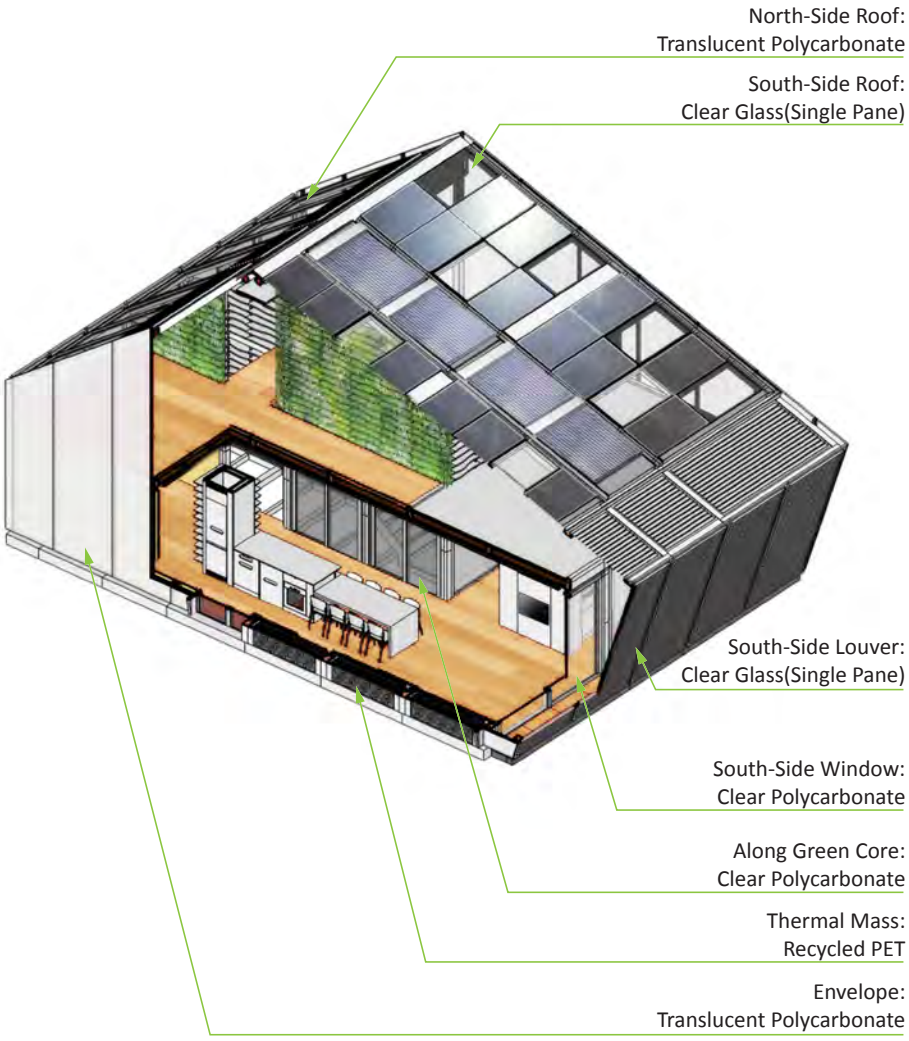
The house is composed of several prefabricated rectangular frames. The open plan organization allows flexible division, and creates a flow of movement in the house. In the order of entering the house, there are 3 main functions: kitchen, living room and bedroom. This setting separates the public shared space and the private living zone. A workstation with storage space keeps the bedroom intimate.



Site Plan

Site Elevation

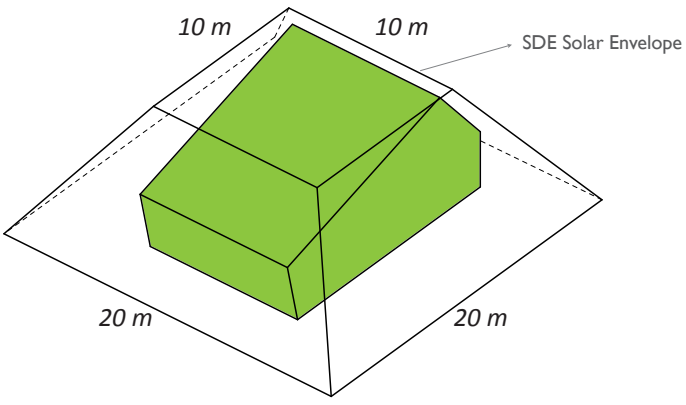
Site Elevation



Orchid House Programming

Geometry

Several design moves were made so that the prototype fits to the solar envelope, provided by the SDE 2014. To harvest rain water and solar energy with the angled roof, it is angled to work for both applications. North facade lets even indirect lighting into the space. Double height space creates an additional living area on the mezzanine.

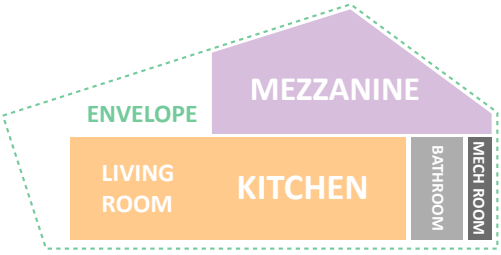


Prototype Fitting In Solar Envelope

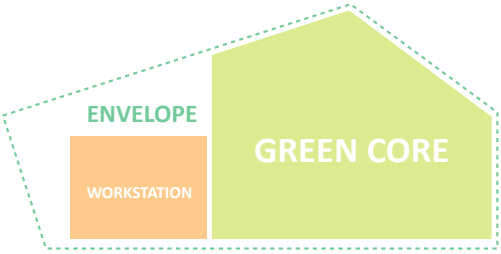
The Orchid House spacing planning criteria is including:

1. The vertical circulation space is place at the center of the house to promote natural lighting and fresh air ventilation.
2. The mechanical room and bathroom are located on north side to reduce heat loss of living space.
3. The kitchen, living room and bedroom forms an open plan which distributing radiant heat from west side thermal mass.
4. The double high tea terrace on east side is to bring morning sunlight to the house.
5. The mezzanine level space is for ventilating the heat generated by photovoltaic panel on the roof.

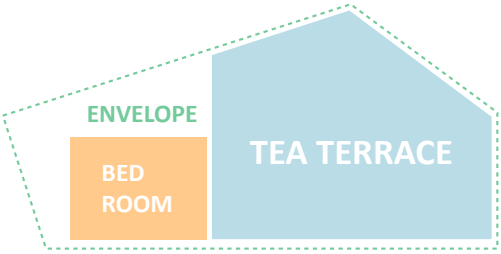
Program Plan Diagram



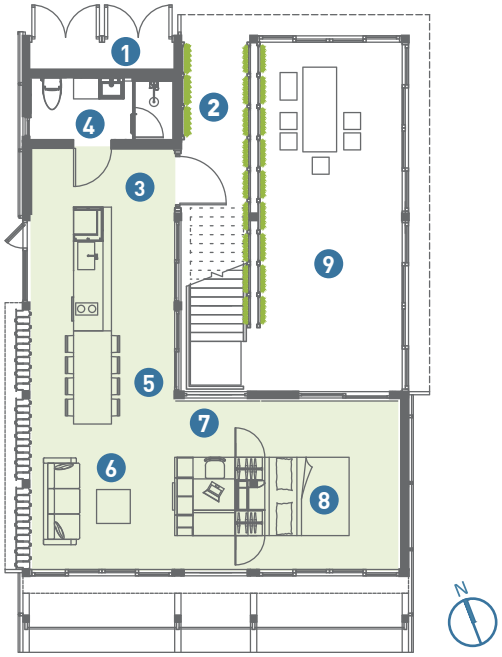
Program Section Diagram 1



Program Section Diagram 2



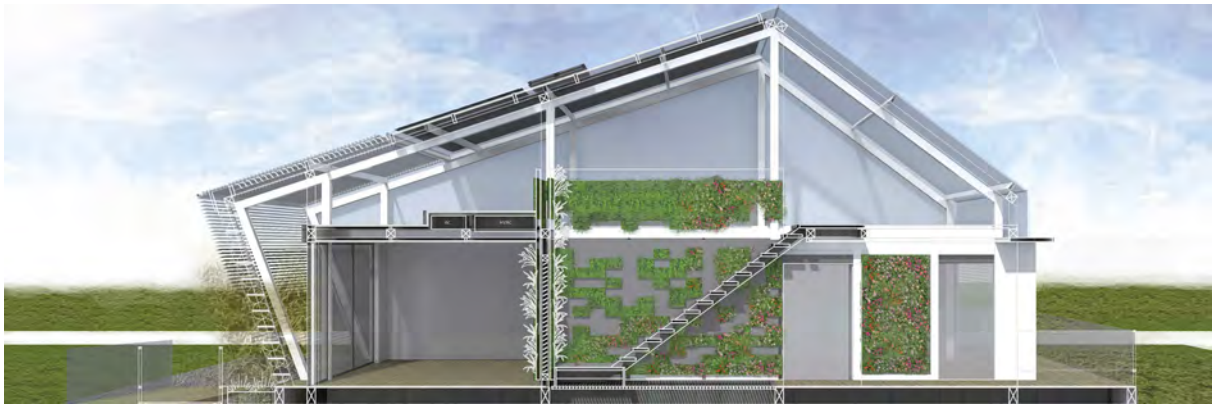
Program Section Diagram 3



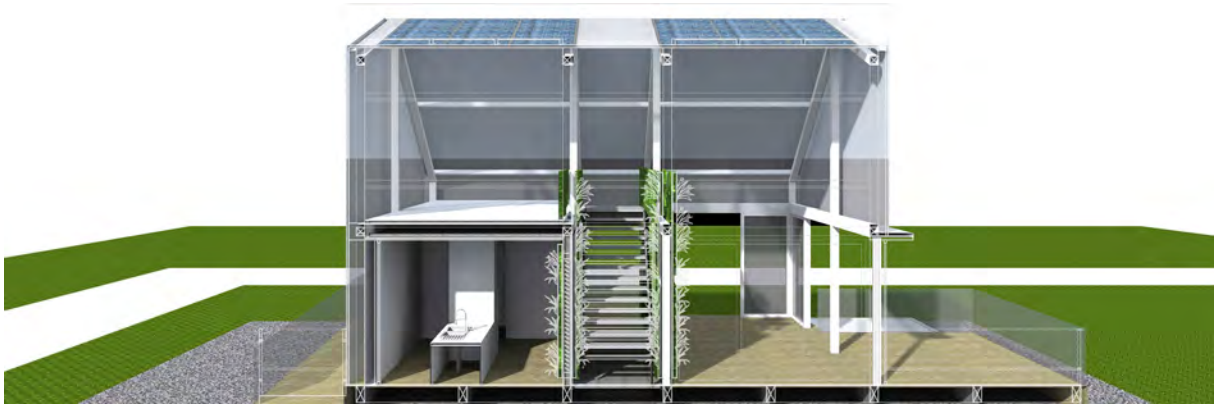
1. Mechanical Room
2. Green Core
3. Entrance
4. Bathroom
5. Kitchen
6. Living Room
7. Workstation
8. Bedroom
9. Tea Terrace

Measurable area	57 sm
Mezzanine	40 sm
Terrace	28 sm

Ground level plan

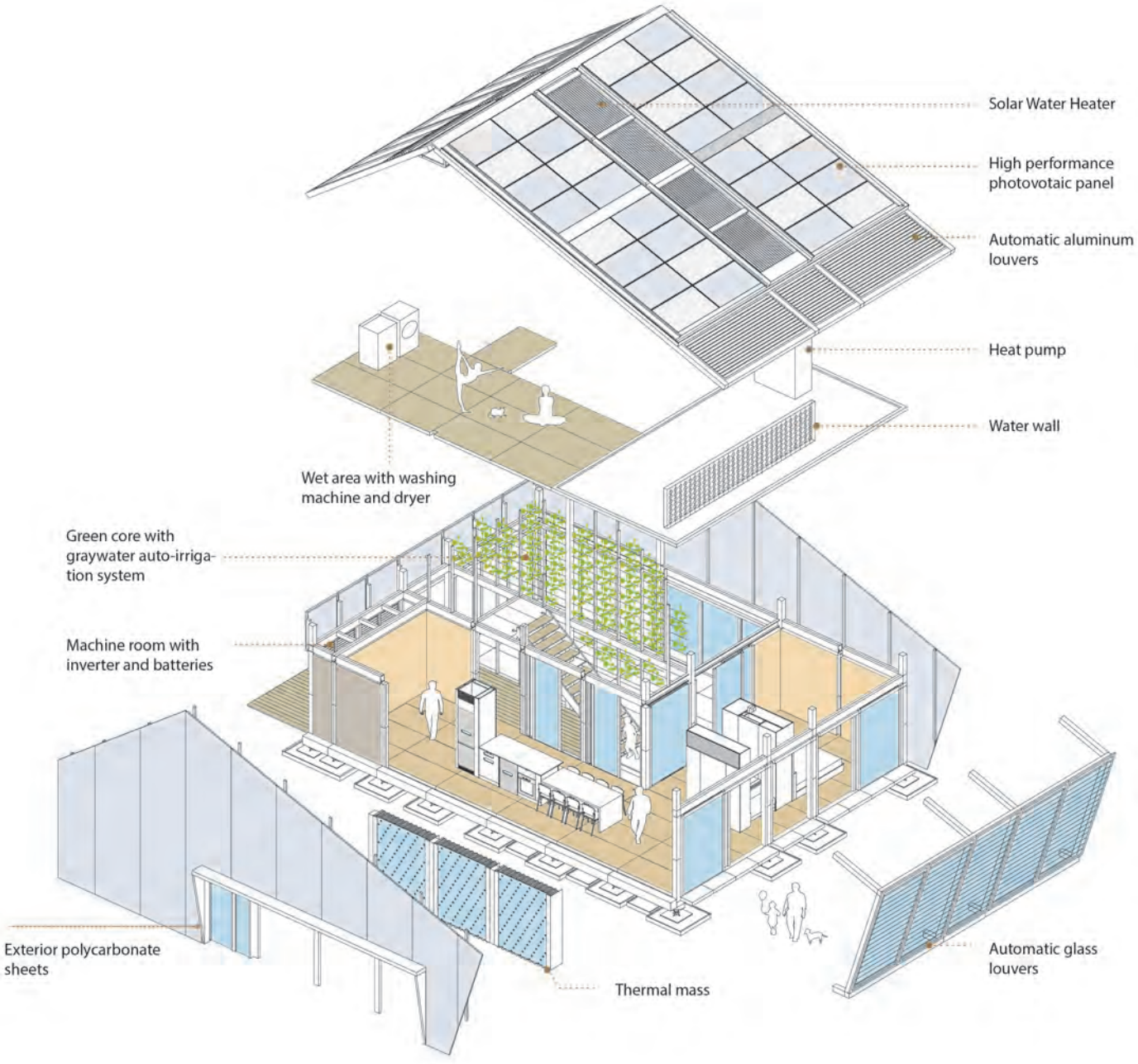


Section AA



Section BB

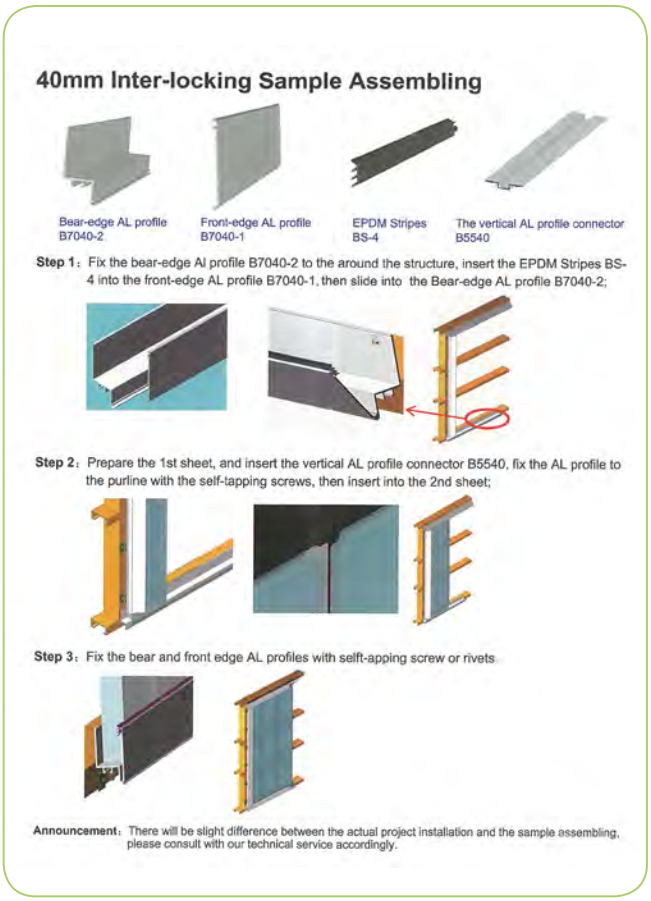
Exploded Axon



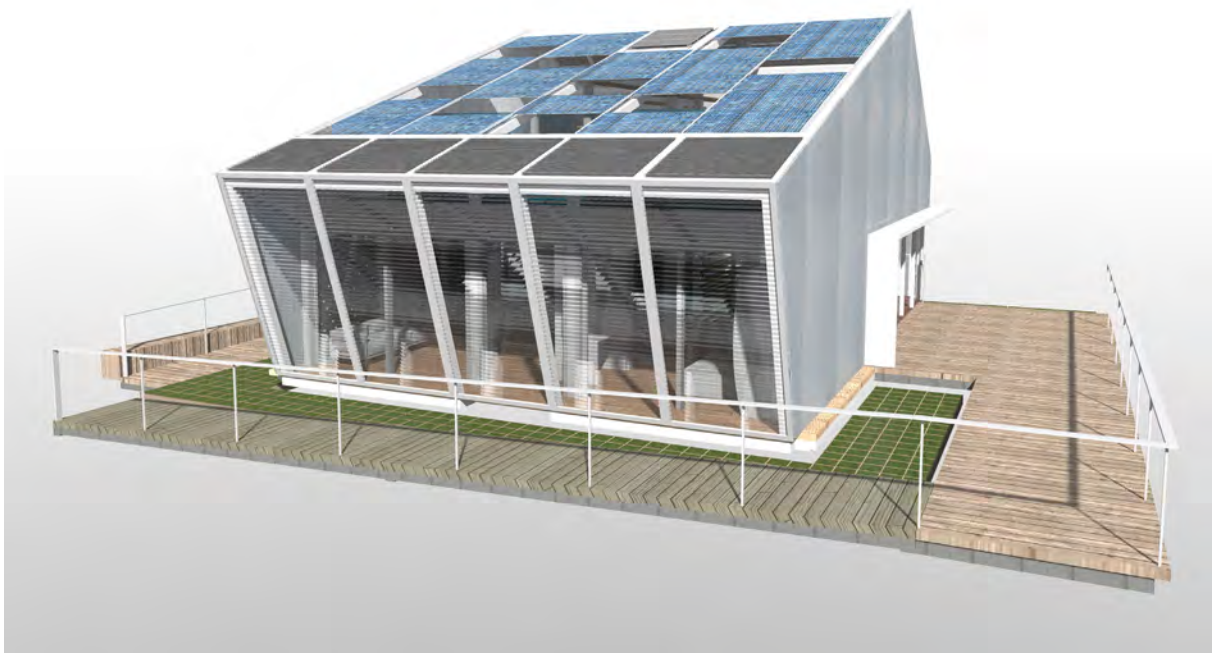
Exterior Design

Polycarbonate material

To design a building which has at least 50 years of life cycle, which could withstand the humidity, earthquake and wind blows, we have chosen the exterior material to be polycarbonate panels. It is lightweight, durable, and transmit light in the space. In Versailles, it makes the construction process much safer because it is not easy to break. The polycarbonate sheets are 100% recyclable and easy to assemble.

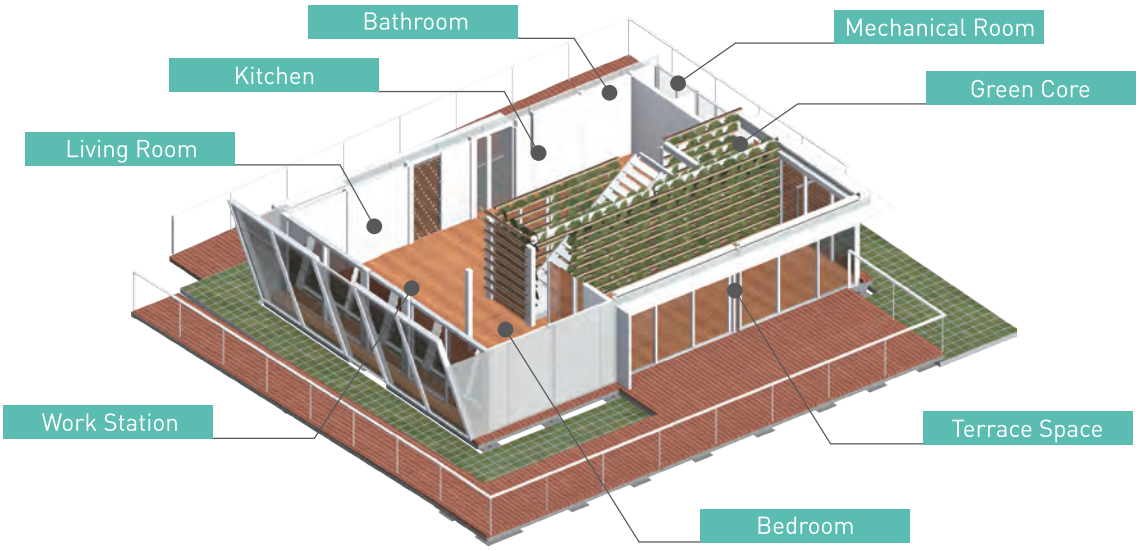


North East View



South East View

Interior Design



Space Organization

View from Living Room

View from the mezzanine level

Tea Terrace View

Passive Strategies

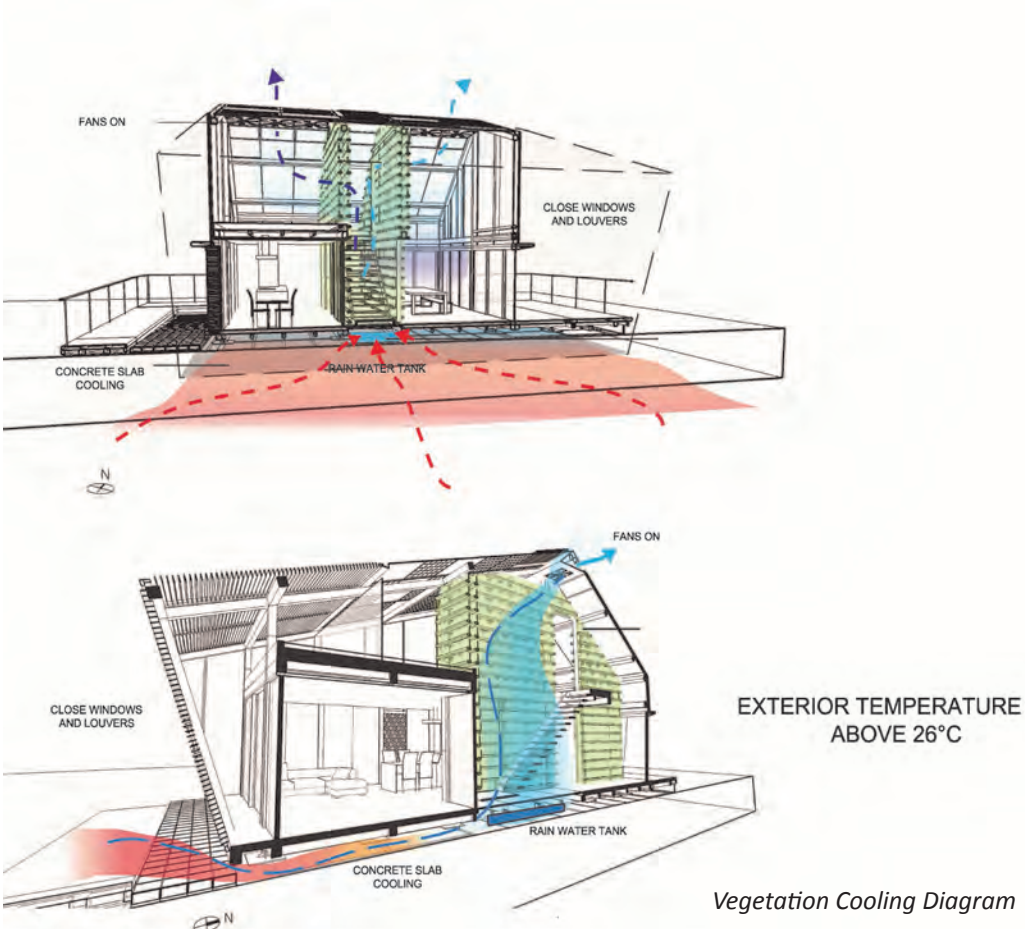
Taiwan is an island in the South East Asia on the Pacific Rim at a latitude of 23 to 24 degree north, which sits right on the Tropic of Cancer. Taipei City is at the north tip of the island and its latitude is 24 degree north. The sub-tropical climate brings high humidity to Taipei's long hot summer and short cold winter. The high temperatures coupled with the high humidity make summers in Taiwan very uncomfortable. Our summer extends from early May to late September. Winter and spring are the raining seasons here. Autumn months are pleasant with the right temperatures and slightly high humidity. However, the comfortable spring and autumn are very short. March and April are the spring months while October and November are the autumn months.

The passive design strategies for Taiwan's hot and humid summer are somewhat complicated. The major strategy is to provide shading while increasing ventilation. Shading will cut down the heat gain from the solar radiation. Ventilation is to reduce humidity by lifting moisture from the air. It also increases thermal comfort through evaporative heat loss.

The cold and humid winter also presents a design challenge. The design strategy is to increase indoor temperatures with solar radiation. Preventing heat loss is another strategy for winter comfort. Adding proper insulation materials may reduce heat loss in winter.

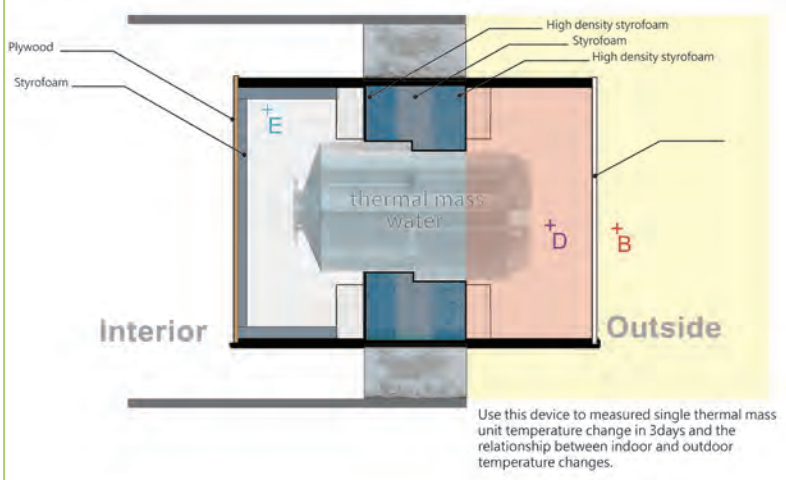
For the Solar Decathlon 2014 prototype, we included the following 4 passive strategies to further conserve the energy:

1. Thermal Mass
2. Water wall
3. Green core
4. Smart skin

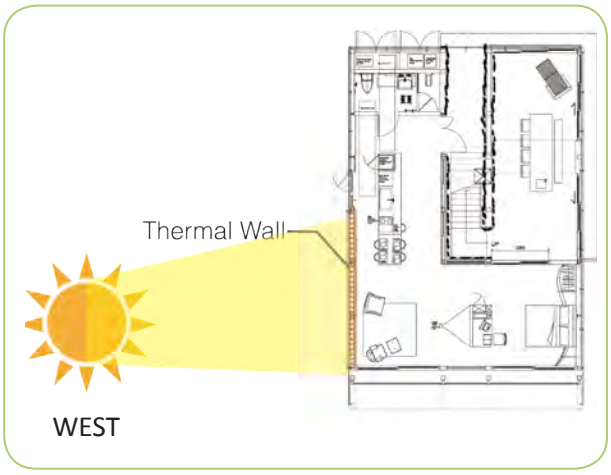


Vegetation Cooling Diagram

1. Thermal mass



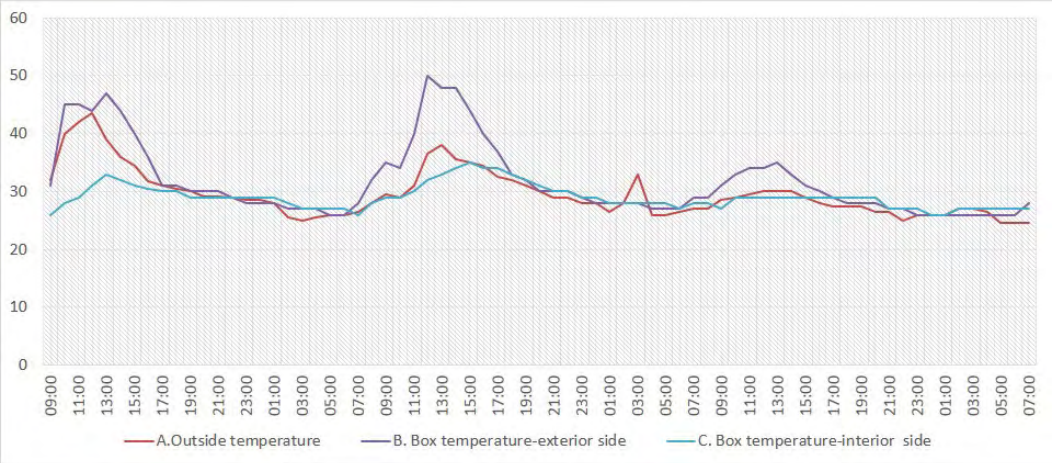
Polli-Bricks Filled With Water



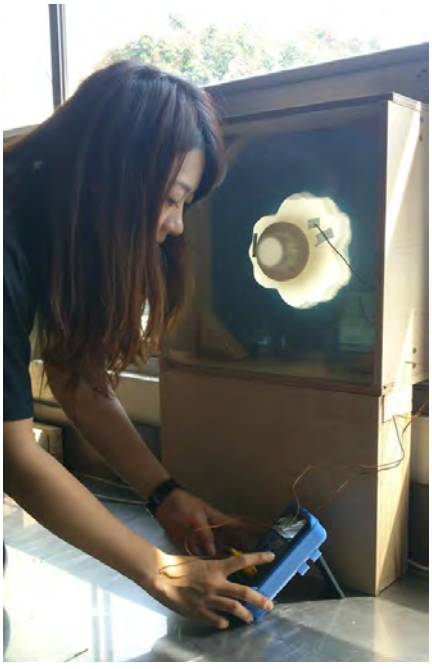
1 To 1 Prototype Of Water Thermal Mass

A 30cm water thermal wall is built on the west side of the house. The thermal wall is constructed with recycled Polyethylene Terephthalate Polymer bottles – the Polli-Bricks. Each bottle contains 6 litter of water. The bottles are piled up to 2 meter height-wise and 3 meter length-wise. The bottles are held together and fixated to a transparent acrylic sheet on their exterior side. The water in the thermal wall absorbs solar radiation during the day and releases heat to interior space at night. The air space between the bottles and the acrylic sheet remains heated during day time through the green house effect and it also prevents radiant heat loss at night. In Taipei, the acrylic sheet has openings on both the upper and lower ends. These openings allow air circulation in the summer heat and that will reduce overheating in summer. As a result, the wall will receive solar radiation during the day, and allow heat loss to the outdoor at night. A three day experiment showed the thermal wall could keep the indoor temperature constant even when the outdoor temperature fluctuates drastically.

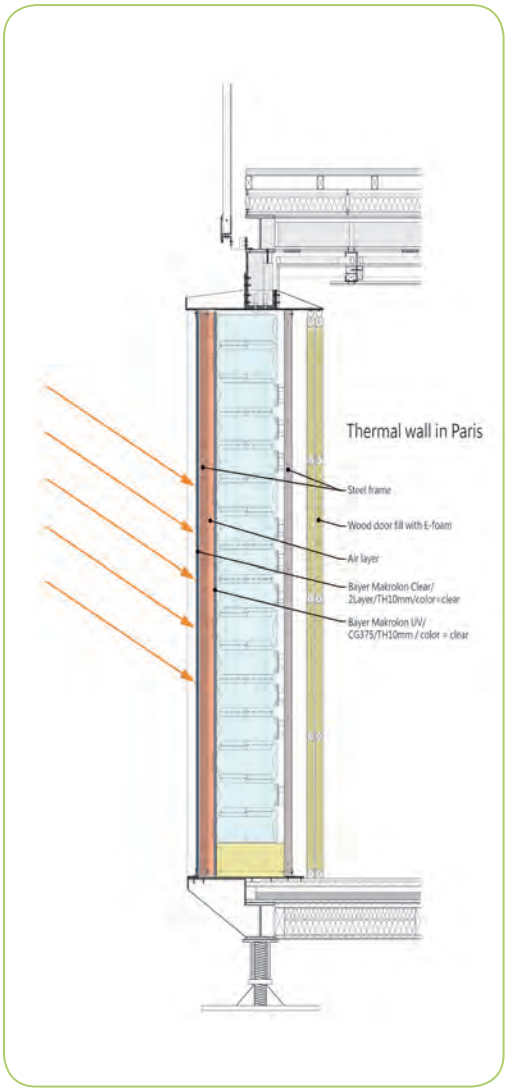
Polli-Bricks temperature records
2013/10/07-09



Thermometer



Making Of Testing Model



Section Detail Of Thermal Maee

Water Wall

Inspired by the agricultural technology of orchid greenhouse, the NCTU/UNICODE team designed a water wall in the inlet side window of the Orchid House. On the mezzanine level of Orchid House prototype, a water wall is installed and will be turned on when the temperature between the double skin rises above 27 degrees Celsius. Together with the water wall, a row of fans on the ceiling will create an air draft and draws hot air out and create the chimney effect.

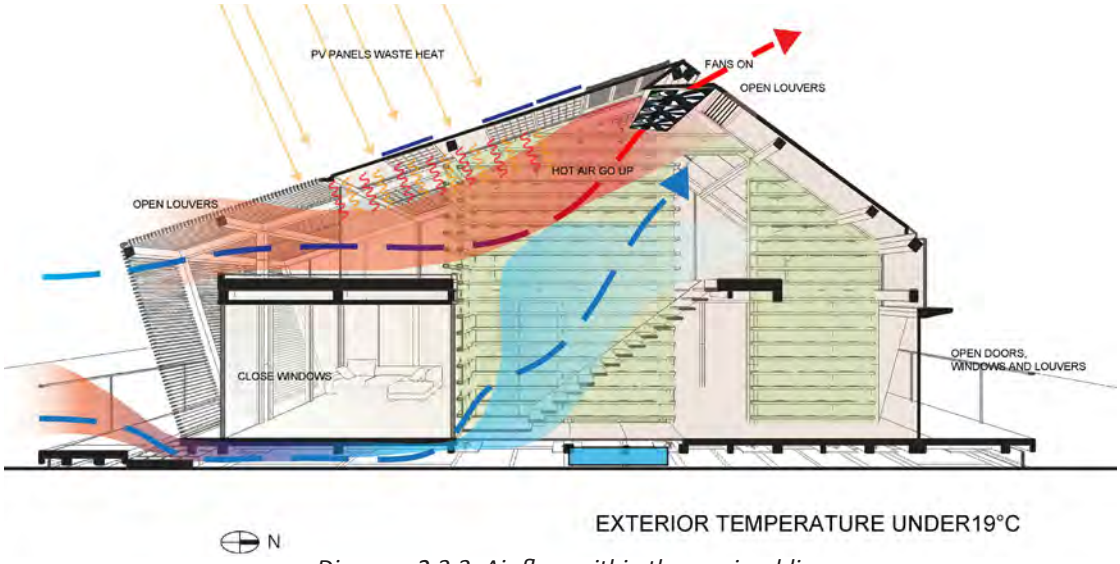
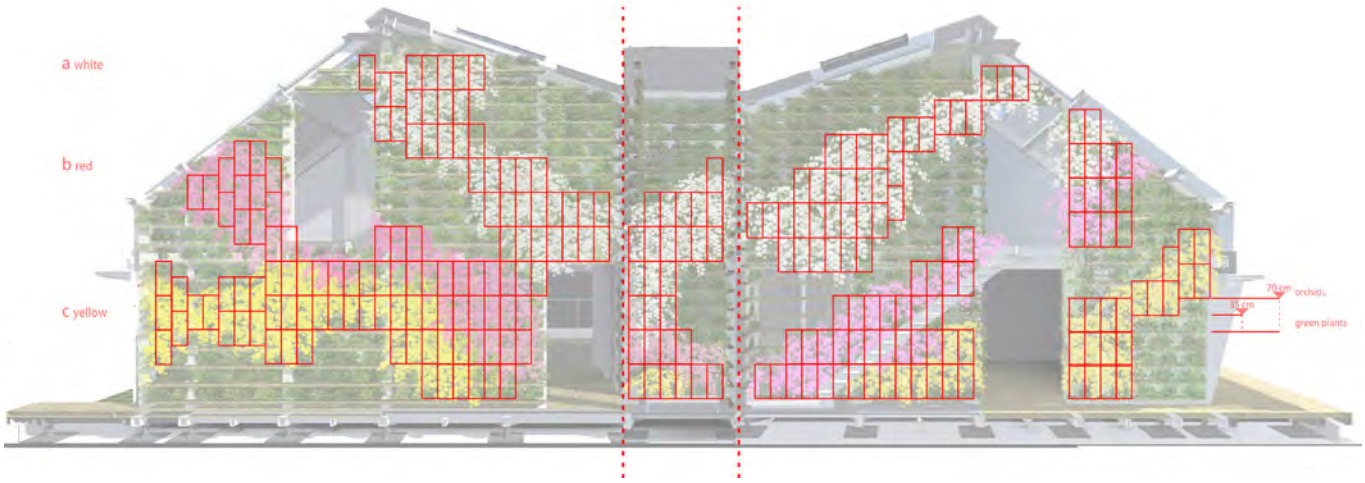


Diagram 2.3.3: Air flow within the semi-public area

The purpose of the water wall is to lower the outdoor air temperature before it enters the house. When the outdoor temperature is above the comfortable level, the water wall near the south end of the house would come on automatically. The outdoor air will then be drawn into the terrace space by the fans near the ridge of the roof. In order to adjust to the high humidity in Taipei's summer, the water in the water wall runs in metal pipes. In the prototype constructed in Versailles, the water in the wall will be exposed to the air. The wall is built up with many Rasching rings which are plastic rings with a lot of holes. Water is dropped on the top of the wall where the Rashing rings separate the water to small particles. When the warm outdoor air passes through the water particles, the sensible heat in the air turns to latent heat which evaporates water drops to vapor. The outdoor air temperature decreases through this evaporation while the humidity increases. The low temperature of the terrace reduces the heat gain to the living space while the humidity is physically stopped by the windows. This process will also remove the waste heat of the PV panels.

2. Green Core



The Orchid house is composed with three main volumes such as the exterior envelop, L shape living area, and green core. The green core in the center of the unit serves as a buffer zone to moderate indoor and outdoor air, reducing the heating and cooling loads. It does not only enhance the verticality of exterior envelop to connect ground level and mezzanine level, but also act as green chimney to promote passive cooling effect in the house.

With potted Orchids and other vegetations, we want to offer the tenant a vertical green space, as what the Taiwanese rooftops use to be.

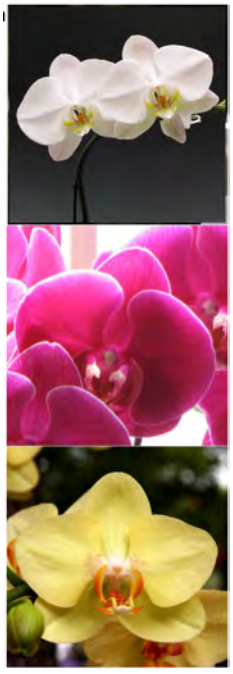
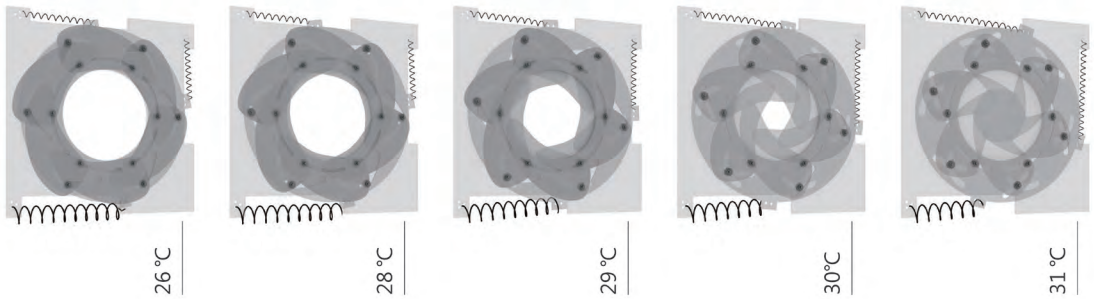
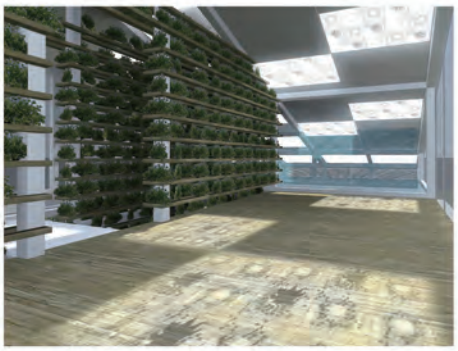


Figure 1.2.2 Green Core View

3. Smart Skin



Shading is the most effective way to cool down a space. Orchid House have invented a smart skin which adapts to the surrounding automatically without power. The memory alloyed springs which connect to the leaves can operate by itself when the temperature reaches the setting of 26°C. This shading device is like skin which moves without electricity and animate the shadow on the floor.



Lighting effect

Making of leaves

Smart Skin Variation

Unit Installation

4.Material Selection

The Orchid House consists with main steel structural frame and series of box infill to incorporate different type of insulation material. The insulation material will be selected by the local environmental condition as well as the financial condition of the house unit. Both steel structure and box infill will be prefabricated in factory near Taipei city for reducing carbon footprint during the transportation.

Most of building material for the basic structure for the Orchid House is easily recyclable materials: Steel, Aluminum window frames, and simple glass. The Orchid House also integrates new material with sustainability concern such as Bayer Makrolon polycarbonate, MegaMaster eFoam insulation, and SPG's 100% recycled glass foam insulation.

Ship

1. Steel

Steel

Bottles

2. Plastic

Product

Pallets

3. Wood

Furniture

Façade

Polli-Bricks: Recycled, Recyclable, and Reusable
Polycarbonate Makrolon® polycarbonate: Recyclable and Reusable
Glass-louver: Recyclable

Structure

Steel: Recyclable and Reusable
Structural Plywood: Recyclable, Reusable, and Renewable

Floor

Wood Plastic Composite: Recycled, Recyclable and Reusable

Insulation

Glass foam: Recycled, Recyclable, and Reusable
e-Foam: Recycled, Recyclable, and Reusable

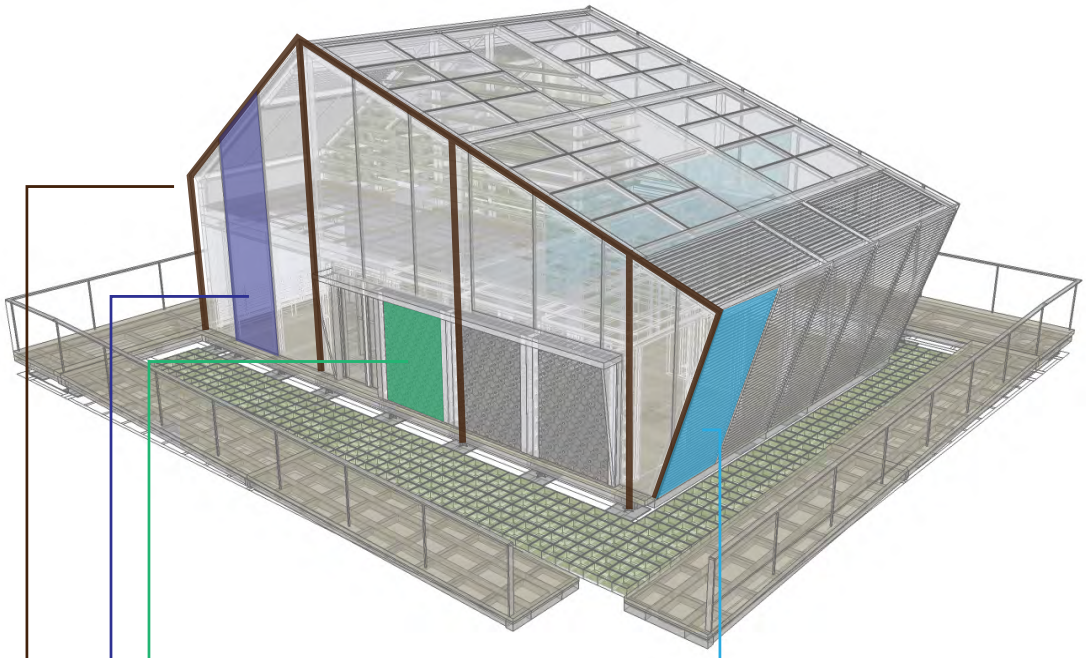
Interior

Wood Furniture: Recycled, Recyclable and Renewable

Bins

4. Glass

Insulation



FACADE

POLLI-Bricks™ RECYCLED RECYCLABLE REUSABLE RENEWABLE

POLYCARBONATE RECYCLED RECYCLABLE REUSABLE RENEWABLE

GLASS-LOUVER RECYCLED RECYCLABLE REUSABLE RENEWABLE

STRUCTURE

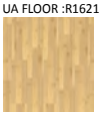
STEEL RECYCLED RECYCLABLE REUSABLE RENEWABLE

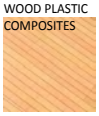
STRUCTURAL PLYWOOD RECYCLED RECYCLABLE REUSABLE RENEWABLE

FLOOR

UA FLOOR :R1621 RECYCLED RECYCLABLE REUSABLE RENEWABLE

WOOD PLASTIC COMPOSITES RECYCLED RECYCLABLE REUSABLE RENEWABLE





INSULATION

GLASS FOAM FOAM RECYCLED RECYCLABLE REUSABLE RENEWABLE

EFOAM RECYCLED RECYCLABLE REUSABLE RENEWABLE

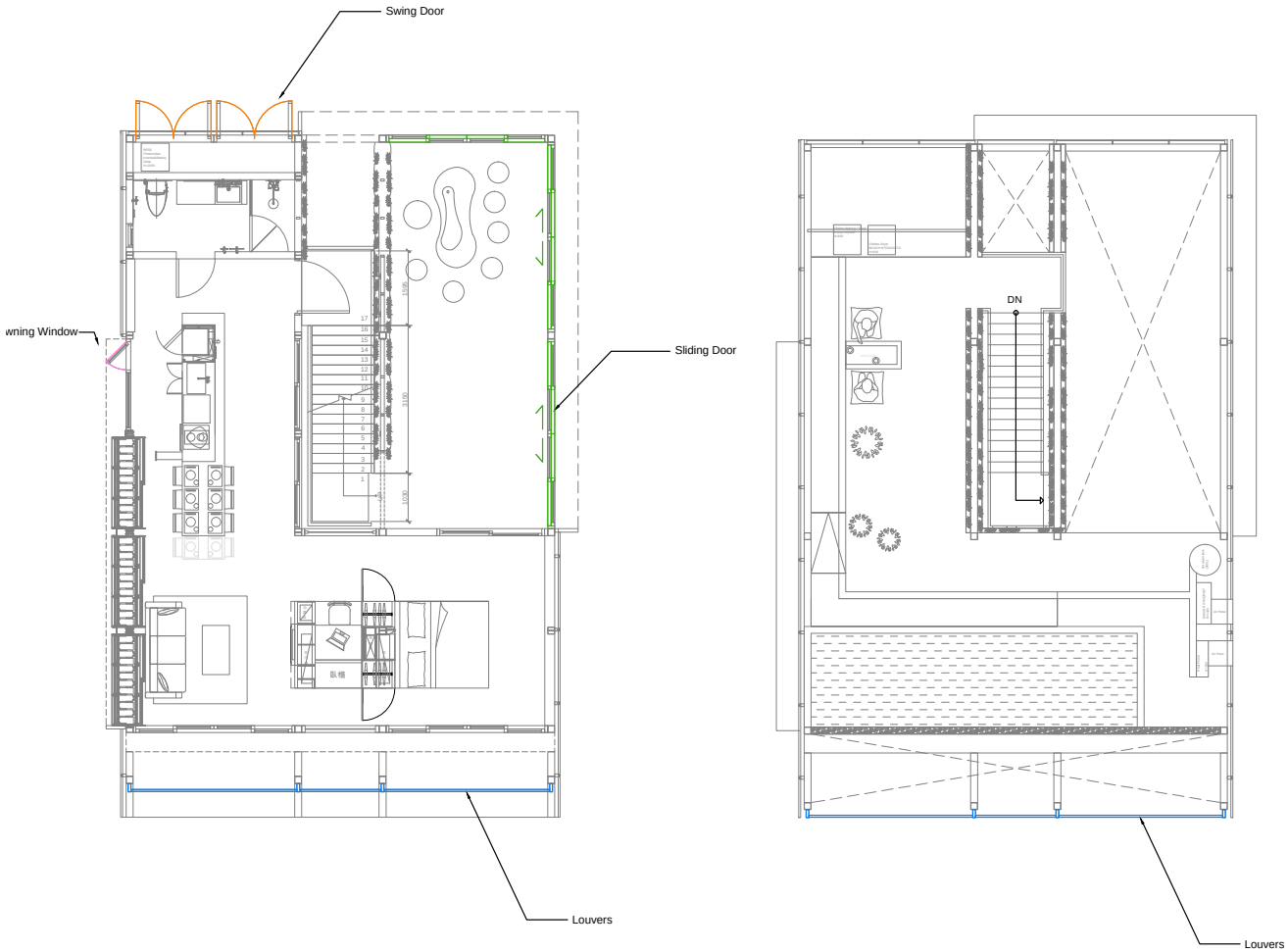
INTERIOR

PLY WOOD RECYCLED RECYCLABLE REUSABLE RENEWABLE

Sustainable Material Matrix

5.2.2 Reconfigurable Features

The façade of Orchid House is mostly covered by translucent Bayer Makrolon 40mm material to bring diffused natural light into the interior space. However, there are some portion of façade to be reconfigured with the passive design strategy .



Footprint Calculation

House: 120.4 M²
Canopy: 8.7 M²
Louvers: 17.8 M²

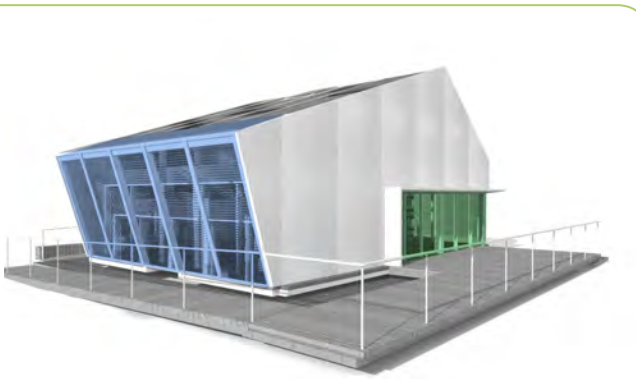
Total: 147.2 M²

East side sliding doors

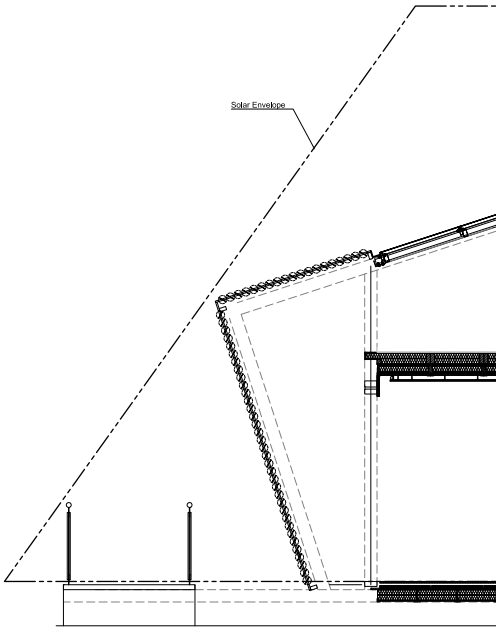
The large flat-rail sliding doors are allocated on the east side of Orchid House. When those doors are open, the tea terrace space is connected with outside deck to be able to host larger size of event without any physical boundary. These sliding door also opens up to showcase the green vertical wall to the outside.

South Side Louvers

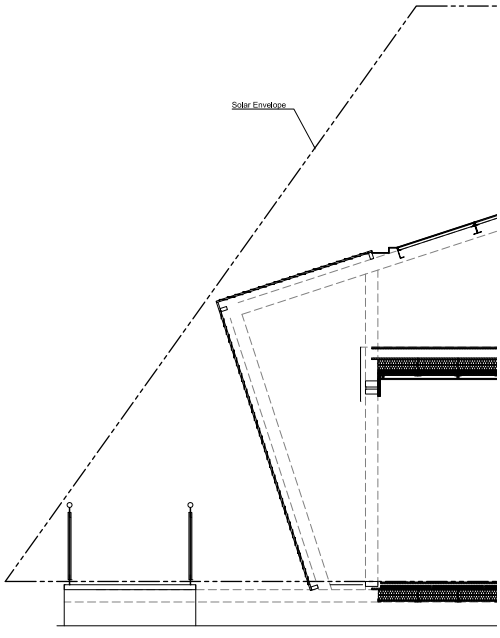
South side of Orchid House is covered by automatic glass louvers. During the summer, louvers are opened to draw natural ventilation. The wind will be filtered by the water wall allocated above of L shape living module for cooling and eventually exhausted by the fan at the highest point of mezzanine level. However, in winter time, the louvers are closed to create greenhouse effect and let in lower angle sunlight during the day.



- Louvers
- Sliding Door
- Swing Door
- Awning Window



Louver Open

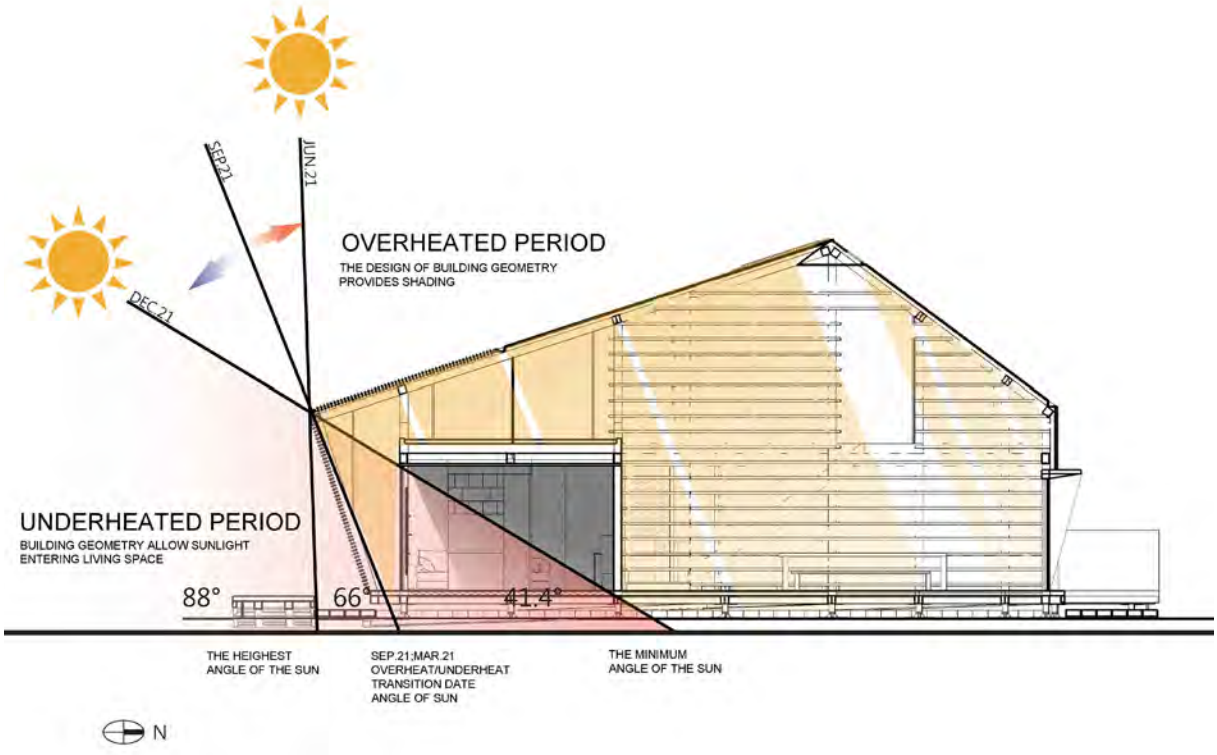


Louver Close

5.2.3 Lighting Design Narratives

Natural lighting

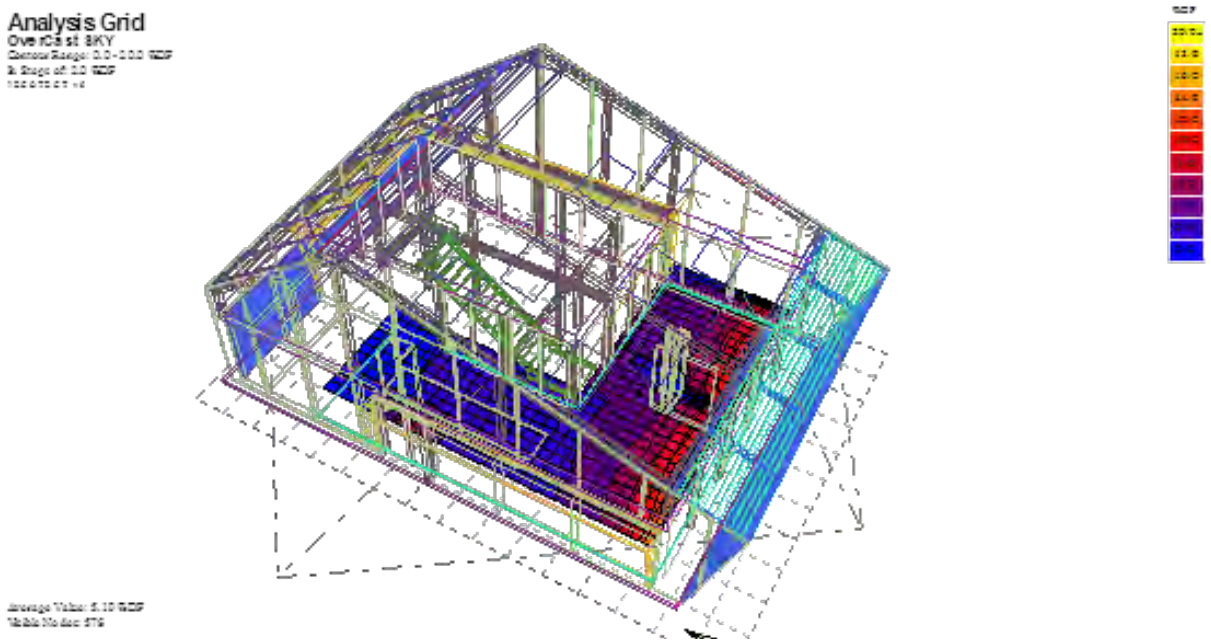
Orchid House has a unique double skin design that brings the perfect amount of natural light into the space. Above the buffer layer, some areas have solar panel while the others has smart skin to moderate shading. The polycarbonate material has a great light transmission while the air gap behaves as a good insulator. Our goal is to bring northern light into the house, while blocking the southern sunlight to reduce direct heat gain. The staircase to the mezzanine level separates the living room and kitchen, and draws more natural light into the house. The west and north façades both have clerestories, to create a more dramatic lighting condition.



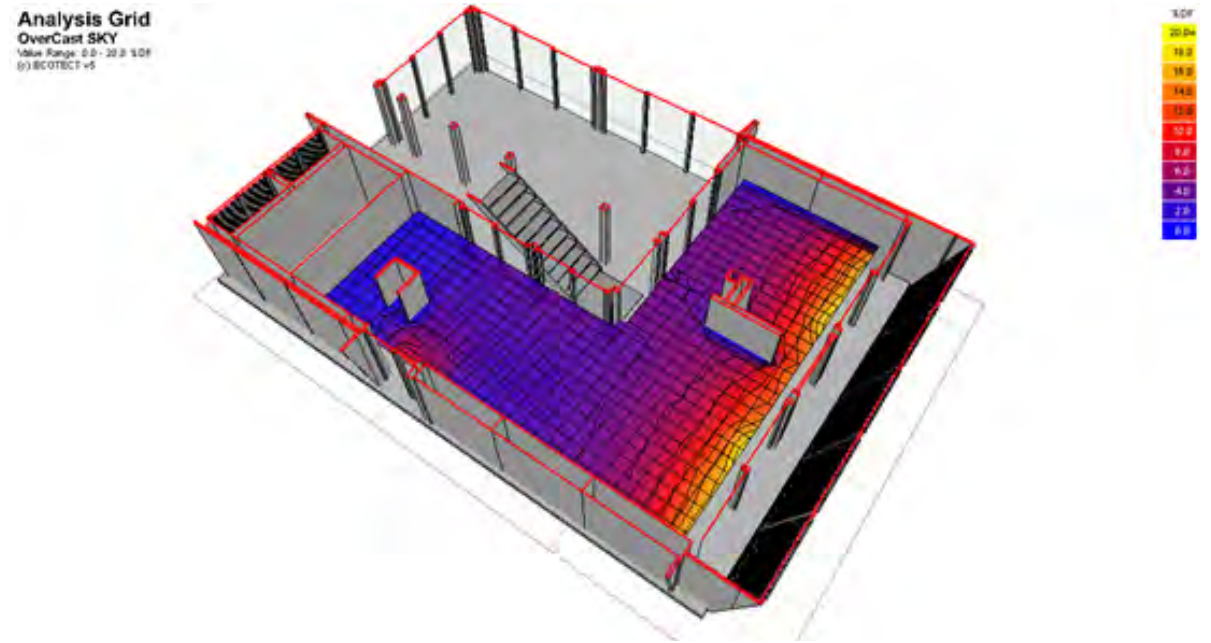
Sun angle analysis in Taiwan

Simulation tools

To simulate daylight and artificial lighting, we have worked with our consultant SGS (Société Générale de Surveillance), Taiwan branch, and use the Ecotech software to estimate the lighting condition. (image of daylight factor) With the large south opening, Orchid House is well illuminated during the day with an average lux of 1745. The CIE model analysis at an over cast day, our average daylight factor is at 5.19%, measuring at 3 meters away from the window, 0.9 meter above ground surface. During the calculation, we have input the interior surface material such as wood flooring, ceiling, polycarbonate panels and so forth to enhance its accuracy.

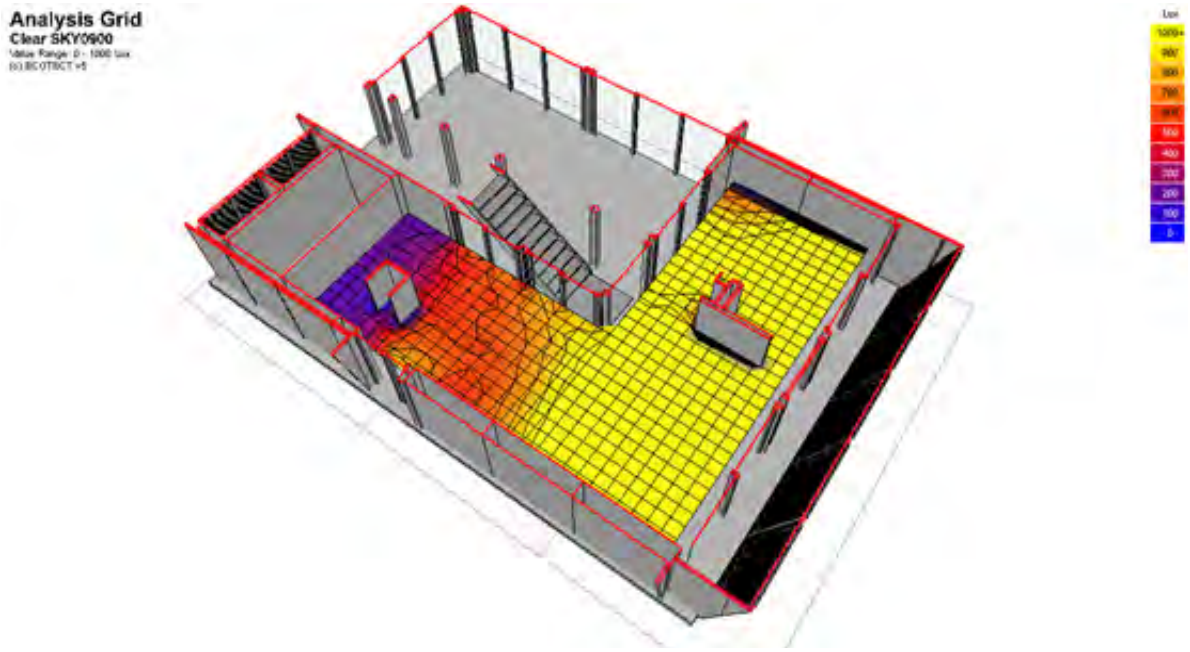


Ecotect simulation model profile

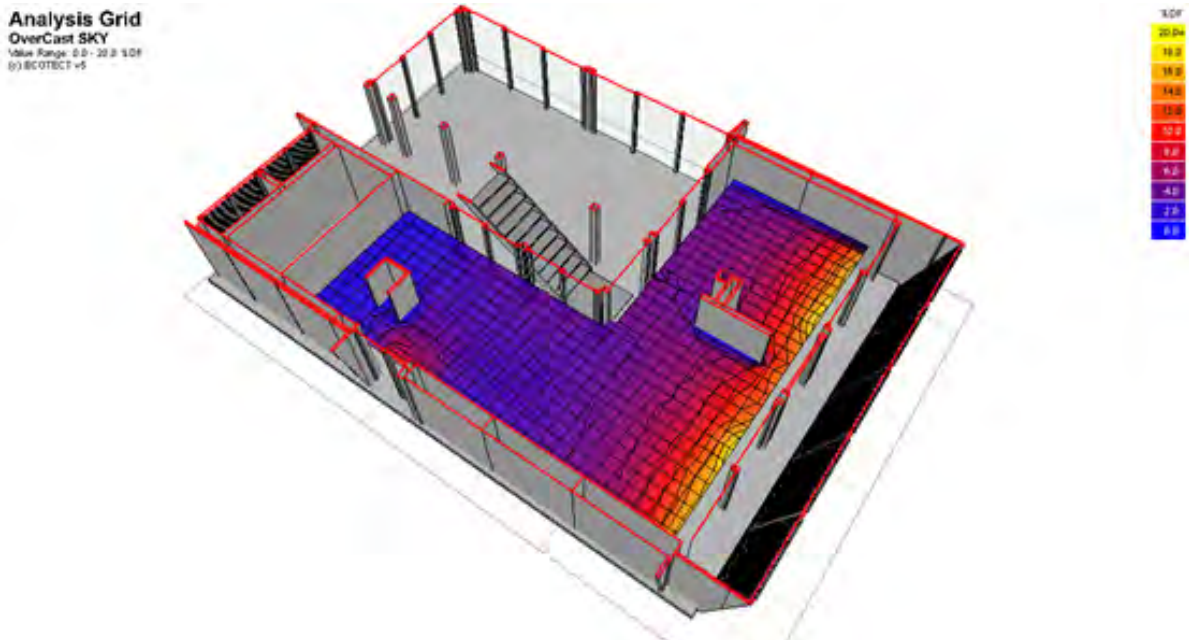


Interior daylight factor - OverCast sky
Average Value = 5.19% DF

*simulation software : Ecotect & Desktop Radiance



Sep 09:00 Interior illuminance - Clear sky
Average Value = 1745.02 Lux



Sep 15:00 Interior illuminance - Clear sky
Average Value = 4368.73 Lux

Artificial lighting

General
From the energy perspective, the optimal use of daylight is to control the dimming or extinguishing of electric lighting system when space lighting is supplemented by natural light transferred through fenestration in the building envelope.

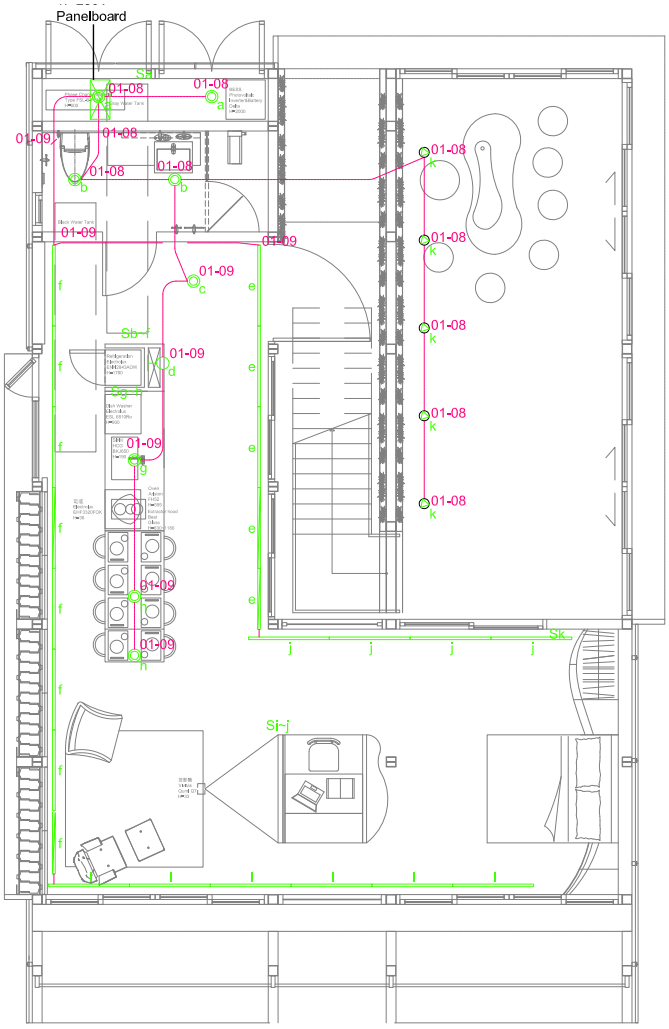
The electric lighting system is also controlled by the dimming or on/off switching to fit the desired room atmospheric conditions.

Lighting Controls for Energy Saving
- There are two ways to reduce lighting energy use through controls:
- Turn lights off when not need
- Reduce lighting power to minimum need

Control Options
- Automatic daylighting sensors to control the luminaries in the daylighted zone
- Ceiling-mounted motion sensors with manual override switches
- Programmable time controller with manual override switches

Delta Electronics LED Light source
To replace compact florescent light bulbs, Delta Group, NCTU/UNICODE's main partner, offers a new solution to illuminate the house. Unlike most LED bulbs available on the market today that use thermal dissipation fins as structure for the body, Delta's LED bulb has eliminated the heatsink fin structure while retaining optimized product performance and lifetime. Selective features are dimming, different light emission angles, 90% recyclable material constitution, and a long life of 40,000hours under normal operating conditions.

View to thermal mass and Green core



SYMBOL & LEGEND	
	Delta DIPT-3106 / 1.2Wx6 AC 100~240V, Wall mounted
	Delta BFDA-W / 12W(1233x37) AC 100~240V, Wall mounted
	Delta BFDA-W / 9W (933x37) AC 100~240V, Wall mounted
	Delta BWPT-112R / 1.2Wx3 AC 100~240V, Wall mounted
	Delta DRPT-509AD / 1.2Wx9 AC 100~240V, Recess mounted
	Delta BUPR-005 / 1.2W AC 100~240V, Recess mounted
	Floor Lamp / 1.2W A60 /DF 10W AC 100~240V / E2
Sa	Lighting Switch single-cut
S3a	Lighting Switch double-cut
	230V Electrical Panelboard
	Branch Circuit (concealed in Ceiling or Wall)
	Branch Circuit (Exposed on Wall)

NOTE

LOOP NUMBER
01-03 —— CIRCUIT NUMBER
└———— PANEL NUMBER
PANEL NUMBER

01-- 1F 230V Panelboard

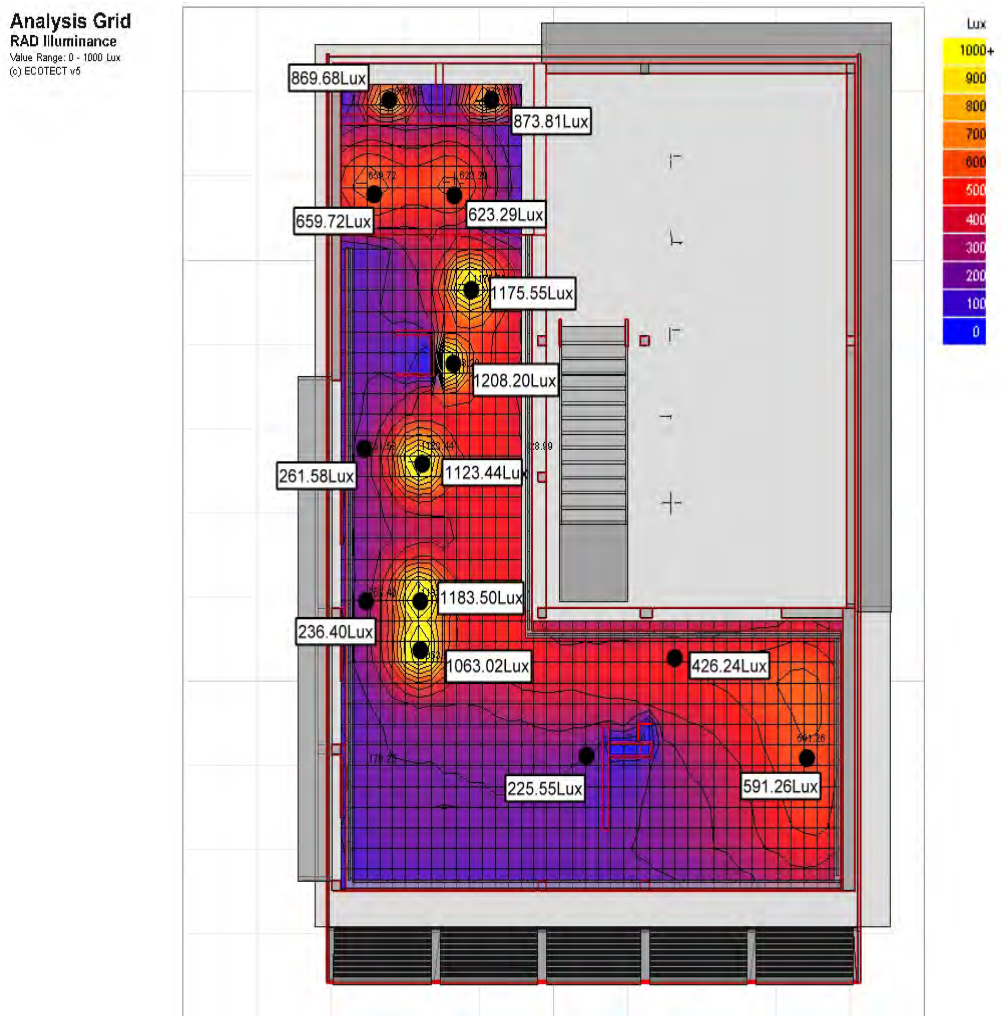
02-- 2F 230V Panelboard

Lighting Plan

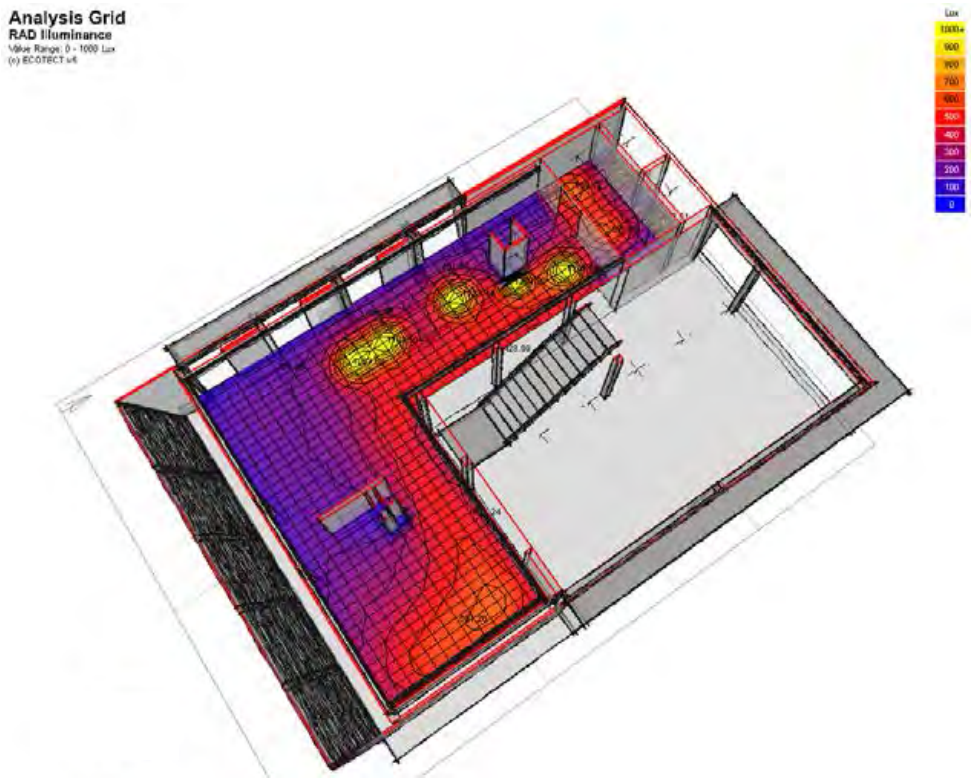
Interior Lighting Simulation

From the result of simulation, the average lighting level in the mesurable area is 358.77 Lux, which meets the 200 Lux value required by SDE organization. The areas which is closer to the window, we have placed indirect lighting to illuminate, to create a more gental lighting effect.

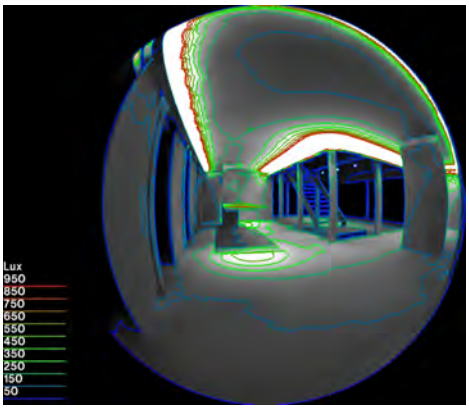
Simulation result is as following:

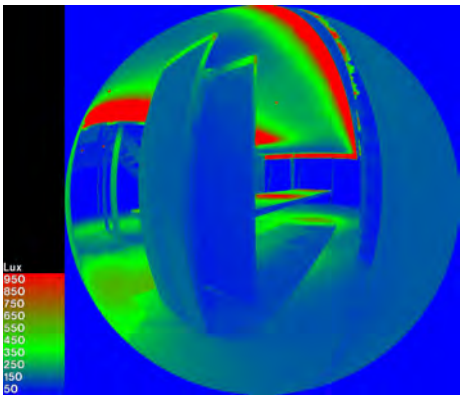


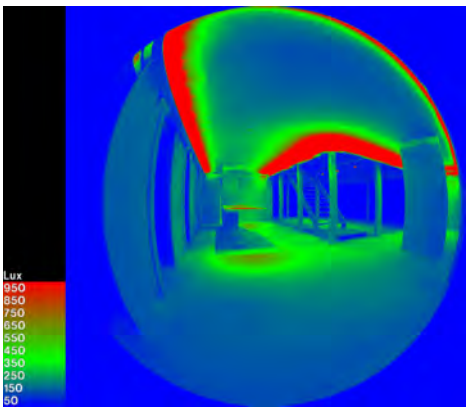
Simulation Result of Interior Lighting

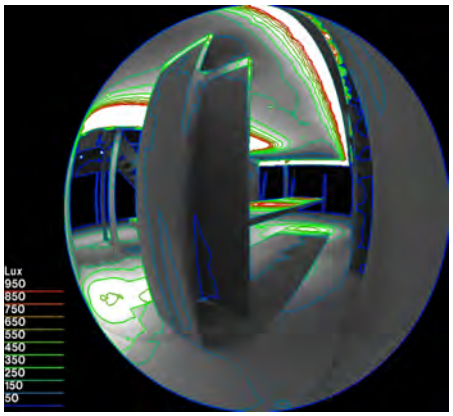


Interior Lighting Distribution



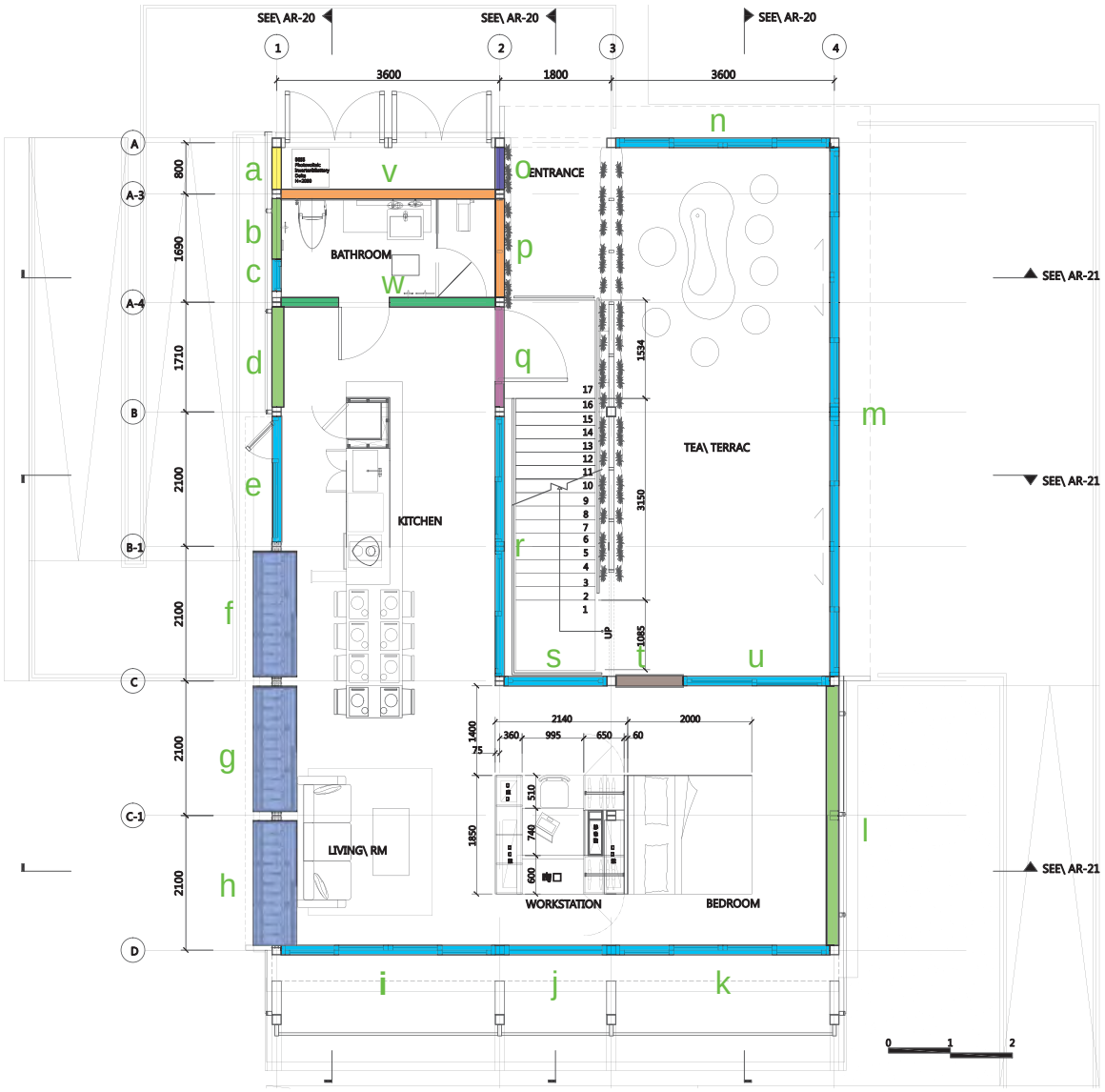






5.2.4 Acoustic Design

The interior faces of walls are designed to provide sufficient absorption and minimize reverberation time. The sound absorption is achieved by the combination of vibrating panels and thick porous material. The interior side of walls and ceilings are covered with plywood with air space behind it. The plywood with air space may sufficiently increase sound absorption in low frequencies. eFoam insulation material behind the airspace provides sound absorption in high frequency.



Unit Mark	Sound level dBA
Heat Pump (Outdoor Unit)	52
Heat Pump (Indoor Unit)*2	39/34
Heat Reclaim Ventilation	28.5
Heat Pump 01	42
Dehumidifier	63
Refrigeration / Freezing	39
Clothes Washer	51
Dryer	65
Dishwasher	41
Extractor hood	66

Sound Insulation

According to the Environmental Protection Administration Executive Yuan, R.O.C (Taiwan), most of the noise on the streets comes from motorcycle and cars, each producing around 95 dB(A). Currently on the street, the noise level is around 73 dB during the day, and 73 dB at night. The regulation for noise level during day time is 76 dB, 63 dB at night. It shows that the noise level is very close to the maximum regulation on the street, therefore, the house should use very good sound insulation to enhance the acoustic value.

The sound insulation of the Orchid House is achieved by the insulation layers, staggered structural elements, and sound leak prevention. The floors, walls, and ceilings of the Orchid are designed in composite layers. Several layers of different thermal insulation material such as Glass Foam and eFoam provide sound insulation. The air space between layers also provides additional insulation value. The staggered structural elements prevent heat-bridge as well as sound transmission. All walls extend to the roofs and floors. Sealant is applied between the wall and the floor. All these construction details sufficiently stop sound transmission.

Noise Barrier

The Orchid House is located on the top of an existing roof, and sitting away from the existing parapet. The parapet serves as the noise barrier from street traffic. The plants between the house and the existing parapet can absorb some reflected noise.

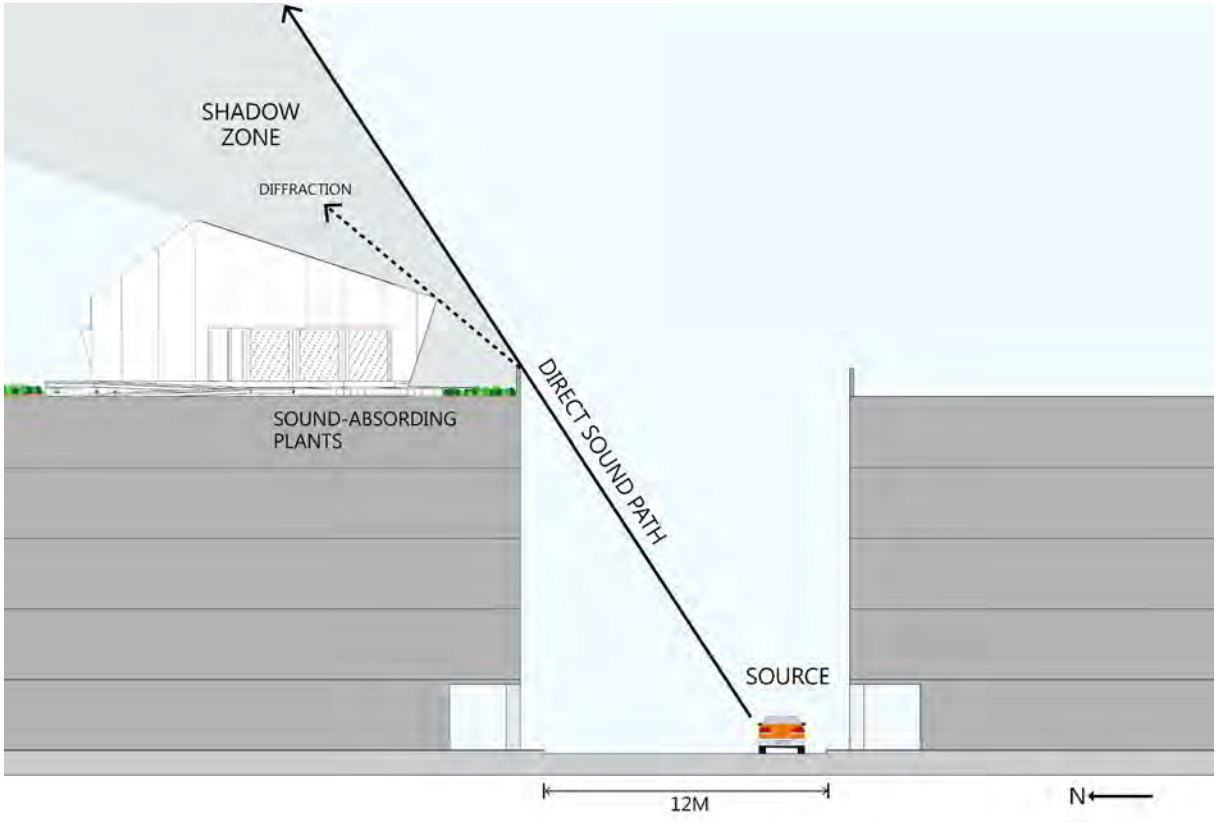


Figure 5.3.2.19 Street Noise Barrier Diagram

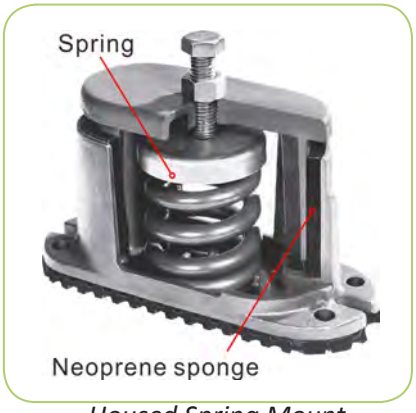
Reverberation Time

The absorption coefficients and the reverberation time of the interior materials are listed on the table below:

				Absorption coefficient						Absorption(sabin)					
KITCHEN	COMPONENTS	MATERIALS	AREA	125Hz	250Hz	500Hz	1KHz	2KHz	4KHz	125Hz	250Hz	500Hz	1KHz	2KHz	4KHz
LIVING ROOM	Floor	Plywood	55.0	0.28	0.22	0.17	0.09	0.10	0.11	15.40	12.10	9.35	4.95	5.50	6.05
	Ceiling	Plywood	55.0	0.28	0.22	0.17	0.09	0.10	0.11	15.40	12.10	9.35	4.95	5.50	6.05
	wall	Plywood	40.0	0.28	0.22	0.17	0.09	0.10	0.11	11.20	8.80	6.80	3.60	4.00	4.40
	windows	Plolycarbonate	42.0	0.11	0.26	0.15	0.14	0.04	0.04	4.62	10.92	6.30	5.88	1.68	1.68
	Air, Sabins per 1000m3		135.3	0.04	0.09	0.26	0.46	0.92	2.58	0.05	0.12	0..35	0.62	1.24	3.48
	Area, ave. coef,. total sabins		55.2	0.2428	0.2288	0.1656	0.1009	0.0869	0.0947	46.67	44.04	32.15	20.00	17.92	21.66
	Reverberation time (sec.)			T=KV/A Sabine						0.50	0.50	0.70	1.10	1.20	1.00
	Eyring's coef.			0.2156	0.2045	0.1526	0.096	0.0832	0.0903						

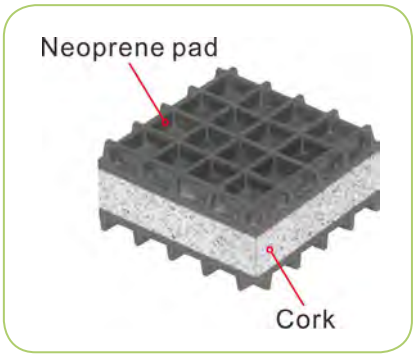
Isolation for Mechanical System Vibration

Some mechanical equipments of the Orchid House are located on the second floor terrace. Because these equipments are sitting on light weight construction, the vibration and noise may cause a serious problem toward the house. As a result, the isolation devices are critical for these equipments. The Unicode Team designs two different types of isolation devices for these equipments. The outdoor unit of the heat pumps, the CO2 heat pump, and the heat exchanger use housed spring mounts. The pump of solar heater uses vibration pads. Both of these devices are designed to properly resist the equipment weight and vibration.



Housed Spring Mount

The Rubber and Cork Sandwich Pad is designed to absorb the noise generated by the water pump. The pad laminates a thick layer of cork between two neoprene pads. Noise from the pump transmits through layers of different densities will lose its intensity due to the change in velocity. Therefore, this pad will sufficiently reduce the noise of the pump.



Rubber and Cork Sandwich isolation Pad

The housed spring mounts selected for the house may resolve both the vibration and acoustic problems generated by the equipments. The deflection of the spring in the central core absorbs the vibration and noise in low natural frequencies. Semi-circular Neoprene sponge between the upper and lower portions of the mount limits the movement during start and stop of the equipments.

5.3 ENGINEERING AND CONSTRUCTION DESIGN NARRATIVE

Synopsis

Local Context: Taipei City

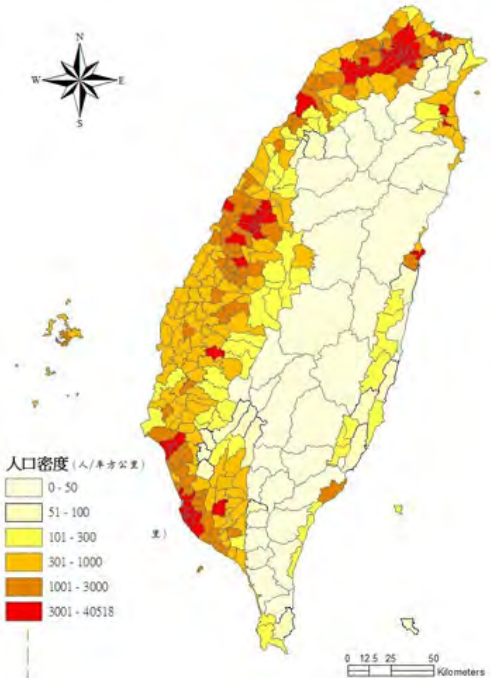
Taipei City Skyline - Urban Context

Taipei Rooftop

Taiwan is a country spanning only 36,193 km2 but with a population of 23.34 million (compare with France's 674,834 km2 and 65.7 million people). The population density is especially high because two-thirds of the island is composed of mountains, and as a result most people live along the coastal areas. It is especially crowded in urban areas, such as the capitol city, Taipei, which is one of the top ten densest cities in the world. In addition to the high population density, Taipei also developed rapidly over the years, both of which contribute to a random assortment of architecture in the city that expands horizontally instead of vertically to conserve space.

However, also as a result of the rapid development, many of the residential buildings were not built to last and have infrastructure that is now rundown or outdated. In recent years, new residential buildings are sky scraper apartments, which are usually only affordable by the wealthy upper class because of the luxury design and locations in the city center.

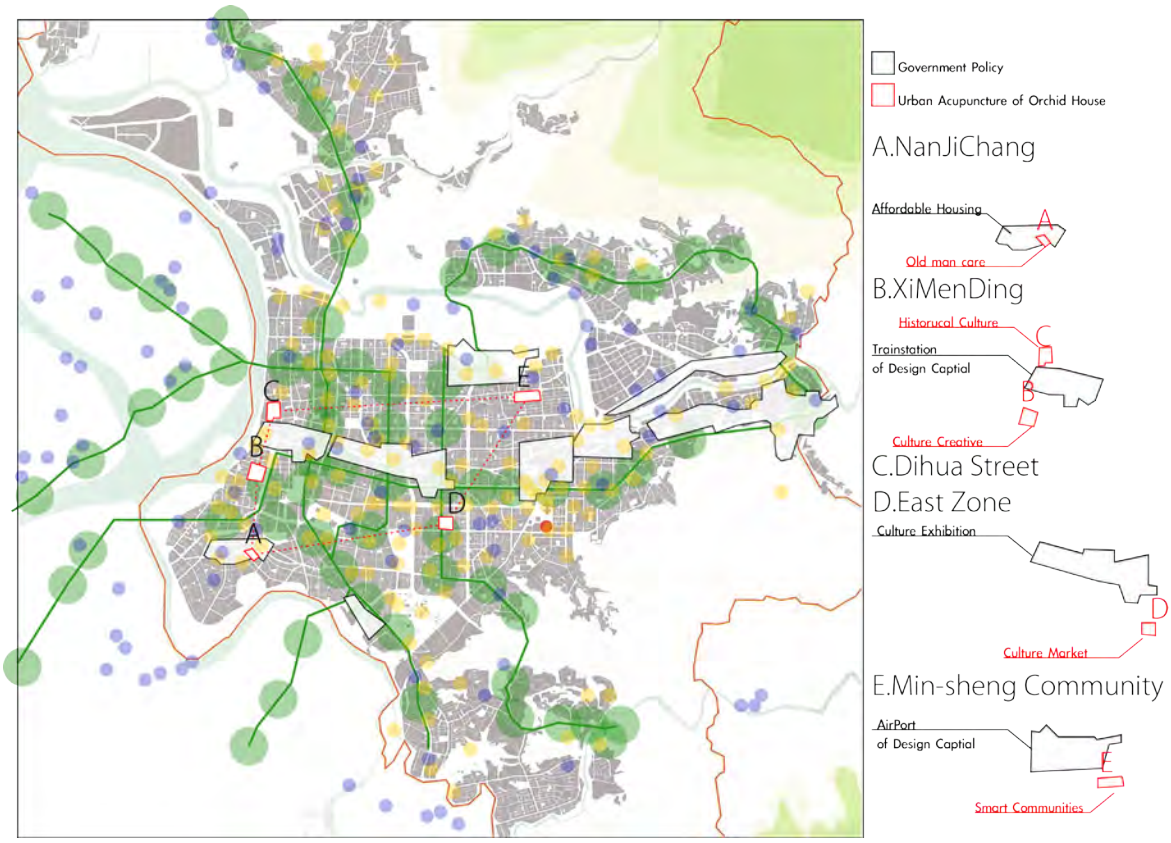
Taipei Urban Crisis



Population Density In Taiwan

This population growth results in the lack of living space and sufficient public amenity, and cause middle classes moving toward the periphery, even outside of city. The majority of these people are young professionals who just graduated from collage whom have worked a few years, and they are not able to afford a house yet. However, most of them works in the city centre and commute, and caused major traffic congestions with millions of cars and motorcycle. Consequently, the city is left with a high carbon dioxide pollution, and the decrease living quality.

Taipei Urban Acupuncture

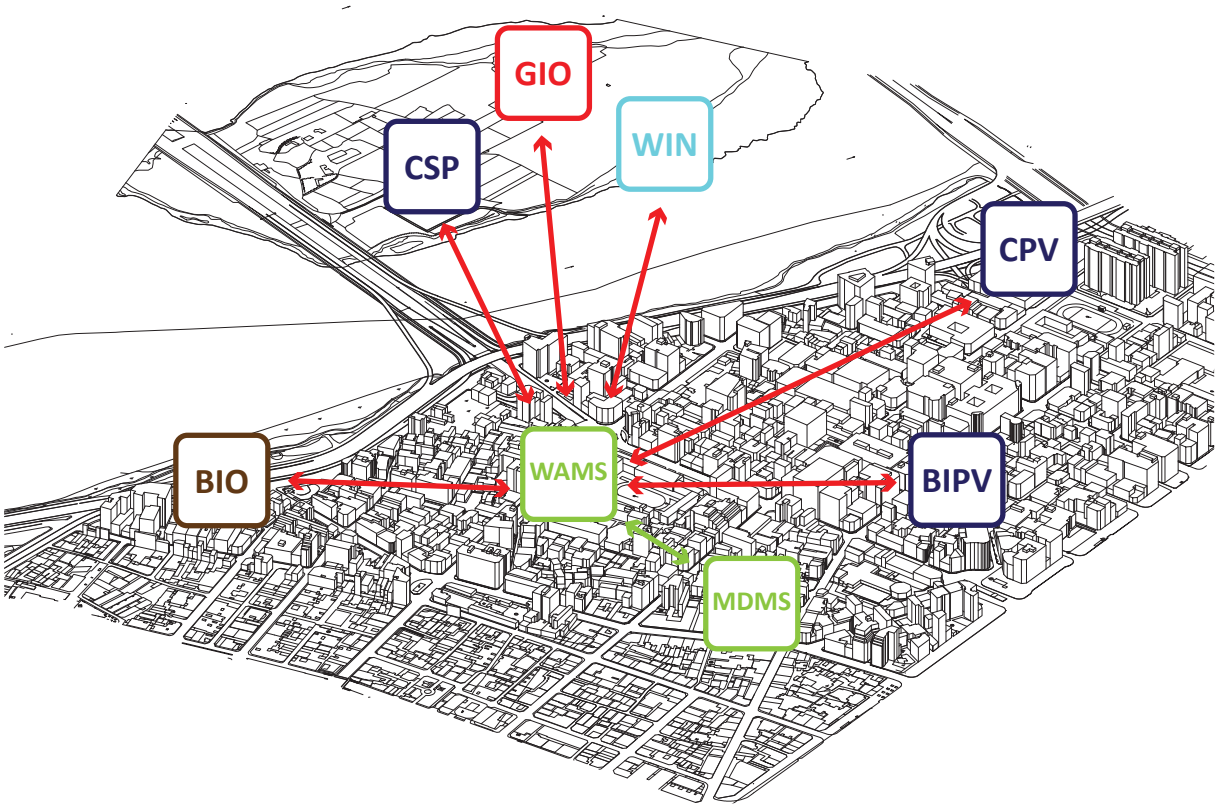


Ximending District

Taipei city population reached its 20-year peak and residential building has been constructed in various types. The majorities are a duplex apartment, which is relatively wide and 4 to 5 story building, and a row house that is extremely narrow and deep single family owned. These two types were constructed during the modern democracy period. Most of flat-roof duplex apartment and row house are facing problems: leakage, heat absorption and no public facilities. Therefore, the illegal make-shift metal roofed shelters have been introduced widely in most of the residential buildings and create unregulated cityscape of Taipei.

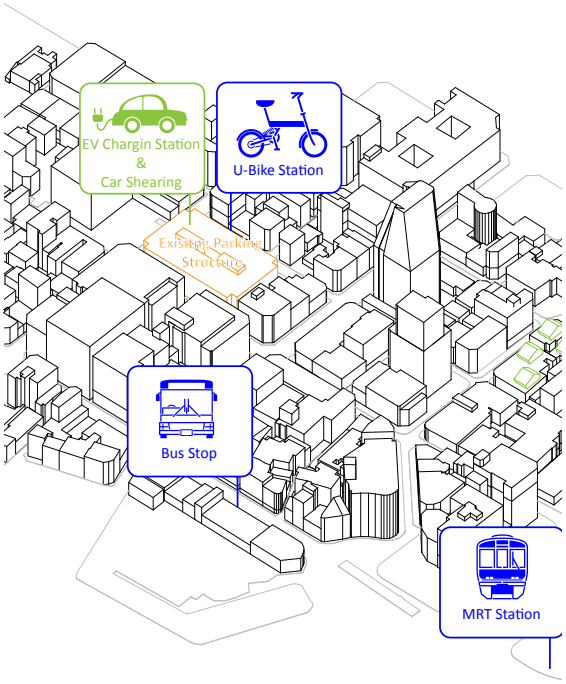
For Orchid House urban design strategy, NCTU UNICODE focus districts where the most of duplex apartment and row house are located as the most needed area for urban regeneration to vitalize not only the residential building, but also these districts.

Zero Energy District



Ximending Smart Grid Concept

As main focal point of Ximending Zero Energy District plan, NCTU UNICODE proposes not only PV panel implementation to buildings, but also larger scale of renewable energy sources such as CSP (Concentrated Solar Power), Biomass, Wind power and Geothermal. In order for all renewable energy sources to be distributed efficiently, advanced applications of Wide-area-Measurement System (WAMS) is installed one of larger footprint building rooftops, and Data Centre (MDMS) serve all the energy with automation system. Furthermore, AMI (Advanced Metering Infrastructure) is installed to Orchid House Clusters to manage power supply within houses. Please refer Architecture Design Narrative for farther details of AMI integration to housing appliances.



EV Charging Station

Orchid House Urban Concept

Orchid Cluster in Taipei Urban Context

Orchid Cluster Section

Orchid House extension on existing building in Taipei city plays not only critical role for Ximending zero energy district urban planning, but also to apply new concept of urban regeneration. Almost 50% of residential building in Taipei city are over 30 years old and typically demolished during the renewal planning. However, NCTU UNICODE points out the problem of city re-development organized by government and executed by private developers. The developer tends to acquire larger number of properties to combine the land FAR (Floor Area Ratio) to build up high-rise residential condominium, which is not affordable for average income level and treated as investment target by investors.

Orchid House will proved unique opportunity for not only the building owner, but also the targeted tenants, who needs housing support to pursue their young profession to promote new creative industry in Taipei.

Orchid House Prototype

Orchid House at La Cite du Soleil, Versailles, France

The Orchid House is as much a physical dwelling structure as a mindset for living. NCTU UNICODE hopes to use the Orchid House to revive Taiwan by focusing on urban centres. Urban areas in Taiwan, particularly the capitol city, Taipei, have high population densities and a random assortment of architecture – many buildings are old with rundown facilities. Furthermore, as in all urban cities but even more so because of the particularly high population density, commuter traffic causes extreme congestion, uses a lot of energy, and creates large amounts of pollution. Reviving the city would include not only renovating buildings and improving the residents' quality of life, but also promoting creativity and sustainability.

Objective

When making the engineering and construction design for the roof top add-on Orchid House of present time Taipei, both the Orchid House and the existing building must be included as consideration factors. The island of Taiwan sits on the Circum-Pacific Seismic Belt as well as the major paths of north Pacific typhoons. Earthquakes and typhoons are the major disasters on this island. As a result, lateral force resistance is as important as gravity load resistance in structural design.

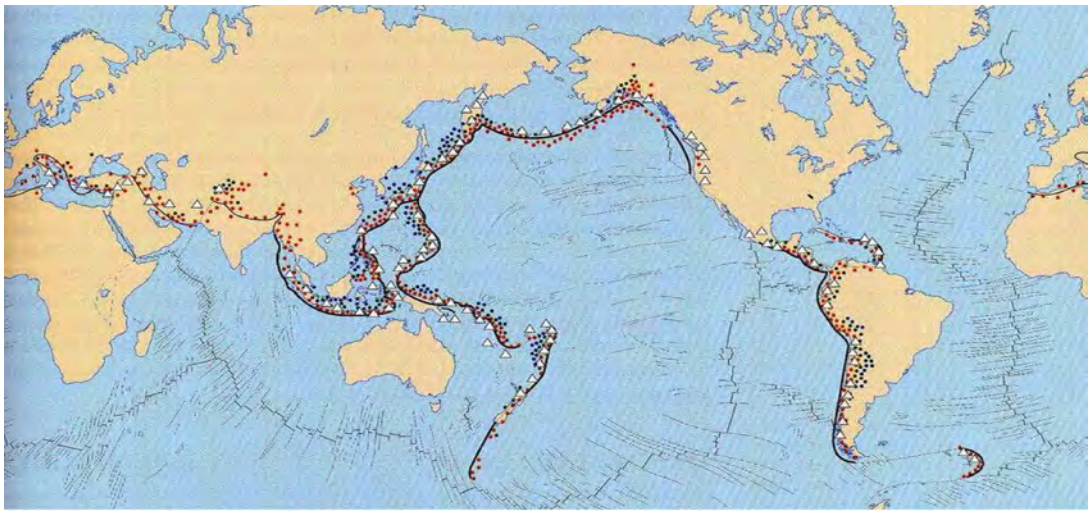


Figure 5.3.0.1 Circum-Pacific Seismic Belt (W.K Hamblin & E.H Christiansen, 1998)

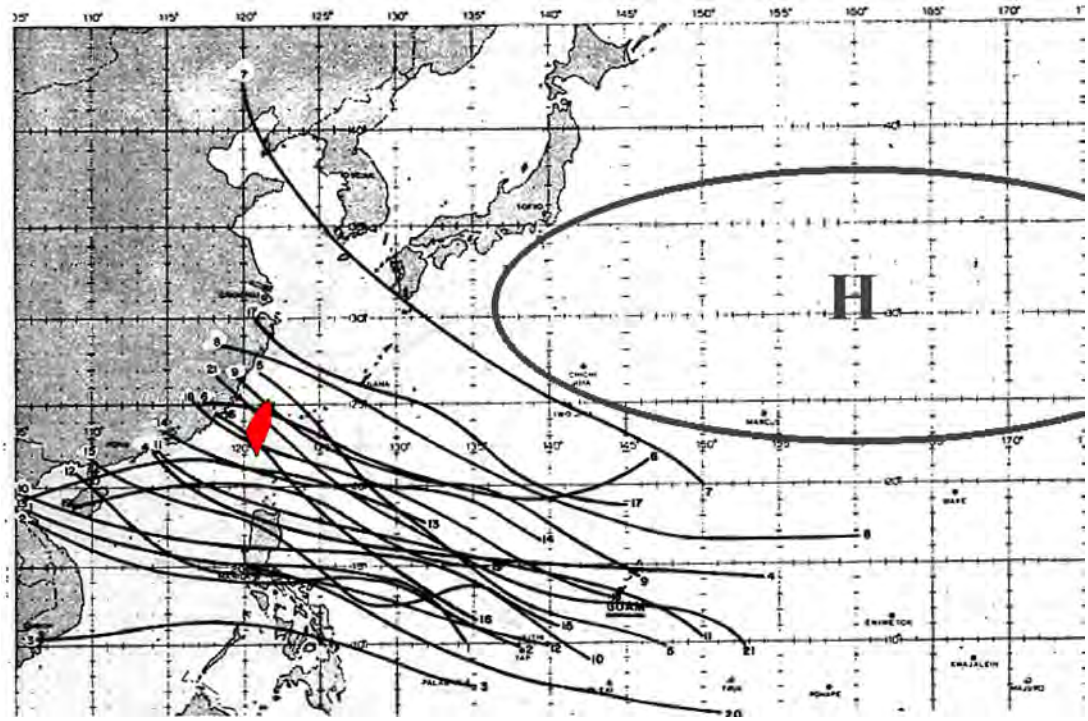


Figure 5.3.0.2 Major paths of West Pacific typhoon ("tropical cyclone Motion and Surrounding Parameter Relationships", John E George, 1975)

The traditional row houses are mainly constructed by reinforced concrete. The rigid post-beam structure of concrete is suitable to resist both gravity and lateral forces. Taiwan Island is rich in cement and that makes concrete a preferred and sensible local construction material.

However, modern buildings in Taiwan tend to see more steel construction. The main reason is to reduce the dead load and construction time. The quality of steel construction is also more reliable than pour in site concrete construction. The recycled steel has been widely applied on the architectural construction on this island. The add-on roof tops commonly seen in Taipei are mainly of steel construction. The reason is to avoid adding too much weight to the existing building structure.

Heat island effect has been a major problem in Taipei just like most of the modern industrialized metropolis. High population density, air pollution, automobile smog, hard urban paving, rapid rain water drainage system all contribute to Taipei's heat island effect. Geographic condition also enforces this effect. Taipei city is located on the Taipei Basin. The surrounding mountains reduce the wind flows which trap the heat in this city.

Flood in the typhoon season is another major disaster in Taipei. Rain water from the tropical storms always brings more water than the city drainage system can handle. To make matter worse, the rivers in this city are shallow and steep, so water does not stay in the city for long. During the dry season, water shortage is another problem people have to face every year. Therefore, keeping the rain water in the city for reuse would be an effective strategy to extend the city's sustainability.

http://teia.e-info.org.tw/e-info/2298

5.3.1 Structural Design

Introduction

The Orchid House's engineering design features an integrated set of systems which is highly efficient in sustaining the comfort factors of the house. Similar to the orchid's natural eco-system, the engineering systems work in a coherent way to increase the efficiency of sunlight and water usage. By choosing recyclable materials such as steel framing and using the pre-fabrication technique, the structure can be erected quickly to save time and energy. The structure system utilizes steel framing with floor and wall infill. This system allows the house to be constructed on different sites with the same framing and different infill which fits its local condition. The steel manufacturer of the Orchid House is Tung Ho Steel Enterprise Corporation whose products are 100% recycled material.

Joint System

The joint system is composed with the Ordinary Moment Resistant Frame method, which has lower ductility for strong seismic resistance. The Ordinary Moment Resistant Frame allows uncomplicated production and short construction time, at the same time pass the stiff regulation for seismic proofing in Taiwan. Thanks to the low ductility of the Ordinary Moment Resistant Frame, the Orchid House will require no structural bracing that would easily disrupt the continuity of space as well as increasing the construction complexity.

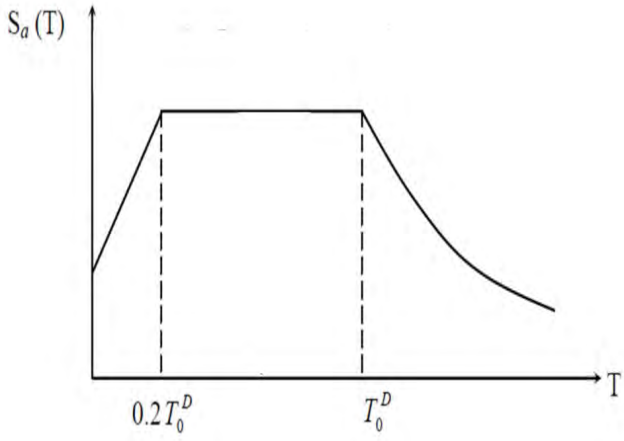


Figure 5.3.1.2a Earthquake Load in Taiwan

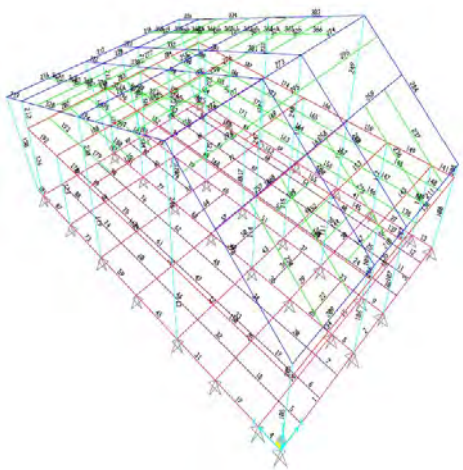


Figure 5.3.1.2b Structural Diagram

Prefabrication

All of the structural components are prefabricated at a factory near the Taipei City and transported to the construction site, which means no need for the on-site welding joints or the landfill trash during the construction. Most of the connections will be joined by bolts and nuts, which can be done without special equipment or skill to build the structure. The modules are designed to be transported by trucks and standard containers as standard shipping. This prefabricate methods are applied when the Orchid House is added on to the existing building rooftops in Taipei City to reduce construction cost and time. It is also suitable when the Orchid house is shipped to France by standard containers.

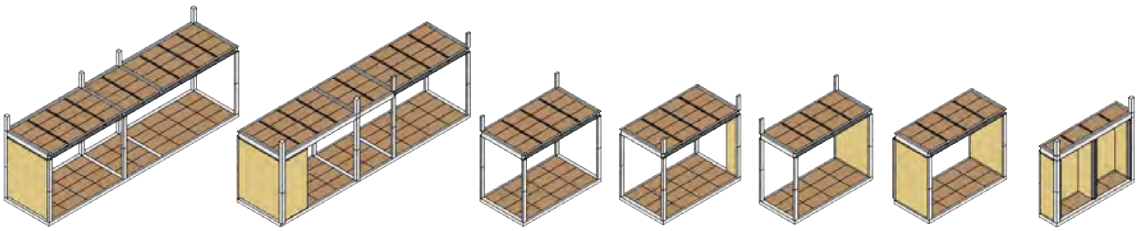


Figure 5.3.1.3 Modules

Foundation

The foundation of the Orchid House is designed to fit on top of the existing local building structure in Taipei. The system extends the existing building's structural grid and requires the Orchid House to extend from it. On the roof tops of the existing buildings, reinforce bars are inserted into the existing concrete columns, and then concrete bases with reinforcement are poured on site to serve as the footing of the Orchid House. Some screw stems are extended from the footing; and steel plates welded at the bottom of the house's columns connect the house to the footings. As a result, the load of the Orchid House will be transferred from the house's steel system to the existing concrete structure that it sits on.

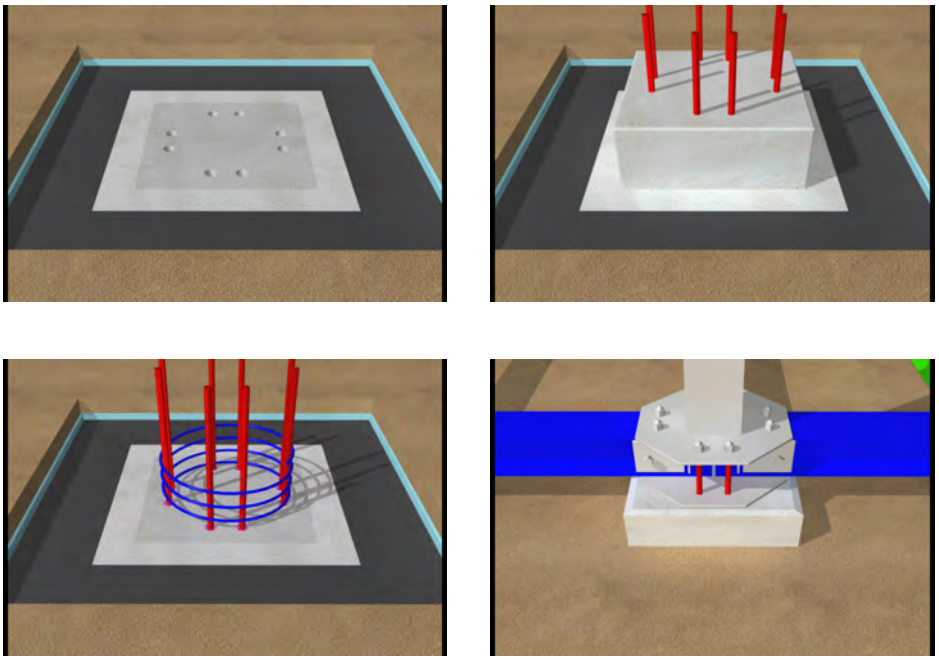


Figure 5.3.1.4a Structural connection between the Orchid House and existing building

The construction of the Orchid House in Versailles has a different site consideration. The prototype Orchid House's foundation is specially designed for the uneven ground condition. The footing utilizes the sand box with steel adjustable foot for easy leveling without expensive tools or special knowledge. This leveling method also helps shorting the overall construction time and cleaning after the competition. The Orchid House is supported by 28 special footings and can be assembled within a half day on site.

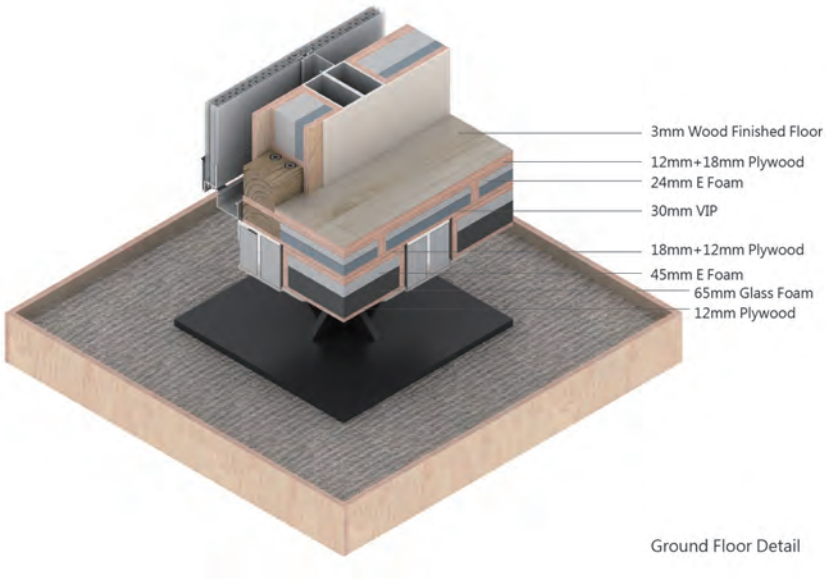


Figure 5.3.1.4b Adjustable Footing in Versailles Site

Figure 5.3.1.5 QR code

QR code management

The QR code will be used for all the structural components marked in the factory while they are manufactured for the construction management. The QR code does not require any expensive or special device for reading, but just the usual mobile device, such as a smart phone or tablet PC with camera. The information technology team of NCTU UNICODE will develop special application for the construction management.

5.3.2 Constructive Design

Introduction

Innovative combinations of passive and active technologies can reduce a considerable amount of energy and material waste. The Orchid House's design uses a light-weight construction, with an insulated envelope that re¬duces mechanical load. The material selection for the Orchid House is mainly targeting the products manufactured in Taiwan with sustainability production process, especially for the structure, architectural finishes, façade material, and furniture.

Wall System

The typical exterior walls of the Orchid House are designed to minimize its thermal conductivity. The exterior walls are constructed with several layers. Makrolon® polycarbonate on the outermost layer provides the unified exterior look. Two layers of plywood add its stiffness. 72mm of eForm provides necessary thermal resistance for Taiwan's condition. The inner most layer is plywood. The total thermal conductivity for the typical exterior wall is 0.15W/m2K.

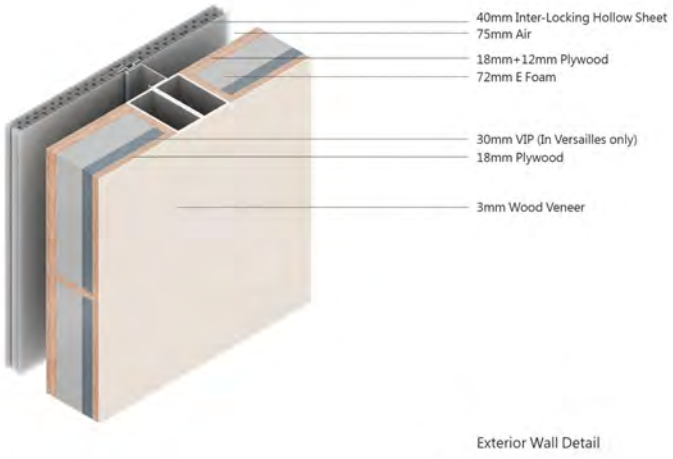


Figure 5.3.2.1 Wall System Diagram

	Insulation Type	Thickness (mm)	Thermal Conductivity (W/mK)	Thermal Transmittance (W/m^2K)	Thermal Resistance (m^2K/W)	AREA (m^2)
Wall AR-341	Exterior Air Film				0.05	
	Polycarbonate	40	0.044	1.1	0.9091	
	Air	75	0.024	0.32	3.125	
	Plywood	18	0.13	7.222222222	0.1385	
	Plywood	12	0.13	10.83333333	0.0923	
	E Foam	72	0.0379	0.526388889	1.8997	
	Plywood	18	0.13	7.222222222	0.1385	
	Plywood	3	0.13	43.33333333	0.0231	
	Interior Air Film				0.15	
TOTAL:		238		0.153230057	6.52613	

Table 5.3.2.1 Wall System Technical Report in Taipei

Glazing

The Orchid House façade will be covered with Makrolon® polycarbonate 40mm Low-E coated Inter-locking sheet from Bayer Material Science. This material is also inserted in window frames to provide lighting and transparency. This Inter-locking system allows the façade material to be easily transported and installed with durability and added resistant value to the Orchid House envelop. Makrolon® polycarbonate is also 100 % recyclable, making it inherently sustainable.

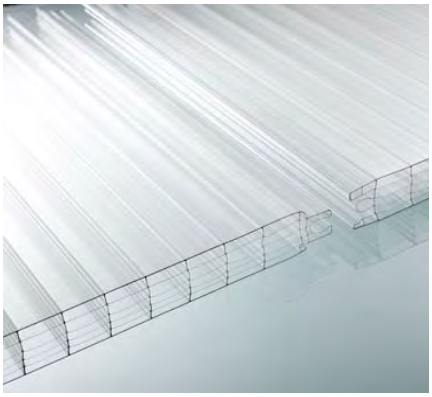


Figure 5.3.2.2 Makrolon® Polycarbonate Sheet

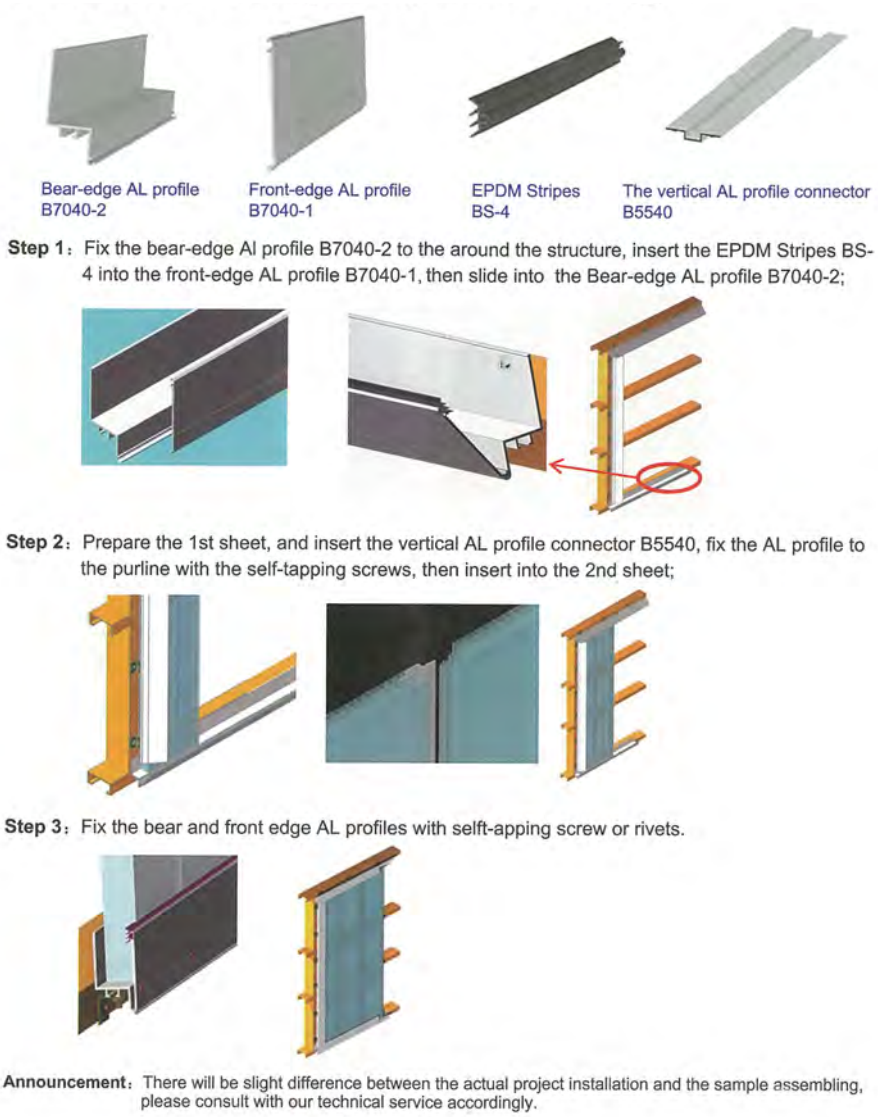


Figure 5.3.2.3 Makrolon® Polycarbonate Panel Assembly

Window Frame

The Orchid House incorporates large size sliding doors on the south and east side façade. YKK AP's aluminum window frame and door sash are chosen for its air and water tight detail. YKK AP window frame's water tightness is measured at 1000 Pascal (Pa), which is almost twice as that of the normal window frame installed in Taiwan. YKK AP window frame also contributes to noise deduction. It is rated as the T-2 class in sound deduction performance level, which reduces noise level from 80~75 dB outside to 50~45 dB inside.

Figure 5.3.2.4 YKK AP Aluminum Frame Detail

Floor System

The floor system of the Orchid House is designed to achieve the same goal of reducing thermal conductivity just like the walls and roof. The floor is constructed with UA wood floor on the top and 24 mm of eFoam underneath it. Two layer of plywood enforce the structure of the floor. 45mm of eFoam and 65mm of Glass Foam supported by a layer of 12mm plywood provide thermal resistance. The total thermal conductivity for the floor is 0.28W/m2K.

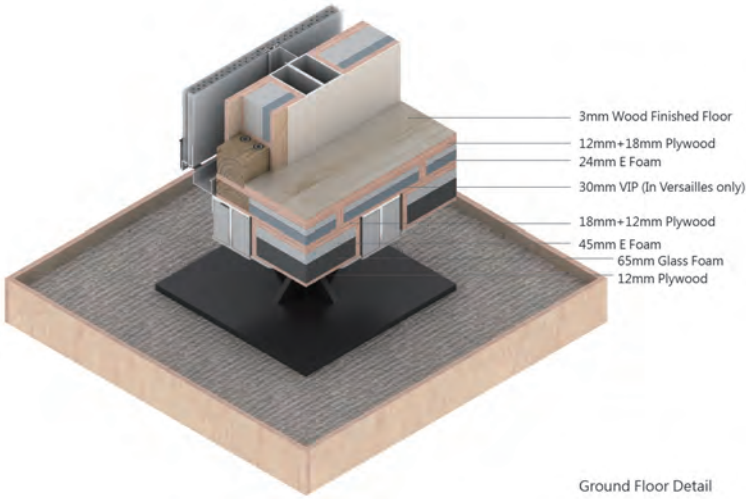


Figure 5.3.2.5 Floor System Diagram

Most of the Orchid House interior wood finish material is the selected FSC certified product from UA Wood Floor Inc. UA Wood Floor Inc. is the biggest wood flooring manufacturer in Taiwan and their production process makes their products recyclable and sustainable. UAPR Premium Collection Products especially utilize Nano technology coating to eliminate defection of wood surface and, while it emits low VOC, to last much longer than typical wood flooring.

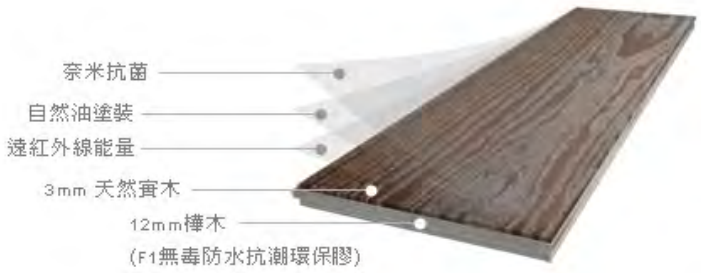


Figure 5.3.2.6 UA Floor

	Insulation Type	Thickness (mm)	Thermal Conductivity (W/mK)	Thermal Transmittance (W/m^2K)	Thermal Resistance (m^2K/W)	AREA (m^2)
Floor (1F) Deck M-Area Panel AR-321	Interior Air Film				0.15	
	Plywood	16	0.13	8.125	0.1230769	
	Plywood	18	0.13	7.222222222	0.1384615	
	E Foam	24	0.0379	1.579166667	0.6332454	
	Plywood	12	0.13	10.83333333	0.0923077	
	Plywood	18	0.13	7.222222222	0.1384615	
	E Foam	45	0.0379	0.842222222	1.1873351	
	Glass Foam	65	0.0711	1.093846154	0.9142053	
	Plywood	12	0.13	10.83333333	0.0923077	

Table 5.3.2.2 Floor System Technical Report

Roof System

The interior roof consists of UA wood floor on the top. Air space and waterproof plastics prevent water leakage. 11mm of eFoam and 65mm of Glass Foam provide thermal resistance. Two layers of plywood to support the upper portion of the roof. 100mm eFoam and 12mm of plywood fill up the space between steel beams. 28mm of eFoam and 9mm plywood go underneath the structural beams. The lowest layer of the roof is a plywood ceiling. The total thermal conductivity of the roof is 0.09W/m2K.

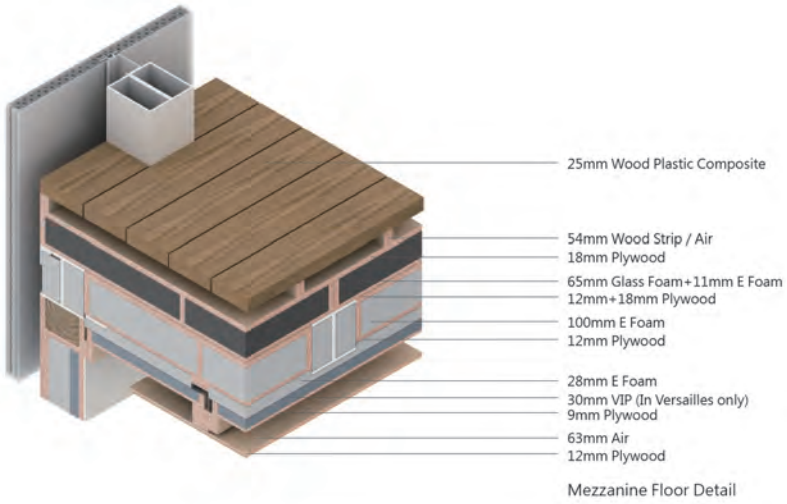


Figure 5.3.2.7 Roof System Diagram

	Insulation Type	Thickness (mm)	Thermal Conductivity (W/mK)	Thermal Transmittance (W/m²K)	Thermal Resistance (m²K)/W	AREA (m²)
Roof (2F Deck) Deck M-Area Panel AR-322	Interior Air Film				0.15	
	Plywood	25	0.13	5.2	0.19231	
	Air	54	0.024	0.444444444	2.25	
	Waterproof Plasti	2	0.03	15	0.06667	
	Plywood	18	0.13	7.222222222	0.13846	
	E Foam	11	0.0379	3.445454545	0.29024	
	Glass Foam	65	0.0711	1.093846154	0.91421	
	Plywood	12	0.13	10.83333333	0.09231	
	Plywood	18	0.13	7.222222222	0.13846	
	E Foam	100	0.0379	0.379	2.63852	
	Plywood	12	0.13	10.83333333	0.09231	
	E Foam	28	0.0379	1.353571429	0.73879	
	Plywood	9	0.13	14.44444444	0.06923	
	Air	63	0.024	0.380952381	2.625	
	Plywood	12	0.13	10.83333333	0.09231	
	Interior Air Film				0.15	
TOTAL:		429		0.093995539	10.6388	

Table 5.3.2.3 Roof System Technical Report

Wood Deck

The east side outdoor deck of Orchid House as well as the west and south side slopes will be covered by Wood Plastic Composite (WPC) provided by HaunSu Tech Corporation. WPC panel is composed of 50 % of High Density Polyethylene (HDPE) and Polypropylene (PP) with 25 % of Wood fiber and 25 % of Glass fiber. Almost half of HDPE and PP comes from recycled plastic in Taiwan and Japan.

Figure 5.3.2.7 Wood Plastic Composite Panel

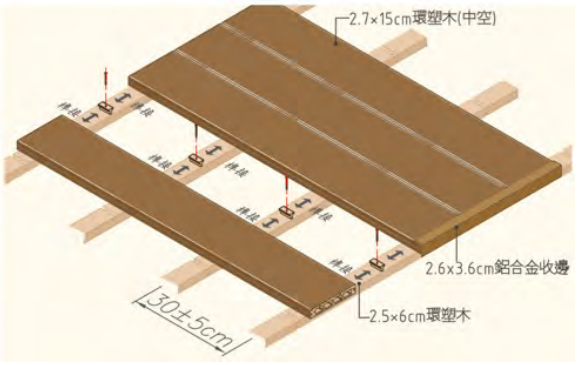


Figure 5.3.2.8 Wood Plastic Composite Panel Insulation

Thermal Wall

A thermal wall is designed for the west side of the orchid House. The POLLI-BRICK™ is chosen for the thermal mass solution. The POLLI-BRICK™ is a 100% post-consumer carbon neutral air insulated curtain wall system from MINIWIZ; however, the POLLI-BRICK™ will be filled with water for the thermal mass application. Team NCTU UNICODE has conducted intensive research of POLLI-BRICK™ at the lab for this new application to prove its functionality. The result shows that the thermal wall efficiently lower the daytime temperature and raise the night time temperature. A computational simulation is also provided to predict its performance year round. The bottles are held together and fixated to a transparent acrylic sheet on their exterior side.

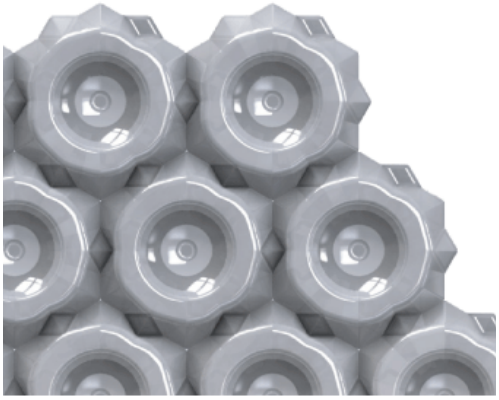


Figure 5.3.2.9 POLLI-BRICK™

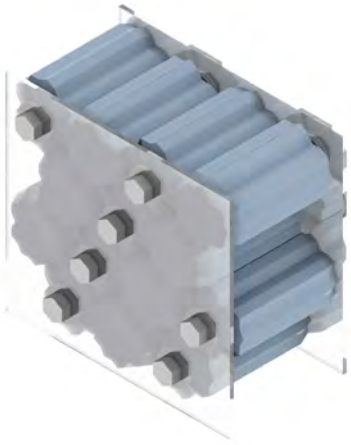
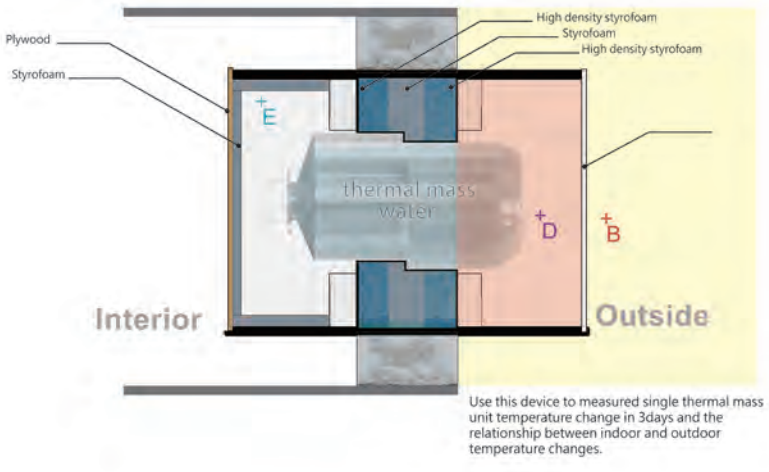


Figure 5.3.2.10 Thermal Wall Detail



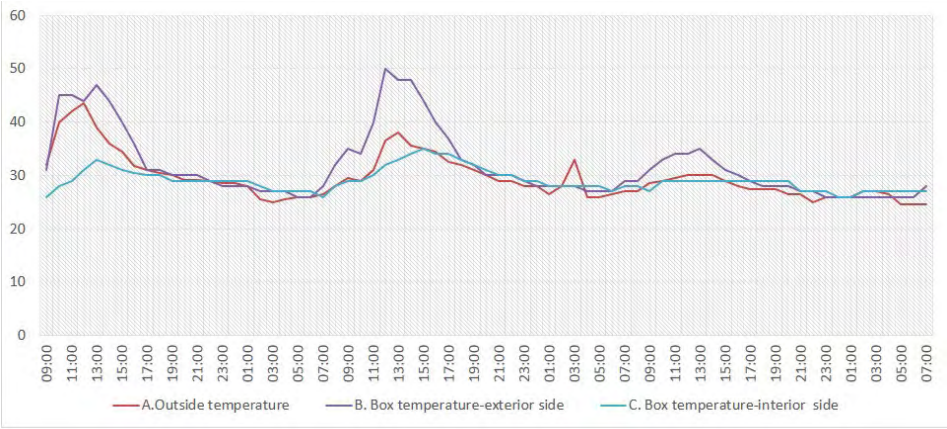


Figure 5.3.2.11 Thermal wall experiment diagram

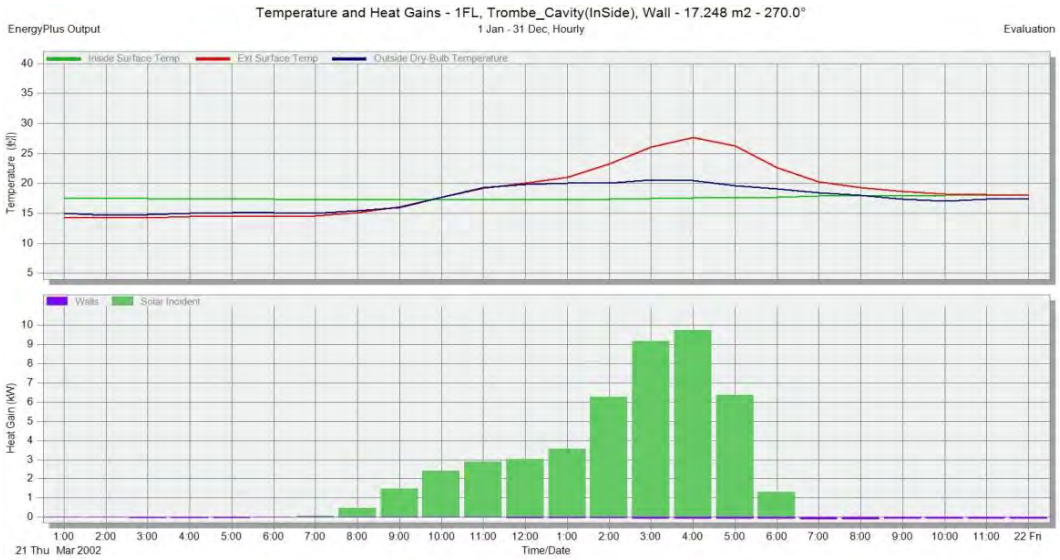


Figure 5.3.2.12 Thermal Wall Simulation in Taipei (21 Mar)

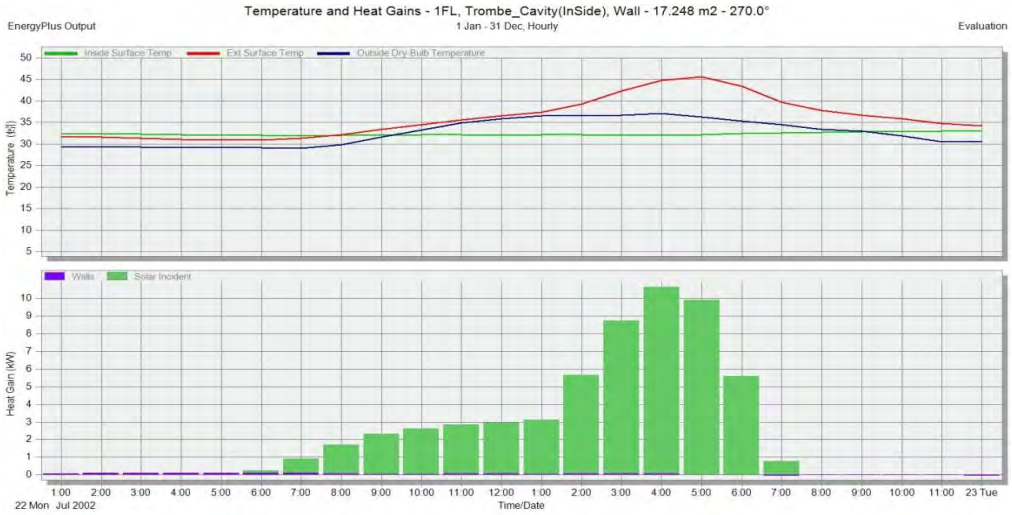


Figure 5.3.2.12 Thermal Wall Simulation in Taipei (22 Jul)

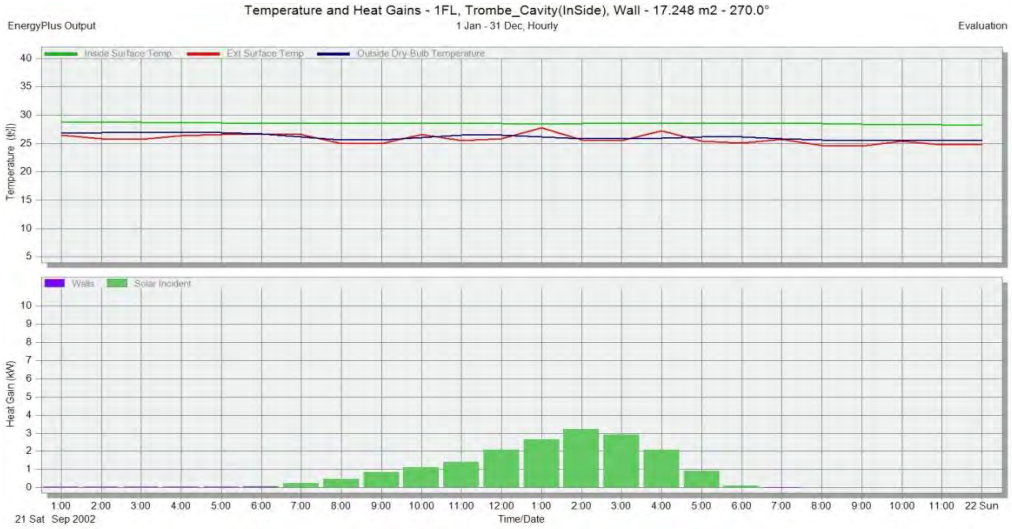


Figure 5.3.2.12 Thermal Wall Simulation in Taipei (21 Sep)

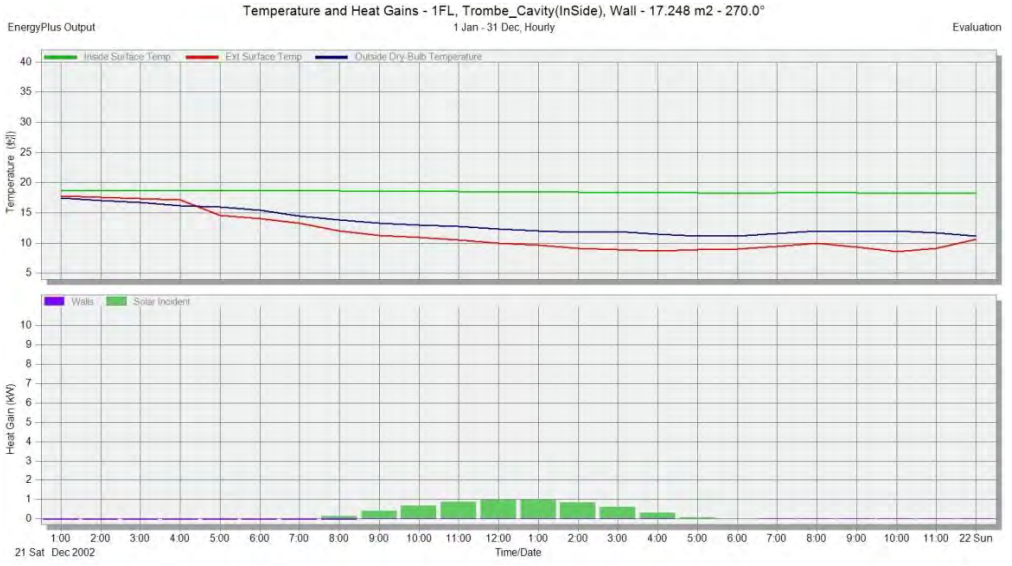


Figure 5.3.2.12 Thermal Wall Simulation in Taipei (21 Dec)

Interior Wall System

The wall between kitchen and bathroom is designed with high thermal resistance value because of the different thermal conditions. The kitchen is air conditioned while the bath room is not. In order to prevent conductivity heat transfer between these two rooms, the interior wall is constructed with eForm insulation. The exterior faces of the wall are plywood. The total thermal conductivity value of the interior wall is 0.29W/m2K.

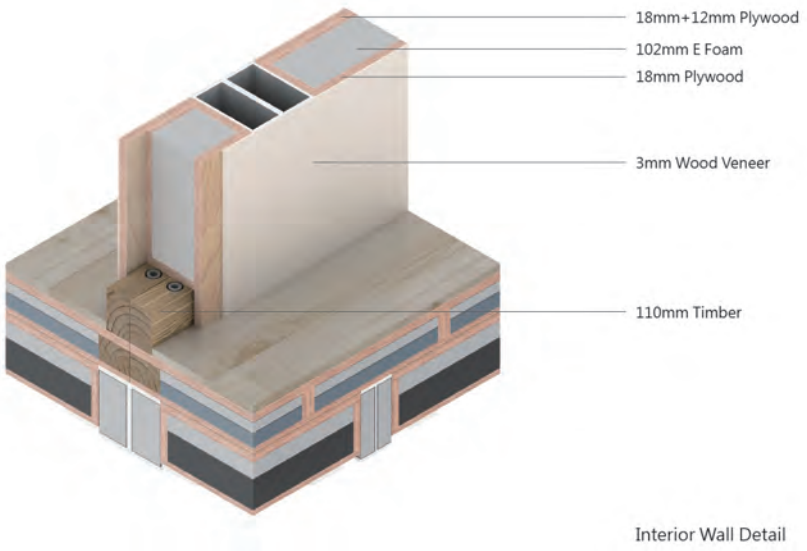


Figure 5.3.2.9a Interior Wall System Diagram

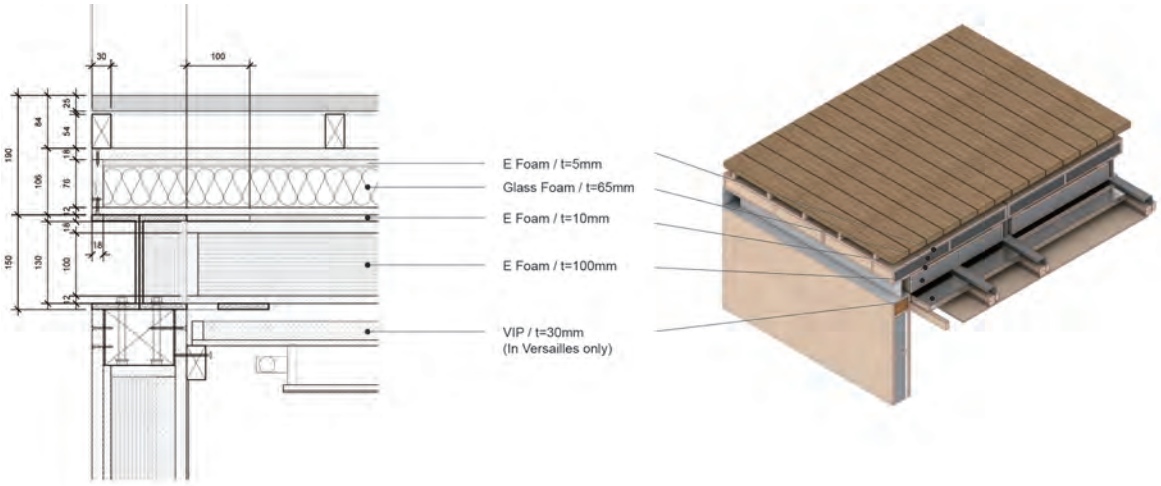
	Insulation Type	Thickness (mm)	Thermal Conductivity (W/mK)	Thermal Transmittance (W/m^2K)	Thermal Resistance (m^2K/W)	AREA (m^2)
Wall (Interior)	Interior Air Film				0.15	
	Plywood	18	0.13	7.222222222	0.1385	
	Plywood	12	0.13	10.83333333	0.0923	
	E Foam	102	0.0379	0.371568627	2.6913	
	Plywood	18	0.13	7.222222222	0.1385	
	Plywood	3	0.13	43.33333333	0.0231	
	Interior Air Film				0.15	
TOTAL:		153		0.295543159	3.3836	

Table 5.3.2.4 Interior Wall System Technical Report

Thermal Insulation

Two insulation materials are used in the Orchid House in Taipei. For the thermal and acoustics solution, the insulation material of very unique recycled glass foam is selected, which could deliver STC ≧ 42dB (ASTM E413). This insulation material will be installed inside the wall, above the ceiling as well as underneath the flooring to reduce thermal heat loss and improve acoustic performance.

Figure 5.3.2.14 Glass Foam Insulation



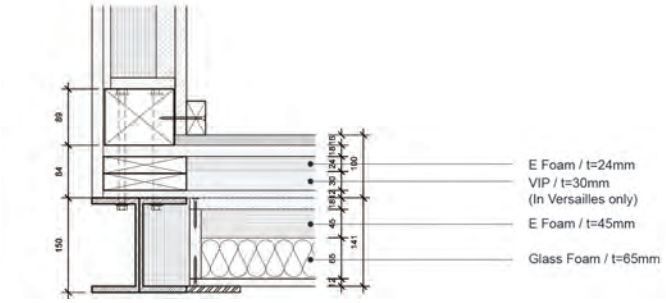


Figure 5.3.2.15 Thermal insulation Diagram

Another insulation material used in the Orchid House is call eForm. It is manufactured from non-toxic raw materials with pollution free process. It is also recyclable and reusable. The structural elements of the insulation panels in different layers are staggered. The purpose is to prevent the heat bridge occurs.

During the contest in Versailles, The prototype of the Orchid House will add Vacuum Insulation Panels (VIP) to its exterior walls, roof and floor. The thermal conductivity of VIP is as low as 0.007 W/m2K. The additional VIP layer lowers the conductivity of the wall to 0.12 W/m2K, the floor to 0.13W/m2K, and the roof to 0.07W/m2K. The VIP is not used in local condition because of its high cost and also because of the hot and humid climate of Taipei. Building in Taipei does not need such a low conductivity value. Extremely low conductivity value in building walls will limit the conductivity heat loss in hot season when air conditioning is not operating, which is not energy efficient.

	Insulation Type	Thickness (mm)	Thermal Conductivity (W/mK)	Thermal Transmittance (W/m^2K)	Thermal Resistance (m^2K/W)	AREA (m^2)
Wall AR-341	Exterior Air Film				0.05	
	Polycarbonate	40	0.044	1.1	0.9091	
	Air	75	0.024	0.32	3.125	
	Plywood	18	0.13	7.222222222	0.1385	
	Plywood	12	0.13	10.83333333	0.0923	
	E Foam	72	0.0379	0.526388889	1.8997	
	VIP	30	0.007	0.233333333	4.2857	
	Plywood	18	0.13	7.222222222	0.1385	
	Plywood	3	0.13	43.33333333	0.0231	
	Interior Air Film				0.15	
TOTAL:		268		0.092491118	10.812	
Floor (1F Deck) Deck M-Area Panel AR-321	Interior Air Film				0.15	
	Plywood	16	0.13	8.125	0.1230769	
	Plywood	18	0.13	7.222222222	0.1384615	
	E Foam	24	0.0379	1.579166667	0.6332454	
	VIP	30	0.007	0.233333333	4.2857143	
	Plywood	12	0.13	10.83333333	0.0923077	
	Plywood	18	0.13	7.222222222	0.1384615	
	Air	40	0.024	0.6	1.6666667	
	E Foam	50	0.0379	0.758	1.3192612	
	Plywood	12	0.13	10.83333333	0.0923077	
	Exterior Air Film				0.05	
TOTAL:		220		0.115081381	8.6895029	
Roof (2F Deck) Deck M-Area Panel AR-322	Interior Air Film				0.15	
	Plywood	25	0.13	5.2	0.19231	
	Air	54	0.024	0.444444444	2.25	
	Waterproof Plastics	2	0.03	15	0.06667	
	Plywood	18	0.13	7.222222222	0.13846	
	E Foam	11	0.0379	3.445454545	0.29024	
	Glass Foam	65	0.0711	1.093846154	0.91421	
	Plywood	12	0.13	10.83333333	0.09231	
	Plywood	18	0.13	7.222222222	0.13846	
	E Foam	95	0.0379	0.398947368	2.50660	
	Plywood	12	0.13	10.83333333	0.09231	
	E Foam	28	0.0379	1.353571429	0.73879	
	VIP	30	0.007	0.233333333	4.28571	
	Plywood	9	0.13	14.44444444	0.06923	
	Air	63	0.024	0.380952381	2.625	
	Plywood	12	0.13	10.83333333	0.09231	
	Interior Air Film				0.15	
TOTAL:		454		0.06760141	14.7923	

Table 5.3.2.5 Technical Report of Orchid House in Versailles

Furniture

The furniture of the Orchid House is designed and manufactured by Taiwanese carpenters and craftsmen with local and recycled materials by traditional craftsmanship.

The tables in the living room and terrace are designed and manufactured with recycled wood from demolished pallet. Taiwanese industry used to make pine wood pallet for cargo shipping. A lot of wood from discarded pallets is looking for being reused. The design of these tables explores the nature of wood texture and extends the touch of recycled wood.

Figure 5.3.2.16 Recycled Wood Tables

The couches and chairs in the Orchid House are manufactured with traditional Taiwanese weaving craftsmanship of rattan. Rattan is a local material which has been used for furniture, household containers, and agricultural equipments. The woven rattan furniture and containers are popular in Taiwan with warn modern Taiwanese lifestyle. The fabric covered pieces are also selected with local material which may reduce reverberation by absorbing sound.

Figure 5.3.2.17 Woven Rattan Furniture

Figure 5.3.2.18 Traditional Craftsmanship of Weaving Rattan Furniture

Reverberation Time

The interior faces of walls are designed to provide sufficient absorption and minimize reverberation time. The sound absorption is achieved by the combination of vibrating panels and thick porous material. The interior side of walls and ceilings are covered with plywood with air space behind it. The plywood with air space may sufficiently increase sound absorption in low frequencies. eForm insulation material behind the airspace provides sound absorption in high frequency. The absorption coefficients and the reverberation time of the interior materials are listed on the table below:

				Absorption coefficient						Absorption(sabin)					
KITCHEN	COMPONENTS	MATERIALS	AREA	125Hz	250Hz	500Hz	1KHz	2KHz	4KHz	125Hz	250Hz	500Hz	1KHz	2KHz	4KHz
LIVING ROOM	Floor	Plywood	55.0	0.28	0.22	0.17	0.09	0.10	0.11	15.40	12.10	9.35	4.95	5.50	6.05
	Ceiling	Plywood	55.0	0.28	0.22	0.17	0.09	0.10	0.11	15.40	12.10	9.35	4.95	5.50	6.05
	wall	Plywood	40.0	0.28	0.22	0.17	0.09	0.10	0.11	11.20	8.80	6.80	3.60	4.00	4.40
	windows	Plolycarbonate	42.0	0.11	0.26	0.15	0.14	0.04	0.04	4.62	10.92	6.30	5.88	1.68	1.68
	Air, Sabins per 1000m3		135.3	0.04	0.09	0.26	0.46	0.92	2.58	0.05	0.12	0..35	0.62	1.24	3.48
	Area, ave. coef,. total sabins		55.2	0.2428	0.2288	0.1656	0.1009	0.0869	0.0947	46.67	44.04	32.15	20.00	17.92	21.66
	Reverberation time (sec.)			T=KV/A Sabine						0.50	0.50	0.70	1.10	1.20	1.00
	Eyring's coef.			0.2156	0.2045	0.1526	0.096	0.0832	0.0903						

Table 5.3.2.6 Sound Absorption Data and Reverberation Time Calculation

Sound Insulation

The sound insulation of the Orchid House is achieved by the insulation layers, staggered structural elements, and sound leak prevention. The floors, walls, and ceilings of the Orchid are designed in composite layers. Several layers of different thermal insulation material such as Glass Foam and eFoam provide sound insulation. The air space between layers also provides additional insulation value. The staggered structural elements prevent heat-bridge as well as sound transmission. All walls extend to the roofs and floors. Sealant is applied between the wall and the floor. All these construction details sufficiently stop sound transmission.

Noise Barrier

The Orchid House is located on the top of an existing roof, and sitting away from the existing parapet. The parapet serves as the noise barrier from street traffic. The plants between the house and the existing parapet can absorb some reflected noise.

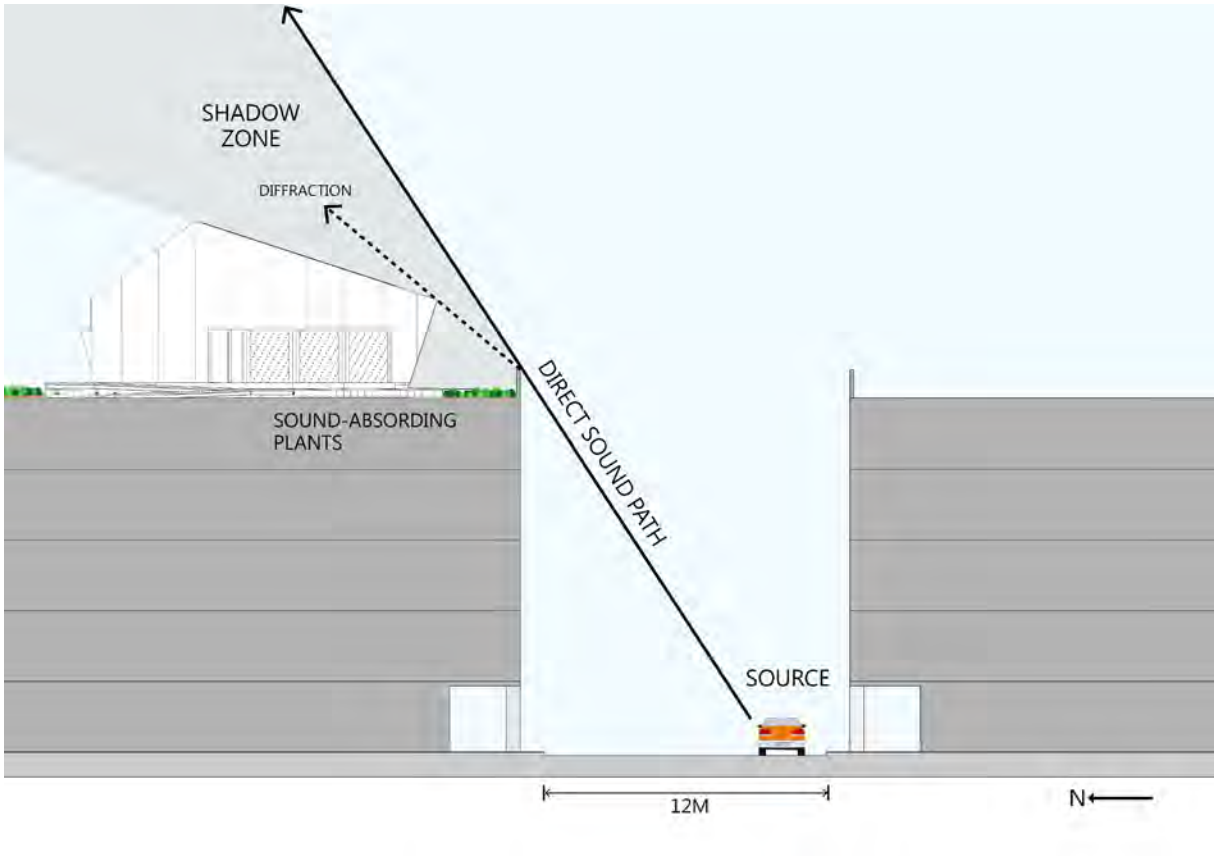


Figure 5.3.2.19 Street Noise Barrier Diagram

Isolation for Mechanical System Vibration

Some mechanical equipments of the Orchid House are located on the second floor terrace. Because these equipments are sitting on light weight construction, the vibration and noise may cause a serious problem toward the house. As a result, the isolation devices are critical for these equipments. The Unicode Team designs two different types of isolation devices for these equipments. The outdoor unit of the heat pumps, the CO2 heat pump, and the heat exchanger use housed spring mounts. The pump of solar heater uses vibration pads. Both of these devices are designed to properly resist the equipment weight and vibration.

The housed spring mounts selected for the house may resolve both the vibration and acoustic problems generated by the equipments. The deflection of the spring in the central core absorbs the vibration and noise in low natural frequencies. Semi-circular Neoprene sponge between the upper and lower portions of the mount limits the movement during start and stop of the equipments.

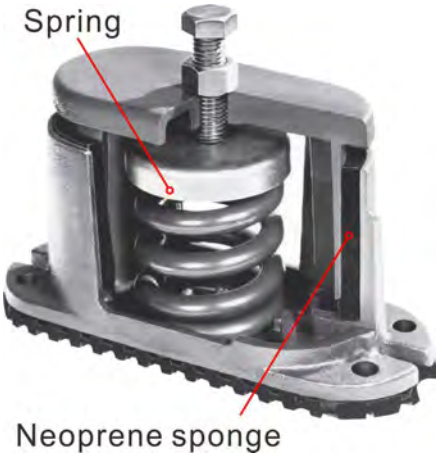


Figure 5.3.2.20 Housed Spring Mount

The Rubber and Cork Sandwich Pad is designed to absorb the noise generated by the water pump. The pad laminates a thick layer of cork between two neoprene pads. Noise from the pump transmits through layers of different densities will lose its intensity due to the change in velocity. Therefore, this pad will sufficiently reduce the noise of the pump.

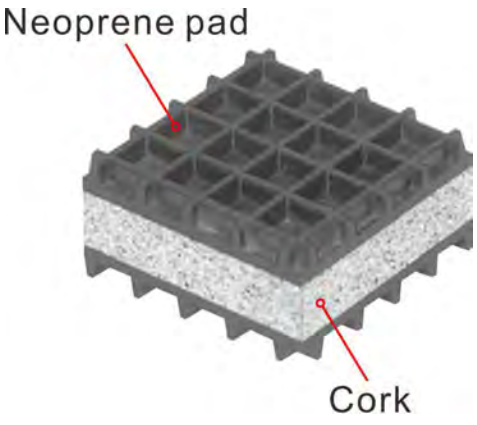


Figure 5.3.2.21 Rubber and Cork Sandwich isolation Pad

5.3.3 Plumbing System

General Description

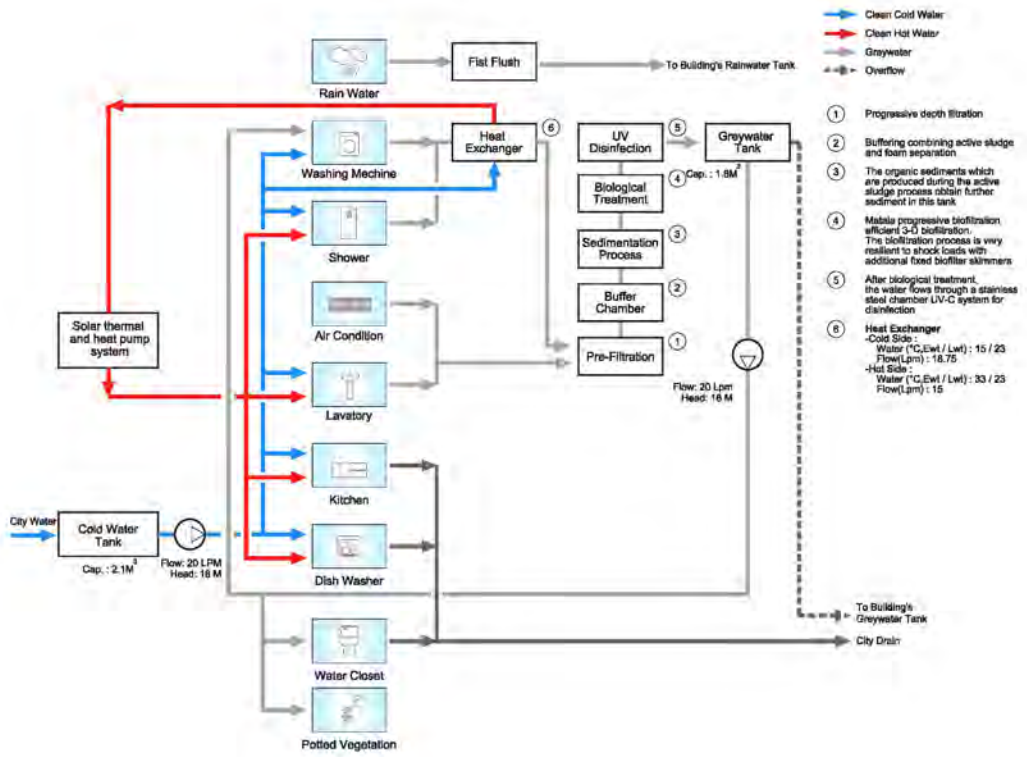
The plumbing system consists of cold water supply (city water) system, domestic hot water (DHW) system, greywater system, drainage system and rainwater havesting system.

The plumbing system design must not only meet the basic requirements of hygiene, but also achieve the other goals of water conservation and high energy efficiency.

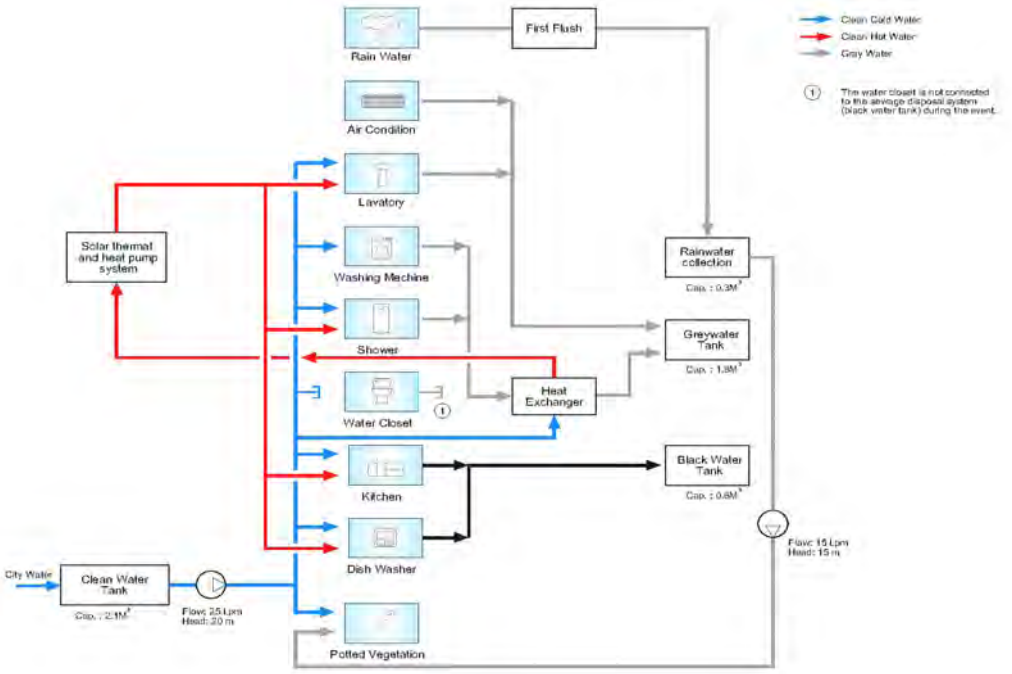
Design Criteria

The design and installation of plumbing system shall meet the related Codes and Regulations of Taiwan.

For Orchid House EN FRANCE, the relevant rules like RULE 8 and RULE 51.8 and requirement are met.



Schematic Diagram Orchid House in Taiwan



Schematic Diagram Orchid House in Competition Site

Detailed Description of the Plumbing Systems

1. Cold Water Supply System

i. Orchid House Taiwan
The cold water supply is interconnected with the building's city water supply system.

ii. Orchid House EN FRANCE
The cold water is delivered by the Solar Decathlon Organization Europe to the cold water tank underneath the floor. The cold water is supplied to use points by a pressure boostingunit. The use points include the plumbing fixtures, dishwashing, cloth washing and grey water makeup.

iii. Cold Water Needs

Use	Unit Consumer	Cycles / Day	Need in Litres
Water Closet	Person		
Full		2	2 × 3 = 6.0
Half		10	10 × 1.5 = 15.0
Shower Head	Person	2	2 × 50 = 100.0
Hand Sink	Person	12	12 × 9 = 108.0
Kitchen Sink	Family	2	2 × 18 = 36.0
Dishwashing	Family	1	1 × 6.5 = 6.5
Cloth Washing	Family	1	1 × 46 = 46.0
Gardening	Family	1	-
Total			**317.5**

iv. Major Equipment
The cold water tank is molded of FRP in one piece in rectangular shape with the stor age capacity of 2100 L.

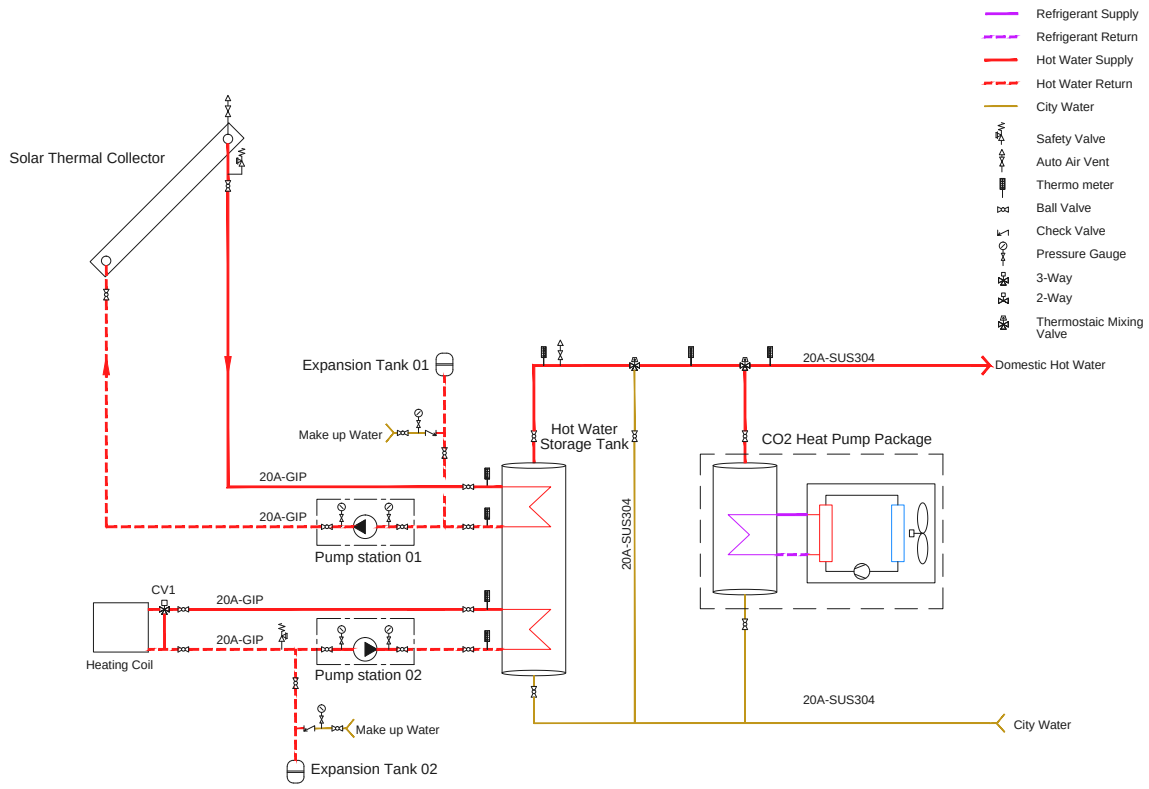
Pressure boosting unit is a stainless pump equipped with a buffer tank to maintain a constant supply pressure. The flow is 30 lpm with the booster pressure set at 1.5 kg/ cm2.

2.Domestic Hot Water System

i. The domestic hot water system (DHW) is supplied from the hot water storage tank which is a part of solar thermal system. The thermostatic 3-way mixing valves regulate the hot water temperature by mixing the hot water coming from the hot water storage tanks with the cold water to 55°C. The DHW is supplied to shower head, hand sink, kitchen sink, dishwashing and cloth washing.

ii. Hot Water Needs

Use	Unit Consumer	Cycles / Day	Need in Litres (°C)
Shower Head	50.0	2	100 (40°C)
Hand Sink	9.0	12	108 (35°C)
Kitchen Sink	18.0	2	36 (55°C)
Dishwashing	6.5	1	6.5 (50°C)
Cloth Washing	46.0	1	46 (45°C)



3. Graywater System

i. Graywater system is actually one kind of drainage system, which is collecting the wastewater water from shower, hand sink, HVAC condensation, and cloth washing machine in the greywater tank underneath the floor.

ii. The case in France prohibits the reuse of greywater other than for gardening. But in Taiwan, the greywater is reused for the toilet (water closet), gardening, and cloth washing after the treatment process.

iii. The wastewater coming from the shower and washing machine flow through a heat exchanger before being collected in the grey water tank.

iv. The pressure boosting unit supplies the greywater to the use point – the automatic gardening system. The automatic gardening system connects to two water sources – greywater and rainwater harvesting system. The two sources are selected manually.

v. Major Equipment
The cold water tank is molded of FRP in one piece in rectangular shape with the storage capacity of 2100 L.

The pressure boosting unit is a stainless pump equipped with a buffer tank to maintain a constant sup-

4. Drainage System

i. Orchid House Taiwan
The drainage system in Taiwan is the waste main collecting the drainage from water closet, kitchen sink, and dish washing machine, and then drains by gravity to the building's central drainage system.

ii. Orchid House EN FRANCE
Drainage system is collecting the wastewater from kitchen sink and dishwashing machine in the black water tank underneath the floor. During the competition the water closet is not connected to the black water tank. The black water also receives the overflow from the neighboring greywater tank.

iii. The black water tank is molded of FRP in one piece in rectangular shape with the storage capacity of 600 L.

5. Rainwater Harvesting System

i. Rainwater harvesting is a system by which, the rainwater that collects on the roofs is collected in a tank underneath the floor, and used for gardening and cleaning.

ii. The rainwater harvesting system consists the following:

Roof catchment
Gutter
Down pipe and first flush pipe
Storage tank

iii. For the case of Orchid House EN FRANCE, the rainwater is used for watering the potted plant.

iv. For the case of Orchid House Taiwan, the rainwater combined with greywater after treatment is used for gardening, water closet, cleaning and wash machine.

v. Estimating gardening water demand during competition:

The water demand of each potted orchid during the competition is 30 litres.
The number of orchid pots is 500.
Demand = 0.06 litres/pot × 500 pots = 30 litres

vi. Major Equipment

The storage tank is molded of FRP in one piece with the storage capacity of 300 L.
The pressure boosting unit is a stainless pump with a buffer tank to maintain a constant supply pressure. The flow is 15 lpm with the booster pressure at 1 kg/cm2.

6.Tank Installation

i. Cold water storage tank

Capacity : 2100 L
Size : 1.00 × 7.00 × 0.3 M
Location : Under the tea terrace floor
Access : The fill opening, instruments for control, and the boosting unit is accessed from above the floor, refer to PL-001

ii. Rainwater storage tank

Capacity : 300 L
Size : 0.70 × 1.50 × 0.3 M
Location : Under the tea terrace floor
Access : The boosting unit and instruments for control is accessed from above the floor, refer to PL-001

iii.Greywater tank

Capacity : 1800 L
Size : 1.00 × 6.00 × 0.3 M
Location : Under the tea terrace floor
Access : The fill opening is accessed from above the floor, refer to PL-001

iv. Black water tank

Capacity : 600 L
Size : 1.20 × 1.80 × 0.3 M
Location : Under the outside floor
Access : The fill opening is accessed from above the floor, refer to PL-001

The Effectiveness of the Control System

For the plumbing system, the control is made on domestic hot water (DHW) system as well as the rain-water harvesting system.

For domestic hot water (DHW) system, PLC control system will first receive the water temperature from sensor, if the temperature reaches the setting value and room temperature drops to low limit, PLC will turn on the valve to let hot water flow to heating coil and hence the heating coil can warm up the room temperature to desired value.

For rainwater harvesting system, PLC control system will receive soil moisture value from sensor, if the soil moisture reaches lower limit, PLC will turn on the valve and pump so that rainwater will be send out from rainwater tank for plant irrigation.

5.3.4 Electrical System Design

Specification

The specification of electrical system are as follows:

-System single phase, 2-Wire
-Nominal Voltage 230V
-Frequency 50HZ
-Short Circuit current 10KA
-Rated current of maximum 63A

Design Characteristics

Design characteristics for residential appliance and equipment circuits

Description	Load (W)	Volts (V)	Wire	Circuit Breaker	Number of outlet	Notes
Refrigeration	308	230	3-2.5 mm^2	16A	1	
Oven	3500	230	3-4 mm^2	20A	1	
Diswasher	2110	230	3-2.5 mm^2	16A	1	
Cooking	1800	230	3-6 mm^2	25A	1	
Clothes Washer	1400	230	3-2.5 mm^2	16A	1	
Clothes Dryer	1000	230	3-2.5 mm^2	16A	1	
Extractor Hood	260	230	3-2.5 mm^2	16A	1	
Clean Water Pump	540	230	3-2.5 mm^2	16A	—	Equipment will be direct connected
Gray water pump	270	230	3-2.5 mm^2	16A	—	Equipment will be direct connected
Bathroom & Tea Terrace Receptacle	—	230	3-2.5 mm^2	16A	3	
Living Room & Workstation Receptacle	—	230	3-2.5 mm^2	16A	2	TV and Computer
Floor Receptacle	—	230	3-2.5 mm^2	16A	4	For general use
VRV	2760	230	3-6 mm^2	16A	—	Equipment will be direct connected
HRV	100	230	3-2.5 mm^2	16A	—	Equipment will be direct connected
CO2 Heat Pump	1340	230	3-2.5 mm^2	16A	—	Equipment will be direct connected
Mezzanine Area Receptacle	—	230	3-2.5 mm^2	16A	3	For general use
Pump Station 01	550	230	3-2.5 mm^2	16A	—	Equipment will be direct connected

Branch-circuit Voltage Drop

The design will support compliance to code maximum voltage drop criteria of 3 percent for all branch circuits.
The formula of voltage drop for two-wire, single-phase circuits, as follows:
VD = 2*L*I*R(We are assuming the cosθ = 1.0, inductance negligible)
VD = Drop in circuit voltage
L : one-way length of circuit
I = Current in conductor
R = resistance per meter of conductor
The result of branch-circuit voltage drop is as follows table.

Source	load	Power (W)	Voltage (V)	Current (A)	Wire	Resistance (Ω/km)	Length (M)	VD	
								(V)	%
1st panel board	Refrigeration	308	230	1.3	3-2.5mm^2	7.410	18	0.36	0.16
1st panel board	Oven	3500	230	15.2	3-4.0mm^2	4.610	21	2.95	1.28
1st panel board	Dishwasher	2110	230	9.2	3-2.5mm^2	7.410	19	2.58	1.12
1st panel board	Cooking	3000	230	13	3-6.0mm^2	3.080	21	1.69	0.73
1st panel board	Clothes Washer	1400	230	0.6	3-2.5mm^2	7.410	22	0.20	0.09
1st panel board	Clothes Dryer	1000	230	4.3	3-2.5mm^2	7.410	24	1.55	0.67
1st panel board	Hood	260	230	1.1	3-2.5mm^2	7.410	24	0.40	0.17
1st panel board	Lighting	651	230	2.8	3-2.5mm^2	7.410	30	1.26	0.55
1st panel board	Lighting	360	230	1.6	3-2.5mm^2	7.410	30	0.70	0.3
1st panel board	Lighting	690	230	3	3-2.5mm^2	7.410	40	1.78	0.77
1st panel board	Lighting	8.4	230	0.4	3-2.5mm^2	7.410	40	0.22	0.09
1st panel board	Lighting	519	230	2.3	3-2.5mm^2	7.410	40	1.34	0.58
1st panel board	Automation	1000	230	4.3	3-2.5mm^2	7.410	10	0.64	0.28
1st panel board	TV& PC Receptacle	900	230	3.9	3-2.5mm^2	7.410	30	1.74	0.76
1st panel board	Clean water pump	540	230	2.3	3-2.5mm^2	7.410	10	0.52	0.23
1st panel board	Rain water pump	270	230	1.2	3-2.5mm^2	7.410	20	0.43	0.19
1st panel board	General receptacle	900	230	3.9	3-2.5mm^2	7.410	30	1.74	0.76
1st panel board	General receptacle	900	230	3.9	3-2.5mm^2	7.410	20	1.16	0.50
2nd panel board	VRV	2760	230	12	3-6.0mm^2	3.080	26	1.92	0.84
2nd panel board	HRV	100	230	0.4	3-2.5mm^2	7.410	15	0.10	0.04
2nd panel board	CO2 Heat Pump	1340	230	5.8	3-2.5mm^2	7.410	26	2.24	0.98
2nd panel board	General receptacle	900	230	3.9	3-2.5mm^2	7.410	30	1.74	0.76
2nd panel board	PUMP Station 01	550	230	2.4	3-2.5mm^2	7.410	26	0.92	0.40
2nd panel board	PUMP Station 02	550	230	2.4	3-2.5mm^2	7.410	26	0.92	0.40
2nd panel board	Circulation Fan	480	230	2.1	3-2.5mm^2	7.410	24	0.74	0.32
2nd panel board	Water wall Pump	373	230	1.6	3-2.5mm^2	7.410	24	0.58	0.25

Grounding system

1. The TT grounding system is designed for the electrical system – the utility only provides a “neutral conductor”, and the House must set up the grounding (or “protective earth”) conductor separately
2. he exposed conductive parts are connected to ground by direct electrical connection. Residual Current Devices (RCDs) are installed on the main and each branch
3. Double insulated (or reinforced insulated) according to IEC, class II is applied to the entire outdoor installation (i.e. lighting fixtures, conductors, splices and terminal strip)

5.3.5 Photovoltaic and Other Electric Solar Systems Design

General Description of the Photovoltaic System

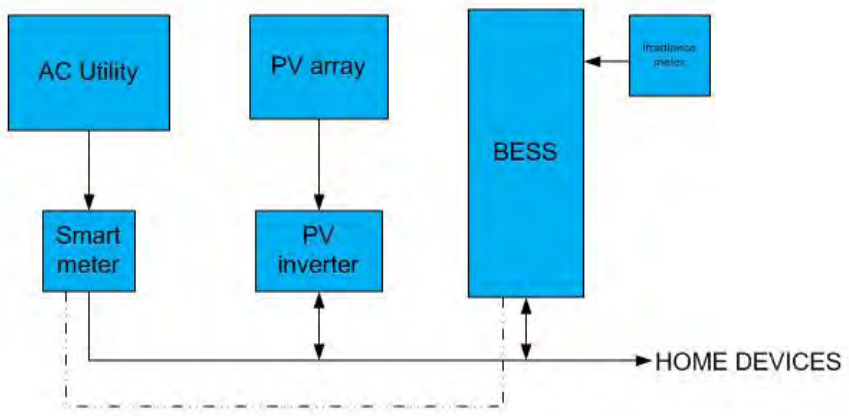
The photovoltaic system is a Building Integrated Photovoltaic (BIPV) design. For design in France, the system contains 20 pcs of 250 Wp multi-crystalline standard type solar module with aluminum frame. 10 modules are connected in serial to form one string and two strings are connected in parallel to form the whole PV array. For design in Taiwan, as the whole roof is covered with PV module to avoid direct sun light in summer, the system is mounted with 33 pcs of 250 Wp multi-crystalline standard type solar module

PV array is then connected to a 5 kW string inverter. This Solivia 5 kW inverter then transfers the DC power to AC power and injects the AC power into the AC circuit of the house.

A Battery Energy Storage System (BESS) is also connected to the AC circuit. The BESS contains controller and battery bank to store power as well as output battery power to the AC circuit for load. With power meter installed and communicate with the BESS, BESS provides the following charging-discharging functions:

1. STANDBY MODE - no energy absorbing or dispatching
2. ABSORB - Watt power absorbing from grid (battery charging)
3. DISPATCH - power dispatch to the grid

The BESS will also provide information about actual Battery State Of Charge (SOC) and energy counters (absorbed from the grid and dispatched to the grid). A schematic diagram is shown as below:
A more detail BESS description can be found in PM 5.3.6



PV array acts as the main power source for this house. In the day time, excess power will charge the BESS and BESS will act as the main power source in peak loading hours.

Design and Specifications

1. Photovoltaic Modules

The module is made with 60 pcs of 6" silicon multi-crystalline cells. Cell size is of 156 mm x 156 mm. Peak power of each module under Standard Test Conditions (STC, cCell Temperature of 25 °C, Irradiance 1000 W/m2 , AM 1.5) is 250 Wp. Performance warranty is 10-year for minimum 90% power output and 25-year for minimum 80% power output.

Module specification under STC is as below:

GENERAL SPECIFICAITON	
Model Name	D6P250B3A
Maximum Rating Power (Pmax)	250 W
Module Efficiency	15.3 %
Open Circuit Voltage (Voc)	37.33 V
Maximum Power Voltage (Vpm)	30.34 V
Short Circuit Current (Isc)	8.69 A
Maximum Power Current (Ipm)	8.24 A
Dimension	1650 mm (L) x 990 mm (W) x 42 mm (D)
Weight	18.3 kg / 42.0 lbs
Solar Cell	60 multicrystalline 6" silicon cells (156 mm x 156 mm)
Front Glass	tempered solar glass, 3.2mm thickness
Cell Encapsulation	EVA (Ethylene-Vinyl-Acetate)
Back Cover	Composite film, white
Junction Box	IP 65 rated
Frame	Anodized aluminum frame, original or black
Mechanical Load	5400 Pa, Max. wind speed: 197 km/h (safety factor 3)
Maximum System Voltage	IEC: DC 1000 V / UL: DC 600 V
Series Fuse Rating	15 A
Operating Temperature	-40 to 85 °C
Nominal Operating Cell Temp.	44.1 °C ± 2°C
Temperature Coefficient of I_{sc}	0.046 % / °C
Temperature Coefficient of V_{oc}	-0.313 % / °C
Temperature Coefficient of P_{max}	-0.420 % / °C
CERTIFICATION	
Certification	IEC 61215 / IEC 61730, UL 1703, CE, MCS, CEC

2. Inverter:

The string inverter used in the photovoltaic system is a 5 kW high efficiency solar inverters for the European market. The advantages of this inverter are:

(1) Usable with all commercially available solar modules (mono, poly, amorphous).
(2) Wide input voltage range
(3) Suitable for indoor and outdoor applications (IP65)
(4) Peak efficiency of 96 %
(5) Full output power up to 55 °C
(6) 10 years guarantee after online registration

The technical data of the inverter (MODEL: Solivia 5.0) is:

DC INPUT	
Maximum PV power	6000 Wp
Nominal power	5500 W
Voltage range	125 ... 600 V
Full power MPP range	150 ... 480 V
Nominal current	15.7 A @ 350 V
Maximum current	36.6 A
AC OUTPUT	
Nominal apparent power	5000 VA
Voltage range	184 ... 264 V
Nominal current	22 A
Nominal frequency 50 Hz	50 Hz
Frequency range	45 ~ 65 Hz
Power factor	adjustable 0.8 cap ~ 0.8 ind
Total harmonic distortion (THD)	< 5 % @ nominal apparent power
GENERAL SPECIFICATION	
Max. efficiency	96.0 %
Efficiency EU	94.7 %
Operating temperature	-25 ~ +60 °C
Full power without derating	-25 ~ +55 °C
Humidity	0 ~ 95 %
Size (L x W x D)	512 x 410 x 182 mm
Weight	31 kg
Cooling	Convection
Communication interfaces	2 x RJ45 / RS485 + 1 x USB A
DC disconnector	Integrated

Display	3 LEDs, 4-line LCD
Protection degree	IP65
Safety class	I
Configurable trip parameters	Yes
Insulation monitoring	Yes
Overload behavior	Current limitation; power limitation
Safety Specification	
Over voltage protection	253 V < 200ms disconnection time
Under voltage protection	195 V < 200 ms disconnection time
Over voltage protection	50.2 Hz < 200 ms disconnection time
Under voltage protection	47.5 Hz < 200 ms disconnection time
Certification	
Anti-islanding protection / Grid regulation	VDE 0126-1-1/A1; UTE C15-712-1; France/Islands (60 Hz); RD 661/2007; RD 1699/2011; CEI0-21; Synergrid C10/11 (July 2012); EN 50438; G59/1-2; VDE-AR-N 4105; VFR 2013; VFR 2014
EMC	EN61000-6-2; EN61000-6-3; EN61000-3-11; EN61000-3-12
Safety	IEC62109-1 / -2; EC conformity

The AC power can be limited at the inverter during commissioning to meet country-specific regulations regarding the maximum permissible grid load. AC voltage and frequency range will be programmed according to the individual country requirements.

3. Battery:

48 V, 125 Ah batteries are chosen to store photovoltaic power for use of the load. Nominal operation voltage of the battery bank is 48 V. Battery bank and battery inverters are positive grounded. In our BESS we use many telecom components and that positive grounding is a common practice in such systems. However, grounding of the positive conductor is optional as DC voltage is used only inside of the BESS. The enclosure grounding is a must. Residual Current Device (RCD) is in place for protecting indirect contact.

4. Cables and Wiring method:

Modules in series connection is made as connect wires from the positive terminal of one module to the negative terminal of the next module. 10 modules are in series connection to form one string. Two strings are connected in parallel as connect wires from the positive terminal of one module of the first string to the positive terminal on the module of second string.

Each module has two No. 12 AWG type standard 90°C sunlight resistant output cables each terminated with plug & play connectors according to IEC 60189.. The cable is suitable for applications where wiring is exposed to the direct rays of the Sun. We recommend that all wiring and electrical connections comply with the National Electrical Code (NEC). A PV module interconnection is a 90°C wet-rated conductors. Wire type is using USE-2 single conductor cable for exposed applications.

Inverter is connected to AC switch panel using 16mm2 PVC wire and then connect to grid also with 16mm2 PVC wire.

5. Protection:

Protection devices in the DC site include DC fuse, surge protector (SPD) and DC switch. All these 3 devices are mounted in a DC box. The DC fuse protects module from reverse current to damage the module and it is design to match module's series fuse rating. The surge protector is also to protect module from surge to damage module. The DC switch is design to protect installer or maintenance technician when module/s is/are connected or disconnected from DC circuit.

Protection device in the AC site includes No Fuse Breaker (NFB). The electricity panel which the photovoltaic is connected the grid has main NFB and also surge protector for AC line protection.

6. Earthing system:

Modules are grounded between module frame and the designed supporting H beam. The H beam is then connected to the steel square pipe of the main structure. Grounding wire is in 14 AWG. For the AC side, inverter grounding is connected to a grounding bus in AC switch panel and then common grounded to the main panel. Details can be found in drawing.

7. Interface with the electricity distribution network

The PV system is connected to main panel. A breaker is installed for protection. Detail can be found in drawing.

Maintenance plan

All work in commissioning and maintenance of a system should be performed by a qualified technician.

Module glass should be cleaned periodically, or when it's dirty. Use water and a soft sponge or cloth for cleaning. A mild, non-abrasive cleaning agent can be used to remove sticky dirt. Check the electrical and mechanical connections regulatory to verify they are clean, secure and undamaged.
Please refer to manual document of PM#4, 5.3.8 of rule 36.8 for detail maintenance plan.

5.3.6 Electrical Energy Balance Simulation

Introduction

The estimation of the electrical production is based on widely used photovoltaic simulation software, named PVSYST. The whole simulation starts from building up a photovoltaic module array model, input weather data includes solar irradiance and environment temperature, followed as input solar module specification, inverter specification and other setting, then PVSYST will present power generation data.

Using photovoltaic system as power generator benefits the environment for reasons of:

i. The source for power generator is from solar irradiance, which is free and without the limita tion, also not to generate waste during power generation process.
ii. Solar module life can reach to at least 25 years. As module is composed with glass, silicon based cell, aluminum and other chemical based material such as EVA. Some of the material can be recycled and hence reduce to waste.
iii. Inverter generally can last around 10 years before some components have to be replaced (for example, capacitor). This reduces electronic waste.

The benefit to the environment of using a photovoltaic system as the main power source is that it is a renewable energy which does not produce any CO2 during power generation in system lifetime of at least 20 years. Also, the photovoltaic system can be installed on top of existing buildings so that the system does not need to occupy land for system installation.

List of the electric loads

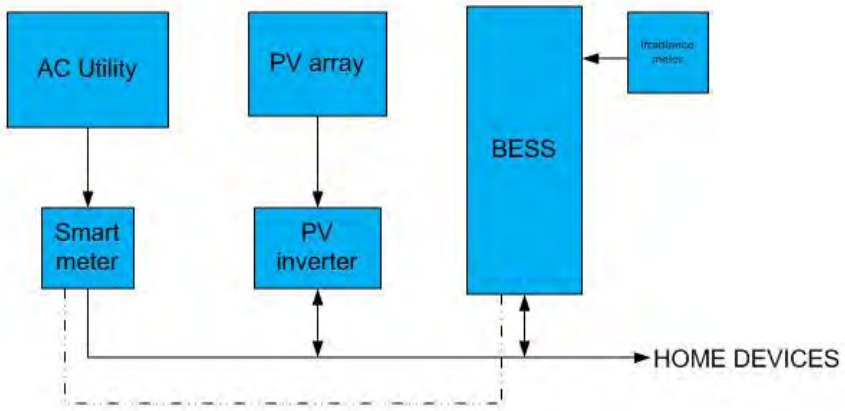
Item	Product Name	Manufacturer / Model Name	Specification	Max. Power (W)
Appliances	Refrigerator/ Freezing	MIELE KFN37452 i DE	R: 170 L F: 57 L	308
	Clothes Washer	MIELE W 664	46L	1400
	Clothes Dryer	Bosch WTW84381FF	112L	1000
	Cooking	MIELE Domino CS 1112E	2 heating plates 1200W/600-1800W	1800
	Oven	MIELE H2161 B CLST	56 L	3500
	Extractor Hood	Best Gloss	630 m3/h	260

	Dishwashing	MIELE G6995 SCVi K20	8 place settings Max. Water Temp.：70℃	2110
Devices	TV	JVC LT-HA52U	27.5 inch	29
	Notebook	ASUS Transformer AiO P1801	18.4 inch	180
HVAC	Variable Refrigerant Volume	DAIKIN RXYMQ4PVE		2760
	Heat Reclaim Ventilation	DAIKIN VAM150GJVE		100
	CO2 Heat Pump	Panasonic HE-C30EQS		1340
	Pump 01	Wlo		550
	Pump 02	Wilo		550
Plumbing	Clean Water Pump	GRUNDFOS		540
	Rain Water Pump	GRUNDFOS		270
Lighting	Kitchen	Tons T8 LED	LED 20W	93.6
	Living Room	Tons T8 LED	LED 20W	62.4
	Workstation & Bedroom /	Tons T8 LED	LED 20W	63.6
	Tea Terrance &Mech. RM.	Tons ODL-005/1.2W	LED 1.2W	28.4
	Mezzanine	Tons T8 LED	LED 20W	36.8

Photovoltaic and Other Electric Solar System Description

1. Photovoltaic System

The photovoltaic system in Paris consists of 20 pcs of 250 Wp multi-crystalline solar modules, a 5 kW inverter and a Battery Energy Storage System (BESS). The system is modular and configurable. A schematic diagram of this photovoltaic system is shown below.



The photovoltaic system is designed with following features:

i. Single phase grid connection at 230 V/50 Hz
ii. Battery capacity of 5.76 kWh
iii. Max battery charging power of 5.8 kW
iv. Max power dispatched to grid of 4.68 kW

In this photovoltaic system, a module array is connected to a string inverter and the BESS is connected to a home grid by single phase connection. The essential role plays a system controller that must communicate to a smart meter in order to read and minimize energy consumption from utility grid.

Module used in this photovoltaic system is with multi-crystalline cells. Module maximum output power at 1000 W/m2 irradiance and 25 oC temperature is 250 Wp.

Inverter used in this photovoltaic system is string type with maximum DC input power of 6 kWp and nominal AC output power of 5 kVA.

2. BESS (Battery Energy Storage System)

Battery Energy Storage System is designed to store energy from grid of PV plant when the energy is available and cheap and dispatch the energy back to the grid when it is expensive or power demand is high. The system is equipped with single 1-phase connection to the grid that is used for energy absorption or dispatch. The system can be controlled from higher level controller that decides about operating mode, depending on data analysis about actual power consumption, electricity price, etc.

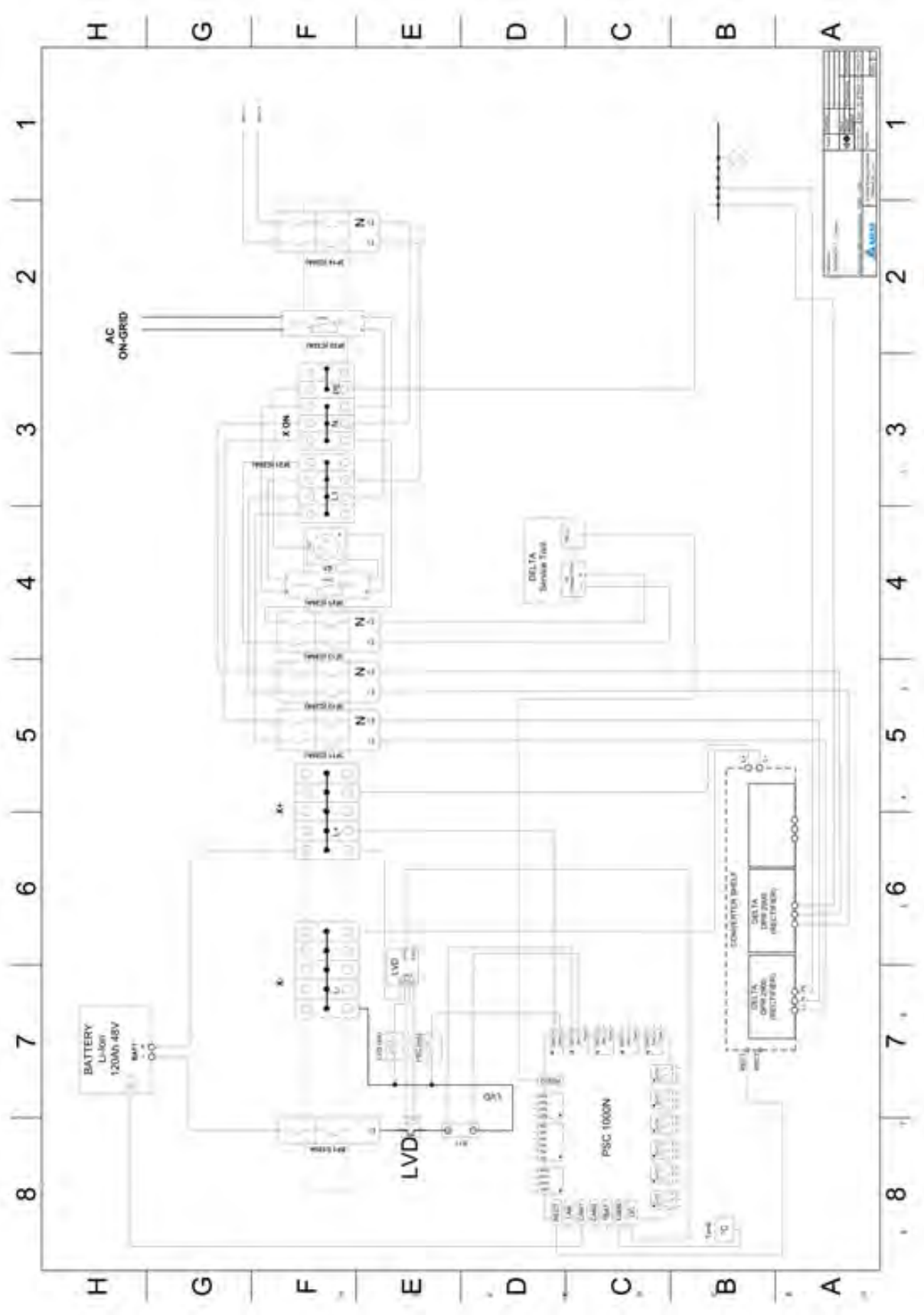
The system can operate in several modes:

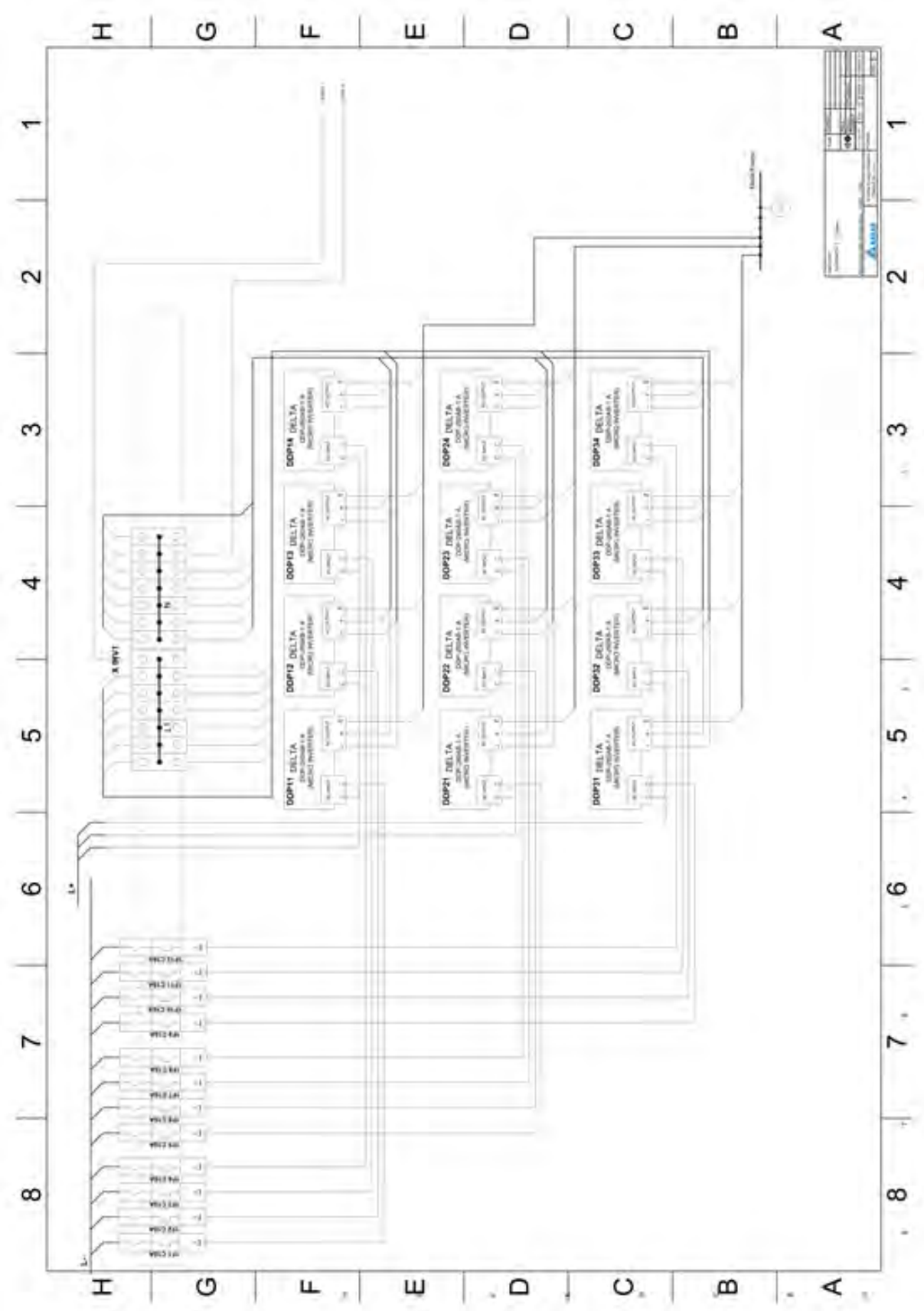
i. "STANDBY" – the system does not absorb nor dispatch the energy, battery SOC level remains the same.
ii. "RECOVERY" – the system is charging the battery to float level using both: rectifiers (from grid) or PV chargers (if equipped).
iii. "ABSORB" – the system is absorbing the energy from grid at programmed power level, charg ing the battery.
iv. "DISPATCH" – the system is dispatching the energy to the grid at programmed power level, discharging the battery.
v. "BALANCE" – the system is automatically balancing the power at the AC grid connection to minimize energy consumption from grid (AC power sensor is required).
vi. "OFF" – the system is OFF because of low battery voltage
vii. "EOFF" – the systems is in emergency power OFF mode (service required)

Battery bank chosen in the BESS system is from DENSIS of 48120T model, which is nominal 48 V 120 Ah battery bank to form a total 5,760 Wh battery storage capacity. The battery bank voltage range is 42~58.5V with standard permanent charge/ discharge current of 0.5C. The maximum permanent charge/discharge current is 1C. Operating temperature range of the battery bank is 0 oC~60 oC. The DENSIS 48120T catalog and battery MSDS is attached.

The picture of the BESS system and is shown below.

The schematic drawing of the BESS system is shown below:





3. Module Grounding

-All module frames and mounting racks must be properly grounded in accordance with respective national electrical code and local authority.

-A bolt, screw, or other parts used for bonding purposes within a module or panel shall not be intended

-Bonding will be by a positive means, such as clamping, riveting, bolted or screwed connectors, welding, soldering or brazing. If the bonding means depends upon screw threads, two or more screws, or two full threads of a single screw must engage the metal.

-The array frame will be grounded in accordance with NEC requirements for grounding solar electrical system. The module frame also be properly grounded.

-The grounding wire must be properly fastened to the module frame to ensure good electrical contacts.

-Grounding wires must be connected to the module frame at one of these locations.

-All grounding hardware (nuts, bolts, washers, screws, etc.) must be stainless steel unless otherwise specified (it should use corrosion-proof fixing material).

-The grounding wire is larger than 12 AWG and multi conductor and rated of 105 °C and 600V.

4. Earthing

As shown in drawing PV-031, the DC side grounding, inverter grounding, BESS grounding as well as AC side grounding are all connected together to the grounding terminal which located in the AC switch panel. The grounding terminal is then connected to an earthing rod if there is no AC ground is available from SDE. Solar modules are all grounded between module frame and supporting metal structure. The DC array grounding conductor selected is XLPE-LSHF 16 mm2 wire and its calculation is 1.56×Isc ×2=1.56×8.69 A×2=27.11 A

5. Protection against Electric Shock

To protect electric shock, all equipments are grounded. Module frame is also grounded to the building structure. Besides grounding protection, ELCB is selected for breakers and it will shut off the power if electric leakage is larger than 30 mA for 0.1 second. Hazard labels are also applies to panels and equipments to alert operator. Only trained professional member is allowed to operate DC and AC panels.

6. DC side drop in voltage calculation

Drop in voltage is less than 3% at Impp STC on DC side – calculation is as below

[Calculation by Vmp and Imp]

i. Module: Vmp=30.34 V ; Imp=8.24 A ;
Temp. Coeff. of Vmp=-0.127 V / oC ; Temp. Coeff. of Imp=0.038 A / oC
ii. Voc @ 50 oC=Vmp(STC)+(50 oC-25 oC)*(ΔVmp / oC)=30.34+25*(-0.127)=27.165 V
iii. Isc @ 50 oC=Imp(STC)+(50 oC-25 oC)*(ΔImp / oC)=8.24+25*(0.038)=9.19 A
iv. solar cable 4 mm2 resistance R50=5.69 Ω/km
v. Module cable length is 1 m, 10 modules in series and hence the total cable length is 10 m
vi. Distance between module string to inverter L2=25 m
vii. solar cable 4 mm2 voltage drop VDV=2*R50*(L1+L2)*Imp=2*5.69 Ω/km*35 m*9.19 A=3.66 V
viii. Module series Voc-string=10 pcs*Vmp=10*30.34 V=303.4 V
ix. DC circuit voltage drop percentage VDV%=VDV /Voc-string*100%=3.66/303.4*100%=1.206%

[Calculation by Voc and Isc]

i. Module: Voc=37.33 V ; Isc=8.69 A ;
Temp. Coeff. of Voc=-0.117 V / oC ; Temp. Coeff. of Isc=0.004 A / oC
ii. Voc @ 50 oC=Voc (STC)+(50 oC-25 oC)*(ΔVoc / oC)=37.33+25*(-0.117)= 34.405 V
iii. Isc @ 50 oC= Isc (STC)+(50 oC-25 oC)*(Δ Isc / oC)= 8.69+25*(0.004)= 8.79 A
iv. solar cable 4 mm2 resistance R50=5.69 Ω/km
v. Module cable length is 1 m, 10 modules in series and hence the total cable length is 10 m
vi. Distance between module string to inverter L2=25 m
vii. solar cable 4 mm2 voltage drop VDV=2*R50*(L1+L2)*Isc=2*5.69 Ω/km*35 m*8.79 A=3.501 V
viii. Module series Voc-string=10 pcs*Voc=10*34.405 V=344.05 V
ix. DC circuit voltage drop percentage VDV%=VDV/Voc-string*100%=3.501/344.05*100%=1.017%

So using either Vmp-Imp or Voc-Isc to calculate DC voltage drop, the results are all within 3%.

7. Wiring for PV system

DC array conductor selection calculation is: 1.56×Isc ×2=1.56×8.69 A×2=27.11 A

Description of the Tools Used for the Simulations

The NUTU/UNICODE team uses three simulation programs to calculate the energy balance of the Orchid house. They are PVSYST, TRANSYS, and ENERGYPLUS. These programs estimate the hourly electrical consumption of appliances, lightings, domestic hot water, and HVAC; and the hourly electricity generation of the PV arrays. The following table shows the simulation results from each program.

Matrix of Temperature and RH Control in Summer			
Room		Air Conditioner (Indoor Unit)	Heating Coil
Temp.	RH		
H	H	On	Off
H	-	On	Off
L	H	On	On

The photovoltaic power generation simulation tool used in this case is PVSYST. PVSYST is a PC software package for the study, sizing and data analysis of complete photovoltaic systems. It deals with grid-connected, stand-alone, pumping and DC-grid (public transport) photovoltaic systems, and includes extensive databases, as well as general solar energy tools.

For grid-connected systems, and especially for building integration, this level will be architect-oriented, requiring information on available area, PV technology (colors, transparency, etc), power required or desired investment.

In project design, it aims to perform a thorough system design using detailed hourly simulations. Within the framework of a “project”, the user can perform different system simulation runs and compare them. He has to define the plane orientation (with the possibility of tracking planes or shed mounting), and to choose the specific system components. He is assisted in designing the PV array (number of PV modules in series and parallel), given a chosen inverter model.

In a second step, the user can specify more detailed parameters and analysis fine effects like thermal behavior, wiring, module quality, mismatch and incidence angle losses, horizon (far shading), or partial shadings of near objects on the array, and so on.

Results include several dozens of simulation variables, which may be displayed in monthly, daily or hourly values, and even transferred to other software. The “Loss Diagram” is particularly useful for identifying the weaknesses of the system design. An engineer report may be printed for each simulation run, including all parameters used for the simulation, and the main results.

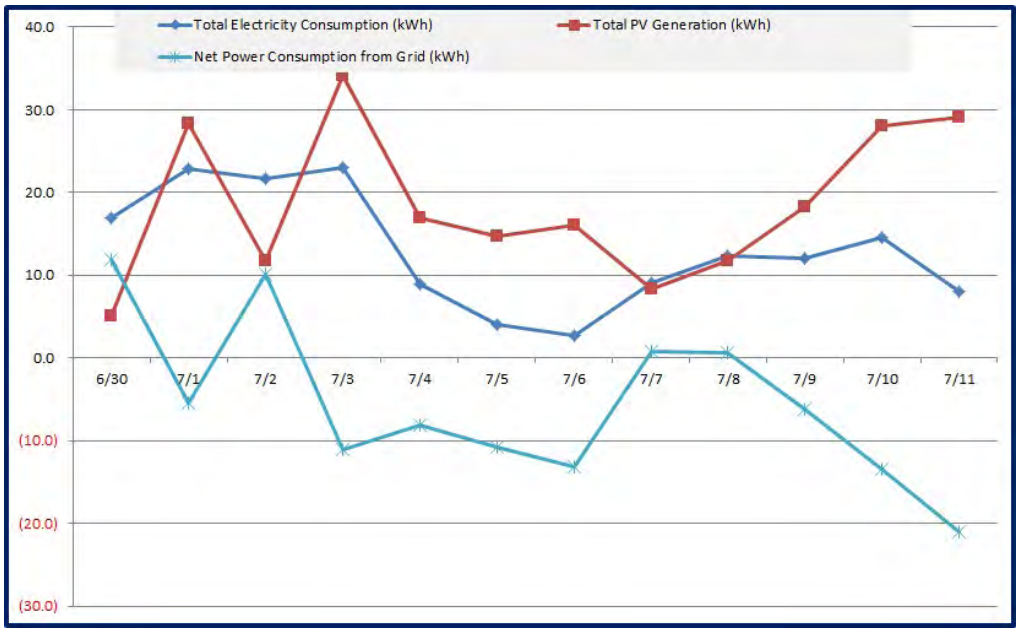
The simulation calculates the distribution of energies throughout the year. Main results are:

i. The total energy production [MWh/y] is essential for the evaluation of the PV system's profitability.
ii. The Performance Ratio (PR [%]) describes the quality of the system itself.
iii. The specific energy [kWh/kWp] is an indicator of production based on the available irradiation (location and orientation).

Results of the simulations

PARIS: In Paris, with a 5 kWp PV system, the electrical energy balance simulation result shown that due to weather condition, PV energy is low on 6/30, 7/2, 7/4~7/9. Even under this circumstance, the whole system can reach zero grid power consumption and send PV power back to grid for total of 66 kWh. Electrical energy balance simulation result shown that during 6/30 to 7/11, total power consumed by appliances, devices, lighting, HVAC and plumbing is 156.4 kWh while total PV generated power is 222.3 kWh and hence there is total 66 kWh power is reversed to the grid. The detail simulation result is shown below.

The General Evaulation Period														
Item	End Use Breakdown	6/30	7/1	7/2	7/3	7/4	7/5	7/6	7/7	7/8	7/9	7/10	7/11	TTL
	Total Electricity Consumption (kWh)	17.0	22.8	21.7	23.0	8.9	4.0	2.8	9.1	12.4	12.0	14.6	8.0	156.3
Appliances	Refrigerator/Freezing	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	1.6
	Clothes Washer	1.0	1.0	1.0	1.0	1.0	0.0	0.0	1.0	1.0	1.0	1.0	1.0	10.0
	Clothes Dryer	0.4	0.4	0.4	0.4	0.4	0.0	0.0	0.4	0.4	0.4	0.4	0.4	3.9
	Cooking	0.9	1.8	0.9	1.8	0.0	0.0	0.0	0.9	0.9	0.9	1.8	0.0	9.9
	Oven	1.8	3.5	1.8	3.5	0.0	0.0	0.0	1.8	1.8	1.8	3.5	0.0	19.3
	Hood	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	2.0
	Dishwashing	1.1	1.1	1.1	1.1	1.1	0.0	0.0	1.1	1.1	1.1	1.1	1.1	10.6
Devices	TV	0.2	0.2	0.2	0.2	0.2	0.0	0.0	0.2	0.2	0.2	0.2	0.2	1.7
	DVD/Projector	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	2.4
	Notebook	1.1	1.1	1.1	1.1	1.1	0.0	0.0	1.1	1.1	1.1	1.1	1.1	10.8
	ipad	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4
Lighting	Kitchen	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	2.6
	Living Room	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	1.5
	Workstation/Bedroom	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	1.6
	Bathroom	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.6
	Tea Terrance &Mech. RM.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
	Mezzanine	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	4.2
	Entrance	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5
HVAC	Cooling /Heating/Ventilation	7.9	11.1	12.6	11.2	2.4	1.2	0.0	0.0	3.2	2.9	2.8	1.6	56.9
Plumbing	Domestic Water Pump	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	9.7
	Gray Water Pump	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5
	Water Wall Pump	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5.6
	Total PV Generation (kWh)	5.1	28.3	11.7	34.2	17.0	14.8	16.0	8.3	11.7	18.2	28.0	29.0	222.3
	Total Reverse to Grid Power (kWh)	0.0	5.5	0.0	11.2	8.1	10.8	13.2	0.0	0.0	6.2	13.4	21.0	89.3
	Net Power Consumption from Grid (kWh)	11.9	-5.5	10.0	-11.2	-8.1	-10.8	-13.2	0.8	0.6	-6.2	-13.4	-21.0	-66.0



In Paris, with a 5 kWp PV system, the yearly electrical energy balance simulation result shown that due to weather condition, PV generated power is low from October to March for yearly total of 4,536.2 kWh. The power consumption per year is 4,935.94 kWh, hence the yearly energy balance is -399.74 kWh which means this house needs to consume 399.74 kWh electricity from the grid. The simulation result table is shown below.

Orchid House Annual Energy Balance Simulation - France														
Item	End Use Breakdown	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	TTL
Total Electricity Consumption (kwh)		578.33	486.89	314.39	296.79	353.72	423.88	418.73	295.58	290.06	308.65	603.60	565.31	4935.94
Appliances	Refrigerator/Freezing	3.89	3.51	3.89	3.77	3.89	3.77	3.89	3.89	3.77	3.89	3.77	3.89	45.8
	Clothes Washer	7.75	7.00	7.75	7.50	7.75	7.50	7.75	7.75	7.50	7.75	7.50	7.75	91.3
	Clothes Dryer	9.95	8.98	9.95	9.63	9.95	9.63	9.95	9.95	9.63	9.95	9.63	9.95	117.1
	Cooking	55.80	50.40	55.80	54.00	55.80	54.00	55.80	55.80	54.00	55.80	54.00	55.80	657.0
	Oven	27.13	24.50	27.13	26.25	27.13	26.25	27.13	27.13	26.25	27.13	26.25	27.13	319.4
	Hood	5.12	4.62	5.12	4.95	5.12	4.95	5.12	5.12	4.95	5.12	4.95	5.12	60.2
	Dishwashing	32.71	29.54	32.71	31.65	32.71	31.65	32.71	32.71	31.65	32.71	31.65	32.71	385.1
Devices	TV	4.50	4.06	4.50	4.35	4.50	4.35	4.50	4.50	4.35	4.50	4.35	4.50	52.9
	DVD/Projector	6.20	5.60	6.20	6.00	6.20	6.00	6.20	6.20	6.00	6.20	6.00	6.20	73.0
	Notebook	13.40	11.99	13.09	12.93	13.40	12.62	13.40	13.25	12.78	13.40	12.78	13.25	156.3
	ipad	0.93	0.84	0.93	0.90	0.93	0.90	0.93	0.93	0.90	0.93	0.90	0.93	11.0
Lighting	Kitchen	3.63	3.28	3.63	3.52	3.63	3.52	3.63	3.63	3.52	3.63	3.52	3.63	42.8
	Entrance	0.16	0.14	0.16	0.15	0.16	0.15	0.16	0.16	0.15	0.16	0.15	0.16	1.8
	Living Room	2.18	1.97	2.18	2.11	2.18	2.11	2.18	2.18	2.11	2.18	2.11	2.18	25.7
	Workstation/Bedroom	2.26	2.04	2.26	2.19	2.26	2.19	2.26	2.26	2.19	2.26	2.19	2.26	26.6
	Bathroom	1.09	0.99	1.09	1.06	1.09	1.06	1.09	1.09	1.06	1.09	1.06	1.09	12.9
	Tea Terrance &Mech. RM.	0.37	0.34	0.37	0.36	0.37	0.36	0.37	0.37	0.36	0.37	0.36	0.37	4.4
	Stair	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.5
	Mezzanine	3.18	2.87	3.18	3.07	3.18	3.07	3.18	3.18	3.07	3.18	3.07	3.18	37.4
HVAC	Cooling /Heating/Ventilation	259.92	202.88	14.40	14.88	71.40	159.88	148.88	25.40	15.88	14.40	303.40	289.38	2836.5
Plumbing	Domestic Water Pump	108.41	94.45	90.30	78.72	72.31	61.12	59.84	60.33	71.15	84.24	97.16	105.20	983.3
	Other Pumps	29.73	26.85	29.73	28.77	29.73	28.77	29.73	29.73	28.77	29.73	28.77	29.73	350.0
Total PV Generation(kWh)		120.30	220.30	349.30	488.70	565.50	602.00	636.50	569.30	426.30	285.40	170.90	101.70	4536.20
Total Reverse to Grid Power (kWh)		0.00	0.00	34.91	191.91	211.78	178.12	217.77	273.72	136.24	0.00	0.00	0.00	1244.44
Net Power Consumption from Grid(kWh)		-458.03	-266.59	34.91	191.91	211.78	178.12	217.77	273.72	136.24	-23.25	-432.70	-463.61	-399.74

TAIPEI: In Taipei, to avoid direct sun light during summer time and its corresponding heat generated by direct sun light, the whole roof area is covered with PV modules, the installed PV system capacity is 8.25 kWp. Based on the simulation of power consumption as well as PV power generation, electrical energy balance simulation result shown that during in the simulated year, total power consumed by appliances, devices, lighting, HVAC and plumbing is 3,436.05 kWh while total PV generated power is 9,507 kWh and hence there is total 6,070.96 kWh power is reversed to the grid. The detail simulation result is shown below.

Orchid House Energy Balance Simulation Result_Taiwan														
Item	End Use Breakdown	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	TTL
Total Electricity Consumption (kwh)		229.89	219.18	220.60	201.31	220.07	361.27	439.44	444.97	378.34	290.99	207.36	222.62	3436.05
Appliances	Refrigerator/Freezing	3.89	3.51	3.89	3.77	3.89	3.77	3.89	3.89	3.77	3.89	3.77	3.89	45.8
	Clothes Washer	7.75	7.00	7.75	7.50	7.75	7.50	7.75	7.75	7.50	7.75	7.50	7.75	91.3
	Cooking	55.80	50.40	55.80	54.00	55.80	54.00	55.80	55.80	54.00	55.80	54.00	55.80	657.0
	Hood	5.12	4.62	5.12	4.95	5.12	4.95	5.12	5.12	4.95	5.12	4.95	5.12	60.2
Devices	TV	4.50	4.06	4.50	4.35	4.50	4.35	4.50	4.50	4.35	4.50	4.35	4.50	52.9
	DVD/Projector	6.20	5.60	6.20	6.00	6.20	6.00	6.20	6.20	6.00	6.20	6.00	6.20	73.0
	Notebook	13.40	11.99	13.09	12.93	13.40	12.62	13.40	13.25	12.78	13.40	12.78	13.25	156.3
	ipad	0.93	0.84	0.93	0.90	0.93	0.90	0.93	0.93	0.90	0.93	0.90	0.93	11.0
Lighting	Kitchen	3.63	3.28	3.63	3.52	3.63	3.52	3.63	3.63	3.52	3.63	3.52	3.63	42.8
	Entrance	0.16	0.14	0.16	0.15	0.16	0.15	0.16	0.16	0.15	0.16	0.15	0.16	1.8
	Living Room	2.18	1.97	2.18	2.11	2.18	2.11	2.18	2.18	2.11	2.18	2.11	2.18	25.7
	Workstation/Bedroom	2.26	2.04	2.26	2.19	2.26	2.19	2.26	2.26	2.19	2.26	2.19	2.26	26.6
	Bathroom	1.09	0.99	1.09	1.06	1.09	1.06	1.09	1.09	1.06	1.09	1.06	1.09	12.9
	Tea Terrance &Mech. RM.	0.37	0.34	0.37	0.36	0.37	0.36	0.37	0.37	0.36	0.37	0.36	0.37	4.4
	Stair	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.5
	Mezzanine	3.18	2.87	3.18	3.07	3.18	3.07	3.18	3.18	3.07	3.18	3.07	3.18	37.4
HVAC	Cooling /Heating/Ventilation	21.08	27.62	17.72	14.40	28.88	183.40	258.88	266.88	197.40	97.88	14.40	18.40	1146.9
Plumbing	Domestic Hot Water Pump	68.58	65.02	62.96	51.24	50.97	42.52	40.34	38.02	45.43	52.88	57.45	64.15	639.6
	Other Pumps	29.73	26.85	29.73	28.77	29.73	28.77	29.73	29.73	28.77	29.73	28.77	29.73	350.0
Total PV Generation(kWh)		600.00	487.00	693.00	786.00	858.00	955.00	1104.00	1032.00	959.00	853.00	619.00	561.00	9507.00
Total Reverse to Grid Power (kWh)		370.11	267.82	472.40	584.69	637.93	593.73	664.56	587.03	580.66	562.01	411.64	338.38	6070.96
Net Power Consumption from Grid(kWh)		-370.11	-267.82	-472.40	-584.69	-637.93	-593.73	-664.56	-587.03	-580.66	-562.01	-411.64	-338.38	-6070.96

Energy Payback and CO2 Reduction

1. Energy recovery time

X. In Taipei, Taiwan, with 8.25 kWp PV installation capacity, the simulated yearly PV output energy is 9,507 kWh/year, simulation report is shown below.

NCTU_TPE_8KW

Balances and main results

	GlobHor kWh/m2	T Amb oC	GlobInc kWh/m2	GlobEff kWh/m2	EArray kWh	E_Grid kWh	EffArrR %	EffSysR %
January	80.0	18.20	92.5	89.5	639	600	12.81	12.03
February	71.0	18.60	77.0	74.4	522	487	12.57	11.73
March	103.0	20.20	108.0	104.4	738	693	12.68	11.90
April	123.0	23.00	122.9	118.9	834	786	12.59	11.87
May	141.0	25.60	135.5	130.9	909	858	12.45	11.75
June	162.0	27.30	152.1	147.1	1009	955	12.30	11.64
July	186.0	29.00	175.3	169.7	1162	1104	12.29	11.67
August	166.0	28.70	163.5	158.4	1088	1032	12.35	11.72
September	146.0	27.80	151.4	146.7	1011	959	12.39	11.75
October	121.0	26.00	133.7	129.7	901	853	12.50	11.83
November	85.0	22.80	97.9	94.7	658	619	12.47	11.72
December	74.0	20.00	87.4	84.3	599	561	12.72	11.92
Year	1458.0	23.96	1497.2	1448.7	10070	9506	12.48	11.78

Legends:				
GlobHor	Horizontal global irradiation	EArray	Effective energy at the output of the array
T Amb	Ambient Temperature	E_Grid	Energy injected into grid
GlobInc	Global incident in coll. plane	EffArrR	Effic. Eout array / rough area
GlobEff	Effective Global, corr. for IAM and shadings	EffSysR	Effic. Eout system / rough area

The simulation is made with PVSYST simulation software based on Taipei's irradiance and temperature data shown in the above table.

Electrical energy input of manufacturing PV system is 2,525 kWh/kWp (according to report of IEA-PVPS-T10-01:2006). So, for this 8.25 kWp designed PV system, the energy consumed for building this PV system is:

Total energy input while manufacturing PV system: 2,525 kWh/kWp×8.25 kWp=20,831.25 kWh
So the energy pay-back time of this system is:

Energy Pay-Back Time (EPBT): 20,831.25 kWh÷9,507 kWh/year=2.19 year

In Paris, PV power simulation based on local temperature and irradiance data is shown below:

140217_交大巴黎_5kWp

Balances and main results

	GlobHor kWh/m2	T Amb oC	GlobInc kWh/m2	GlobEff kWh/m2	EArray kWh	E_Grid kWh	EffArrR %	EffSysR %
January	24.0	4.60	31.5	30.0	134.2	120.3	13.05	11.70
February	43.0	4.70	54.6	52.3	237.9	220.3	13.35	12.36
March	76.0	7.00	86.3	83.0	373.9	349.3	13.26	12.39
April	114.0	9.80	122.1	117.7	519.3	488.7	13.02	12.25
May	140.0	13.50	143.3	138.3	600.9	565.5	12.84	12.08
June	153.0	16.30	154.6	149.4	638.6	602.0	12.64	11.92
July	163.0	18.90	166.4	160.7	673.7	636.5	12.39	11.71
August	139.0	19.00	147.9	142.9	602.7	569.3	12.47	11.78
September	96.0	16.00	108.5	104.7	452.9	426.3	12.77	12.02
October	59.0	11.80	72.0	69.1	306.9	285.4	13.05	12.13
November	32.0	7.30	43.8	41.7	187.1	170.9	13.08	11.95
December	20.0	5.10	27.0	25.6	114.3	101.7	12.98	11.55
Year	1059.0	11.21	1157.9	1115.5	4842.3	4536.2	12.80	11.99

Legends:				
GlobHor	Horizontal global irradiation	EArray	Effective energy at the output of the array
T Amb	Ambient Temperature	E_Grid	Energy injected into grid
GlobInc	Global incident in coll. plane	EffArrR	Effic. Eout array / rough area
GlobEff	Effective Global, corr. for IAM and shadings	EffSysR	Effic. Eout system / rough area

In the same calculation formula with simulated PV power in Paris, So the energy pay-back time of this system is:

Energy Pay-Back Time (EPBT): 12,625 kWh÷4,536 kWh/year=2.783 year

2. CO2 emissions

i. CO2 emission saving associated to the PV panels' production

The CO2 per kWh emission is 0.636 kg in Taiwan. According to report of IEA-PVPS-T10-01:2006, electrical energy for PV module manufacturing is in total of 2,296 kWh/kWp, so for this 8.25 kWp system in Taiwan, Total CO2 emission for PV module manufacturing is:

0.636 kg/kWh×2,296 kWh/kWp×8.25 kWp=12,047.11 kg

Generally, PV system service life time is around 20 to 25 years, so in this PV system's life, the total CO2 reduced is:

0.636 kg/kWh×9,507 kWh/year×20 year=120,929.04 kg

So from the two calculations of above, the 20 years of net CO2 emission reduction of the 8.25 kWp system in Taiwan is 108,881.93 kg (120,929.04 kg – 12,047.11 kg).

By the same calculation formula, with the average CO2 emission per kWh electricity in France of 0.08 kg/kWh, the 20 years of net CO2 emission reduction of the 5 kWp system in Paris is 6,339.2 kg (7,257.6 kg-918.4 kg).

0.08 kg/kWh×4,536 kWh/year×20 year=7,257.6 kg

ii. CO2 emission saving associated to a year of system functioning

For Taipei, Taiwan, as shown in above, simulated yearly PV system output power is 9,507 kWh, converted to CO2 emission saving of a year PV system functioning is:

0.636 kg/kWh×9,507 kWh/year×1 year=6,046.45 kg

By the same calculation, for Paris, the CO2 emission saving of a year PV system functioning is:

0.08 kg/kWh×4,536 kWh/year×1 year=362.88 kg

iii. CO2 emission associated to energy balance in Taiwan

In Taiwan, estimated power generated by PV system per year is 9,507 kWh/year. Estimated power usage per year is 3,436.05 kWh/year. So the energy balance in Taiwan of one year is 6,070.96 kWh/year (estimated yearly energy produced by PV power deduct estimated yearly power consumption). So the CO2 emission under the circumstance of yearly energy balance in Taipei, Taiwan is:

6,070.96 kWh/year×0.636 kg/kWh=3,861.13 kg

iv. CO2 emission associated to energy balance in France

In France, estimated power generated by PV system per year is 4,536.2 kWh/year. Estimated power usage per year is 4,935.4 kWh/year. So the energy balance in France of one year is -399.74 kWh/year (estimated yearly energy produced by PV power deduct estimated yearly power consumption). So the CO2 emission under the circumstance of yearly energy balance in Paris, France is:

399.74 kWh/year×0.08 kg/kWh=31.98 kg

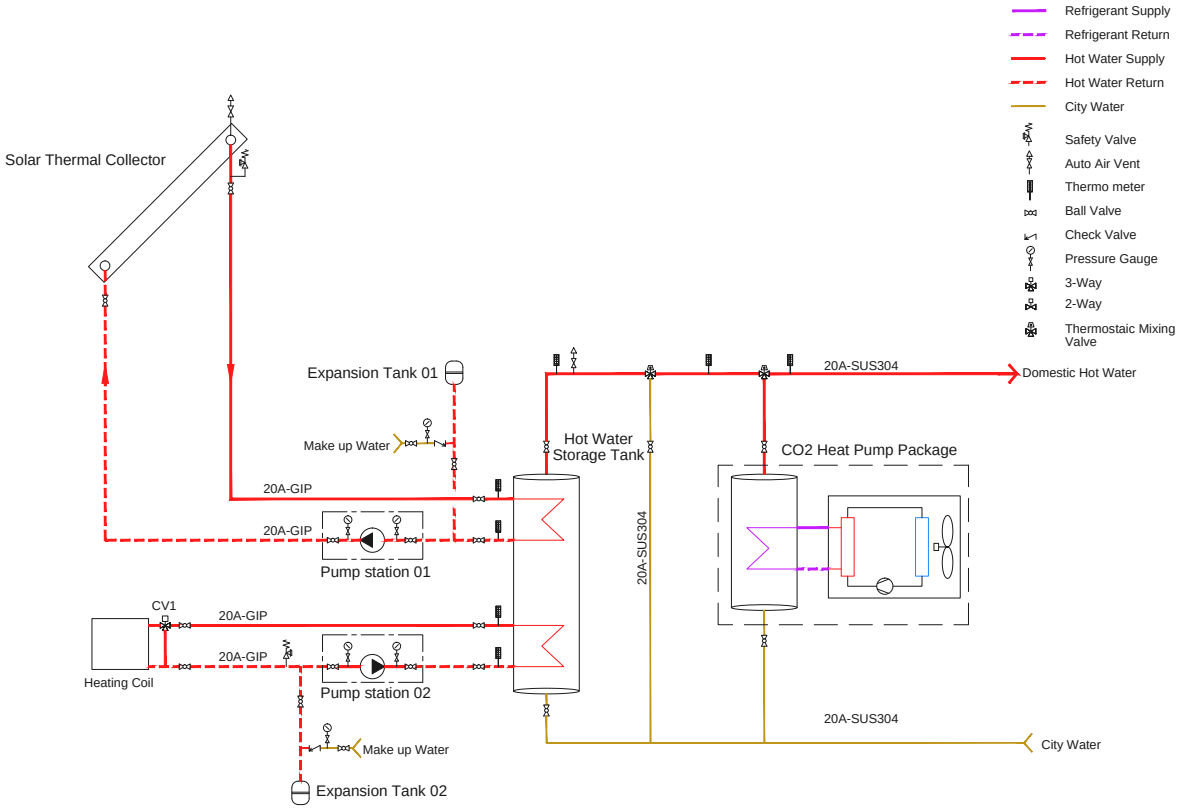
5.3.7 Solar Thermal Design

General Description

The solar thermal system is to recover the heat from solar radiation. The heat is used for the domestic hot water and space heating. The system comprises solar collectors, hot water storage tank and pump stations. Because the solar thermal energy can't satisfy the thermal demands year-round independently, an auxiliary heat generator – air-to-water heat pump – is included.

The system for charging the solar thermal store tank includes an internal heat exchanger for solar feed. In the store the hot water temperature can be as high as 90°C, which can be limited to a set maximum draw-off temperature of 60°C by means of thermostatic three-way mixing valve.

The backup for the solar thermal system is provided by the air-to-water heat pump equipped with a storage tank. When the thermal energy stored in the solar thermal store tank is depleted, the backup warm water of 60°C will blend with the then cool domestic water from the solar thermal storage tank to produce the minimum 52°C hot water by means of a thermostatic three-way mixing valve.



Design Criteria

The solar thermal system is part of overall energy plan including the passive solar system, active solar system, HVAC system, and other high performance strategies.

In addition to the domestic water heating, the solar thermal system is also to augment the space heating to increase the performance of solar thermal system.

The solar thermal energy takes precedence over the heat pump to heat both the domestic hot water and space heating, but the heat pump will only backup the domestic hot water require ment.
Nevertheless, the back-up heat pump can still be able to cover all the demands from domestic hot water independently.

Considering the protection against possible legionellosis, the hot water temperature can achieve 60°C occasionally.

Hot Water Need Estimation

Domestic Hot Water System Needs

Use	Draws / Day	Litres / Each Draw (°C)	Need Per Day
Shower Head	2	50 (40°C)	100.0
Hand Sink	12	9 (35°C)	108.0
Kitchen Sink	2	18 (55°C)	36.0
Dishwashing	1	9.8 (50°C)	9.8
Cloth Washer	1	100 (45°C)	100.0
Total			**353.8**

The thermal energy required to heat the domestic hot water is 12.1 kwh per day, which is based on the cold water supply of 15°C.

Energy Balance of Solar Thermal System

The analysis of solar thermal system using the simulation tool TRANSYS for both Orchid House Taiwan and France is shown in Appendix C, on page 1-4 .

Major Equipment

Solar Collectors

i. Type : Evacuated Tube

ii. Characteristics

Quantity : 4

Absorber shape : Cylindrical

Gross Collector area : 13.6 m2

Efficiency constant : η0 = 0.734

@ G = 8000 w/m2 a1 (w/m2k) = 1.529

a2 (w/m2k) = 0.0166

iii. Materials

Casing / Manifold : Aluminum (Extruded)

Absorber + Coating : Aluminum + ALN/SS – ALN/CU

Flowed through element : Copper pipe

Glazing : Borosilicate glass (outer tube)

Insulation : Mineral Wool + Polyurethane

Heat transfer fluid : Water

Hot Water Storage Tank

i. Type : Indirect cylinder twin coil vessel

ii. Capacity, liters : 300

iii. Features :

Two smooth copper tube indirect coils

Thermo glazing and dual magnesium anodes for corrosion protection

High-grade thermal insulation

Heat Pump

i. Type : Air-to-water heat pump

ii. Refrigerant : Carbon Dioxide

Accessibility of the Installation for Maintenance Task

The hot water storage tank and pump stations are located in the machine room on ground floor, which is accessible from the outside of house via the porch.
The heat pump is located outdoors on the mezzanine, which is accessible from the inside of the house.

Effectiveness of the Insulation

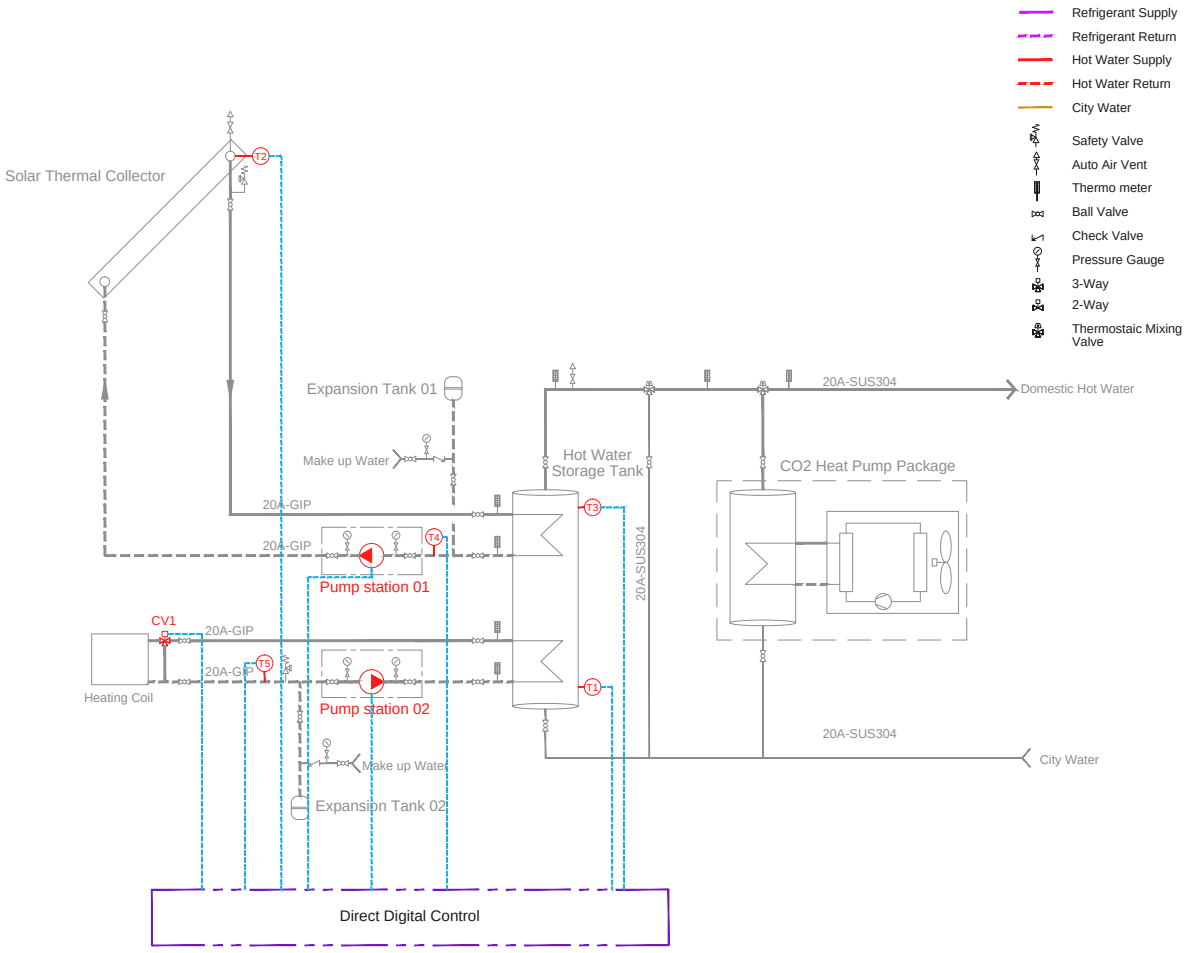
Solar water supply and return piping :
EPDM rubber insulating material of 25mm thickness with UV protective jacket.
Hot water storage tank :
90mm thick flexible polyurethane foam.
Domestic hot water piping :
25mm thick polyurethane foam.

Control System

Hot water storage tank loading
i. When the temperature at the lower area of the tank (T2) is 8°C less than the temperature at the collector (T1), the pump (P1) is switched on. If the temperature difference falls below 3°C, the pump is switched off
ii. When the temperature at the lower area of tank reaches the set maximum temperature, the charging process is stopped automatically.
iii. During the period of high insolation, the provision for protecting the pump (P1) from overheating is provided – stopping the pump's operation.

Heat pump operates
When the temperature at the higher area of the tank (T3) is lower than the set temperature, the heat pump system switched on.

Space heating process
i. When the space heating process is actuated, the circulation pump (P2) operates. When the temperature at the lower area of the tank (T3) is below 40°C, the pump (P2) is switched off.
ii. The room temperature sensor switches on/off the control valve (CV1) to control the room temperature within the designated range.



Cost of the Installation

The total cost for the solar thermal system is at about 17,680 USD. The itemized estimation is as follows.

Item	Description	Cost (USD)
1	Solar collectors	6,500
2	Heat pump	5,600
3	Hot water storage tank	600
4	Pump stations	680
5	Control	2,600
6	Piping material	1,100
7	Labor	600
	Total	**17,680**

The contribution of solar thermal system is its yearly solar yield of 6200 kwh/a which is estimated by TRANSYS shown on Appendix B page 1-4 .

5.3.8 Building Integrated Solar Active Systems

Aesthetical Integration:

Modules used in this system are designed as part of the building southern side roof. As its un-transparency, the roof modules block direct sunlight to the house while absorbing sun radiation to generate power for the house. Modules and transparent glasses are arranged in a way that natural light is still a main light source The module's blue appearance forms a beautiful surface of the roof, with the arrangement of transparent glasses, it becomes a fascinating chessboard like roof.

Constructive Solution

Module, H beam and supporting square pipe composite a module unit. The module unit is designed to directly attach to the house roof structure of square steel pipe tightly using screws and nuts. Within module unit, gap between module to module and module to glass will be dispensed with Silicon epoxy to seal the gap and provides water resistance. Gap between module units is also sealed with Silicon epoxy to provide water resistance. Details of the module unit mounting can be found in the drawing.

Energy Balance positive impact:

The photovoltaic system is the only electrical power generation system of this house. The power generated by this system provides the electricity to the house load, including appliance power load and HVAC cooling power load.

Additional properties

Modules of the photovoltaic system are part of the northern side roof. Module units function as roof to provide water resistance, shade of direct sun light. However, solar modules are not ideal material for thermal insulation not noise protection.

Maintenance:

All work in commissioning and maintenance of a system must be performed by a qualified PV technician.

i. Structural: Structural maintenance (mostly inspection) of the photovoltaic system is required periodically like all other building materials. The inspection should be made on (1) if any rusted or corrosion material observed; (2) if any bolt is loosen; (3) if structural foundation is still OK.

ii. Module: Generally, as module can withstand wind or snow load up to 5,400 Pa and the roof is tilt, there is not much specific maintenance work has to be performed. However, as the module surface cleanliness is a key to solar module power conversion, a quarterly based module surface cleaning is required. Use water and a soft sponge or cloth for module surface cleaning. A mild, non-abrasive cleaning agent can be used to remove sticky dirt. Modules have bypass diodes integrated in the junction box and are wired in parallel with series string. In the unlikely event of diode failure, it is recommended to contact with the installer or module vendor for module replacement.

Great care should be exercised to ensure that corrosion caused by the grounding means is avoided. Corrosion can increase the resistance of the grounding connection on the module, or can even cause the grounding connection to fail entirely. Corrosion can be caused by the effects of weather, humidity, dirt and so on. Corrosion can also be caused when two dissimilar metals contact each other (galvanic action).

iii. DC: Routine functional inspection of DC switch, DC fuse and surge protector should be carried out. Insulation resistance also should be checked periodically. Use thermal imager to check on all connection points and the DC panel.

iv. Inverter: Visually check on wiring and connector to see if they are fixed well and no damage. Also check on the environment of the inverter to see if the air flow is blocked. Check to see if the inverter is abnormally hot and making any noise.

v. BESS: Battery needs to be replaced once the charging/discharging efficiency is getting too low. Checked on all connectors to see if they are tightly connected.

vi. AC: Check on ELCB, NFB, fuse, surge protector to see they are functional OK and check connection bolt and nut to see if they are tightly fastened. If available, use thermal imagers to check on all connection points as well as the whole AC panels.

vii. Maintenance Plan List

Routine maintenance of the PV system should be performed and recorded. Below is a recommended check table for routine maintenance.

5.3.9 Relative Humidity Control

Introduction

Relative humidity (RH) control is still rare for general households in Taiwan, but the living comfort can be improved by keeping the room's relative humidity within a range between 40% and 55%. Taiwan is located in the South Asia having the subtropical climate of hot and humid, room's RH is continuously high during the summer: incurring the RH control in the room being expensive and energy consuming. The following suggestion of controlling room RH by utilizing the existing air conditioner for temperature control and solar energy for reheating is worth of promoting.

Features and benefits

1. Principle

The air conditioners in the room are used for both cooling and dehumidifying. When the RH is high and requiring the dehumidifying function, the air conditioners are continuously supplying cold air even when the room temperature is already low; the heating coil in the supply air stream of energy recovery ventilator is energized and supplying hot air to raise the room temperature – acting the reheat function.

Matrix of Temperature and RH Control in Summer			
Room		Air Conditioner (Indoor Unit)	Heating Coil
Temp.	RH		
H	H	On	Off
H	-	On	Off
L	H	On	On

2. Benefits

i. Capital cost

This innovative measure just utilizes the existing air conditioners and heating coil originally designed for temperature control and add the new control functions to the existing home automation system. The capital cost is much lower than the alternative product (1) and (2).

ii. Operating cost

The house is designed and constructed air-tight, and the outdoor air is dehumidified by the energy recovery ventilator before it is delivered into the room, so the latent heat is remarkably reduced i.e. the requirements of reheating is equally reduced – reheating process is a waste of energy theoretically. The alternative (2) is an energy-efficient way to dehumidify air, but it is expensive to install and not available locally. The alternative (1) is using the similar principle of dehumidification: cooling and dehumidifying by evaporator coil first and then reheating by the heat of consenter, but it are less energy-efficient comparing with this proposed system.

	Proposed	Refrigerant Dehumidifier	Adsorption Dehumidifier
Capital Cost	Minimal $	Low $$	High $$$$$
Operating Energy	Medium $$	High * $$$$	Low $

*The units are small in size with the less energy-efficiency compressors comparing with the variable refrigerant flow (VRF) type heat pump.

Item	Area	Method	Inspection Criteria	Period	
				Q	Yr
1	Module	visual inspect	Surface cleanliness	v	
		visual inspect	Cell crack	v	
		visual inspect	Bubble under glass		v
		visual inspect	Junction BOX intact		v
		visual inspect	Wire & pipe is intact		v
		visual & tool	Grounding wire and nut is well fastened		v
		tool	String series voltage within specification		v
		tool	Bolt & nut is tightly fastened		v
2	Inverter	visual inspect	Case corrosion or damage		v
		visual inspect	Wire & pipe is intact		v
		visual and touch	Connector is intact and tightly connected		v
		visual inspect	Ventilation path is clear		v
		visual inspect	Noise, vibration, smell or over heat		v
		visual inspect	LCD display intact		v
3	AC Panel	visual inspect	Case corrosion or damage		v
		visual inspect	Label, warning sign is missing		v
		visual inspect	Drawing is in place		v
		visual inspect	Any water or insect inside the panel		v
		visual inspect	Wire & pipe is intact		v
		visual & tool	Breaker, fuse, SPD is intact		v
		tool	Bolt & nut is tightly fastened		v
		visual inspect	Duct and cover is intact		v
		tool	Insulation resistance is within specification		v
		visual inspect	Panel inside cleanliness		v

4	DC panel	visual inspect	Case corrosion or damage		v
		visual inspect	Label, warning sign is missing		v
		visual inspect	Drawing is in place		v
		visual inspect	Any water or insect inside the panel		v
		visual & tool	Breaker, fuse, SPD is intact		v
		tool	Bolt & nut is tightly fastened		v
		visual inspect	Duct and cover is intact		v
		tool	Insulation resistance is within specification		v
		visual inspect	Panel inside cleanliness		v
5	Structural	visual inspect	No corrosion or rust		v
		visual and touch	Tightly fixed		v
6	BESS	visual inspect	All equipment is intact		
		visual and touch	Connector is intact and tightly connected		
		visual inspect	Wire & pipe is intact		
		visual inspect	Ventilation path is clear		
		visual & tool	Battery efficiency and is intact		
7	Power	visual inspect	Check on average power generation	v	
		visual inspect		v	

3. Conclusion

Utilizing the originally existing air conditioners and heating coil and combing the home automation system makes the RH control in the region of subtropical climate feasible : inexpensive on capital cost and effective on energy consumption. To achieve the object of lowering the energy consumption, the air tightness of envelope and using the high – efficiency energy recovery ventilator for outdoor air is still the key for success.

5.4 ENERGY EFFICIENCY DESIGN NARRATIVE

Synopsis

Local Context: Taipei City

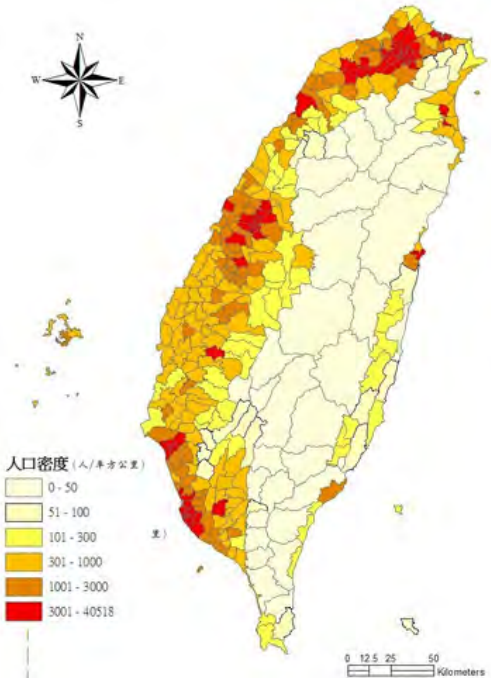
Taipei City Skyline - Urban Context

Taipei Rooftop

Taiwan is a country spanning only 36,193 km2 but with a population of 23.34 million (compare with France's 674,834 km2 and 65.7 million people). The population density is especially high because two-thirds of the island is composed of mountains, and as a result most people live along the coastal areas. It is especially crowded in urban areas, such as the capitol city, Taipei, which is one of the top ten densest cities in the world. In addition to the high population density, Taipei also developed rapidly over the years, both of which contribute to a random assortment of architecture in the city that expands horizontally instead of vertically to conserve space.

However, also as a result of the rapid development, many of the residential buildings were not built to last and have infrastructure that is now rundown or outdated. In recent years, new residential buildings are sky scraper apartments, which are usually only affordable by the wealthy upper class because of the luxury design and locations in the city center.

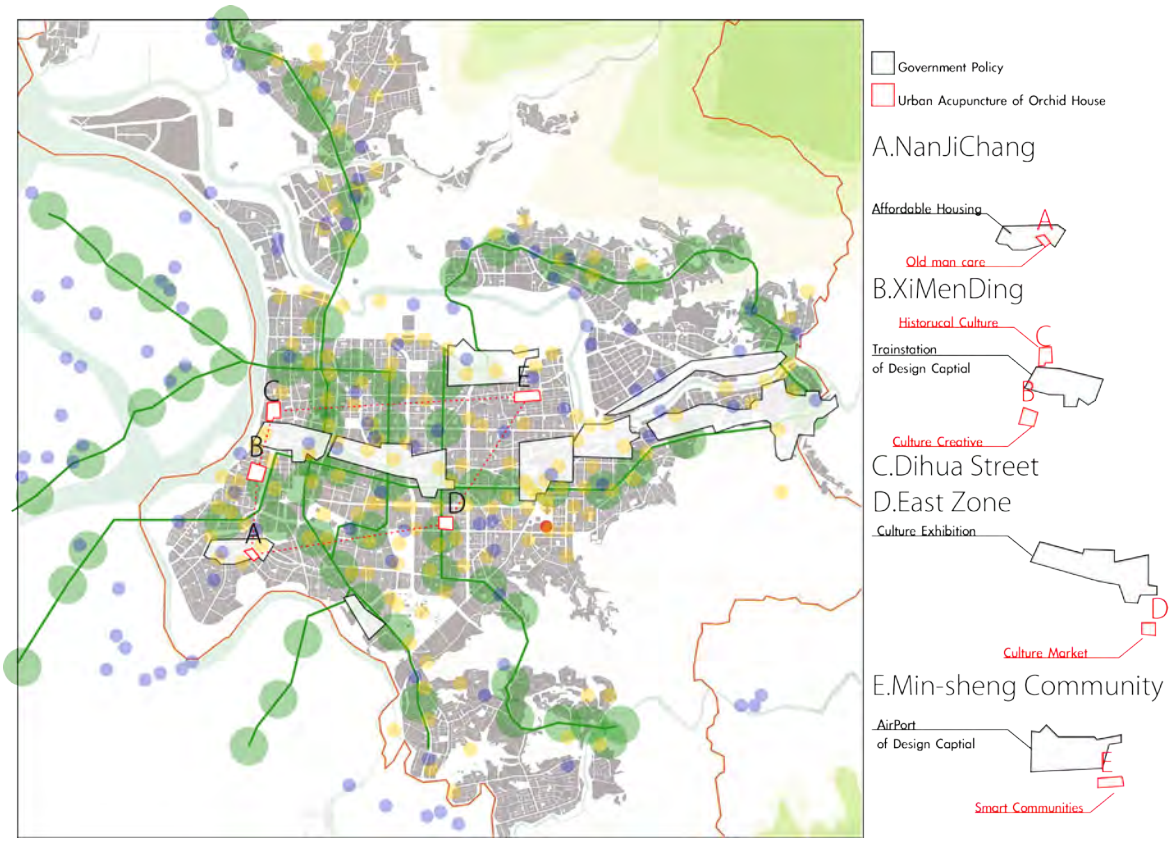
Taipei Urban Crisis



Population Density In Taiwan

This population growth results in the lack of living space and sufficient public amenity, and cause middle classes moving toward the periphery, even outside of city. The majority of these people are young professionals who just graduated from collage whom have worked a few years, and they are not able to afford a house yet. However, most of them works in the city centre and commute, and caused major traffic congestions with millions of cars and motorcycle. Consequently, the city is left with a high carbon dioxide pollution, and the decrease living quality.

Taipei Urban Acupuncture

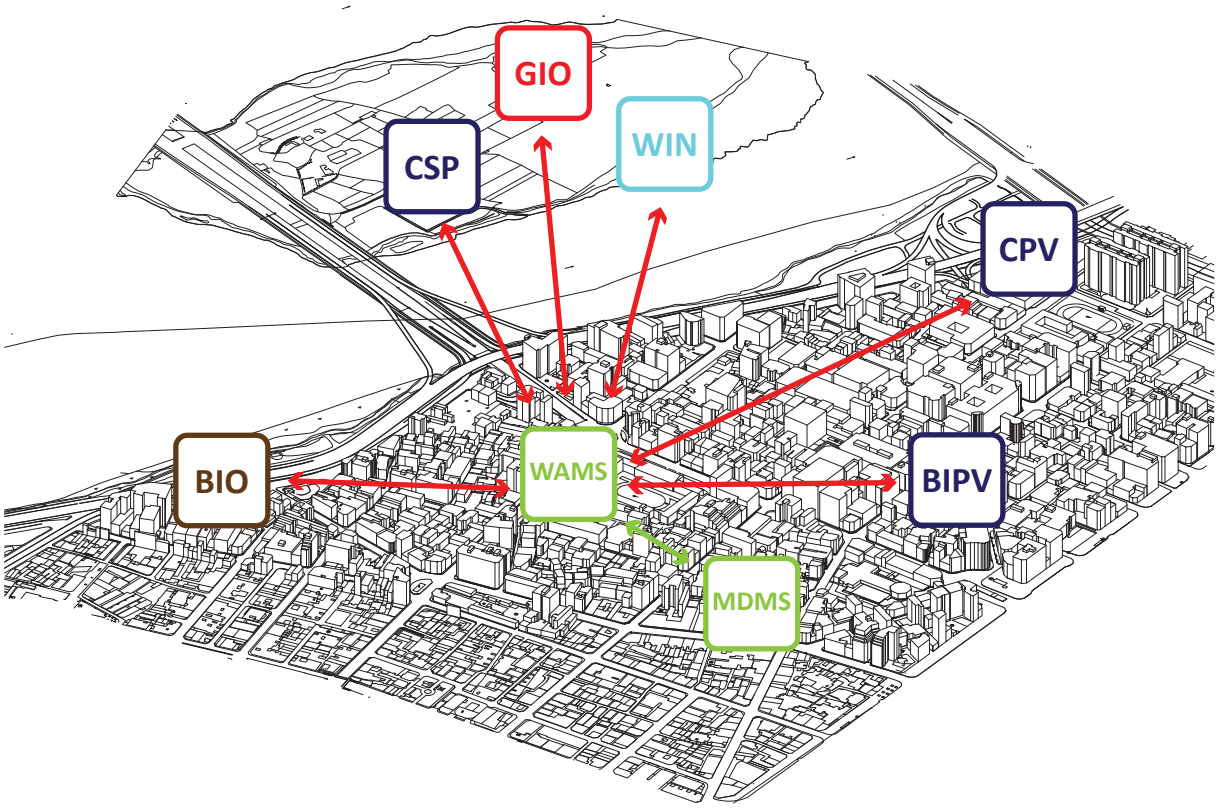


Ximending District

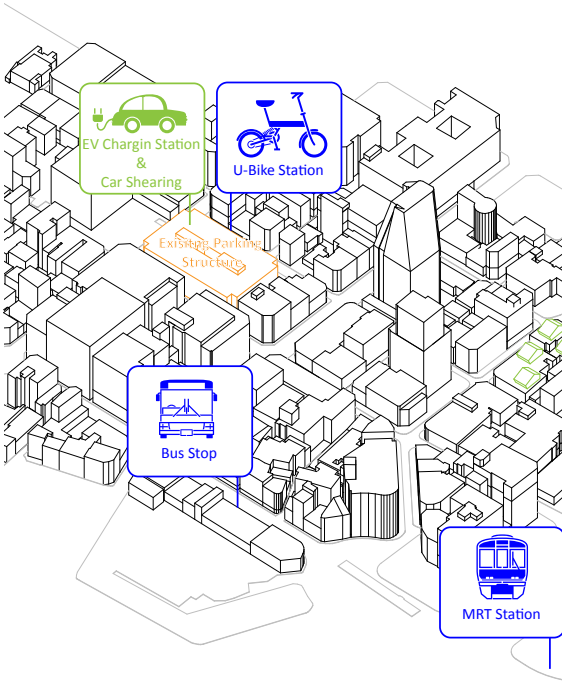
Taipei city population reached its 20-year peak and residential building has been constructed in various types. The majorities are a duplex apartment, which is relatively wide and 4 to 5 story building, and a row house that is extremely narrow and deep single family owned. These two types were constructed during the modern democracy period. Most of flat-roof duplex apartment and row house are facing problems: leakage, heat absorption and no public facilities. Therefore, the illegal make-shift metal roofed shelters have been introduced widely in most of the residential buildings and create unregulated cityscape of Taipei.

For Orchid House urban design strategy, NCTU UNICODE focus districts where the most of duplex apartment and row house are located as the most needed area for urban regeneration to vitalize not only the residential building, but also these districts.

Zero Energy District



Ximending Smart Grid Concept



EV Charging Station

As main focal point of Ximending Zero Energy District plan, NCTU UNICODE proposes not only PV panel implementation to buildings, but also larger scale of renewable energy sources such as CSP (Concentrated Solar Power), Biomass, Wind power and Geothermal. In order for all renewable energy sources to be distributed efficiently, advanced applications of Wide-area-Measurement System (WAMS) is installed one of larger footprint building rooftops, and Data Centre (MDMS) serve all the energy with automation system. Furthermore, AMI (Advanced Metering Infrastructure) is installed to Orchid House Clusters to manage power supply within houses. Please refer Architecture Design Narrative for farther details of AMI integration to housing appliances.

Orchid House Urban Concept

Orchid Cluster in Taipei Urban Context

Orchid Cluster Section

Orchid House extension on existing building in Taipei city plays not only critical role for Ximending zero energy district urban planning, but also to apply new concept of urban regeneration. Almost 50% of residential building in Taipei city are over 30 years old and typically demolished during the renewal planning. However, NCTU UNICODE points out the problem of city re-development organized by government and executed by private developers. The developer tends to acquire larger number of properties to combine the land FAR (Floor Area Ratio) to build up high-rise residential condominium, which is not affordable for average income level and treated as investment target by investors.

Orchid House will proved unique opportunity for not only the building owner, but also the targeted tenants, who needs housing support to pursue their young profession to promote new creative industry in Taipei.

Orchid House Prototype

Orchid House at La Cite du Soleil, Versailles, France

The Orchid House is as much a physical dwelling structure as a mindset for living. NCTU UNICODE hopes to use the Orchid House to revive Taiwan by focusing on urban centres. Urban areas in Taiwan, particularly the capitol city, Taipei, have high population densities and a random assortment of architecture – many buildings are old with rundown facilities. Furthermore, as in all urban cities but even more so because of the particularly high population density, commuter traffic causes extreme congestion, uses a lot of energy, and creates large amounts of pollution. Reviving the city would include not only renovating buildings and improving the residents' quality of life, but also promoting creativity and sustainability.

Objective

Taiwan is an island in the South East Asia on the Pacific Rim at a latitude of 23 to 24 degree north, which sits right on the Tropic of Cancer. Taipei City is at the north tip of the island and its latitude is 24 degree north. The sub-tropical climate brings high humidity to Taipei's long hot summer and short cold winter. The high temperatures coupled with the high humidity make summers in Taiwan very uncomfortable. Our summer extends from early May to late September. Winter and spring are the raining seasons here. Autumn months are pleasant with the right temperatures and slightly high humidity. However, the comfortable spring and autumn are very short. March and April are the spring months while October and November are the autumn months.

The passive design strategies for Taiwan's hot and humid summer are somewhat complicated. The major strategy is to provide shading while increasing ventilation. Shading will cut down the heat gain from the solar radiation. Ventilation is to reduce humidity by lifting moisture from the air. It also increases thermal comfort through evaporative heat loss.

The cold and humid winter also presents a design challenge. The design strategy is to increase indoor temperatures with solar radiation. Preventing heat loss is another strategy for winter comfort. Adding proper insulation materials may reduce heat loss in winter.

Power supply is another issue people are facing in Taiwan. The nuclear disaster from the Fukushima tsunami has led to the rise of an anti-nuclear movement in Taiwan. The power supply of Taipei is mainly from two nuclear power plants near Taipei, with a third nuclear plant under construction. All these three plants are on the same earthquake zone; and the distance from the closest nuclear plant is only 20 kilometer to the center of Taipei. Alternative power sources have been a quest to this city.

5.4.1 Technology Project Summary

Technology Project Summary Table of the Orchid House in Taipei

1. Project Dimemtions	Data	Location of detailed information
Gross area (m^2)	116.66 m^2	PM/Appendix A
Net floor area (m^2)	71.30 m^2	PM/Appendix A
Conditioned Volume (m^3)	206.06 m^3	PM/Appendix A
2. House envelope		
Insulation types and thickness (m)	Glass Foam 0.065 m	PM/5.3.2
	eFoam Varies	PM/5.3.2
Walls area (m^2) and Thermal Transmittance (W/m^2K)	32.19 m^2 0.15 $W/m^2.K$	PM/Appendix A
Floor area (m^2) and Thermal Transmittance (W/m^2K)	60.54 m^2 0.28 $W/m^2.K$	PM/Appendix A
Roof area (m^2) and Thermal Transmittance (W/m^2K)	60.54 m^2 0.09 $W/m^2.K$	PM/Appendix A
Glazing area (m^2) and Thermal Transmittance (W/m^2K)	32.10 m^2 0.75 $W/m^2.K$	PM/Appendix A
Glazing Solar Gain (SHGC)	77%	
HVAC System		
Heating system	HVAC Cooling And Heating	PD/ME-011
Energy Production Equipemnt	Heat Pump	
Type	Variable Refrigerant Flow	
Model	RXYMQ4PVE	
Heating Capacity	12.5 KW	
Heating Efficiency	Cop: 3.82	
Cooling Capacity	11.2 KW	
Cooling Efficiency	Cop: 3.79	
Thermal Unit	Room Heating And Cooling	PD/ME-011
Type	Wall Mounted Type	
Model	FXAQ40MAVE	
Refrigerant (Type)	R-410A	
Heat Recovery Ventilation or Energy Recovery Ventilation	Room Active Vention	PD/ME-012
Type	Heat Reclaim Ventilation	
Model	VAM150GJVE	
Efficiency	Cooling 66% (Enthalpy) Heating 72% (Enthalpy)	
4. Domestic Hot Water		
System (Type, capacity)	Domestic And Space Heating (Indirect cylinder Twin Coil Vessel,	PM/36.7-5.3.7

	300 L)	
Solar thermal Collectors	Domestic Hot Water And Heating	PM/36.7-5.3.7
Type	Evacuated Tube	
Area (m^2)	13.6 m^2 (Gross Collector Area)	
5. Electrical Energy production		
PV Modules (Type)	Multi-Crystalline standard module	PM/5.3.5
PV panels area (m^2)	53.9055 m^2	PM/5.4.1
Installed PV power (kWp)	8.25 kWp	PM/5.3.5
Estimated energy production (kWh/year)(include the information of all PV types)	9507.0 kWp/year	PM/5.4.1
6. Energy Consumption		
Estimated energy consumption (kWh/year)	3436.5 kWh/year	
Energy electrical consumption per conditioned	19.13 kWh/year per m^2	
Energy Use Characterization (% of total energy consumptiion)		
Heating (%)	0.79% 27 kWh	
Cooling (%)	27.50% 945kWh	
Ventilation (%)	5.09% 175 kWh	
Domestic Hot Water (%)	18.62% 640 kWh	
Lighting (%)	4.42% 152.26 kWh	
Appliance and Devices (%)	43.58% 1497.5 kWh	
7. Energy Balance		
Estimated energy balance (kWh/year)	6070.5 kWh/year	PM/5.3.6
Estimated CO2 emission (Tn/year) (include the calculation in the Project manual and indicate its location here)	-3.86113 Tn/year	PM/5.3.6
8. List of Singular and Innovative material and systems		
Liquid thermal mass		PM/5.3.2
High R-Value insulations: Glass foam, EFoam and Vacuum Insulated Panel		PM/5.3.2
Solar thermal System's Configuration		PM/5.3.7
Relative Humidity Control		PM/5.3.9
Battery Energy Storage System (BESS)		PM/5.3.6

Technical Project Summary Table of the Prototype Orchid House in Versailles

1. Project Dimemtions	Data	Location of detailed information
Gross area (m^2)	116.66 m^2	PM/Appendix A
Net floor area (m^2)	71.30 m^2	PM/Appendix A
Conditioned Volume (m^3)	206.06 m^3	PM/Appendix A
2. House envelope		
Insulation types and thickness (m)	Glass Foam 0.065 m	PM/5.3.2
	eFoam Varies	PM/5.3.2
	VIP 0.03 m	PM/5.3.2
Walls area (m^2) and Thermal Transmittance (W/m^2K)	32.19 m^2 0.09 $W/m^2.K$	PM/Appendix A
Floor area (m^2) and Thermal Transmittance (W/m^2K)	60.54 m^2 0.12 $W/m^2.K$	PM/Appendix A
Roof area (m^2) and Thermal Transmittance (W/m^2K)	60.54 m^2 0.07 $W/m^2.K$	PM/Appendix A
Glazing area (m^2) and Thermal Transmittance (W/m^2K)	32.10 m^2 0.75 $W/m^2.K$	PM/Appendix A
Glazing Solar gain (SHGC)	77%	
HVAC System		
Heating system	HVAC Cooling And Heating	PD/ME-011
Energy Production Equipemnt	Heat Pump	
Type	Variable Refrigerant Flow	
Model	RXYMQ4PVE	
Heating Capacity	12.5 kW	
Heating Efficiency	Cop: 3.82	
Cooling Capacity	11.2 kW	
Cooling Efficiency	Cop: 3.79	
Thermal Unit	Room Heating And Cooling	PD/ME-011
Type	Wall Mounted Type	
Model	FXAQ40MAVE	
Refrigerant (Type)	R-410A	
Heat Recovery Ventilation or Energy Recovery Ventilation	Room Active Vention	PD/ME-012
Type	Heat Reclaim Ventilation	
Model	VAM150GJVE	
Efficiency	Cooling 66% (Enthalpy) Heating 72% (Enthalpy)	
4. Domestic Hot Water		
System (Type, capacity)	Domestic And Space Heating (Indirect cylinder Twin Coil Vessel, 300 L)	PM/5.3.7

Solar thermal Collectors	Domestic Hot Water And Heating	PM/5.3.7
Type	Evacuated Tube	
Area (m^2)	13.6 m^2 (Gross Collector Area)	
5. Electrical Energy production		
PV Modules (Type)	Multi-Crystalline standard module	PM/5.3.5
PV panels area (m^2)	32.67 m^2	PM/5.4.1
Installed PV power (kWp)	5 kWp	PM/5.3.5
Estimated energy production (kWh/year) (include the information of all PV types)	4536.2 kWh/year	PM/5.4.1
6. Energy Consumption		
Estimated energy consumption (kWh/year)	4972.56 kWh/year	
Energy electrical consumption per conditioned (kWh/year per m^2)	26.46 kWh/year per m^2	
Energy Use Characterization (% of total energy consumptiion)		
Heating (%)	20.01% 995 kWh	
Cooling (%)	7.00% 348 kWh	
Ventilation (%)	3.52% 175 kWh	
Domestic Hot Water (%)	19.77% 983.3 kWh	
Lighting (%)	3.06% 152.26 kWh	
Appliance and Devices (%)	46.64% 2319 kWh	
7. Energy Balance		
Estimated energy balance (kWh/year)	-399.74 kWh/year	PM/5.3.6
Estimated CO_2 emission (Tn/year) (include the calculation in the Project manual and indicate its location here)	0.03198 Tn/year	PM/5.3.6
8. List of Singular and Innovative material and systems		
Liquid thermal mass		PM/5.4.2
High R-Value insulations: Glass foam, EFoam and Vacuum Insulated Panel		PM/5.4.2
Solar thermal System's Configuration		PM/5.3.7
Relative Humidity Control		PM/5.3.9
Battery Energy Storage System (BESS)		PM/5.3.6

5.4.2 Comprehensive Energy Analysis and Discussion Report

Section I – Influence of Energy Analysis on House Design and Competition Strategy

1. Introduction

The Orchid House utilizes both sunlight and water to ensure optimal living conditions and create minimal waste. Natural light is harnessed not only to generate electricity from the roof photovoltaic panels, but also to regulate indoor temperatures through the thermal mass wall. Water efficiency is maximized through the use of a water-curtain wall, greenhouse cooling and drip irrigation systems. In addition, solar radiation is used to heat water which can be used domestically or used to radiate warmth when run through thermal piping under the panels of the floor.

In order to maximize energy efficiency, NCTU/UNICODE performed energy simulation and set numerous parameters to test the integrated home systems. Using Building Information Modeling, a baseline model of the Orchid House was created to the study the relationship between the envelope and the measurable area. This model was then used to predict the following building properties:

- Internal gains and cooling load within the structure to optimize HVAC system and additional cooling devices
- Annual electricity demand
- Orchid House performance during competition week

1.1 Energy Analysis Objectives

The objective of energy analysis is to evaluate and aid design decisions in both the schematic design and design development stage. At each stage, different tools are used to simulate the physical environment and performance of the building.

1.1.1 Schematic Design Stage

Using climate analytical tools, the team analyzed Taipei's local climate for various annual properties such as temperature, humidity, wind speeds, wind direction, solar exposure and other helpful information. By breaking down the data into seasonal proportions, the team was able to integrate green building strategies such as building rotation, shading devices, natural ventilation and other passive design utilizing these natural forces to achieve optimal thermal comfort, natural lighting and energy efficiency.

1.1.2 Design Development Stage

As building materials, building and HVAC systems, lighting and other appliances are included into the design, more sophisticated energy models can be used to simulate the annual energy consumption of the building based on Taipei's climate and occupancy behavior. Simulated models accurately depict fluctuations in Orchid House's interior temperature, humidity, lighting, heat gain and loss, cooling load, energy load and other parameters, which are then used to adjust and balance design strategies for further optimization.

1.2 Energy Analysis Methodology

Energy Analysis is performed using Green BIM (Building Information Modeling) where the design model is created using BIM software and then transferred to supplementary simulation software to simulate environmental conditions and energy use.

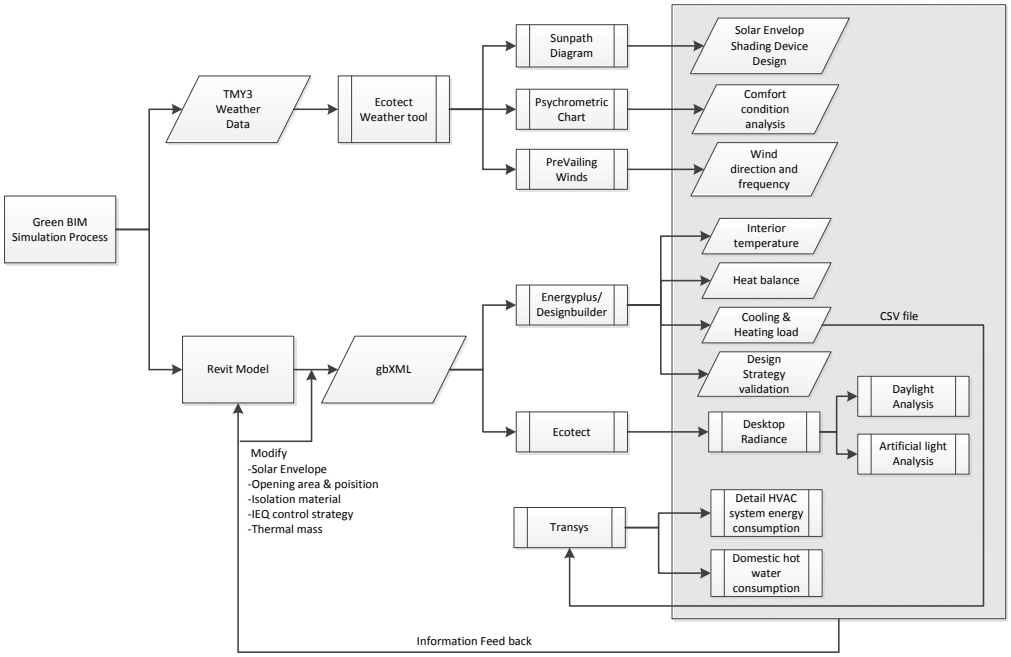


Figure 5.4.2.1.1a The workflow between BIM model and simulation software during the Green BIM simulation process

1.3 Climate Data and Weather Analysis

The latitude of Taipei is 24 degree north. The sub-tropical climate brings to Taipei long hot and humid summer and short cold and humid winter. The high temperature backed with the high humidity makes summers in Taiwan very uncomfortable. Winter and spring are the raining seasons here. Autumn months are pleasant with the right temperature and slightly high humidity. Taiwan experiences prevailing southeast winds in summer and northeast winds in winter.

1.3.1 Taipei Seasonal Climate Analysis

Taipei winter occurs throughout the months of December to February with an average temperature of 17oC. While severe cold fronts can cause indoor temperatures to reach as low as 7oC, strong solar radiation during the winter can also raise outdoor temperatures to 28~30oC. Conversely, during the summer months of June to September, Taipei experiences the warmest of temperatures. Due to the unique topographical formation of Taipei, in the shape of a basin, warm air becomes trapped between the atmosphere and the surrounding mountains. When compounded with solar radiation and frequent rain, the climate conditions during this time are hot and humid. As a result, the moths of June to September experience the highest demand for mechanical cooling and building energy use.

During the spring and autumn seasons (March to May and September to November respectively) of Taipei, climate conditions are mild with temperatures ranging between 17~25oC. However, during days with strong solar radiation, outdoor temperatures can often reach temperatures above 30oC causing large temperature fluctuations between day and night. The occurrence of these transitional seasons where daytime temperatures are high accompanied by low temperature evenings allows for the design considerations of daytime shading devices and evening passive ventilation strategies. Figure 1.2.2 describes the various monthly climate fluctuations of Taipei.

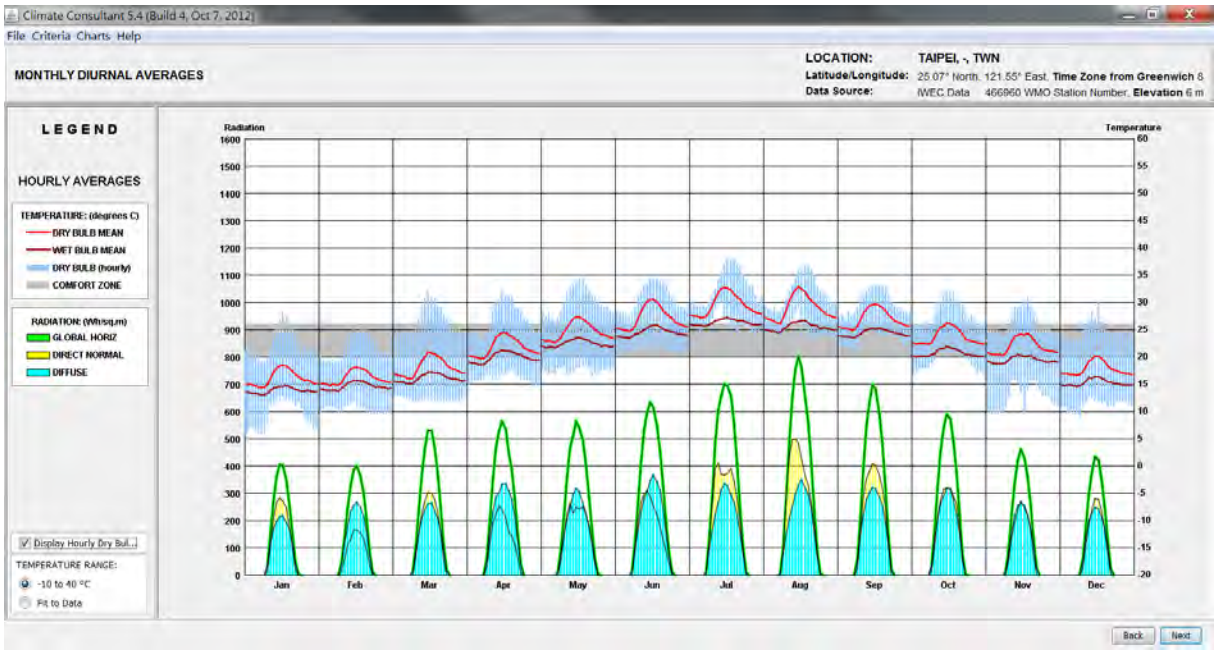


Figure 5.4.2.1.1b Monthly climate fluctuation data for Temperature, Humidity, and Solar Radiation.

1.3.2 Cooling Degree Hour and Heating Degree Hour Analysis

Typically, a large magnitude of cooling degree hours and heating degree hours represent climates that demand higher building energy consumption, and provides a reference for energy conservation design considerations. Table 1.3.1 shows the cooling degree hours and heating degree hours using Taipei weather data, when indoor temperature conditions are set between 18~26 oC. It is apparent that, in Taipei climate, cooling degree hours far exceeds heating degree hours. This also shows the lack of the need for mechanical cooling during winter months.

Month	Heating Degree Hours (°C.hr)	Cooling Degree Hours (°C.hr)
Jan	1780	169
Feb	1515	134
Mar	1155	800
Apr	75	1696
May	7	3480
Jun	0	5044
Jul	0	6953
Aug	0	6518
Sep	0	4885
Oct	3	2696
Nov	238	1847
Dec	1022	446
Total	5795	34668

Table 5.4.2.1.1a Monthly Heat Degree Hour and Cooling Degree Hour analysis for Taipei climate

1.3.3 Wind Speed and Direction Analysis

From the prevailing winds analysis shown in Figure 1.3.2, the Taipei basin predominantly experiences east winds on a monthly basis. Again, the unique topographical features of Taipei cause wind to behave in a more conformed behavior (funneling northeast winds in the winter and mitigating southeast winds in the summer), with the exception of summer where mild southwest winds also influence climate conditions.

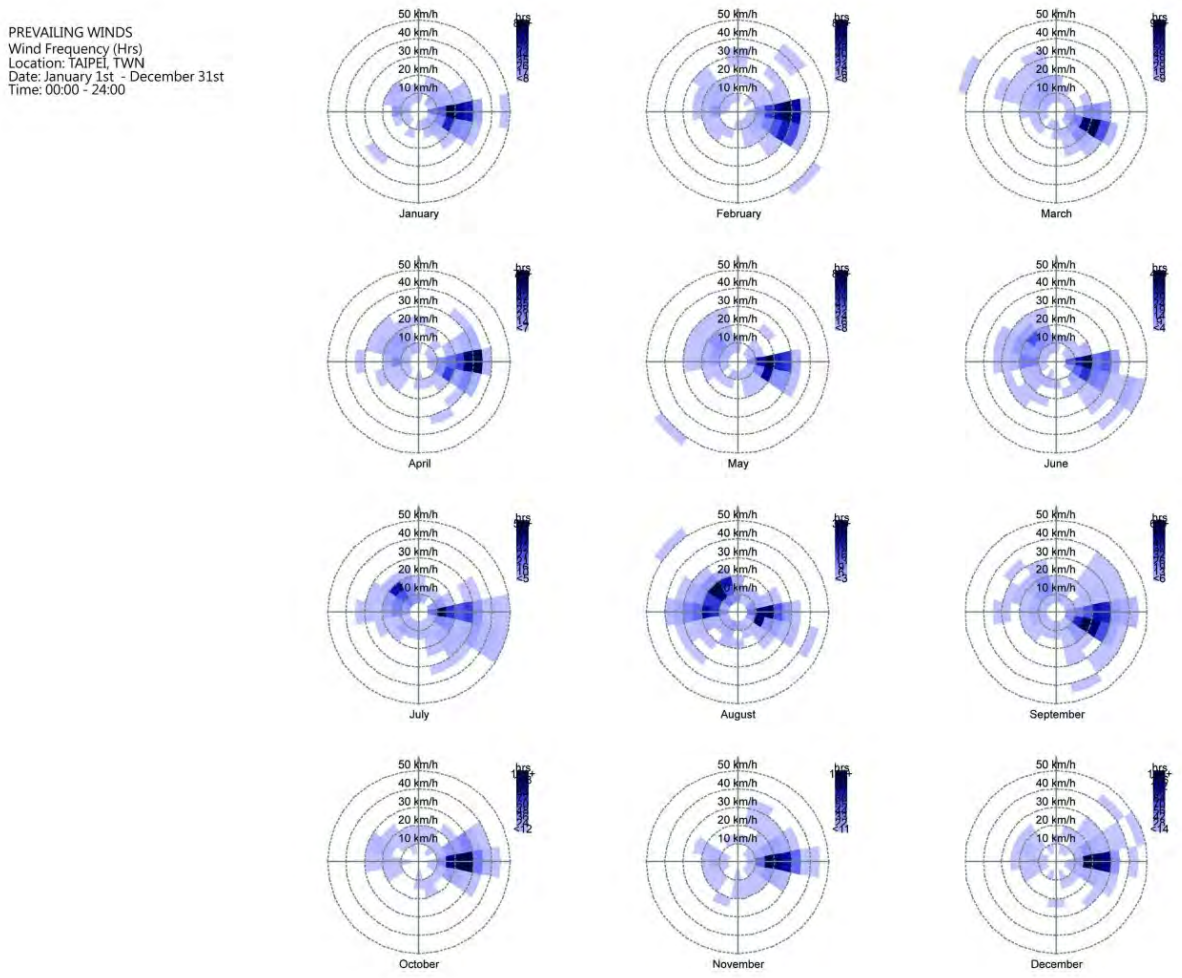


Figure 5.4.2.1.1c Monthly prevailing winds analysis of Taipei area

1.4 Team Energy Strategy

Various design strategies were implemented to maximize comfort while minimizing electricity use during summer and winter climate condition. The overall energy strategy is to first use passive methods followed by semi-passive methods, and finally mechanical systems when no alternative methods are available. The electricity required to operate the semi-passive and active systems will be generated from the photovoltaic cells installed on the roof of the Orchid House.

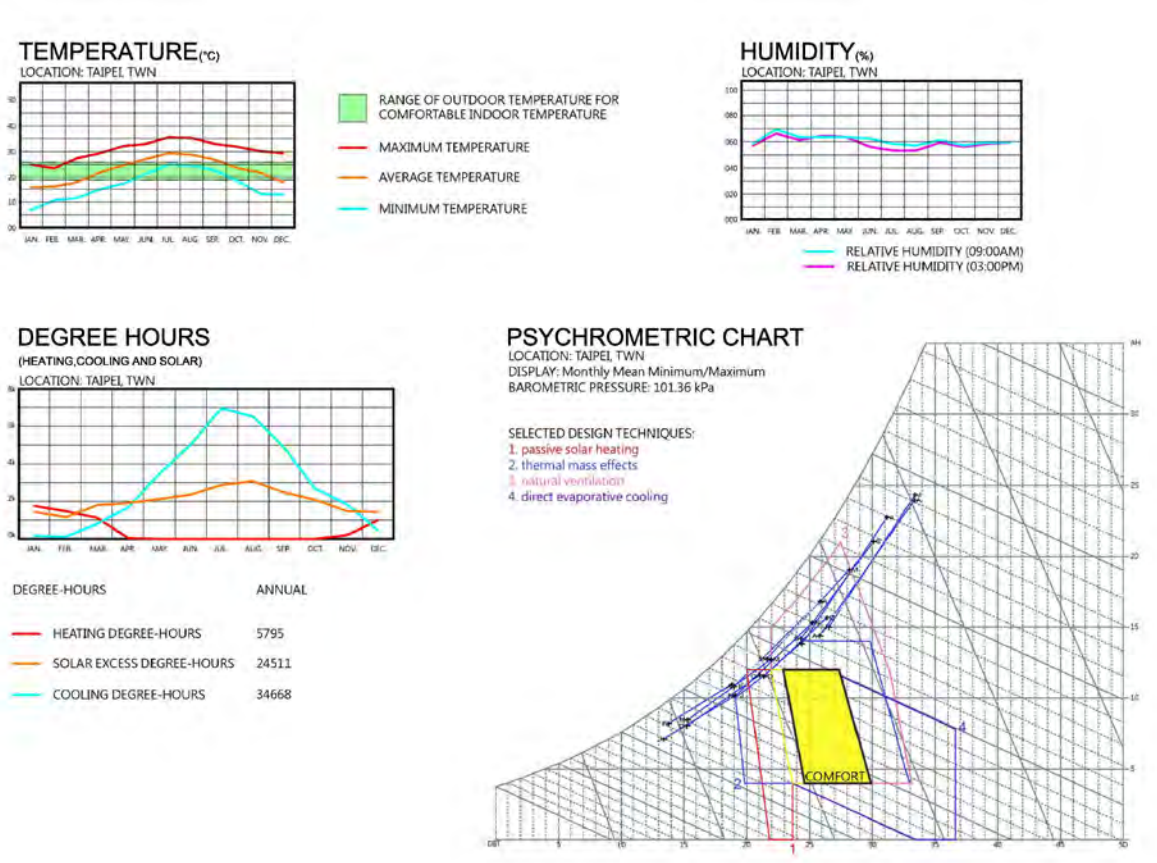


Figure 5.4.2.1.1d Climate data including Temperature, Humidity, Degree Hours and Psychrometry Chart of Taipei area

Cooling Strategies

- Shading
- Natural ventilation
- Solar chimney
- Earth and vegetation cooling
- Evaporative cooling
- Heat pump cooling with heat exchanger

Heating Strategies

- Direct solar gain
- Greenhouse effect
- Thermal wall
- Heat exchanger preheated by solar hot water
- Heat pump heating with heat exchanger

2. Influence of energy analysis in the project design (Project Design Optimization)

2.1 Solar Exposure

Solar exposure simulation was used as an aid during building envelope, shading and opening considerations. The sun path simulation allows for the analysis of solar angle and exposure during specific seasons or days.

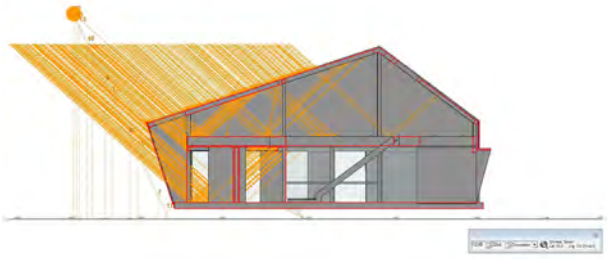


Figure 5.4.2.1.2a Solar exposure on building envelope during Winter Solstice

Figure 5.4.2.1.2b Solar exposure on building envelope during Summer Solstice

Figure 5.4.2.1.2c Solar exposure on building envelope during Spring Equinox

Figure 5.4.2.1.2d Solar exposure on building envelope during Autumn Equinox

2.2 Simulation of Indoor Environmental Comfort, Heat Balance and Applying Design Optimization

For preliminary analysis, we used Energyplus analysis software to simulate Orchid House indoor temperature and heat balance fluctuations under the conditions of Taipei climate. The heat balance algorithm inherent in Energyplus allows for the simulation of hourly indoor temperature, in addition it provides analysis of heat gain and heat loss from individual building components such as exterior walls, ceilings, floors, windows, doors, etc. This provides valuable information to determine which components require and will benefit the most from the application of energy saving strategies.

For example, the Terrace Area on the first floor of Orchid House is designed to be a Buffer Zone to the indoor mechanically ventilated space. During preliminary analysis, we discovered that during sunny days, solar radiation through the skylight and wall glazing of the enclosed Terrace Area generate large amounts of heat that subsequently gets transferred to the indoor measurable zone (mechanically ventilated space).

Figure 5.4.2.1.2e shows the temperature and heat balance fluctuation of the Terrace Area throughout a summer day (June 22) before ventilation strategy was implemented to mitigate the generated heat. On that day, outdoor temperatures reach as high as 33.5oC, while the Terrace Area has a peak tempera-

ture of 31.5oC. The heat balance chart shows that indoor heat gain can be attributed to solar radiation from the envelope windows. Beginning from 7am in the morning, solar radiation enters the Terrace Area from the east facing windows, followed by solar radiation entering directly through the skylight from noon until 5pm causing indoor temperature to rise steadily throughout the day. It is not until the sun path passes the point of solar incidence between the indoor temperatures begins to decline slowly.31.5oC. The heat balance chart shows that indoor heat gain can be attributed to solar radiation from the envelope windows. Beginning from 7am in the morning, solar radiation enters the Terrace Area from the east facing windows, followed by solar radiation entering directly through the skylight from noon until 5pm causing indoor temperature to rise steadily throughout the day. It is not until the sun path passes the point of solar incidence between the indoor temperatures begins to decline slowly.

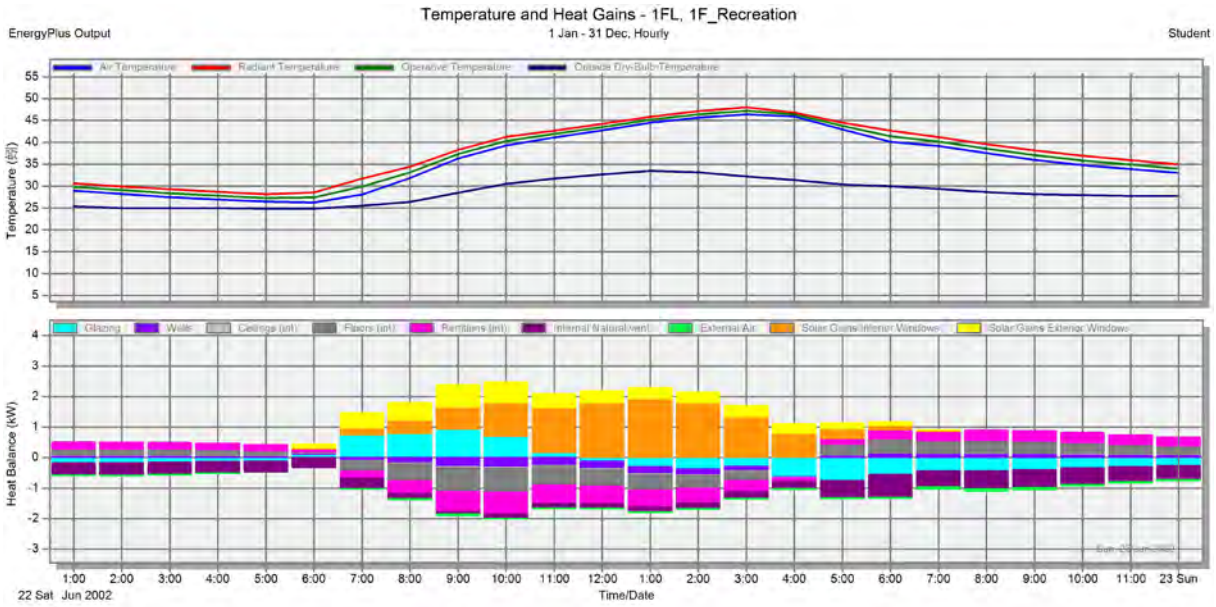


Figure 5.4.2.1.2e 1F Terrace Area temperature and heat gain analysis chart

In order to solve this overheated problem, the glazing material has to be changed to lower the Solar Heat Gain Coefficient (SHGC). The strategy of ventilating the Buffer Zone at night is also utilized. Figure 2.5 shows that solar radiation through windows and the conductivity heat through glazing reduce significantly after these two strategies applied. From the peak of 2.5kw reduce to 0.6kw. Sufficient heat loss at night, lower the peak temperature in the daytime.

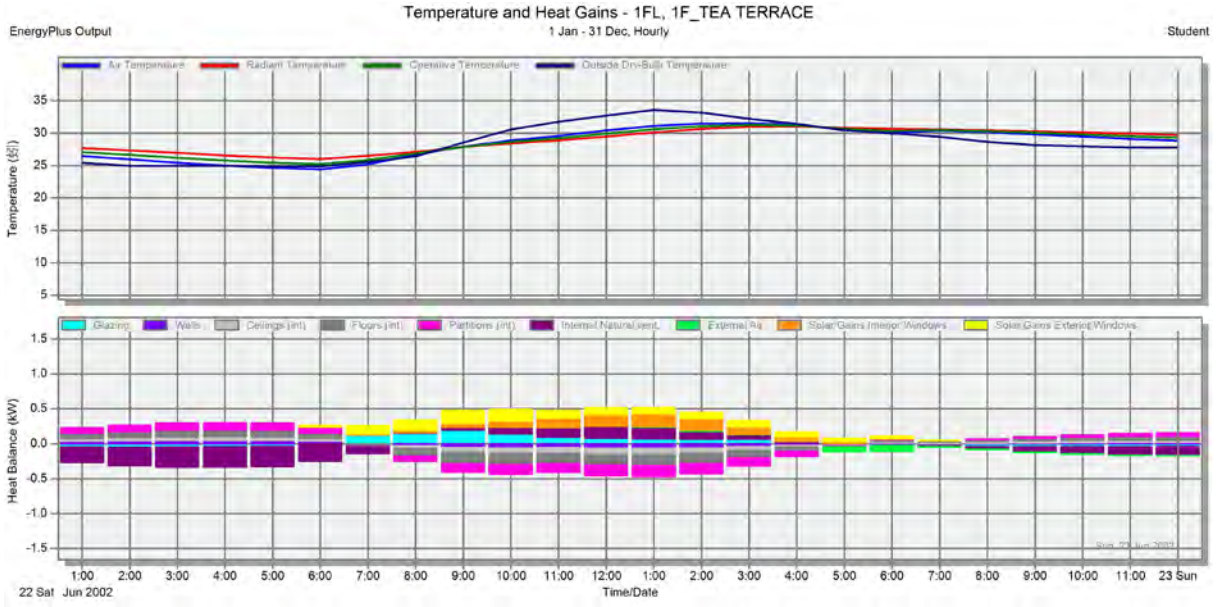


Figure 5.4.2.1.2f Building heat balance analysis before ventilation strategy

Because the temperature of the Buffer Zone effects the amount of heat transfer from the measurable area, the retaining heat in the Buffer Zone effects the measurable area's thermal condition. Figure 5.4.2.1.2g shows the measurable area's temperature in the whole year if the openings of the Buffer Zone and the measurable area are closed without any ventilation. There will be 2481.4 hours of time when the temperature is from 30 to 33C0. Figure 5.4.2.1.2h shows that if the openings are open at night, the hours of the temperature between 30 and 33C0 will reduce to 1337.8. The hours of the temperature between 32 and 33C0 reduce ever more. It will be reduced from 1593.3 hours to 186.1 hours.

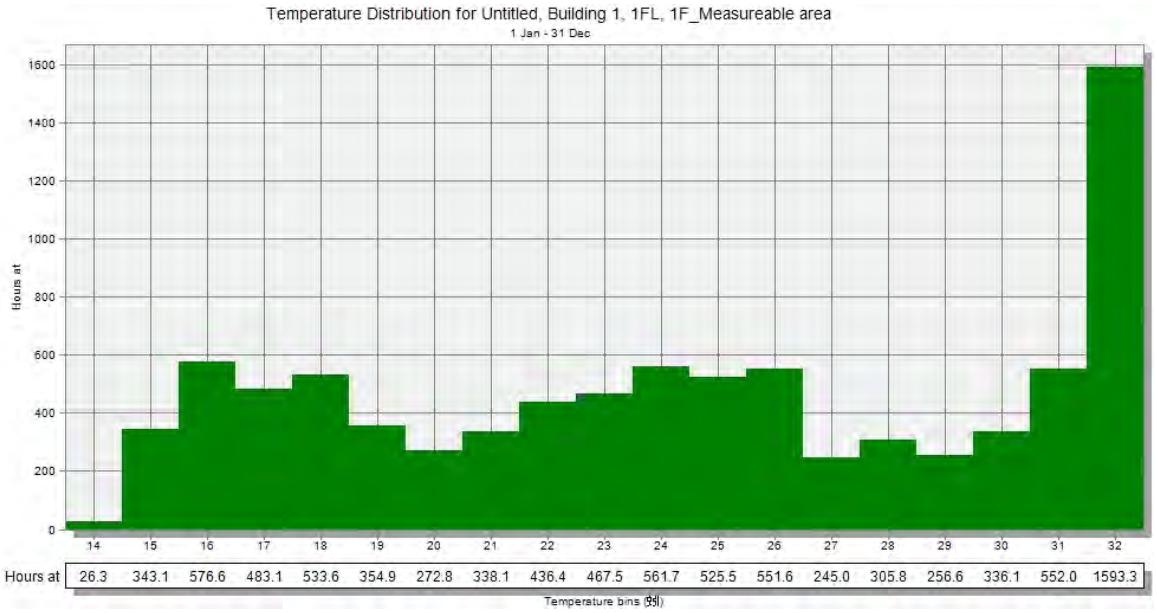


Figure 5.4.2.1.2g Measurable zone interior annual air tempature distribution before ventilation strategy

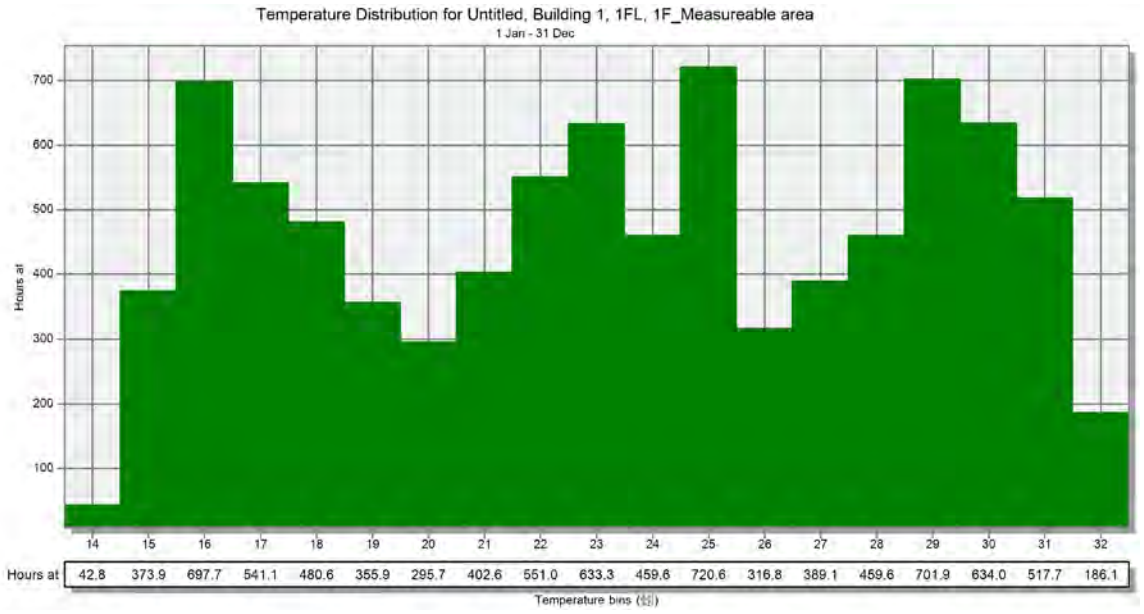


Figure 5.4.2.1.2h Measurable zone interior annual air tempature distribution after ventilation strategy

3. Influence of the energy analysis in the HVAC systems (conditioning systems optimization)

From the outset of the HVAC design, an energy-efficient HVAC is the goal. The following approaches to achieve the goal of energy efficiency design have been done with the help of energy and comfort simulation:

3.1 Space Cooling and Heating Equipment

The hot and humid climate of the Taipei's summer makes the choice of cooling and heating equipment limited to heat pump in the beginning, rather than radiant system. Even though the focus is always on the heat pump system, the energy simulation continuously forces the team to look for the highest energy-efficiency equipment by comparing products from different manufacturers: finally, Daikin is selected with the energy-efficient performance shown on Appendix D.1.13 and D.1.14, page .

3.2 Mechanical Ventilation

The heat reclaim ventilator (HRV) is formally included in Deliverable #3, because the energy simulation dictate the HRV to the mechanical ventilation system to greatly reduce the cooling and heating loads incurred by ventilation – a high-efficiency HRV with 80 percent of energy reclaim is selected.

3.3 Space Heating by Solar Thermal Energy

The space heating by thermal energy is first incorporated in the design in Deliverable #3, because the energy simulation requests the energy saving to include even the small amount of energy. The solar thermal energy can provide the free energy of 1204 kwh per year. See Appendix B.1.1.6.

In the Deliverable 3, the analysis revealed that the useful solar energy collected by the solar thermal system, which is of 2.6 / m2 gross area of solar collectors, is only enough to provide heat for both the domestic hot water and space heating for o months and CO2 heat pump is required to backup the solar thermal system for 7 months. Now, the gross area of solar collectors has increased from 2.61 m2 to 13.6 m2, the new analysis has shown the solar thermal energy can cover the load of both domestic hot water and space heating almost completely in nine months with high irradiation, backup heating is necessary in just three months. The new analysis is shown in Appendix B.

5.4.3 Section II – Projected Performance of Final Housing Unit Design

1. Housing Unit and Systems Description

1.1 The Geometric Envelope

The geometry of the Orchid House is generated by its physical environmental condition. The weather analysis shows that shading and natural ventilation are the most important passive design strategies for Taiwan's climate. The NCTU/UNICODE team designs the house to maximize shading and natural ventilation with its geometric form.

The angle of the roof determines the solar yields on the PV panels. The latitude of Taipei is 240, so the theoretically optimal roof tilt angle is 24o. Because Taiwan's peak electrical load happens in summer for cooling purposes, the roof angle of the Orchid House is designed to be 6o less than 24o that makes it 180. This roof angle increases solar yields during overheated season.

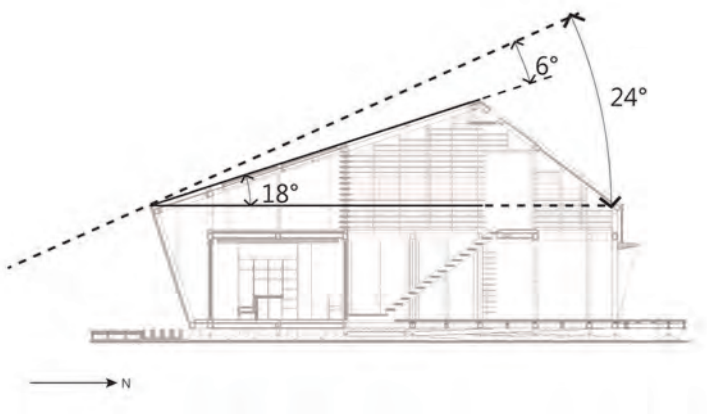


Figure 5.4.2.2.1a Roof Angle Diagram

The angle of the south façade directs the summer shading and winter direct solar gain. Based on the climate analysis of Taipei, the comfortable indoor temperatures 22°C ~ 29°C result from an outdoor balance point temperatures of 19°C ~ 26°C. People, appliances, and PV panels generate heat in the house, and this heat needs to be released to outdoor in order to maintain at a comfortable level. The balance point temperature is the outdoor temperature that causes balance between thermal gains and losses at a desired indoor temperature with natural heat transfer. Plotting the average temperatures of Taipei to the balance point temperature, The NCTU/UNICODE Team found the overheated period is from June 1st to September 21st, and the under-heated period is from December 1st to March 21st. The Orchid House reached the optimal south façade angle of 66o for both the ideal summer shading and winter solar radiation.

1.2 Energy Analysis Methodology

Energy Analysis is performed using Green BIM (Building Information Modeling) where the design model is created using BIM software and then transferred to supplementary simulation software to simulate environmental conditions and energy use.

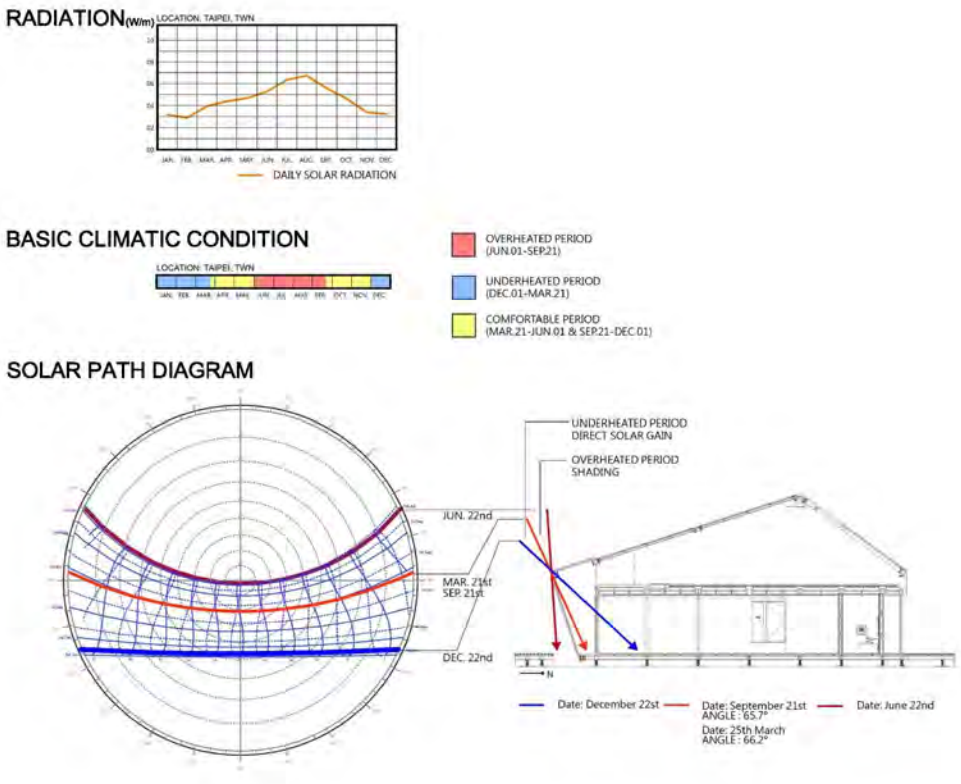


Figure 5.4.2.2.1b Solar Angle for south facade

The climate analysis shows that natural ventilation is the most efficient passive design strategy in Taiwan. The geometry of the Orchid House increases natural ventilation for summer cooling. The prevailing wind of Taipei comes from the southeast. The large openings on both south and north side of the house create positive wind load on the south façade and negative wind load on the north façade. This pressure difference may induce air flow into the house.

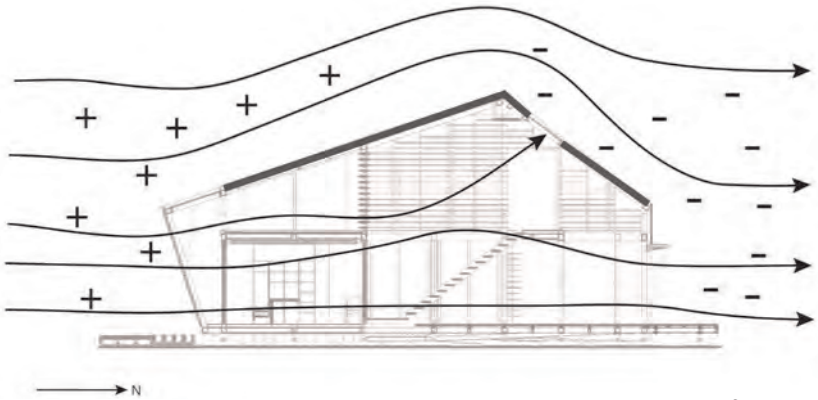


Figure 5.4.2.2.1c Natural Ventilation Generated by Air Pressure Difference

The geometry of the Orchid House also generates Bernoulli Effect to induce natural ventilation. Bernoulli Effect states the natural phenomenon that increases the velocity of air while decreasing its static pressure. The wind flow through the angled roof of the Orchid House has a longer travelling distance than the air flowing into the house. The longer travelling distance increase its velocity and decrease its static pressure. As a result, the low air pressure near the roof top opening induces air flow towards it.

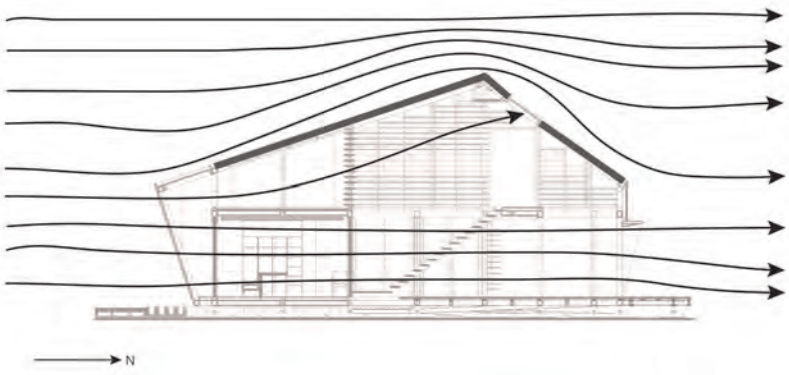


Figure 5.4.2.2.1d Natural Ventilation by Bernoulli Effect Diagram

1.2 Passive Design Strategies

The NCTU/UNICODE team designed several passive strategies to achieve thermal comfort in the Orchid House. The passive cooling strategies include shading, natural ventilation, solar chimney, heat sink, evaporation, and vegetation cooling. The passive heating strategies include direct solar gain, green house effect, thermal wall, and heat changer preheated by solar hot water.

1.2.1 The passive design strategies for Cooling

i. Shading

The geometry of the Orchid House is based on the solar angle. And the solar angle was decided by the weather analysis. The overheated period is from June 1st to September 21st, and the under-heated period is from December 1st to March 21st in Taipei. For cooling purposes, we need to shade the south openings from sunlight that comes down over 66° until September 2ist. This shading device will cover the openings for the whole overheated season. The building geometry of the Orchid House offers a shading area on the south side to protect the solar radiation during the overheated season.

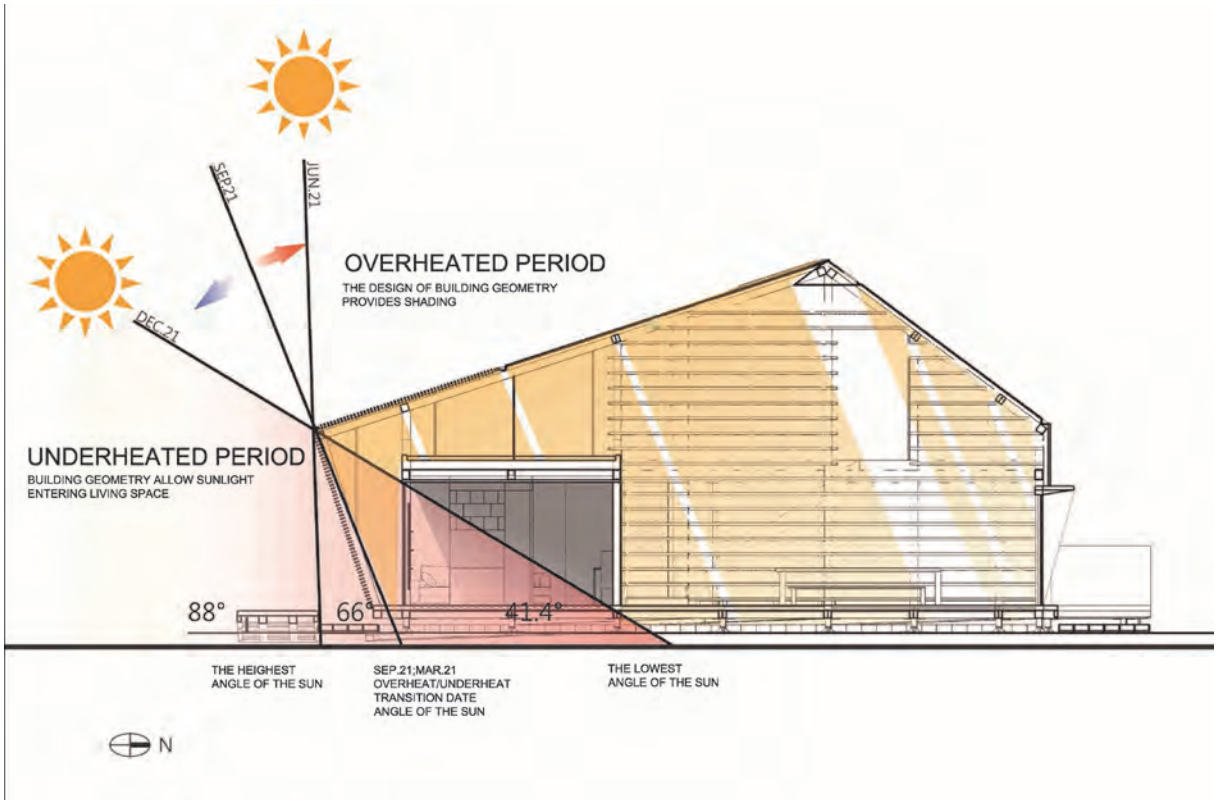


Figure 5.4.2.2.1e Solar Angle and Shading Diagram

ii. Natural Ventilation

When the outdoor temperature is within the comfortable range and the wind is blowing, all windows and louvers of the Orchid House would open up to allow natural wind to blow in. Because of the prevailing southeast summer wind in Taiwan, the Orchid House has large openings on both south and north sides to create pressure difference which induces natural wind blowing through the entire house. The geometry of the Orchid House further increases the interior air movement with the Venturi Effect. The ridge of the house increases the outdoor air velocity near the ridge and creates a low pressure on the opening near it, which is known as the Bernoulli Effect. This decrease in pressure at the opening will cause an increase in the speed of the indoor air movement, which then will remove the indoor heat generated by Human, appliances, and PV panels. It also blows on human skin to increase comfort.

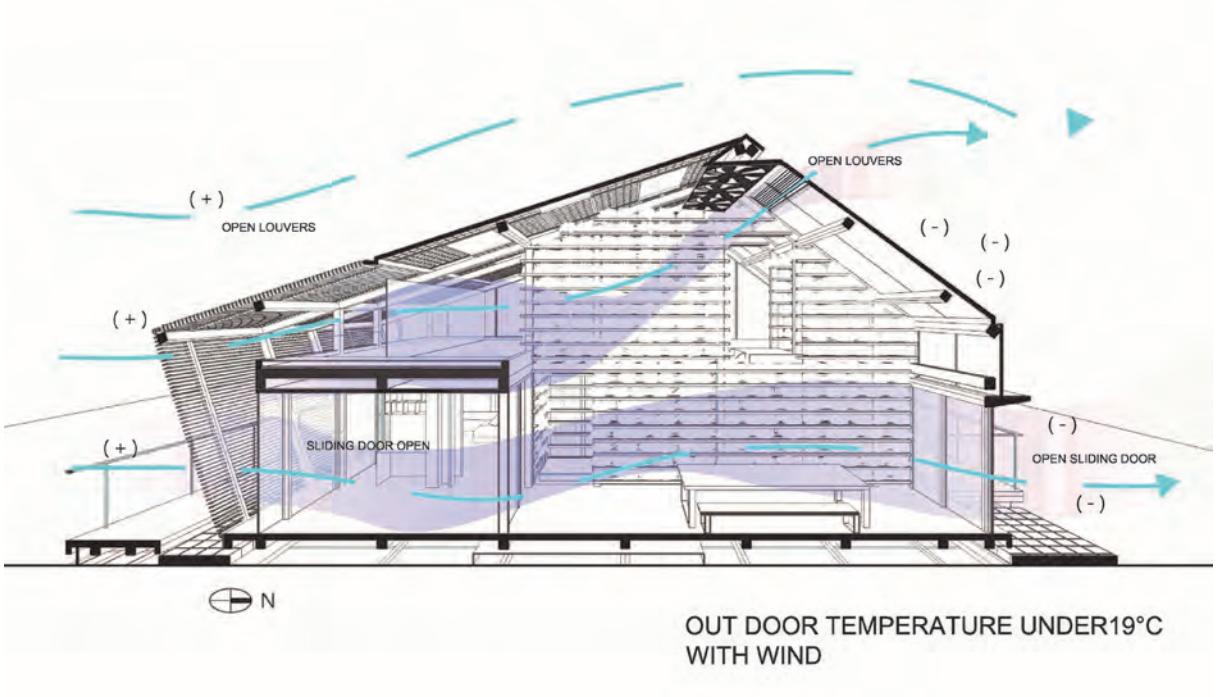


Figure 5.4.2.2.1f Natural Ventilation Diagram

iii. Solar Chimney

When the outdoor temperature is comfortable but there is no wind, the waste heat generated on the underside of the PV panels creates stack effect. The waste heat creates the temperature difference between indoor and outdoor on the ridge opening. The temperature difference then generates the pressure difference which would not exist otherwise. The indoor warm air would rise and escape through the ridge opening. All exterior windows and louvers need to be opened to allow outdoor air to enter. This air movement will drive away the heat and humidity from inside the house. The surface temperature of the PV panels is measured around 50°C. The solar chimney resolves the waste heat problem, and at the same time, creates comfortable living condition.

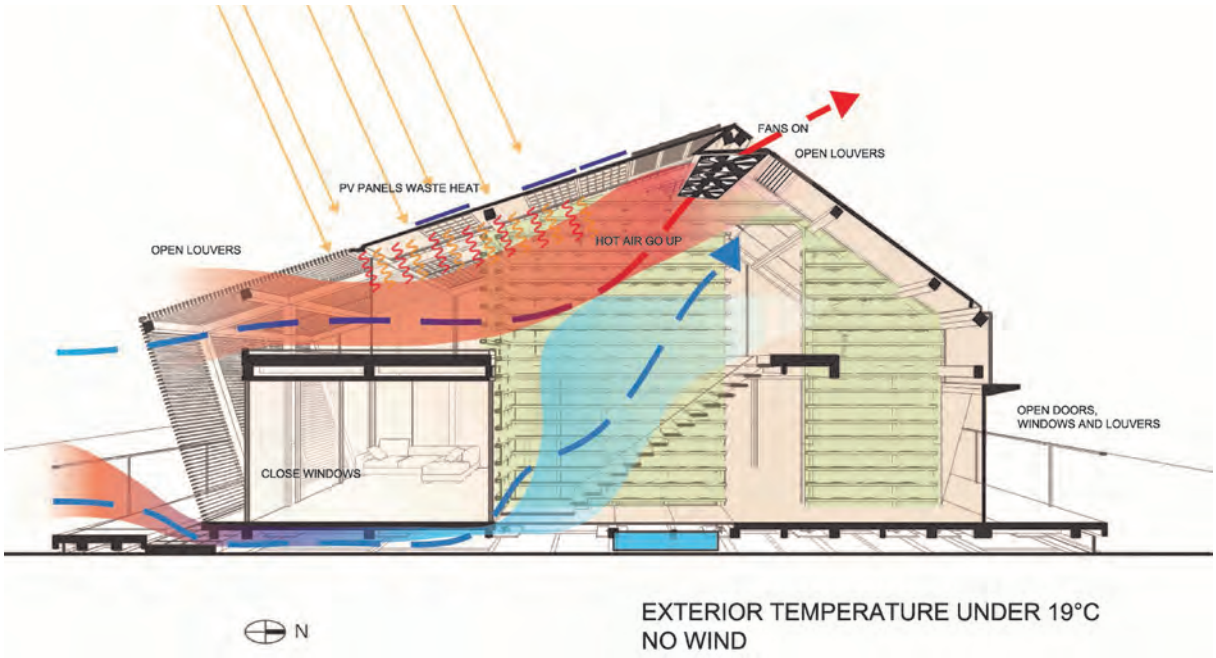


Figure 5.4.2.2.1g Solar Chimney Diagram

iv. Heat Sink and Vegetation Cooling

When the outdoor temperature is above the comfortable level, a series of fans near the ridge of the roof would be turned on automatically in the Orchid House. These running fans would create a negative pressure which draws the outdoor air to the space underneath the floor. The air then would flow through the floor opening in the green core. After the air flows into the green core, it penetrates the vegetation wall around the green core and enters the terrace area. The warm outdoor air is first cooled by the existing building concrete slab and rain water tank under the floor and then cooled by the evaporative effect of the plants.

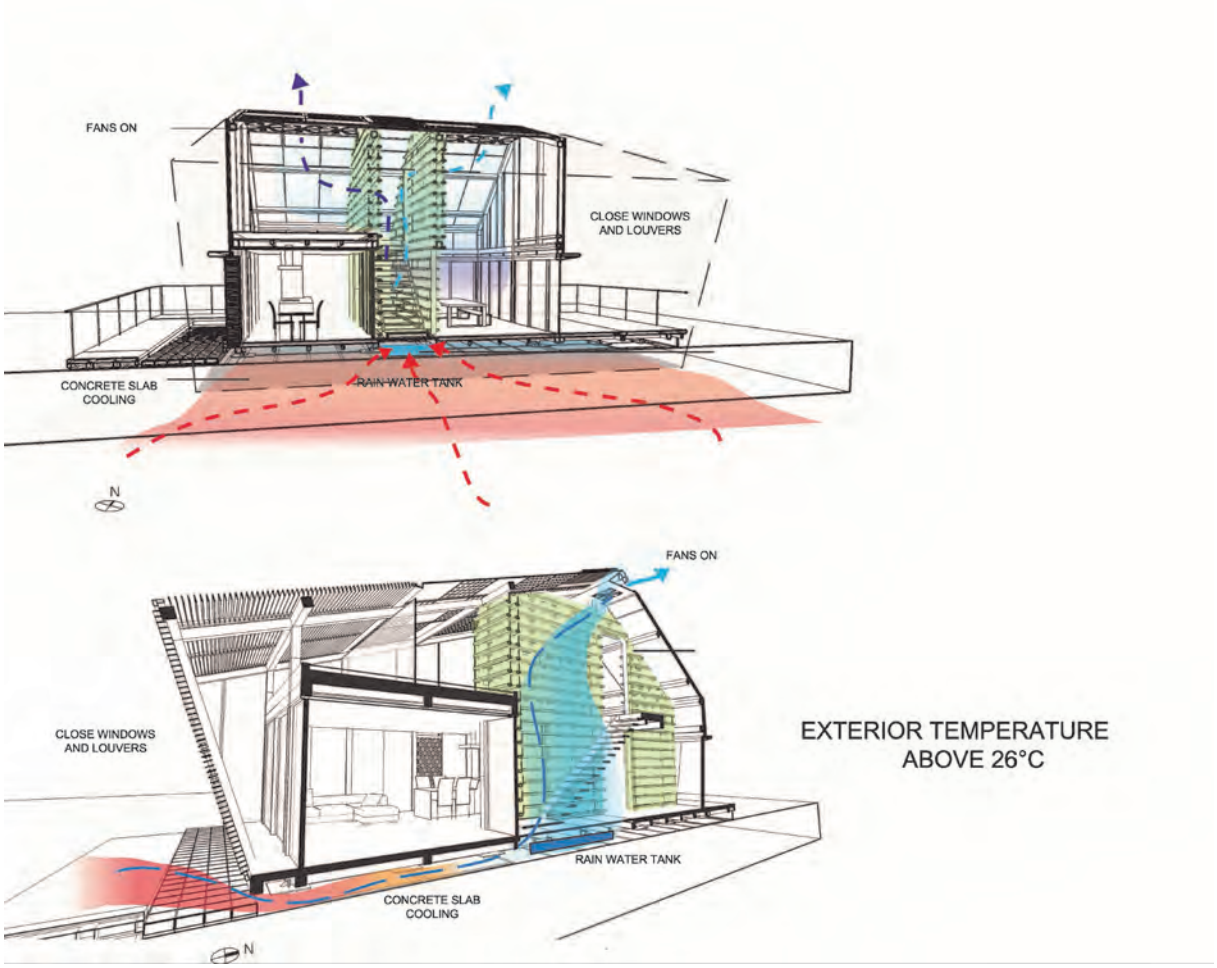


Figure 5.4.2.2.1h Heat Sink and Vegetation Cooling Diagram

In the competition site of Versailles, “Heat sink and Vegetation Cooling” will be modified as “Earth and Vegetation Cooling.” The Orchid House is sitting on the earth ground in the competition site instead of its urban site on the roof top. During the two competition weeks, the Orchid House will draw the outdoor air through underneath the house and use the earth as heat sink to lower the temperature of the outdoor air before it enters the house.

v. Evaporative Cooling

Inspired by the agricultural technology of orchid greenhouse, the NCTU/UNICODE team designed a water wall in the inlet side window of the Orchid House. The purpose of the water wall is to lower the outdoor air temperature before it enters the house. When the outdoor temperature is above the comfortable level, the water wall near the south end of the house would come on automatically. The outdoor air will then be drawn into the terrace space by the fans near the ridge of the roof. In order to

adjust to the high humidity in Taipei's summer, the water in the water wall runs in metal pipes. Some metal plates are connected to the pipes to increase the heat transfer area.

In the prototype constructed in Versailles, the water in the wall will be exposed to the air. The wall is built up with many Rasching rings which are plastic rings with a lot of holes. Water is dropped on the top of the wall where the Rashing rings separate the water to small particles. When the warm outdoor air passes through the water particles, the sensible heat in the air turns to latent heat which evaporates water drops to vapor. The outdoor air temperature decreases through this evaporation while the humidity increases. The low temperature of the terrace reduces the heat gain to the living space while the humidity is physically stopped by the windows. This process will also remove the waste heat of the PV panels.

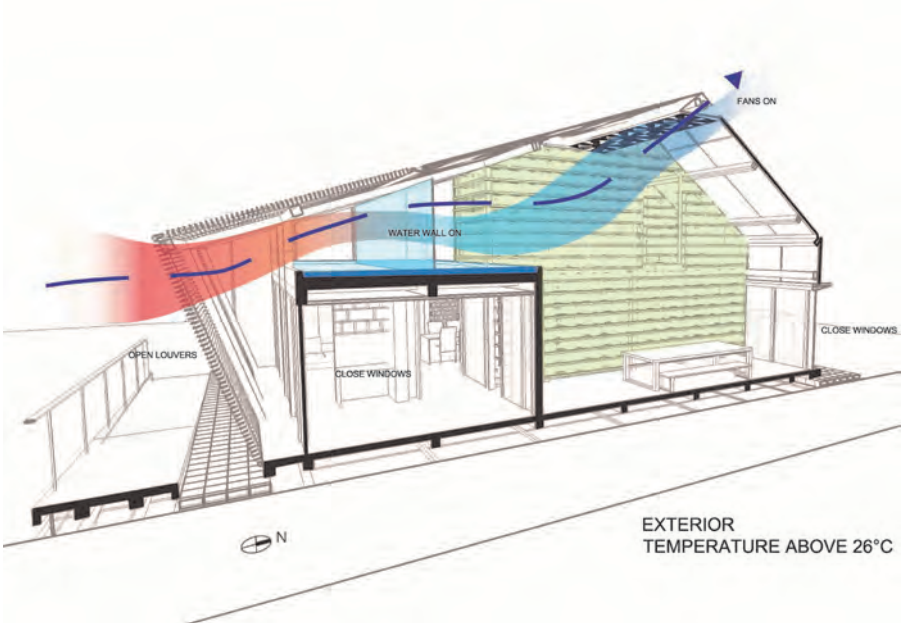


Figure 5.4.2.2.1i Evaporative Cooling Diagram

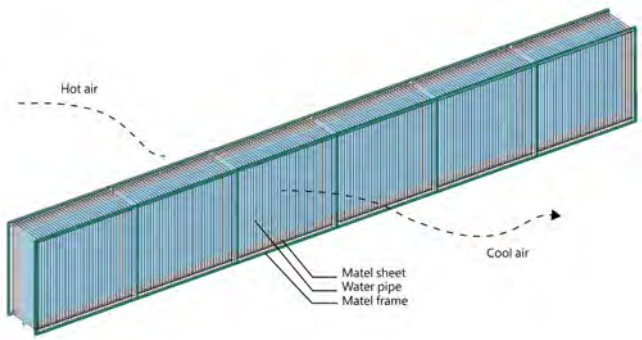


Figure 5.4.2.2.1j Water Wall Design in Taipei

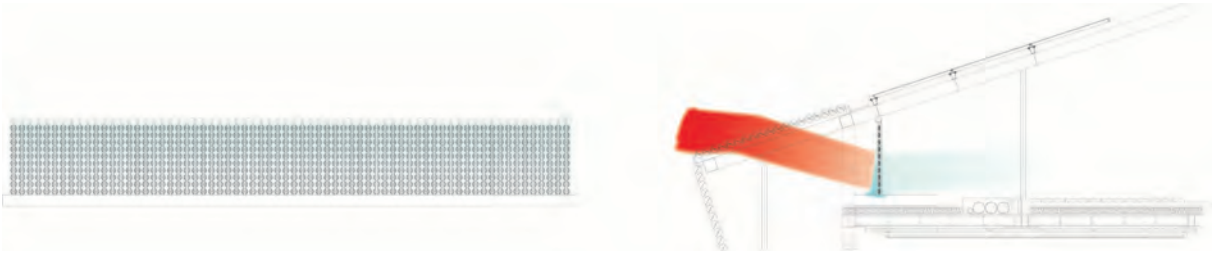


Figure 5.4.2.2.1k Water Wall Design in Versailles

1.2.2 The passive design strategies for heating

i. Direct solar gain

The climate analysis of Taipei indicates an under-heated period from December 1st to March 21st. In order to provide direct solar gain for the living spaces during the under-heated period, the building geometry was designed to allow direct solar radiation into the living spaces during the under-heated season.

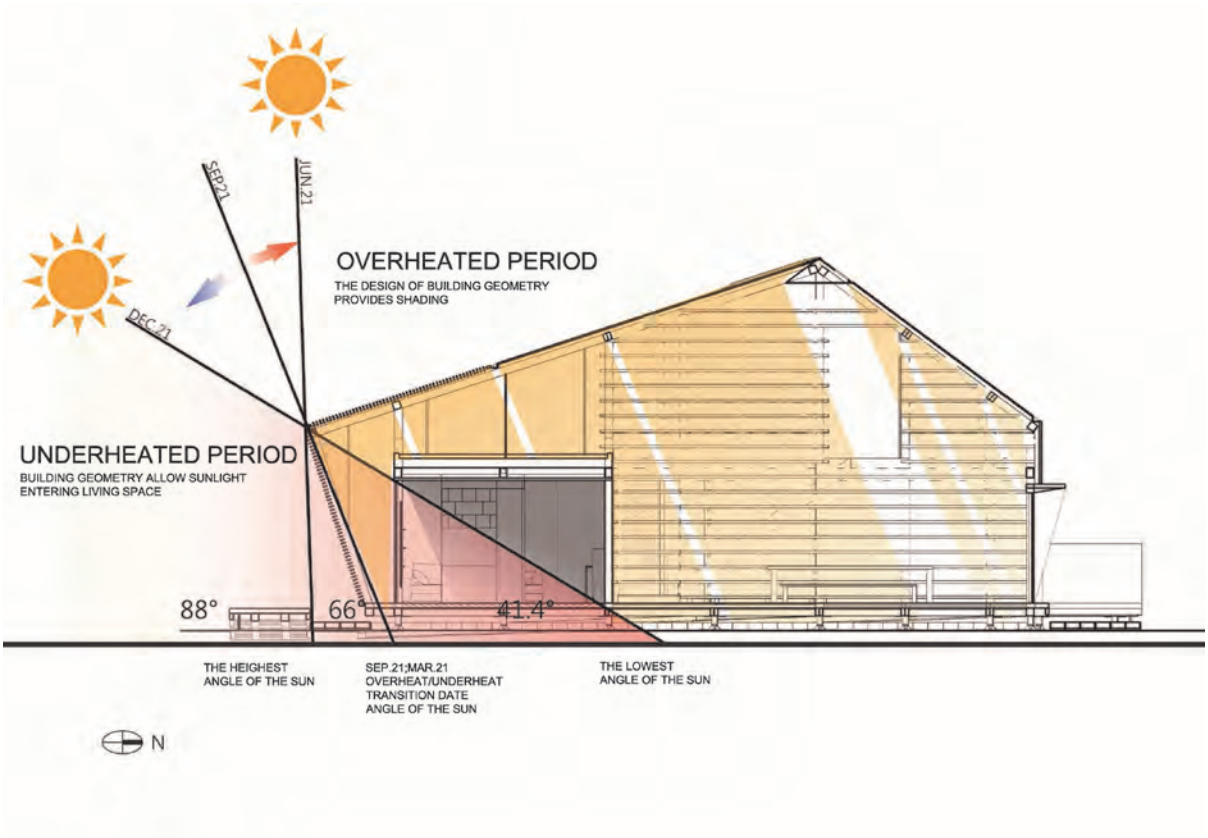


Figure 5.4.2.2.1l Solar Angle and Direct Solar Gain Diagram

ii. Greenhouse effect

During the under-heated days, all exterior windows and louvers of the Orchid House will remain closed to keep out the cold wind. The exterior glazing of the greenhouse is made by a Polycarbonate sheet - Makrolon® that allows 77% of solar radiation to penetrate. After the short wave solar radiation is absorbed by the interior materials, the indoor temperature increases as the temperature of the interior materials increases and releases long wave infrared heat which cannot penetrate Makrolon®. The waste heat generated underneath the PV panels is also long wave infrared which remains indoors and further elevates the indoor temperature.

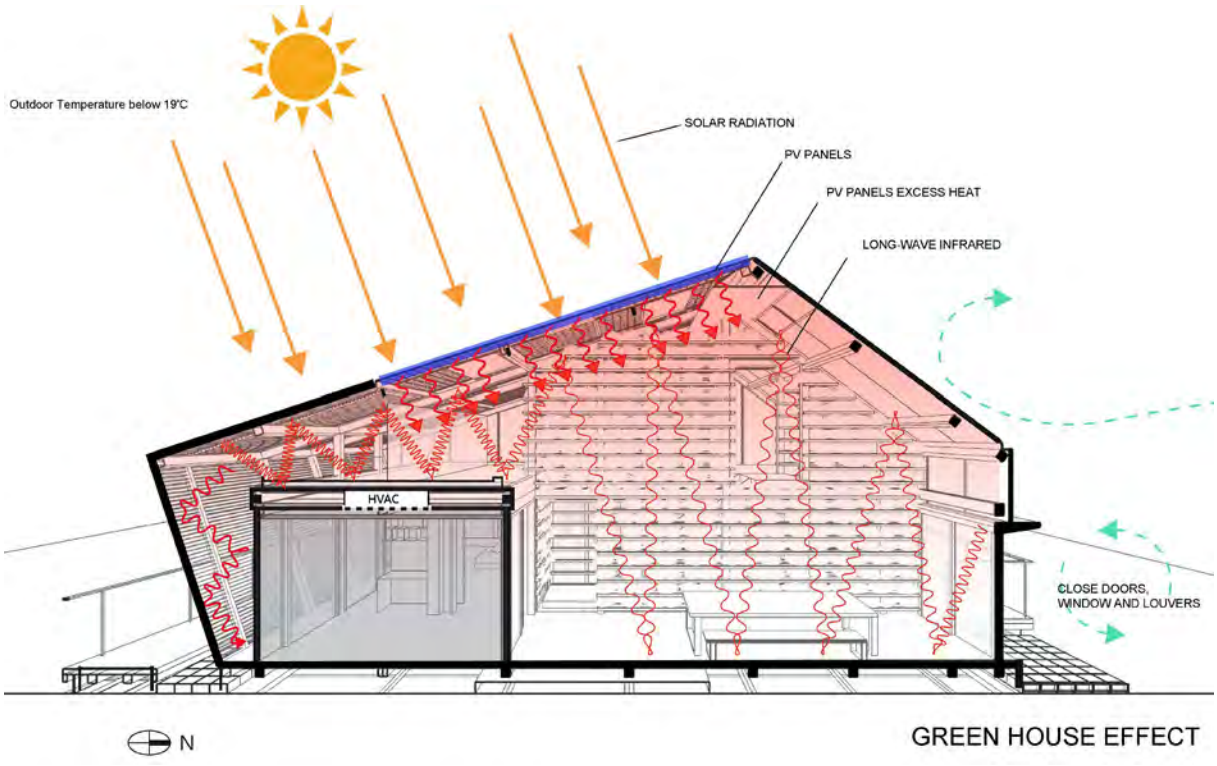


Figure 5.4.2.2.1.m Greenhouse Effect Diagram

iii. Thermal wall

A 30cm water thermal wall is built on the west side of the house. The thermal wall is constructed with recycled Polyethylene Terephthalate Polymer bottles – the Polli-Bricks. Each bottle contains 6 litter of water. The bottles are piled up to 2 meter height-wise and 3 meter length-wise. The bottles are held together and fixated to a transparent acrylic sheet on their exterior side. The water in the thermal wall absorbs solar radiation during the day and releases heat to interior space at night. The air space between the bottles and the acrylic sheet remains heated during day time through the green house effect and it also prevents radiant heat loss at night. In Taipei, the acrylic sheet has openings on both the upper and lower ends. These openings allow air circulation in the summer heat and that will reduce overheating in summer. As a result, the wall will receive solar radiation during the day, and allow heat loss to the outdoor at night. A three day experiment showed the thermal wall could keep the indoor temperature constant even when the outdoor temperature fluctuates drastically.

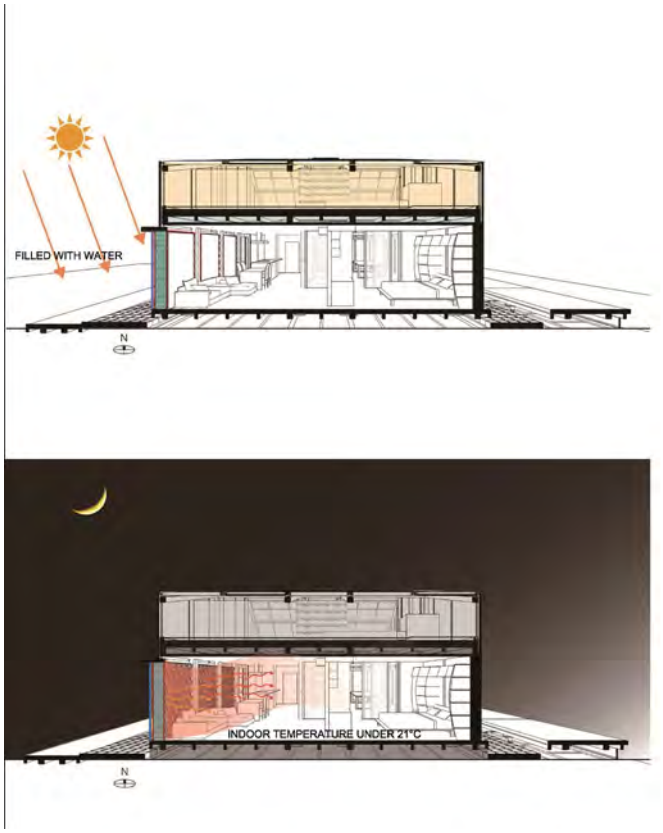


Figure 5.4.2.2.1n Thermal Wall Diagram in Under-heated Season

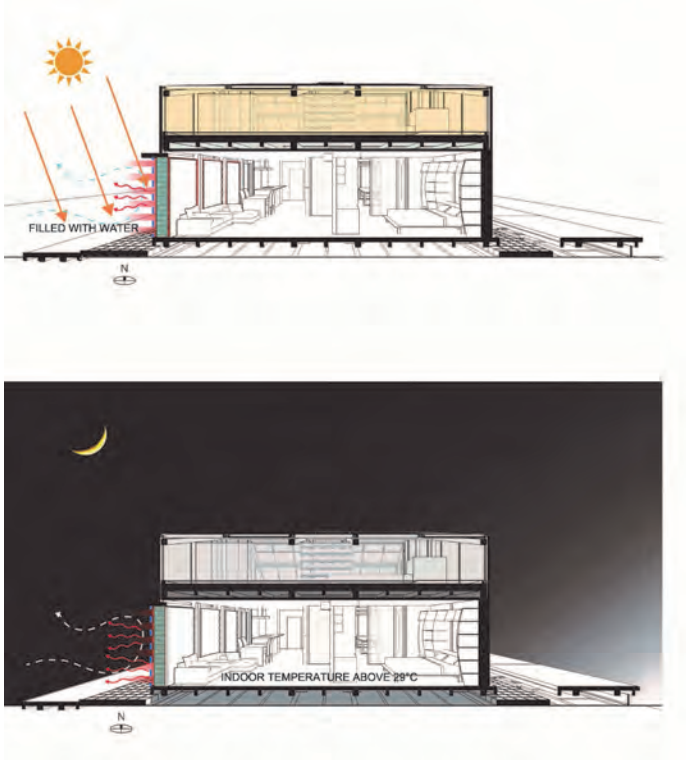


Figure 5.4.2.2.1o Thermal Wall Diagram in Over-heated Season

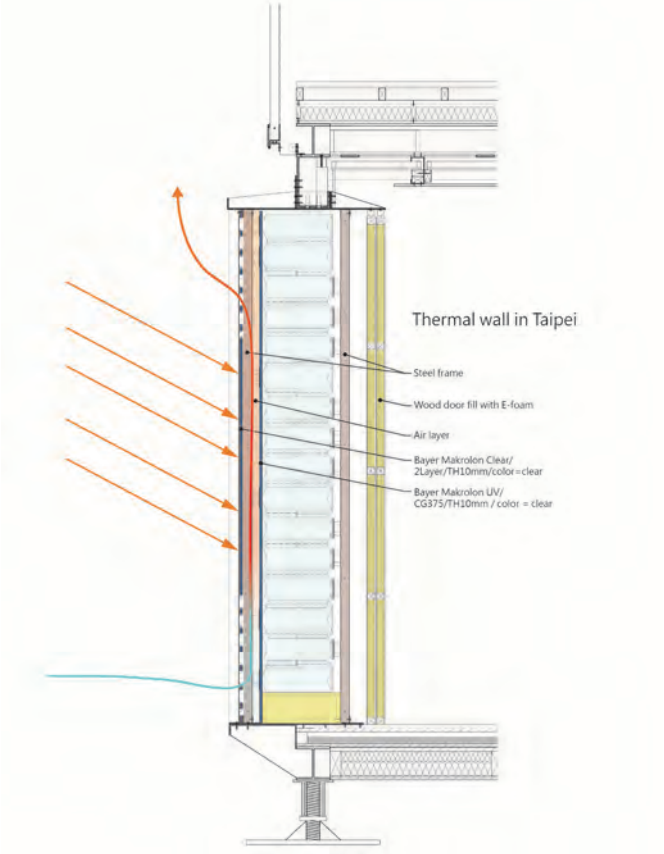


Figure 5.4.2.2.1p Thermal Wall Detail in Taipei

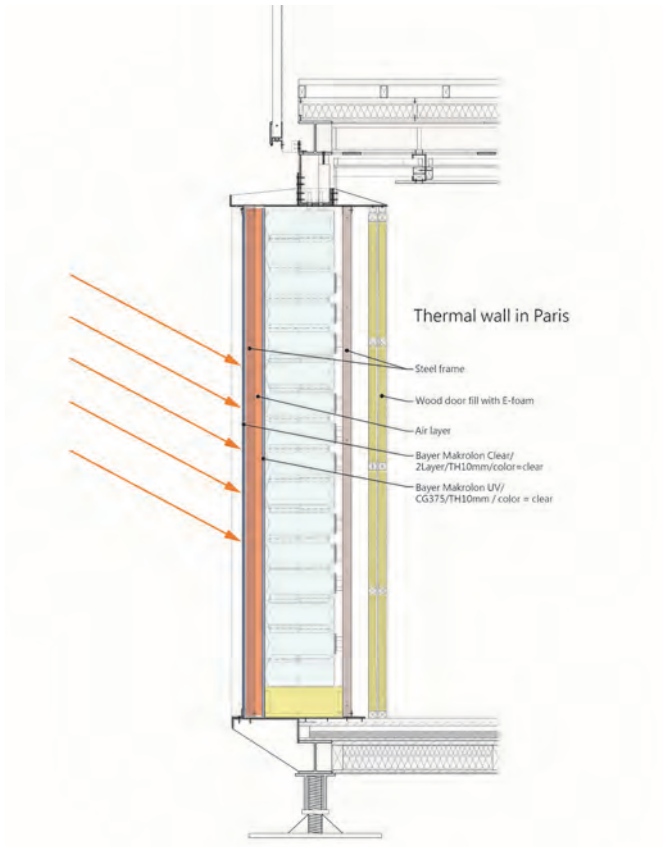
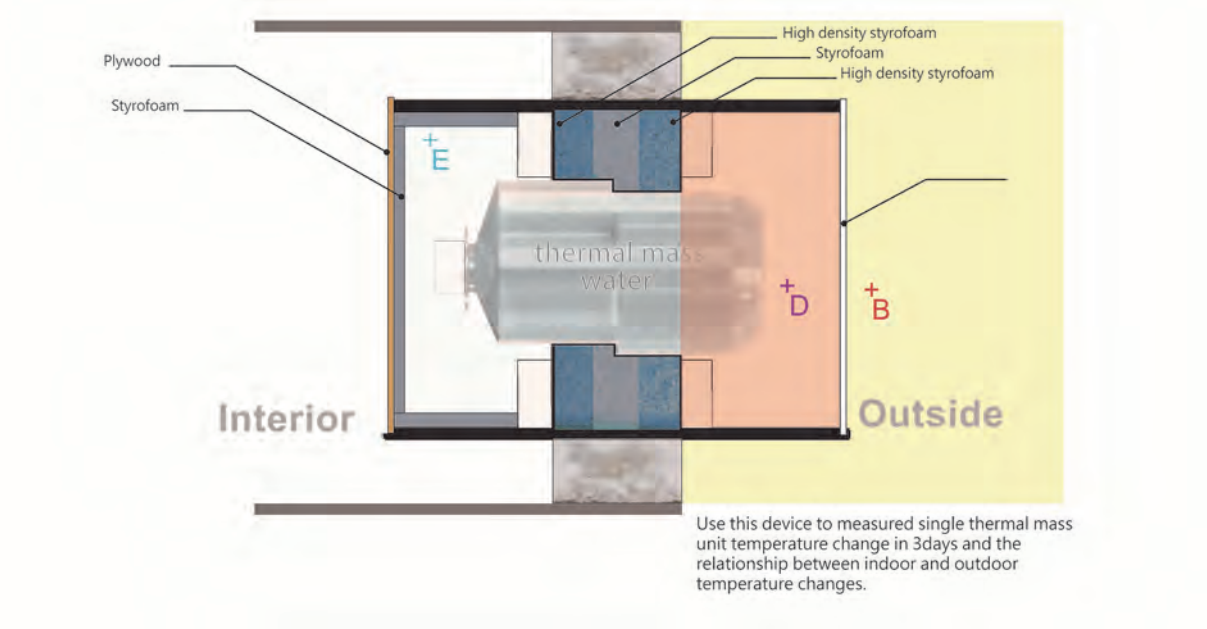


Figure 5.4.2.2.1q Thermal Wall Detail in Versailles



Polli-Bricks temperature records
2013/10/07-09

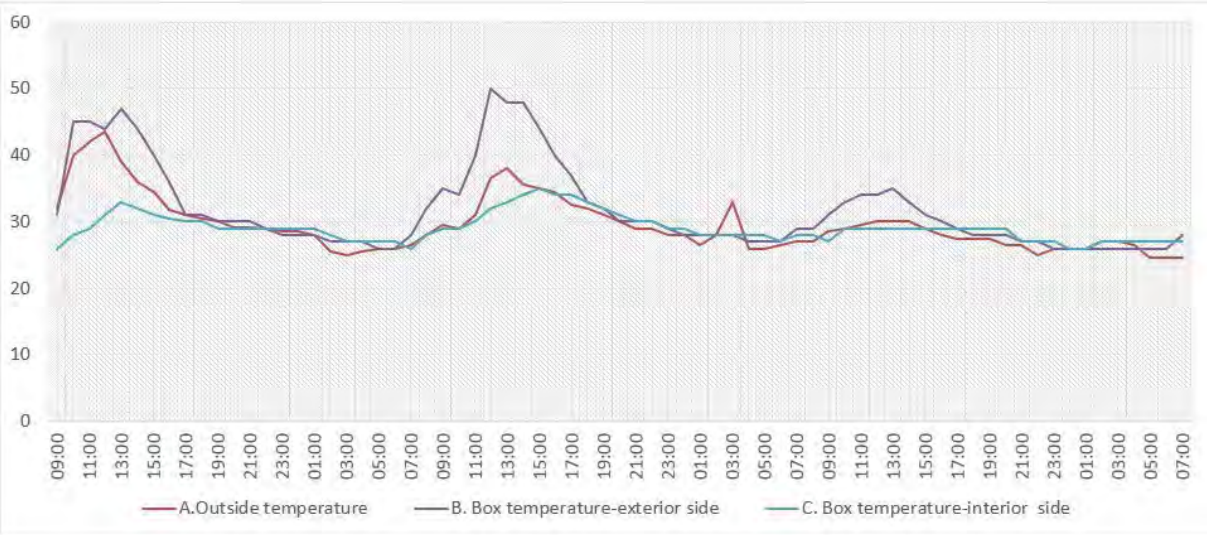
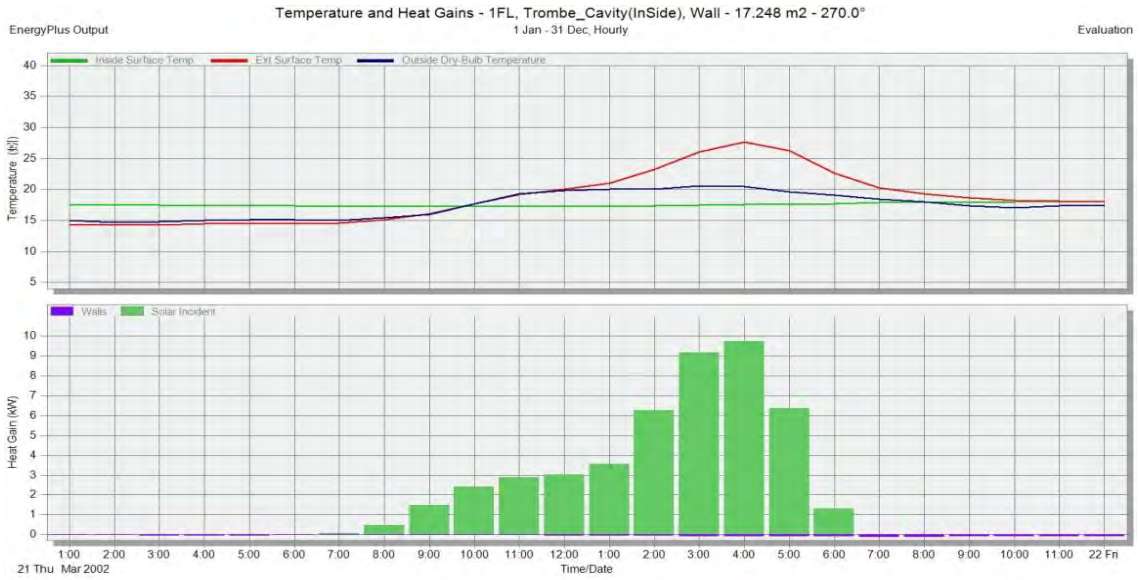


Figure 5.4.2.2.1r Thermal Wall Experiment Diagram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EnergyPlus Output
1 Jan - 31 Dec, Hourly
Evaluation
Inside Surface Temp
Ext Surface Temp
Outside Dry-Bulb Temperature
Temperature (b!)
Walls
Solar Incident
Heat Gain (kW)
21 Thu Mar 2002
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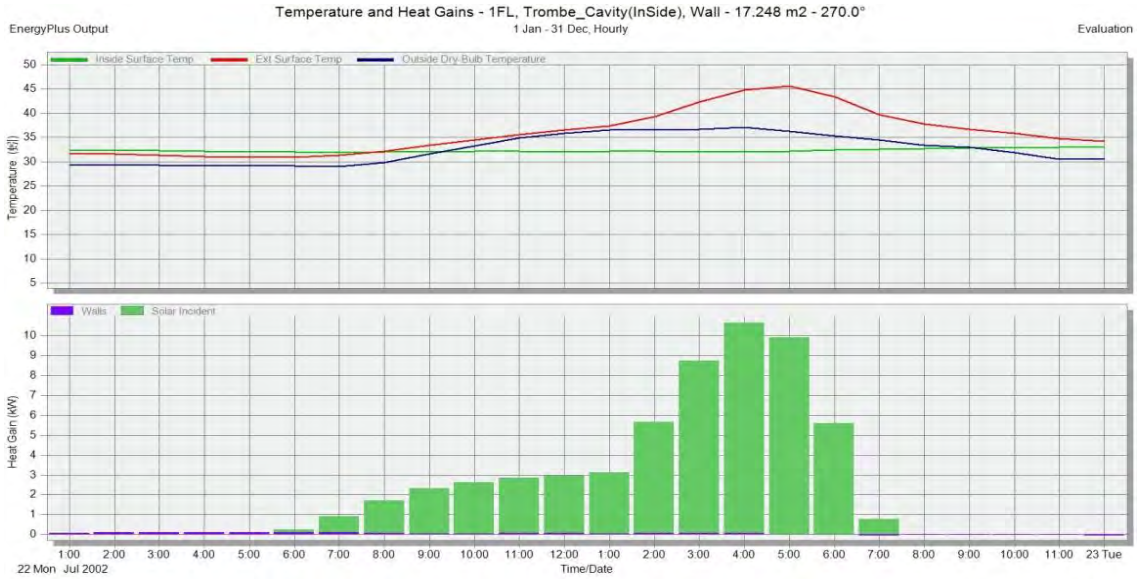
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EnergyPlus Output
1 Jan - 31 Dec, Hourly
Evaluation
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Ext Surface Temp
Outside Dry-Bulb Temperature
Temperature (b!)
Walls
Solar Incident
Heat Gain (kW)
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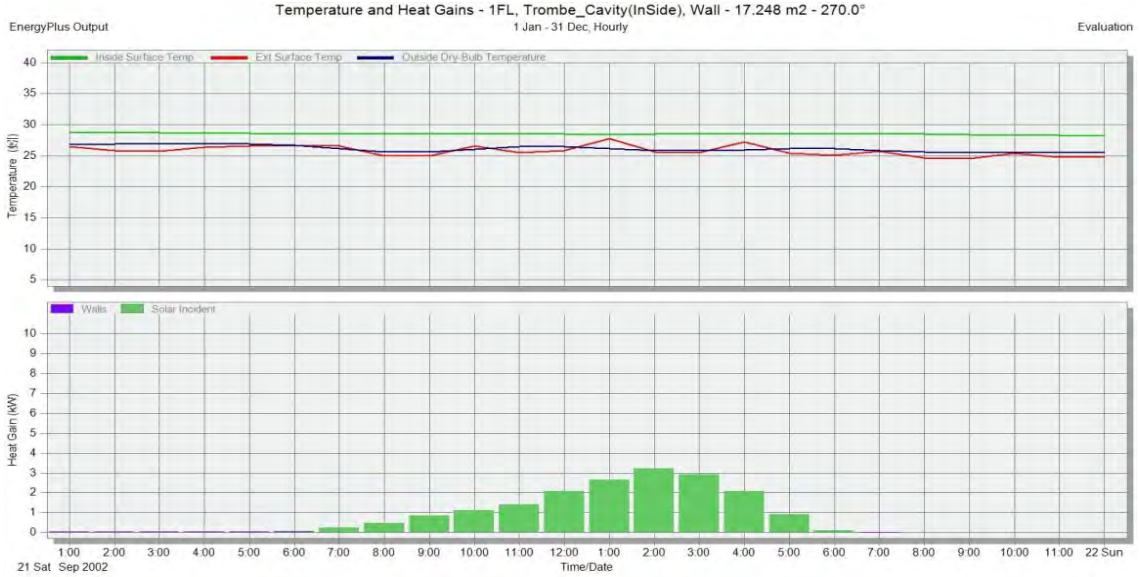
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EnergyPlus Output
1 Jan - 31 Dec, Hourly
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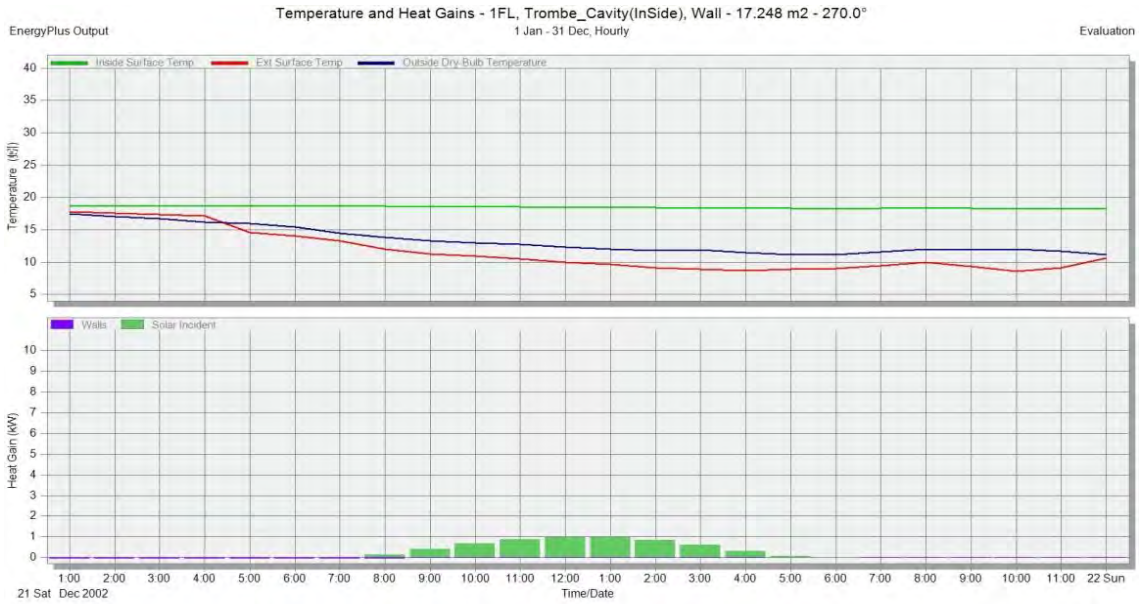


iv. Heat exchanger preheated by solar hot water

The solar hot water system on the roof provides domestic hot water and preheats inlet air in heat exchanger for winter heating. The hot water is drawn to the coil in the inlet duct of the heat exchanger which preheats the inlet air before it enters the living spaces. This will help us decrease the use of heat pumps.

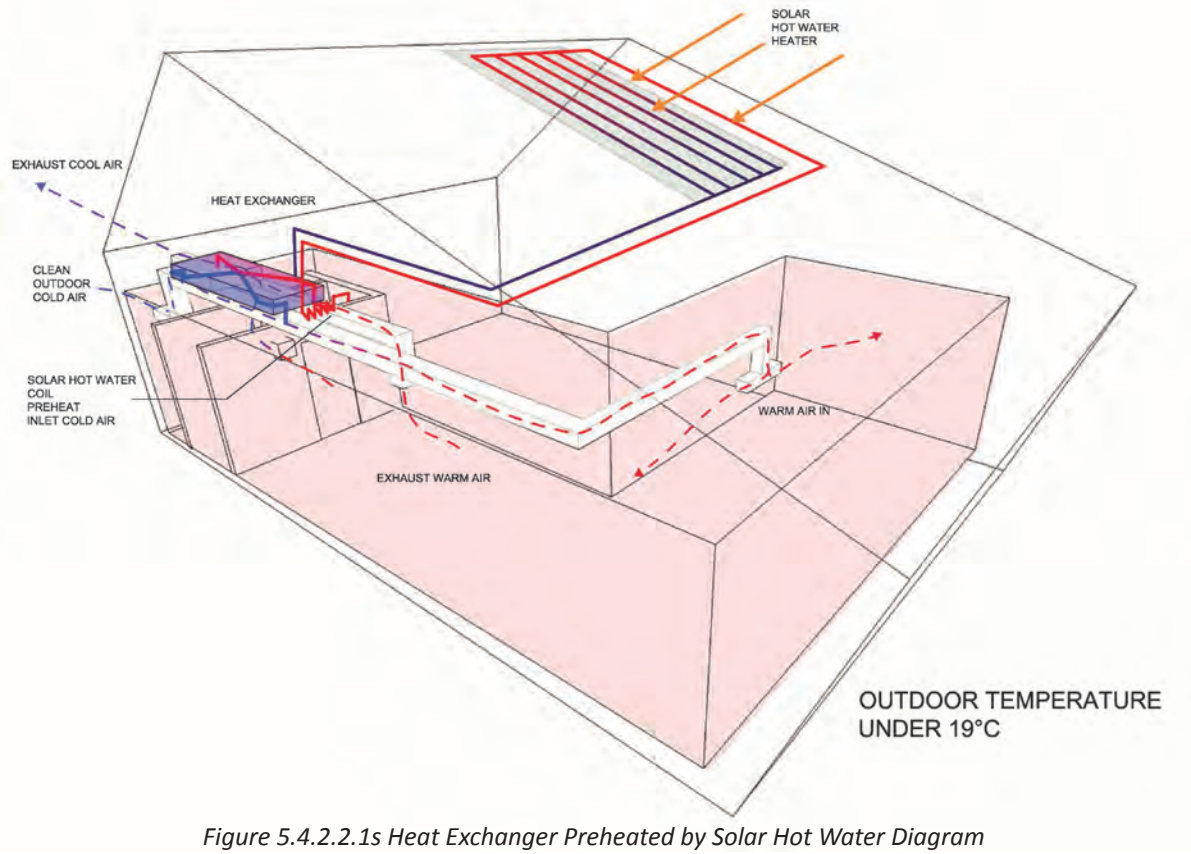


Figure 5.4.2.2.1s Heat Exchanger Preheated by Solar Hot Water Diagram

2.0 House, Appliances and HVAC Simulations (Annual Simulation)

2.1 Simulation Tools Description

The building energy modeling tool used for this project is DesignBuilder, developed by DesignBuilder Software Ltd located in the United Kingdom. For accurate energy analysis, DesignBuilder uses the EnergyPlus dynamic thermal simulation engine developed under the U.S. Department of Energy. For Orchid House, DesignBuilder was used to model internal temperature fluctuations, HVAC loading, and heat balance (relationship between time and heat gain/loss). The simulation results generated by DesignBuilder aided the project team in developing passive design strategies, operational schedules, systems and materials selection, and evaluate building efficiency. The limitation with using DesignBuilder is a less accurate Computational Fluid Dynamics (CFD) simulation needed to model natural ventilation and air flow within the project building.

TRANSYS Simulation Program is adopted for the HVAC Simulation. Three portions of HVAC system have been done:

1. Heat pump energy consumption for both space cooling and heating.
2. Energy recovery ventilator to reclaim the thermal energy, sensible and latent heat, from the exhaust air.
3. Solar thermal system to provide a limited amount of energy for space heating.

The results of simulation including the input and output data, and the summary are shown in Appendix B1, C1, and D1.

2.2 Housing Unit Modeling: internal gains, occupancy behavior patterns, ventilation and comfort temperature

2.2.1 Modeling Methodology and Zoning

Before energy simulation can be performed, a model of the project building is created first. We used Autodesk Revit to build the design model of Orchid House, and then through format conversion (gbXML – Green Building XML Schema), the model was transferred to the DesignBuilder platform. The advantage of using separate software platforms is the ability to leverage the comparative strengths and apply it into the simulation process. Revit is a prevalent and powerful BIM tool that allows for the data entry of individual building components. For example, during the placement of a wall, parameters such as wall thickness, layer composition and physical properties can easily be inputted. When transferred to DesignBuilder this data is used by the energy analysis algorithm to derive the thermal properties of the wall. This is applied to every building component throughout the model, to create an accurate physical environment for energy simulation. In addition, Revit software has the feature to input individual Thermal Zones, allowing for the analysis of individual areas, and also allows easy creation of building openings, glazing, and shading devices. Figures 5.4.2.2.2b ~ 2d show the individual Thermal Zones and building openings in the DesignBuilder software.

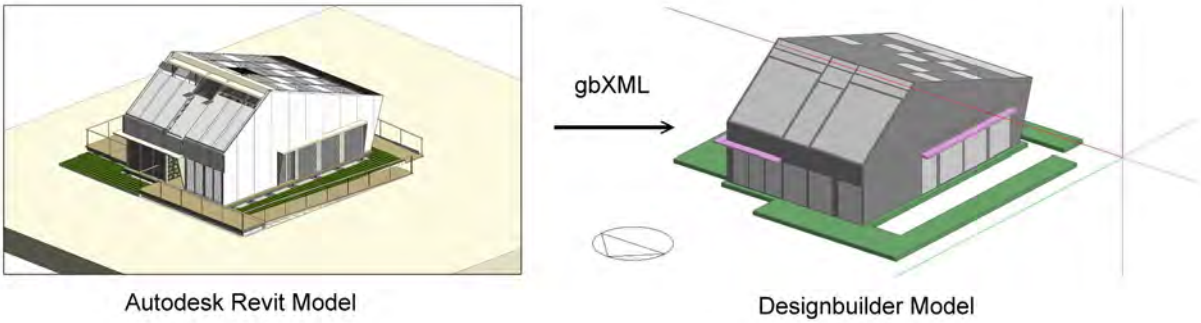


Figure 5.4.2.2.2a The transfer process between Revit and DesignBuilder by gbXML simplifies the model and removes irrelevant information which allows for more efficient energy simulation

Figure 5.4.2.2.2b A visualization of the DesignBuilder energy model

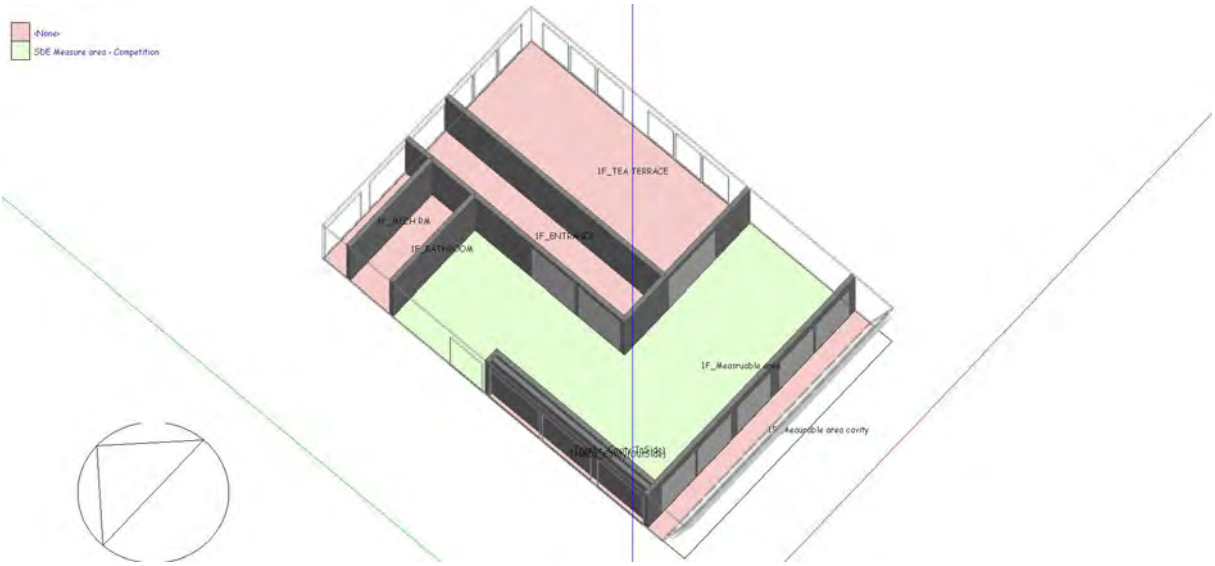


Figure 5.4.2.2.2c Ground Floor thermal zones and building openings in Design Builder

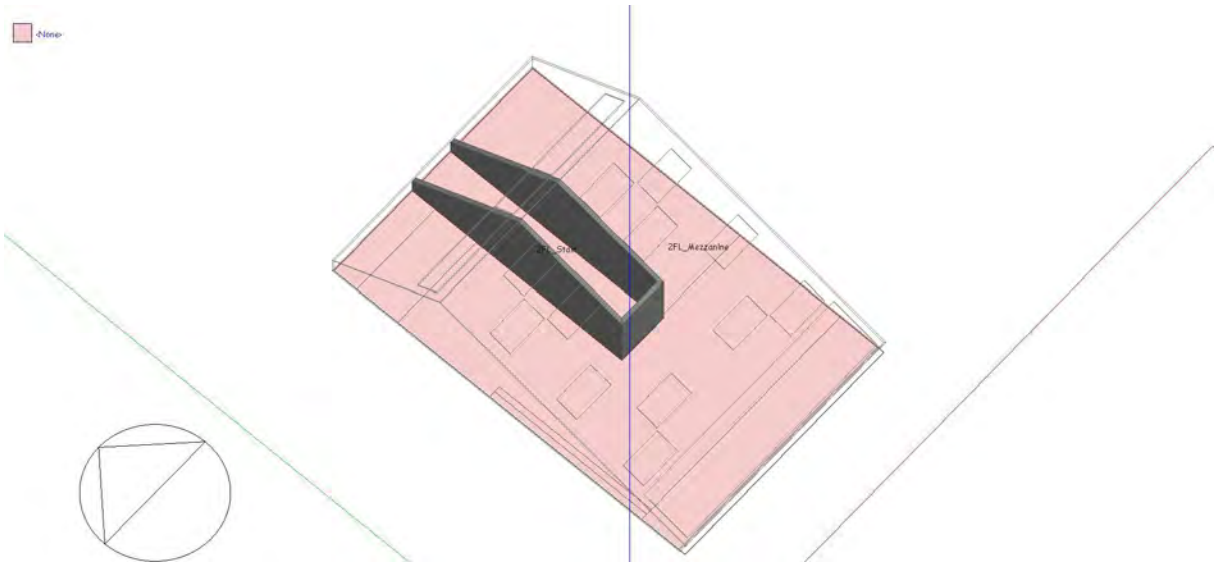


Figure 5.4.2.2.2d Second Floor thermal zones and building openings in Design Builder

2.2.2 Material Thermal Properties

Asides from the physical properties of materials that get transferred from Revit to DesignBuilder, additional thermal properties must be inputted for these materials to perform accurate energy analysis.

Thermal properties for building materials are obtained from:

- Test reports provided by materials manufacturers
- Green building reference guides such as the British Chartered Institution of Building Services Engineers Guide A or Taiwanese Green Building Standards.

The thermal properties for building materials used in Orchid House are as follows:

Ground Floor					
Layer	Insulation Type	Thickness (mm)	Thermal Conductivity (W/m².K)	Specific Heat (J/kg-k)	Density (Kg/m²)
Inner	Plywood	6.00	0.13	2500.00	560.00
	Plywood	12.00	0.13	2500.00	560.00
	VIP	30.00	0.01	687.00	177.00
	Glass Foam	130.00	0.07	840.00	117.00
Outer	Plywood	6.00	0.13	2500.00	560.00

Second Floor					
Layer	Insulation Type	Thickness (mm)	Thermal Conductivity (W/m².K)	Specific Heat (J/kg-k)	Density (Kg/m²)
Inner	Plywood	6.00	0.13	2500.00	560.00
	Plywood	12.00	0.13	2500.00	560.00
	VIP	30.00	0.01	687.00	177.00
	Glass Foam	130.00	0.07	840.00	117.00
	Plywood	24.00	0.13	2500.00	560.00
Outer	Plywood	6.00	0.13	2500.00	560.00

1F Wall(East+West)					
Layer	Insulation Type	Thickness (mm)	Thermal Conductivity (W/m².K)	Specific Heat (J/kg-k)	Density (Kg/m²)
Outer	Polycarbonate	40.00	0.04	1200.00	1200.00
	Air	60.00	0.02	1008.00	1.23
	Plywood	24.00	0.13	2500.00	560.00
	Glass Foam	65.00	0.07	840.00	117.00
	VIP	30.00	0.01	687.00	177.00
	Plywood	12.00	0.13	2500.00	560.00
Inner	Plywood	6.00	0.13	2500.00	560.00

Thermal Wall					
Layer	Insulation Type	Thickness (mm)	Thermal Conductivity (W/m².K)	Specific Heat (J/kg-k)	Density (Kg/m²)
Outer	Polycarbonate	10.00	0.03	1200.00	1200.00
	Air	40.00	0.02	1008.00	1.23
	PET	3.00	0.51	1000.00	1370.00
	Water	250.00	0.58	4190.00	990.00
	PET	3.00	0.51	1000.00	1370.00
	Polycarbonate	10.00	0.03	1200.00	1200.00
	Air	40.00	0.02	1008.00	1.23
Inner	Plywood	40.00	0.13	2500.00	560.00

2F Wall(East+West)					
Layer	Insulation Type	Thickness (mm)	Thermal Conductivity (W/m².K)	Specific Heat (J/kg-k)	Density (Kg/m²)
Outer	Polycarbonate	15.00	0.03	1200.00	1200.00
	Air	10.00	0.02	1008.00	1.23
Inner	Polycarbonate	15.00	0.03	1200.00	1200.00

PLYCARBONATE ROOF					
Layer	Insulation Type	Thickness (mm)	Thermal Conductivity (W/m².K)	Specific Heat (J/kg-k)	Density (Kg/m²)
Outer	Polycarbonate	3.00	0.0280	1200.00	1200.00
	Air	10.00	0.0240	1008.00	1.23
Inner	Polycarbonate	3.00	0.0280	1200.00	1200.00

Interior partition					
Layer	Insulation Type	Thickness (mm)	Thermal Conductivity (W/m².K)	Specific Heat (J/kg-k)	Density (Kg/m²)
Inner	Plywood	6.00	0.13	2500.00	560.00
	Plywood	12.00	0.13	2500.00	560.00
	VIP	30.00	0.01	687.00	177.00
	Glass Foam	130.00	0.07	840.00	117.00
	Plywood	12.00	0.13	2500.00	560.00
Outer	Plywood	6.00	0.13	2500.00	560.00

ROOF-PV Panel					
Layer	Insulation Type	Thickness (mm)	Thermal Conductivity (W/m².K)	Specific Heat (J/kg-k)	Density (Kg/m²)
	Soda lime glass	10.00	1.00	750.00	2500.00

Transparent panel(10mm)								
Layer	Insulation Type	Thickness (mm)	Thermal Conductivity (W/m².K)	Specific Heat (J/kg-k)	SHGC	VLT	Density (Kg/m²)	熱傳導率-U值 (W/m².K)
Outer	Polycarbonate	3.00	0.03	1200.00	0.43	0.42	1200.00	9.33
	Air	4.00	0.02	1008.00			1.23	6.00
Inner	Polycarbonate	3.00	0.03	1200.00			1200.00	9.33

Transparent panel(6mm)								
Layer	Insulation Type	Thickness (mm)	Thermal Conductivity (W/m².K)	Specific Heat (J/kg-k)	SHGC	VLT	Density (Kg/m²)	熱傳導率-U值 (W/m².K)
	Polycarbonate	6.00	0.03	1200.00	0.63	0.65	1200.00	4.67

2.2.3 Interior Gains

The energy model includes various inputs for heat gains such as appliances, lighting fixtures and occupancy. Affecting these inputs includes other constraints such as power consumption, operating schedule and thermal emissions. For appliances and lighting fixtures, the main parameters investigated for Orchid House are the energy rate and heat gain fraction. However, since there are few reference documents for appliance and lighting heat gain fraction, the following assumptions were used for the energy model:

Interior gains – Appliance

Space	Product Name	Energy rate(w)	Heat gain fraction		
			Fraction Radiant	Fraction Latent	Fraction Lost
Kitchen	Refrigerator	308	0.3	0	0.3
	Oven	3500	0.4	0.1	0.3
	Electrical stove	1800	0.1	0.3	0.1
Living Room	TV	29	0.3	0	0.3
Work station	Note book	180	0.3	0	0.3
Mezzanlne	Clothes dryer	1000	0.1	0.3	0.3
	Clothes washer	1400	0.1	0.3	0.3

- The Radiant fraction is the fraction of heat emitted by the device as long-wave radiation.
- The Latent fraction is the fraction of the rated power which is converted to latent energy and affects the moisture balance in the zone instead of the sensible heat balance.
- Fraction heat lost is the fraction of the sensible heat emitted which is lost or vented directly to outside without affecting the zone heat balance.
- Fraction Convective = 1.0 – (Fraction Latent + Fraction Radiant + Fraction Lost)

Interior gains –Lighting fixtures

Space	Product Name	Energy rate(w)	Heat gain fraction		
			Fraction Radiant	Fraction Latent	Fraction Lost
Entrance	Tons T8 LED	20	0.4	0	0.3
Bathroom	Tons DG-913C	12.6	0.4	0	0.3
Kitchen	Tons T8 LED	100	0.4	0	0.3
	Tons KA-112R	3.6	0.4	0	0.3
	Delta A60	1.2	0.4	0	0.3
	Tons DA-504AD	4.8	0.4	0	0.3
Living Room	Tons T8 LED	60	0.4	0	0.3
	Tons DA-504AD	2.4	0.4	0	0.3
	Delta A60	1.2	0.4	0	0.3

The occupancy of Orchid House is set as the common Taiwanese household of Husband and Wife duo couple with the following metabolic rates (thermal emissions):

Interior gains – Occupancy

Space	Occupancy	Metabolic	
		Metabolic rate (w/person)	Factor
Measurable area	2	126	0.9

- Metabolic rate data according to ASHRAE Handbook of Fundamentals, Chapter 8,Table 5.

2.2.4 Occupancy Behavior Pattern

Occupancy rate and behavior will reflect the operation schedule and energy consumption of the appliances and various fixtures within the model house. Therefore, setting a believable mode of occupancy behavior becomes vital for achieving accurate energy simulation. Based on a Taiwanese research report “A study on the Energy Consumption Certificate of Residential Buildings”, the author created a statistical model for the average Taiwanese household occupancy rate and behavior. Referencing these results the following occupancy schedule was created and used for the energy model of Orchid House in Taiwan setting.

The Orchid House is designed for a family of young couple with no kid. Both of the family members are working people who works five days a week. This type of family is very popular in Taipei because both husband and wife take the advantage of living close to work.

As a result, the energy consumption of a typical work day focuses on the early morning before work and late afternoon to evening after work.

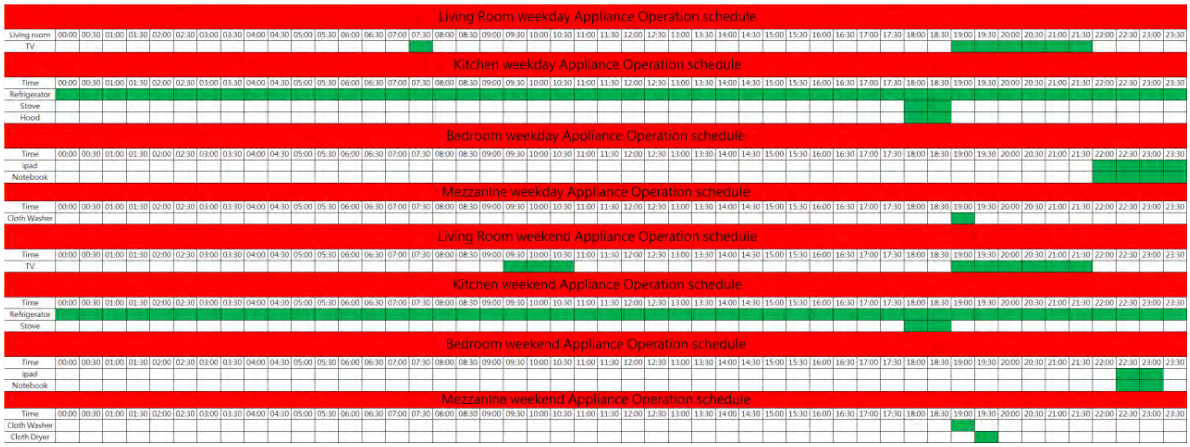
The following table shows the schedules of the occupancy, appliance, light fixture, and HVAC operation.

1. Occupancy schedule

2. Appliance operation schedule

Oven, cloth dryer, and dish washer are hardly used in a typical Taiwanese household. Taiwanese cooks seldom bake food in oven. Taiwanese family members usually wash dishes by hands. And Taiwanese people prefer to hang dry clothes. They believe the sun ray may kill germs on the clothes.

Therefore, while calculating electricity consumption in Taipei, the NCTU Unicode team remove oven, cloth dryer, and dish washer from the appliance list. This will make the simulation close to the real live style of Taiwanese family.



On the other hand, a typical Taiwanese two people family usually washes clothes every other day. The table above shows 30 minutes per day that is equal to one hour a typical operation time every other day.

3. Lighting fixtures operation schedule

- The percentage of lighting fixture is on in certain hour. For example, 50% in the column of living room means 50% of lighting fixture in living room is on.
- Proportion of time when the light fixture is on. For example, 5% in the column of entrance and stair means 3 minutes of all light fixtures in these two spaces are on.

4. HVAC System operation schedule

In the report, "A study on the Energy Consumption Certificate of Residential Buildings", the author documents that the average Taiwanese household does not use mechanical heating devices, and the adjustment of clothing is used instead to cope with the change in indoor temperatures during colder weather. Therefore no heating devices are inputted in the energy model for Orchid House when simulating Taiwanese conditions. In order to accommodate heating days and energy heat balance in the model, the control temperature is set at 20oC, set between the dates of January 1st to April 30th, and December 1st to December 31st.

The HVAC system operation schedule below is based on the average Taiwanese occupancy behavior, the parameters that influence HVAC use in the model include:

- When outdoor temperatures exceed 29oC, HVAC systems are switched on and set at a control temperature of 26.5oC
- The occupancy rate of the building

2.2.5 Ventilation

Taiwan experiences large day-night temperature fluctuations throughout the summer and mid-seasons of the year (autumn and spring). Due to this climate factor, Taiwan is suitable for night time cooling strategies. This can be achieved by passive ventilation of the core space through openings in the envelope and can achieve reduction in HVAC load.

The following natural ventilation schedules were used in the energy model for the natural ventilation strategy of Orchid House throughout the year.

Natural Ventilation Setting

Space	Ratio of Operable Area Open-Windows and Doors (%)	Start date			End date		HVAC System Operation profile	
		Month	day	~	Month	day	Weekday	Weekend
Tea Terrance &Mech. RM.	100%	5	1	~	10	31	23:00-04:00	23:00-04:00
Mezzanine	100%	5	1	~	10	31	23:00-04:00	23:00-04:00
Measurable Zone South Cavity Area	100%	5	1	~	10	31	23:00-04:00	23:00-04:00

The algorithm used by Energyplus to simulate natural ventilation is Airflow Network based on the AIRNET tool developed by the National Institute of Standards and Technology (NIST), it provides simulation for:

- Envelope leakage
- Operable windows and doors
- Leakage and openings between zones

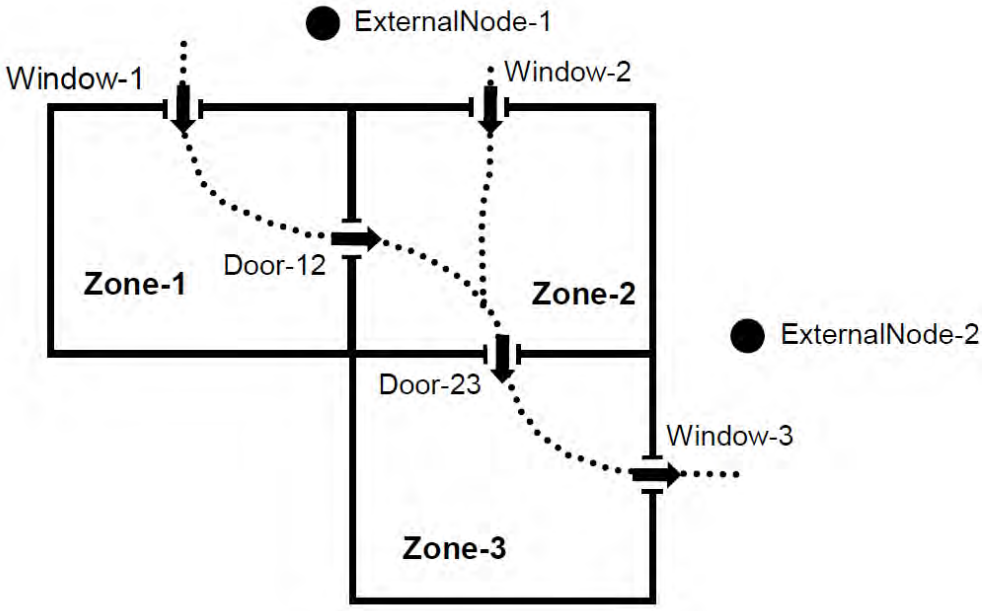


Figure 5.4.2.2.2e Example of Energyplus Airflow Network

Factors influencing Natural Ventilation include:

- Wind speed
- Buoyancy
- HVAC distribution system
- Zone exhaust fan
- Surface leakage
- Large vertical openings(windows and doors)
- Large horizontal openings
- Zone-to-zone airflow

Energyplus control types: Temperature

- All of the zone's openable windows and doors are opened if Tzone > Tout and Tzone > Tset and operation schedule allows venting.
- Tout is the outdoor air temperature,
- Tzone is the previous time step's zone air temperature,
- Tadjcacent zone is the previous time step's air temperature for the adjacent zone for interior sur faces,
- Tset is the zone natural ventilation set point temperature, in this case is 27°C

2.2.6 Indoor Thermal Comfort Setting

The indoor environmental comfort temperature range is set at 26.5°C in the summer, and 20°C in the winter.

2.3 Housing Unit Energy Loads

The appliances consume 1497.5 kWh of electricity a year, which is 43.58% of total energy consumption. Appliance ranks the highest position among the different categories of energy consumption. HVAC consumes 972 kWh of electricity, which is 28.28% of total, and ranked the second.

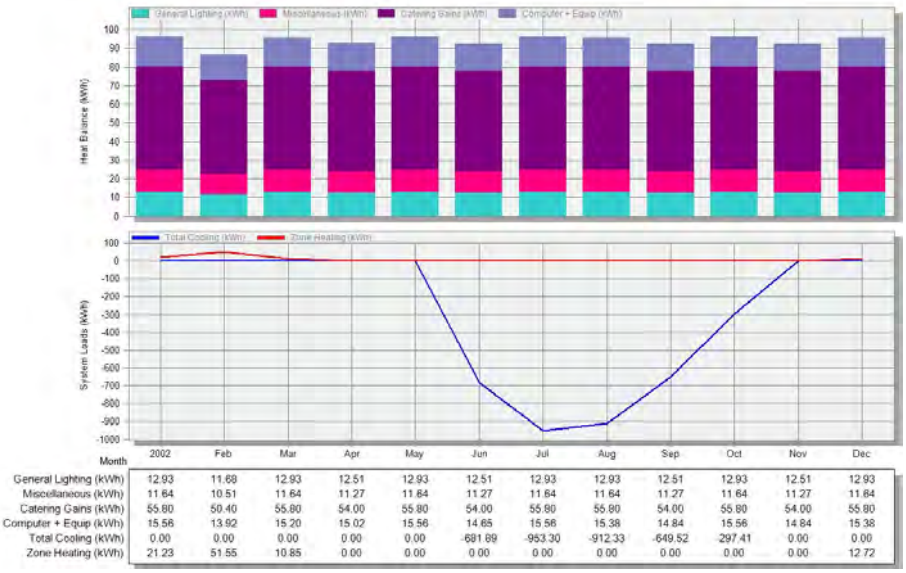


Figure 2.3.2 Housing Energy Loads Simulation Result - Monthly

The NCTU Unicode Team uses Designbuilder simulation program to simulate the basic energy load, which includes appliances, light fixtures, and HVAC. Because Designbuilder does not have a model for the heat pump used in the Orchid House, TRANSYS simulation program is applied. The team uses “csv” format to insert the HVAC load information, simulated by Designbuilder, to TRANSYS in order to obtain an accurate result.

The following table shows the annual energy load calculated by Designbuilder:

Housing Unit Energy Loads-Annual	
Unit	Energy Loads(kWh)
Miscellaneous	137.06
Catering	657
Equipments + Computers	181.48
Lighting	152.26
Cooling Load	3494.45
Heating Load	96.35

3. Results and Discussions

3.1 Heat gains and losses by the building envelop

Figure 5.4.2.2.2h shows the simulation result of annual heat balance of the Orchid House. Most of the heat gains are solar heat gain from exterior and interior windows. As a result, it is sufficient to save energy by changing wall materials and glazing with lower Solar Heat Gain Coefficient.

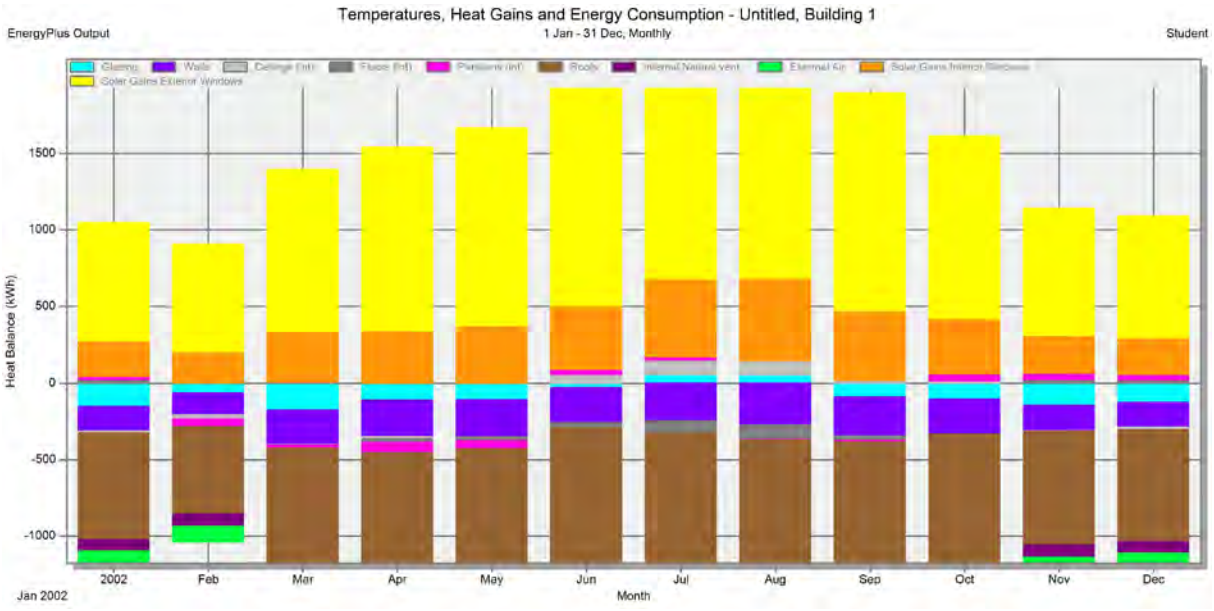


Figure 5.4.2.2.2h Monthly heat gains and losses by the building envelop

The type of Heat Gains occurs in the Orchid House:

- Glazing - the total heat flow to the zone from the glazing, frame and divider of exterior glazing.
- Solar Gains Exterior Windows - Short-wave solar radiation transmission through all external windows.
- Solar Gains Interior Windows - Total beam + diffuse solar radiation transmission through interior windows.
- Walls - Sum of heat gains to the zone from external wall inner surfaces.
- Roofs - Sum of heat gains to the zone from external roof inner surfaces.
- Ceilings - Sum of heat gains to the zone from ceiling inner surfaces.
- Floors - Sum of heat gains to the zone from internal floor inner surfaces.
- Partitions - Sum of heat gains to the zone from internal partition inner surfaces.

- Internal Natural Ventilation - heat gain from other zones due to air exchange through open internal windows, doors, vents, holes.

3.2 Predicted indoor temperatures in passive days

The results of the indoor temperature fluctuation for the Measureable Area and various Buffer Zones during each season (Figure 5.4.2.2.2h) show that without natural ventilation, the Measurable Area throughout the year experiences less temperature fluctuation than the adjacent Buffer Zones.

The spikes in temperature in the Measurable Area can be attributed to the use of household culinary appliances such as the stove or oven. Due the thermal insulation of the designed envelope is, heat emission from appliances in the interior of the building will accumulate and cause the indoor temperature to rise. Therefore, in the summer and mid-seasons, without the operation of mechanical cooling, the Measureable Area can reach temperatures higher than the surrounding Buffer Zones. In the winter, the thermal insulated envelope allows the interior to stay in the range of 25°C even when outdoor temperature is an average of 15°C. This shows that the Measurable Area is within thermal comfort conditions without the need of any mechanical heating.

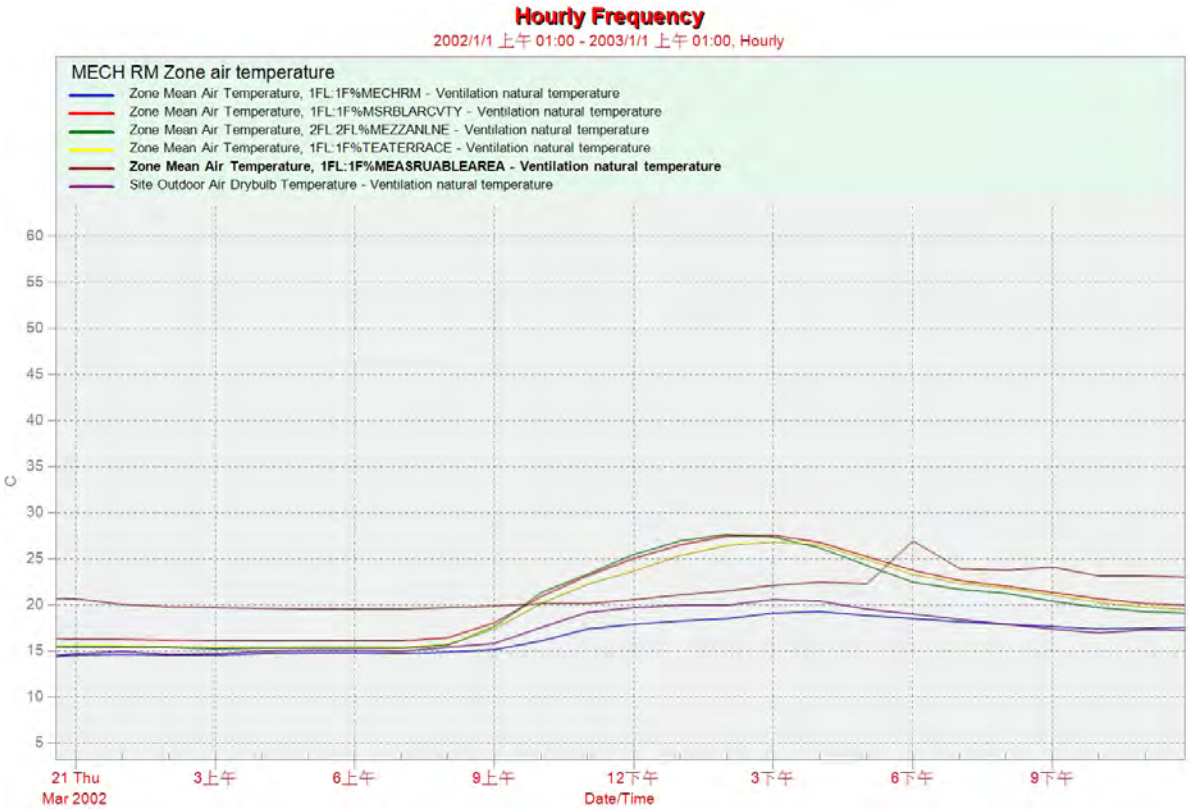


Figure 5.4.2.2.2i Summer Solstice Zone Air temperature comparison between several spaces

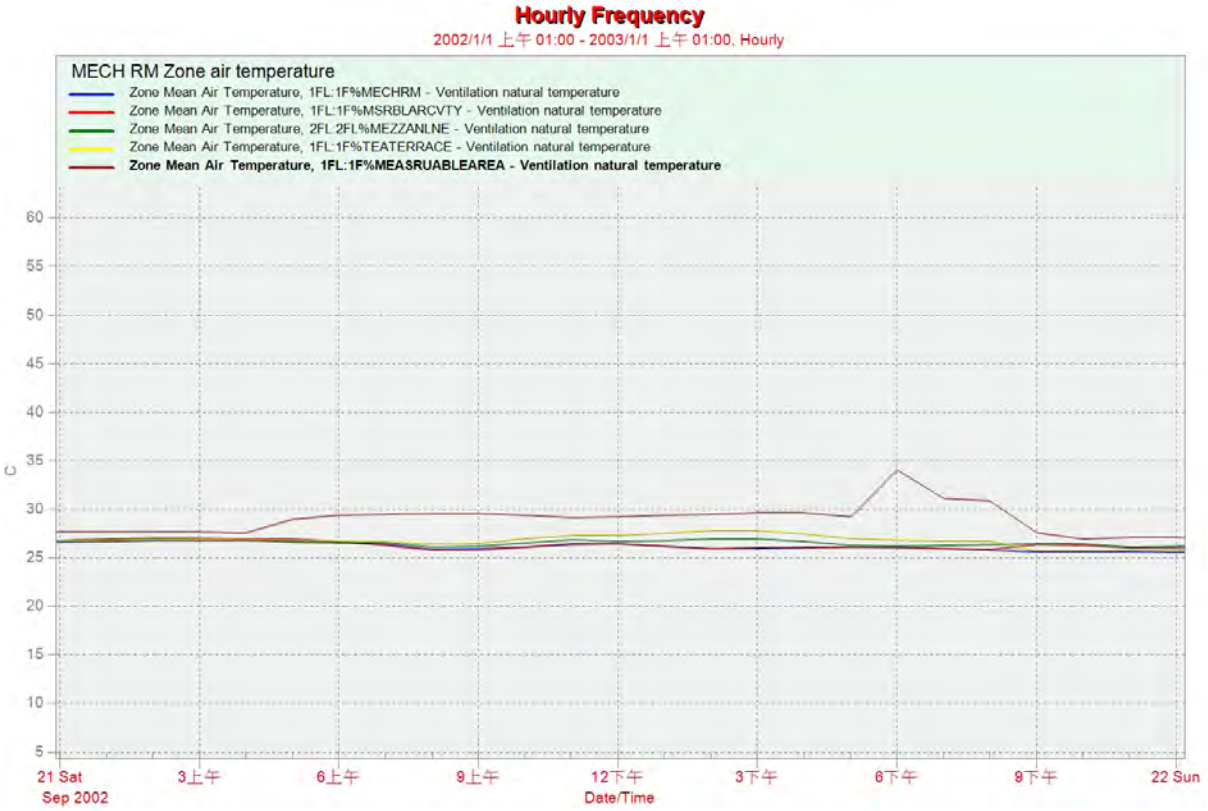


Figure 5.4.2.2.2j Autumn Equinox Zone Air temperature comparison between several spaces

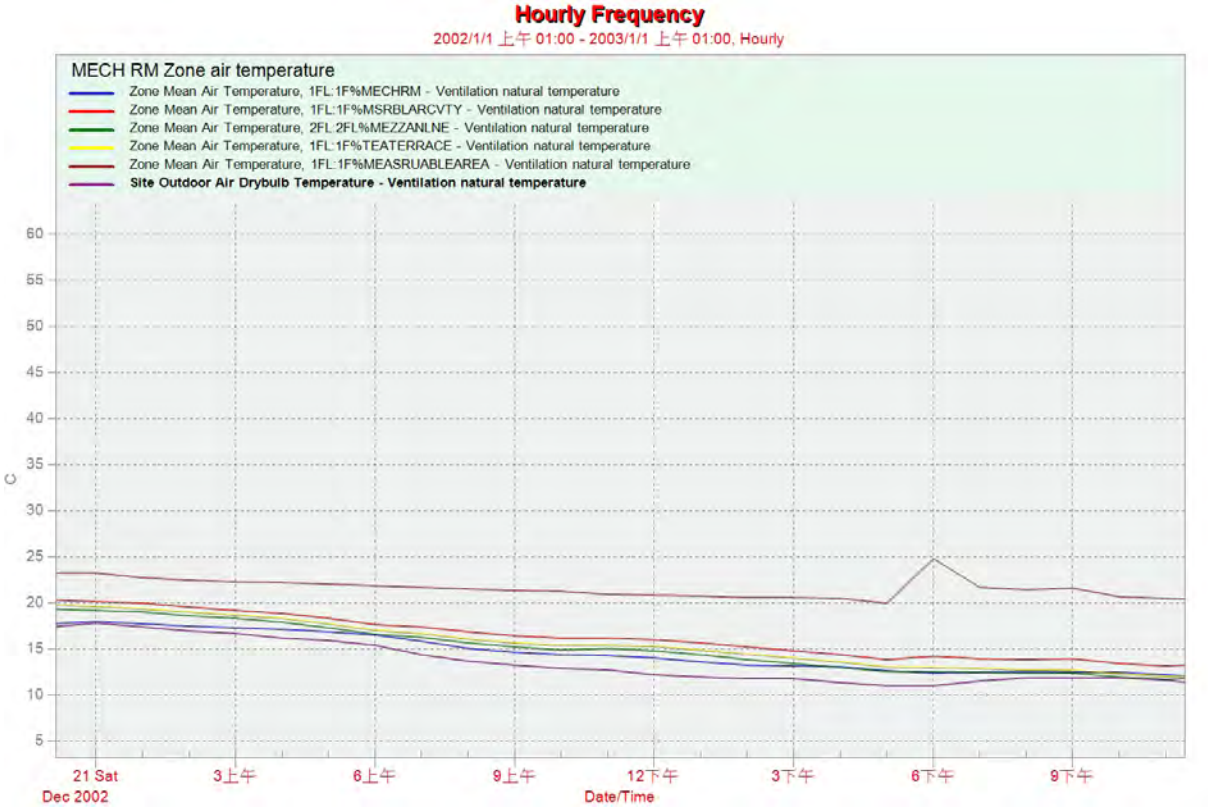


Figure 5.4.2.2.2k Winter Solstice Zone Air temperature comparison between several spaces

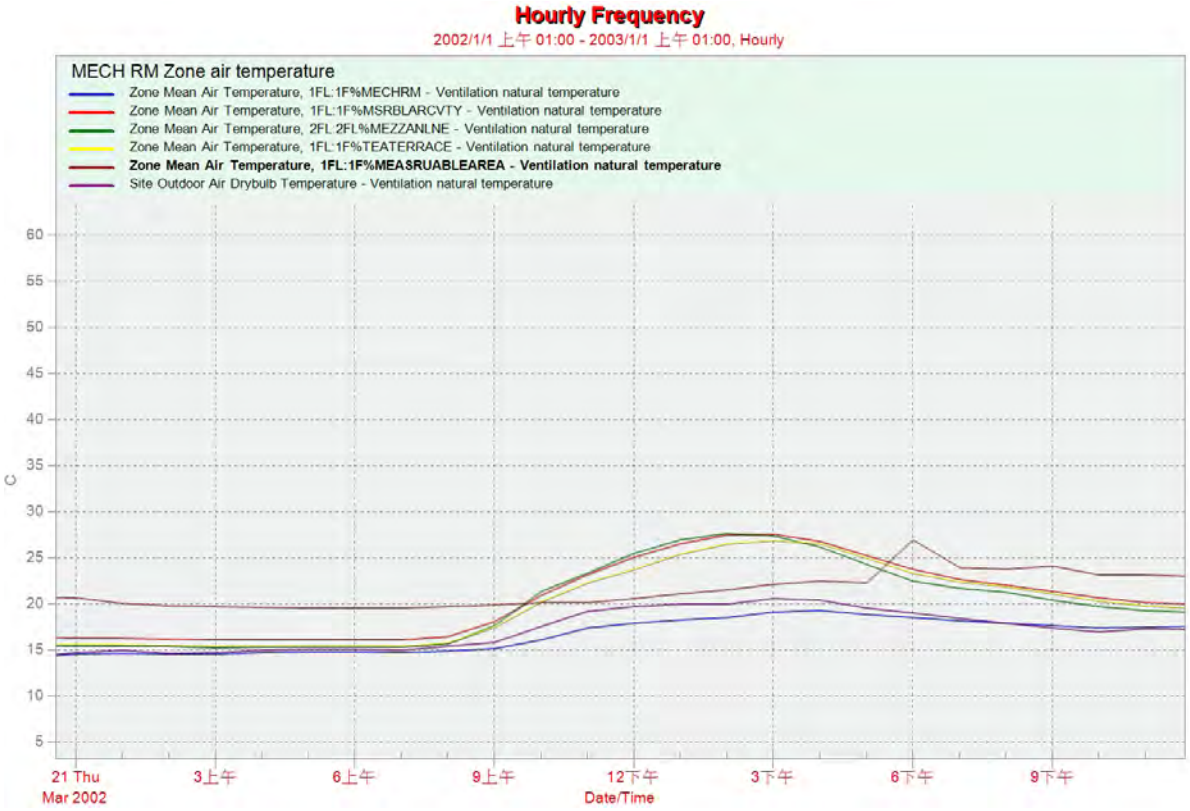


Figure 5.4.2.2.2l Spring Equinox Zone Air temperature comparison between several spaces

3.3 HVAC Selection Criteria

The HVAC system is selected to meet the following basic criteria:

- Appropriate size: the cooling and heating capacity is larger than the cooling and heating loads calculated based on the extreme yearly conditions.

Maximum Load, kW		7Heat Pump Capacity, kW	
Cooling	Heating	Cooling Mode	Heating Mode
10.42(Taipei) 7.88(Versailles)		• Indoor unit: 4.7 + 4.7 = 9.4 • Outdoor unit: 11.2	
	1.03(Taipei) 8.47(Versailles)		• Indoor unit: 5 + 5 = 10 • Outdoor unit: 12.5

3.3.1 To achieve high energy – efficiency

The high energy-efficient elements of HVAC system is selected to achieve the goal of saving energy in the cooling and heating of the human.

i. Heat pump selected with one of the highest efficiency in the industry: 6.7 IEER and 3.8 COP.
ii. Energy recovery ventilation with highly efficient energy recovery of 76% efficiency is selected and automatically switched between heat exchanger and bypass.

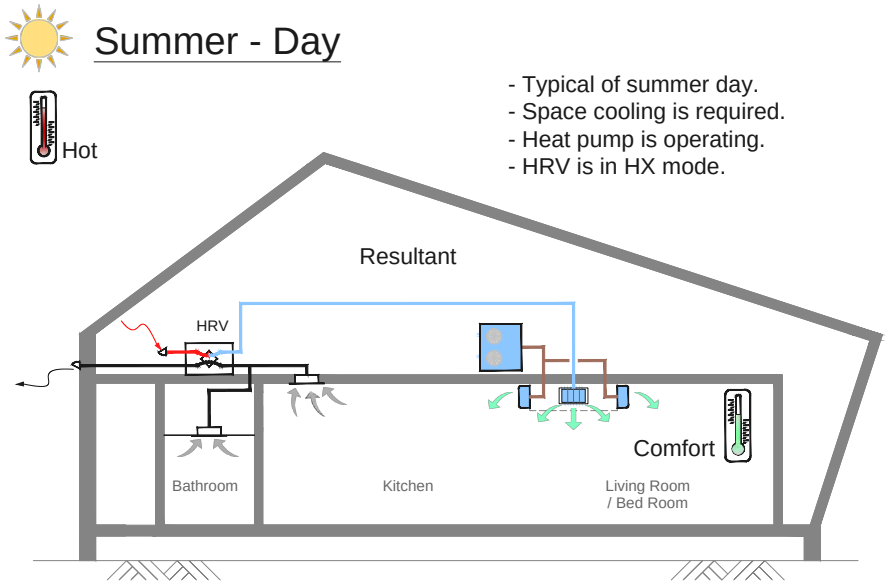
3.3.2 To keep the noise generated by the HVAC elements low to help the room stay within the limits for noise.

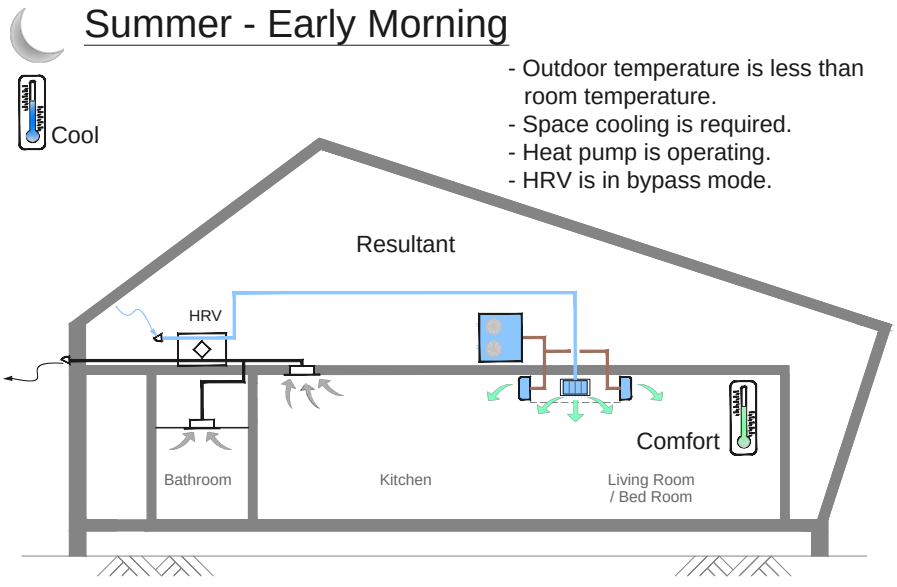
1. Final design of HVAC system

The HVAC System consists of cooling, heating and ventilation system.

i. Cooling System

- The air-conditioning equipment for the space cooling is a heat pump system comprising one outdoor unit and two indoor units.
- The heat pump features the R-410A refrigerant for its zero ODP effect and for energy saving. Other major breakthrough technologies include the reluctance DC scroll compressor, area spiral fan DC fan motor and super area grille. All these features can help achieve the high overall energy efficiency – the COP is 3.8 based on the indoor temperature of 27°C DB / 19°C WB and outdoor temperature of 35°C DB.
- The heat pump with DC inverter achieves the excellent partial load performance.

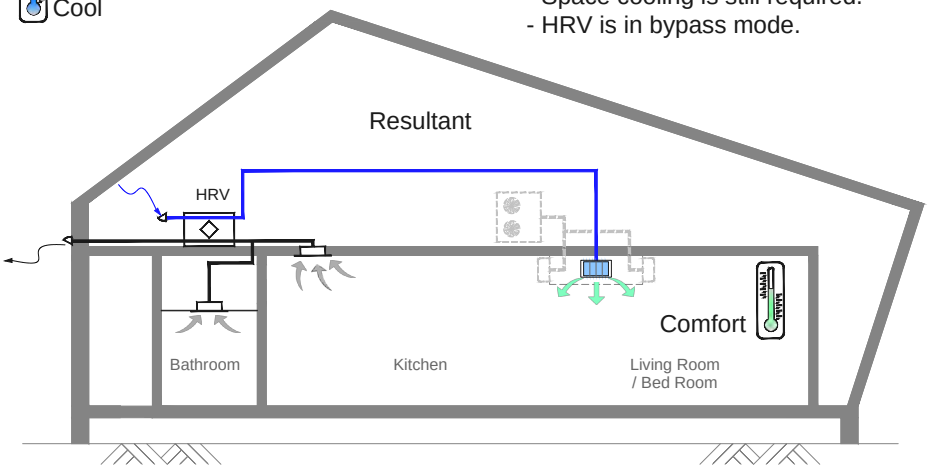




Spring - Night

Cool

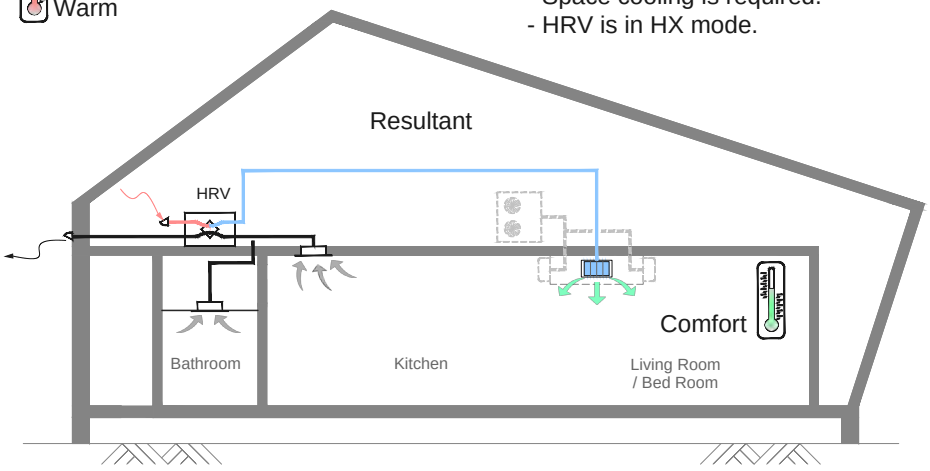
- Outdoor temperature is much less than room temperature.
- Space cooling is still required.
- HRV is in bypass mode.

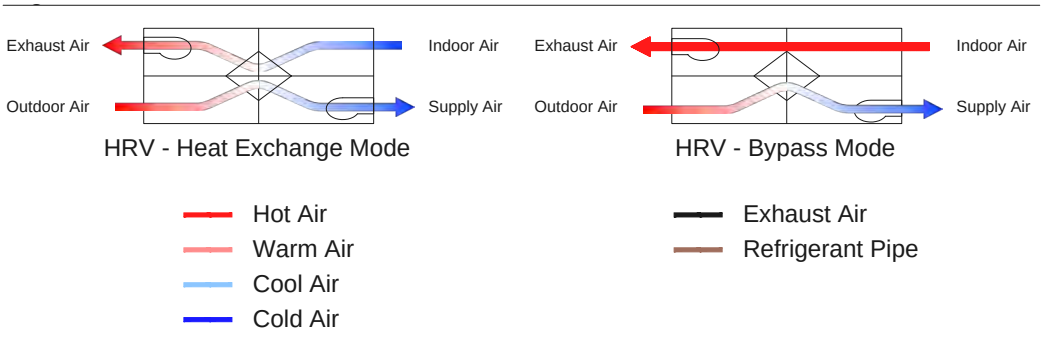


Spring - Day

Warm

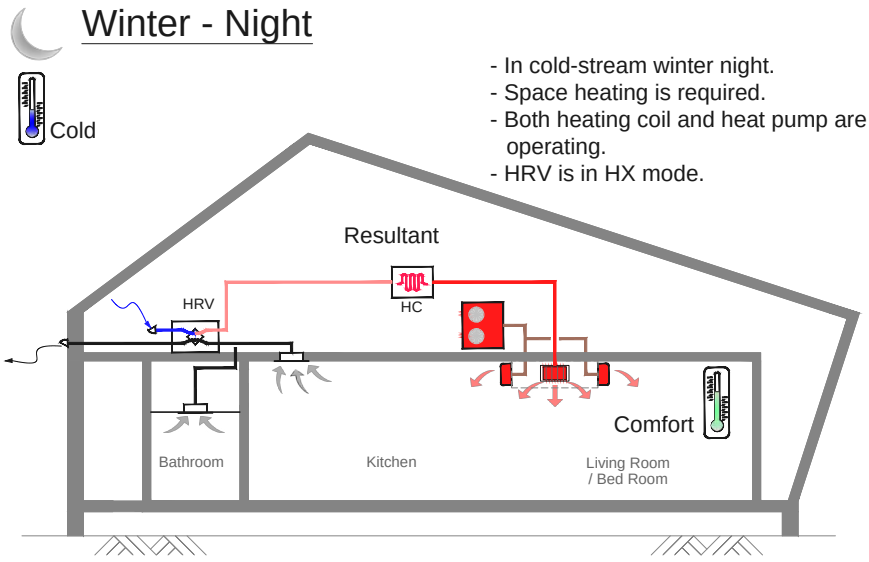
- Outdoor temperature is higher than room temperature.
- Space cooling is required.
- HRV is in HX mode.

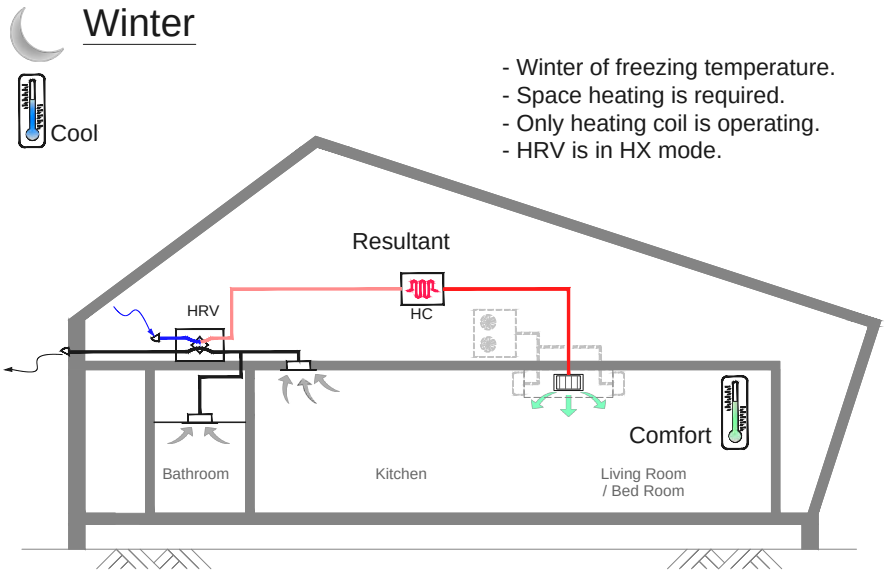




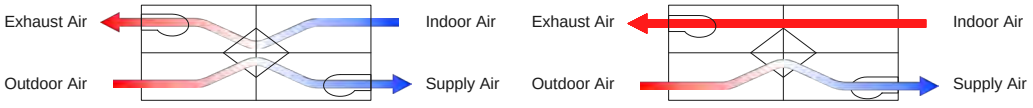
ii. Heating System

- Since the winter temperature is not severe in Taiwan, the required heat can be provided from the ventilation system – the heating coil on the fresh air supply duct. The heat source of the heating coil comes from the solar energy, i.e. the energy harnessed by the solar thermal collector.
- During a few especially cold winter days, the heat pump operates.





Legend:

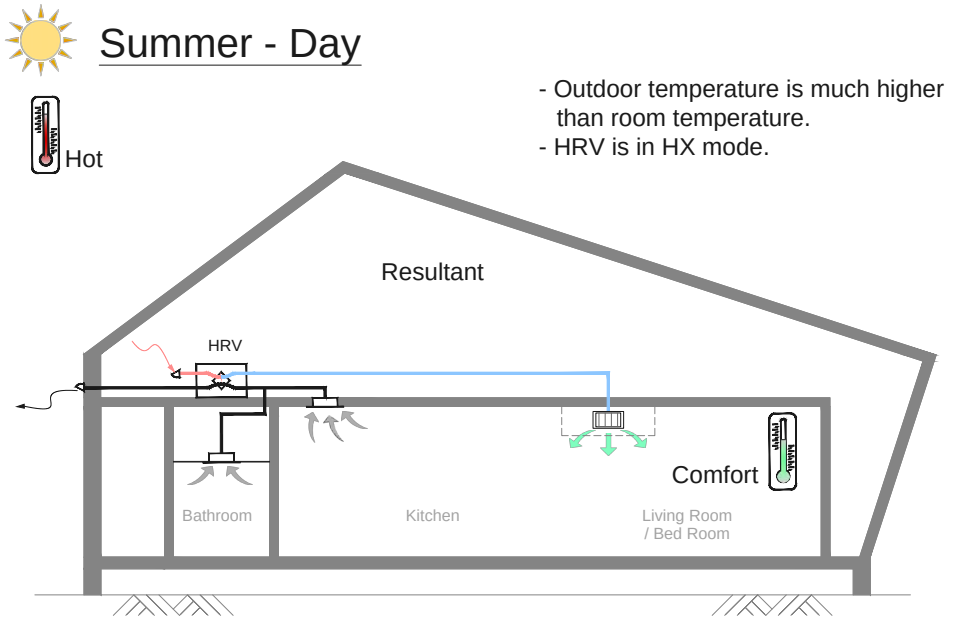


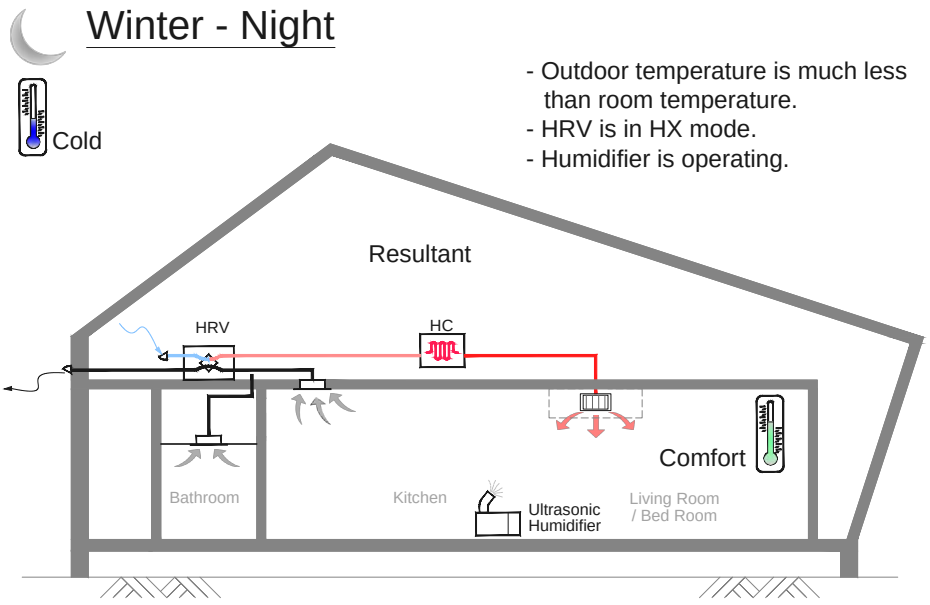
Hot Air
Warm Air
Cool Air
Cold Air

Exhaust Air
Refrigerant Pipe

iii. Ventilation System

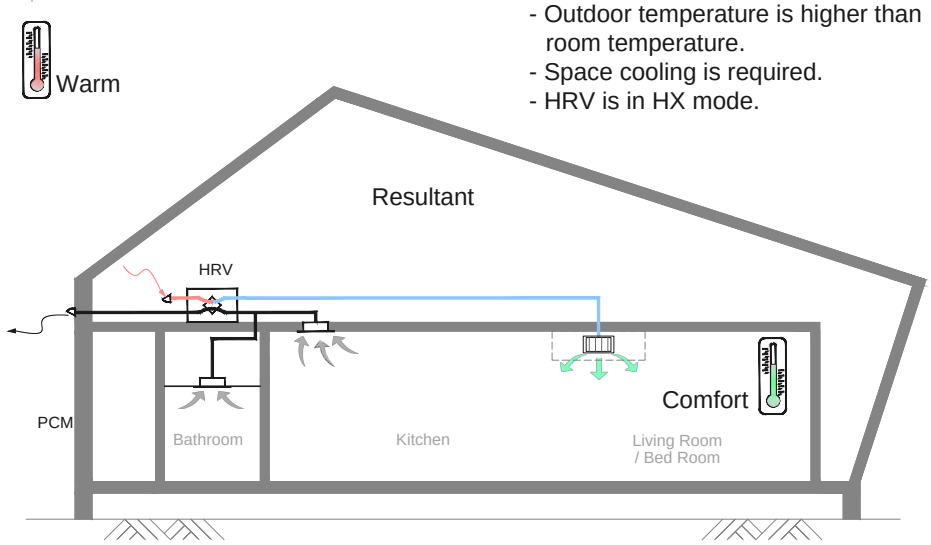
- Fresh air is supplied at all times of the day with intermittent stop while the room's CO2 concentration is lower than the predetermined value – 800 ppm. Clean air obtained thanks to fine filter Class F7 in the fresh air inlet and Class G4 in the exhaust air.
- The HRV (Heat Reclaim Ventilation) is a highly efficient heat recovery system which recovers the thermal energy of exhaust air and reuses it for heating or cooling of supply air. The enthalpy exchange efficiency can achieve 66% in cooling operation and 72% in heating operation.
- The heat recovery mode and bypass mode are to be selected considering the indoor and outdoor temperature to achieve the high energy saving and good thermal comfort.





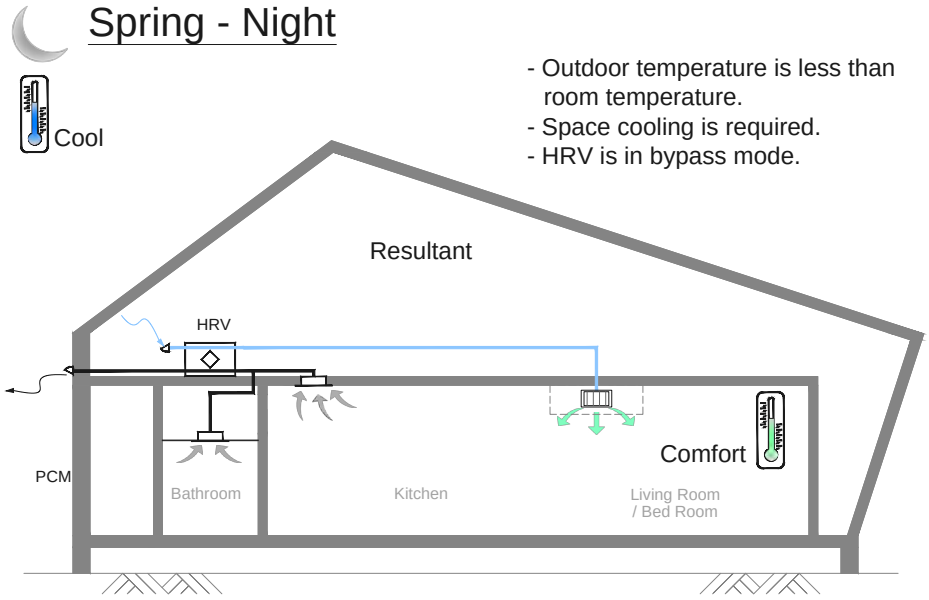
Spring - Day

- Outdoor temperature is higher than room temperature.
- Space cooling is required.
- HRV is in HX mode.

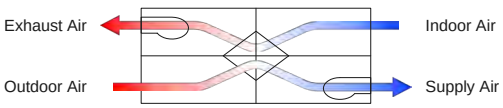


Spring - Night

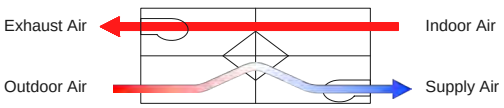
- Outdoor temperature is less than room temperature.
- Space cooling is required.
- HRV is in bypass mode.



Legend:



HRV - Heat Exchange Mode



HRV - Bypass Mode

Hot Air
Warm Air
Cool Air

Cold Air
Exhaust Air

iv. The fresh air intake is sucking in the air from the space underneath the floor, where the ambient air is precooled by the earth masses.

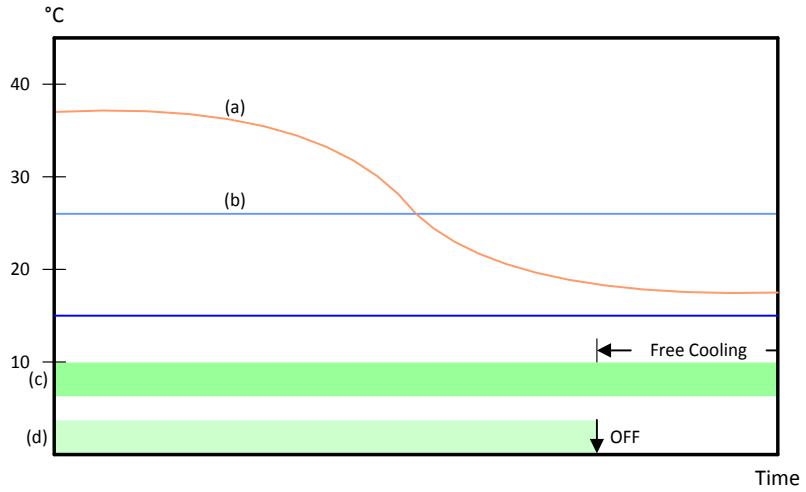
v. Other High Efficiency and Performance Strategies

- Control system integrates the heat pump and HRV:

1. Automatic Ventilation Mode Changeover

Operation	Sensor of Ventilation	Mode of Operation
Cooling	Indoor Temp. > Outdoor Temp.	Bypass
	Indoor Temp. < Outdoor Temp.	Heat Recovery
Heating	Indoor Temp. > Outdoor Temp.	Heat Recovery
	Indoor Temp. < Outdoor Temp.	Bypass

2. Free Cooling

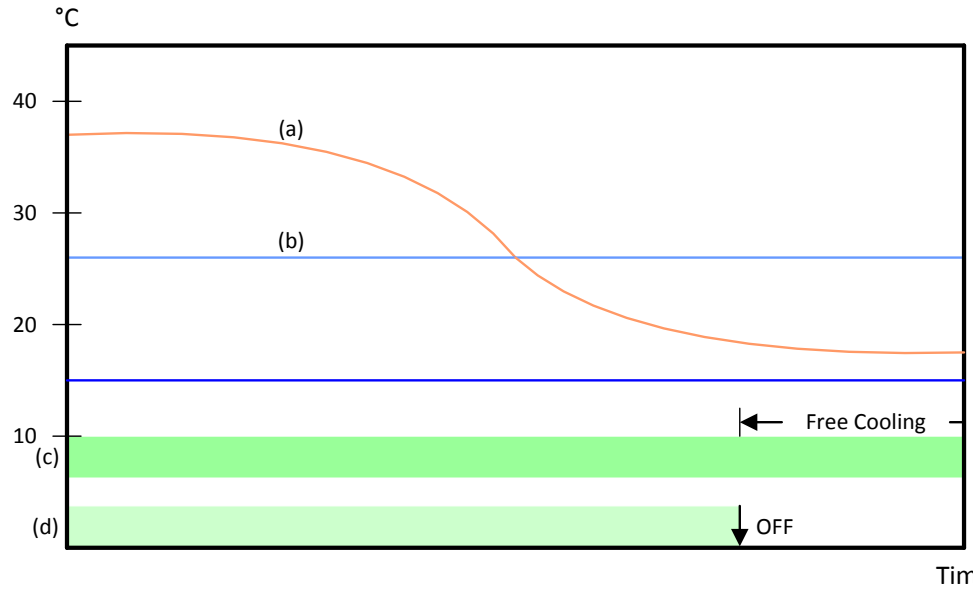


(a) Outside Temperature
(b) Room Temperature
(c) Operation State of HRV
(d) Operation State of Heat Pump

3. The automatic ON/OFF of HRV and heat pump is operated according to the pre-set conditions or through the BAS after confirming the status of the occupants' presence.
4. With the standard interface for BACnet and LonWorks, it is integrated with the House's BAS System.

- The Optimal Operations

1. The optimal operations by combining above equipment and systems to achieve the maximum energy saving are Free Cooling



(a) Outside Temperature
(b) Room Temperature
(c) Operation State of HRV
(d) Operation State of Heat Pump

2. The automatic ON/OFF of HRV and heat pump is operated according to the pre-set conditions or through the BAS after confirming the status of the occupants' presence.

3. With the standard interface for BACnet and LonWorks, it is integrated with the House's BAS System.

• The Optimal Operations
The optimal operations by combining above equipment and systems to achieve the maximum energy saving are shown in the following drawings.

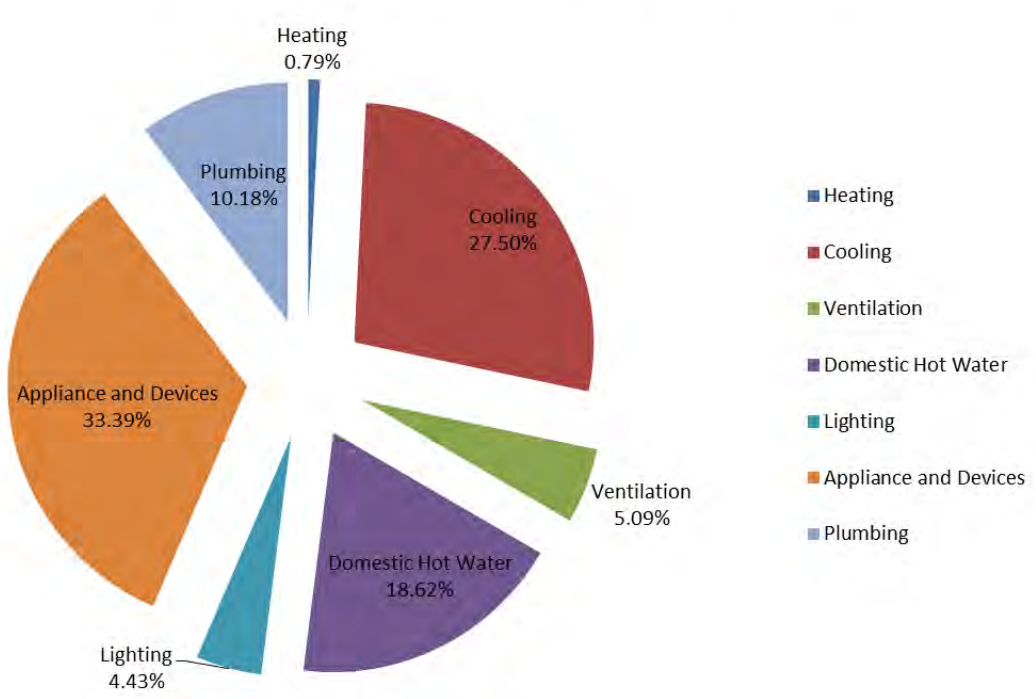
3.4 Predicted Heating and Cooling Loads and HVAC Energy Demand

From the Designbuilder simulation, the whole year cooling load is 3494.45 kWh, and heating load is 94.35 kWh. Transys program turns the heating and cooling loads into HVAC consumption. The yearly HVAC energy demand is 945 kWh (Cooling energy) +27 kWh (Heating energy) = 972 kWh/year.

3.5 Housing Unit Performance

The annual energy demand of the Orchid House in Taipei:

Energy Use Characterization	Demand energy kWh/year	% of total energy consumption
Heating	27	0.79%
Cooling	945	27.50%
Ventilation	175	5.09%
Domestic Hot Water	640	18.62%
Lighting	152.26	4.43%
Appliance and Devices	1147.5	33.39%
Plumbing	350	10.18%
Total	3436.76	100%
Energy use intensity (EUI，kWh/m^2.year)	18.28	



In the Green Architecture Manual, published by of the Institute of Architecture, Ministry of Interior, Taiwan, the average Energy Use Intensity (EUI) of typical Taiwanese residential units is 34kWh/m2. The EUI of the Orchid House is 18.28kWh/m2 that is 46.24% lower than the average of Taiwan.

4. Conclusion

The simulation results provide the NCTU/UNICODE Team information to predict the performance of the Orchid House in both its local site and the competition site. The simulation of Taipei is a year round simulation which helps the team to understand the house's thermal condition in different seasons. The simulation predicts overheated summer due to the large glazing area, and the solution is to change the glass glazing to Polycarbonate sheet which has a lower SHGC of 77%. The simulation also predicts that the high thermal resistance value of wall insulation material prevents heat loss in summer. When the active cooling device is not operating, this insulation keeps the interior heat gain by people, appliance, and lightings indoors. This creates thermal problems to the Measurable Area. The solution is to remove the most expensive insulation material, VIP, from the Orchid House in Taipei. That resolves the overheated problem, and also reduces the overall cost of the house.

The simulation of the contest weeks also predicts the thermal performance of the house in Versailles. It focuses the two competition weeks. The simulation includes the two passive days when no active devices are operating. The simulation result shows overheated night. Another simulation adds night ventilation to the house and results in a significant temperature drop at night. The team decided to open windows at night during the competition weeks to obtain a better thermal condition.

The simulation also predicts the shortage of thermal hot water system. With the original design, the solar hot water can only provide hot water for domestic use. In order to provide sufficient solar hot water for space heating, the team adds the area of solar collectors.

The final HVAC system could cope with the high temperature and relative humidity climate of Taipei while still maintaining the room's comfort for human year-round, but more importantly, the system could achieve the set goal verified by simulations as follows:

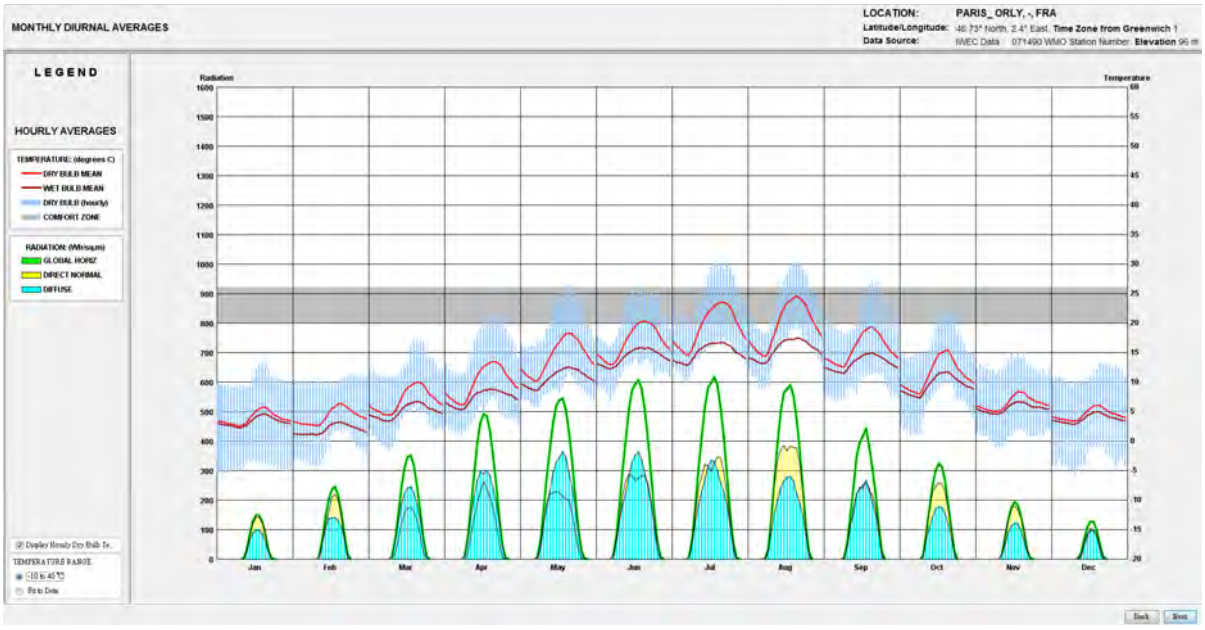
- Help reduce the cooling and heating loads: The heat reclaim ventilator with the 80 percent of average efficiency reduces the cooling and heating loads from the ventilation.
- Keep the energy consumption of HVAC system to the minimum: The final HVAC equipment with the advanced technology can minimize the energy consumption.

Section III - Adaptations made by the Team in the house for the prototype in Versailles

1. House Adaptations for the Prototype in Versailles

1.1 Weather Analysis

The town of Versailles, situated 16 kilometers to the south-west of Paris, sits on an elevated plateau. The four seasons in Versailles are distinctive with comfortable humidity. Winter weather can be wet and windy, and January is predictably the coldest month, when the likelihood of snowy weather is at its highest.
The climate can feel colder if the winds are strong, although daytime temperatures do tend to stay around 6°C / 43°F. However, a dramatic rise in temperature can be expected from March onwards, as summer quickly approaches.
The summer climate in Versailles is often sunny and warm, May to September are historically the driest months. However, even though July and August do see highs of more than 25°C / 77°F, some days can be a little overcast with occasional rainy weather.



The average daily temperature from June to August is 18~20°C. In sunny days, the outdoor temperature may go up to 30°C due to solar radiation. The daily temperature difference may go up to 10°C.
The weather of Versailles is very different from that of Taipei in summer. During the competition weeks, the weather of Versailles needs to be considered as a factor of modification. The design of the prototype needs to consider both insulation and heat loss at daytime, and insulation and heat gain at night time.

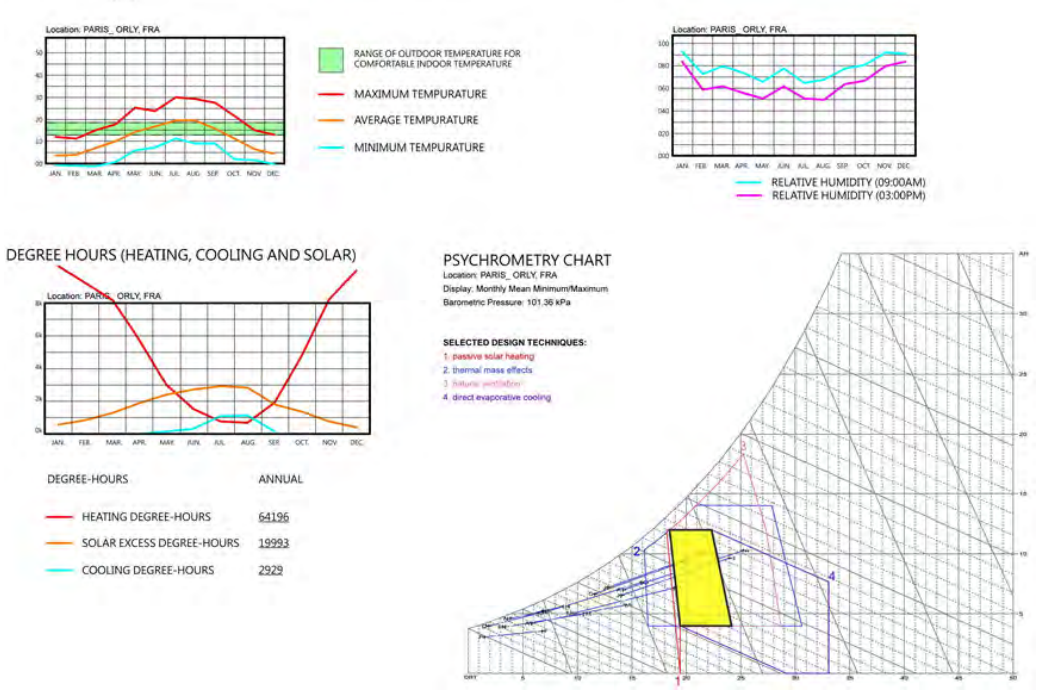


Figure 5.4.2.3.1b Climate Data including Temperature, Humidity, Degree Hours and Psychrometry Chart of Paris Area

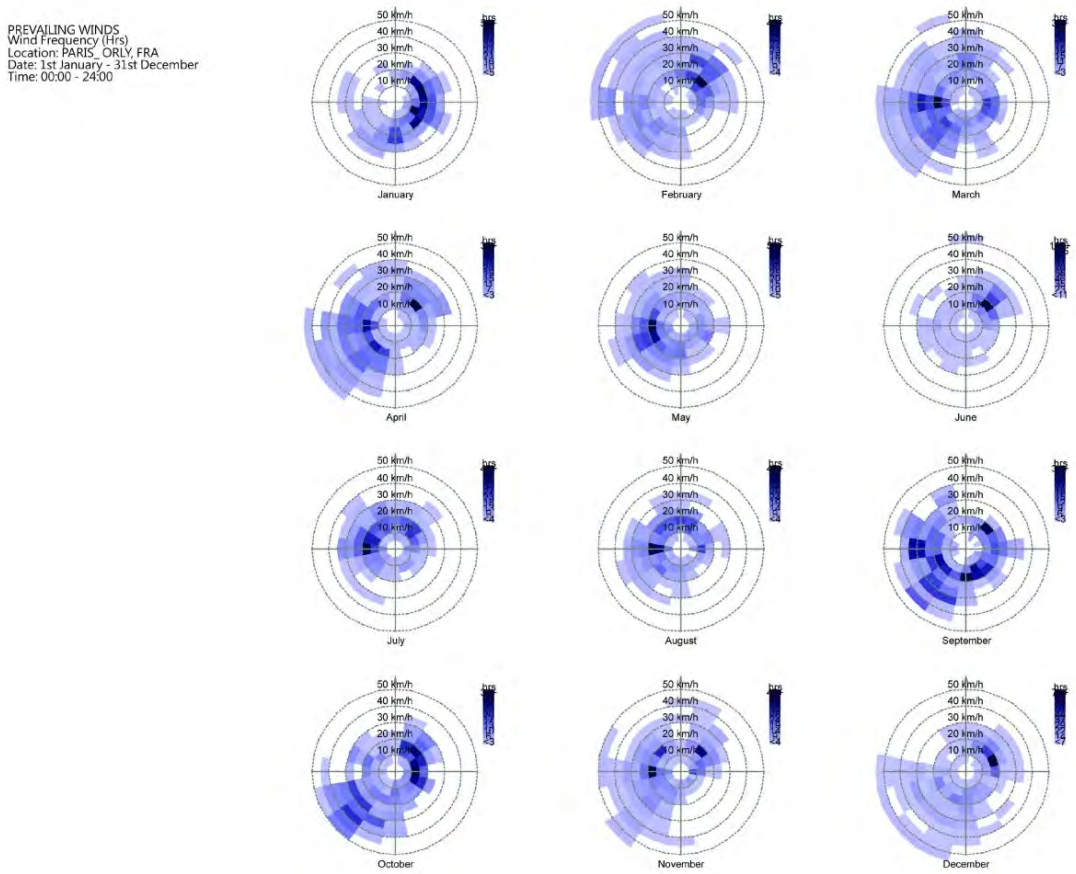


Figure 5.4.2.3.1c Monthly prevailing winds analysis of Paris area

1.2 Adaptations made by the Team in Orchid house

Our adaptation design Strategy included:

- High isolation performance envelop.
- Thermal wall and green house for daily heat storage and diffuse to interior space at night.
- Free cooling system.
- Daily natural ventilation.

2. House, Appliances and HVAC Simulations in the Two Competition Weeks in Versailles

2.1 House Passive interior air temperature Simulation

The NCTU/UNICODE Team try to use simulation program to understand the indoor thermal condition during the competition weeks. The following graphics shows the indoor temperature in the measurable area under the condition of interior heat gain from appliances without ventilation.

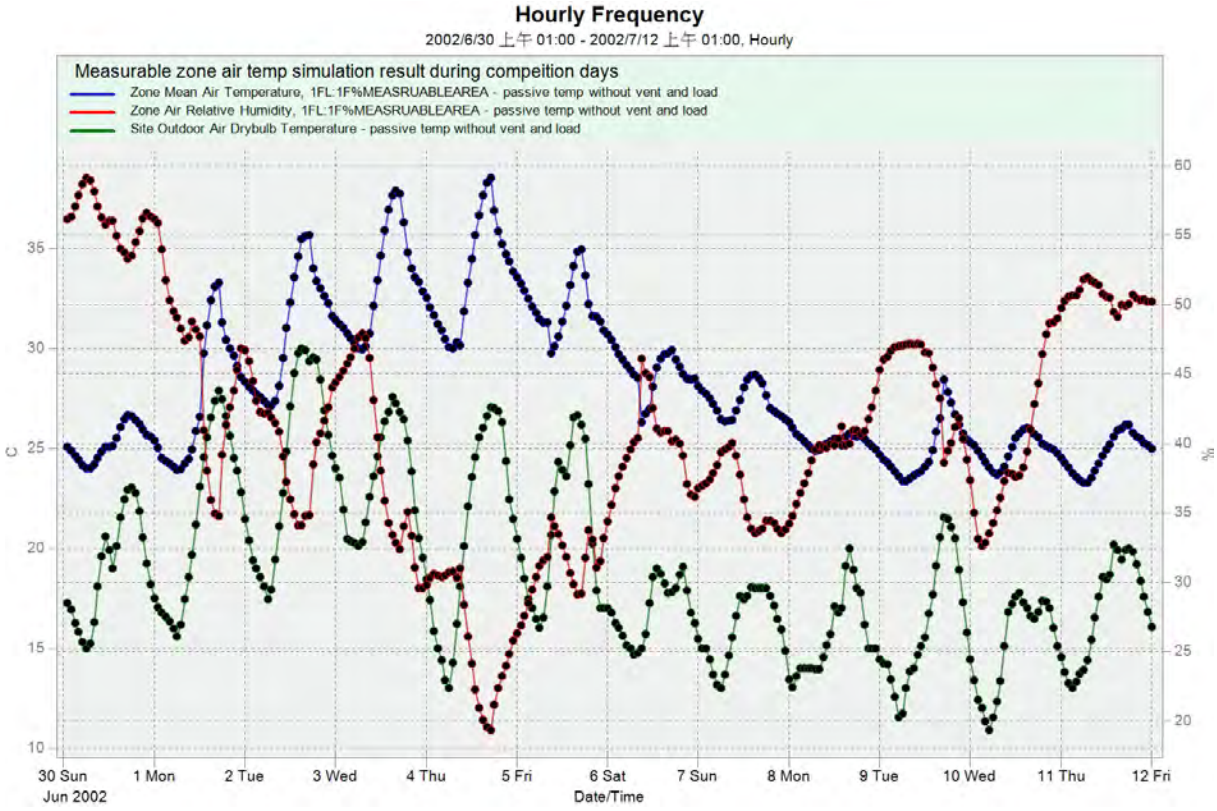


Figure 5.4.2.3.2aMeasurable area air temperature, humidity simulation result

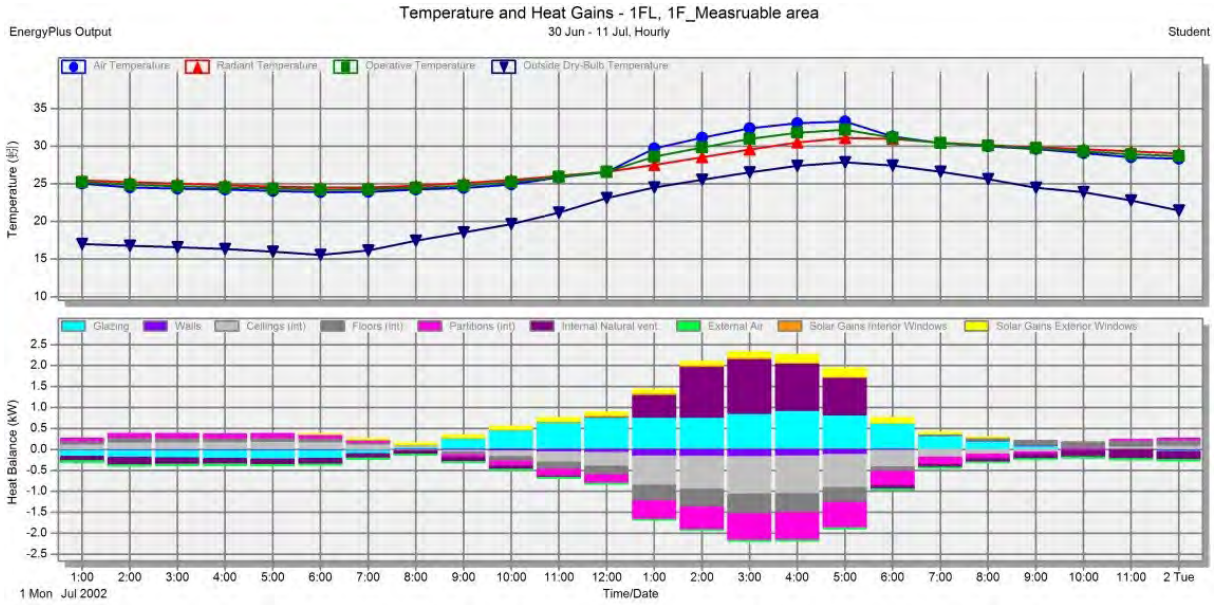


Figure 5.4.2.3.2b Measurable area heat balance simulation in Jul 2

During the sunny days with strong solar radiation, the temperature of the Buffer Zone increases by the solar radiation heat gain through large glazing areas. Because the temperature of the Buffer Zone changes the heat transfer rate from the Measurable Area, the temperature of the Measurable Area is effected.

2.2 Appliances and HVAC Simulation

The operation schedules of appliances, light fixtures, and HVAC are defined in the energy model of the simulation program according to the competition schedule. The NCTU Unicode team tries to understand:

- The operation condition of the appliances, light fixtures, and HVAC.
- Interior thermal condition.
- Production of renewable energy.
- Energy demand.

The geometric volume, the space planning, and the materials property of the energy model for the prototype Orchid House in Versailles is similar to those of the Orchid House in Taipei. However, the appliances, the operation schedule, the number of occupations, and the temperature are quite different because the simulation for Versailles is based on the competition rule.

The energy model is defined as:

i. Material Thermal Properties

Vacuum Insulation Panel (VIP)

According to the analysis of the weather data, the Unicode team understands that the daily temperature range is significant in Versailles. As a result, the team adds a VIP layer into the exterior walls, floors, and roofs of the prototype. The purpose of installing this high resistance insulation material is to avoid heat gain during the daytime and heat loss at night.

Makrolon® Polycarbonate Sheet

In order to achieve a better thermal storage, an additional layer of Makrolon® Polycarbonate Sheet is added on the exterior side of the thermal wall. This will increase the absorption of solar radiation in daytime and reduce heat loss to outdoor at night.

The material information is listed below. Green shaded columns show materials installed in the prototype in Versailles only:

Ground Floor					
Layer	Insulation Type	Thickness (mm)	Thermal Conductivity (W/m².K)	Specific Heat (J/kg-k)	Density (Kg/m²)
Inner	Plywood	6.00	0.13	2500.00	560.00
	Plywood	12.00	0.13	2500.00	560.00
	VIP	30.00	0.01	687.00	177.00
	Glass Foam	130.00	0.07	840.00	117.00
Outer	Plywood	6.00	0.13	2500.00	560.00

Second Floor					
Layer	Insulation Type	Thickness (mm)	Thermal Conductivity (W/m².K)	Specific Heat (J/kg-k)	Density (Kg/m²)
Inner	Plywood	6.00	0.13	2500.00	560.00
	Plywood	12.00	0.13	2500.00	560.00
	VIP	30.00	0.01	687.00	177.00
	Glass Foam	130.00	0.07	840.00	117.00
	Plywood	24.00	0.13	2500.00	560.00
Outer	Plywood	6.00	0.13	2500.00	560.00

1F Wall(East+West)					
Layer	Insulation Type	Thickness (mm)	Thermal Conductivity (W/m².K)	Specific Heat (J/kg-k)	Density (Kg/m²)
Outer	Polycarbonate	40.00	0.04	1200.00	1200.00
	Air	60.00	0.02	1008.00	1.23
	Plywood	24.00	0.13	2500.00	560.00
	Glass Foam	65.00	0.07	840.00	117.00
	VIP	30.00	0.01	687.00	177.00
	Plywood	12.00	0.13	2500.00	560.00
Inner	Plywood	6.00	0.13	2500.00	560.00

Thermal Wall					
Layer	Insulation Type	Thickness (mm)	Thermal Conductivity (W/m².K)	Specific Heat (J/kg-k)	Density (Kg/m²)
Outer	Polycarbonate	10.00	0.03	1200.00	1200.00
	Air	40.00	0.02	1008.00	1.23
	PET	3.00	0.51	1000.00	1370.00
	Water	250.00	0.58	4190.00	990.00
	PET	3.00	0.51	1000.00	1370.00
	Polycarbonate	10.00	0.03	1200.00	1200.00
	Air	40.00	0.02	1008.00	1.23
Inner	Plywood	40.00	0.13	2500.00	560.00

2F Wall(East+West)					
Layer	Insulation Type	Thickness (mm)	Thermal Conductivity (W/m².K)	Specific Heat (J/kg-k)	Density (Kg/m²)
Outer	Polycarbonate	15.00	0.03	1200.00	1200.00
	Air	10.00	0.02	1008.00	1.23
Inner	Polycarbonate	15.00	0.03	1200.00	1200.00

Interior partition					
Layer	Insulation Type	Thickness (mm)	Thermal Conductivity (W/m².K)	Specific Heat (J/kg-k)	Density (Kg/m²)
Inner	Plywood	6.00	0.13	2500.00	560.00
	Plywood	12.00	0.13	2500.00	560.00
	VIP	30.00	0.01	687.00	177.00
	Glass Foam	130.00	0.07	840.00	117.00
	Plywood	12.00	0.13	2500.00	560.00
Outer	Plywood	6.00	0.13	2500.00	560.00

ROOF-PV Panel					
Layer	Insulation Type	Thickness (mm)	Thermal Conductivity (W/m².K)	Specific Heat (J/kg-k)	Density (Kg/m²)
	Soda lime glass	10.00	1.00	750.00	2500.00

Transparent panel(10mm)								
Layer	Insulation Type	Thickness (mm)	Thermal Conductivity (W/m².K)	Specific Heat (J/kg-k)	SHGC	VLT	Density (Kg/m²)	熱傳導率-U值 (W/m².K)
Outer	Polycarbonate	3.00	0.03	1200.00	0.43	0.42	1200.00	9.33
	Air	4.00	0.02	1008.00			1.23	6.00
Inner	Polycarbonate	3.00	0.03	1200.00			1200.00	9.33

Transparent panel(6mm)								
Layer	Insulation Type	Thickness (mm)	Thermal Conductivity (W/m².K)	Specific Heat (J/kg-k)	SHGC	VLT	Density (Kg/m²)	熱傳導率-U值 (W/m².K)
	Polycarbonate	6.00	0.03	1200.00	0.63	0.65	1200.00	4.67

ii. Interior Gains

Compare to the energy model of the Orchid House in Taipei, The energy model of the prototype adds oven, dish washer and cloth dryer according to the competition rule.

Interior gains – Appliance

Space	Product Name	Energy rate(w)	Heat gain fraction		
			Fraction Radiant	Fraction Latent	Fraction Lost
Kitchen	Refrigerator	308	0.3	0	0.3
	Oven	3500	0.4	0.1	0.3
	Electrical stove	1800	0.1	0.3	0.1
	Dish Washer	2110	0.2	0.3	0.3
Living Room	TV	29	0.3	0	0.3
Work station	Note book	180	0.3	0	0.3
Mezzanlne	Clothes dryer	1000	0.1	0.3	0.3
	Clothes washer	1400	0.1	0.3	0.3

The type and number of the light fixtures in the prototype is the same as those in Taipei.

Interior gains –Light fixtures

Space	Product Name	Energy rate(w)	Heat gain fraction		
			Fraction Radiant	Fraction Latent	Fraction Lost
Entrance	Tons T8 LED	20	0.4	0	0.3
Bathroom	Tons DG-913C	12.6	0.4	0	0.3
Kitchen	Tons T8 LED	100	0.4	0	0.3
	Tons KA-112R	3.6	0.4	0	0.3
	Delta A60	1.2	0.4	0	0.3
	Tons DA-504AD	4.8	0.4	0	0.3
Living Room	Tons T8 LED	60	0.4	0	0.3
	Tons DA-504AD	2.4	0.4	0	0.3
	Delta A60	1.2	0.4	0	0.3
Work station/ Bedroom	Tons T8 LED	60	0.4	0	0.3
	Tons DA-504AD	2.4	0.4	0	0.3
	Delta A60	2.4	0.4	0	0.3
Tea Terrance &Mech. RM.	Tons ODL-005	2.4	0.4	0	0.3
	Tons DA-504AD	6	0.4	0	0.3
Mezzanine	Tons T8 LED	160	0.4	0	0.3
	Delta A60	2.4	0.4	0	0.3
	Tons ODL-005	9.6	0.4	0	0.3
Stair	Tons LSP-3106	14.4	0.4	0	0.3

During the public visit days, the model assumes nineteen occupants in the house. Fourteen of them are visiting the measurable area; and five of them are visiting mezzanine and other area of the house.

Interior gains – Occupancy

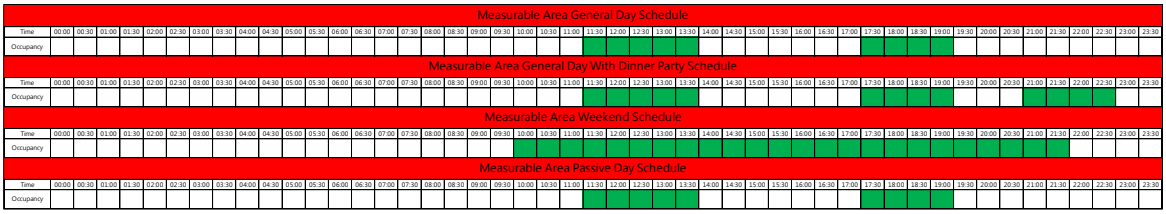
Space	Occupancy	Metabolic	
		Metabolic rate (w/person)	Factor
Measurable area	14	126	0.9
Mezzanlne	3	126	0.9
Other spaces	2	126	0.9

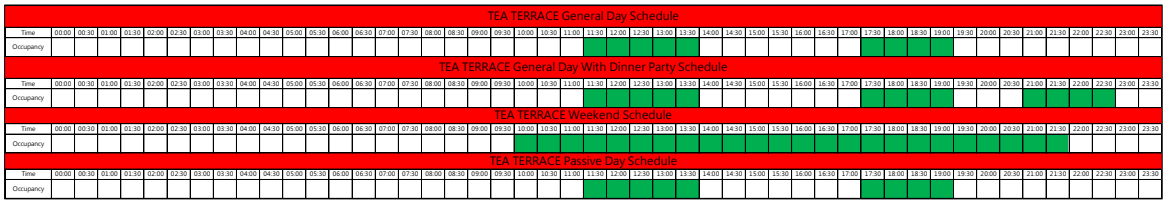
iii. Occupancy Behavior Pattern

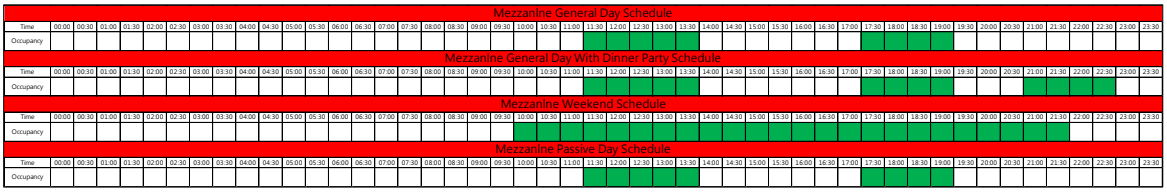
The occupancy patterns are defined as general days, general days with dinner, passive days, and weekends according to the contest schedule. The operation time of the appliances, light fixtures and HVAC are based on these occupancy patterns.

The tables below show the schedules during the contest weeks in Versailles:

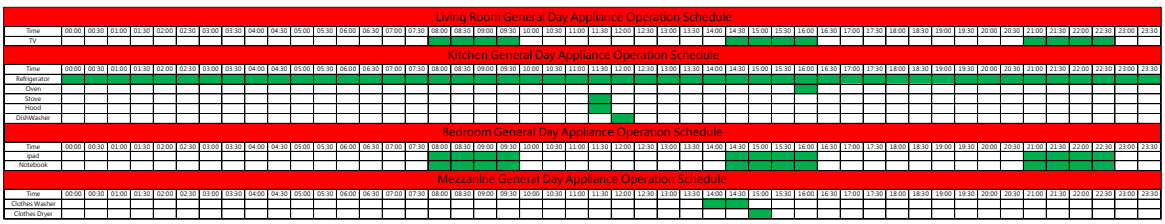
(1) Occupancy Schedule

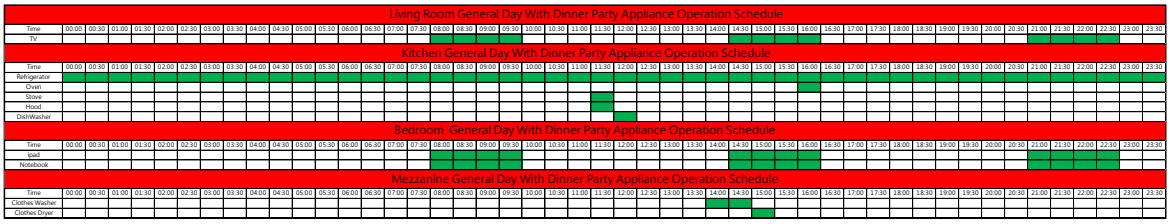


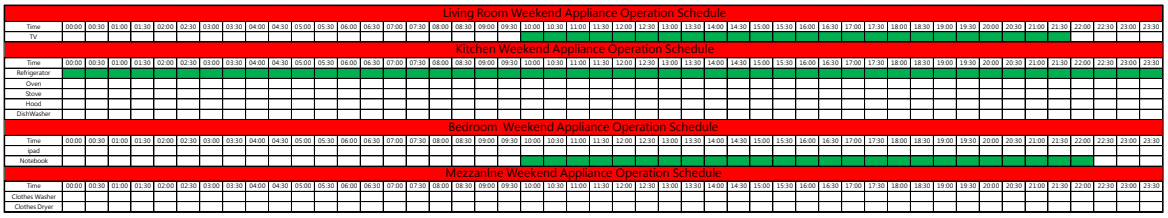


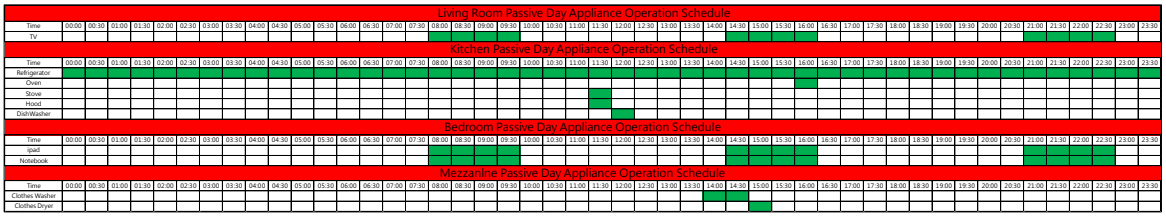


(2) Appliance Operation Schedule

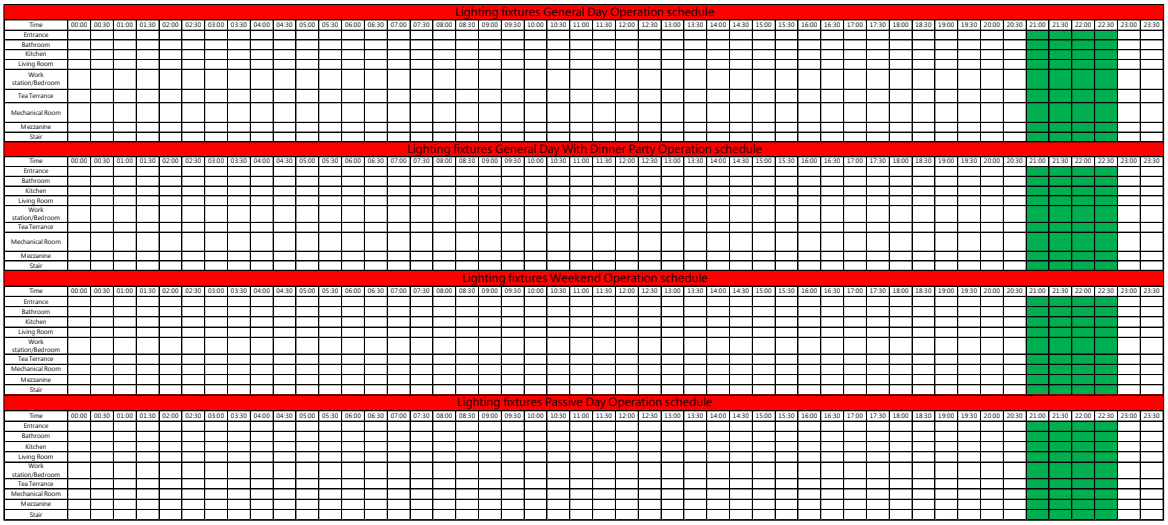








(3) Lighting fixtures Operation Schedule



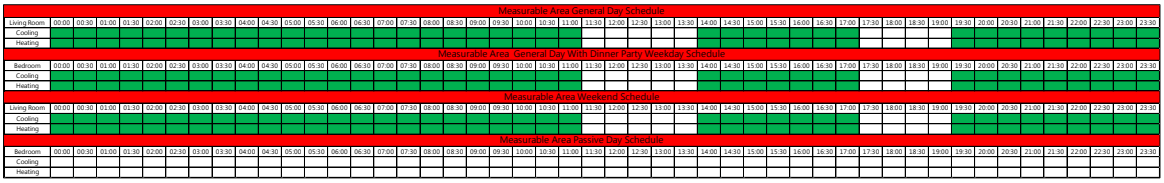
(4) HVAC System operation schedule

The NCTU Unicode Team assumes the temperature setting for the contest week is between 24 and 26.5oC. This temperature is calculated from the TMY2 weather data and the contest rule 19.5 sub-contest 5.1. Both passive and active simulations should achieve the indoor temperature to this range. Therefore, the cooling and heating starting temperatures are:

- Cooling: 26.5℃
- Heating: 24℃

	Tea	Ted-7	Ted-6	Ted-5	Ted-4	Ted-3	Ted-2	Ted-1	Ti min	Ti max
6/30	17.98	18.98	15.70	15.42	16.48	18.08	18.72	19.57	23.73	25.73
7/1	18.23	15.70	15.42	16.48	18.08	18.72	19.57	18.98	23.81	25.81
7/2	19.27	15.42	16.48	18.08	18.72	19.57	18.98	21.68	24.16	26.16
7/3	20.80	16.48	18.08	18.72	19.57	18.98	21.68	24.33	24.66	26.66
7/4	21.59	18.08	18.72	19.57	18.98	21.68	24.33	23.03	24.92	26.92
7/5	21.58	18.72	19.57	18.98	21.68	24.33	23.03	20.95	24.92	26.92
7/6	21.49	19.57	18.98	21.68	24.33	23.03	20.95	20.66	24.89	26.89
7/7	20.38	18.98	21.68	24.33	23.03	20.95	20.66	16.81	24.53	26.53
7/8	19.23	21.68	24.33	23.03	20.95	20.66	16.81	15.92	24.15	26.15
7/9	18.16	24.33	23.03	20.95	20.66	16.81	15.92	15.70	23.79	25.79
7/10	17.33	23.03	20.95	20.66	16.81	15.92	15.70	16.20	23.52	25.52
7/11	16.47	20.95	20.66	16.81	15.92	15.70	16.20	15.14	23.24	25.24

The HVAC operation schedule is as below:



Simulation Result

The following table shows the simulation result. The electricity consumption of the Orchid House is estimated to be 151.46 kWh in the contest weeks.

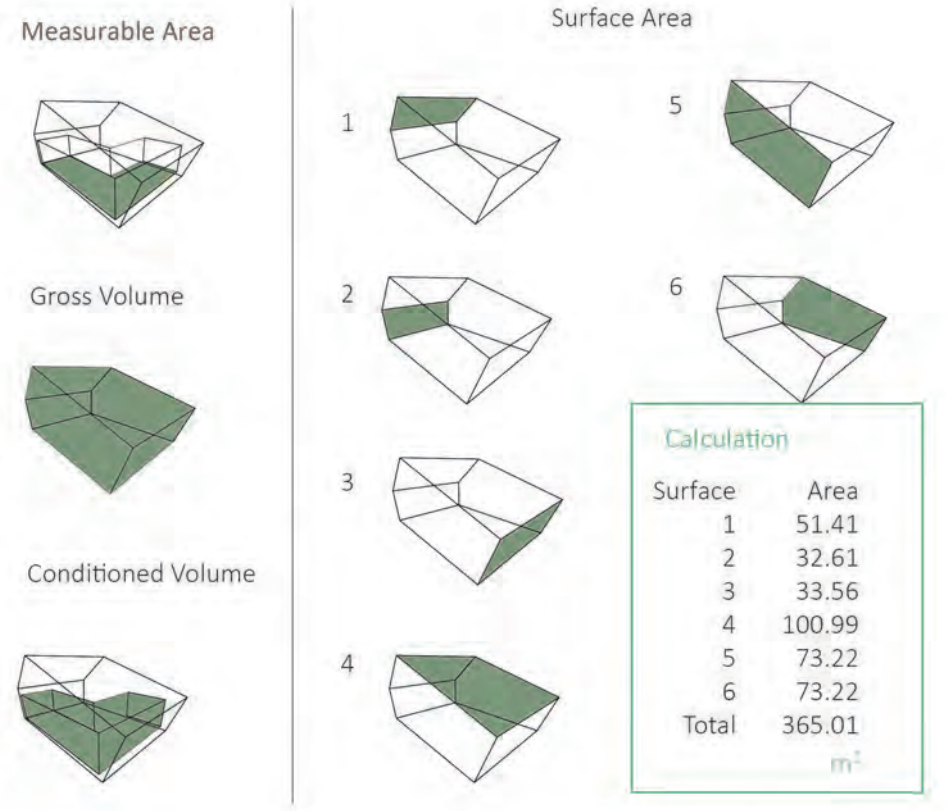
Even though the simulation is based on historical weather data and predicted occupancy, the real situation will be quite different. However, predicting energy consumption may help the team to understand the possibility of achieving zero or even negative energy consumption.

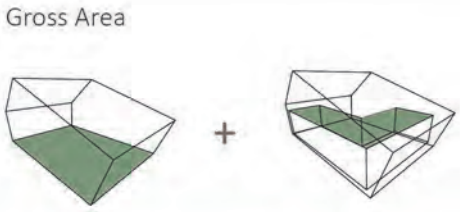
The simulation shows that the Orchid House produces 222.28kWh and consumes 151.46 kWh of electricity during the contest weeks. The energy balance is positive while the indoor comfort is sufficiently provided.

Orchid House Competition Period Energy Balance Simulation - France														
Item	End Use Breakdown	6/30	7/1	7/2	7/3	7/4	7/5	7/6	7/7	7/8	7/9	7/10	7/11	TTL
Total Electricity Consumption (kwh)		16.98	22.85	21.75	23.00	8.91	3.97	2.78	9.12	8.31	11.16	14.61	8.04	151.46
Appliances	Refrigerator/Freezing	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	1.56
	Clothes Washer	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	10.00
	Clothes Dryer	0.39	0.39	0.39	0.39	0.39	0.00	0.00	0.39	0.39	0.39	0.39	0.39	3.85
	Cooking	0.90	1.80	0.90	1.80	0.00	0.00	0.00	0.90	0.90	0.90	1.80	0.00	9.90
	Oven	1.75	3.50	1.75	3.50	0.00	0.00	0.00	1.75	1.75	1.75	3.50	0.00	19.25
	Hood	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	1.98
	Dishwashing	1.06	1.06	1.06	1.06	1.06	0.00	0.00	1.06	1.06	1.06	1.06	1.06	10.55
Devices	TV	0.17	0.17	0.17	0.17	0.17	0.00	0.00	0.17	0.17	0.17	0.17	0.17	1.74
	DVD/Projector	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	2.40
	Notebook	1.08	1.08	1.08	1.08	1.08	0.00	0.00	1.08	1.08	1.08	1.08	1.08	10.80
	Ipad	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.36
Lighting	Kitchen	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	2.60
	Living Room	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	1.51
	Workstation/Bedroom	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	1.57
	Bathroom	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.60
	Tea Terrance &Mech. RM.	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.20
	Mezzanine	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	4.25
	Entrance	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.48
HVAC	Cooling /Heating/Ventilation	7.86	11.08	12.63	11.23	2.44	1.19	0.00	0.00	0.00	2.85	2.84	1.57	53.69
Plumbing	Domestic Water Pump	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.00	0.00	0.81	0.81	8.10
	Gray Water Pump	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.48
	Water Wall Pump	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	5.58
Total PV Generation(kWh)		5.09	28.31	11.71	34.15	16.98	14.77	15.97	8.29	11.74	18.20	28.02	29.03	222.28
Net Power Consumption from Grid(kWh)		-11.89	5.46	-10.04	11.15	8.07	10.81	13.20	-0.83	3.44	7.04	13.41	20.99	70.82

Appendix A Technical Project Report

1. Project Dimension





Calculation		
	Measurable Area	56.9 m²
	Gross Area	187 m²

Project Dimensions	
Gross area	187 m²
Gross Volume	683.48 m³
Surface area	365.01 m²
Net floor area	71.30 m²
Conditioned Volume	206.06 m³

2. House Envelope

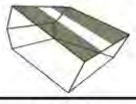
2.1 Taipei

	Insulation Type	Thickness (mm)	Thermal Conductivity (W/mk)	Thermal Transmittance (W/m^2k)	Thermal Resistance (m^2k/W)	AREA (m^2)
Wall AR-341	Exterior Air Film				0.05	
	Polycarbonate	40	0.044	1.1	0.9091	
	Air	75	0.024	0.32	3.125	
	Plywood	18	0.13	7.222222222	0.1385	
	Plywood	12	0.13	10.83333333	0.0923	
	E Foam	72	0.0379	0.526388889	1.8997	
	Plywood	18	0.13	7.222222222	0.1385	
	Plywood	3	0.13	43.33333333	0.0231	
	Interior Air Film				0.15	
TOTAL:		238		0.153230057	6.52613	
Wall (Interior)	Interior Air Film				0.15	
	Plywood	18	0.13	7.222222222	0.1385	
	Plywood	12	0.13	10.83333333	0.0923	
	E Foam	102	0.0379	0.371568627	2.6913	
	Plywood	18	0.13	7.222222222	0.1385	
	Plywood	3	0.13	43.33333333	0.0231	
	Interior Air Film				0.15	
TOTAL:		153		0.295543159	3.3836	
Thermal Wall AR-342	Exterior Air Film				0.05	
	PET	3	0.51	170	0.0058824	
	Water	250	0.58	2.32	0.4310345	
	PET	3	0.51	170	0.0058824	
	Air	30	0.024	0.8	1.25	
	Plywood	3	0.13	43.33333333	0.0230769	
	E-foam	35	0.0379	1.082857143	0.9234828	
	Plywood	3	0.13	43.33333333	0.0230769	
	Interior Air Film				0.15	
TOTAL:		327		0.349352803	2.8624359	
Floor (1F) Deck M-Area Panel AR-321	Interior Air Film				0.15	
	Plywood	16	0.13	8.125	0.1230769	
	Plywood	18	0.13	7.222222222	0.1384615	
	E Foam	24	0.0379	1.579166667	0.6332454	
	Plywood	12	0.13	10.83333333	0.0923077	
	Plywood	18	0.13	7.222222222	0.1384615	
	E Foam	45	0.0379	0.842222222	1.1873351	
	Glass Foam	65	0.0711	1.093846154	0.9142053	
	Plywood	12	0.13	10.83333333	0.0923077	
	Exterior Air Film				0.15	
TOTAL:		210		0.276288796	3.6194012	
Roof (2F) Deck M-Area Panel AR-322	Interior Air Film				0.15	
	Plywood	25	0.13	5.2	0.19231	
	Air	54	0.024	0.444444444	2.25	
	Waterproof Plasti	2	0.03	15	0.06667	
	Plywood	18	0.13	7.222222222	0.13846	
	E Foam	11	0.0379	3.445454545	0.29024	
	Glass Foam	65	0.0711	1.093846154	0.91421	
	Plywood	12	0.13	10.83333333	0.09231	
	Plywood	18	0.13	7.222222222	0.13846	
	E Foam	100	0.0379	0.379	2.63852	
	Plywood	12	0.13	10.83333333	0.09231	
	E Foam	28	0.0379	1.353571429	0.73879	
	Plywood	9	0.13	14.44444444	0.06923	
	Air	63	0.024	0.380952381	2.625	
	Plywood	12	0.13	10.83333333	0.09231	
	Interior Air Film				0.15	
TOTAL:		429		0.093995539	10.6388	

	Insulation Type	Thickness (mm)	Thermal Conductivity (W/mk)	Thermal Transmittance (W/m^2k)	Thermal Resistance (m^2k/W)	AREA (m^2)
Glazing (Windows) Wall West2 (Window)	Exterior Air Film				0.05	
	Polycarbonate	10	0.028	2.8	0.35714	
	Air	10	0.024	2.4	0.41667	
	Polycarbonate	10	0.028	2.8	0.35714	
	Interior Air Film				0.15	
TOTAL:		10		0.751341682	1.330952	
Canopy (Roof) Roof South Panel 1	PV Panel	5.2				
Roof South Panel 2	Polycarbonate	10	0.028	2.8	0.35714	
TOTAL:		10			0.35714	
Roof North Panel 2	Polycarbonate	10	0.028	2.8	0.35714	
TOTAL:		10			0.35714	

2.2 Versailles

	Insulation Type	Thickness (mm)	Thermal Conductivity (W/mk)	Thermal Transmittance (W/m^2k)	Thermal Resistance (m^2k/W)	AREA (m^2)
Wall AR-341	Exterior Air Film				0.05	
	Polycarbonate	40	0.044	1.1	0.9091	
	Air	75	0.024	0.32	3.125	
	Plywood	18	0.13	7.222222222	0.1385	
	Plywood	12	0.13	10.83333333	0.0923	
	E Foam	72	0.0379	0.526388889	1.8997	
	VIP	30	0.007	0.233333333	4.2857	
	Plywood	18	0.13	7.222222222	0.1385	
	Plywood	3	0.13	43.33333333	0.0231	
	Interior Air Film				0.15	
TOTAL:		268		0.092491118	10.812	
Wall (Interior)	Interior Air Film				0.15	
	Plywood	18	0.13	7.222222222	0.1385	
	Plywood	12	0.13	10.83333333	0.0923	
	E Foam	102	0.0379	0.371568627	2.6913	
	Plywood	18	0.13	7.222222222	0.1385	
	Plywood	3	0.13	43.33333333	0.0231	
	Interior Air Film				0.15	
TOTAL:		153		0.295543159	3.3836	
Thermal Wall AR-342	Exterior Air Film				0.05	
	PET	3	0.51	170	0.0058824	
	Water	250	0.58	2.32	0.4310345	
	PET	3	0.51	170	0.0058824	
	Air	30	0.024	0.8	1.25	
	Plywood	3	0.13	43.33333333	0.0230769	
	E-foam	35	0.0379	1.082857143	0.9234828	
	Plywood	3	0.13	43.33333333	0.0230769	
	Interior Air Film				0.15	
TOTAL:		327		0.349352803	2.8624359	
Floor (1F) Deck M-Area Panel AR-321	Interior Air Film				0.15	
	Plywood	16	0.13	8.125	0.1230769	
	Plywood	18	0.13	7.222222222	0.1384615	
	E Foam	24	0.0379	1.579166667	0.6332454	
	VIP	30	0.007	0.233333333	4.2857143	
	Plywood	12	0.13	10.83333333	0.0923077	
	Plywood	18	0.13	7.222222222	0.1384615	
	Air	40	0.024	0.6	1.6666667	
	E Foam	50	0.0379	0.758	1.3192612	
	Plywood	12	0.13	10.83333333	0.0923077	
	Exterior Air Film				0.05	
TOTAL:		220		0.115081381	8.6895029	

	Insulation Type	Thickness (mm)	Thermal Conductivity (W/mk)	Thermal Transmittance (W/m^2k)	Thermal Resistance (m^2k/W)	AREA (m^2)
Roof (2F) Deck M-Area Panel AR-322	Interior Air Film				0.15	
	Plywood	25	0.13	5.2	0.19231	
	Air	54	0.024	0.444444444	2.25	
	Waterproof Plastics	2	0.03	15	0.06667	
	Plywood	18	0.13	7.222222222	0.13846	
	E Foam	11	0.0379	3.445454545	0.29024	
	Glass Foam	65	0.0711	1.093846154	0.91421	
	Plywood	12	0.13	10.83333333	0.09231	
	Plywood	18	0.13	7.222222222	0.13846	
	E Foam	95	0.0379	0.398947368	2.50660	
	Plywood	12	0.13	10.83333333	0.09231	
	E Foam	28	0.0379	1.353571429	0.73879	
	VIP	30	0.007	0.233333333	4.28571	
	Plywood	9	0.13	14.44444444	0.06923	
	Air	63	0.024	0.380952381	2.625	
	Plywood	12	0.13	10.83333333	0.09231	
	Interior Air Film				0.15	
TOTAL:		454		0.06760141	14.7923	
Glazing (Windows)	Exterior Air Film				0.05	
	Polycarbonate	10	0.028	2.8	0.35714	
	Air	10	0.024	2.4	0.41667	
	Polycarbonate	10	0.028	2.8	0.35714	
	Interior Air Film				0.15	
TOTAL:		10		0.751341682	1.33095	
Roof South Panel 1 	PV Panel	5.2				
TOTAL:		5.2				
Roof South Panel 2	Polycarbonate	10	0.028	2.8	0.35714	
TOTAL:		10		2.8	0.35714	
Roof North Panel	Polycarbonate	10	0.028	2.8	0.35714	
TOTAL:		10		2.8	0.35714	

Appendix B Analysis of Solar Thermal System Performance: Energy Balance of Solar Thermal System

1. Orchid House in Taipei

1.1 Analysis of Solar Thermal System Performance

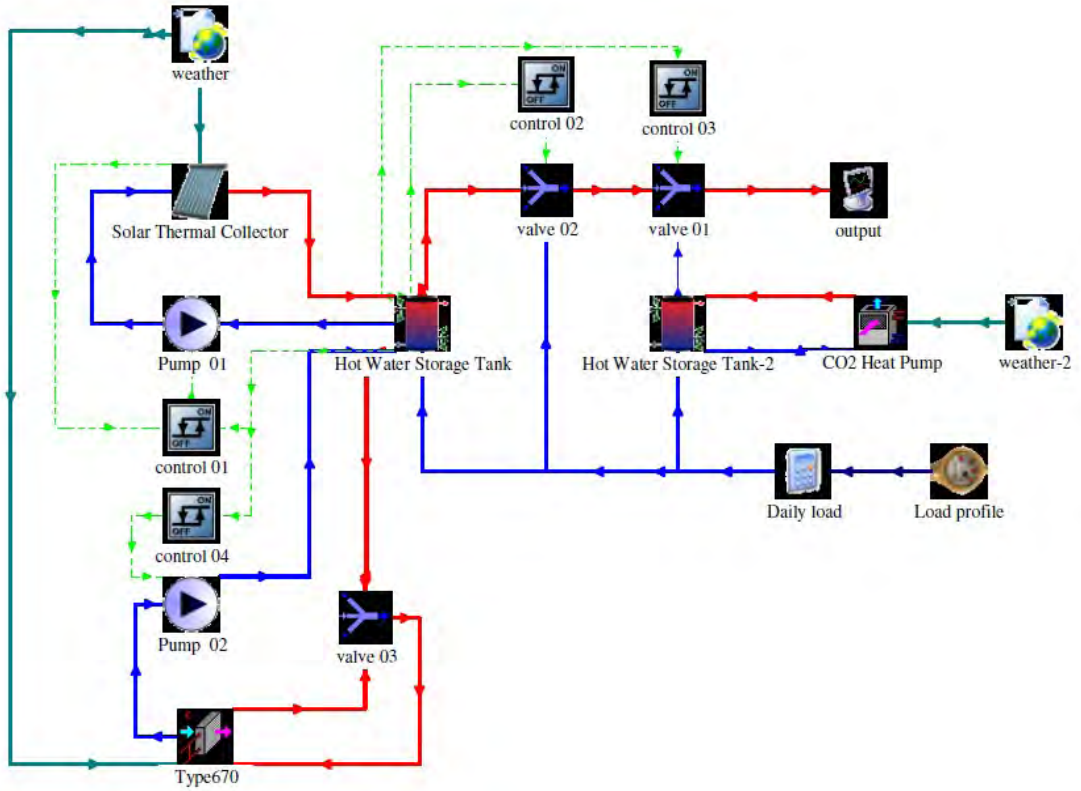


Fig B.1.1a TRNSYS model

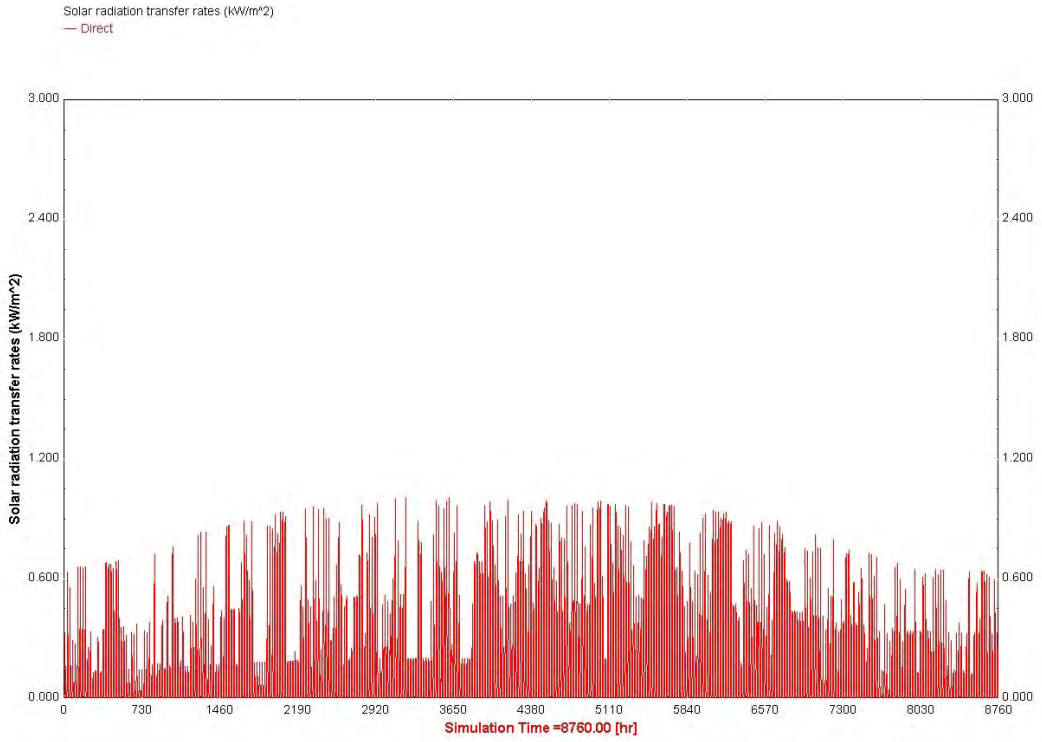


Fig B.1.1b Direct radiation hour of year

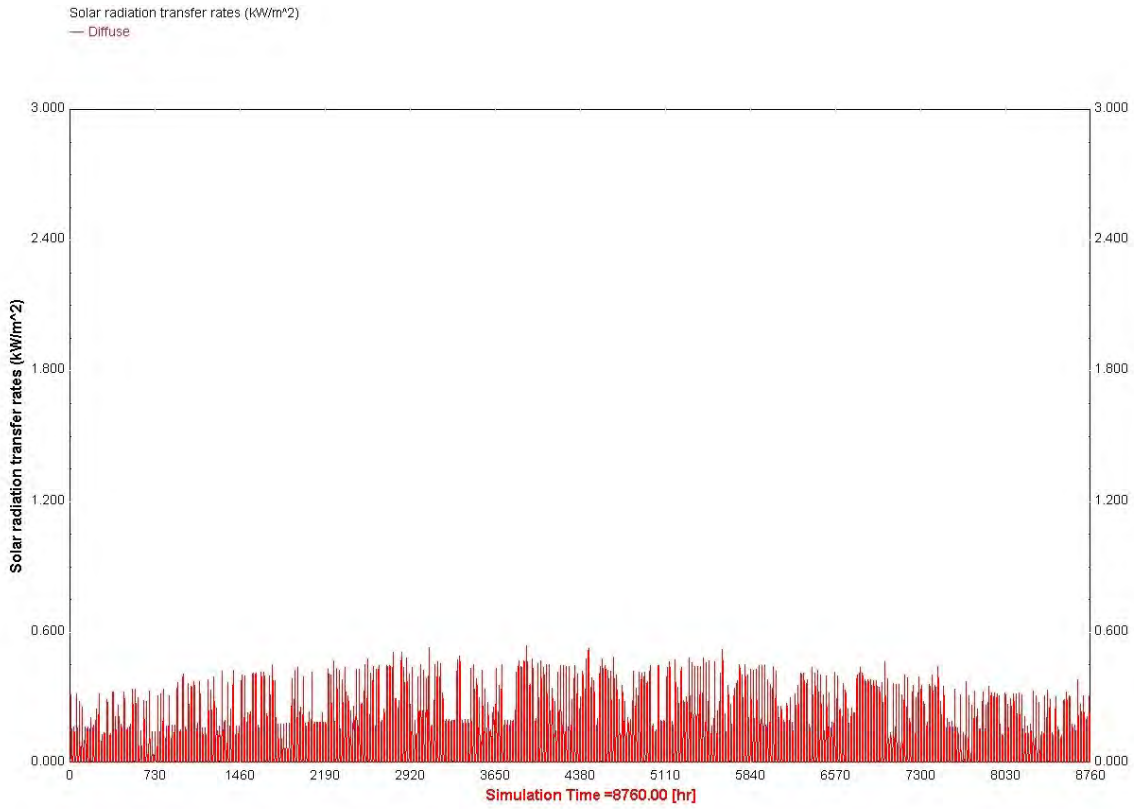


Fig B.1.1c Diffusion radiation hour of year

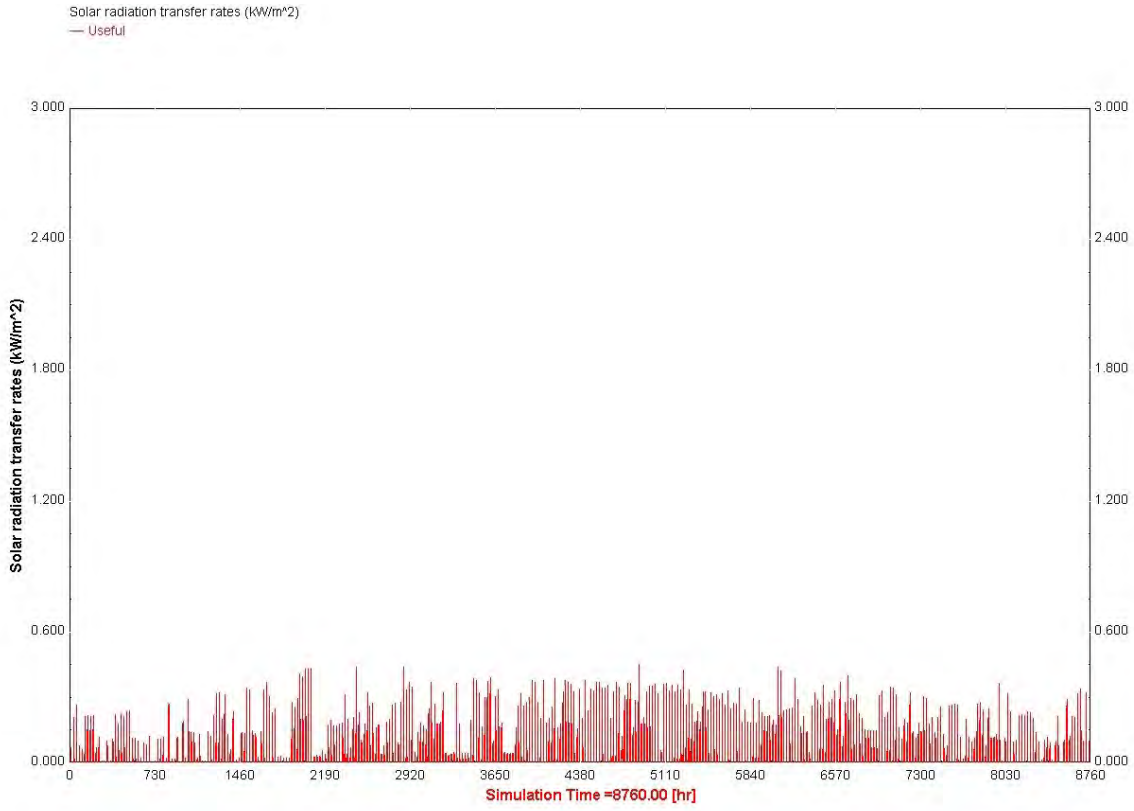


Fig B.1.1d Useful radiation hour of year energy collected from solar collectors

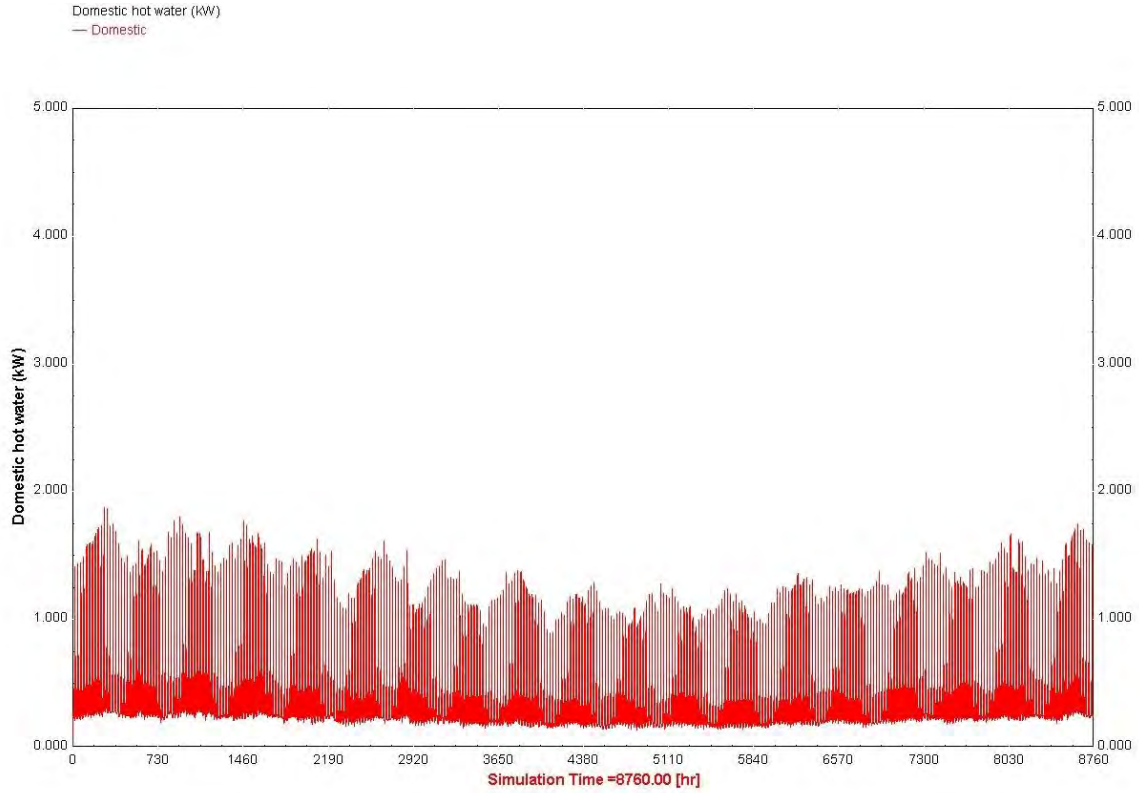


Fig B.1.1e Heating load – domestic hot water

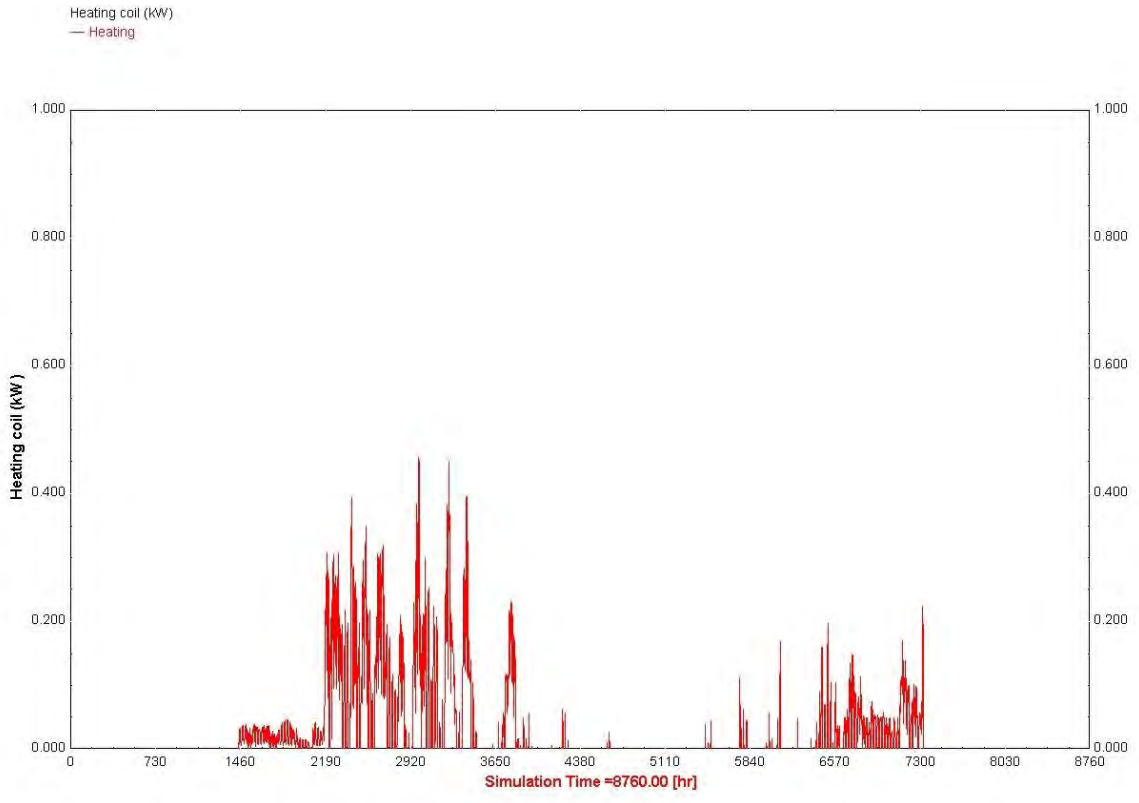


Fig B.1.1f Solar thermal energy available for space heating –solar energy collected deducts the energy consumed by heating the domestic water, hour of year

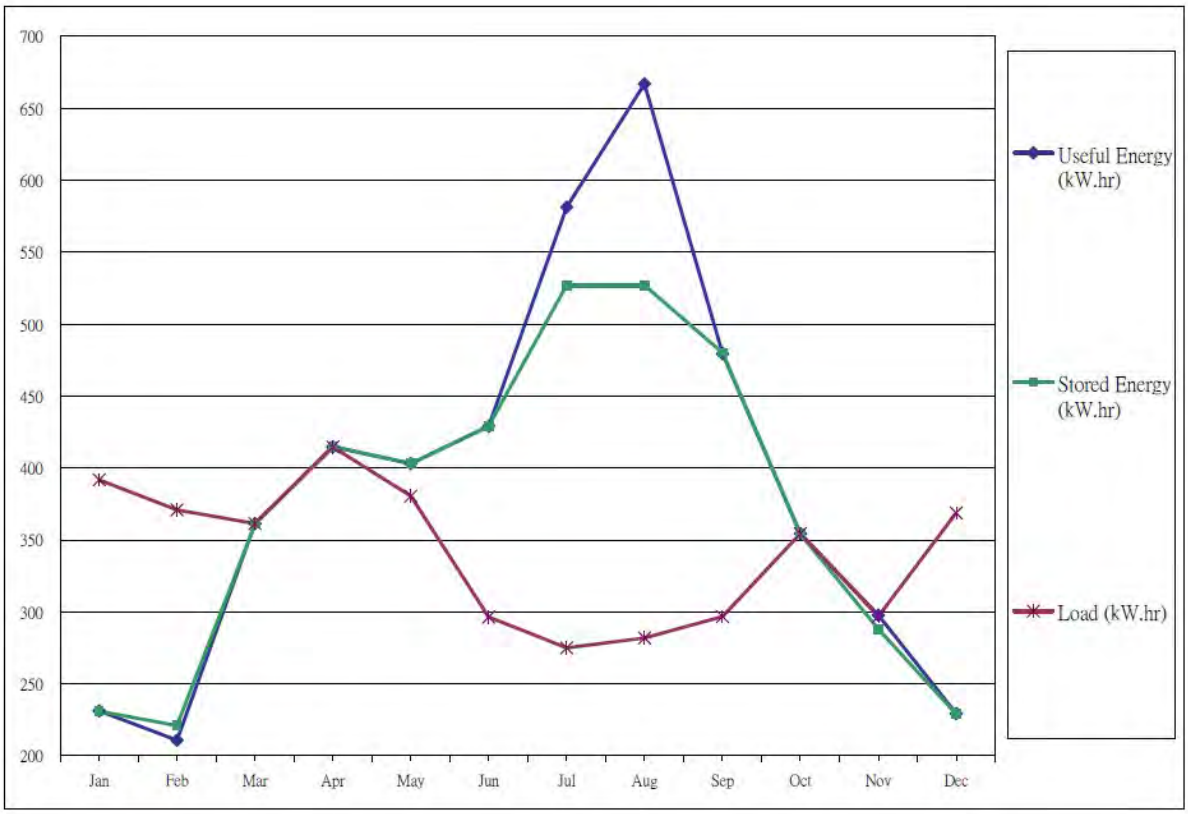


Fig B.1.1g Useful Energy, stored energy and heating load (domestic water plus space heating) profile, hour of year

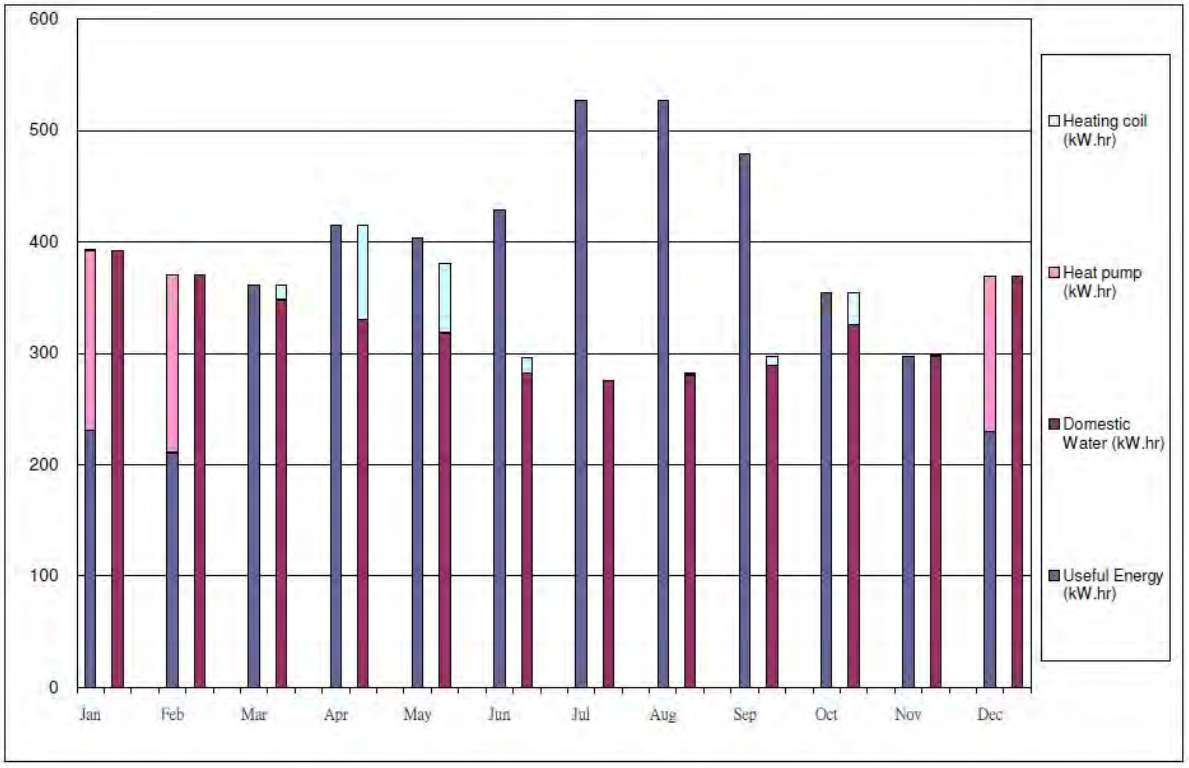


Fig B.1.1h Result of solar thermal system's performance –
solar energy collected, heat pump generation and energy consumed, hour of year

1.2 CO2 Heat Pump's Electrical Energy Consumption Analysis

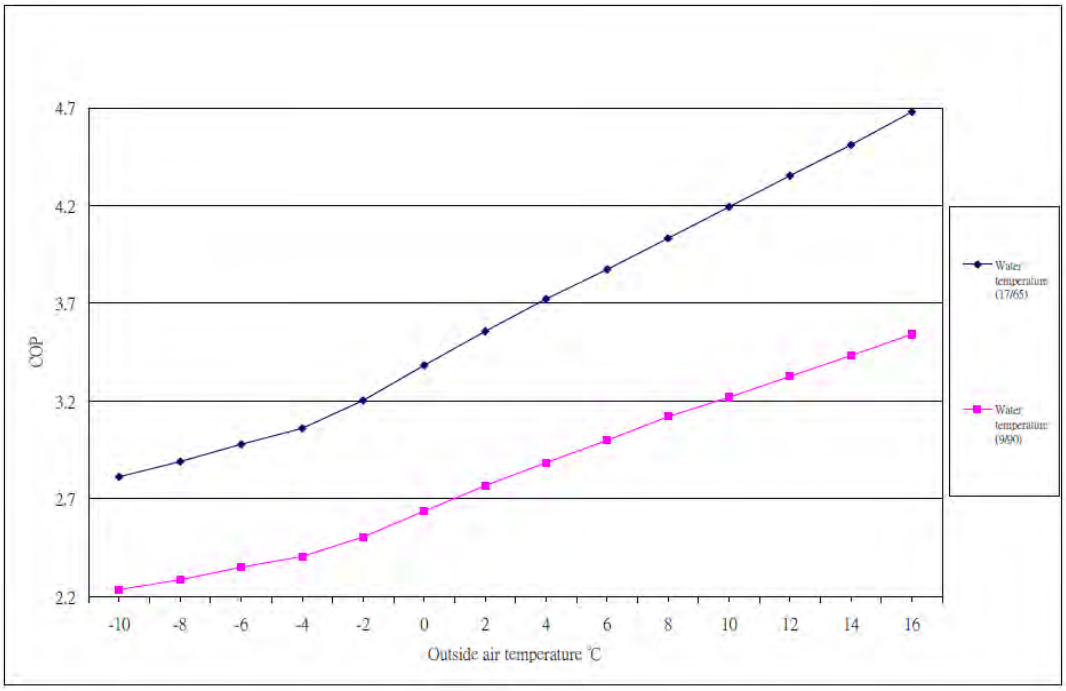


Fig B.1.2a COP of CO2 heat pump

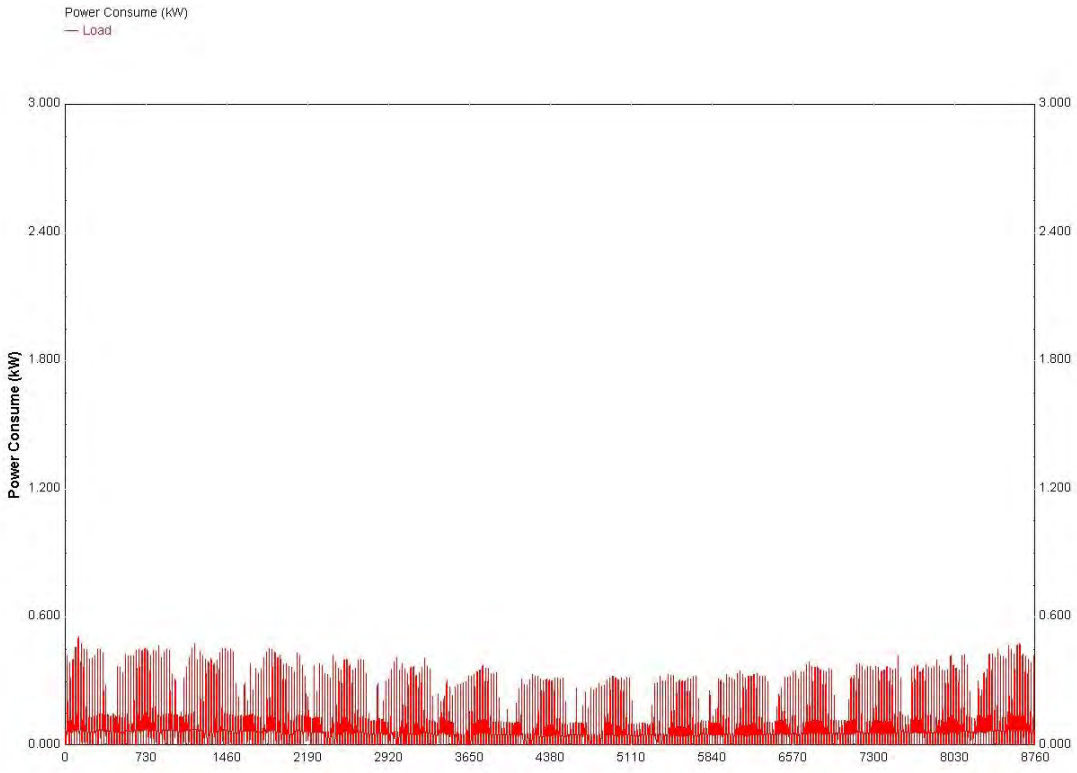


Fig B.1.2b Electrical energy consumption by CO2 heat pump, hour of year

2. Orchid House in Versailles

2.1 Analysis of Solar Thermal System Performance

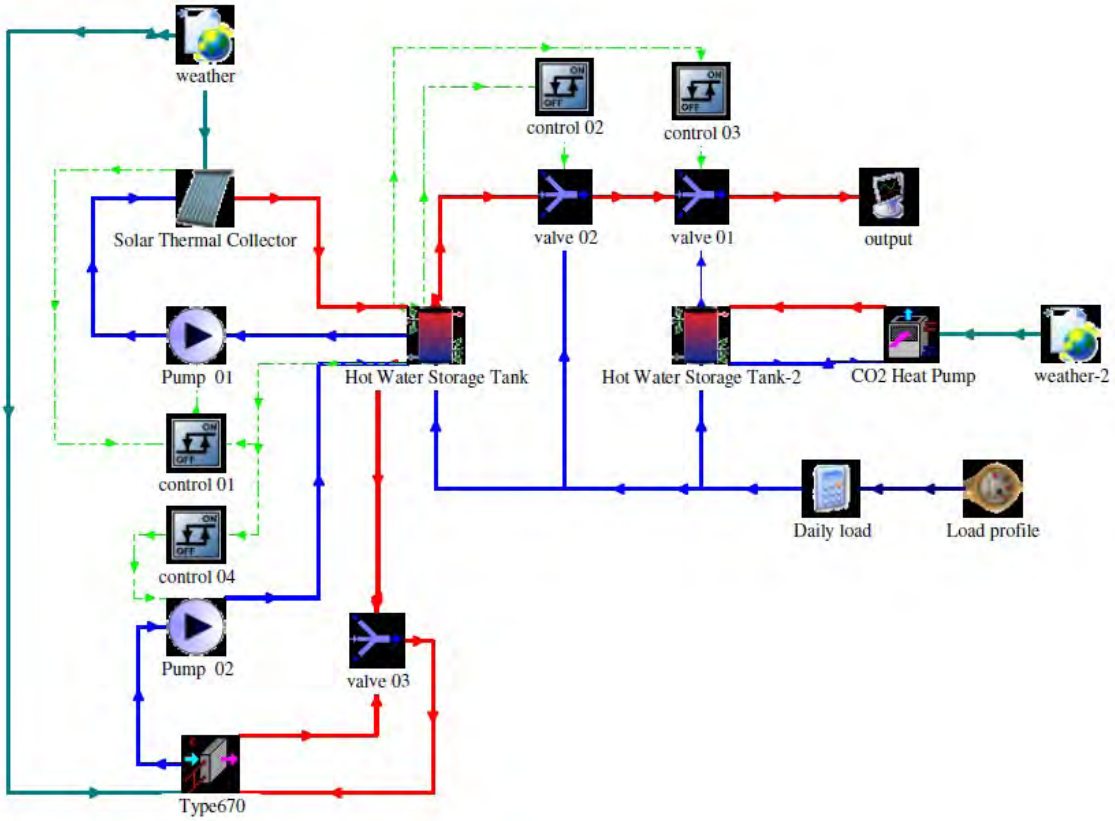


Fig B.2.1a TRNSYS model

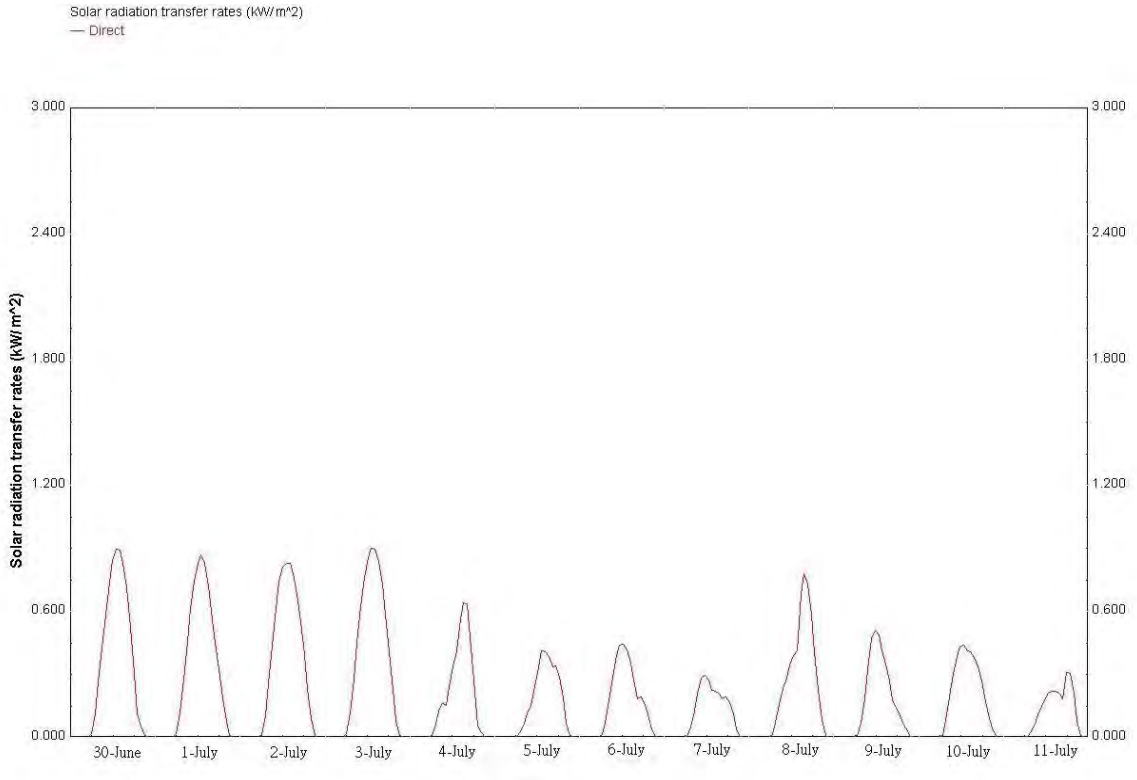


Fig B.2.1b Direct radiation from June 30 to July 11

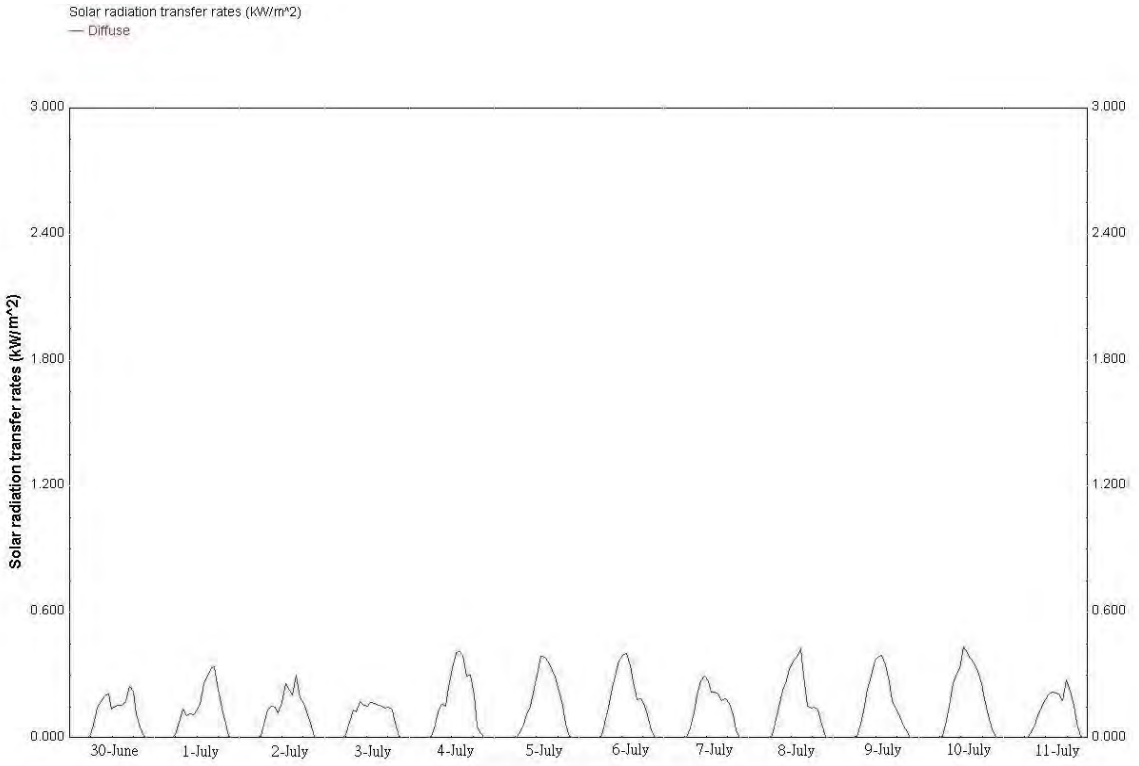


Fig B.2.1c Diffusion radiation from June 30 to July 11

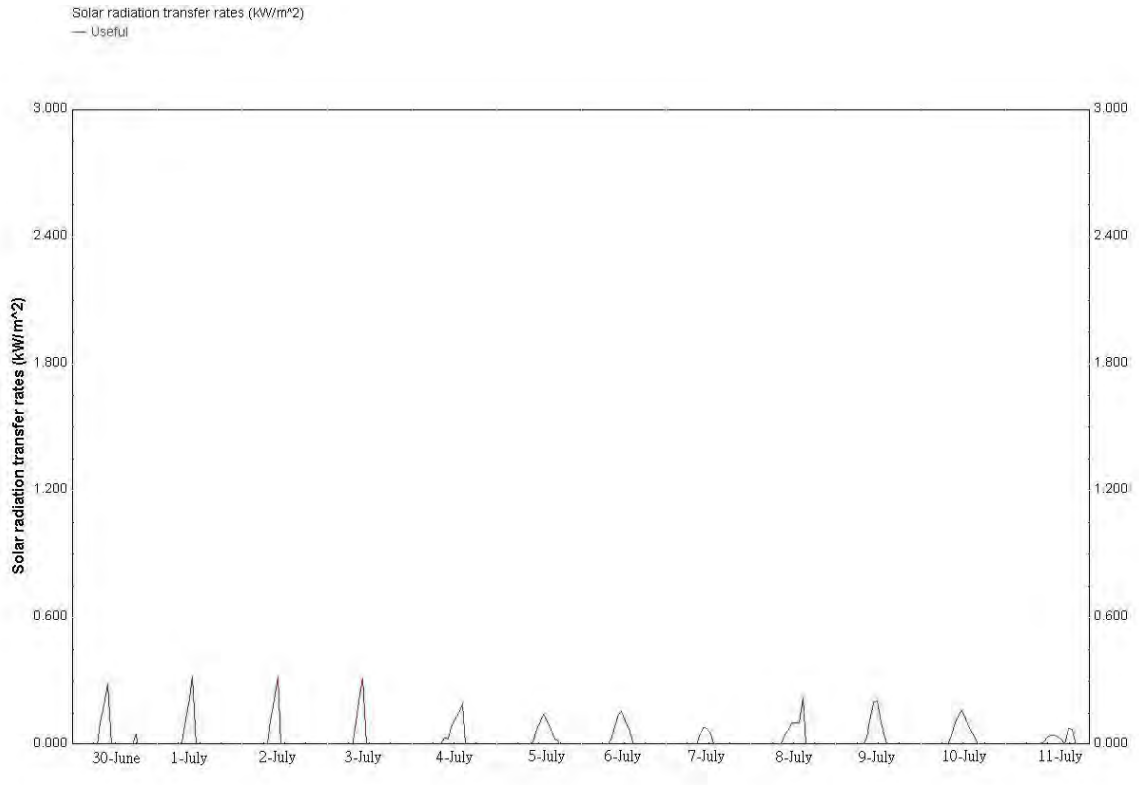


Fig B.1.4 Useful radiation from June 30 to July 11
Energy collected from solar collectors

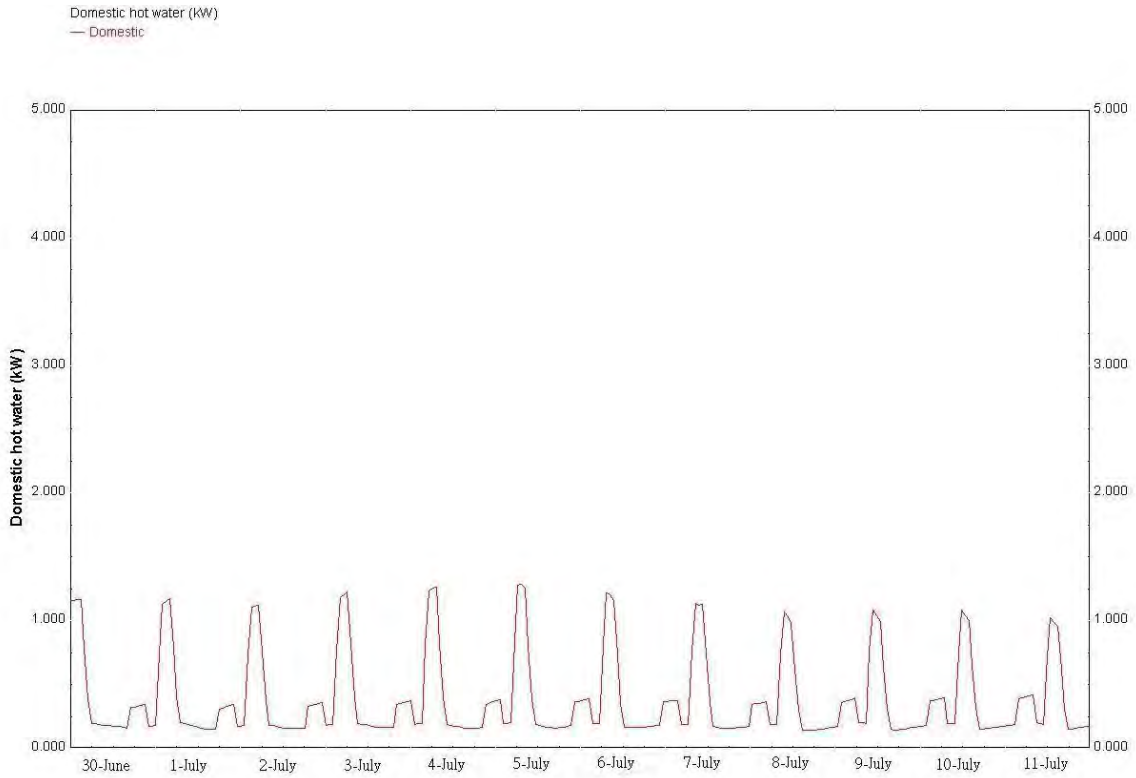


Fig B.2.1e Heating load – domestic hot water from June 30 to July 11

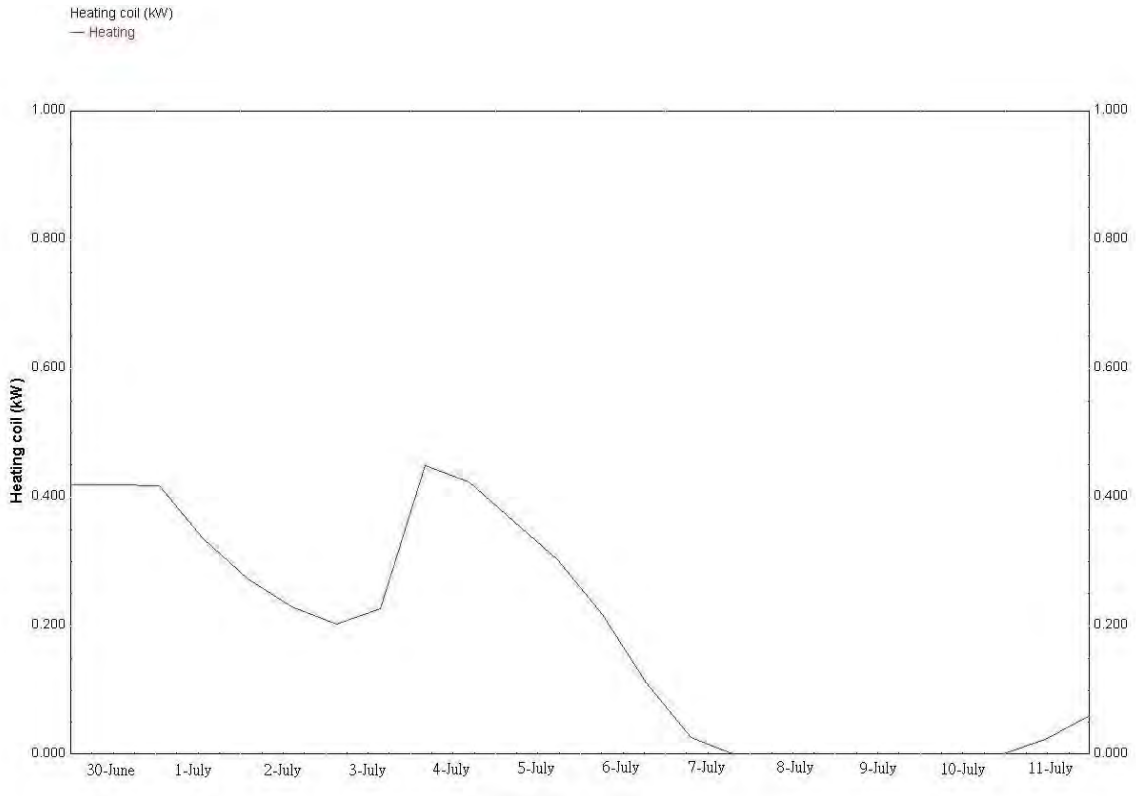


Fig B.2.1f Solar thermal energy available for space heating – solar energy collected deducts the energy consumed by heating the domestic water, from June 30 to July 11.

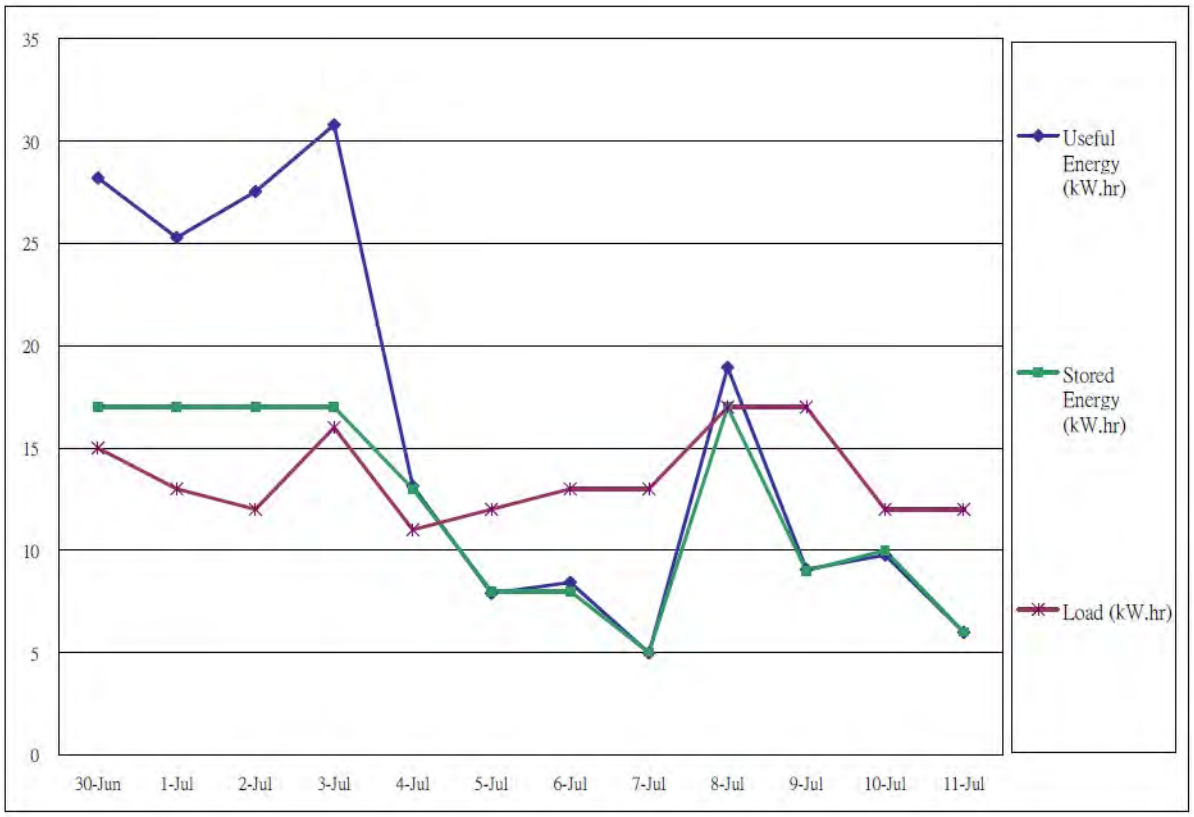


Fig B.2.1g Useful energy, stored energy, and heating load for domestic hot water and space heating, from June 30 to July 11.

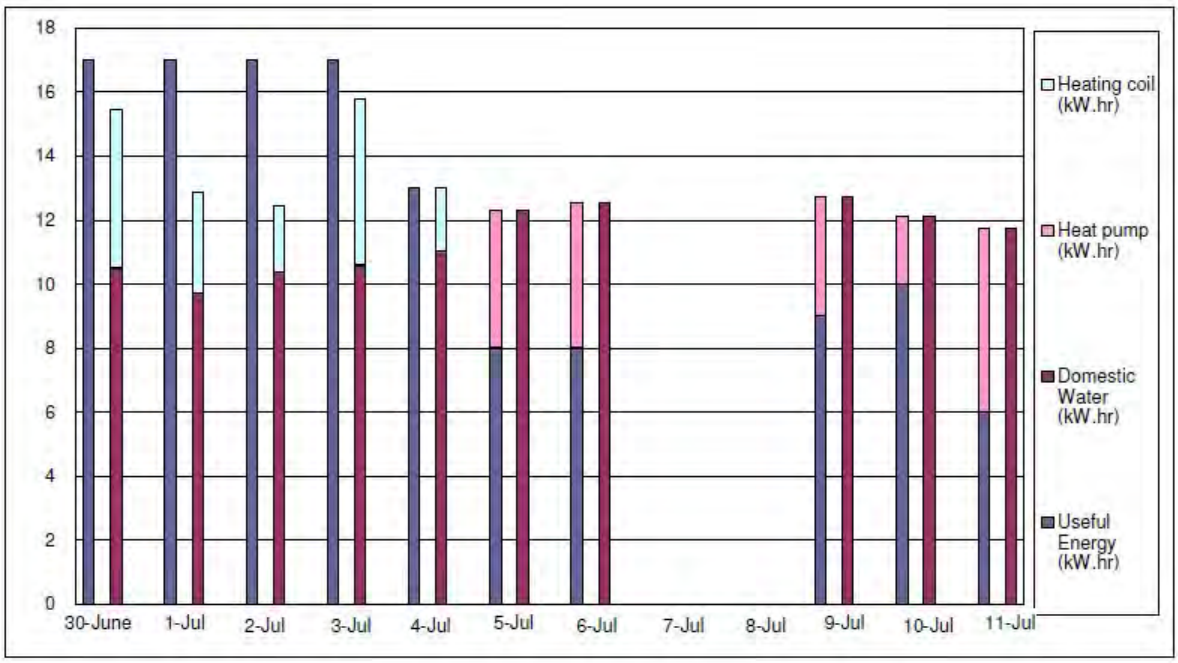


Fig B.2.1h Result of solar thermal system's performance – solar energy collected, heat pump generation and energy consumed, from June 30 to July 11.

2.2 CO2 Heatpump's Electrical Energy Consumption Analysis

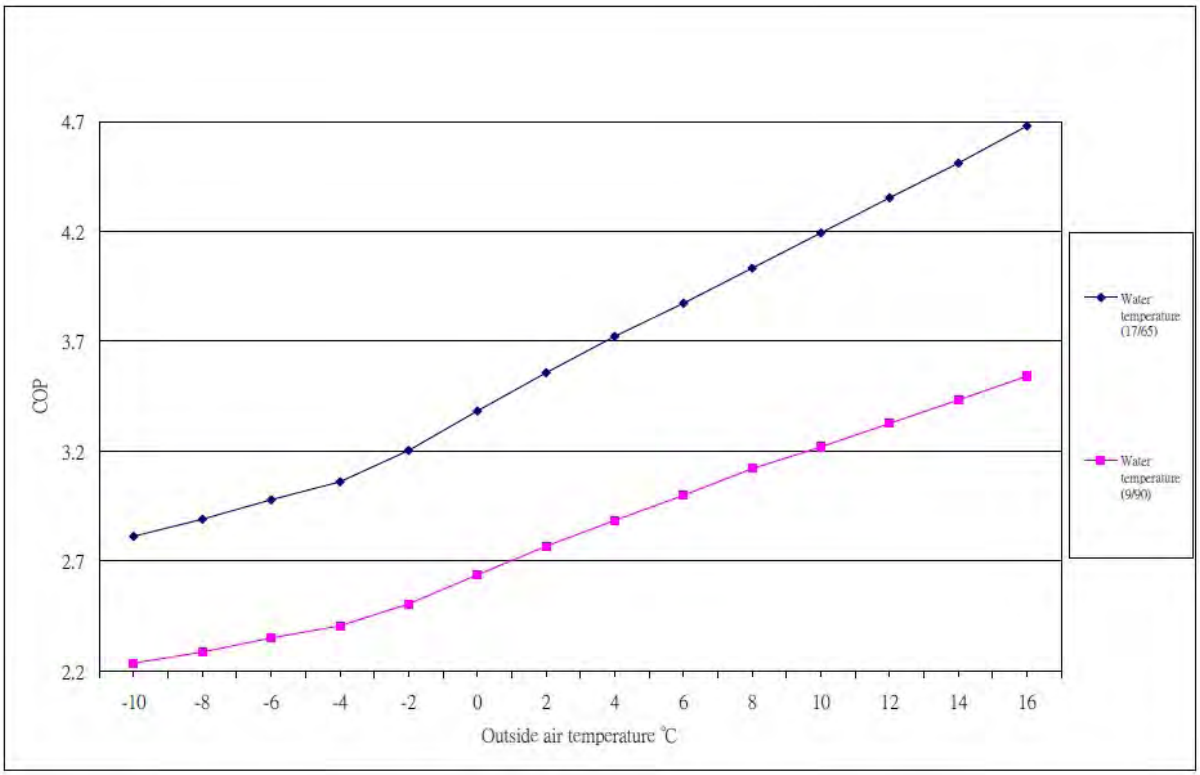


Fig B.2.2a COP of CO2 heat pump

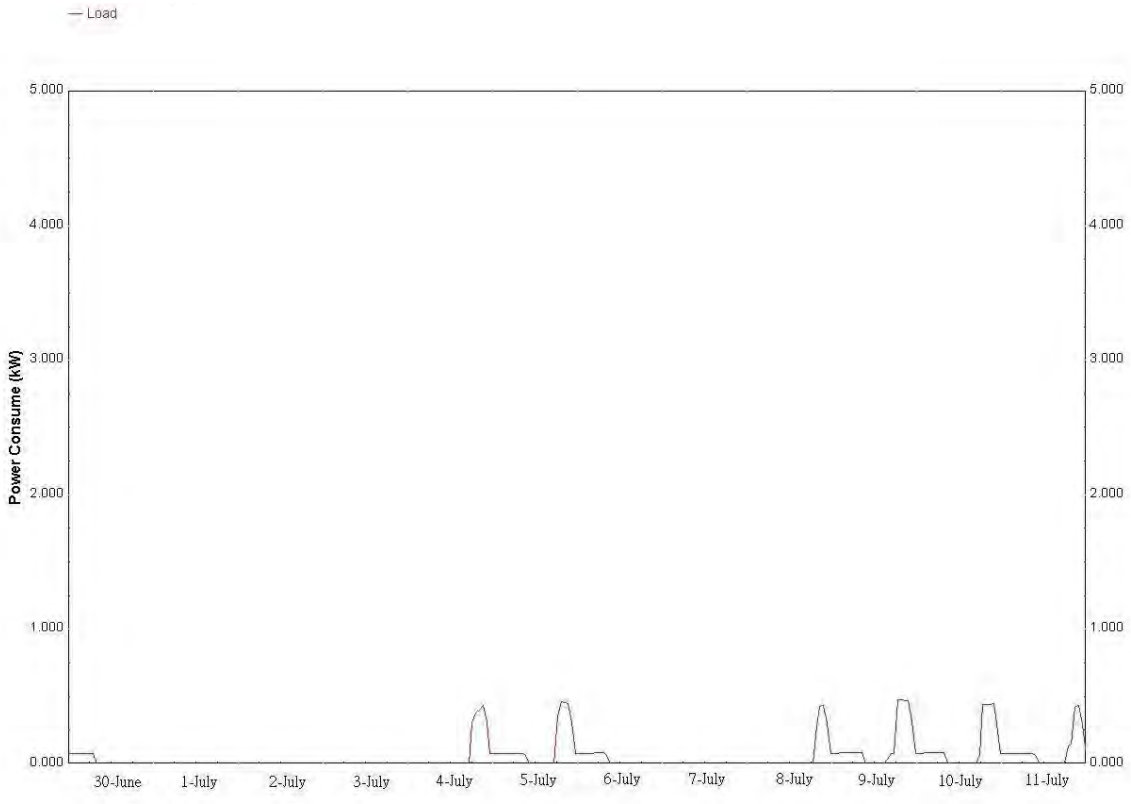


Fig B.2.2b Electrical consumption by CO2 heat pump, from June 30 to July 11

Appendix C – Analysis of HRV System Performance

1. Orchid House in Taipei

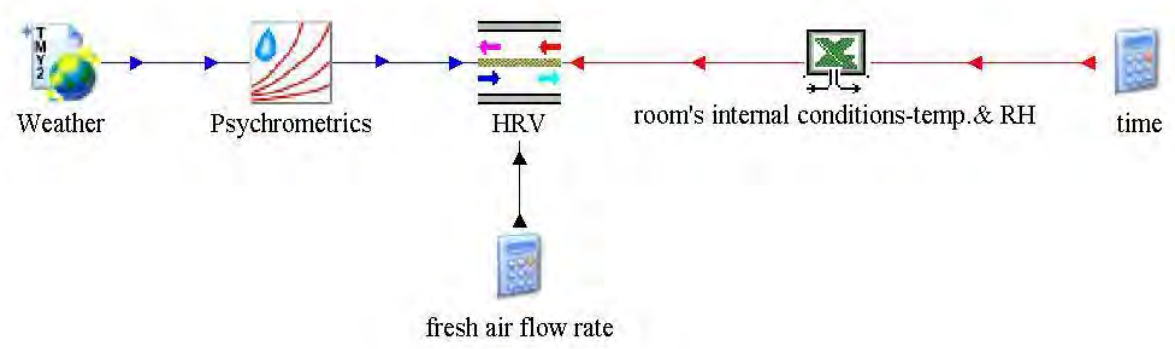


Fig C.1a TRNSYS model – for calculating the cooling load and heating load saving in heat reclaim ventilation mode.

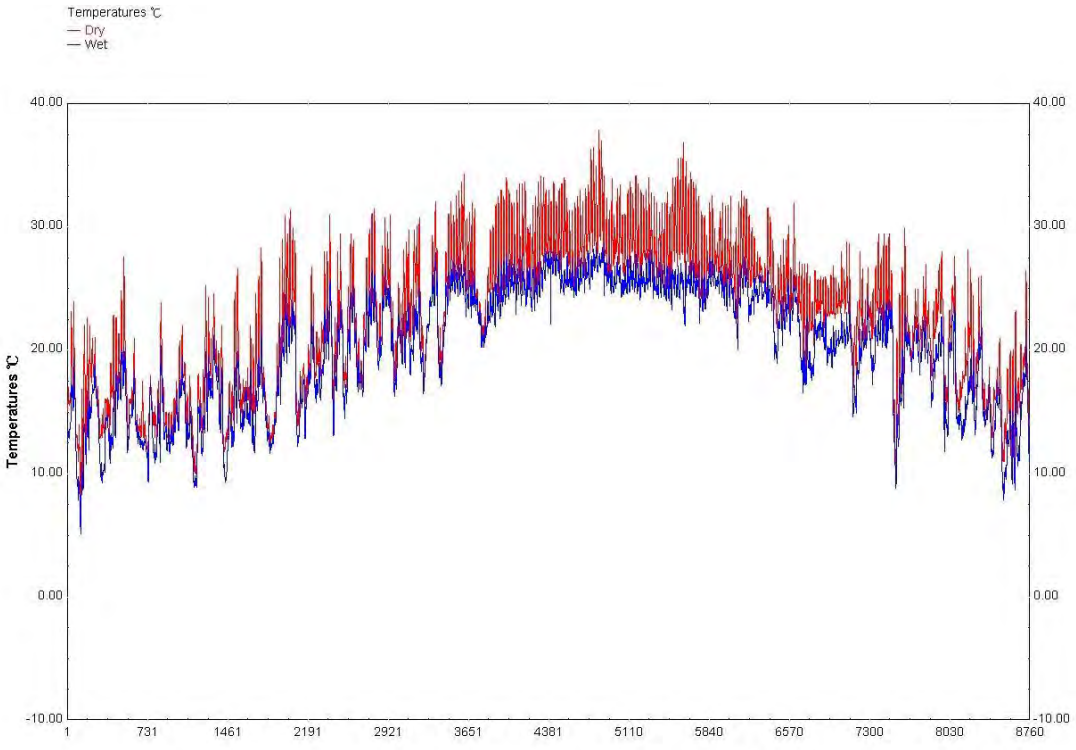


Fig C.1b Dry bulb and wet bulb temperature, hour of year – outdoor conditions

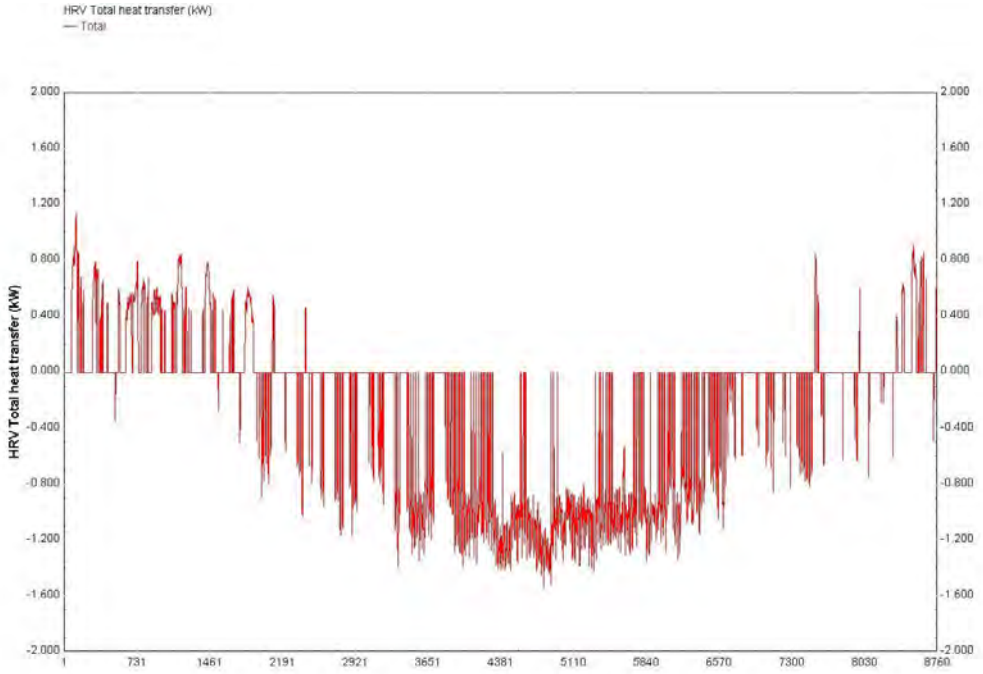


Fig C.1c Energy recovered by HRV, hour of year
Positive value represents heating energy recovered; negative value represents cooling energy recovered

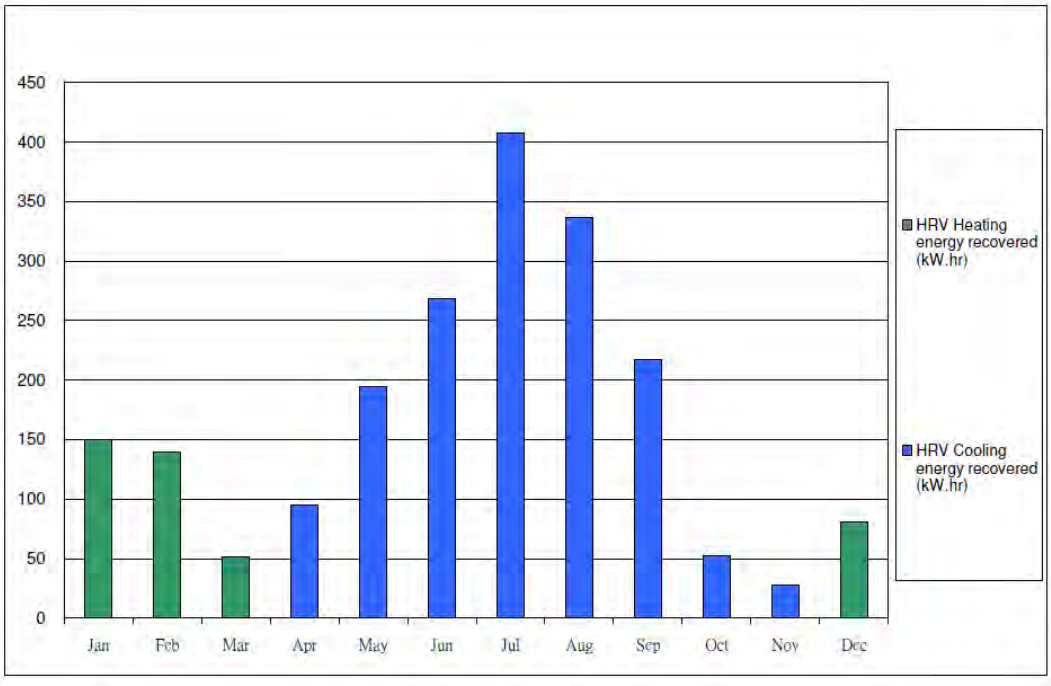


Fig C.1d Summary of HRV performance, hour of year

2. Orchid House in Versailles

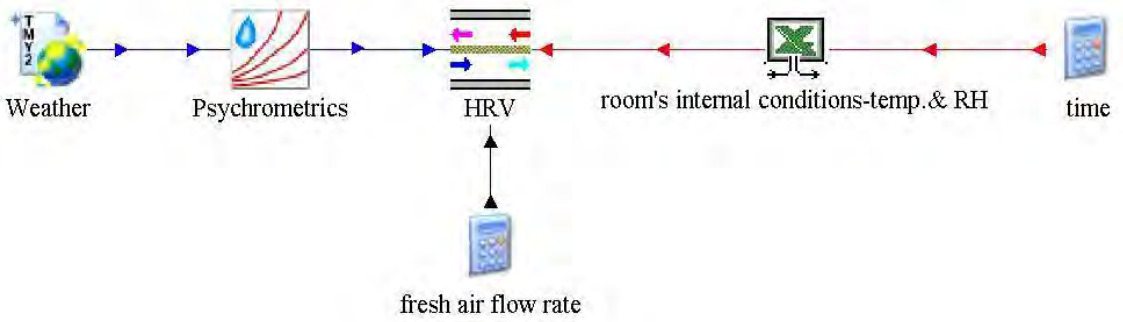


Fig C.2a TRNSYS model

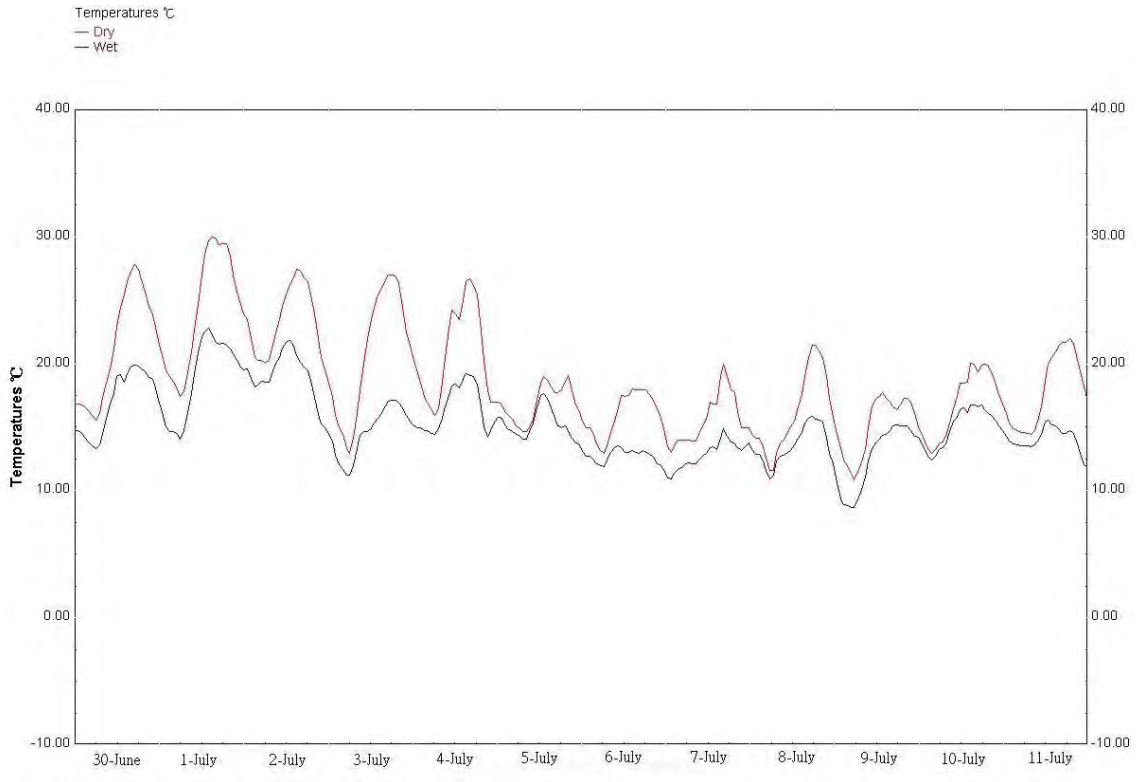


Fig C.2b Dry bulb and wet bulb temperature, from June 30 to July 11 – outdoor conditions

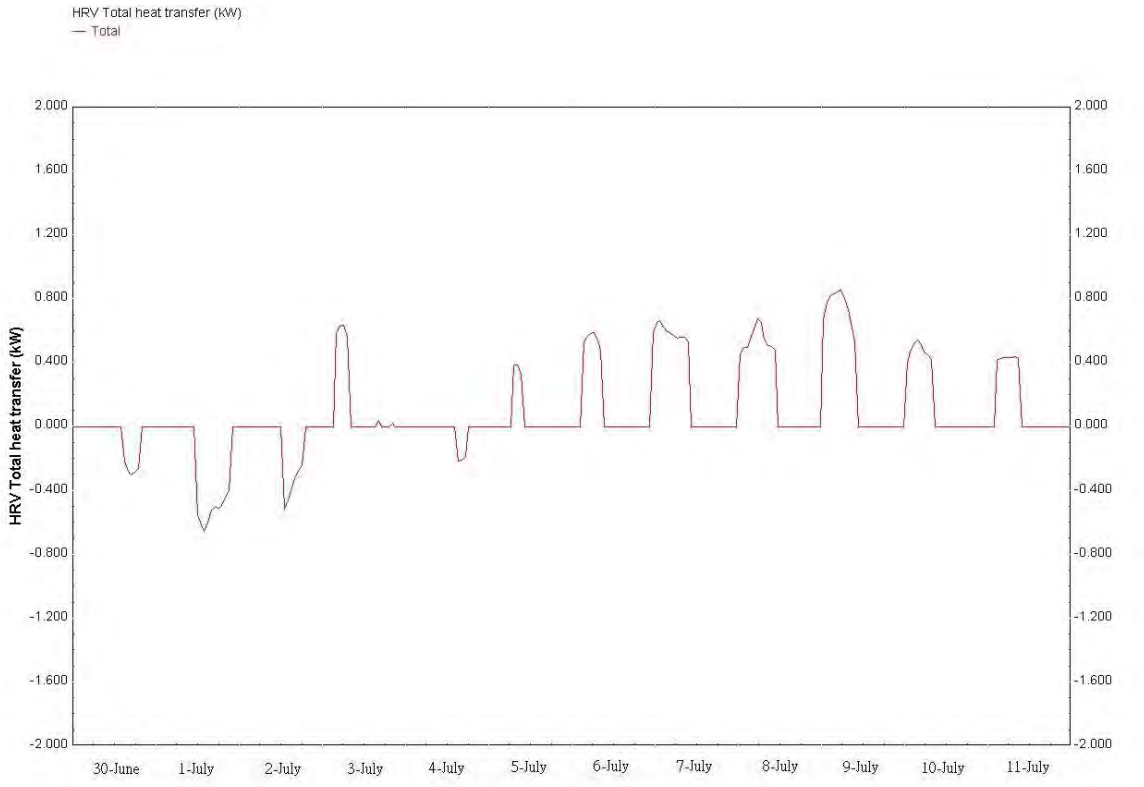


Fig C.2c Energy recovered by HRV, from June 30 to July 11
positive value represents heating energy recovered; negative value represents cooling energy recovered

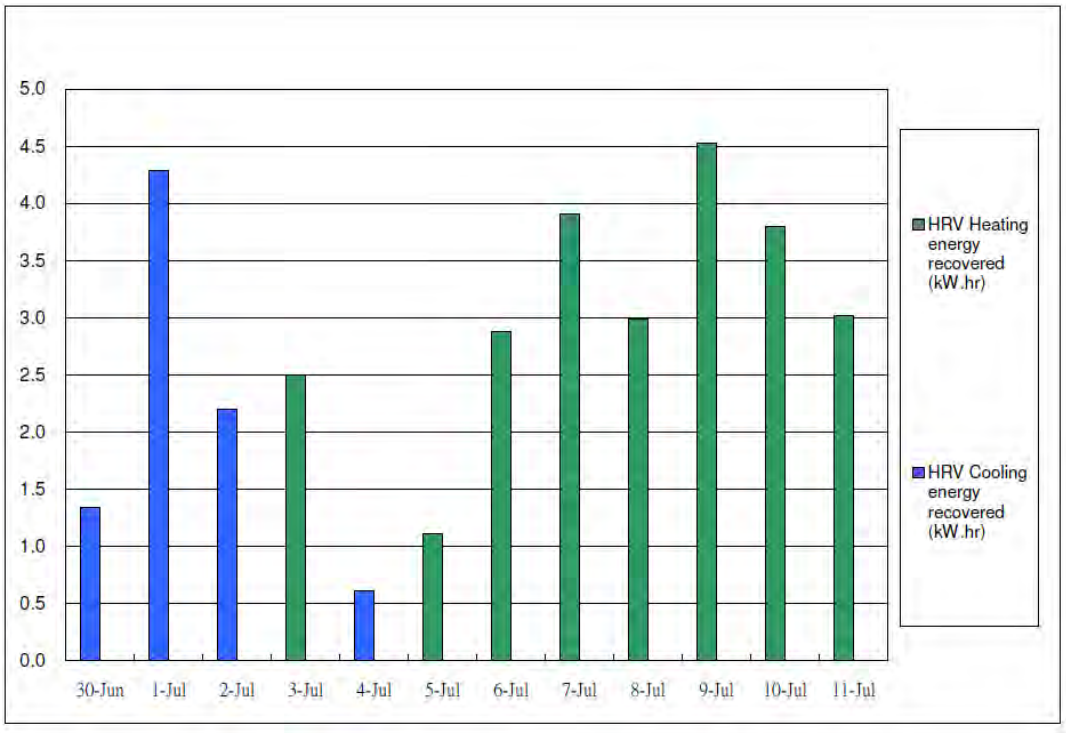


Fig C.2d Summary of HRV performance, from June 30 to July 11

Appendix D – Analysis of VRV Electrical Energy Consumption

1. Orchid House in Taipei

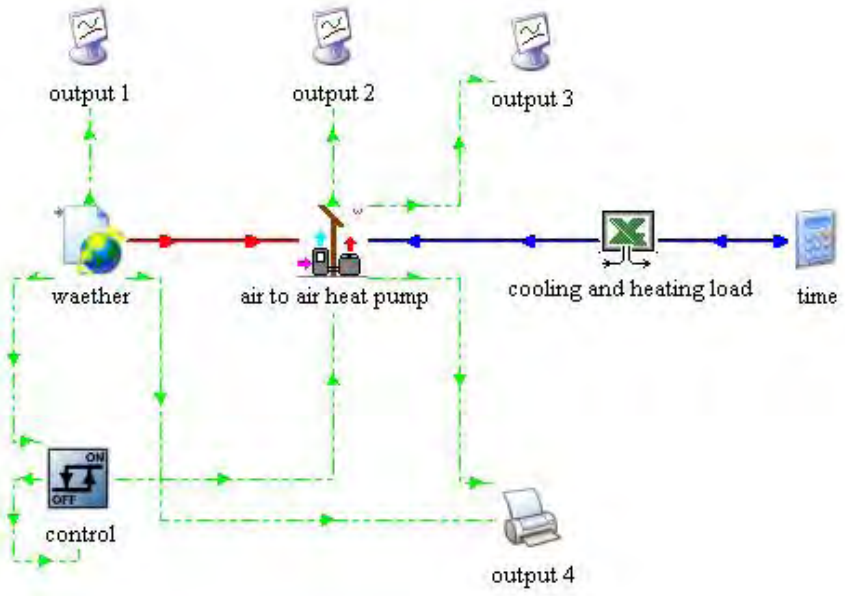


Fig D.1a TRNSYS model

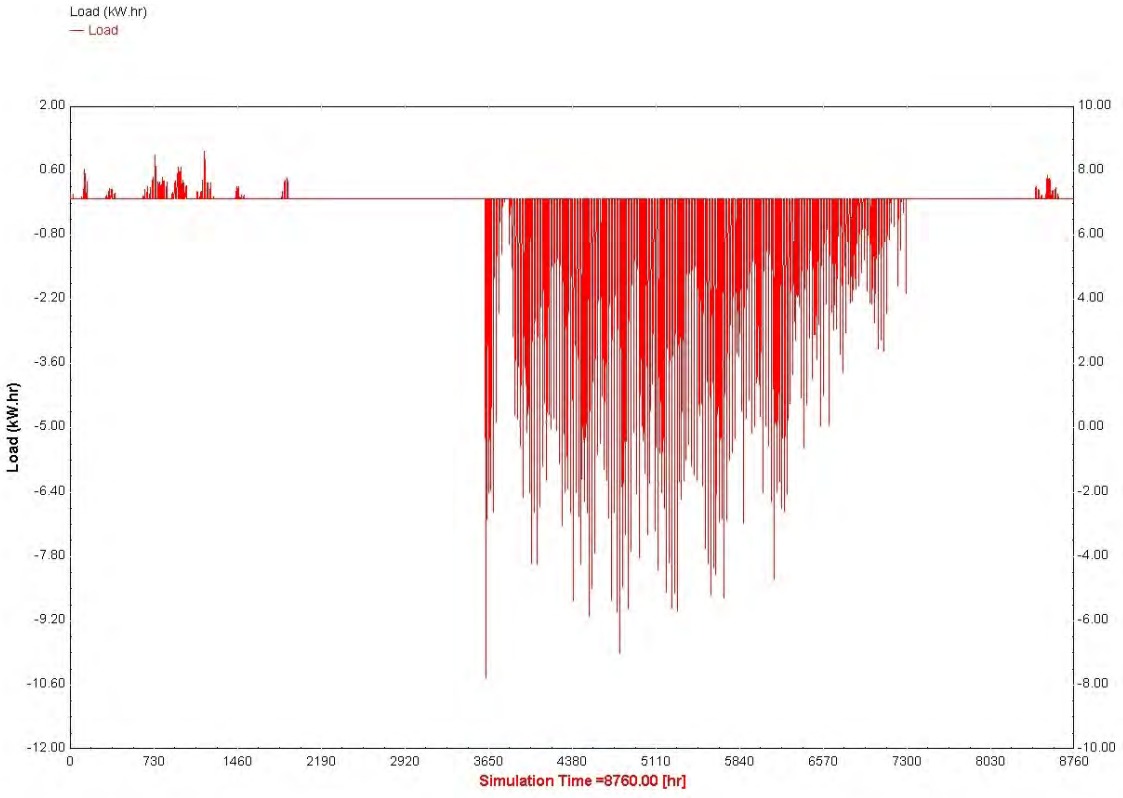


Fig D.1b Cooling loads and heating loads, hour of year
Positive value represents heating loads and negative value represents cooling loads.

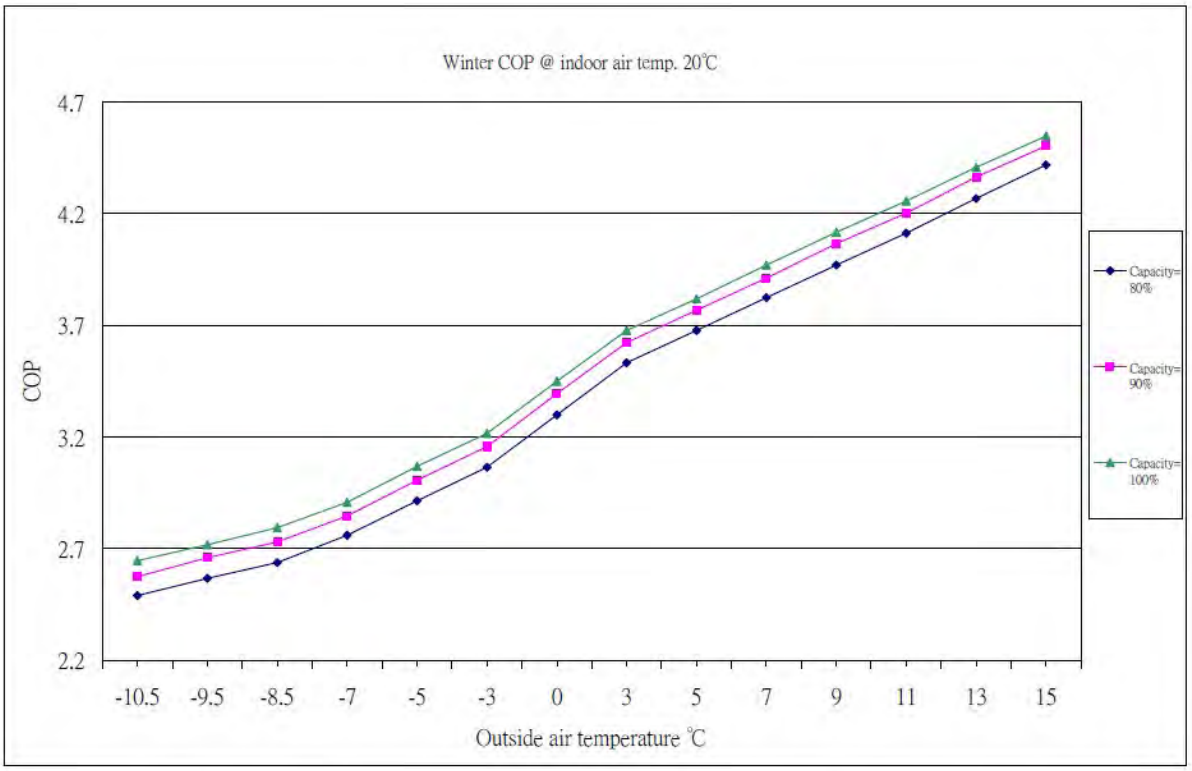


Fig D.1c COP of VRV in the heating mode

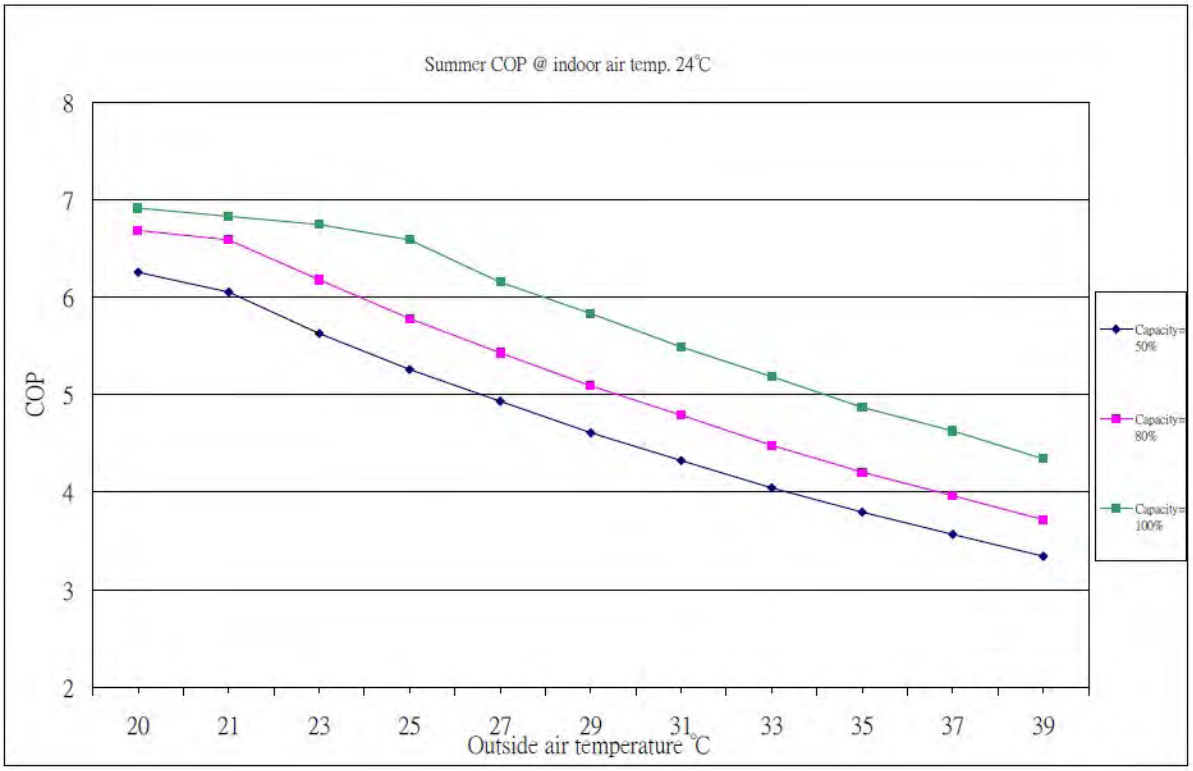


Fig D.1d COP of VRV in the cooling mode

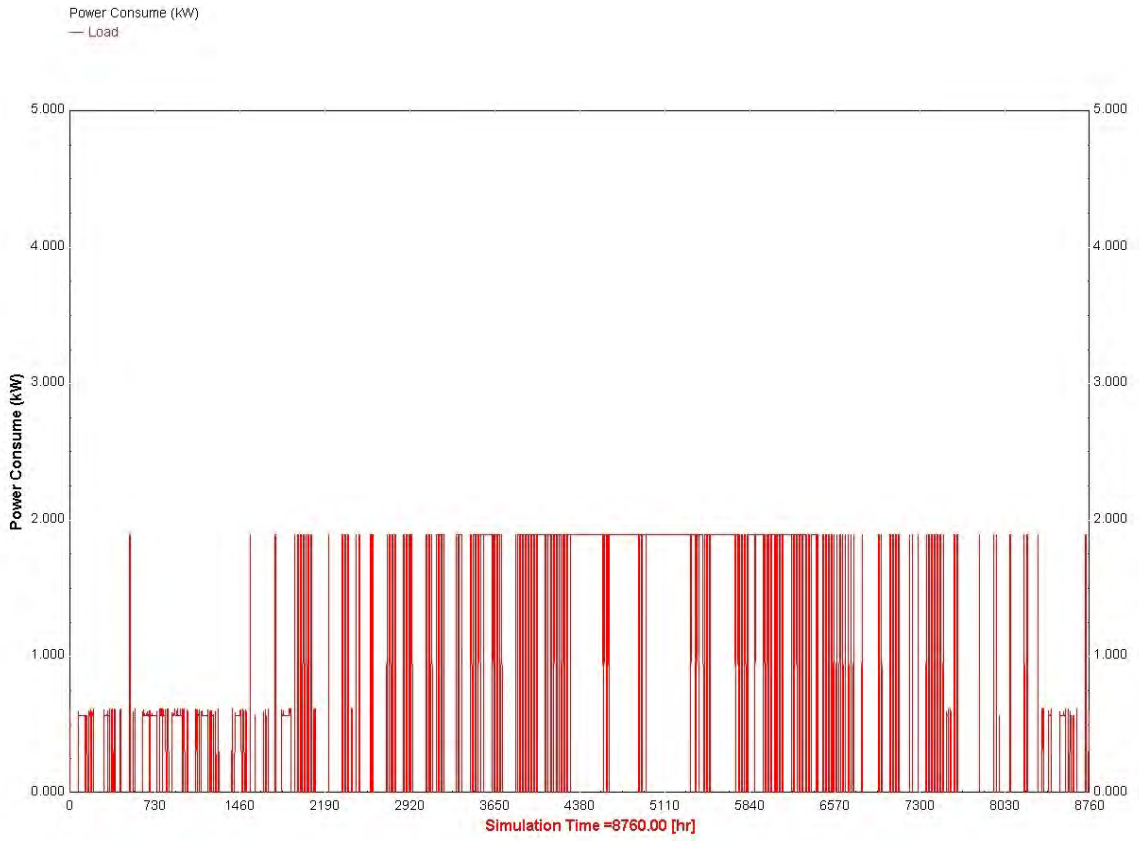


Fig D.1e Electrical energy consumption by VRV, hour of year

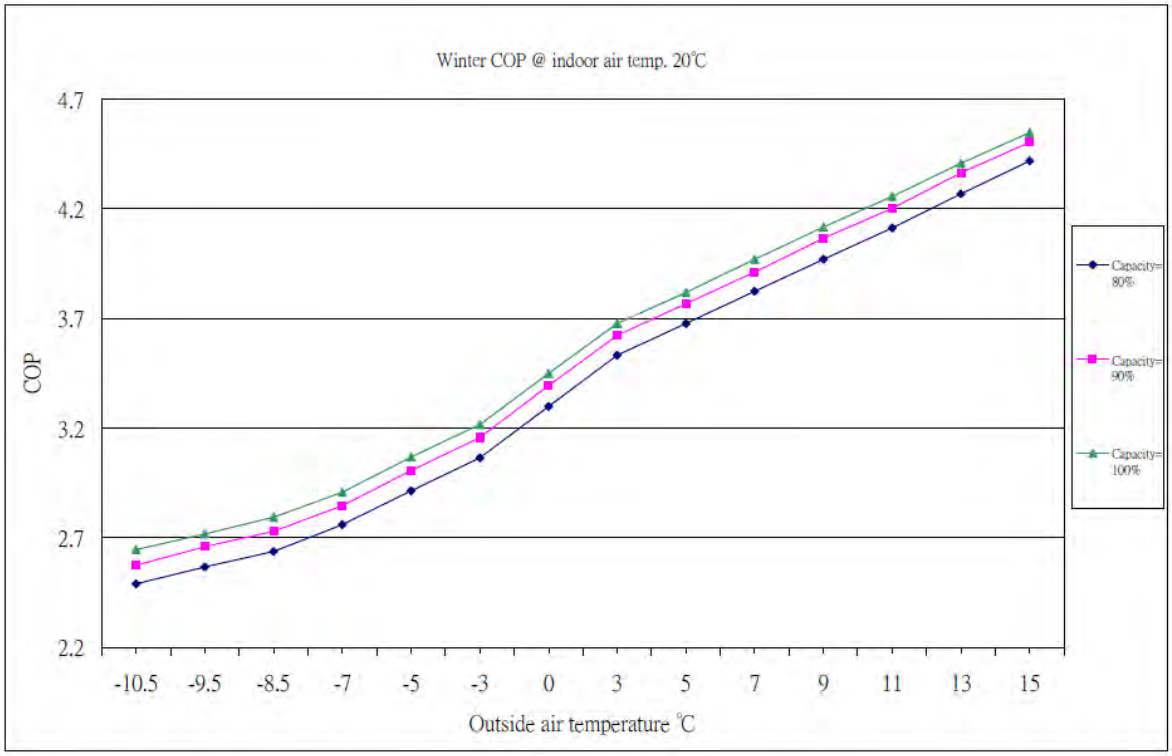


Fig D.2c COP of VRV in the heating mode

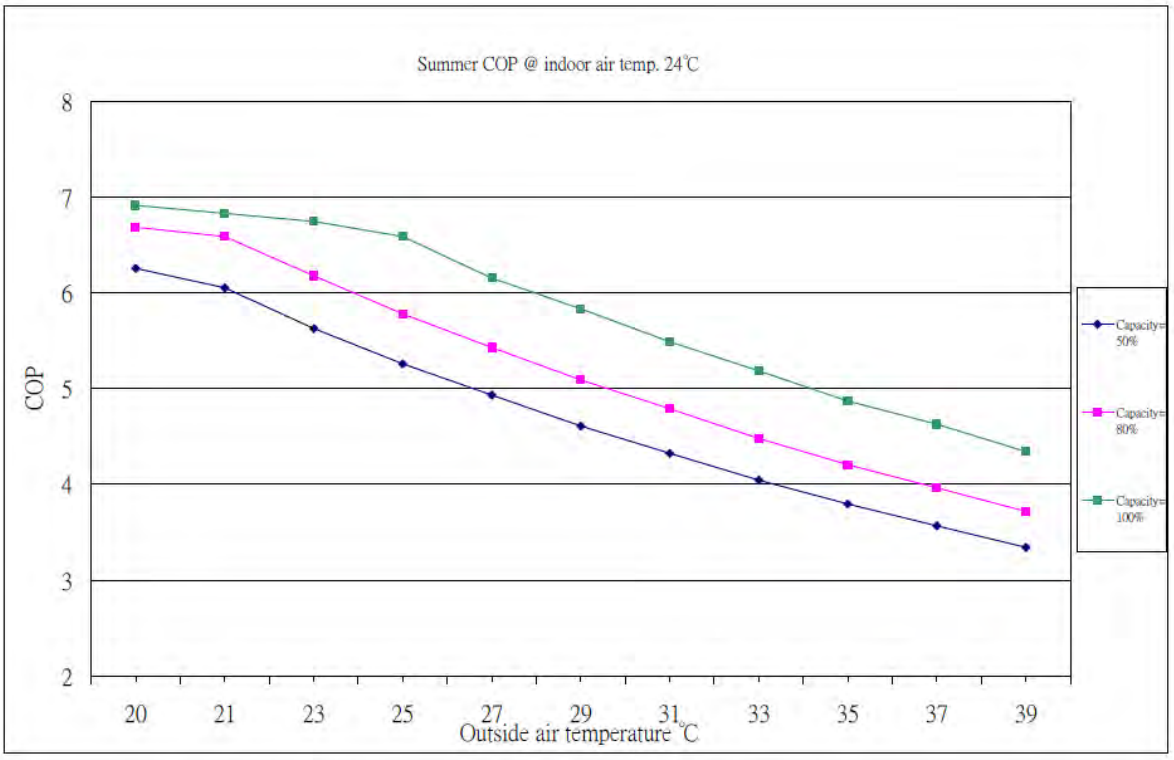


Fig D.2d COP of VRV in the cooling mode

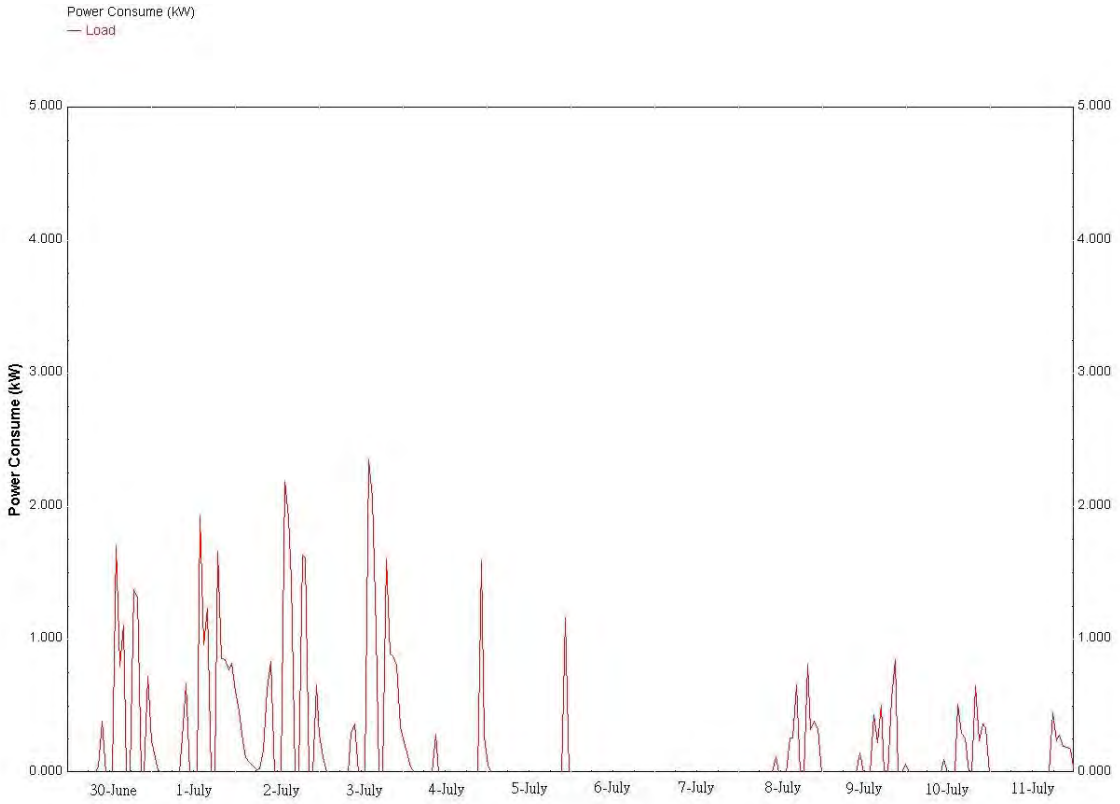


Fig D.2e Electrical energy consumption by VRV, from June 30 to July 11

Appendix E Appliances Report

Product Name	Manufacturer	Model Name	Specifications	Size (D/W/H) mm	Energy label	Power(Consumption)
Refrigeration / Freezing	MIELE	KFN37452 i DE	R: 170 L F: 57 L	560/550/1772	A++	308W(0.627kwh/24hr)
Oven	MIELE	H2161 B CLST	56 L	593/560/555	A	3500 W
Dishwasher	MIELE	G6995 SCViK2O	Normal：55℃ Intensive：75℃	598/570/845	A+++	2110W/10A
Cooking	MIELE	Domino CS 1112E	2 heating plates 1200W/600-1800W	272/500	A	1800 W
Cloths Washer	MIELE	W 664	46L	456/600/900	A++	1400W(0.77kwh)
Dryer	BOSCH	WTW84363NL	112L	640/700/880		1000W(212kwh)
TV	Samsung	F400 Series 4	LED/ 28 inch	49.5/645/435	A	29W
Notebook	ASUS	Transformer AiO P1801	18.4 inch	46.6/16.2/37.6		180 W
Extractor hood	Best	Gloss	630 m3/h	455/435/830		260 W

Appendix F HVAC Systems Report

Name	Dual Coil Storage Tank
Service	Domestic Hot Water
Total Capacity	300 L
Tank Diameter	760 mm
Tank Height	1310 mm
DHW Outlet Size	20ϕ
Standby Heat Loss	2.1 Kwh/24h
Size of Solar Indirect Coil	1.1 m^2

Name	Pump Station 1
Service	Solar Thermal Collector Circuit
Pump Flow	0.7 cmh
Pump Head	10 m
Electrical Power Supply	230 V
Frequency	50
Power Consumption	235 W
Pipe Connection Size	25ϕ

Name	Heating Only Heat Pump
Service	Domestic Hot Water and Heating
Type	Air-to-Water Heat Pump
Nominal Capacity	4.5 KW
COP	4.7
Electrical Power Supply	230 V
Frequency	50 HZ
Power Consumption	0.96 KW
Liquid Pipe Size	6.4 ϕ
Gas Pipe Size	9.5 ϕ
Refrigerant	R-744

Name	Solar Thermal Collector
Service	Domestic Hot Water and Heating
Type	Evacuated Tube
Quantity	4
Gross Collector Area	13.6 m^2
Net Aperture Area	10.2 m^2
Max. Operating Temperature	99°C
Stagnation Temperature	375°C
Max. Operating Pressure	6 Bar
Nominal Flow Rate	237 L/hr
Efficiency η_0	73 %
Effective Heat Transfer Coefficient	
K_1	1.553 w/m^2
K_2	0.0022 w/m^2
Thermal Capacity	4.1 ckj (m^2 · K)

Name	Outdoor Unit of Cooling/Heating Heat Pump
Service	HVAC Cooling and Heating
Type	Heat Pump
Cooling Capacity	11.2 KW
Heating Capacity	12.5 KW
COP	Cooling = 3.8 Heating = 3.82
EER	Cooling = 6.7 Heating = 6.7
Electrical Power Supply	230 V
Frequency	50 HZ
Power Consumption	KW Cooling = 2.95 Heating = 3.27
Refrigerant	R-410A

Test condition for outdoor unit:

1. Cooling Condition : Indoor Temperature 27°C DB / 19°C WB
   Outdoor Temperature 35°C DB
2. Heating Condition : Indoor Temperature 20°C DB
   Outdoor Temperature 7°C DB / 6°C WB

Name	Indoor Unit of Heat Pump
Service	Room Heating and Cooling
Type	Wall Mounted
Quantity	2
Cooling Capacity	4.5 KW
Heating Capacity	5.0 KW
Fan Flow (H/L)	12/9 m^3/min
Air Filter	Washable Resin Net

Name	Heat Reclaim Ventilator
Service	Room Active Ventilation
Temperature Exchange Efficiency	79%
Enthalpy Exchange Efficiency	
Cooling	66%
Heating	72%
Fan Air Flow Rate	150 m^3/h
Electrical Power Supply	230 V
Frequency	50 HZ
Power Consumption	30 W × 2

Test condition for exchange efficiency:

Condition	Indoor		Outdoor	
	°Cdb	rh%	°Cdb	rh%
Cooling	27	50	35	60
Heating	20	40	7	70

Name	Humidifier
Service	Room Humidification
Type	Ultrasonic Humidifier
Capacity	0.9 kg/hr

Appendix G Electrical Energy Production Simulation

1. PVSYST Simulation of Yearly Energy Production in Taipei

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Grid-Connected System: Simulation parameters

Project :	**NCTU**				
Geographical Site	**Taipei**			**Country**	**China**
Situation		Latitude	24.5oN	Longitude	121.4oE
Time defined as		Legal Time	Time zone UT+8	Altitude	10 m
		Albedo	0.20		
Meteo data :	Taipei, Synthetic Hourly data				
Simulation variant :	**NCTU_TPE_8KW**				
		Simulation date	11/04/14 11h06		

Simulation parameters

Collector Plane Orientation		Tilt	18 deg	Azimuth	0 deg
Horizon		Free Horizon			
Near Shadings		No Shadings			

PV Array Characteristics

PV module	Si-poly	Model	**D6P250B3A**		
		Manufacturer	NSP		
Number of PV modules		In series	11 modules	In parallel	3 strings
Total number of PV modules		Nb. modules	33	Unit Nom. Power	250 Wp
Array global power		Nominal (STC)	**8.25 kWp**	At operating cond.	7.41 kWp (50oC)
Array operating characteristics (50oC)		U mpp	306 V	I mpp	24 A
Total area		Module area	**53.9 m2**	Cell area	48.2 m2

Inverter		Model	**Solar Inverter SOLIVIA 5.0 EU G4 TR**		
		Manufacturer	Delta Energy		
Characteristics		Operating Voltage	150-480 V	Unit Nom. Power	5.00 kW AC
Inverter pack		Number of Inverter	2 units	Total Power	10.00 kW AC

PV Array loss factors

Thermal Loss factor		Uc (const)	30.0 W/m2K	Uv (wind)	0.0 W/m2K / m/s
=> Nominal Oper. Coll. Temp. (G=800 W/m2, Tamb=20oC, Wind=1 m/s.)				NOCT	44 oC
Wiring Ohmic Loss		Global array res.	212 mOhm	Loss Fraction	1.5 % at STC
Module Quality Loss				Loss Fraction	0.2 %
Module Mismatch Losses				Loss Fraction	2.0 % at MPP
Incidence effect, ASHRAE parametrization		IAM =	1 - bo (1/cos i - 1)	bo Parameter	0.05

User's needs : Unlimited load (grid)

Evaluation Mode

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Grid-Connected System: Main results

Project : NCTU

Simulation variant : NCTU_TPE_8KW

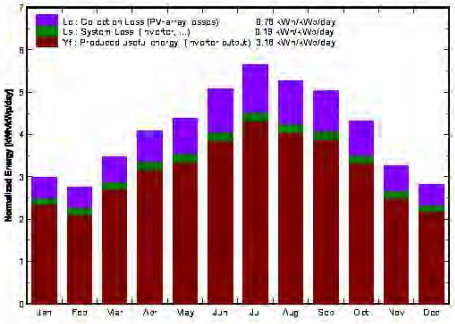
Main system parameters				
PV Field Orientation	System type	**Grid-Connected**		
PV modules	tilt	18 deg	azimuth	0 deg
PV Array	Model	D6P250B3A	Pnom	250 Wp
Inverter	Nb. of modules	33	Pnom total	**8.25 kWp**
Inverter pack	Model	Solar Inverter SOLIVIA 5.0 EP G4 TP	Pnom	5.00 kW ac
User's needs	Nb. of units	2.0	Pnom total	**10.00 kW ac**
	Unlimited load (grid)			

Main simulation results

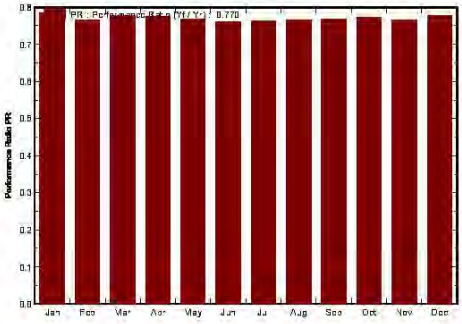
System Production — **Produced Energy** **9506 kWh/year** Specific prod. 1152 kWh/kWp/year

Performance Ratio PR 77.0 %

Normalized productions (per installed kWp): Nominal power 8.25 kWp



Performance Ratio PR



NCTU_TPE_8KW

Balances and main results

	GlobHor kWh/m2	T Amb oC	GlobInc kWh/m2	GlobEff kWh/m2	EArray kWh	E_Grid kWh	EffArrR %	EffSysR %
January	80.0	18.20	92.5	89.5	639	600	12.81	12.03
February	71.0	18.60	77.0	74.4	522	487	12.57	11.73
March	103.0	20.20	108.0	104.4	738	693	12.68	11.90
April	123.0	23.00	122.9	118.9	834	786	12.59	11.87
May	141.0	25.60	135.5	130.9	909	858	12.45	11.75
June	162.0	27.30	152.1	147.1	1009	955	12.30	11.64
July	186.0	29.00	175.3	169.7	1162	1104	12.29	11.67
August	166.0	28.70	163.5	158.4	1088	1032	12.35	11.72
September	146.0	27.80	151.4	146.7	1011	959	12.39	11.75
October	121.0	26.00	133.7	129.7	901	853	12.50	11.83
November	85.0	22.80	97.9	94.7	658	619	12.47	11.72
December	74.0	20.00	87.4	84.3	599	561	12.72	11.92
Year	1458.0	23.96	1497.2	1448.7	10070	9506	12.48	11.78

Legends: GlobHor Horizontal global irradiation — EArray Effective energy at the output of the array

T Amb Ambient Temperature — E_Grid Energy injected into grid

GlobInc Global incident in coll. plane — EffArrR Effic. Eout array / rough area

GlobEff Effective Global, corr. for IAM and shadings — EffSysR Effic. Eout system / rough area

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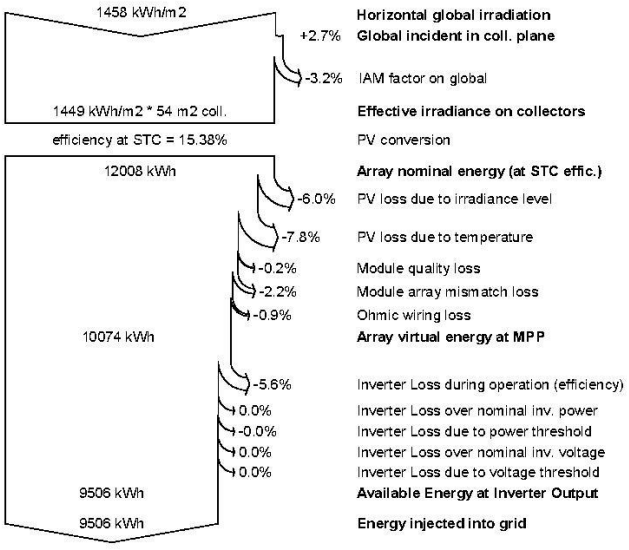
Grid-Connected System: Loss diagram

Project : NCTU

Simulation variant : NCTU_TPE_8KW

Main system parameters	System type	**Grid-Connected**		
PV Field Orientation	tilt	18 deg	azimuth	0 deg
PV modules	Model	D6P250B3A	Pnom	250 Wp
PV Array	Nb. of modules	33	Pnom total	**8.25 kWp**
Inverter	Model	Solar Inverter SOLIVIA 5.0 EH G4 TP	Pnom	5.00 kW ac
Inverter pack	Nb. of units	2.0	Pnom total	**10.00 kW ac**
User's needs	Unlimited load (grid)			

Loss diagram over the whole year



2. PVSYST Simulation of yearly energy production in Versailles

PVSYST V5.71		17/02/14	Page 1/3

Grid-Connected System: Simulation parameters

Project :	**2014 SDE PARIS**			
Geographical Site	**Paris**		**Country**	**France**
Situation	Latitude	49.1oN	Longitude	2.1oE
Time defined as	Legal Time	Time zone UT+1	Altitude	26 m
	Albedo	0.20		
Meteo data :	Paris, Synthetic Hourly data			

Simulation variant :	**140217_交大巴黎_5kWp**			
	Simulation date	17/02/14 10h21		

Simulation parameters

Collector Plane Orientation	Tilt	18 deg	Azimuth	0 deg
Horizon	Free Horizon			
Near Shadings	No Shadings			

PV Array Characteristics

PV module	Si-poly	Model	**D6P250B3A**		
		Manufacturer	DelSolar		
Number of PV modules		In series	10 modules	In parallel	2 strings
Total number of PV modules		Nb. modules	20	Unit Nom. Power	250 Wp
Array global power		Nominal (STC)	**5.00 kWp**	At operating cond.	4439 Wp (50oC)
Array operating characteristics (50oC)		U mpp	276 V	I mpp	16 A
Total area		Module area	**32.7 m2**	Cell area	29.2 m2
Inverter		Model	**Solar inverter SOLIVIA 5.0 TR**		
		Manufacturer	Delta Energy		
Characteristics		Operating Voltage	150-480 V	Unit Nom. Power	5.50 kW AC

PV Array loss factors

Thermal Loss factor	Uc (const)	20.0 W/m2K	Uv (wind)	0.0 W/m2K / m/s
=> Nominal Oper. Coll. Temp. (G=800 W/m2, Tamb=20oC, Wind=1 m/s.)			NOCT	56 oC
Wiring Ohmic Loss	Global array res.	293 mOhm	Loss Fraction	1.5 % at STC
Module Quality Loss			Loss Fraction	0.2 %
Module Mismatch Losses			Loss Fraction	2.0 % at MPP
Incidence effect, ASHRAE parametrization	IAM =	1 - bo (1/cos i - 1)	bo Parameter	0.05

User's needs : Unlimited load (grid)

PVSYST V5.71		17/02/14	Page 2/3

Grid-Connected System: Main results

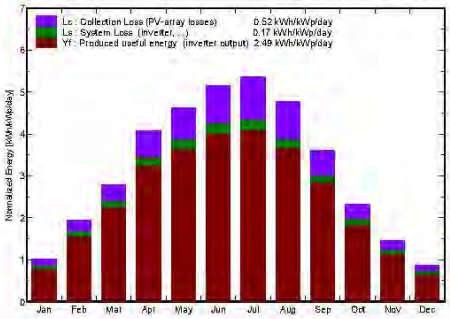
Project : **2014 SDE PARIS**
Simulation variant : **140217_交大巴黎_5kWp**

Main system parameters	System type	**Grid-Connected**		
PV Field Orientation	tilt	18 deg	azimuth	0 deg
PV modules	Model	D6P250B3A	Pnom	250 Wp
PV Array	Nb. of modules	20	Pnom total	**5.00 kWp**
Inverter	Model	Solar inverter SOLIVIA 5.0 TR	Pnom	5.50 kW ac
User's needs	Unlimited load (grid)			

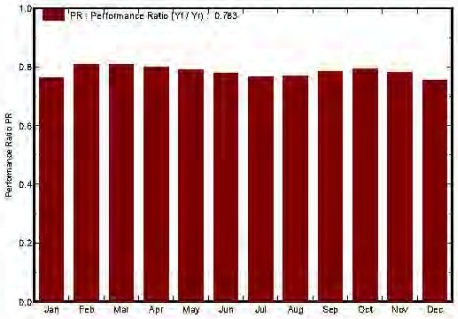
Main simulation results

System Production	**Produced Energy**	**4536 kWh/year**	Specific prod.	907 kWh/kWp/year
	Performance Ratio PR	78.3 %		

Normalized productions (per installed kWp): Nominal power 5.00 kWp



Performance Ratio PR



140217_交大巴黎_5kWp

Balances and main results

	GlobHor kWh/m2	T Amb oC	GlobInc kWh/m2	GlobEff kWh/m2	EArray kWh	E_Grid kWh	EffArrR %	EffSysR %
January	24.0	4.60	31.5	30.0	134.2	120.3	13.05	11.70
February	43.0	4.70	54.6	52.3	237.9	220.3	13.35	12.36
March	76.0	7.00	86.3	83.0	373.9	349.3	13.26	12.39
April	114.0	9.80	122.1	117.7	519.3	488.7	13.02	12.25
May	140.0	13.50	143.3	138.3	600.9	565.5	12.84	12.08
June	153.0	16.30	154.6	149.4	638.6	602.0	12.64	11.92
July	163.0	18.90	166.4	160.7	673.7	636.5	12.39	11.71
August	139.0	19.00	147.9	142.9	602.7	569.3	12.47	11.78
September	96.0	16.00	108.5	104.7	452.9	426.3	12.77	12.02
October	59.0	11.80	72.0	69.1	306.9	285.4	13.05	12.13
November	32.0	7.30	43.8	41.7	187.1	170.9	13.08	11.95
December	20.0	5.10	27.0	25.6	114.3	101.7	12.98	11.55
Year	1059.0	11.21	1157.9	1115.5	4842.3	4536.2	12.80	11.99

Legends:
GlobHor Horizontal global irradiation
T Amb Ambient Temperature
GlobInc Global incident in coll. plane
GlobEff Effective Global, corr. for IAM and shadings
EArray Effective energy at the output of the array
E_Grid Energy injected into grid
EffArrR Effic. Eout array / rough area
EffSysR Effic. Eout system / rough area

PVSYST V5.71		17/02/14	Page 3/3

Grid-Connected System: Loss diagram

Project : **2014 SDE PARIS**

Simulation variant : **140217_交大巴黎_5kWp**

Main system parameters	System type	**Grid-Connected**			
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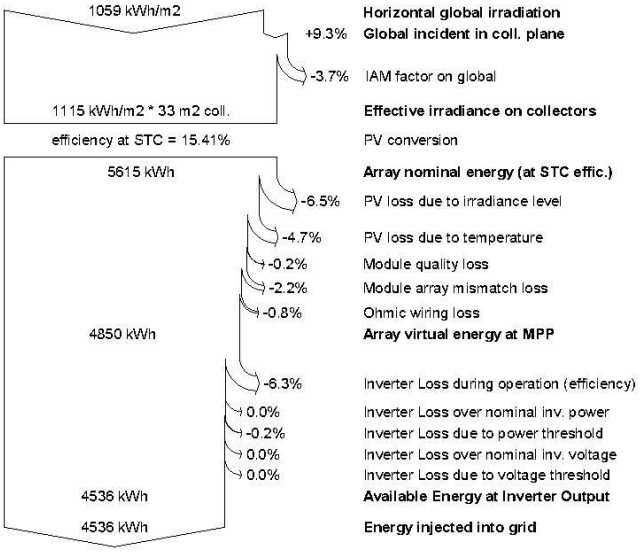
Loss diagram over the whole year



3. Electrical Energy production

(1) PV Modules (Type)
PV module type is multi-crystalline module with Aluminum frame.

(2) PV panels area (m2)
Single module includes Aluminum frame is 1.6335 m2. In France, the whole system consists of 20 modules and the total module area is 32.670 m2. In Taiwan, the whole system consists of 33 modules and the total module area is 53.9055 m2

(3) Installed PV power (kWp)
Single module peak power is 250 Wp. Total 20 modules produce peak power of 5,000 Wp for France and total 33 modules produce peak power of 8,250 Wp for Taiwan.

(4) Estimated energy production (kWh/year)
For Taiwan's 8.25 kWp PV system, the simulation of yearly energy production is 9,507 kWh/year in Taipei, Taiwan. For France's 5 kWp PV system, the simulation of yearly energy production is 4,536.2 kWh/year in Paris, France Please see below for detail simulation report.

(5) Energy Production Simulation
Based on PVSYST simulation of the above condition, the energy production simulation report is as below:

5.5 Innovation Report

Synopsis

Local Context: Taipei City

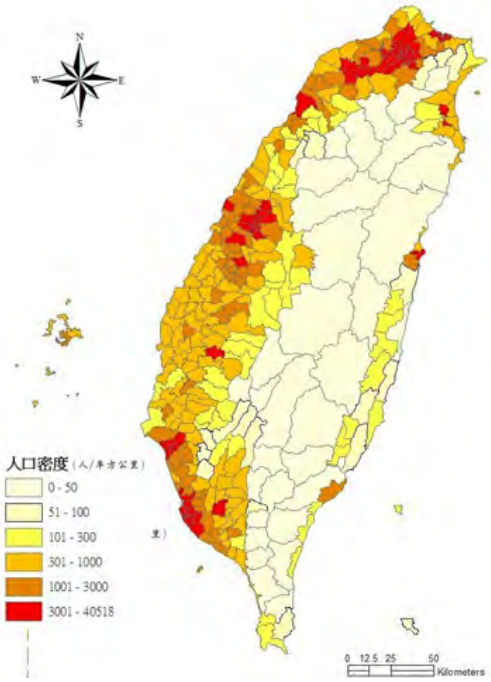
Taipei City Skyline - Urban Context

Taipei Rooftop

Taiwan is a country spanning only 36,193 km2 but with a population of 23.34 million (compare with France's 674,834 km2 and 65.7 million people). The population density is especially high because two-thirds of the island is composed of mountains, and as a result most people live along the coastal areas. It is especially crowded in urban areas, such as the capitol city, Taipei, which is one of the top ten densest cities in the world. In addition to the high population density, Taipei also developed rapidly over the years, both of which contribute to a random assortment of architecture in the city that expands horizontally instead of vertically to conserve space.

However, also as a result of the rapid development, many of the residential buildings were not built to last and have infrastructure that is now rundown or outdated. In recent years, new residential buildings are sky scraper apartments, which are usually only affordable by the wealthy upper class because of the luxury design and locations in the city center.

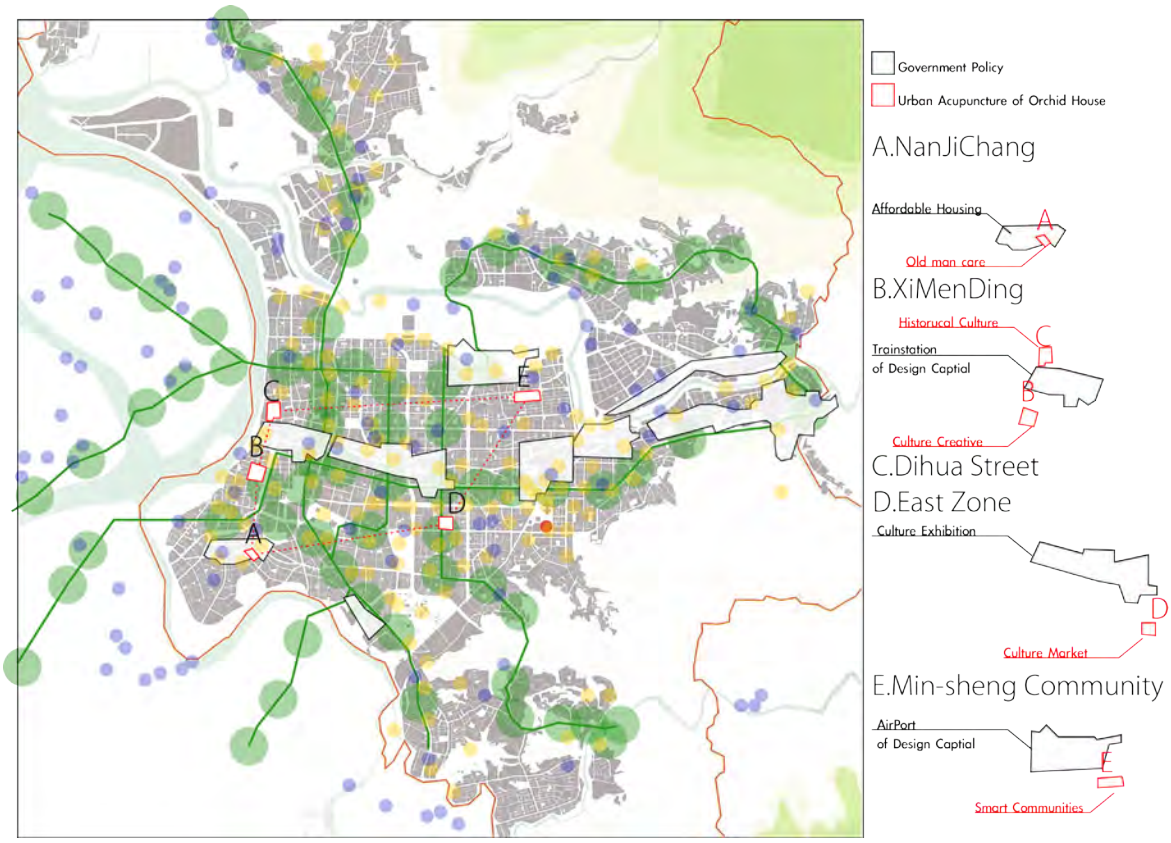
Taipei Urban Crisis



Population Density In Taiwan

This population growth results in the lack of living space and sufficient public amenity, and cause middle classes moving toward the periphery, even outside of city. The majority of these people are young professionals who just graduated from collage whom have worked a few years, and they are not able to afford a house yet. However, most of them works in the city centre and commute, and caused major traffic congestions with millions of cars and motorcycle. Consequently, the city is left with a high carbon dioxide pollution, and the decrease living quality.

Taipei Urban Acupuncture

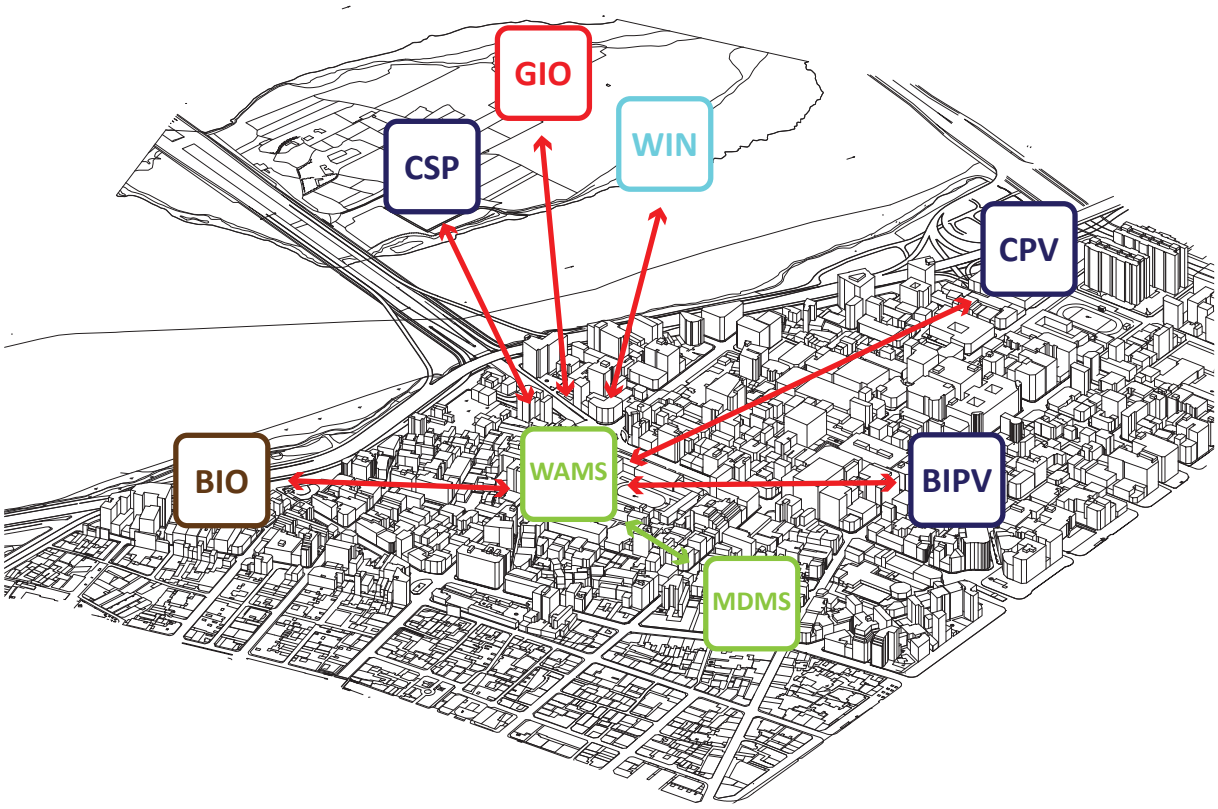


Ximending District

Taipei city population reached its 20-year peak and residential building has been constructed in various types. The majorities are a duplex apartment, which is relatively wide and 4 to 5 story building, and a row house that is extremely narrow and deep single family owned. These two types were constructed during the modern democracy period. Most of flat-roof duplex apartment and row house are facing problems: leakage, heat absorption and no public facilities. Therefore, the illegal make-shift metal roofed shelters have been introduced widely in most of the residential buildings and create unregulated cityscape of Taipei.

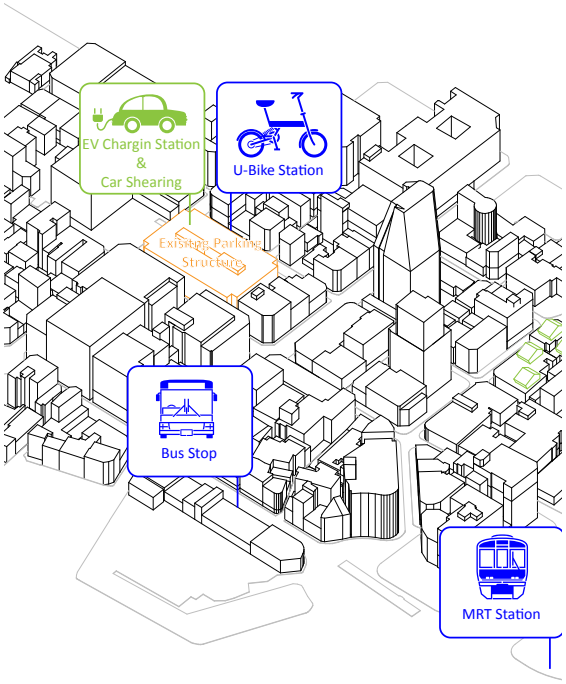
For Orchid House urban design strategy, NCTU UNICODE focus districts where the most of duplex apartment and row house are located as the most needed area for urban regeneration to vitalize not only the residential building, but also these districts.

Zero Energy District



Ximending Smart Grid Concept

As main focal point of Ximending Zero Energy District plan, NCTU UNICODE proposes not only PV panel implementation to buildings, but also larger scale of renewable energy sources such as CSP (Concentrated Solar Power), Biomass, Wind power and Geothermal. In order for all renewable energy sources to be distributed efficiently, advanced applications of Wide-area-Measurement System (WAMS) is installed one of larger footprint building rooftops, and Data Centre (MDMS) serve all the energy with automation system. Furthermore, AMI (Advanced Metering Infrastructure) is installed to Orchid House Clusters to manage power supply within houses. Please refer Architecture Design Narrative for farther details of AMI integration to housing appliances.



EV Charging Station

Orchid House Urban Concept

Orchid Cluster in Taipei Urban Context

Orchid Cluster Section

Orchid House extension on existing building in Taipei city plays not only critical role for Ximending zero energy district urban planning, but also to apply new concept of urban regeneration. Almost 50% of residential building in Taipei city are over 30 years old and typically demolished during the renewal planning. However, NCTU UNICODE points out the problem of city re-development organized by government and executed by private developers. The developer tends to acquire larger number of properties to combine the land FAR (Floor Area Ratio) to build up high-rise residential condominium, which is not affordable for average income level and treated as investment target by investors.

Orchid House will proved unique opportunity for not only the building owner, but also the targeted tenants, who needs housing support to pursue their young profession to promote new creative industry in Taipei.

Orchid House Prototype

Orchid House at La Cite du Soleil, Versailles, France

The Orchid House is as much a physical dwelling structure as a mindset for living. NCTU UNICODE hopes to use the Orchid House to revive Taiwan by focusing on urban centres. Urban areas in Taiwan, particularly the capitol city, Taipei, have high population densities and a random assortment of architecture – many buildings are old with rundown facilities. Furthermore, as in all urban cities but even more so because of the particularly high population density, commuter traffic causes extreme congestion, uses a lot of energy, and creates large amounts of pollution. Reviving the city would include not only renovating buildings and improving the residents' quality of life, but also promoting creativity and sustainability.

5.5.1 Innovation in Architecture

Innovation	Description	Reference
Cluster Concept	Rather than the typical row housing in the city, this collective housing creates a small community which has a mixture of studio and 1-bedrooms on the rooftop surface. The organic way of placing units is flexible and allows multiple meeting pockets and green space to be used by the public.	5.2.1
Release Rooftop Space	Most of the rooftops in Taipei are occupied by illegal metal additions, and they are mostly occupied by the top floor residents. Orchid Cluster's design can release up to 50% space back to the tenant for communal usage.	5.2.1
Double envelope with moderated buffer zone	Basic principle of moderated buffer zone is inspired by Taiwanese orchid green house for controlling perfect temperature and humidity. The Orchid House evolves the traditional technique into new bioclimatic system. The moderated buffer zone will protect interior space from harsh direct sun yet bring enough daylight into space.	5.2.1
House keeper system	House keeper system does not only provide comfort living quality in the house, but also connect the residents of Orchid House to Taipei city data network. The Orchid House computing system can download the data from Taipei city and display on tablet computer or smart phone through the specially developed APP for the system.	5.2.1

5.5.1 Innovation in Architecture

Innovation	Description	Reference
From Trash to Gold	We live with what our ancestor had created, but we regenerate usable material from it. The material selection of Orchid House is carefully chosen and mostly recycled or refurbished items, such as our everyday bottles and bins. The structural steel is made with 100% recycled steel which is dismantled from abandoned ships.	5.2.1
Evaporative Cooling Water Rings	Instead of using the traditional water wall which is less durable, Team UNICODE invented a new evaporative cooling systems which is made with plastic water rings. It is light-weight, cost efficient, resists to humidity, and it also aesthetically pleasing. It is very efficient in increasing the water surface area with rotating rings.	5.2.1
Green Core	The green core is the heart of Orchid House for not only esthetic point reason, but also interior space comfort condition control. It filters the poluted air and moderate the temperature, humidity in the house. We also want to create a chimney effect to draw hot air out.	5.2.1
Smart Skin	Team UNICODE has invented a new way of shading the house. By design the memory alloy spring, the smart skin system moves Smart skin reacts with surrounding environmental condition without any electricity consumption by utilizing memory alloy spring.	5.2.1

5.5.2 Innovation in Engineering and Construction

Innovation	Description	Reference
Foundation system for existing Taipei rooftop	The foundation of the Orchid House eliminates unnecessary construction by placing the footing on the existing building's columns. The load of the house may directly transfer to the existing building structure.	5.3.1
High efficiency wall system	The thermal conductivity of the Orchid House is 0.15 W/m2K, which is about 18 times more efficient than typical brick wall in Taiwanese residential construction	5.3.2
Liquid thermal mass	The liquid thermal mass for Orchid House is unique application of stackable POLLI-Brick, which made with 100% post-consumer carbon neutral air insulated curtain wall system.	5.3.2
High R-Value thermal insulations: Glass foam, EFoam and Vacuum Insulated Panel	The Orchid House system investigates various possibility with thermal insulation materials. The insulation will be installed prefabricated wood boxes and placed on wall, floor and ceiling. The criteria of material selection focus on its efficiency and environmental concern.	5.3.2
DHW Production	The thermostatic 3-way mixing valves regulate the hot water temperature	5.3.3
Battery Energy Storage System (BESS)	Battery Energy Storage System is designed to store energy from grid of PV plant when the energy is available and cheap and dispatch the energy back to the grid when it is expensive or power demand is high.	5.3.6
Solar Thermal System Configuration	The solar thermal system is designed for both domestic hot water and space heating. The water in the solar collector heats up the water in the solar thermal storage tank. The hot water in the tank provides domestic usage. An internal heat exchanger is located at the bottom of solar thermal storage tank and use hot water in the tank to preheat inlet air.	5.3.7

Innovation	Description	Reference
Relative Humidity Control	Relative humidity (RH) control is still rare for general households in Taiwan, but the living comfort can be improved by keeping the room's relative humidity within a range between 40% and 55%.	5.3.9

5.5.3 Innovation in Energy Efficiency

Innovation	Description	Reference
Double Skin on South Façade with automated louvers	The south façade of Orchid House is 66 degree to avoid direct sun gain into interior space. There are buffer zone between the automated louver and house interior envelop for controlling natural ventilation and greenhouse effect.	5.4.2
Evaporative cooling	Inspired by the agricultural technology of orchid greenhouse, the water wall is to lower the outdoor air temperature before it enters the house envelope.	5.4.2
Heat exchanger	The solar hot water system on the roof provides domestic hot water and preheats inlet air for reducing the use of heat pump.	5.4.2
Heat Reclaim Ventilation	Heat exchanger recovers heat from exhaust air. The solar hot water system on the roof also provides hot water to preheat inlet air which reduce the use of heat pump.	5.4.3
Relative Humidity Control	Relative humidity (RH) control is still rare for general households in Taiwan, but the living comfort can be improved by keeping the room's relative humidity within a range between 40% and 55%.	5.3.9

5.5.4 Innovation in Communication and Social Awareness

Innovation	Description	Reference
Disseminating Orchid House & SDE to high school students and teachers in Taiwan	NCTU professors and students gave lectures at several high schools in Taipei and Hsinchu for promoting Solar Decathlon Europe and the Orchid House project, and also interviews the candidates for the winter camp hosted by NCTU UNICODE and Delta Foundation.	Communication action
Winter Camp, disseminating sustainable city development idea to young generation	As one part of the focal point for the NCTU UNICODE's communication action, winter camp for high school students were hosted on February 7th to 9th 2014. The group of high school students develop different rooftop schemes to improve Taipei city	Communication action
Solar Ambassador Program	After interview all the students and instructors during the winter camp, the best high student from the group is selected as the Solar Ambassador to join Solar Decathlon Europe 2014 with NCTU UNICODE. The ambassador will share his experience during the SDE with his schoolmates to expand dissemination of sustainable development idea.	Communication action
Exhibition of Orchid House concept and model at Delta Foundation	NCTU UNICODE collaborated with Delta Foundation to host the exhibition about Orchid House at their headquarter building in Taipei to share the vision with general public.	Communication action
Weekly countdown on Facebook page	Every week NCTU UNICODE shares the activities log with our Facebook followers since beginning of the Orchid House Project. The number of log is now over 40 posts and keep going until the end of the Orchid House journey.	Communication action

During the competition

Innovation	Description	Reference
Cultural event to promote Taiwanese inhabitant at La cite du Soleil®	NCTU UNICODE is going to collaborate with the one of our sponsors Delta Electric to host cultural event at La cite du Soleil® to promote Taiwanese culture. Currently planning to project "Aerial Image of Taiwan" with high resolution projector.	Communication action
Different house tours for different audiences	NCTU UNICODE will prepare different tour routes for different type of audience during the public visit for better understanding of our vision of the Orchid House. General public will be guided with the member of UNICODE for the basic concept, while VIP and Professional will be guided to understand innovative system of the house.	Communication action
Live broadcast on web	There will be live stream camera installed in the house during the Solar Decathlon Europe to share the excitement with the people who cannot attend the event at La cite du Soleil®.	Communication action
Creative Brochure	Orchid House brochure will be printed on recyclable eco-bag for our gest to use after the tour and disseminate rest of visitors in La cite du Soleil®. One side of brochure bag is presented with large Orchid House logo to express our brand presence while the other side presents detail information of the house.	Communication action

After the competition

Innovation	Description	Reference
Orchid House installation at Huashan 1914	After the journey to La cite du Soleil® in France, the Orchid House will be installed at Huashan 1914 to celebrate their 100th year anniversary. Huashan 1914 is one of the most popular cultural spots for the young people in Taipei and the Orchid House will promote sustainable life style to general public with their live experience.	Communication action
Orchid House portfolio publication	NCTU UNICODE is collecting all the research from the development of the Orchid House project to publish the project portfolio book to share our idea and experience to wider range of audience in Taiwan. The book launch event will be hosted at the Orchid House in Huashan 1914 after the house is back from France.	Communication action
Documentary movie of Orchid House experience	NCTU UNICODE is documenting every phase of the Orchid House project to edit a film to share the general public our experience through the journey. The film will be broadcasted at the Orchid House for general public to enjoy at Huashan 1914 site.	Communication action

5.5.5 Innovation in Urban Design, Transportation and Affordability

Innovation	Description	Reference
Turning urban crisis to opportunities	Deep understanding of urban condition in Taipei and analysis to turn urban crisis into opportunities. The urban renewal plan is implementing each relationship between crisis and opportunities.	5.1.1
Urban Acupuncture	Apply urban acupuncture concept to Taipei renewal plan by pointing critical locations of city to be regenerated. By renewing point by point, the new development can cover larger area and influence whole Taipei City.	5.1.1
Provide young professionals decent rental space combining with the government's policy	Our proposed roof addition through Orchid House, will not only coincide with the governmental policy in place, we also aim to optimize it by connecting to other resources both from the city and central government and leverage the unique conditions that the five representative sites can offer.	5.1.1
Zero Energy District	Ultimate goal of Taipei Urban renewal plan is to make city energy self-sufficient. Ximending district will act as a pilot project for implementing new urban concept.	5.1.1
Smart Grid system with AMI technology	Introduce WAMS (Wide-area Measurement system) and MDMS (Data center) technology to form smart grid in Ximending district. All renewable energy sources are managed with WAMS and distributed to district components. Also buildings are connected to smart grid with AMI (Advanced Monitoring Infrastructure) to be lively monitored.	5.1.1

Innovation	Description	Reference
EV Charging Station	EV Charging station will be installed along the Smart Grid in Ximending district to provide finer public transportation mesh with in the area. All EV is charged by renewable energy, which harvested within the district.	5.1.1
Orchid Cluster	Orchid Cluster is not only just an addition to existing building, but also integration of renewable energy source, building infrastructure, new vertical circulation addition and green open space of the rooftop. Newly added elevator shifts add easier accessibility to the rooftop space and also able to regulate it. Electric consumption for the all common utilities are provided through Building Integrated PV panel energy generation.	5.1.1

5.5.6 Innovation in Sustainability

Innovation	Description	Reference
Reduce Taipei city CO2 emission rate	Conserving energy use, generating renewable energy and reducing construction waste contribute to reduce carbon footprint of Taipei City	5.6.1
Provide young professional opportunity to live in Taipei downtown	Reduce the commuting time and distance by providing rentable space on rooftop to eliminate unnecessary carbon footprint.	5.6.2
Maximize bioclimatic strategies to conserve energy	Strategies solar shading, natural ventilation, and insulation for suitable passive strategies in Taiwanese climate.	5.6.3
Reduce construction solid waste and CO2 emission	Prefabrication steel construction can eliminate solid waste and CO2 emission compared with typical RC construction in Taiwan	5.6.4
Utilize energy recovery ventilator to reduce energy consumption	Energy recovery ventilator recovers about 80% of exhausted energy and reduce energy consumption by 3430 kWh per year	5.6.6
Install Taiwan produced PV Cell in Taiwanese residential buildings	Even though Taiwan is second largest PV cell manufacturing countries, the installation ratio of PV system is very low. The Orchid House will promote PV system made in Taiwan to install Taiwanese residential buildings	5.6.6
Harvest rainwater to reduce burden of city sewage system	Taipei sewage system capacity is in short for handling heavy annual perception and typhoon. The Orchid House rainwater harvesting system reduce the burden of sewage system.	5.6.7

5.6 Sustainablity Report

Synopsis

Local Context: Taipei City

Taipei City Skyline - Urban Context

Taipei Rooftop

Taiwan is a country spanning only 36,193 km2 but with a population of 23.34 million (compare with France's 674,834 km2 and 65.7 million people). The population density is especially high because two-thirds of the island is composed of mountains, and as a result most people live along the coastal areas. It is especially crowded in urban areas, such as the capitol city, Taipei, which is one of the top ten densest cities in the world. In addition to the high population density, Taipei also developed rapidly over the years, both of which contribute to a random assortment of architecture in the city that expands horizontally instead of vertically to conserve space.

However, also as a result of the rapid development, many of the residential buildings were not built to last and have infrastructure that is now rundown or outdated. In recent years, new residential buildings are sky scraper apartments, which are usually only affordable by the wealthy upper class because of the luxury design and locations in the city center.

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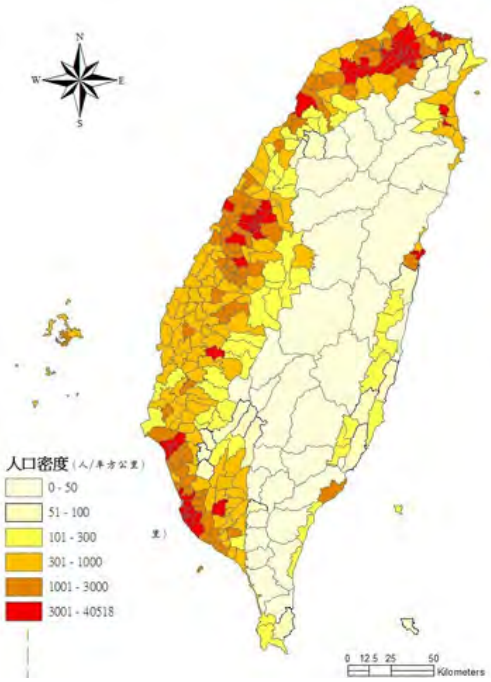

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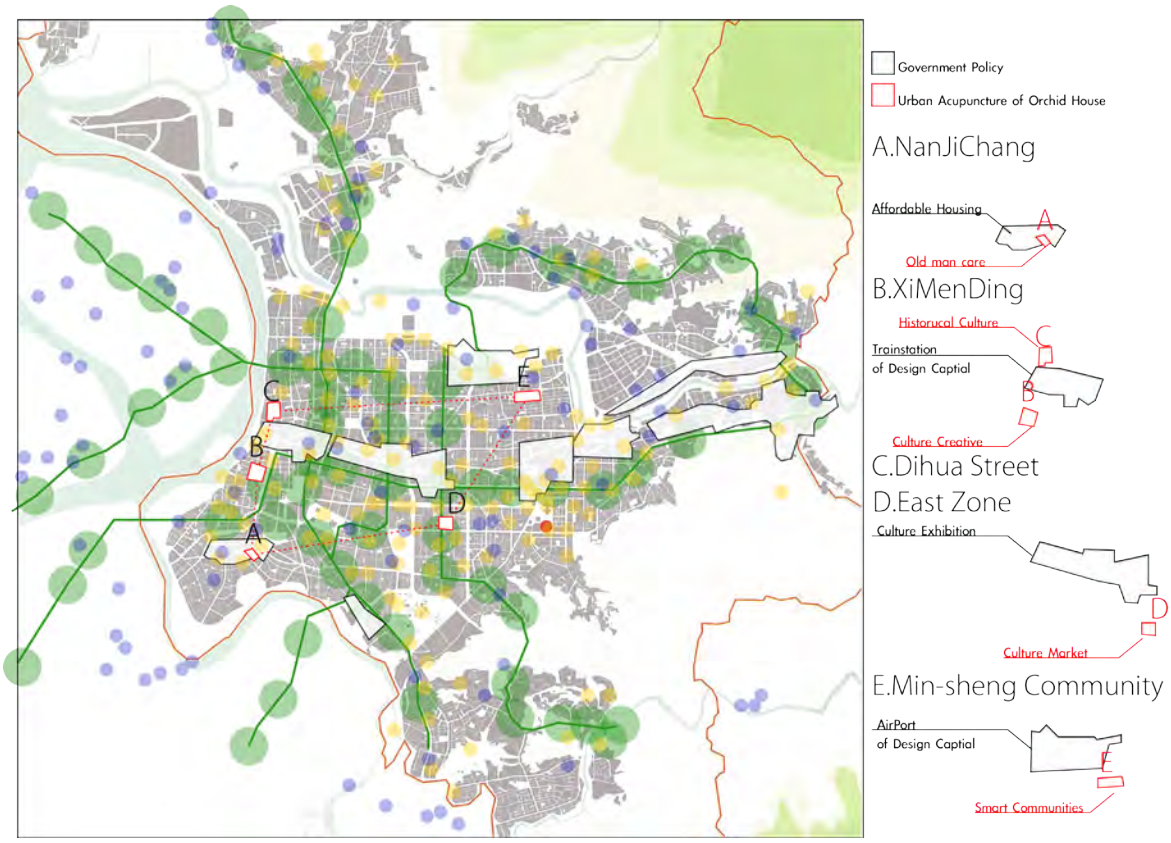

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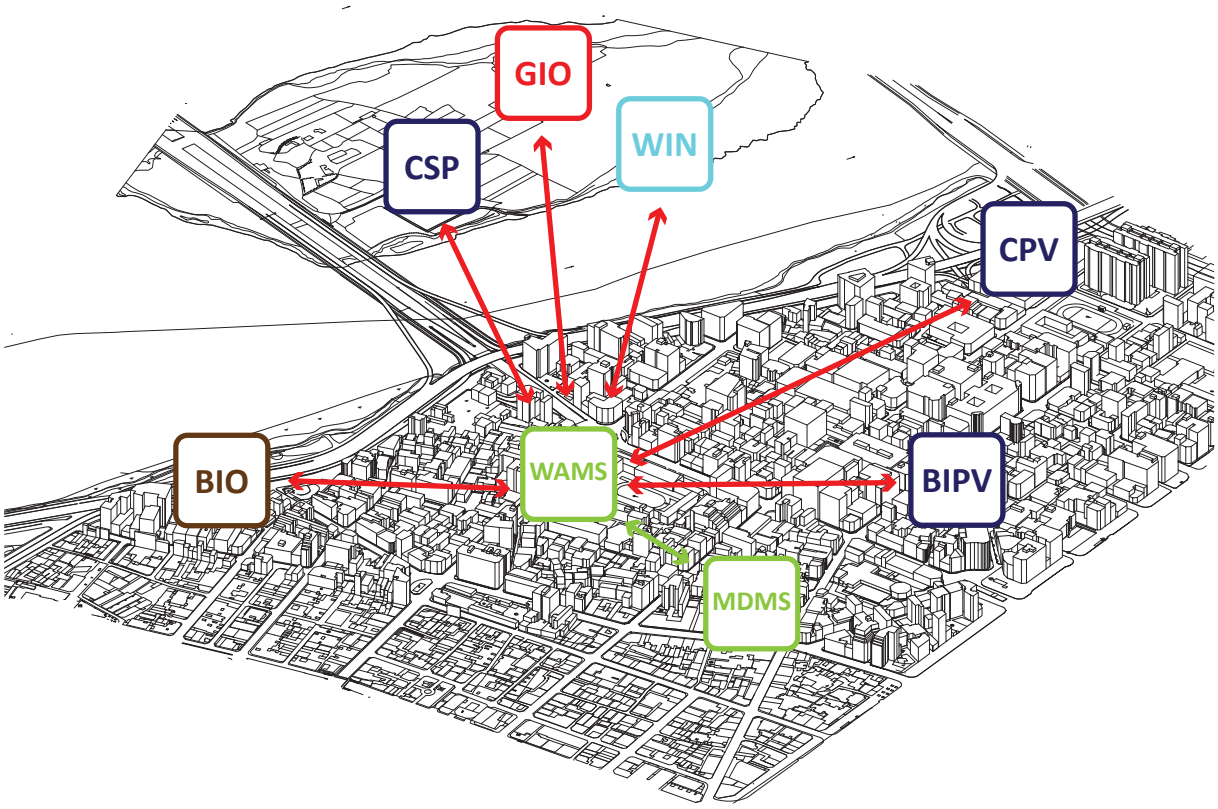

Ximending Smart Grid Concept

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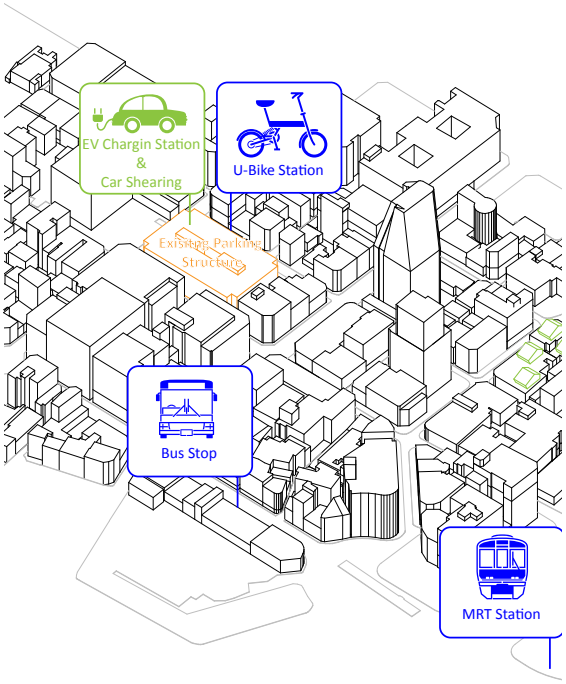

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Orchid Cluster Section

Orchid House extension on existing building in Taipei city plays not only critical role for Ximending zero energy district urban planning, but also to apply new concept of urban regeneration. Almost 50% of residential building in Taipei city are over 30 years old and typically demolished during the renewal planning. However, NCTU UNICODE points out the problem of city re-development organized by government and executed by private developers. The developer tends to acquire larger number of properties to combine the land FAR (Floor Area Ratio) to build up high-rise residential condominium, which is not affordable for average income level and treated as investment target by investors.

Orchid House will proved unique opportunity for not only the building owner, but also the targeted tenants, who needs housing support to pursue their young profession to promote new creative industry in Taipei.

Orchid House Prototype

Orchid House at La Cite du Soleil, Versailles, France

The Orchid House is as much a physical dwelling structure as a mindset for living. NCTU UNICODE hopes to use the Orchid House to revive Taiwan by focusing on urban centres. Urban areas in Taiwan, particularly the capitol city, Taipei, have high population densities and a random assortment of architecture – many buildings are old with rundown facilities. Furthermore, as in all urban cities but even more so because of the particularly high population density, commuter traffic causes extreme congestion, uses a lot of energy, and creates large amounts of pollution. Reviving the city would include not only renovating buildings and improving the residents' quality of life, but also promoting creativity and sustainability.

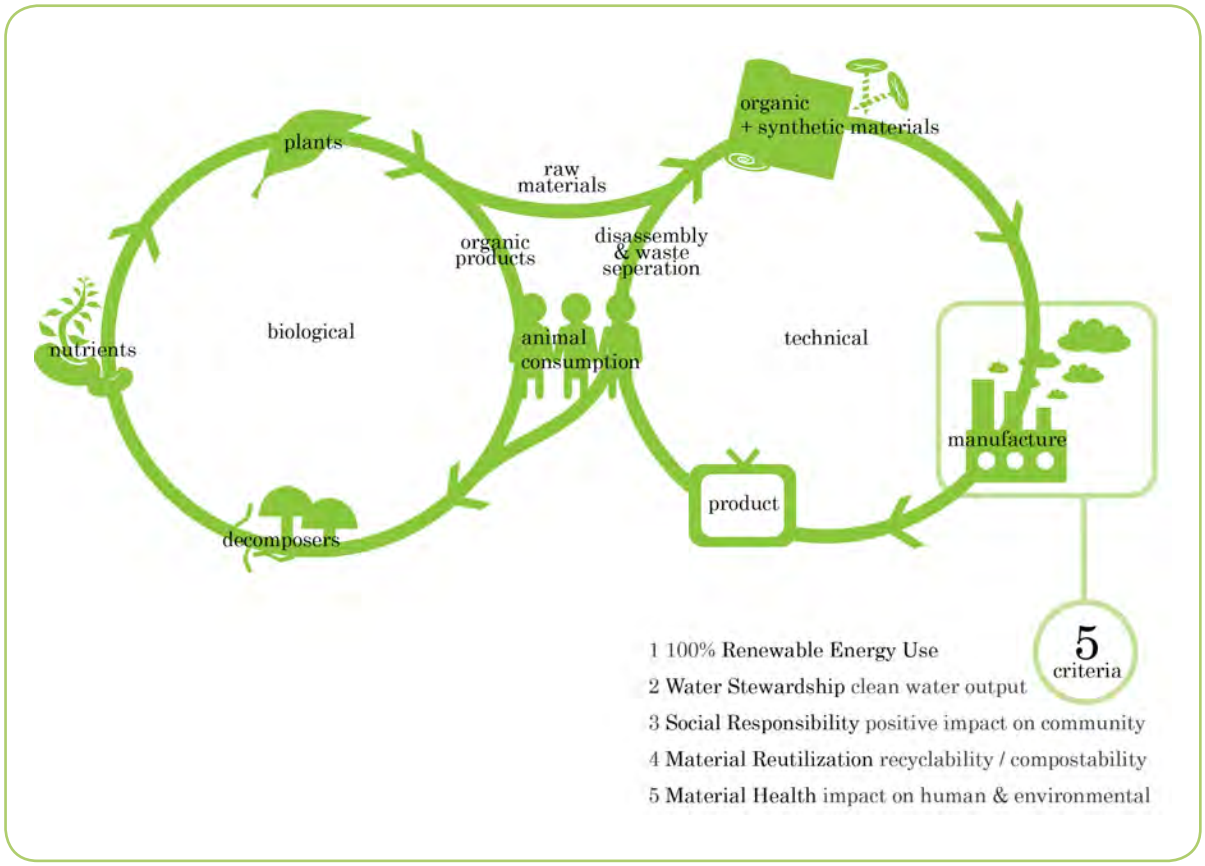
5.6.1 General Concept of the Project and Sustainablity

Global urbanization has been pointed out as one of the biggest problems in next coming century for human being as United Nation projected that 64.1% and 85.9% of the developing and developed world respectively will be urbanized by 2050. Urbanization rapidly spread across the Western countries, and since the 1950s, it has begun to progress in Asian countries, such as Japan, Korea, China and Taiwan. Taiwan's urbanization is currently ranked as 40th among rest of the world and it has reached 78% in 2011. However, since 2007 when high speed rail service starts operating, the rural area has been quickly developed to promote Taiwan's urbanization. NCTU UNICODE challenges to create sustainability loop in highly developed island, especially the nation capital city Taipei.

The overall Orchid House's sustainability concept incorporates the philosophy of Cradle to Cradle in urban scale to create sustainable urban eco-system.

> *Cradle to Cradle is a biomimetic approach to the design of products and systems. It models human industry on nature's processes viewing materials as nutrients circulating in healthy, safe metabolisms. It suggests that industry must protect and enrich ecosystems and nature's biological metabolism while also maintaining a safe, productive technical metabolism for the high-quality use and circulation of organic and technical nutrients.*

Cradle to Cradle: Remaking the way we make things



Biological and Technical Nutrients in the Cradle to Cradle Design Framework

Cradle to Cradle concept suggests us to look back healthy and safe metabolism in nature, which has been one of the most important driven force of Orchid House project. The natural orchid habitat in virgin rainforest of Taiwan present us how to maintain their living condition perfectly balanced with sun light and drips of water. Taiwanese used to deal with water well when the main industry was agriculture abased (32% of GDP in 1952), how to retain water to wet-lands during the dry season for next season farming. However since the economy base has shifted to industry-oriented (47% of GDP in 1986), the farm lands have been developed as industrial factories and paved with asphalt. Taipei cannot retain any more rain water after severe typhoon and there are often floods and mudslides. Water for our project is not to only consume for portable or irrigation purpose, but also to retain well to recycle and re-use in sustainable manner.

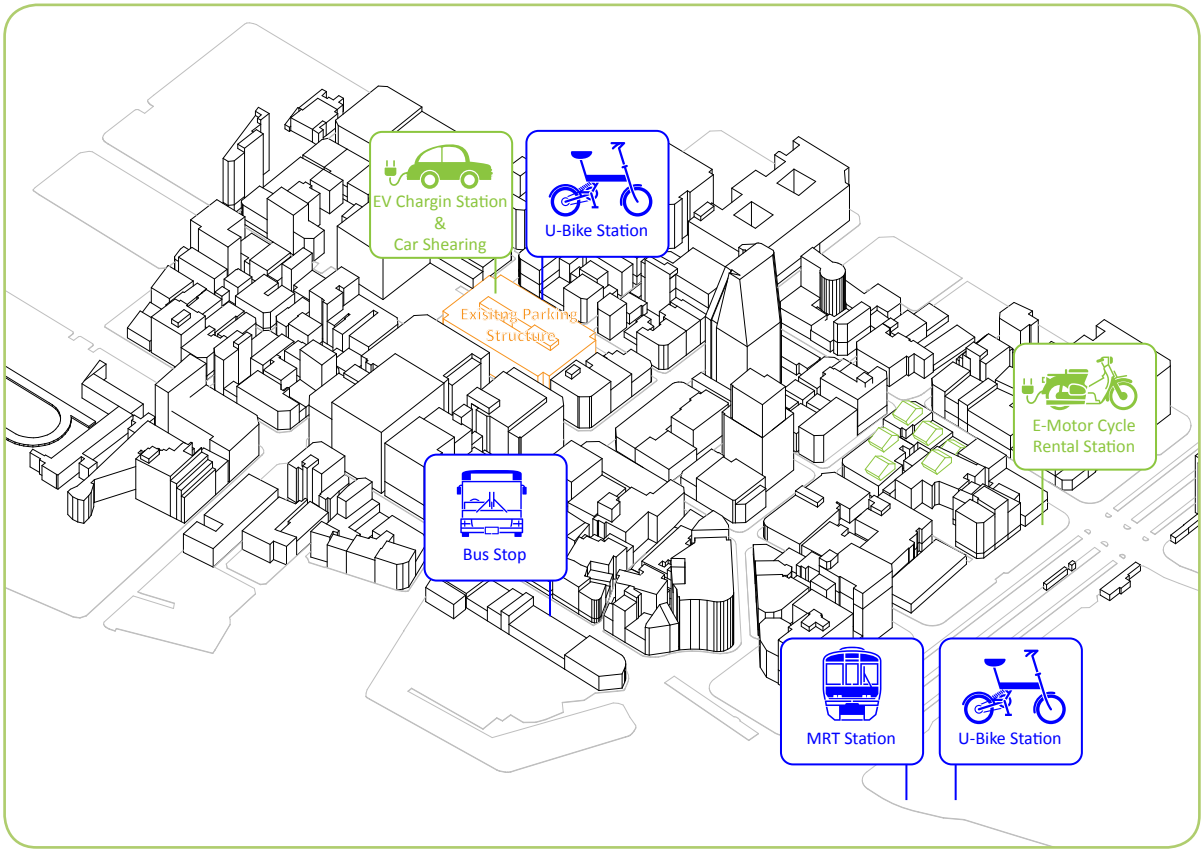
Wetland in Taoyuen County, Taiwan

Another important concept of Cradle to Cradle is to create circulation loop of ecosystem for the each product's life cycles. Taiwan is considered as the global center for the high-technology related industry for past decades. One of the main industrial products, such as Personal Computer and LCD screens are heavily relying on virgin plastic material. However, plastic product is never dissolved from the earth once it is formed. In other words, it is the largest trash we have created or have been creating still today. NCTU UNICODE has realized that this negative loop of accumulating trash needs to be shifted to another direction to be part of ecosystem. That is the reason why we have focused on plastic products that is 100 % recycled. Taiwanese technology has been evolved to create treasure from trash. All the computer parts are now refurbished and become the exterior wall. Orchid House project is ongoing progress of new ecosystem loop of Taiwanese industrial chain.

5.6.2 Urban Design, Transportation and Affordability

Taiwan's energy supply is monopoly relying on Taiwan Power system, which is 41,400 MW installed capacity in year 2011. However, the limited natural resources for energy generation, Taiwan relies on 99% of imported resources. Also Taiwan Power has developed isolated system which not yet been connected to other power systems. Recently Taiwan Power has been falling to reflect the costs under government's energy policy.

In order for Taipei to be apart from these energy consumption issues, well planned infrastructure system has to be installed. Orchid House project propose Zero Energy scheme in Ximending district to be a pilot project of future Taipei city to be energy self-sufficient from electricity plants. In this Zero Energy District scheme, the most important system is not necessary how to generate electricity, but how to manage the flow of energy. We have looked into Smart grid and AMI (Advanced monitoring infrastructure) system to apply Ximending district. Smart grid system relies on WAMS (Wide-area Measurement System) for collecting energy data from renewable energy sources, such as CSP, Wind Power, Biomass, Geothermal and Photovoltaic panels, and distributes through MDMS (Data Centre) to where electricity is needed. With these technology implementation, the grid security and reliability will increase 20% and also energy conservation and carbon emission will be decreased dramatically.



Rental EV station integration to existing infrastructure

Smart grid system provide Ximending district to be well connected in terms of collecting and sharing what is happing in the district lively, such as traffic data and public transportation. We propose new electric vehicle charging station where people can rent electric car/motorcycles to map the district much finer mesh to be able to access other locations without relying on private transportation methods. These stations are installed in existing parking structures or street open space to avoid conflict between overcrowded street conditions and vehicle availability is shared online website or smart phone application for user to check the up to date status.

Based on the research by Environmental Protection Administration (EPA), each person in Taiwan, on average, produce 10.89 tons of carbon emissions a year, which is more than its Japan and South Korea, and daily per capita carbon footprint of 19.6 kg, almost four times the UN recommendation in 2011. In order for us to reduce carbon footprint, everyone in the city needs to aware how much CO2 contribution made by driving cars and motorcycles. Data sharing is one of the best ways to indicate and educate people what kind of city condition we are living.

Taipei City often encounters floods and mudslides after large typhoon hits. The part of reason why these natural disasters are unavoidable is that the geographic condition of the city is basin and there is no proper reservoir in some locations. In order for Taipei city to retain water well in the city is to construct more green space. However, due to the extreme high real estate value of lands, a lot of parks are covered with other functions rather than pure open green space with soil and not contributing enough to retain water in the city.

This is why NCTU UNICODE proposes green roof system along with Orchid Clusters on existing buildings in Taipei. Currently most of Taipei rooftops are unregulated or abandoned. With the new green roof area and proper water recycling system and harvest system, the burden of sewage system can be reduced affectedly. Also newly covered green roof promotes decrease heat island effect in the city.

Ximending Green Programme

Green Roof

a

b

c

Ximending's Rooftop Area : 254,943.5 m²

Ximending's Existing Green Area : 20990.8 m²

New Green Rooftop Area : 59893.15 m²

Green Proportion :
(20990.8 + 59893.15) / 254943.5 * 100%
= 31.7%

In order to promote sustainable city development, the housing affordability for young professionals is essential for the metropolitan city like Taipei. However, currently the housing price is way beyond of what general income resident to afford acquiring property in downtown Taipei. The average monthly salary of people who have a bachelor degree in Taiwan is NT $36,871 (€890.05) according to the 2013 survey conducted by Taiwanese online recruitment company, and standard size apartment (89.3 m^2) with 22 years old building is NT $13 million (€ 317,857). Also Taipei is considered one of the highest rent price in Asian cities. Based on ECA International survey, Taipei is the 11th highest in Asia, and 46th in the world. Therefore, the young professionals who are within three years after their graduation from collage hardly make their lives in Taipei city.

This is why we proposes Orchid Cluster on existing building in Taipei city along with our government's youth housing policy for recent college graduates and youngsters to optimally allocate their income to attain a quality living in the city and is slated to open by 2016. The sizes of this dwelling units range from 24m2, 42 m2, 72m2. In order for the unique housing proposal responding to the most urgent social matter not to be fluctuated in price with the real estate market and thus youth's interest of living would be sacrificed, the newly built housing will only offer rental option. To make it more affordable, it runs at a discount of the market rate, 80%.

Young professionals commute to work in Taipei

Commuting time	**Average 0.45hr**
Commuting Method	
Motorcycle	**31.5%**
Car	25.5%
Bus	16.1%
Walking	8.8%
Bicycle	15.1%
Carbon footprint	**106.28 g/km**

Young professionals live in Orchid House

Commuting time	**Average 0.5hr**
Commuting Method	
Walking	**40.5%**
Bicycle	35.5%
Bus	10.5%
Motorcycle	0.5%
Car	0.5%
Carbon footprint	**6.15g/km**

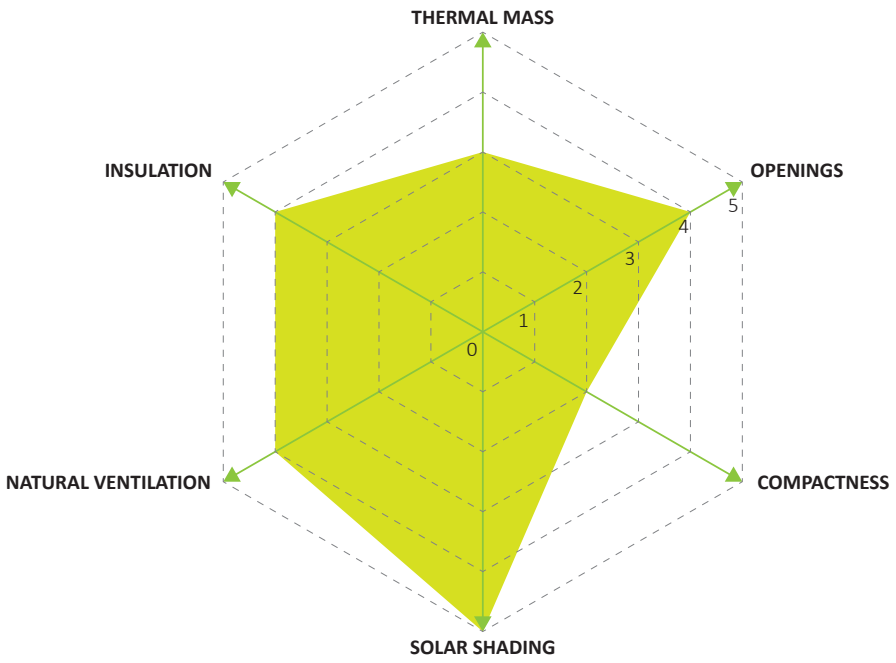
95% Carbon footprint reduction in commuting

Once Orchid Cluster system is well-implemented to Taipei city social infrastructure, it promotes people to live close where they work. The average commuting time for young professionals in Taipei city is 45 minutes and majority methods is by motorcycles, which results 106.28 g/km of carbon footprint. However, by reducing commuting time and avoiding private transportation, the footprint could be minimized 95%. Considering Taipei population is over 2 million in central part of the city, the amount of carbon dioxide we could prevent each day of commuting will be enormous.

In order for city to create sustainable development loop, it should be collecting efforts in different scales. The environmental impact by energy production and transportation could be reduced by new technologies. However, in the end if the user does not recognized the way to minimize the wasted energy, it would not enough to cover the increasing demands. NCTU UNICODE respects the idea of Cradle to Cradle, the metabolic ecosystem in urban scale to develop Taipei city to be truly sustainable city in many aspects by educating general public with the knowledge and experience through Orchid House Project.

5.6.3 Bioclimatic Strategies

Currently Taiwanese building comfort condition managing methods are heavily relying on active strategies. Recently during the summer, Taiwan with limited energy resources, there are often crisis for energy shortage due to the high electricity energy consumption of buildings. The consumption raises to around 30% of total electric supply through the year, which is 40% to 50% during the summer time and around 20% during the winter. However, most of residential buildings are built with low insulated material such as reinforced concrete and bricks, the heat gain through the intensive sun radiation absorbs the cooled air from air-conditioning immediately.



Bioclimatic Strategies Graph

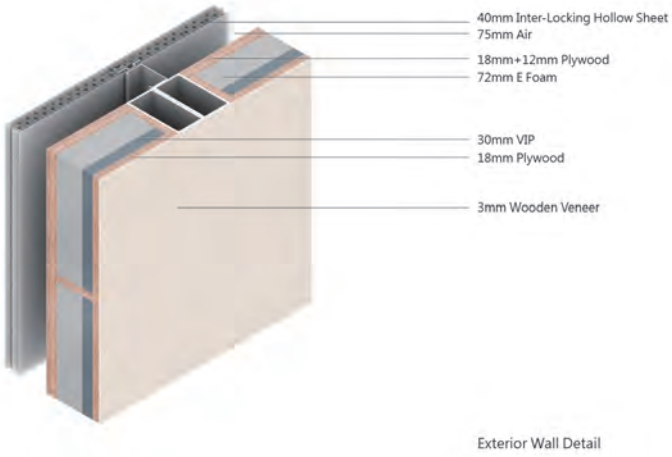
Exterior Envelope

The Orchid House's exterior envelope consists with Makrolon® polycarbonate 40mm Low-E coated Inter-locking sheet from Bayer Material Science on general façade, automatic transparent glass louvers on south side, as well as high efficiency photovoltaic panel on the south facing roof.

Even though the Makrolon® polycarbonate 40mm is 55% transparent and its U-value is 1.1 W/m²*K, the installation process and supporting materials are far less than conventional glass curtain wall system. The Orchid House will already eliminate large amount of material usage and human resource by incorporating this system. Also Makrolon® polycarbonate is also 100 % recyclable, making it inherently sustainable.

The south side automatic glass louvers contribute the main passive design strategies of the Orchid House. During the hot summer time the louvers will be open to promote natural ventilation, meanwhile during the winter time, it will be closed and promote greenhouse effect in between living volume and envelope to protect from cold weather as well as heat the indoor space.

The typical exterior walls of the Orchid House are designed to minimize its thermal conductivity. The exterior walls are constructed with several layers. Makrolon® polycarbonate on the outermost layer provides the unified exterior look. Two layers of plywood add its stiffness. 72mm of eForm provides necessary thermal resistance for Taiwan's condition. The inner most layer is plywood. The total thermal conductivity for the typical exterior wall is 0.15W/m2K.



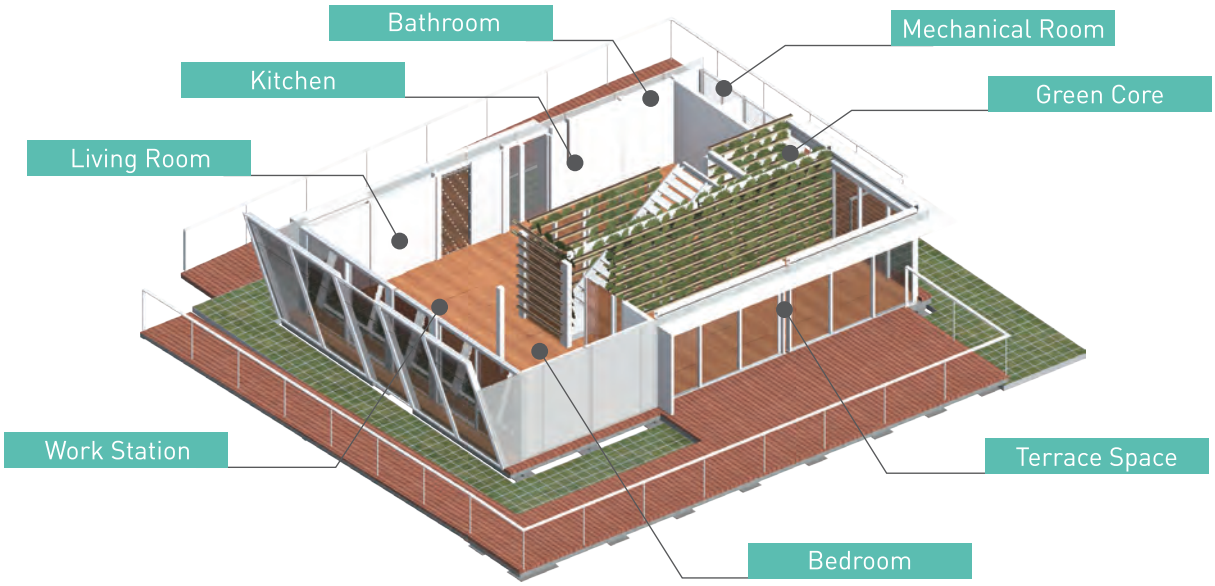
Wall System Diagram in Taipei

	Insulation Type	Thickness (mm)	Thermal Conductivity (W / m*K)	Thermal Transmittance (W/m2k)	Thermal Resistance (m2K)/W	AREA (m2)
Wall AR-341	Exterior Air Film				0.05	
	Polycarbonate	40	0.044	1.1	0.9091	
	Air	75	0.024	0.32	3.125	
	Plywood	18	0.13	7.222222222	0.1385	
	Plywood	12	0.13	10.83333333	0.0923	
	E Foam	72	0.0379	0.526388889	1.8997	
	Plywood	18	0.13	7.222222222	0.1385	
	Plywood	3	0.13	43.33333333	0.0231	
	Interior Air Film				0.15	
TOTAL:		238		0.153230057	6.52613	

L-shape living volume

The L-shape living volume build with layers of highly insulated material. The innovative glass foam will be installed in wall, floor and ceiling. The glass foam is made with 100% recycled glass and infinitely recyclable. Since it is rated as one hour fire protection, it is mainly used for the fire separation.

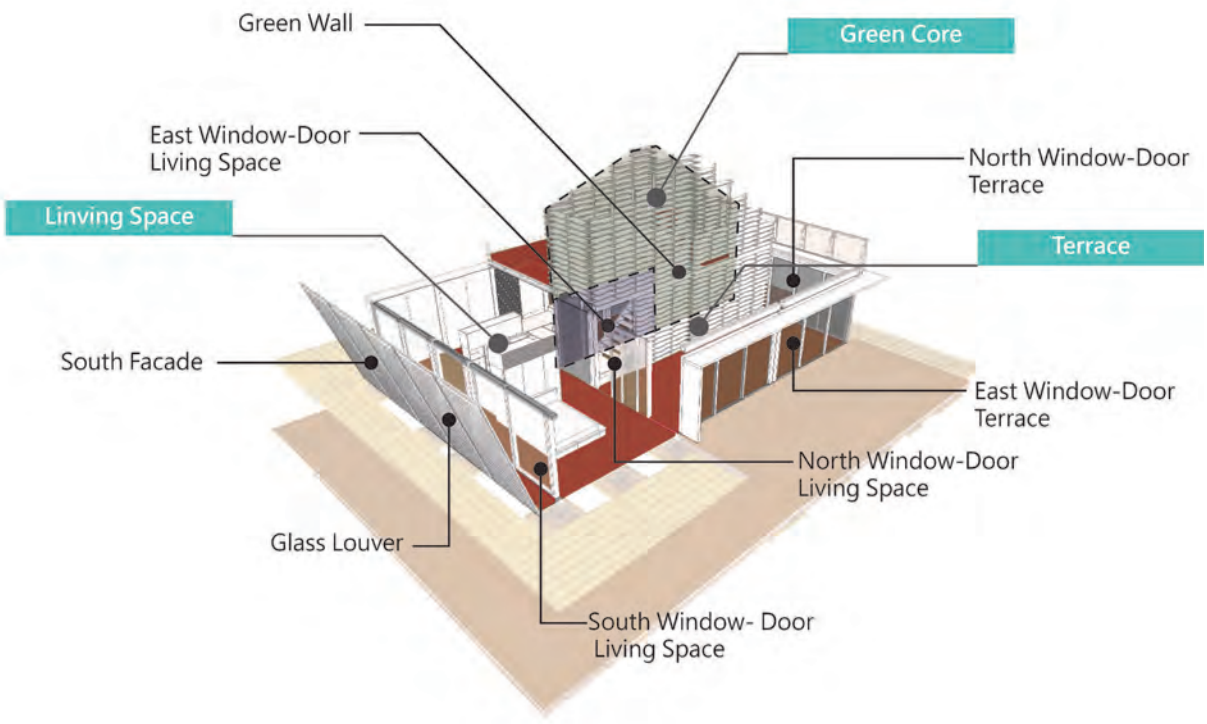
For the extreme weather condition, the Vacuum Insulation Panel (VIP) may be installed for the better performance of climate resistance. However, the usage of VIP will be exam carefully with the cost performance versus energy consumption.



Glazing

The Orchid House incorporates Bayer Makrolon® polycarbonate 10mm with YKK AP air-tight window frame system for most of the Solar Decathlon Europe 2014 prototype due to the transportation and construction safety. The U-value of Bayer Makrolon® polycarbonate 10mm is 2.8 W/m²*K and the weight is only 1.7 kg/m². It is durable and easy to handle.

This glazing system is applied on the south façade of the living space, the north window-door between living space and terrace, the east window-door between living space and green core, and the east and north window-doors of the terrace.



Orchid House Glazing Systems

On the south façade, the glazing system together with the glass louver on its exterior side creates a double layer glazing system. During the overheated days when natural ventilation is desired, both the glass louver and the window-door open to maximize air flow. Shading is provided by the roof whose geometry is carefully calculated to carry shadow during overheated season. During the under-heated days, the glass louver is closed. Solar radiation penetrates the glasses on the louver and provides direct solar gain to the house.

On the north window-door of the living space, the glazing system is located between living space and buffer zone. Since the thermal condition of the buffer zone is relatively mild. The glazing system stands alone to allow daylights in.

On the east window-door of the living space, the green wall is located right on the exterior side of the glazing. The glazing system allows visual contact between the living space and the green core. Because the plants on the green wall may reduce air temperature in summer, the window-door may remain open until the active cooling system is on.

On the east and north sides of the terrace, the glazing provides cool light into the terrace. The light will be reflected into the living space while avoiding direct solar heating which usually accompanies with day light.

Daylight

The lighting strategy of Orchid house is to eliminate excessive lighting and utilize as much natural as possible.

The southern facade has louver that cuts the hot direct sun light in summer, and lets in natural light in winter. The geometry of south side house is adjusted to reduce heat gain during the summer, yet bring more direct sun light to the interior space during the winter time. The key is to extend the roof on the south side outward to create a perfect condition for lighting control.

The exterior parameter of Orchid House is mostly covered with planters to promote reflected light to come in through the openings. This externally reflected component will contribute to the interior day light.

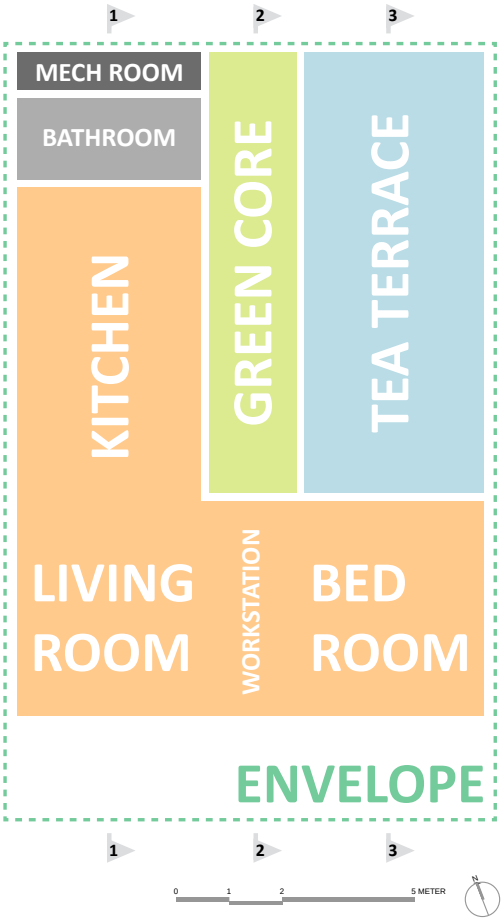
Lastly, the green core and POLLI-BRICK™ will bring diffused daylight to the interior space. The 30cm deep POLLI-BRICK™ thermal mass will filter harsh west afternoon sun light to soften diffused light and the living room will bright until the sunset. The clear Bayer Makrolon® polycarbonate 10mm will be placed at rooftop of central green care to drawn direct sun light to the center of the house. The wooden planters for the vertical garden will act as louvers to diffuse the light into the room.

View to thermal mass and Green core

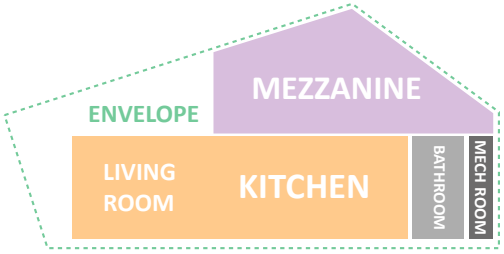
Space Planning

The Orchid House spacing planning criteria is including:

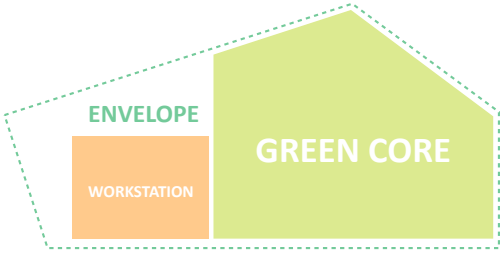
1. The vertical circulation space is place at the center of the house to promote natural lighting and fresh air ventilation.
2. The mechanical room and bathroom are located on north side to reduce heat loss of living space.
3. The kitchen, living room and bedroom forms an open plan which distributing radiant heat from west side thermal mass.
4. The double high tea terrace on east side is to bring morning sunlight to the house.
5. The mezzanine level space is for ventilating the heat generated by photovoltaic panel on the roof.



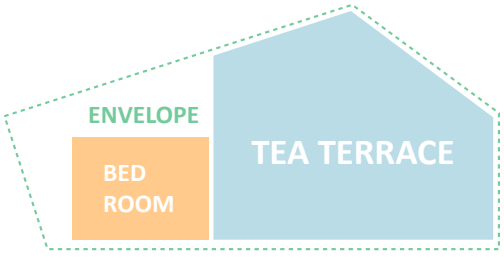
Program Plan Diagram



Program Section Diagram 1



Program Section Diagram 2



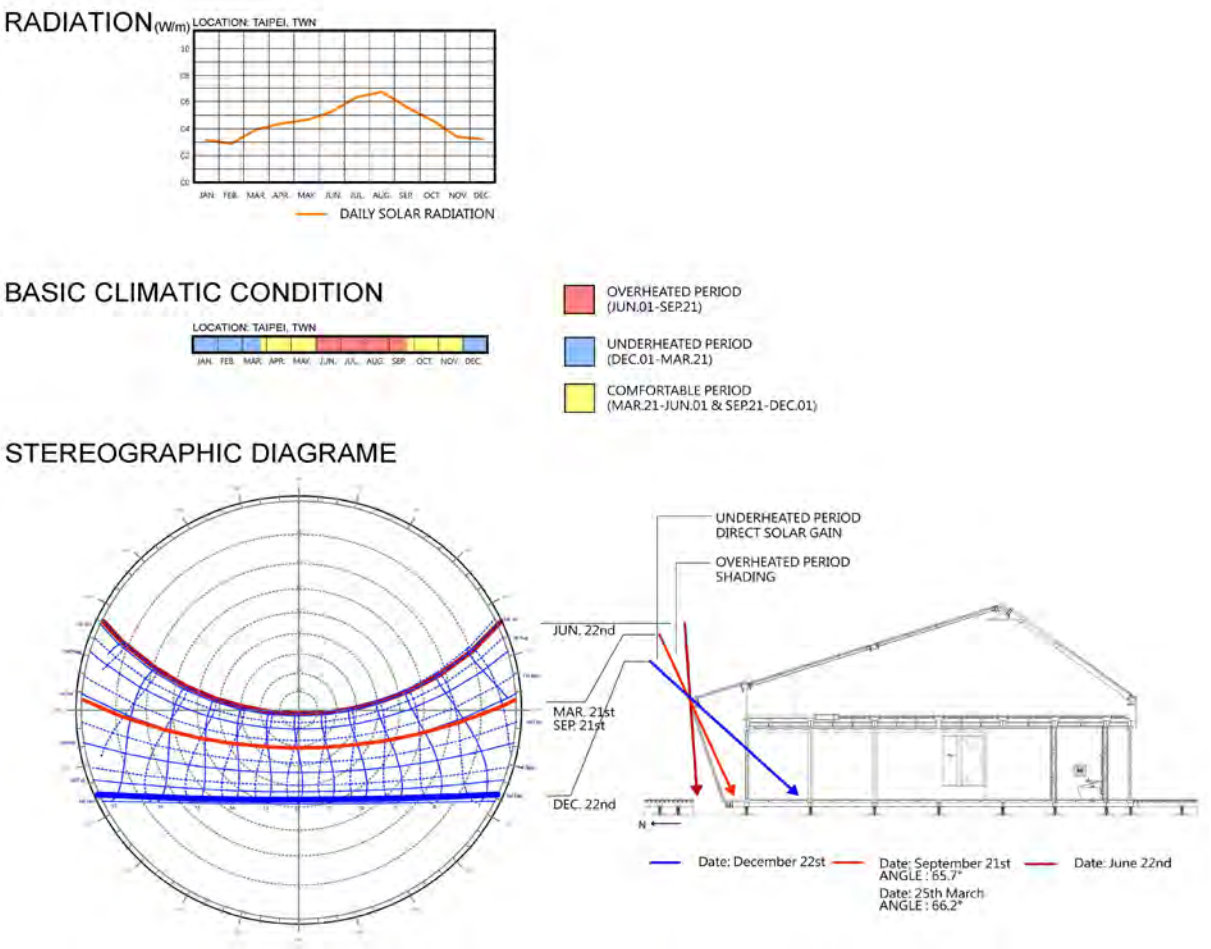
Program Section Diagram 3

Passive heating strategies

The passive Heating strategies include:

1.Direct solar gain:

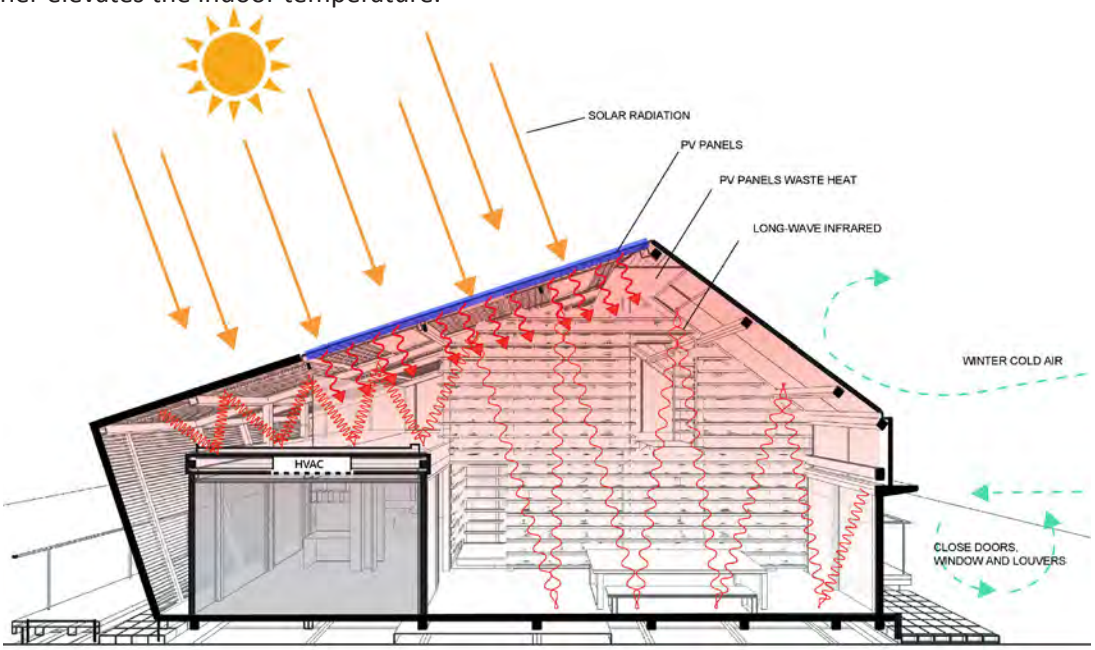
In order to keep the indoor temperature comfortable between 22°C and 29°C, the outdoor balance point temperature needs to be at 19°C to 26°C. The average temperature of Taipei is below 19°C from December 1st to March 21st which is defined as the under-heated period. To provide direct solar gain for the living space, the building geometry was designed with the purpose to allow solar radiation to enter the living space during the whole under-heated period.



Solar Angle and Direct Solar Gain Diagram

2.Greenhouse effect:

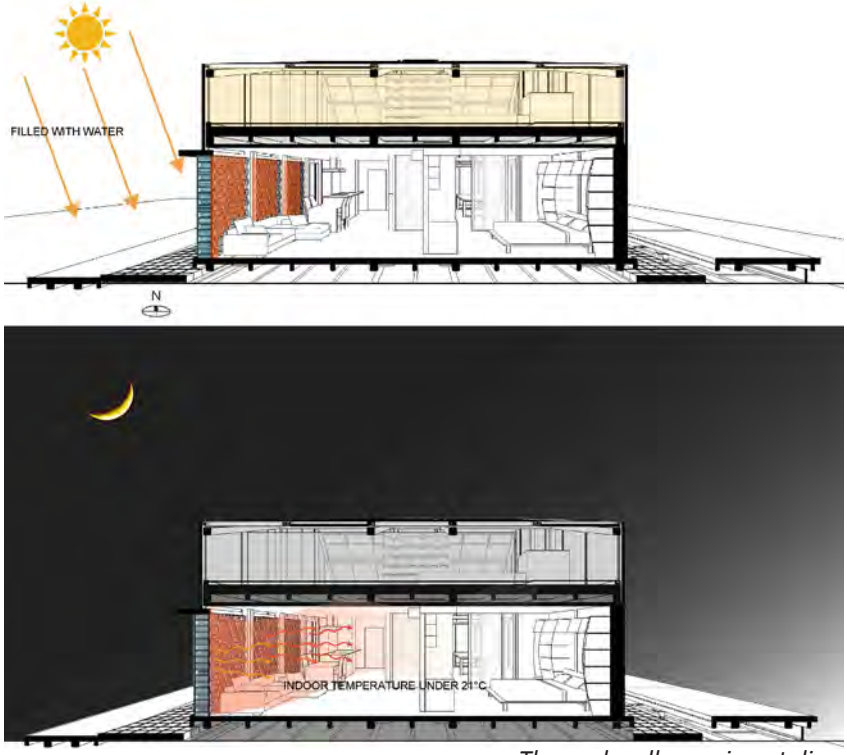
When the outdoor temperature is below 19°C, all exterior windows and louvers of the building will be closed. The greenhouse effect generated from the solar radiation will increase the indoor temperature. The waste heat generated underneath the PV panels also remains indoors and further elevates the indoor temperature.



Greenhouse Effect Diagram

3.Thermal wall:

The 30cm thick thermal wall on the west side of the house is built with water-filled 6-litter-bottles. The bottles are made of recycled Polyethylene Terephthalate Polymer. This thermal wall utilizes the high heat capacity of water to store solar energy for heating. The wall is 2.2 meters in height and 6 meters in width that accounts for 40% of the floor area.



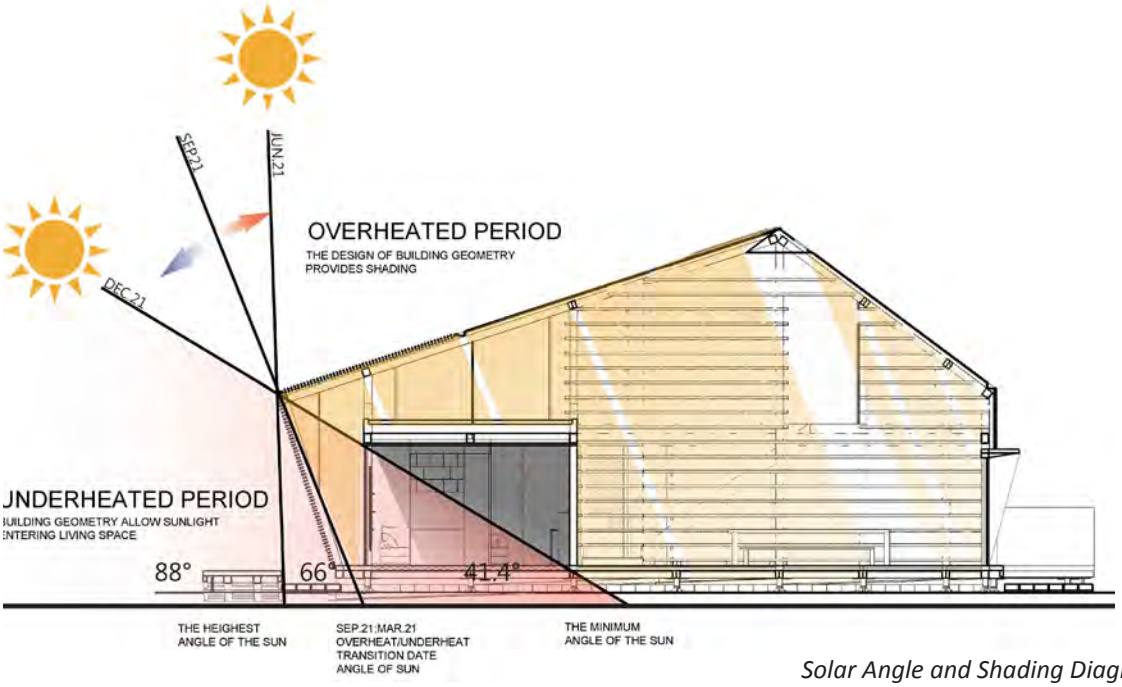
Thermal wall experiment diagram

Passive cooling strategies

The passive cooling strategies include:

1.Shading:

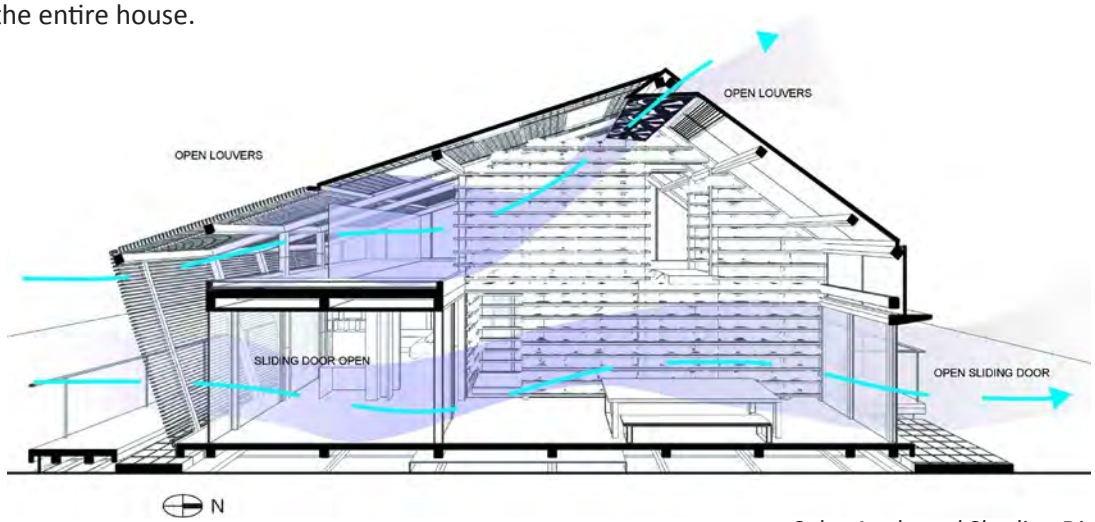
The average temperature in Taipei is above 26°C from June 1st to September 21st which may be defined as overheated period. It is essential to avoid solar radiation in the living space during these days. As a result, we need to shade the south openings from sun beams that come in at 66° until September 2ist. It will completely shade the south openings for the whole overheated season. The building geometry of the Orchid House offers a shading area on the south side to protect the solar radiation during the overheated period in Taipei.



Solar Angle and Shading Diagram

2.Natural Ventilation:

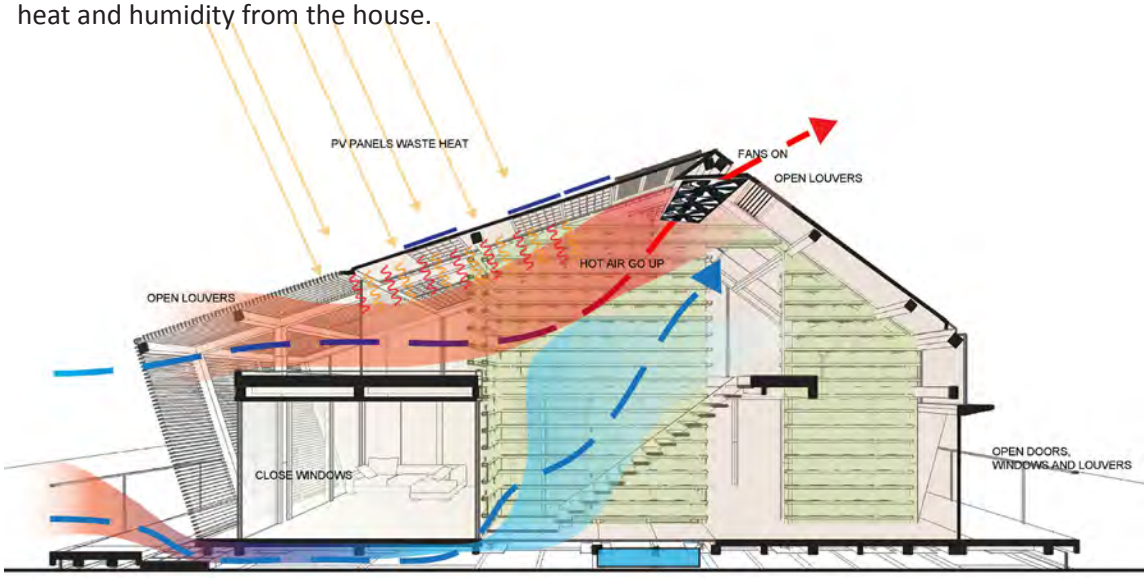
When the outdoor temperature is between 19°C and 26°C, and the wind is blowing, all windows and louvers of the Orchid House would open up to allow natural wind to blow in. The wind will carry off the waste heat generated by PV panels as well as the heat and humidity generated by human and appliances. Due to the prevailing summer southwest wind in Taiwan, the Orchid House has large openings on both the south and north sides to capture all natural wind blowing through the entire house.



Solar Angle and Shading Diagram

3.Solar Chimney:

When the outdoor temperature is between 19°C and 26°C but there is no wind, the waste heat generated by the PV panels under the roof will create stack effect, which means the indoor warm air would rise and escape through the opening near the ridge of the roof. This air movement will bring the outdoor air into the house through the windows and louvers which will drive away the heat and humidity from the house.



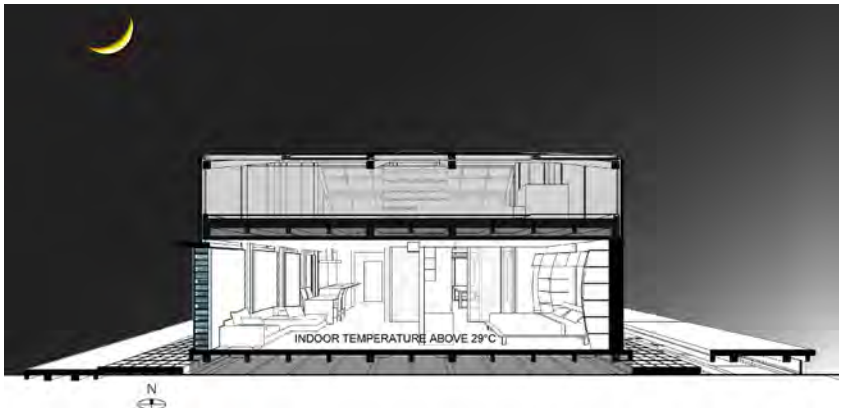
Solar Chimney Diagram

Thermal Energy Strategies

Thermal energy storage strategies are important passive design strategies for the Orchid House. The Unicode team's thermal energy strategies include:

1.Thermal wall:

For heating purpose, the thermal wall on the west side of the house stores solar radiation in the water and releases it into the indoor space at night when the temperature is below comfortable level. This energy storage process serves the best in autumn when the daily temperature takes a big dive at night in Taipei. It also performs well in sunny winter days when the daytime is warm and nighttime is cold. During the warm nights, a sliding wall panels with high thermal resistance may be closed to prevent heat radiates into the living space. During the extreme hot summer in Taiwan, when the solar radiation should be preferably kept out, the water in the thermal wall may be removed which will turn the thermal wall from thermal storage device to thermal resistance device. The thermal resistance value of the empty Polli-Bricks wall to 12m2*°C/w. See section 1.5.3 for more detail about Thermal wall.



Thermal wall at overheated night

2.Earth and rain water tank heat-sink:

The Orchid House has a raised footing that sits on top of existing roof surface. There is a space between raised floor and underneath building structure to create a cool shaded space. Rain water tank also sits in this space. When the outdoor warm air (26+°C) flows into this space, the heat will be absorbed by the building structure and the rain water in the tank. That will cool down the air before it enters the terrace space. See section 1.6.4 for more detail about earth cooling.

Ventilation

Because of the long, hot, and humid summers in Taiwan, ventilation becomes the most important passive design strategy for the Orchid House. Ventilation brings cool outdoor air into the space to lower the indoor temperature. The outdoor air may also be cooled by heat sink such as the earth and water tank or by evaporation before entering indoor spaces. Air flow on human skin can also lift some heat from our body. It also increases evaporation in our skin to increase comfort in overheated condition.

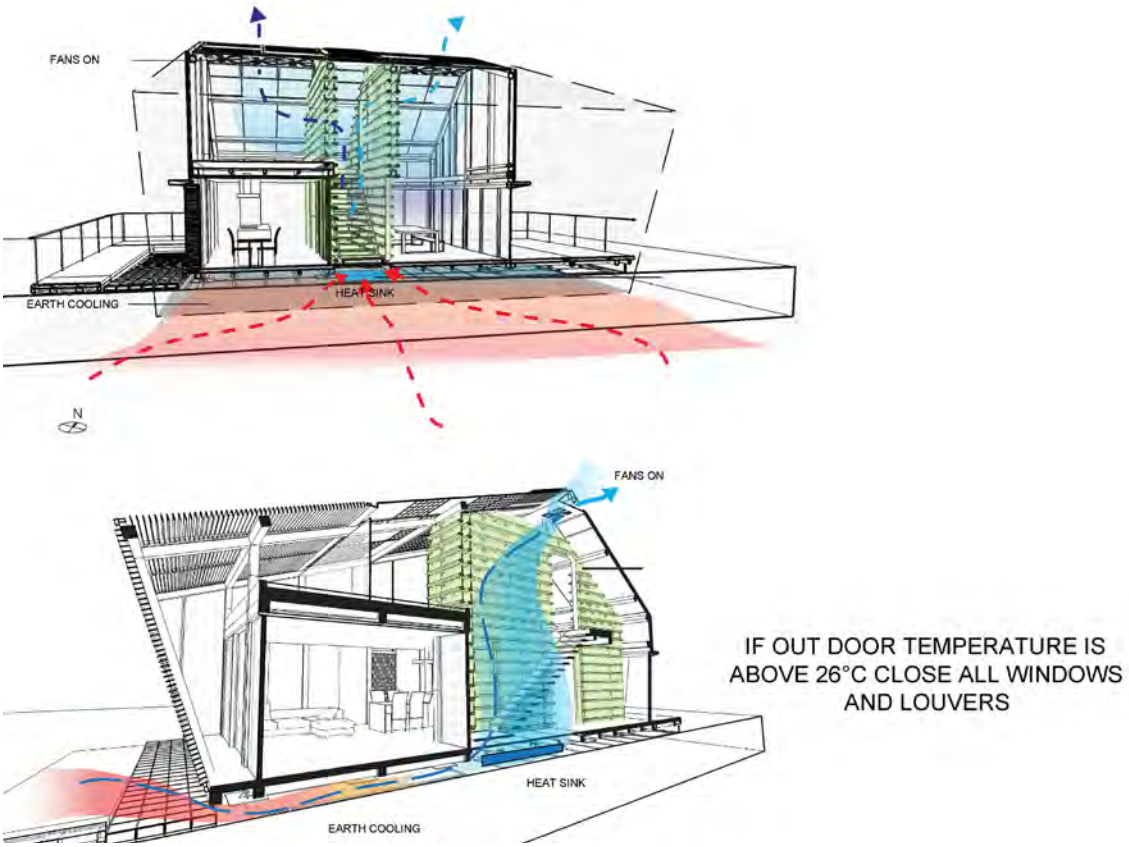
Our ventilation strategies include:
1.Natural ventilation: See section 1.6.2
2.Forced ventilation for earth and vegetation cooling: See section 2.9.1
3.Forced ventilation for evaporative cooling: See section 2.9.2

Hybrid or Semi-passive systems

The semi-passive systems include:

1.Forced ventilation with earth and vegetation cooling:

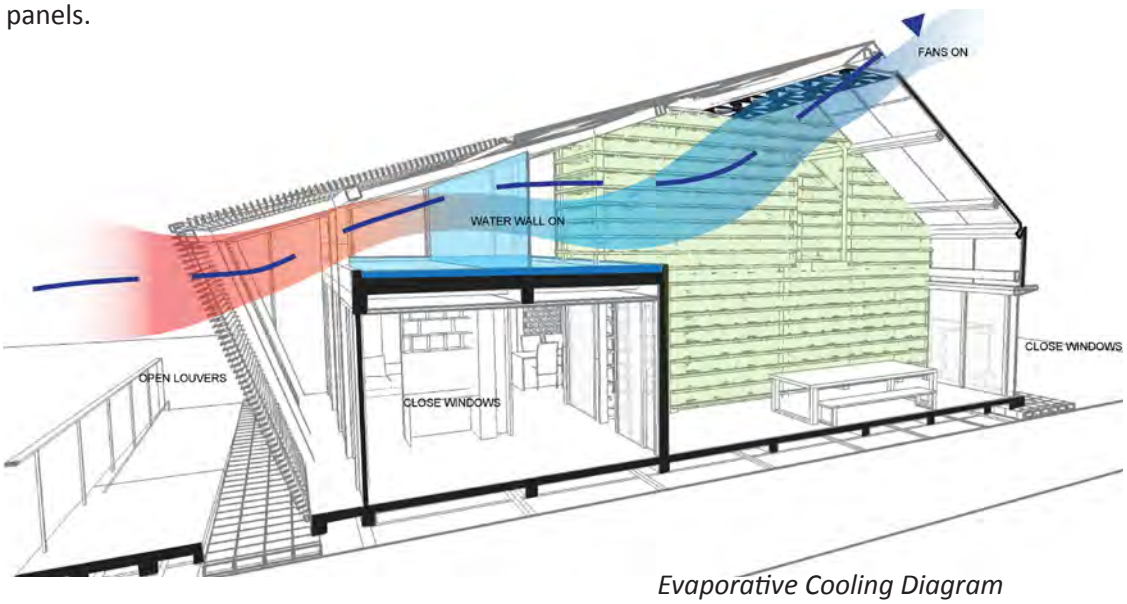
When the outdoor temperature is above 26°C, a series of fans near the ridge of the roof would be turned on. These running fans would create a negative pressure which draws the outdoor air to the underneath space of the floor. The air then would flow through the floor opening in the green core. After the air flows into the green core, it penetrates the vegetation wall around the green core and enters the terrace area. The warm outdoor air is first cooled by the underneath building structure and rain water tank under the floor and then cooled by the evaporative effect of the plants.



Earth and Vegetation Cooling Diagram

2.Forced ventilation with evaporative cooling:

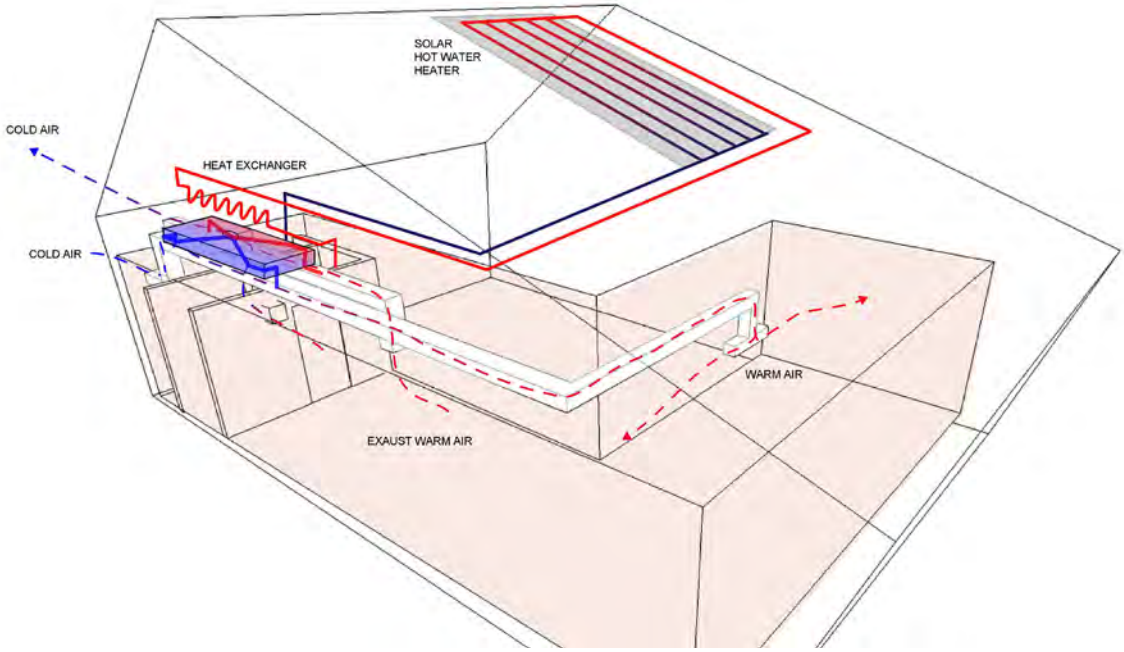
When the outdoor temperature is above 26°C, a water wall would come on automatically. The outdoor air will then be drawn into the terrace space by the fans near the ridge of the roof. The outdoor air temperature is lowered by the evaporative effect. This process reduces the heat gain of the indoor space from the terrace. This process will also remove the waste heat from the PV panels.



Evaporative Cooling Diagram

3.Heat exchanger preheated by solar hot water:

The solar hot water system on the roof provides domestic hot water as well as hot air for winter heating. The hot water is drawn to the inlet duct of the heat exchanger, so the inlet air is preheated before it enters the living space. This enables us to largely reduce the operation of heat pump for heating purpose .



Solar hot water preheat air handling system

Exterior Design

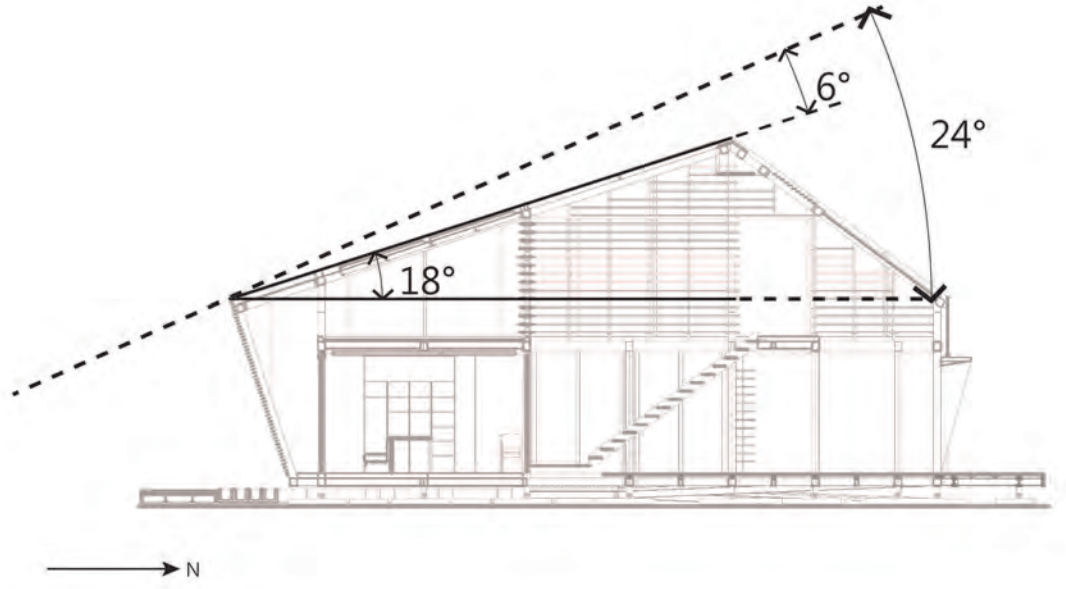
The concept of the Orchid House is to build a buffer space, the terrace, outside the living space. We use all passive and semi-passive strategies to control the temperature of the buffer space. No matter how extreme the outdoor climate may be, the microclimate of the buffer space is moderate which reduces the use of mechanical system in the living space. Some outdoor plants can also reduce air temperature around the house. It also lowers the air temperature through evaporation before the warm air enters the house.

East side view at Solar Decathlon Europe

The Geometric Envelope

The geometry of the Orchid House is generated by its physical environmental condition. The weather analysis shows that shading and natural ventilation are the most important passive design strategies for Taiwan's climate. The NCTU/UNICODE team designs the house to maximize shading and natural ventilation with its geometric form.

The angle of the roof determines the solar yields on the PV panels. The latitude of Taipei is 240, so the theoretically optimal roof tilt angle is 24o. Because Taiwan's peak electrical load happens in summer for cooling purposes, the roof angle of the Orchid House is designed to be 6o less than 24o that makes it 180. This roof angle increases solar yields during overheated season.



The angle of the south façade directs the summer shading and winter direct solar gain. Based on the climate analysis of Taipei, the comfortable indoor temperatures 22°C ~ 29°C result from an outdoor balance point temperatures of 19°C ~ 26°C. People, appliances, and PV panels generate heat in the house, and this heat needs to be released to outdoor in order to maintain at a comfortable level. The balance point temperature is the outdoor temperature that causes balance between thermal gains and losses at a desired indoor temperature with natural heat transfer. Plotting the average temperatures of Taipei to the balance point temperature, The NCTU/UNICODE Team found the overheated period is from June 1st to September 21st, and the under-heated period is from December 1st to March 21st. The Orchid House reached the optimal south façade angle of 66o for both the ideal summer shading and winter solar radiation.

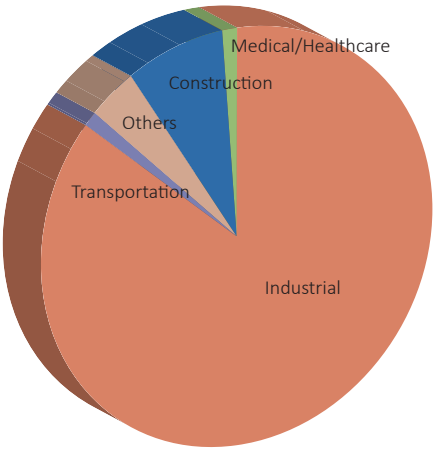
5.6.4 Construction system

Taiwanese typical residential construction method is reinforced concrete columns and slabs with brick infill for 4-5 story building. (*Figure 5.6.4.0.1: Brick infill photo*) Many of Taipei residential buildings are widely opening store front at street level, however, it sometimes results in weak story on the first floor. Also, the concrete sub-contractor's insufficient engineering skill casts columns with lack of ductile and causes building collapsing after strong earthquake. According to the National Center for Research on Earthquake Engineering, earthquake over magnitude 6.3 around Taipei basin could trigger 4,000 building failures. The prime problem is that around 700,000 residential buildings in Taipei metropolitan area are over 30 years old and built with not adequate seismic proof design.

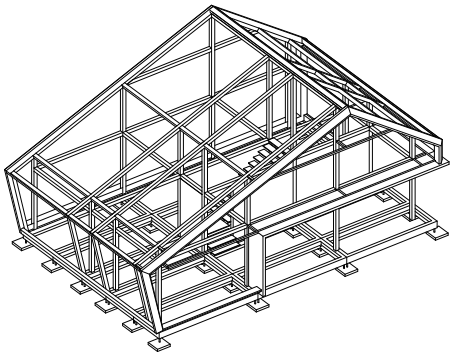
Brick Infill RC strcture

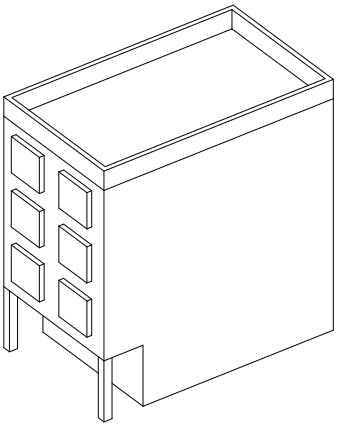
Taiwan is an Island with high population density, therefore the landfill waste is one of the biggest challenges to protect its own healthy environmental condition. According to the data from EPA in Taiwan, the construction waste is the second largest output among all enterprise waste after industrial waste. (*Figure 5.6.4.0.2: Waste chart*) Demolishing all the over 30-year old building in the metropolitan area such as Taipei, Taichung, and Kaohsiung for urban renewal will increase the construction waste amount drastically and garbage treatment system will be overcapacity. Waste treatment is also one of the biggest concern Taipei city renewal is currently facing.

By analyzing the existing site/rooftop condition, NCTU UNICODE propose the prefabricated steel structure for the Orchid House rooftop extension as well as the structural reinforcement for the below existing RC structure. All the steel structure will be manufactured in factories near Taipei area to reduce post construction waste and also all the post production waste to be recycled within the factory. Also with the Orchid House Urban Regeneration plan, the amount of landfill will be minimized comparing with typical demolishing urban renewal construction projects.



Waste Chart





	Orchid House Construction (Steel Prefabrication)	Typical Taiwanese RC Construction
Solid Waste	5% of Construction Material	Up to 20% of Construction Material
CO2 Emission	-20% in 20 years	5% to 13% per Cubic Meter
Construction Time	1 month	1 year
Production Energy	30 Gj per ton	1.4 Gj per ton

5.6.5 Materials

The Orchid House consists with main steel structural frame and series of box infill to incorporate different type of insulation material. The insulation material will be selected by the local environmental condition as well as the financial condition of the house unit. Both steel structure and box infill will be prefabricated in factory near Taipei city for reducing carbon footprint during the transportation.

Most of building material for the basic structure for the Orchid House is easily recyclable materials: Steel, Aluminum window frames, and simple glass. The Orchid House also integrates new material with sustainability concern such as Bayer Makrolon polycarbonate, MegaMaster eFoam insulation, and SPG's 100% recycled glass foam insulation.

Materials selection

The Orchid House Prototype at Versailles, France material selection is including:

Façade

Polli-Bricks: Recycled, Recyclable, and Reusable
Polycarbonate Makrolon® polycarbonate: Recyclable and Reusable
Glass-louver: Recyclable

Structure

Steel: Recyclable and Reusable
Structural Plywood: Recyclable, Reusable, and Renewable

Floor

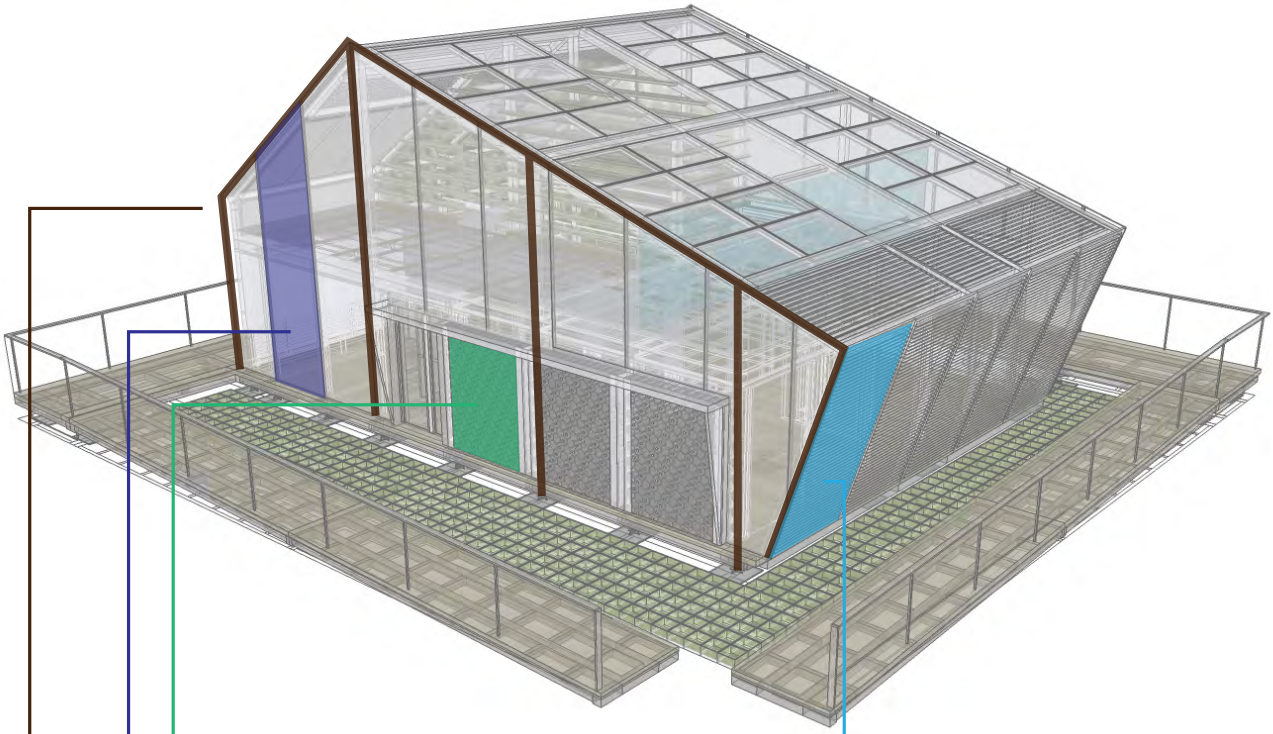
UA Floor: Recyclable and Renewable
Wood Plastic Composite: Recycled, Recyclable and Reusable

Insulation

Glass foam: Recycled, Recyclable, and Reusable
e-Foam: Recycled, Recyclable, and Reusable

Interior

Wood Furniture: Recyclable and Renewable



FACADE

POLLI-Bricks™ RECYCLED RECYCLABLE REUSABLE RENEWABLE

POLYCARBONATE RECYCLED RECYCLABLE REUSABLE RENEWABLE

GLASS-LOUVER RECYCLED RECYCLABLE REUSABLE RENEWABLE

STRUCTURE

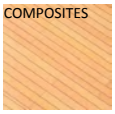
STEEL RECYCLED RECYCLABLE REUSABLE RENEWABLE

STRUCTURAL PLYWOOD RECYCLED RECYCLABLE REUSABLE RENEWABLE

FLOOR

UA FLOOR :R1621 RECYCLED RECYCLABLE REUSABLE RENEWABLE

WOOD PLASTIC COMPOSITES RECYCLED RECYCLABLE REUSABLE RENEWABLE



INSULATION

GLASS FOAM FOAM RECYCLED RECYCLABLE REUSABLE RENEWABLE

EFOAM RECYCLED RECYCLABLE REUSABLE RENEWABLE

INTERIOR

PLY WOOD RECYCLED RECYCLABLE REUSABLE RENEWABLE

Sustainable Material Matrix

Incorporated Energy

The incorporated energy of construction materials used in Orchid House was analyzed using the Cumulative Energy Demand method provided for the SimaPro life cycle analysis software. For the selection of materials chosen from Ecoinvent database for Orchid House life cycle analysis, refer to section 5.7.10 Life Cycle Analysis.

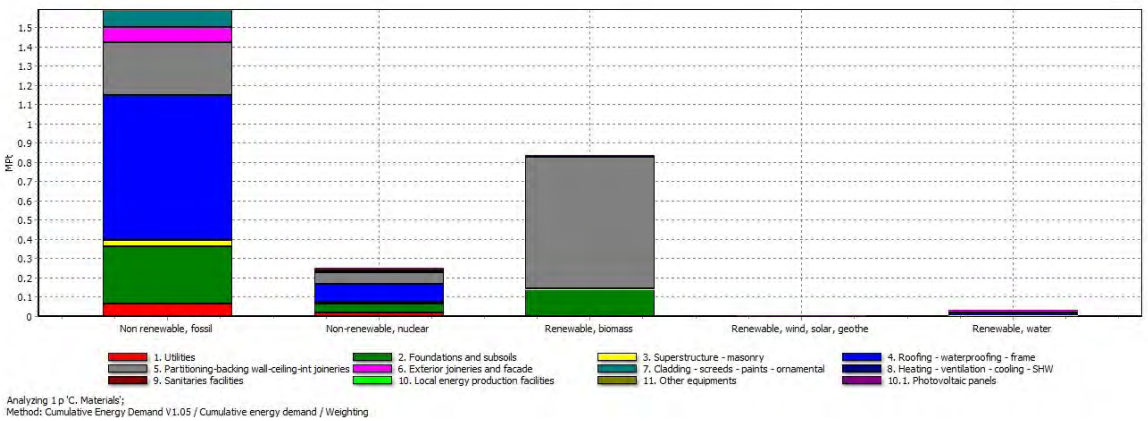
Cumulative Energy Demand
The Cumulative Energy Demand results reflect the amount of energy consumed in the process of raw materials gathering, transportation, manufacturing and processing of building materials. The accumulation of all these processes then becomes the incorporated energy of these materials. The total incorporated energy from building materials is 2,750,11 MJ equivalent.

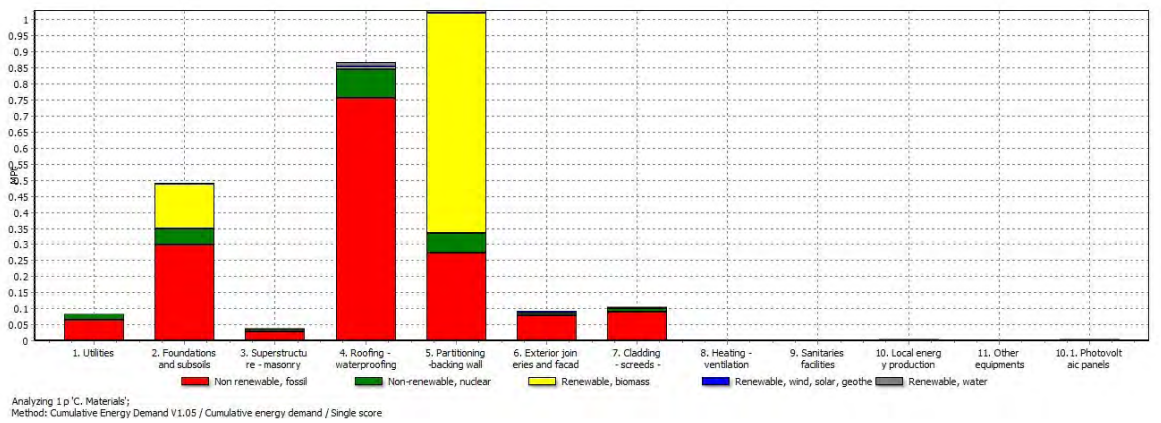
Based on the results, the top four processes that contribute to energy demand are from the coal and natural gas generated energy for materials processing and manufacturing, consuming as much as 579,721 MJ of energy and 36.3% of total energy.

The processing of polystyrene and polyethylene used in the vacuum insulated panel and thermoplastic materials of the thermal wall and wood plastic composite also contribute to 170,610 MJ eq. and 10.7% of total incorporated energy

The largest proportion of biomass consumed originates from the plywood used in the wall partitions and foundation of Orchid House. A trace amount of energy is used in terms of water use for the construction materials.

Impact category	Unit	Total	Utilities	Foundations	Superstructure	Roofing /frame	Partitioning /wall	Exterior joineries	Paints
Non renewable, fossil	MJ eq	1,626,778	65,241	299,510	28,652	756,439	272,858	108,865	88,372
Non-renewable, nuclear	MJ eq	252,372	17,355	50,047	8,577	89,959	62,185	11,751	10,666
Renewable, biomass	MJ eq	836,001	5	137,301	959	5,954	684,559	1,390	5,700
Renewable, wind, solar, geothe	MJ eq	3,338	1	354	32	1,649	1,000	87	180
Renewable, water	MJ eq	31,622	1,293	3,601	448	12,283	8,512	3,363	1,482



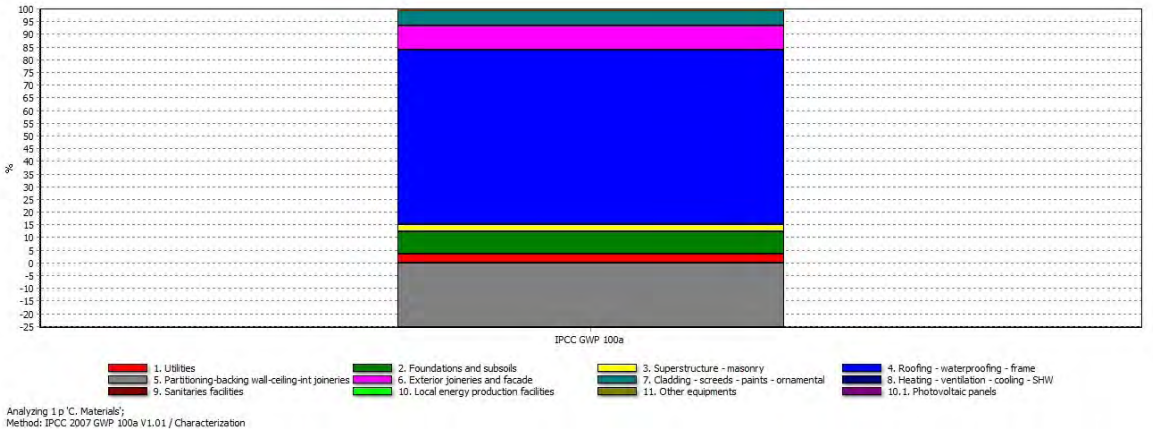


No	Process	Unit	Total	Utilities	Foundations	Super structure	Roofing /frame	Partitioning /wall	Exterior joineries	Paints
	Total of all processes	MJ eq	1,594,972	65,241	299,510	28,652	756,439	272,858	77,059	88,372
1	Hard coal, at mine/EEU U	MJ eq	223,490	20	7,880	464	200,353	10,924	1,855	1,672
2	Hard coal, at mine/WEU U	MJ eq	138,669	23	5,563	1,273	118,167	9,815	2,359	1,172
3	Natural gas, at production onshore/RU U	MJ eq	124,538	11	20,939	3,289	47,680	42,882	3,154	5,117
4	Natural gas, at production onshore/DZ U	MJ eq	93,025	7	14,774	1,505	24,555	44,602	1,707	5,152
5	Polystyrene, expandable, at plant/RER U	MJ eq	91,662	0	82,935	8,399	176	118	27	8
6	Polyethylene, HDPE, granulate, at plant/RER U	MJ eq	78,948	5	77,146	47	390	1,289	25	42
7	Lignite, at mine/RER U	MJ eq	75,681	27	7,470	461	39,082	23,482	2,805	1,547
8	Hard coal, at mine/ZA U	MJ eq	62,566	7	3,392	433	53,084	4,053	962	511
9	Natural gas, at production offshore/NO U	MJ eq	60,945	5	12,910	2,474	21,566	19,564	1,429	2,334
10	Natural gas, at production onshore/NL U	MJ eq	58,747	5	12,042	2,256	21,263	18,898	1,397	2,239

Incorporated CO2

Using the IPCC 2007 GWP 100a analyzing method the following results were obtained for CO2 equivalent of the building materials. The total incorporated CO2 from building materials used in Orchid House is 58,723 kg CO2 equivalent.

The results show that the partition and walls of the Orchid House remove -19,999 kg CO2 eq from the environment, this is a result of the plywood sequestering CO2 from the environment. A more detailed look into the results reveals that as much as 213,355 kg CO2 is sequestered from the plywood used, however CO2 released during the processing of the plywood negates most of its environmental benefits. Never the less, the sequestered CO2 from the plywood is able to reduce over a quarter of the global warming potential from the other building materials. The benefits of using natural construction materials is evident by these results, and warrants more considering in materials selection in the future.



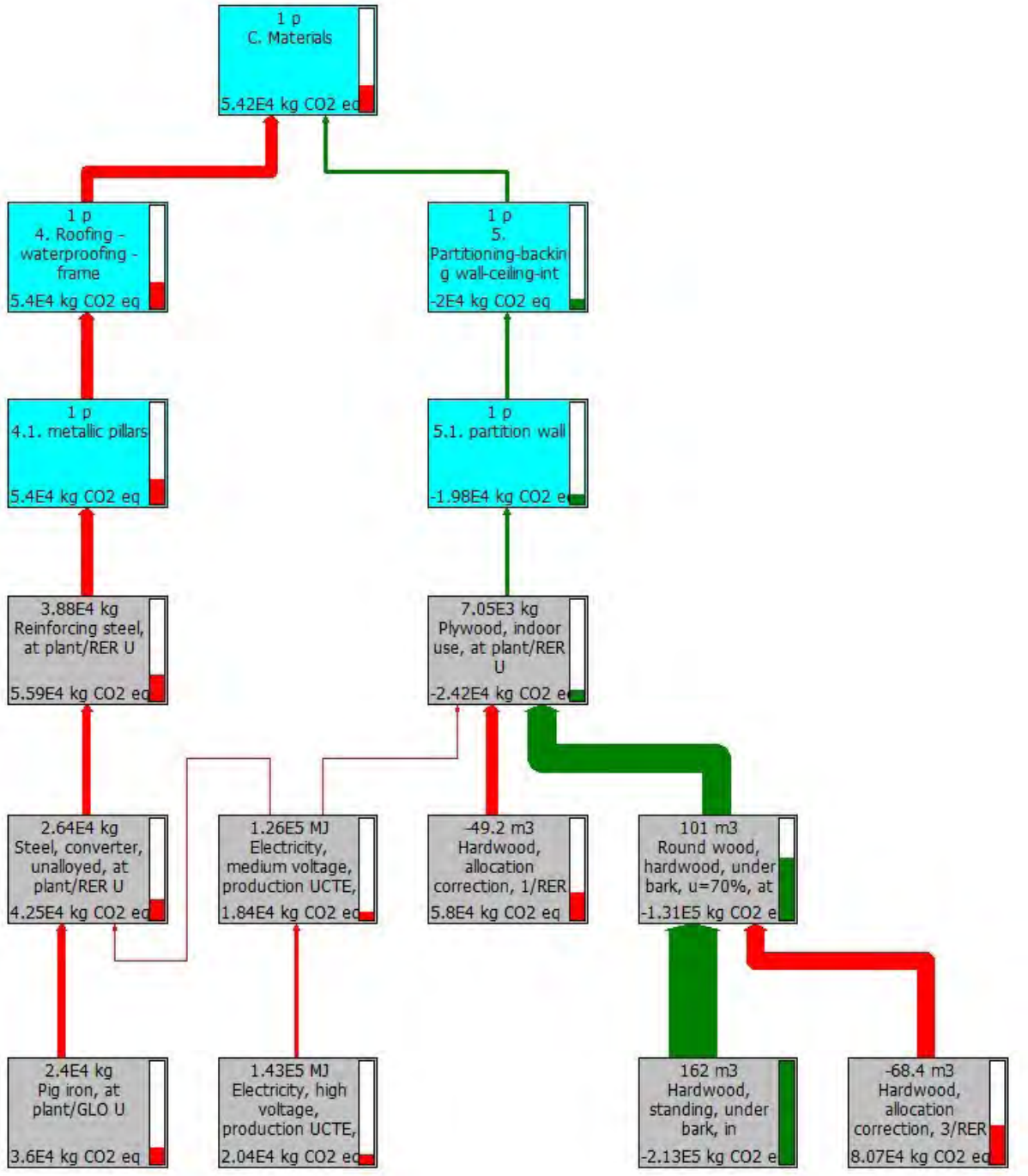
Impact category	Unit	Total	Utilities	Foundations	Super structure	Roofing /frame	Partitioning /wall	Exterior joineries	Paints
IPCC GWP 100a	kg CO2 eq	58,723	2,743	6,907	2,289	53,989	-19,999	7,570	4,751

No	Process	Unit	Total	Utilities	Foundations	Super structure	Roofing /frame	Partitioning /wall	Exterior joineries	Paints
	Total of all processes	kg CO2 eq	58,723	2,743	6,907	2,289	53,989	-19,999	7,570	4,751
1	Hardwood, allocation correction, 3/RER U	kg CO2 eq	80,720	0	13,194	2	266	67,251	4	3
2	Hardwood, allocation correction, 1/RER U	kg CO2 eq	58,018	0	9,480	1	211	48,322	2	2
3	Wood chips, from industry, hardwood, burned in furnace	kg CO2 eq	31,261	0	5,124	0	0	26,137	0	0
4	Pig iron, at plant/GLO U	kg CO2 eq	20,346	1	490	19	19,533	197	70	35
5	Natural gas, burned in industrial furnace >100kW	kg CO2 eq	7,429	0	1,697	409	3,646	1,023	193	459
6	Sinter, iron, at plant/GLO U	kg CO2 eq	5,134	0	124	5	4,929	50	18	9
7	Polycarbonate, at plant/RER U	kg CO2 eq	4,841	0	0	0	0	0	4,840	0
8	Polystyrene, expandable, at plant/RER U	kg CO2 eq	3,577	0	3,236	328	7	5	1	0
9	Ammonia, steam reforming, liquid, at plant/RER U	kg CO2 eq	3,320	0	541	2	19	2,748	1	8
10	Lignite, burned in power plant/DE U	kg CO2 eq	2,941	1	292	23	1,500	917	117	59
11	Quicklime, in pieces, loose, at plant/CH U	kg CO2 eq	2,925	0	72	5	2,791	31	17	7
12	Hard coal, burned in power plant/DE U	kg CO2 eq	2,170	1	208	17	1,069	654	157	43
13	Polyvinylchloride, suspension polymerised, at plant	kg CO2 eq	2,155	2,151	0	0	1	2	1	0
14	Polyethylene, HDPE, granulate, at plant/RER U	kg CO2 eq	2,122	0	2,074	1	10	35	1	1
15	Steel, converter, unalloyed, at plant/RER U	kg CO2 eq	1,997	0	47	1	1,928	14	4	3
16	Hardwood, standing, under bark, in forest/RER U	kg CO2 eq	-213,385	0	-34,880	-6	-703	-177,772	-13	-7

Similar to the incorporated energy, the largest source of incorporated CO2 is derived from the roofing and frame of Orchid House. If the amount of sequestered CO2 is included, this portion comprises 68.5% of total incorporated CO2 for 53,989 kg CO2 equivalent.

The remaining 31.4% of incorporated CO2 are distributed somewhat evenly between the utilities, foundation, superstructure, exterior joineries and facade and the paints used in the Orchid House with approximately 25,000 kg CO2 equivalent.

The network diagram of the results from SimaPro shows the largest contributor and reducer of incorporated CO2.



Maintenance Plan

Maintenance Plan for Active Systems
A plan is set up for the operation, performance evaluation and maintenance of the Orchid House to ensure the ongoing accountability and optimization of House energy, water consumption and IAQ performance in the future.

・Continuous metering for performance measurement and verification is implemented according to the documents issued by The International Performance Measurement and Verification Protocol (IPMVP). The following items are included:

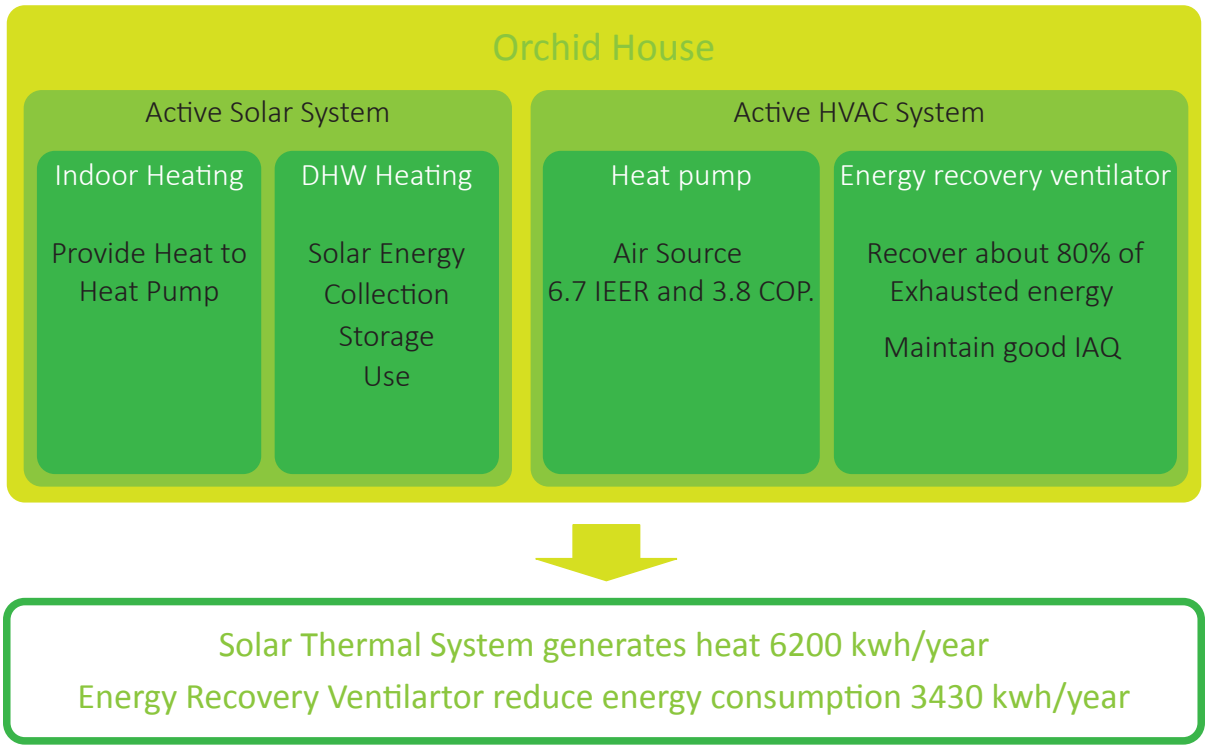
-Heat pump efficiency
-Heat reclaim ventilator efficiency
-Solar thermal collector efficiency
-Water consumption
-Energy balance
-Electrical energy balance
-Control system
-Indoor air quality
-Ventilation air Volumes

・Allocate an appropriate fund for ongoing monitoring of environmental performance, product pur chasing, maintenance, and improvement.
・Use environmentally safe cleaning materials.
・Facility the reduction of wastewater generated by House occupants.
・Educate the House occupants for the operation and maintenance.
・Every six months, evaluate existing systems to determine if they have remained undisturbed.
・Every six months, access House energy use to ensure it is at predicted levels.

5.6.6 Active System and Equipment

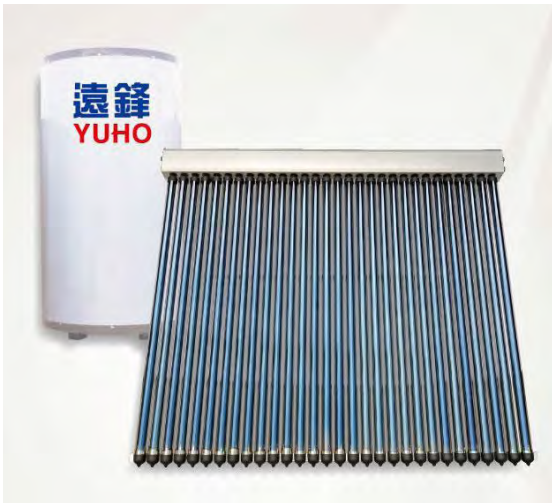
Active systems for the Orchid House have been selected based on their efficiency and performance. The systems include active solar system as DHW heating and active HVAC system. These two active systems will be simultaneously operated by the sensors imbedded in the Orchid House to achieve as comfortable indoor condition as possible with minimum energy cost.

Active systems and Equipment



First of all, in order to down size the heat pump and solar thermal system, the Orchid House needs to minimize its heat gain. By conserving the active system size, it is automatically reduce energy consumption and reduce the energy cost. The bioclimatic strategies of the Orchid House has been proven by the software simulations, such as F-Chart Software and helps farther engineering the house active system.

The solar collector for the Orchid house has been specified by its higher thermal performance and installed south facing mounted with 18 degrees to achieve 73% efficiency. The collected heated water will be stored with highly insulation water tank, which can contain two days amount of hot water for the best economic performance. The water tank will be located the mezzanine level of the house to avoid direct heat gain from exposed sun. The solar thermal system will be operated with automatic control system to optimize energy collection and storage.



Active solar thermal system is also designed to supply the space heating. The backup is provided by an air-to-water heat pump with its storage tank. The heat pump using carbon dioxide as refrigerant is more ecological and energy-efficient than other refrigerants. The COP of this air-to-water heat pump is as high as 4.6. The active solar thermal system have been configured to have two separate hot water storage tanks the solar thermal storage tank stores the higher temperature water of 90°C - the higher temperature water means the more solar energy stored – and the backup hot water tank will only supply 60°C hot water. The water in solar thermal store tank has the priority over the backup hot water to be used.

In order to maximize the efficiency of heat pump, the high efficiency heat reclaim ventilator is interlocked for optimal combined operation. The heat reclaim ventilator can recover nearly 80% of exhausted energy to reduce the ventilation energy while maintaining a good IAQ. The Orchid House active system is also automatically controlled to optimize the overall operation and achieve the maximum energy saving.

In order to visualize the effectiveness of the Orchid House active solar thermal system and active HVAC system, the simulation shows the result of how those two systems contribute to the energy reduction. The solar thermal system will generate 6200 kWh of heat annually. The simulation is shown in Appendix A , on page 1-4 . The heat reclaim ventilator of HVAC system will reduce the house's energy consumption of 3430 kWh annually. The simulation is shown in Appendix – A on page 5-6. The heat pump for space cooling and heating have the operating efficiency of 6.7 IEER and 3.4 COP respectively, which is among the best performance in the market.

Techinical Choices made on the artificial lighting

To save energy and in the same time, to achieve desired lighting effect, LED lighting is chosen for artificial lighting. Different LED lighting devices are chosen for different scenario ranging from 1.2 W to 20 W power consumption. Detail lighting layout can be found in drawing EL-402 and EL-403.

Lighting control is made by either motion detector or by PLC (Programmable Logic Controller). For places that people will only access occasionally, PIR (Passive Infrared Sensor) type of motion detector is installed to control lighting so that lighting device will be turned on and off depends on if there is any moving object presents in the designed sensing area. Besides motion detection function, the designed PIR motion detector has environmental lighting detection and action delay time selection function. With environmental lighting detection function, LED lighting will not be turned on if sensing area is within environmental nature lighting criteria and hence save power usage.

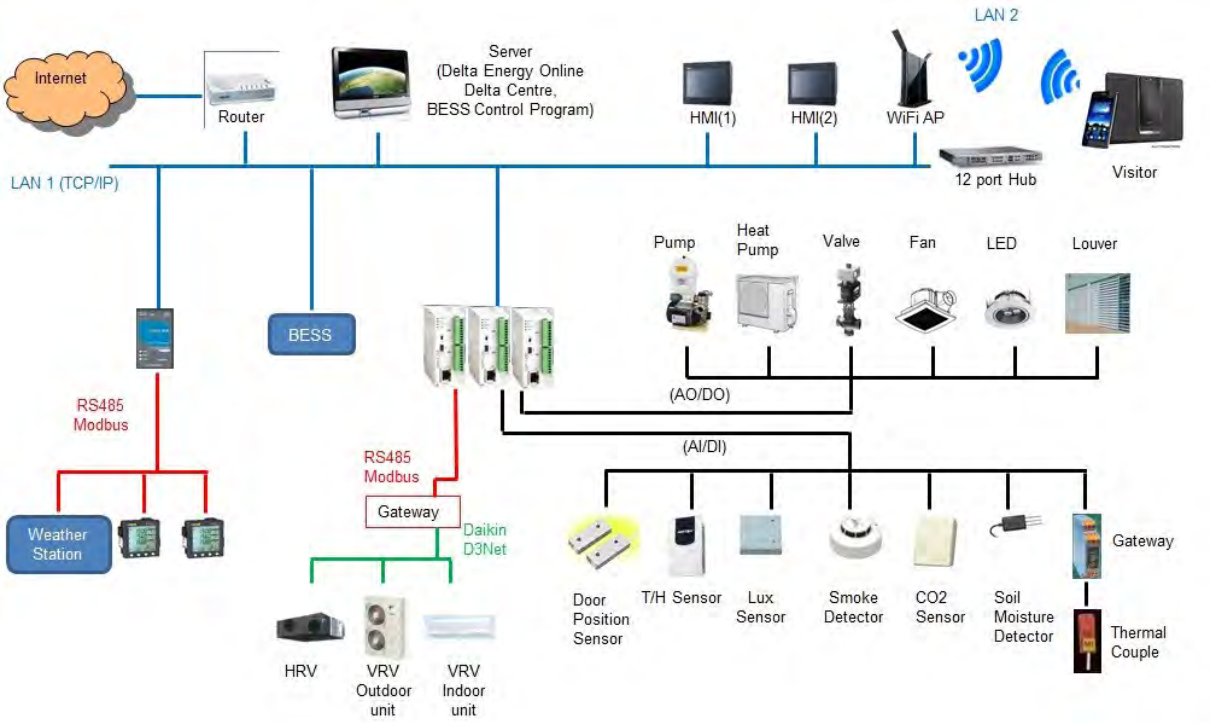
The PIR controlled area includes mechanical room, entrance area, bathroom, tea terrace, stairs and 2F space.

For area other than the above, the lighting control is made by PLC for auto control and with a HMI (Human Machine Interface) for manual control. In PLC auto control mode, PLC will receive local light sensor signal for local environmental nature lighting level, PLC will send out dimming signal to particular LED driver based on pre-programmed environmental nature lighting level criteria and hence maintain area lighting level to a pre-defined Lux level. Considering in some scenario that lighting control has to be done manually, a HMI is installed so that tenant can manually turn on and off particular LED lighting and tuning particular LED lighting's light level. Handheld device can link to HMI via Ethernet and WiFi, this feature provides tenant convenience and mobility to operate manual lighting control.

Technical choices made on the building management system

The whole BMS (Building Management system) is based on PLC control structure. Equipped with Delta Electronics industrial PLC and I/O module, the BMS can receive equipment or sensor AI/DI as input data, calculated with pre-programmed control logic and then send out AO/DO command to specific equipment or device to maintain defined environmental scenario and save power usage.

On top of the PLC control system, a Delta Energy On Line (EnOL) system is installed as an energy consumption monitoring system. This EnOL system keeps monitoring energy generation (by Photovoltaic system) and energy consumption (load) and provides report and graph so that user can easily identify energy flow. The schematic of the BMS is shown below.



Contribution of each system to the project sustainability

Both lighting control system as well as BMS system is designed to provide functions for an intelligent building. All the components of both systems are available in market and hence both systems can be easily deployed and installed with affordable cost.

Techinical Choices made on the Appliances

The appliances for the Orchid House prototype at Versailles, France is specially selected with EU complied since the electricity voltage difference between Taiwan 110V, 60 Hz and France 230V, 50Hz. The selection has made based on the appliance's energy efficiency class label.

Clothes Washer

Manufacturer	:	MIELE
Model	:	W664
Performance	:	
Energy Efficiency Class		Certification
A++		EU Energy Label

Dryer

Manufacturer	:	BOSCH
Model	:	WTW8
Performance	:	
Energy Efficiency Class		Certification
A++		EU Energy Label

Dishwasher

Manufacturer	:	MIELE
Model	:	G6995 SCViK20
Performance	:	
Energy Efficiency Class		Certification
A+++		EU Energy Label

Oven

Manufacturer	:	MIELE
Model	:	H2161BCLST
Performance	:	
Energy Efficiency Class		Certification
A		EU Energy Label

Cooking

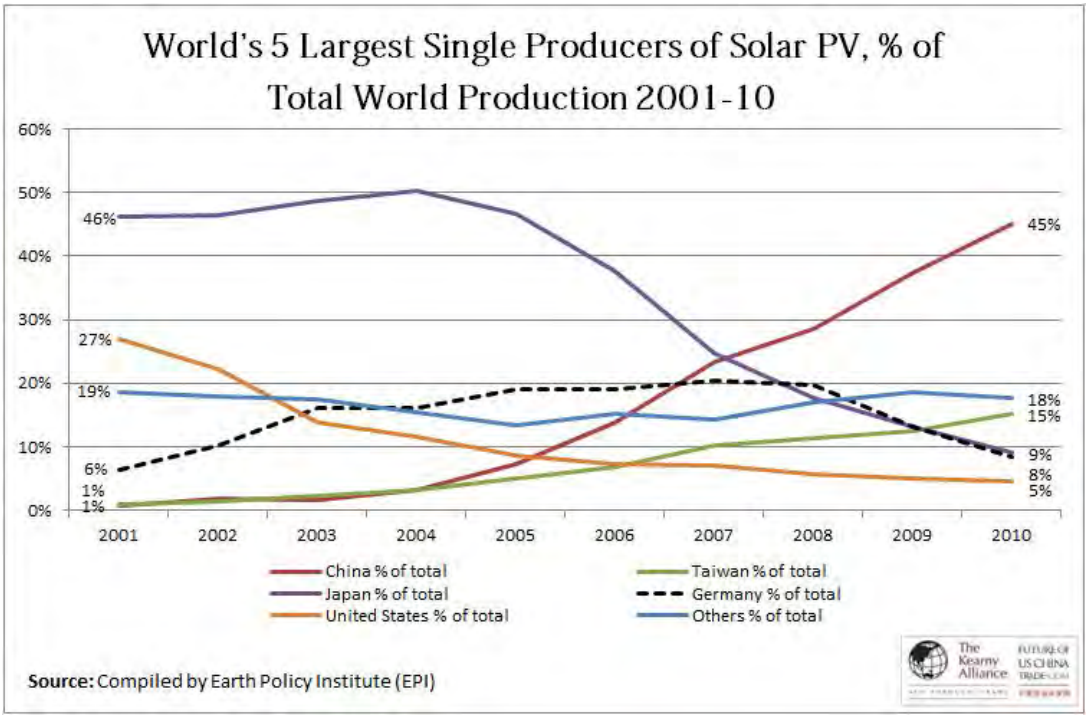
Manufacturer	:	MIELE
Model	:	Domino CS 1112E
Performance	:	1200W

TV

Manufacturer	:	JVC
Model	:	LT-28HA52U
Performance	:	
Energy Efficiency Class		Certification
A		EU Energy Label

5.6.7 Solar Systems

Based on Earth Policy Institute (EPI) survey, Taiwan is the second largest solar PV producing counties among the world in 2010 (Figure: World 5 largest single producers). However, Taiwan's photovoltaic peak power capacity is about 206 MWp in 2012, which is much less than other countries such as Germany as 32,411 MWp, China as 8,043 MWp and Japan 6,704 MWp. NCTU UNICODE is aware this situation and likes to raise the social awareness in this solar energy issues and governmental policy with the Orchid House project.



NCTU UNICODE collaborates with Delta Electrics, which is the parent company of DelSolar as the largest solar cell producing company on a capacity basis, for Orchid House project to promote installing solar power system on residential buildings. Currently almost none of Taiwanese residential buildings install PV system on their rooftop, although Taiwan is received more than twice the sun exposure of Germany. For the Orchid House PV system, DelSolar D6P Multi-Crystalline module is chosen for its high efficiency and cost performance. It is light weight and easier to install.

Energy Recovery Time for PV System

Simulated yearly PV output energy is 5,540 kWh/year, simulation report is shown below.

PVSYST V5.71		17/02/14	Page 2/3

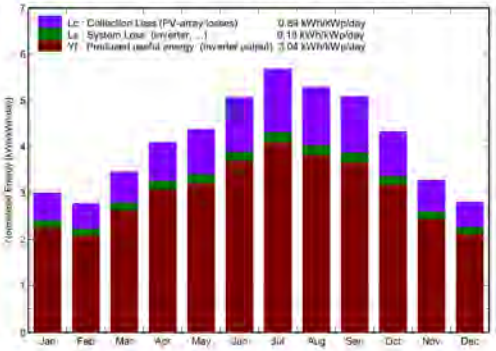
Grid-Connected System: Main results

Project : **2014 SDE PARIS**
Simulation variant : **140217_交大台北_5kWp**

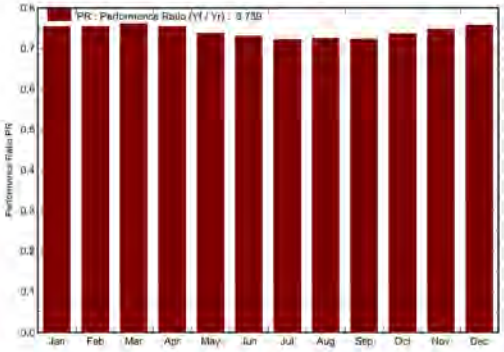
Main system parameters	System type	**Grid-Connected**			
PV Field Orientation	tilt	18 deg	azimuth	0 deg	
PV modules	Model	D6P250B3A	Pnom	250 Wp	
PV Array	Nb. of modules	20	Pnom total	**5.00 kWp**	
Inverter	Model	Solar inverter SOLIVIA 5.0 TR	Pnom	5.50 kW ac	
User's needs	Unlimited load (grid)				

Main simulation results
System Production — **Produced Energy** **5540 kWh/year** Specific prod. 1108 kWh/kWp/year
Performance Ratio PR 73.9 %

Normalized productions (per installed kWp): Nominal power 5.00 kWp



Performance Ratio PR



140217_交大台北_5kWp
Balances and main results

	GlobHor kWh/m2	T Amb oC	GlobInc kWh/m2	GlobEff kWh/m2	EArray kWh	E_Grid kWh	EffArrR %	EffSysR %
January	80.0	16.20	93.0	89.9	374.1	350.8	12.31	11.54
February	71.0	18.60	77.7	75.1	313.8	292.8	12.37	11.54
March	103.0	20.20	107.1	103.7	434.3	407.4	12.41	11.64
April	123.0	23.00	122.8	118.8	491.0	463.0	12.24	11.54
May	141.0	25.60	135.6	131.0	529.7	499.9	11.96	11.28
June	162.0	27.30	151.9	146.8	585.9	554.9	11.80	11.18
July	186.0	29.00	176.1	170.6	669.5	636.0	11.64	11.06
August	166.0	28.70	163.8	158.7	625.7	593.4	11.69	11.09
September	146.0	27.80	152.5	147.9	581.9	551.2	11.68	11.06
October	121.0	26.00	134.2	130.0	522.3	493.9	11.92	11.27
November	85.0	22.80	98.3	95.0	390.9	367.4	12.18	11.45
December	74.0	20.00	86.9	84.1	351.5	329.3	12.38	11.59
Year	1458.0	23.96	1499.9	1451.6	5870.8	5540.1	11.98	11.31

Legends:
GlobHor — Horizontal global irradiation
T Amb — Ambient Temperature
GlobInc — Global incident in coll. plane
GlobEff — Effective Global, corr. for IAM and shadings
EArray — Effective energy at the output of the array
E_Grid — Energy injected into grid
EffArrR — Effic. Eout array / rough area
EffSysR — Effic. Eout system / rough area

The simulation is made with PVSYST simulation software based on Taipei's irradiance and temperature data.

Electrical energy input of manufacturing PV system is 2,525 kWh/kWp (according to report of IEA-PVPS-T10-01:2006). So, for this 5 kWp designed PV system, the energy consumed for building this PV system is:

Total energy input while manufacturing PV system: 2,525 kWh/kWp×5 kWp=12,625 kWh

So the energy pay-back time of this system is:

Energy Pay-Back Time (EPBT): 12,625 kWh÷5,540 kWh/year=2.279 year

CO2 emissions for PV System

CO2 emission saving associated to the PV panels' production

The CO2 per kWh emission is 0.636 kg in Taiwan. According to report of IEA-PVPS-T10-01:2006, electrical energy for PV module manufacturing is in total of 2,296 kWh/kWp, so for this 5 kWp system in Taiwan, Total CO2 emission for PV module manufacturing is:

0.636 kg/kWh×2,296 kWh/kWp×5 kWp=7,301.28 kg

Generally, PV system service life time is around 20 to 25 years, so in this PV system's life, the total CO2 reduced is:

0.636 kg/kWh×5,540 kWh/year×20 year=70,468.80 kg

So from the two calculations of above, the 20 years of net CO2 emission reduction of the 5 kWp system in Taiwan is 63,167.52 Kg

CO2 emission saving associated to a year of system functioning

As shown in above, simulated yearly PV system output power is 5,540 kWh, converted to CO2 emission saving of a year PV system functioning is:

0.636 kg/kWh×5,540 kWh/year×1 year=3,523.44 kg

Carbon Payback Time and CO2 Emissions for Solar Thermal System

Embodied energy	9,800 kwh
Embodied carbon	6,232 kgCO2
Energy saving (1)	4,658 kwh/yr
Carbon saving	2,962 kgCO2/yr
Carbon payback	2.1 years in Taipei
Total carbon emission saving (2)	59,240 kgCO2

Note:
(1)Energy saving is calculated from the “Analysis of Solar Thermal System”
(2)The total carbon emission saving considers the saving during 20 years of service life time minus the embodied carbon for the solar thermal system.

Accessibility

All work in commissioning and maintenance of a system should be performed by a qualified technician.

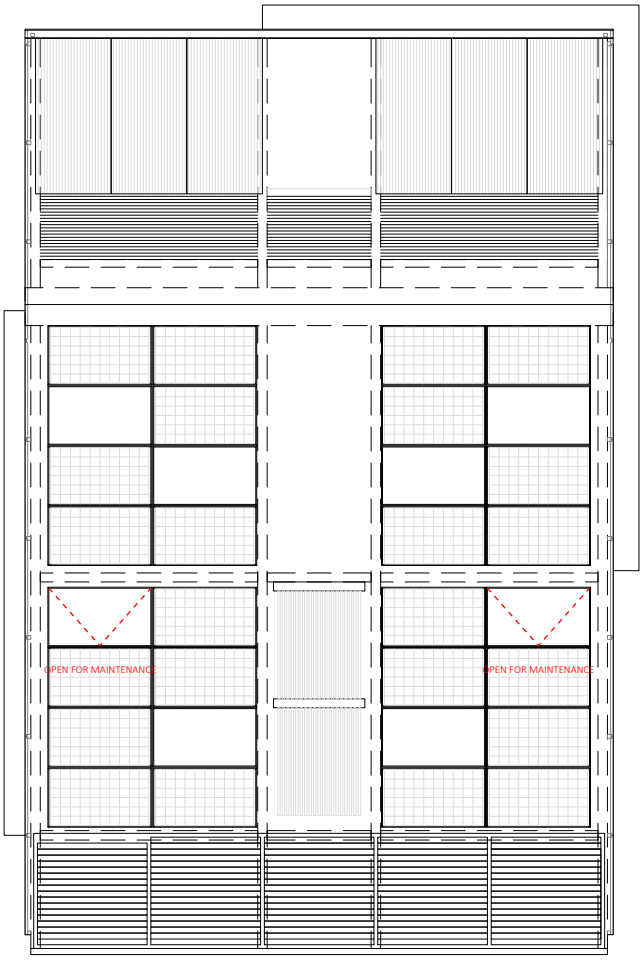
For general routine system maintenance, module glass should be cleaned periodically, or when it’s dirty. Use water and a soft sponge or cloth for cleaning. A mild, nonabrasive cleaning agent can be used to remove sticky dirt.

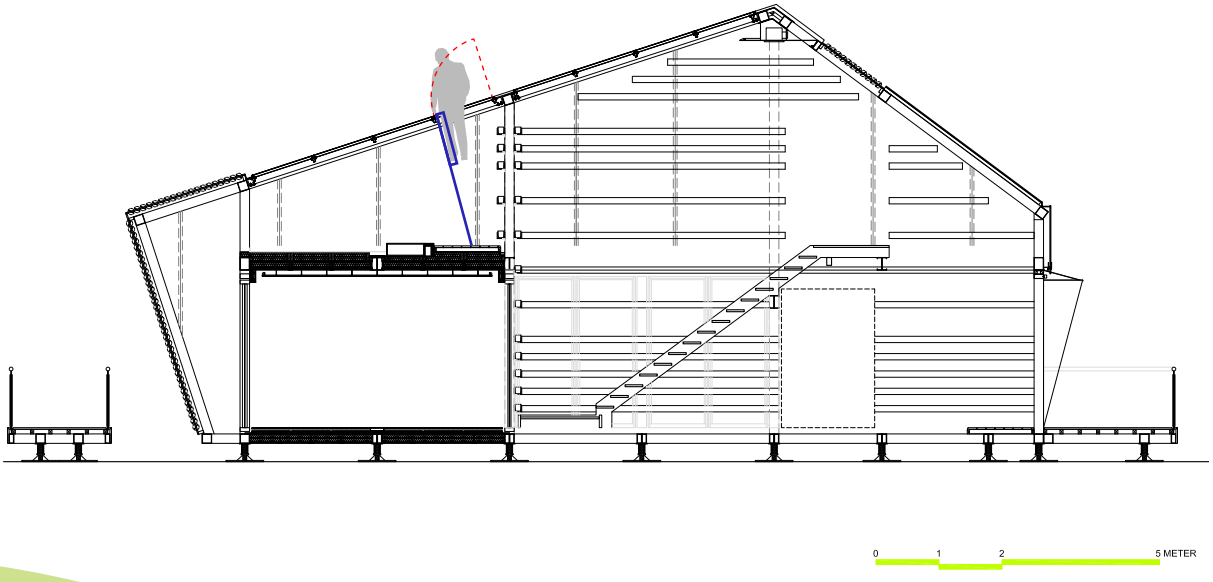
Check the electrical and mechanical connections periodically to verify they are clean, secure and undamaged. All electrical devices should be checked periodically by technician. Grounding also needs to be checked regularly.

Detail system maintenance can be found in PM#4, 5.3.8 of rule 36.8 for detail maintenance plan.

Maintenance Plan

In order for the roof PV system to function maximum efficiency, there are couple of maintenance awing window pre-installed in the Orchid House roof system. For instant cleaning, the hydro-pressure cleaning device will be used for removing dusts from the surface from the opening of roof. On the other hand, for the deep cleaning, cleaning person will climb up to the roof with safety rope hooked to the house structure.





Installation, maintenance and accessibility for Solar Thermal System

During the installation process, relevant safety regulations must be followed to provide a safety situation for the workers, especially during roof work.

In this case of in-roof installation, the collectors are mainly integrated into the roof structure and roof cover which designed by the architectural and structural engineers. The details of installation shall be in accordance with the installation instructions by the manufacturer.

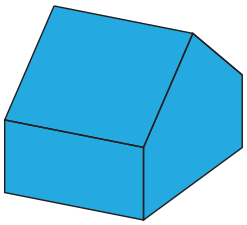
The necessary steps to start up the solar thermal system are:
1. Flush out the solar circuit.
2. Check for leak.
3. Fill with solar liquid.
4. Set pump and controller.

For maintenance, the following regular checks are recommended:
1. Visual inspection.
2. Checking the frost protection.
3. Checking the corrosion protection.
4. Monitoring the system parameters.

The personal access to the roof to carry out the maintenance at heights is the same as that for PV System.

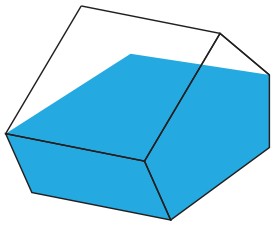
5.6.8 Water

Taiwan lies across the Tropic of Cancer, and the East Asian Monsoon directly influences its climate. The average annual rainfall is more than 2,500mm and some Eastern regions receive close to 5,000mm rainfall. Between July and October, there are several typhoons fit the island and due to the Taipei city's geographic condition as basin, the rain water runoff is one of the major reasons why some part of city get severe floods. (Figure: Taipei flood) The Orchid House project address these water runoff issues in Taipei rooftop not only for recycling the rain water, but also for reducing the basic portable water consumption for the house use.



Typical Taiwanese Dwelling
Water Consumption

500 L/day



Orchid House
Water Consumption

250 L/day

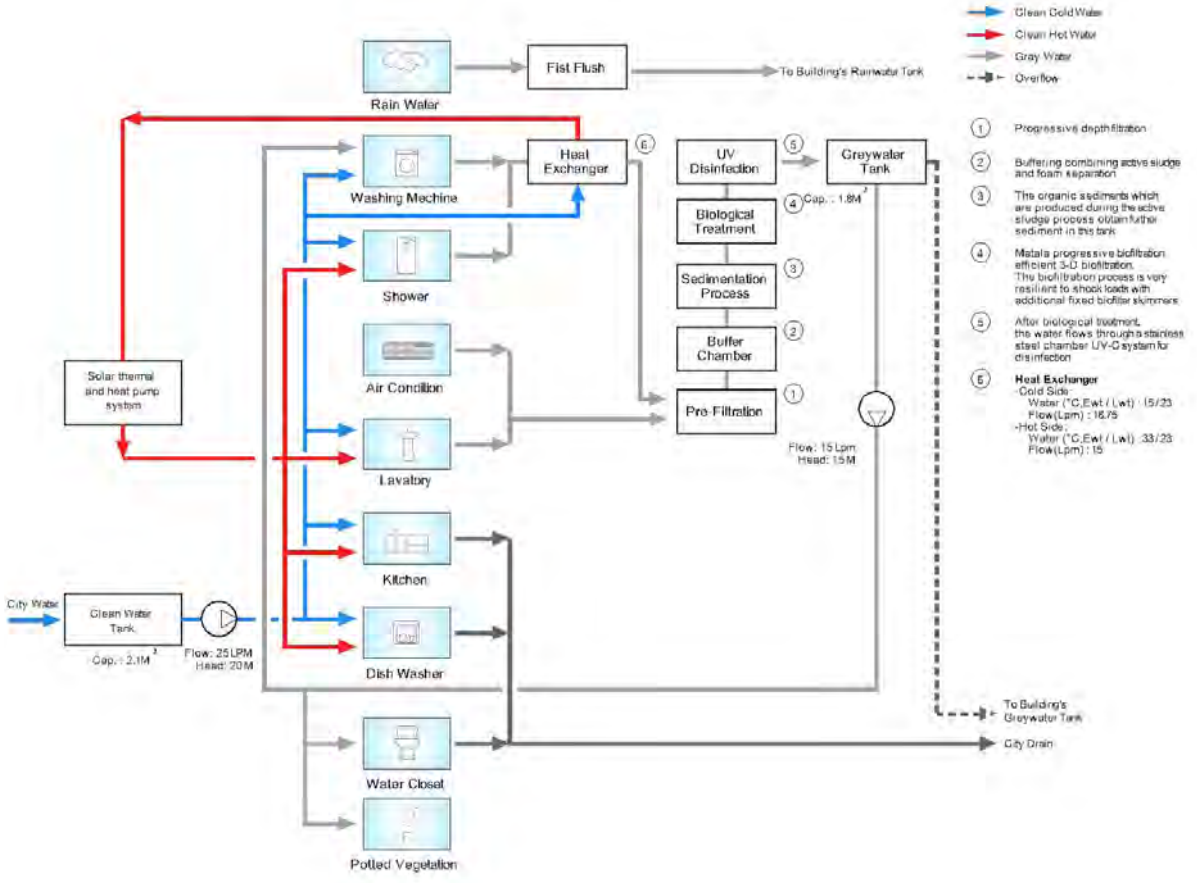
(50% deduction)

The Orchid house will consume water about 250L per day, in comparison with typical house hold in Taiwan uses 500L per day according to the report by Taiwan Water Corporation. In order to reduce 50% of portable water usage, the Orchid House selects appliances and plumbing fixtures based on its efficiency and utilizes gray water and rain water. By recycling the rainwater and conserving 50% of portable water, the Orchid House contributes to improve Taipei city water condition.

The goal of Orchid House Taiwan is set to build an ecological house on the roof of Taipei's building. The water management plan for Orchid House Taiwan should be integrating into the building on which it sits.

Project's general water use, management and conservation concept
Water is used by the following home appliances and plumbing fixtures: water closet, lavatory faucet, shower, kitchen faucet, washing machine and dish washer. The prime management and conservation concepts for water use are:

- Reduction of consumption
- Greywater reuse
- Managing rainwater
- High efficiency irrigation system



Schematic Diagram

Fixture list

Water closet

Manufacturer:	HCG
Model:	C3016
Water consumption:	1.5 / 3 L
Label:	

Lavatory faucet

Manufacturer:	HCG
Model:	LF3167PT(AW)
Water consumption:	6.7 lpm
Label:	

Shower

Manufacturer:	HCG
Model:	ST8801TA
Water consumption:	-
Label:	-

Washing machine

Manufacturer:	MIELE
Model:	W664
Water consumption:	46 L
Label:	A++

Dish washer

Manufacturer:	MIELE
Model:	G6995 SCVik20
Water consumption:	6.5 L
Label:	A+++

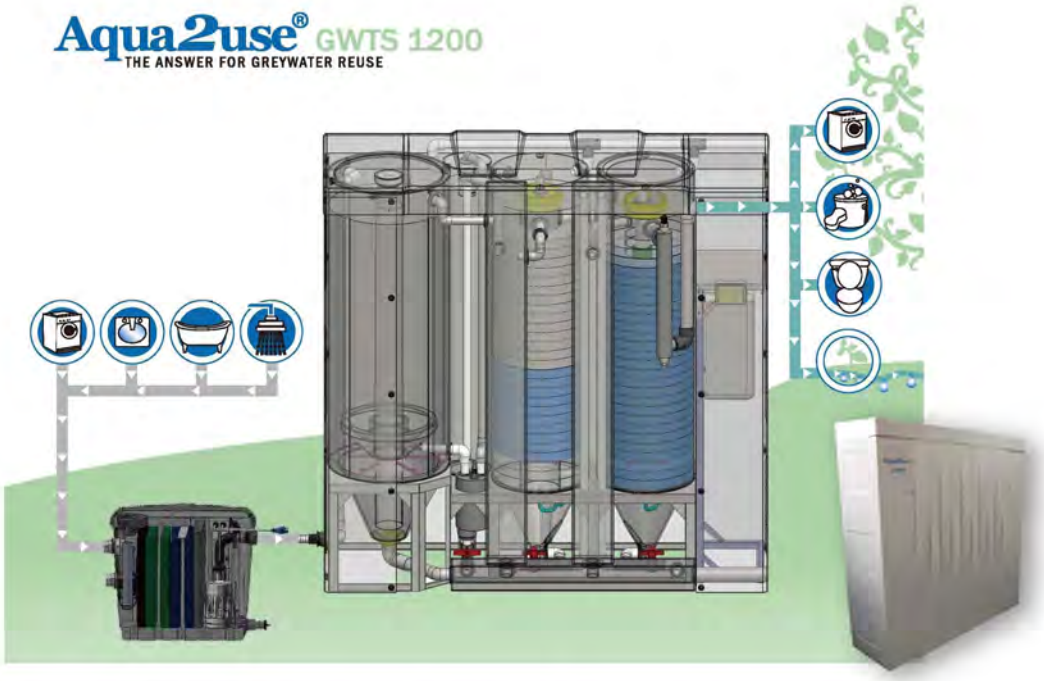
Water System

Treatment of waste water
The black water discharged from Kitchen Sink, dish washer and water closet will connected to the city drainage system through the building's main – the design and construction shall comply with the local codes.

Greywater system
The graywater – drain from shower, hand sink and wash machine – is considered to be reused for water closet, irrigation, cleaning and washing machine after treated by graywater treatment system.

The recycling reuse of wastewater is applied to graywater. The measure of water revise is to collect the wastewater from washing machine, shower and hand sink, and then be treated with the process of pre- filtration, first active sludge treatment, second sedimentation, biological treatment and UV disinfection to remove grit, hair, lint, sand, soap, scum, silt, reduce the pollutants BOD, COD, SS, turbidity and disinfect. The quality of effluent will achieve BOD < 3 mg/L, SS < 2 mg/L, E. Coli < 1 Orgs / 100 ml, turbidity: 0.47 NTU, PH: 7.9, conductivity: 497 µs/cm which is suitable for the use of irrigation, water closets, building cleaning, car washing and even washing machines. In this project, the graywater reuse is estimated 254. Liters per day, which is primarily used by the House, and its surplus is planned to be stored in another storage tank for the use of other households in the building. One of the suppliers for graywater treatment system is Aqua2use Taiwan.

Scheme of Greywater Treatment System- A safe solution with certified results and no chemical or disinfectants added.



Certification Test Results of Aqua2use® Greywater Treatment System
NATA-approved lab water tests over a period of 6 months with 31 samplings total

The black water discharged from kitchen sink, dish washer and water closet will connected to the city drainage system through the building's main – the design and construction shall comply with the local codes.

Managing rainwater
A rainwater harvesting system consisting roof catchment surface, gutter and downspouts for collection, leaf screen and first-flush divert and storage tank will be in place for rainwater use. The leaf screen and first-flush divert are used to remove dust and debris from the initial catchment runoff. First flush diverters are designed to divert a portion of the initial rainfall to eliminate contaminants that were on the catchment surface when the rainfall started.

The contribution of rainwater harvesting in Taiwan is projected below:
$S = R \times A \times C$
Supply = Rainfall × Area × Run-off coefficient (RC)
S = Mean annual rainwater supply (m3)
R = Mean annual rainfall (m)
A = Area (m2)
C = Run-off coefficient
Therefore:
$S = 2.405 \times 118.7 \times 0.9 = 256.92615$ m3

The rainwater is harvested and stored in a storage tank to be used by all the residents in the building, therefore the greatest utilization of rainwater will be realized. Note: In Taiwan, the rain often comes in the form of sudden downpour.

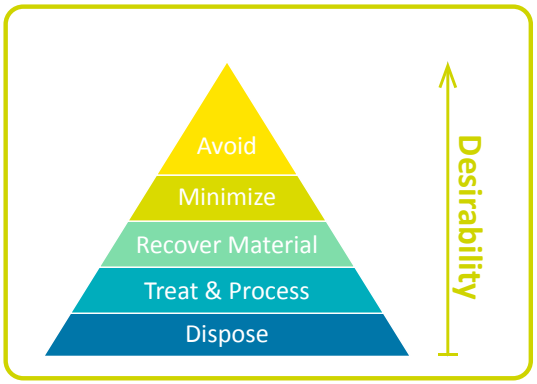
5.6.9 Solid Waste

Taipei city spends large effort for recycling the city garbage. After the Environmental Protection Administration (EPA) established a program in 1998, a financial resource called the Recycling Fund applied to establish recycling companies and waste collectors. Between 1998 and 2008, the recycling rate increased from 6 percent to 32 percent. The Orchid House project's waste management assessment principal follows those basis of Taipei city waste management system.

Taiwan's majority of solid waste is generated from industrial filed, which occupies over 90% of waste. However construction waste is the second largest in Taiwan and need to improve for reducing landfill waste. The Orchid House structure is composed with the prefabricated steel frame, which can minimize the construction solid waste to 5% of construction material. By considering the typical Taiwanese residential buildings are built with reinforced concrete with brick infill generate up to 20% waste of its construction material, the Orchid House project can eliminate large amount of construction waste.

Construction phase assessment

The Orchid House construction phase waste management must follow the hierarchy of desirability by activities. It states that waste avoidance is the most preferable option, followed by minimization of quantities and hazards of waste generated. Next, it indicates that reuse, recovery and recycling should be preferred over treatment of waste and disposal should be considered as a last option.



Waste Mangement Hierarchy

During the construction phase of the Orchid House, the solid waste management assessment are summarized below:

- To assess the construction activities involved for the proposed works and determine the type, nature and where possible estimate the volume of waste to be generated
- To identify any potential environmental impacts from the generation of waste associated with the work
- To categories waste materials where practical, for example, suitability for re-use/recycling, disposal to public filling areas, disposal to landfill and any pre-treatment requirement prior to disposal
- To recommend appropriate waste management options (including waste minimization on-site, reuse or recycling opportunities and off-site disposal option
- To identify site management/mitigation measures that should be implemented to minimize any potential impacts from the generation, handling, storage and disposal measures/routings of waste, in accordance with the current legislative and administrative requirement

Actual construction waste from the preliminary construction of Orchid House yielded the following construction waste. The solid waste was separated by its materials properties and measured by volume.

Construction Waste	Volume (Liter)
Efoam	140
Regular Blue Foam	140
VIP	140
Plastic	700
Paper	280
Composite outdoor flooring	140
Steel	140
Bayer Polycarbonate	140

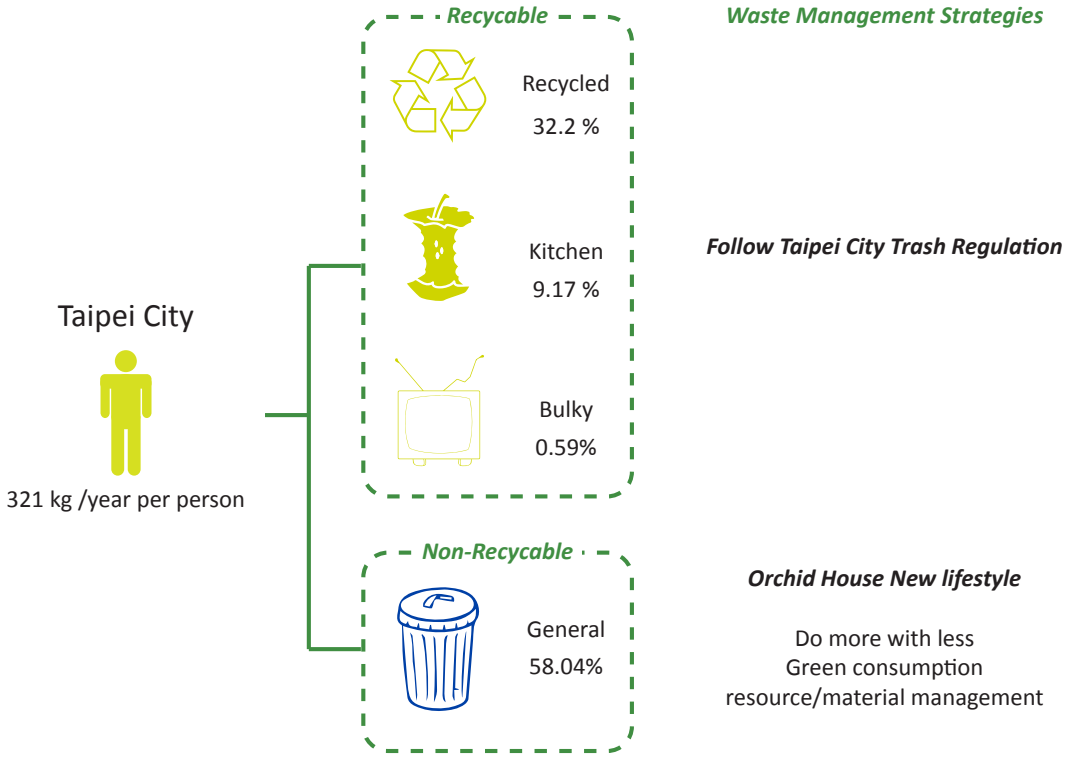
From the construction waste results, it can be concluded that despite initial planning and materials quantities calculation, small amounts of excess construction material are present after construction. Despite being disposed of in a sustainable manner, recycled and/or reused, the excess material represents excess transportation and handling that could have been avoided.

In addition, there are construction waste products such as the wrapping plastic used for protection of the construction material that cannot be reused or recycled adequately. This plastic, 700 liters, will contribute to landfill waste, and may eventually release harmful gasses to the environment throughout its life cycle of degradation. Future considerations should be made to devise strategies to decrease this

Project use and maintenance

People in Taipei produce average 321 Kg domestic waste a year, 32.2 % recyclable, 9.17 Kitchen waste, 0.59% bulky waste and 58.04% general waste. In Taipei city recycling system, not only recyclable waste, but also Kitchen waste and bulky waste can also be reused, which adds up to 41.96 % recycling. This percentage is relatively high comparing with other metropolitan cities. However, the 58.04 percent of general waste still needs challenge to minimize.

The Orchid House domestic waste management is basically educating the tenant with strict garbage separation into recycled, kitchen west, bulky waste and general waste following the Taipei City trash separation rule. However in order to minimize the amount of general trash, the Orchid House must act as new educational hub for re-thinking a new way of life. Since the Orchid House is presenting special opportunities to young professionals, the tenants of house will demonstrate their new lifestyle in the house as “Do more with less”, “Green consumption”, and “resource/material management” to reduce daily basis of waste management.



End of life assessment

The Orchid House’s end of life assessment is divided into four stages, deconstruction/demolition, transport, waste processing and disposal. During the end of life stage of building, the most carbon critical elements are substructure, superstructure and internal finishes. The Orchid House superstructure is made with steel frame, which can recycle without losing its structural capacity. Also the façade material Bayer Makrolon is 100% recyclable, which contributes much less demolition waste from the construction. Lastly, the Orchid House interior finish is mostly build with wood materials, which can process to processed products.

5.6.10 Life Cycle Analysis

The life cycle analysis of Orchid House is separated into six individual stages of the building life cycle. The analysis is conducted using SimaPro LCA software combined with Ecoinvent 3.0 materials and processes database and various impact assessment methods including Eco-indicator 99 (v2.09), Recipe Midpoint (v.1.07), Cumulative Energy Demand (v.1.05) and IPCC 2007 GWP 100a (v1.01).

The life cycle analysis of Orchid House is separated into six individual stages of the building life cycle. This analysis report will be presented following the aforementioned stages: 1. Construction Stage 2. Transport of Materials 3. Building Materials 4. Use Phase 5. Transport of Users and 6. Whole Building Analysis 7. End of Life Analysis.

Construction Stage Analysis
Based on the construction process detailed in 10.4.8 of the Project Manual for Orchid House, the largest sources of energy consumption during construction stage originate from the construction machinery and transport of construction materials from the preassembly site to the construction site. For the sake of practicality and feasibility for analysis, only the three largest consumers of diesel are considered, smaller diesel consuming machinery is omitted as their influence may be insignificant towards total consumption.

The diesel consuming machineries analyzed in this stage, ranked by fuel consumption demand from highest to lowest are: 1. Trailer Trucks for materials transportation 2. 50 Ton Crane and 3. Forklift.

Assumptions
Various assumptions are made in this analysis for consumption metrics and conversion rates. These values are derived from various sources including industry research papers, government environmental reports and online references. In the event where values are provided as ranges, the average is used. Used consistently throughout the analysis are the following conversion rates:

Diesel Gallon	Kilogram
1	3.85
Kilogram Diesel	Energy (MJ)
1	46

1 Diesel Gal=3.85 kg Diesel
1 kg Diesel=46 MJ Energy Consumption

Travel distance by the trailer trucks is based on the distance from Xin Zhu County, to Taipei City. Xin Zhu is selected as the destination for building pre-assembly due to its convenience for building materials transport and availability of pre-assembly plants.
The diesel consumption rate for each machinery is provided in the results table.

Results

The largest consumer of diesel for the construction stage is from the trailer trucks used to transport the pre-assembled building parts to the building site. The energy consumption of the trailer trucks is slightly more than ten times the energy consumption of the forklift and crane combined, consuming 1,987,345 MJ. The 50 ton crane and forklift pale in comparison by consuming 170,016 MJ and 26,494 MJ of energy respectively.

Machinery	Quantity	Fuel Consumption Rate (km/gal)	Travel Distance (km)	Diesel Consumption (gal)	Energy Consumption (MJ)
Trailer Trucks	13	10.4	83	11,222	1,987,345

Machinery	Hours Used (hrs)	Fuel Consumption Rate (gal/hr)	Diesel Consumption (gal)	Weight (kg)	Energy Consumption (MJ)
Forklift	136	1.1	149.6	576	26,494
50 Ton Crane	48	20	960	3,696	170,016

Based on these results it can be determined that the greatest energy savings would be achieved by reevaluating the transport using trailer trucks. Since the fuel consumption efficiency of the trucks is unlikely to improve significantly in the near future, strategies such as decreasing the transport distance by pre-assembling the building parts closer to the building site or reconsidering the packaging to decrease the quantity of trucks needed are feasible options.

In addition, flatbed trucks are extremely wide and have a wide turning radius. The target application of Orchid House is for low-rise, high density residential apartment complexes which are often located in neighborhoods with narrow streets and alleys. These small alleys could potentially cause a problem for the transport of the preassembled parts, therefore requiring the parts to be shipped in smaller portions. This will lead to the reliance of smaller transportation vehicles and more trips, potentially increasing or decreasing the energy consumption for transportation.

A more in depth construction stage analysis is worth exploring in the future for real life application of Orchid House in Taiwan.

Transport of Materials Analysis

As an island country with limited natural resources, Taiwan is at a disadvantage in terms of obtaining raw materials, however Taiwan does have adequate technical capability to process and manufacture products after the raw materials are received.

The distance of travel in this analysis takes into account only the transport of the material from the manufacturing or processing plant to the construction site of the building, and does not take into account the distance the raw material travels to the processing plant. The reason for not considering origin of raw material is due to limited information obtained from the manufacturer or distributer; in most cases, the origin of the raw material could not be confirmed. The primary source of iron ore for steel manufacturing in Taiwan originates from either China or Australia, again since the origin of the steel used for Orchid House could not be confirmed, the steel factory in Taoyuan, Taiwan was used as the manufacturing location.

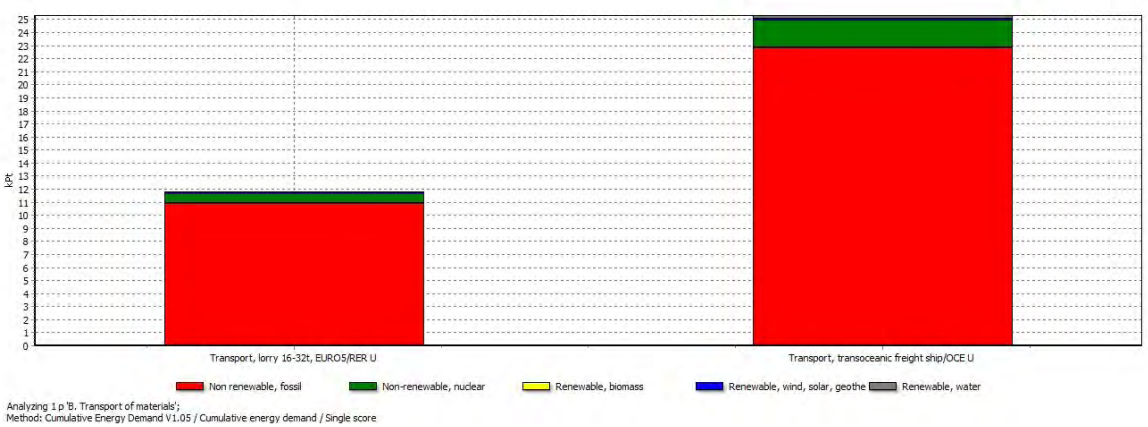
Only two means of transport were used for materials, transport by lorry 16-32t and transport by transoceanic freight ship. Lorry as transportation was primarily used for transporting within Taiwan, such as from the manufacturer or ship harbor to the construction assembly site. Freight ship was used as a low carbon intensive way of transportation to bring materials from different countries. The only foreign countries of material origin are China, Japan, Korea, Chile and Germany. Among these four foreign countries, three are located within East Asia.

For the complete list of materials place of manufacture, way of travel, distance, and transport impact (tkm), refer to the supplementary construction material data spread sheet (CM) for the TEE report.

Results

Transport by lorry and transoceanic freight ship contributed to 4,518 and 149,098 metric ton kilometers (tkm) respectively. Despite the freight ships exceeding the amount of tkm of lorries by over thirty-three times, results show that transport by lorry contributes to almost a third of the total energy consumption. This shows that transport by oceanic freight ship is much less energy intensive than transport by lorry, assuming that the freight ship is carrying a full load of cargo. The total amount of energy consumed for material transport accumulates to 33,736 MJ equivalent.

Impact category	Unit	Total	lorry 16-32t	transoceanic freight ship
Non renewable, fossil	MJ eq	33,736	10,933	22,803
Non-renewable, nuclear	MJ eq	2,847	703	2,144
Renewable, biomass	MJ eq	97	22	75
Renewable, wind, solar, geothe	MJ eq	46	6	40
Renewable, water	MJ eq	380	137	244



Building Materials Analysis

The materials used for the construction of Orchid House are chosen in an attempt to maximize utility and function, while being sustainable and easy to install and maintain. The primary materials used for the structure of the Orchid House involve steel beams which are sustainable in that it is used from recycled steel and is recyclable at the end of the buildings life time, at the same time being durable and flexible enough to withstand the frequent earthquakes of Taiwan. Almost 38,000kg of steel is used in the Orchid House, comprising of 62.9% of the total building mass. Plywood and aluminum used in the partition walls and shading also comprise as much as 20.9% of the building mass. The large proportion of steel, plywood and aluminum used will consistently be reflected in the results of the life cycle analysis of building materials.

Material	Material Mass (kg)	Building Mass Ratio (%)
Orchid House	60,328	100.00%
Steel	37,961	62.92%
Plywood	7,048	11.68%
Aluminum	5,539	9.18%
Glass/Glass Foam	2,944	4.88%
Paint	1,824	3.02%
PVC	1,391	2.30%
Wood Plastic	1,077	1.79%
Polycarbonate	626	1.04%

Description of Materials Selection in SimaPro

Despite having an extensive selection of materials and processes, the LCA database Ecoinvent v3.0 is unable to fully reflect the materials LCA used in Taiwan since the Ecoinvent database is derived of materials gathered, processed and manufactured primarily in Europe. A large proportion of the construction materials used for Orchid House are gathered, processed and manufactured from neighboring countries of Taiwan, with a small portion of materials completely domestically produced. Manufacturing processes in Europe can be different from manufacturing in Asia, such as having different transportation distances, energy consumption during production, manufacturing efficiency and waste processing. With this in mind, the LCA analysis of Orchid House uses Ecoinvent database as a reasonable substitute for materials used for Orchid House in Taiwan. The following material descriptions are for innovative or substitute Orchid House materials not found in the Ecoinvent database. Materials that are found in the Ecoinvent database are used as provided, with the provided European LCA values.

It is worth mentioning that an attempt was made to explore a domestic equivalent for materials LCA database, however, no such database exists in Taiwan with such an extensive list of materials or rigorous research approach for data gathering.

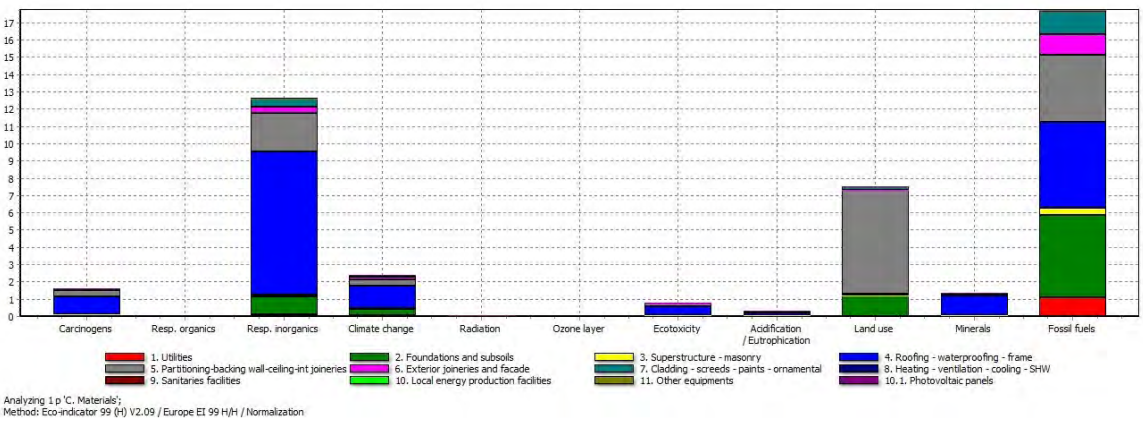
Innovative Material (Polli-Brick™)
The west-side thermal wall consists of configuration of Polli-Brick system. Each brick is manufactured from recycled PET bottles, this process is not included in the eco-invent database, therefore the assumption is made that the manufacturing process for Polli-Brick is equivalent to the process of commercial bottle grade polyethylene terephthalate.

Vacuum Insulated Panel (Vacupor®)
The VIP insulation material, Vacupor, is composed primarily of fused silica in addition to small amounts of opacifiers to minimize infrared radiation and silicates. As this specific insulation material is not available in the Ecoinvent database, a substitute material with similar physical properties was chosen. The material chosen was Polystyrene Foam Slab which has slightly higher thermal conductance properties.

Wood Plastic Composite
Wood Plastic Composites (WPCs) are produced by mixing ground wood particles and heated thermoplastic resin. Since the wood particles can be derived as a by-product of the wood industry, the majority of energy consumption and carbon emissions is thought to be derived from the thermoplastic component of the building material. As a conservative measure to satisfy both the strength of the material and the energy consumption of the composite manufacturing process, high-density polyethylene (HDPE) was chosen as the material used in the SimaPro analysis.

Results
Four analysis methods were used to explore the effects of construction material on the environment; these methods are Eco-indicator 99, Recipe Midpoint (H)/World Recipe, Cumulative Energy Demand, and IPCC 2007 GWP 100a.

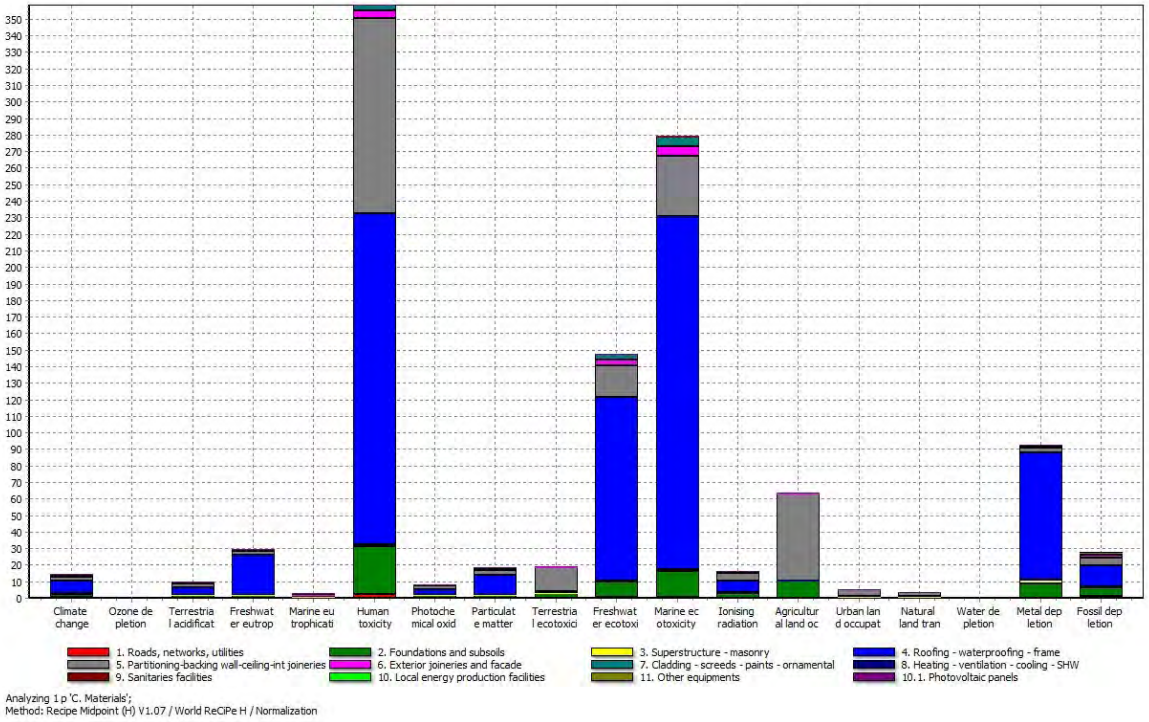
Eco-indicator 99
The results from the Eco-indicator reveal that besides fossil fuel consumption and land use from the manufacturing process of the construction materials, respiratory inorganics are also released into the air causing an accumulated Disability-Adjusted Life Year (DALY) of 0.14 or approximately two months in a person lifetime. After further analysis, the contributors of respiratory inorganics are released from the materials used in the foundations, frame and partition walls. The main culprit here is the release of airborne particulates during the steel manufacturing process from iron ore. Despite having a small effect in context of the Orchid House, it serves as a chilling reminder of the potential health impacts from the construction of city skyscrapers or large scale infrastructures.



Impact category	Unit	Total	Foundations	Frame	Partitioning-walls
Carcinogens	DALY	0.01	0.00	0.01	0.00
Resp. inorganics	DALY	0.11	0.01	0.07	0.02
Climate change	DALY	0.02	0.00	0.01	0.00

Recipe Midpoint (H)/World Recipe

Based on the results there are three environmental impacts that are of concern, by order of magnitude these are Human toxicity, Marine ecotoxicity, and Freshwater ecotoxicity. The main contributors to these environmental concerns are from the steel and plywood consisting of the roofing- -frame, partitioning-walls and foundation of the Orchid House.



The top 15 contributors for each environmental impact category are presented in the following tables. The main factors for human toxicity are caused primary from byproducts of the steel manufacturing process, wood ash, wood chip, slag disposal and effluent from plywood production. Smaller traces of hazardous gases such as urea formaldehyde and ammonia also contribute to human toxicity.

Both Marine Ecotoxicity and Freshwater Ecotoxicity are caused by the disposal of manufacturing byproducts such as slag, sludge, dust, chips and waste effluents. Again, the largest contributor of toxicity is from steel manufacturing, holding the top three places are steel slag disposal, nickel smelter slag disposal and steel sludge disposal.

Category: Human toxicity

No	Process	Total	Foundations	Roofing/frame	Partitioning/Walls
	Total of all processes	358.60	29.29	200.55	117.67
1	Steel, electric, un- and low-alloyed, at plant	148.04	3.51	142.39	1.30
2	Disposal, wood ash mixture, pure, 0% water, to landfarming	61.42	10.07	0.27	51.03
3	Treatment, plywood production effluent, to wastewater treatment, class 3	34.06	5.58	0.00	28.47
4	Sinter, iron, at plant	20.00	0.48	19.20	0.19
5	Wood chips, from industry, hardwood, burned in furnace 50kW/CH U	18.01	2.95	0.00	15.06
6	Disposal, dust, unalloyed EAF steel, 15.4% water, to residual material landfill	11.81	0.28	11.34	0.11
7	Disposal, wood ash mixture, pure, 0% water, to municipal incineration	9.18	1.50	0.04	7.62
8	Disposal, slag, unalloyed electr. steel, 0% water, to residual material landfill	7.67	0.18	7.37	0.07
9	Copper, primary, at refinery	4.13	0.43	1.31	1.46
10	Ferronickel, 25% Ni, at plant	3.70	0.13	3.29	0.16
11	Urea formaldehyde resin, at plant	3.00	0.49	0.00	2.51
12	Plywood, indoor use, at plant/RER U	3.00	0.49	x	2.51
13	Steel, converter, unalloyed, at plant/RER U	2.27	0.05	2.19	0.02
14	Ammonia, steam reforming, liquid, at plant/RER U	1.98	0.32	0.01	1.64
15	Disposal, lignite ash, 0% water, to opencast refill/DE U	1.43	0.14	0.73	0.45

Category: Marine ecotoxicity

No	Process	Total	Foundations	Roofing/frame	Partitioning/Walls
	Total of all processes	279.34	15.36	213.60	36.53
1	Disposal, slag, unalloyed electr. steel, 0% water, to residual material landfill	75.46	1.81	72.46	0.72
2	Disposal, nickel smelter slag, 0% water, to residual material landfill/CH U	67.29	2.51	59.48	3.27
3	Disposal, sludge from steel rolling, 20% water, to residual material landfill	46.10	1.12	44.04	0.50
4	Treatment, plywood production effluent, to wastewater treatment, class 3	20.32	3.33	0.00	16.99
5	Steel, electric, un- and low-alloyed, at plant/RER U	11.82	0.28	11.36	0.10
6	Disposal, dust, unalloyed EAF steel, 15.4% water, to residual material landfill	5.27	0.13	5.06	0.05
7	Ferronickel, 25% Ni, at plant/GLO U	3.77	0.14	3.36	0.16
8	Disposal, wood ash mixture, pure, 0% water, to municipal incineration/CH U	3.12	0.51	0.01	2.59
9	Well for exploration and production, offshore/OCE/I U	3.08	0.52	1.19	1.01
10	Titanium dioxide, chloride process, at plant/RER U	2.50	0.00	0.00	0.00
11	Operation, transoceanic freight ship/OCE U	2.45	0.10	2.17	0.08
12	Disposal, rednud from bauxite digestion, 0% water, to residual material landfill	2.36	0.15	0.21	0.14
13	Wood chips, from industry, hardwood, burned in furnace 50kW/CH U	2.29	0.38	0.00	1.92
14	Copper, primary, at refinery/RLA U	2.14	0.22	0.68	0.75
15	Hot rolling, steel/RER U	2.02	0.05	1.94	0.02

Category: Freshwater ecotoxicity

No	Process	Total	Foundations	Roofing/frame	Partitioning/Walls
	Total of all processes	147.67	9.37	110.73	18.96
1	Disposal, slag, unalloyed electr. steel, 0% water, to residual material landfill	43.02	1.03	41.31	0.41
2	Disposal, nickel smelter slag, 0% water, to residual material landfill/CH U	38.43	1.44	33.97	1.86
3	Disposal, sludge from steel rolling, 20% water, to residual material landfill	26.45	0.64	25.26	0.29
4	Treatment, plywood production effluent, to wastewater treatment, class 3	14.22	2.33	0.00	11.89
5	Disposal, dust, unalloyed EAF steel, 15.4% water, to residual material landfill	3.20	0.08	3.07	0.03
6	Disposal, wood ash mixture, pure, 0% water, to municipal incineration	1.88	0.31	0.01	1.56
7	Polystyrene, expandable, at plant/RER U	1.72	1.56	0.00	0.00
8	Discharge, produced water, onshore/GLO U	1.41	0.16	0.63	0.44
9	Disposal, rednud from bauxite digestion, 0% water, to residual material landfill	1.33	0.09	0.12	0.08
10	Disposal, average incineration residue, 0% water, to residual material landfill	1.29	0.47	0.15	0.01
11	Titanium dioxide, chloride process, at plant/RER U	1.24	0.00	0.00	0.00
12	Disposal, cement, hydrated, 0% water, to residual material landfill/CH U	0.97	0.04	0.86	0.03
13	Soy beans IP, at farm/CH U	0.91	0.01	0.00	0.05
14	Disposal, lignite ash, 0% water, to opencast refill/PL U	0.89	0.09	0.47	0.28
15	Polycarbonate, at plant/RER U	0.81	0.00	0.00	0.00

Use Phase Analysis

The Ecoinvent database does not provide electricity LCA data for Taiwan grid power. Japan was chosen as the closest substitute resembling Taiwan energy conditions. Both Taiwan and Japan are island countries that rely almost completely on import for energy resources. The energy structure for Japan and Taiwan is also very similar with primary source in energy as crude oil, coal and natural gas composing 86% and 90.8% respectively of total energy consumption. Therefore the electricity data chosen for Orchid House was for Japan low-voltage at grid. The major difference in energy consumption between Japan and Taiwan can be attributed to the difference in renewable energy production, where Japan has 6% renewable energy, and Taiwan only has 0.3% renewable energy.

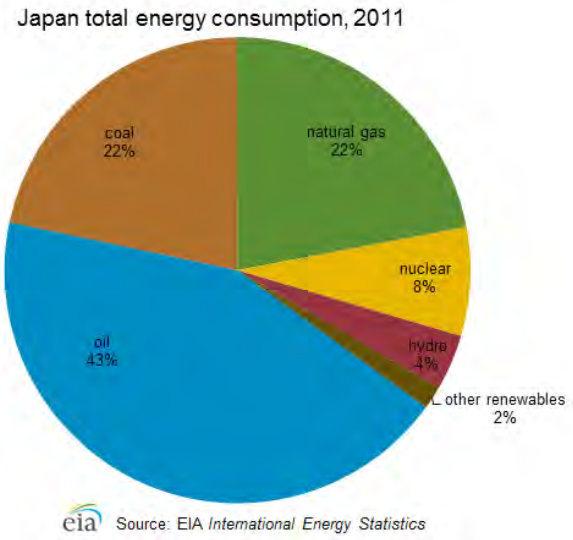


Figure: Japan Energy Structure 2011

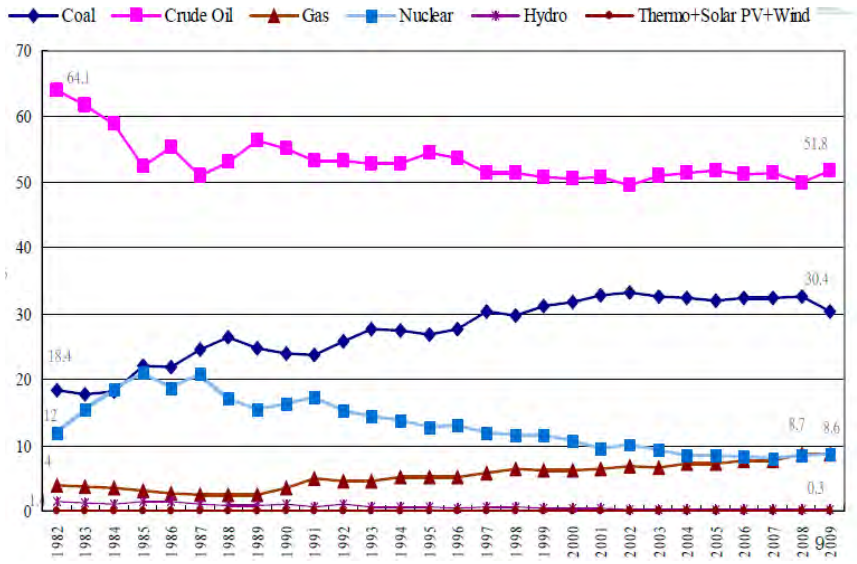


Figure: Taiwan Energy Structure from 1982 to 2009

Source: The impacts of Climate Change on Energy Security of Taiwan, Dr. Chi-Yuan Liang, The Executive Yuan, Taiwan, ROC, Oct 23, 2010

Electricity data is used for the energy consumption values for Use Phase processes including heating, cooling, lighting, sanitary hot water, ancillaries, specific electricity and energy production.
Energy consumption for Use Phase process is derived from the energy simulation performed in the Comprehensive Energy Analysis and Discussion Report, see section 5.4.3.

Results
Due to the greater amount of energy production supplied by the PV panels than the energy demand required from the operation of the Orchid House, a negative CO2 emissions value of is derived. This value indicates that throughout the 50 year lifetime of the Orchid House, as much as 170,910 kg CO2 eq is removed from atmosphere as a result of the PV energy generation replacing non-renewable energy generated used from the power grid.

Based on these results, the amount of incorporated CO2 from the building materials (58,723 kg CO2 eq) would be paid back from the PV energy generation in slightly over 17 years. However, this is assuming that the PV panels can generate power with the same efficiency over the entire life time of the building, in addition to not requiring maintenance or replacement.

Impact category	Unit	Total	D.1. Water consumption	D.2. Heating	D.3. Cooling	D.4. Lighting	D.5. Sanitary Hot Water	D.6. Ancillaries	D.7. Specific electricity	D.8. Energy production
IPCC GWP 100a	kg CO2 eq	-170,910	1	814	28,504	4,593	19,304	27,810	34,612	-286,549

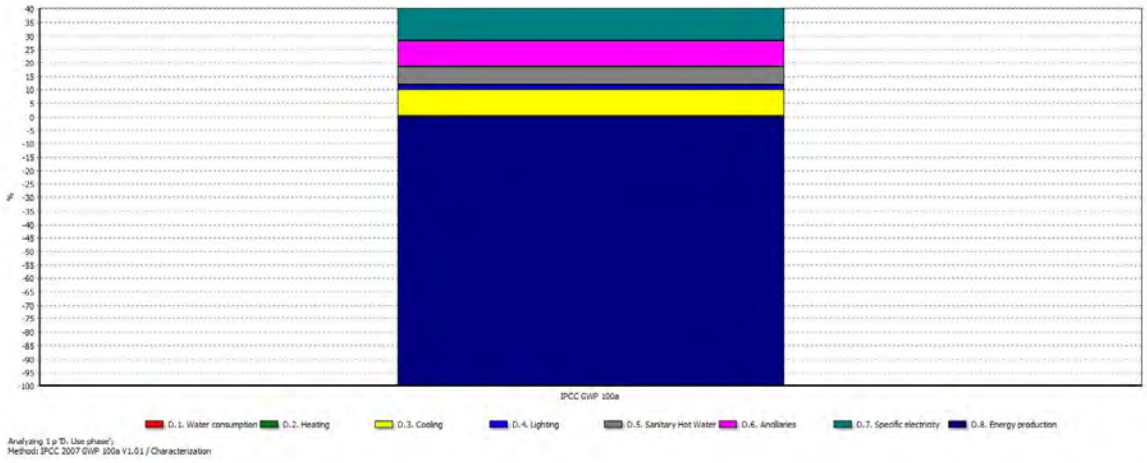
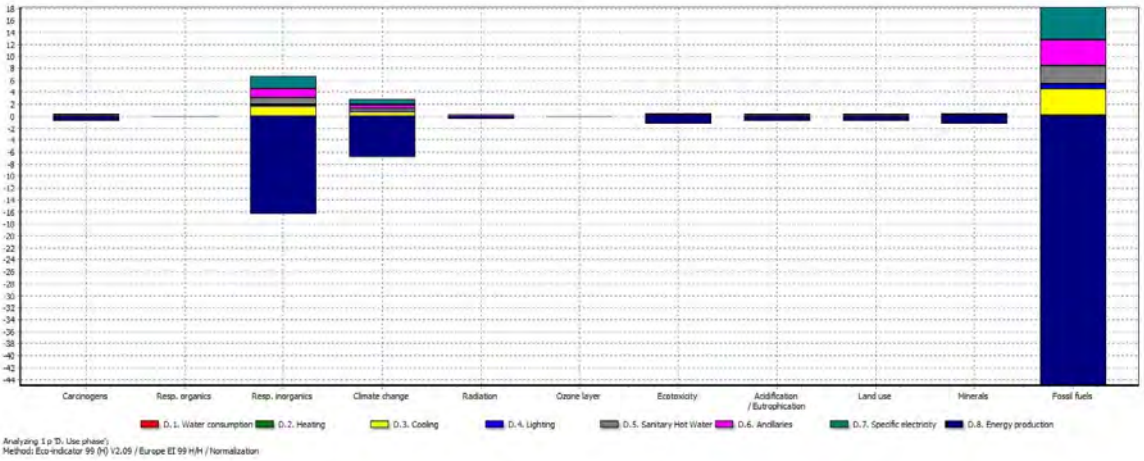
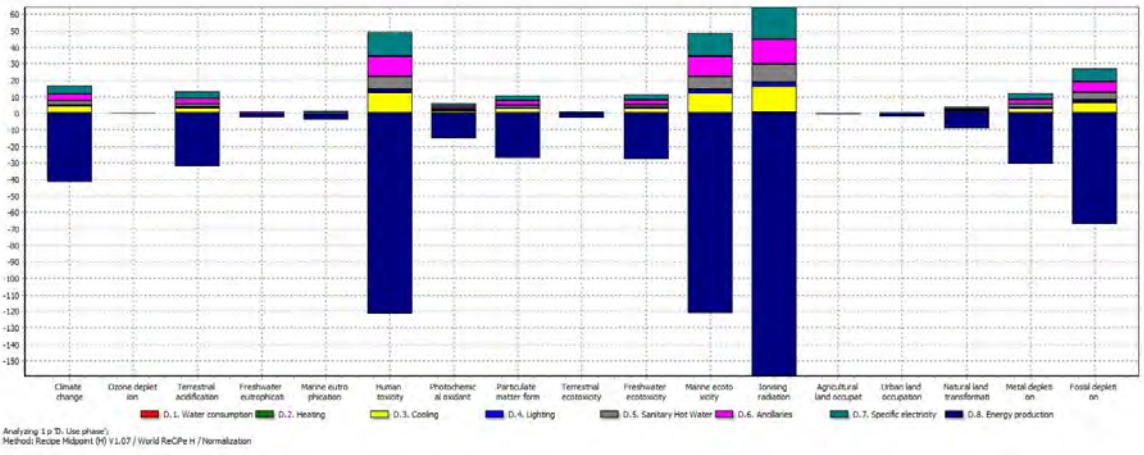


Figure 2. Energy Consumption Distribution during Use Phase

The reduction of energy used from the grid also results in additional environmental savings other than reduced CO2 emissions. As a result of reduced respiratory inorganics and carcinogens from fossil fuel burning, DALY is increased by 0.128. In addition, the prevention of as much as 51,715 kg oil eq from fossil depletion, 8,511 kg 1,4-DB eq from human toxicity and 125,336 kg U235 eq from ionizing radiation is achieved. These are all significant rewards as a result of use phase energy generation.





Impact category	Unit	Total	D.2. Heating	D.3. Cooling	D.4. Lighting	D.5. Sanitary Hot Water	D.6. Ancillaries	D.7. Specific electricity	D.8. Energy production
Climate change	kg CO2 eq	-171,171	816	28,548	4,600	19,334	27,853	34,665	-286,986
Ozone depletion	kg CFC-11 eq	0	0	0	0	0	0	0	0
Terrestrial acidification	kg SO2 eq	-729	3	122	20	82	119	148	-1,222
Freshwater eutrophication	kg P eq	0	0	0	0	0	0	0	-1
Marine eutrophication	kg N eq	-18	0	3	0	2	3	4	-30
Human toxicity	kg 1,4-DB eq	-8,511	41	1,419	229	961	1,385	1,724	-14,269
Photochemical oxidant forma	kg NMVOC	-452	2	75	12	51	74	92	-758
Particulate matter formation	kg PM10 eq	-226	1	38	6	26	37	46	-379
Terrestrial ecotoxicity	kg 1,4-DB eq	-13	0	2	0	1	2	3	-21
Freshwater ecotoxicity	kg 1,4-DB eq	-72	0	12	2	8	12	15	-120
Marine ecotoxicity	kg 1,4-DB eq	-174	1	29	5	20	28	35	-292
Ionising radiation	kg U235 eq	-125,336	597	20,903	3,368	14,157	20,395	25,383	-210,139
Agricultural land occupation	m2a	-1,725	8	288	46	195	281	349	-2,893
Urban land occupation	m2a	-997	5	166	27	113	162	202	-1,672
Natural land transformation	m2	-68	0	11	2	8	11	14	-113
Water depletion	m3	-1,290	6	216	35	146	210	262	-2,167
Metal depletion	kg Fe eq	-8,143	39	1,358	219	920	1,325	1,649	-13,653
Fossil depletion	kg oil eq	-51,715	246	8,625	1,390	5,841	8,415	10,473	-86,705

Transport of Users Analysis

The transportation of users for Orchid House takes into account the living habits of two inhabitants in addition to transportation of operations and maintenance personnel for the photovoltaic array installed.

The Orchid House is designed to accommodate a newly-wed working couple. Assuming that the couple does not own a private automotive vehicle, and only rely on the comprehensive network of public transportation provided in Taipei City (metro rail and bus system), and the couple spend one day at home each week, each year the couple will rely on public transportation 312 days a year. As the Orchid House is targeted to be built in areas with highest development density to accommodate increase in urban population, travel distance between work and home is estimated to not exceed 7 km one way. Therefore, considering travel to and from the couples respective work places, in addition to going out one day over the weekend, throughout the lifetime of the building, a person living in the Orchid House would have traveled 218,400 person kilometers. The transport method chosen in the SimaPro database was for a tram reflecting Swiss conditions.

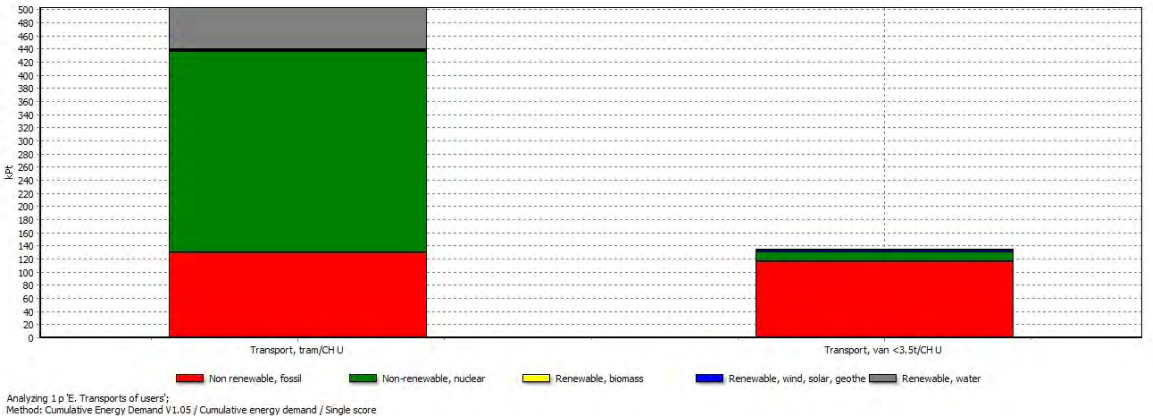
For operations and maintenance of the building, it is expected that the photovoltaic panels will require regular maintenance work. Based on the Solar America Board of Codes and Standards for photovoltaic system operations and maintenance, in order to guarantee proper operating conditions of the PV panels, routine scheduled preventive maintenance should be performed once a year. Each maintenance routine should be performed by two trained operations and maintenance personnel. Assuming the maintenance personnel drive a distance of 25km in an automotive van (<3.5t) from Taipei County, no additional trips are needed to perform maintenance work, and the photovoltaic panel has a life-time of 50 years (15~20 years in reality), the total person kilometer traveled per maintenance personnel will be 2,500 km.

Person Description	Transportation Method	Days per Year	Distance Traveled (km/day)	Building Life-Time	Total Person Km
Husband	Metro Rail	312	14	50	218,400
Wife	Metro Rail	312	14	50	218,400
Maintenance Person 1	Automotive Vehicle	1	50	50	2,500
Maintenance Person 2	Automotive Vehicle	1	50	50	2,500
				TOTAL	441,800

Results

The expected energy consumption from non-renewable sources is 567,313 MJ equivalent with the couple inheriting over 76% of the transportation energy consumption.

Impact category	Unit	Total	Transport, tram	Transport, van <3.5t
Non renewable, fossil	MJ eq	245,375	129,821	115,554
Non-renewable, nuclear	MJ eq	321,938	306,281	15,657
Renewable, biomass	MJ eq	2,562	2,167	395
Renewable, wind, solar, geothe	MJ eq	1,215	1,046	170
Renewable, water	MJ eq	66,579	63,837	2,743

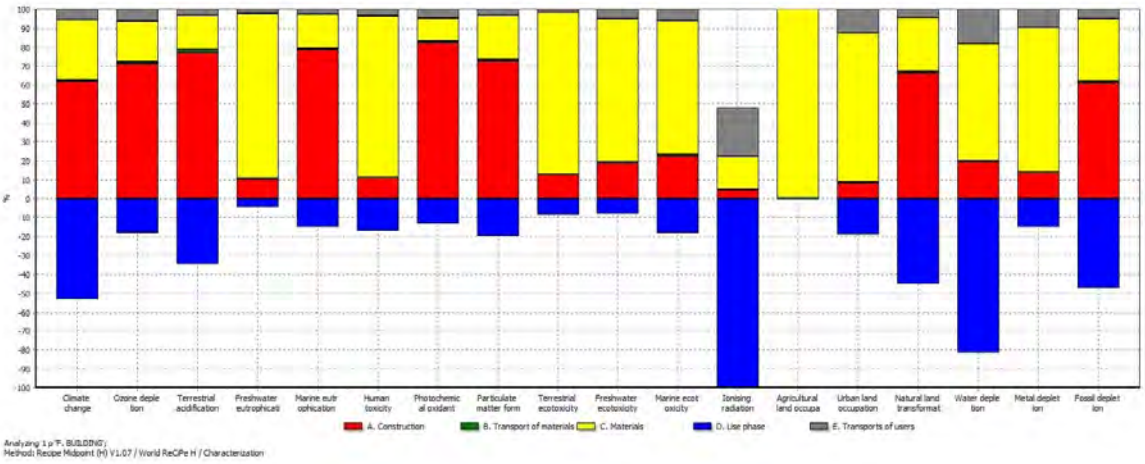


The analysis does not take into account the possibility of using public bus transportation system as an alternative means of transportation. It is expected that the energy consumption from transportation would be lower if bus system was used as a substitute.

Whole Building Analysis

For the analysis of the whole building, emphasis is placed on the proportion of contribution from each phase of the building life cycle to determine which phase contributes the most to each environmental impact category. For more in depth analysis please see the analysis portion for each phase within this section.

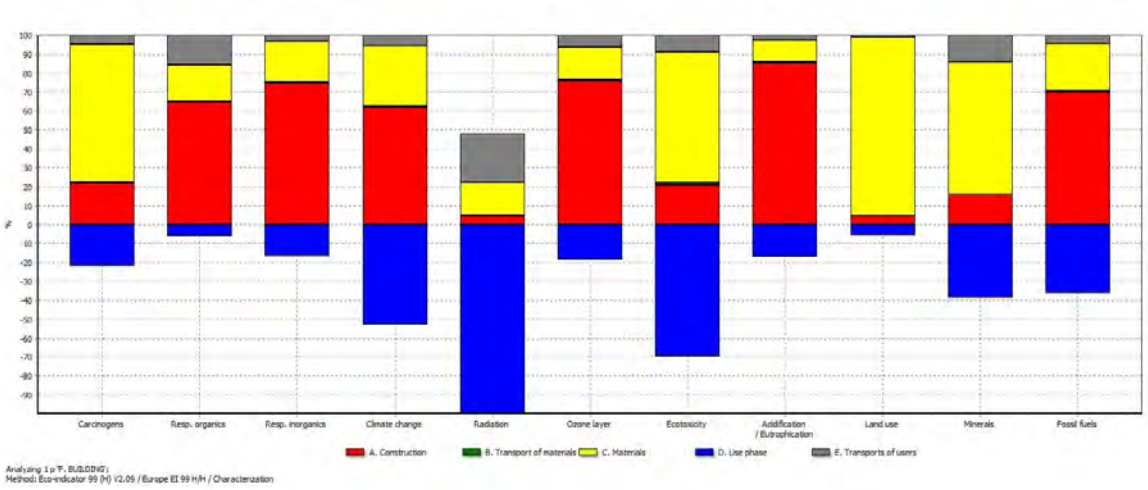
Results: Recipe Midpoint (H)
The largest contributors of negative environmental impact in this category are Construction Stage and Materials. Construction Stage impacts climate change, terrestrial acidification, photochemical oxidant formation, and fossil depletion significantly while Materials impact human toxicity, the ecotoxicity of terrestrial, freshwater and marine environment, and an almost complete dominance on agricultural and land occupation. The transport of users contributes slightly to every category, but surprisingly contributes a large portion to ionising radiation.



Impact category	Unit	Total	A. Construction	B. Transport of materials	C. Materials	D. Use phase	E. Transports of users
Climate change	kg CO2 eq	150,839	198,854	2,295	102,186	-171,171	18,674
Ozone depletion	kg CFC-11 eq	0	0	0	0	0	0
Terrestrial acidification	kg SO2 eq	1,376	1,621	35	382	-729	68
Freshwater eutrophication	kg P eq	10	1	0	9	0	0
Marine eutrophication	kg N eq	100	93	1	21	-18	3
Human toxicity	kg 1,4-DB eq	41,080	5,422	95	42,273	-8,511	1,801
Photochemical oxidant formation	kg NMVOC	2,915	2,765	28	413	-452	160
Particulate matter formation	kg PM10 eq	902	818	11	262	-226	38
Terrestrial ecotoxicity	kg 1,4-DB eq	133	18	0	124	-13	2
Freshwater ecotoxicity	kg 1,4-DB eq	780	160	2	644	-72	46
Marine ecotoxicity	kg 1,4-DB eq	779	212	7	676	-174	59
Ionising radiation	kg U235 eq	-64,990	5,843	280	21,644	-125,336	32,578
Agricultural land occupation	m2a	343,556	266	7	344,833	-1,725	175
Urban land occupation	m2a	4,227	425	17	4,122	-997	661
Natural land transformation	m2	82	99	1	43	-68	6
Water depletion	m3	289	306	7	982	-1,290	285
Metal depletion	kg Fe eq	45,766	7,505	63	41,189	-8,143	5,151
Fossil depletion	kg oil eq	57,555	66,766	763	36,216	-51,715	5,525

Results: Eco-indicator

The Eco-indicator analysis results are similar in that the majority of environmental impact is caused by either Construction Stage or Materials with small contribution to each category from transport of users. Again, the environmental impact from transport of materials is dwarfed compared to the other life cycle stages.



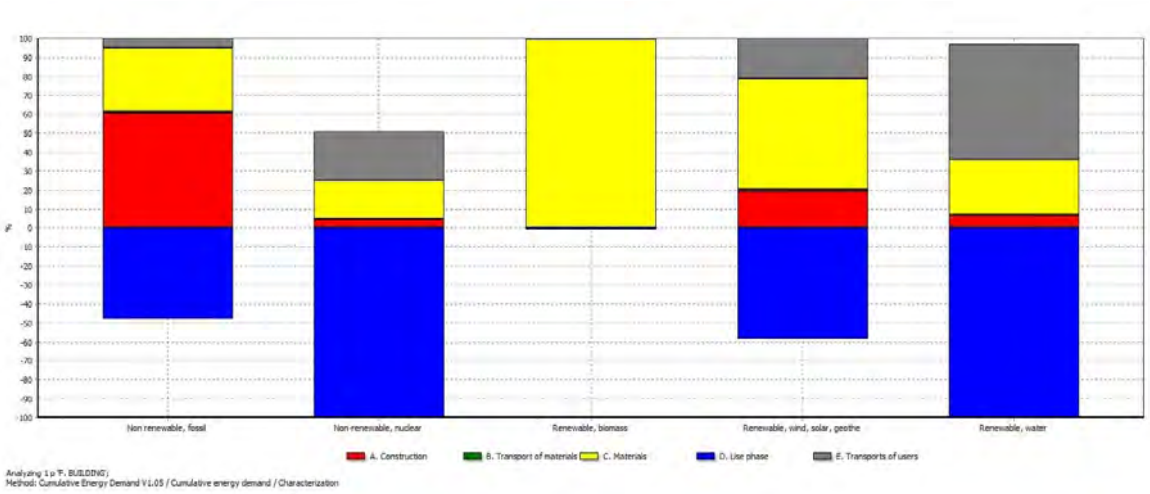
Impact category	Unit	Total	A. Construction	B. Transport of materials	C. Materials	D. Use phase	E. Transports of users
Carcinogens	DALY	2.E-02	4.E-03	5.E-05	1.E-02	-4.E-03	9.E-04
Resp. organics	DALY	7.E-04	5.E-04	3.E-06	1.E-04	-4.E-05	1.E-04
Resp. inorganics	DALY	4.E-01	4.E-01	4.E-03	1.E-01	-9.E-02	2.E-02
Climate change	DALY	3.E-02	4.E-02	5.E-04	2.E-02	-4.E-02	4.E-03
Radiation	DALY	-1.E-03	1.E-04	6.E-06	5.E-04	-3.E-03	7.E-04
Ozone layer	DALY	3.E-05	3.E-05	3.E-07	6.E-06	-6.E-06	2.E-06
Ecotoxicity	PAF*m2yr	19,115	13,103	872	43,639	-44,221	5,722
Acidification/ Eutrophication	PDF*m2yr	13,469	13,808	160	1,828	-2,754	427
Land use	PDF*m2yr	43,094	2,048	30	43,054	-2,648	610
Minerals	MJ surplus	8,877	2,285	21	10,202	-5,658	2,028
Fossil fuels	MJ surplus	352,210	387,949	4,207	137,928	-202,929	25,055

Results: Cumulative Energy Demand

Based on the results from cumulative energy demand analysis, power generation from the PV panels is able to completely negate the energy demand from nuclear energy and water consumption. In fact, as much as 612,286 MJ eq can be saved from non-renewable nuclear energy. The allocation of these energy savings can perhaps be transferred to non-renewable fossil energy, if the environmental benefits from fossil energy saving outweighs the benefits from nuclear energy saving. This is by itself an interesting topic that could be analyzed more deeply.

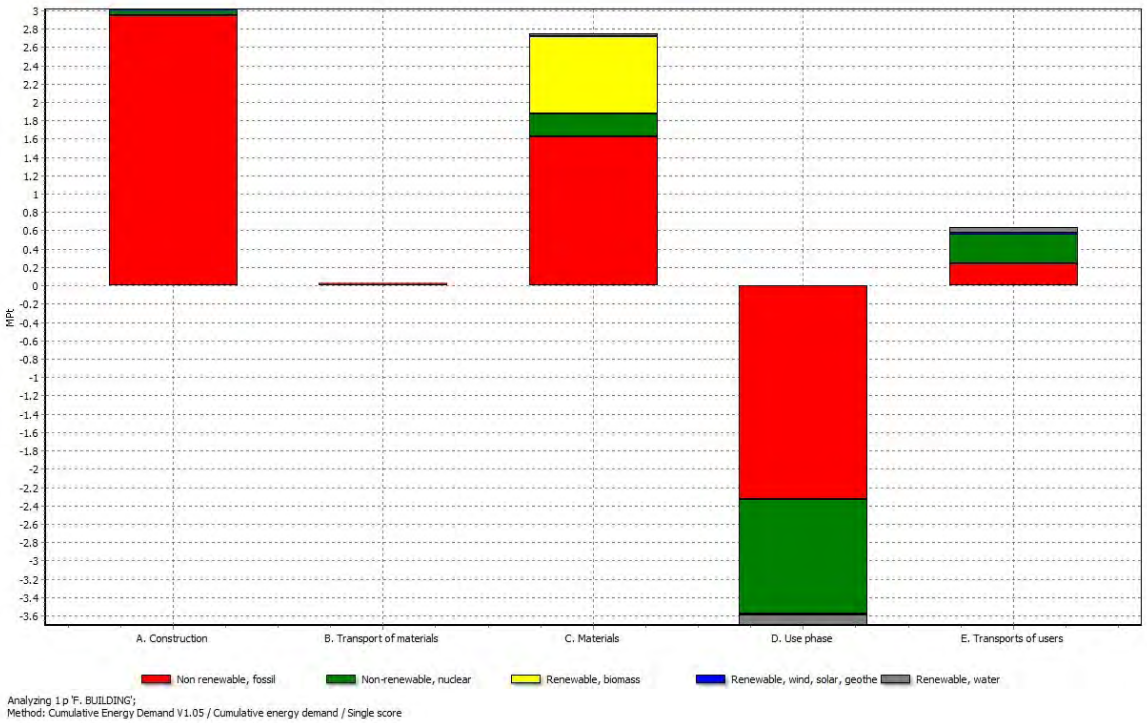
Almost all of the renewable biomass is consumed by materials (99.4%). This is expected, since all the biomass is consumed in the form of plywood being used as a construction material in the partition walls and foundation of the Orchid House.

Transport of users contributes to 62.8% of water consumption, the reason for this, after further analysis, is discovered to be due to the fact that the tram transportation system chosen in SimaPro (Transport, tram/CH U) is powered mostly be hydropower which consumes water during power generation.



Impact category	Unit	Total	A. Construction	B. Transport of materials	C. Materials	D. Use phase	E. Transports of users
Non renewable, fossil	MJ eq	2,520,306	2,949,453	33,736	1,626,778	-2,335,037	245,375
Non-renewable, nuclear	MJ eq	-612,286	59,406	2,847	252,372	-1,248,850	321,938
Renewable, biomass	MJ eq	834,101	2,549	97	836,001	-7,107	2,562
Renewable, wind, solar, geothe	MJ eq	2,369	1,102	46	3,338	-3,333	1,215
Renewable, water	MJ eq	-3,711	7,407	380	31,622	-109,700	66,579

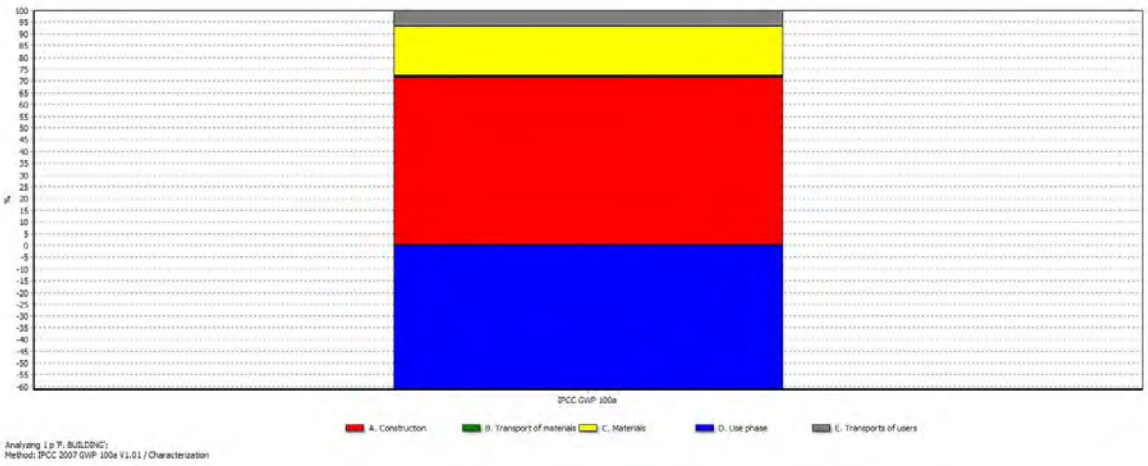
From the single score diagram, it is shown that construction stage consists almost completely of non-renewable fossil energy, this is expected as construction stage analysis was performed only considering the amount of diesel consumption from the primary machinery used during construction. The energy savings from fossil and nuclear is proportional based on the energy structure of the power grid. For materials, the energy proportion will be based on the European power grid, since all the materials chosen in SimaPro are based on European materials data, while the use phase energy proportion will be based on the Japan power structure.



Results: IPCC 2007 GWP 100a

The total amount of greenhouse gas emission throughout the 50 year life cycle of the Orchid House is 278,533 kg CO2 eq. However, 61.4% or 170,910 kg CO2 eq is saved from the generation of solar energy, therefore the final total for emissions for the Orchid House is 107,623 kg CO2 eq.

The greatest contributor of CO2 emissions 71.4% or 198,831 kg CO2 eq is from the construction stage, while the second greatest contributor materials emits 21.1% or 58,723 kg CO2 eq. Together, construction stage and materials combine to emit 92.5% of CO2 emissions. Therefore, to decrease the global warming potential of the Orchid House for future application, reduction considerations for construction and materials can be researched.



Impact category	Unit	Total	A. Construction	B. Transport of materials	C. Materials	D. Use phase	E. Transports of users
IPCC GWP 100a	kg CO2 eq	107,623	198,831	2,294	58,723	-170,910	18,684

End of Life Analysis

The materials used for Orchid House were chosen not only for utility and performance but also for due to the sustainable nature of the material properties. Almost all the materials can be recycled or reused for new building application. The only landfill disposal occurs in the event where the energy consumption of the separation and processing for recycling greatly outweigh the environmental benefits and energy savings. An example of this is the PVC wiring for electric cables.

For the complete list of materials end of life scenarios see the construction materials table prepared for TEE evaluation.

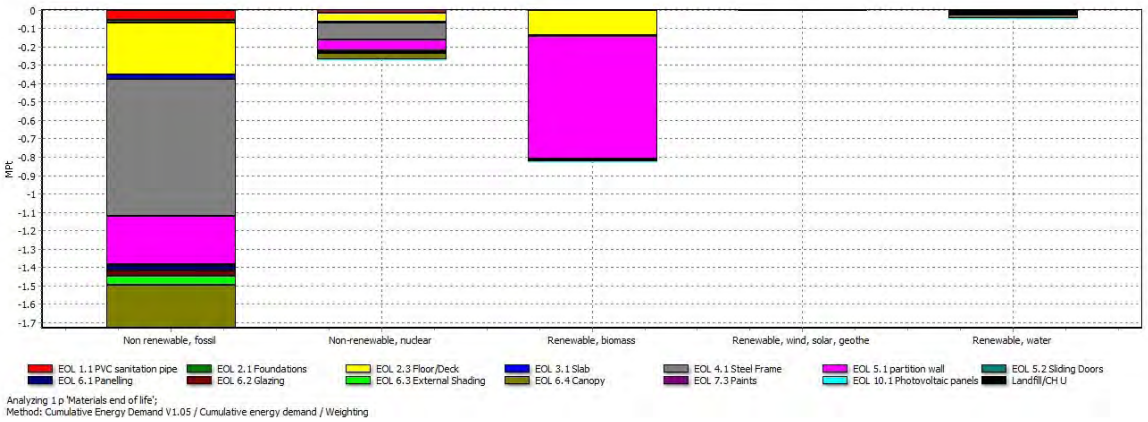
It is worth mentioning that for this analysis there are only three end of life scenarios considered: landfill, incineration and reuse. In most cases, materials reuse is the end of life scenario, however it is possible that a process of refurbishing or recycling is performed before the material can be used again for building application. This additional energy for processing is not considered in this analysis, therefore the actual energy savings, and environmental benefits will be lower than the results shown in this analysis.

Results

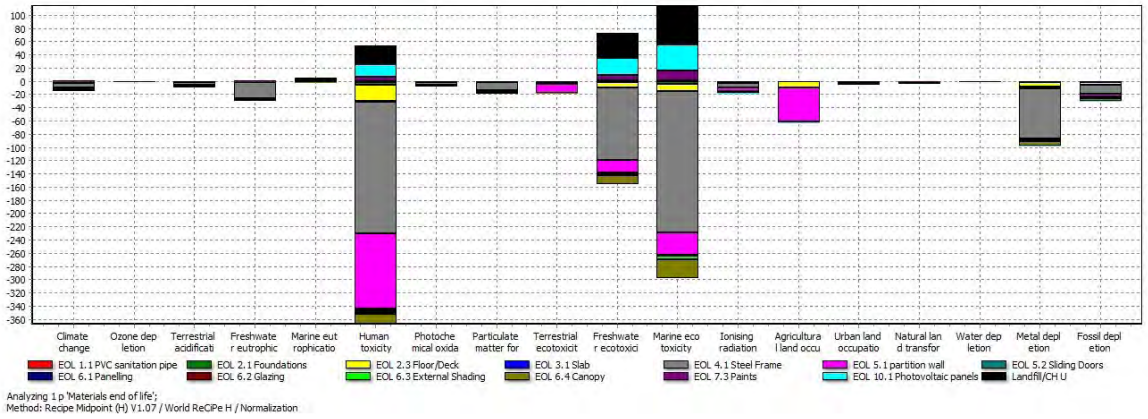
The cumulative energy demand shows that the end of life scenarios for all the building materials can save as much as 2,869,349 MJ eq from nonrenewable and renewable sources. The end of life energy savings is actually slightly greater than the total incorporated energy of the building materials (2,750,111 MJ eq). This is due primarily to the decrease in transportation. For example, the plywood used for Orchid House originally originated from Chile over 18,000 km away, however after the plywood is refurbished and reused for construction of a new Orchid House, the travel distance decreases to less than 50 km.

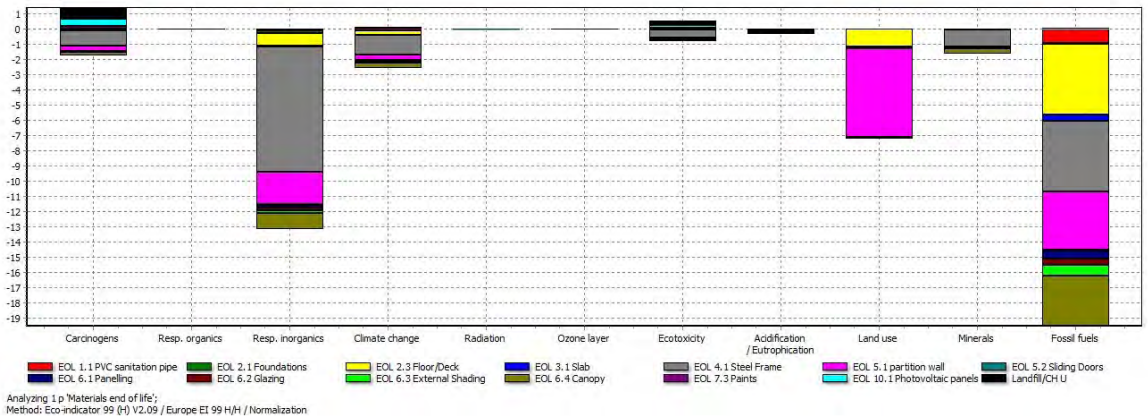
Impact category	Unit	Total	EOL 1.1 PVC sanitation pipe	EOL 2.1 Foundations	EOL 2.3 Floor/Deck	EOL 3.1 Slab	EOL 4.1 Steel Frame	EOL 5.1 partition wall
Non renewable, fossil	MJ eq	-1,726,493	-55,284	-16,420	-282,152	-24,039	-741,880	-263,287
Non-renewable, nuclear	MJ eq	-271,066	-14,797	-1,970	-48,017	-7,444	-89,022	-60,217
Renewable, biomass	MJ eq	-823,063	-3	-131	-137,168	-691	-5,925	-663,953
Renewable, wind, solar, geo	MJ eq	-3,538	-1	-36	-317	-22	-1,641	-970
Renewable, water	MJ eq	-45,188	-1,099	-268	-3,322	-171	-12,102	-8,241

Impact category	Unit	EOL 5.2 Sliding Doors	EOL 6.1 Panelling	EOL 6.2 Glazing	EOL 6.3 Extemal Shading	EOL 6.4 Canopy	EOL 7.3 Paints	EOL 10.1 Photovoltaic panels	Landfill/CHU
Non renewable, fossil	MJ eq	-3,656	-33,433	-28,423	-45,819	-234,888	572	-116	2,332
Non-renewable, nuclear	MJ eq	-696	-2,385	-2,042	-7,247	-38,001	157	-24	640
Renewable, biomass	MJ eq	-7,055	-49	-44	-1,294	-6,732	2	-28	8
Renewable, wind, solar, geo	MJ eq	-10	0	0	-87	-451	1	-7	3
Renewable, water	MJ eq	-94	-109	-103	-3,136	-16,634	32	-72	130



Based on the results from Recipe Midpoint and Eco-indicator we see that the reuse of materials has the effect of saving the environment from toxification, climate change, air pollution, land use and other environmental impact that would have been caused by purchasing virgin material. Therefore the Disability-Adjusted Life Year (DALY) saved will be similar to the building materials, saving 0.14 DALY.





The end of life results prove that with the selection of sustainable material, the original environmental and energy impacts from the materials can be made up at the end of the building life cycle, achieving a cradle-to-cradle use of the material.

5.7 Communications Plan

5.7.1 Introduction

The communication plan is an important part of the Orchid House project. It is the main documentary of all the process of our project, and it records the information in design, the relationship with the sponsors and the reference in media. The main purpose is to raise the awareness of the general public and to present the messages of our urban strategies through all the events.

5.7.2 Communication Project

Abstract

With our highly integrated marketing and communications strategy, we aim to generate strong publicity for our participation in the Solar Decathlon Europe (SDE) 2014, as well as to increase the public awareness regarding the specific objectives for a more sustainable future in our cities. Most importantly, our implementation are so planned that it is to take place prior and post the SDE 2014!

For the 18 months working periods towards SDE 2014, our actions rolls out into four phases:

Phase 1 - the Design (July 2013 to the end of January 2014)
Phase 2 - the Construction (February 2014 to the end of May 2014)
Phase 3 - the Competition (June 2014 to August 2014).
Phase 4 - the Enhancement (August 2014 and onwards)

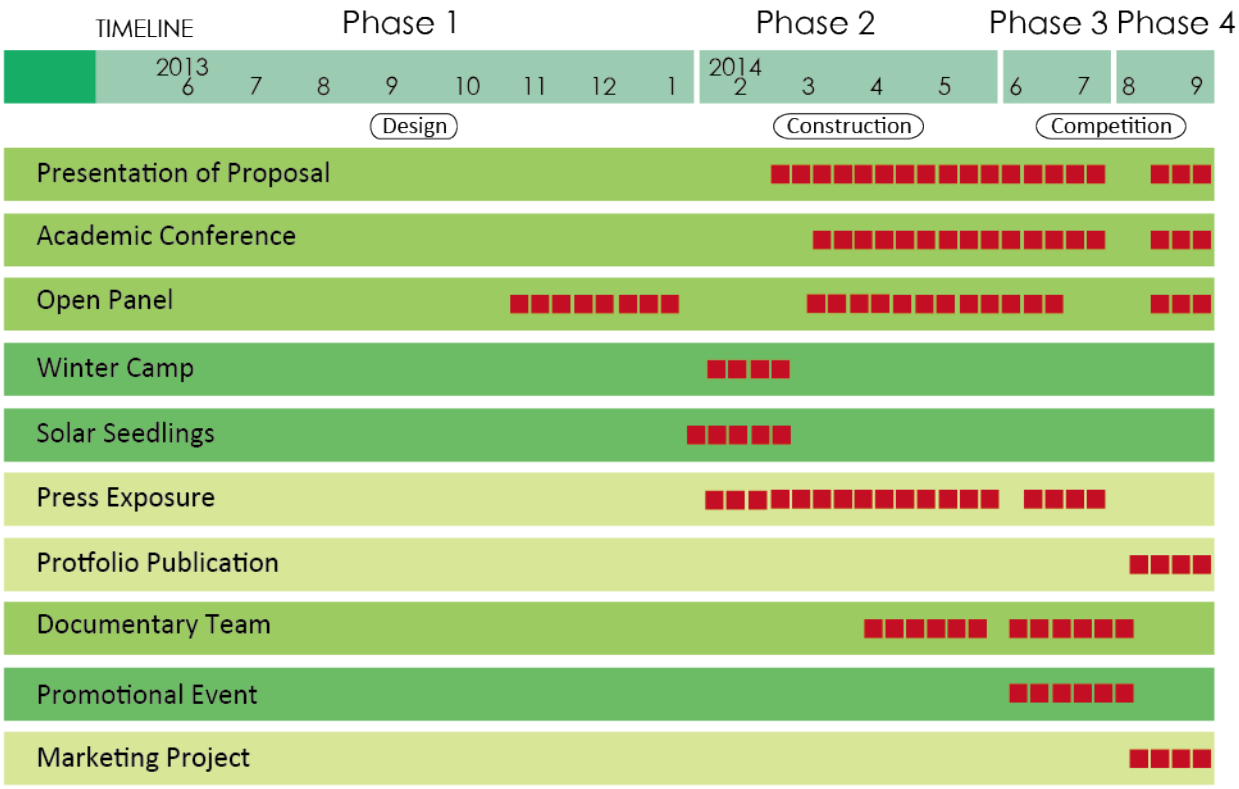
This is specifically designed to encourage and raise continuing interests in sustainable practices in Taiwan. By participating in SDE, one of our commitments is to demonstrate to the government and the public that alternative energy, specifically solar energy, and green technology are highly practical and applicable. Therefore, one of the most important missions is that we do not stop our PR actions at the end of the competition, but rather to continue for months to come in order to ensure that our messages and achievements will continue its influences throughout the country.

Our Integrated Marketing and Communications Plan covers six major Aspects related to SDE's mission: Exchange, Outreach, News, Production, Issues, and Marketing. These aspects may be executed individually or synergistically with one another so to achieve holistic results. Out of the six Aspects, we will launch four major Actions for implementation (detailed description in later pages):

1) Forum,
2) Media,
3) Publishing, and
4) Workshop.

Through the execution of the above four Actions, we will communicate with the public that the following Objectives are demonstrated in our solar house:
1) Adaptive Strategy,
2) Modulized Assembly
3) Smart Living,
4) Self-Sufficiency,
5) Social Benefit, and
6) Collaborative Approach

Exchange - Awareness Platform



SWOT ANALYSIS

The SWOT analysis includes and summarized all relevant information gathered during the analytical phase of the marketing plan and categorizes them in:

Strengths:
characteristics of the Orchid House that may provide it with competitive advantage over others.

Weaknesses:
characteristics that may place the Orchid House at a disadvantage relative to others.

Opportunities:
elements ot trend that may represent chances to improve performance in the external environment.

Threats:
elements or trends in the external environment that could cause trouble for the Orchid House.

Strengths	Weaknesses
1. Hosue projected for subtropical weather condition 2. A solution for stormwater run-off 3. A solution for urban regeneration 4. Deal with social housing issue 5. Improving the urban landscape by design but ramain the original urban context 6. To save energy 7. To solve heat island effect 8. To innovate the modularized products by development of social housing in prefabricated houses, economical construction method and ecological materials 9. To collaborate with enterprise and academic 10. We have hign technology support 11. The innovative green core system	1. Difficult to adapt to various type of rooftop 2. limited financial resources 3. Hard to convinced by those who occupy the rooftop
Opportunities	**Threats**
1. Taiwan social housing ratio is low 2. The increasing population of younger generation cannot afford a house in city 3. Integrating single house system into city network system 4. Improve the urban landscape - city beauttiful movement 5. The excellent enterprise devote to the green field 6. To encourage city government modify the inapplicable law and policy 7. To systematize the old building	1. How to comply with social justice 2. The market would be pessimistic 3. Highly fragmented sectors need to integrate 4. Limited awareness of the necessity of green building 5. Reducing the private space of certain group 6. Difficulty of the household in Orchid House to pay-back the money they earn from the energy saving 7. Limited awareness of Team Unicode brand to general public

Analysis of the situation
New city aesthetics – Taipei rooftop urban regeneration

The primary goal in SDE aims to promote a better urban environment, architecture, and greener energy practice. We believe we should actively share and exchange with the public what we have learned and experienced through our research and design. There are three primary target groups in this concern: 1) the government, 2) the Academia, and 3) the general public. It will take place mostly in Phases 1, 2, and 4.

- **Definition of the Communication Objective / Message**
  Promoting knowledge of urban cities, architecture, and green energy.
- **Identitfication of the Target Group:**
  the government, academia, those interested in architecture and sustainable energy.
- **Message/s Establishment**
  We will use Orchid House as a prototype to disseminate our research for the house and the urban issue.
- **Action's description / Projects**

  i. Presentation of Proposal:
  • Project: New city aesthetics – Urban rooftop regeneration
  • Objectives: to offer a proposal to city government about the integration of social housing issue and urban regeneration
  • Time: March-September
  • Channel: publication, exhibition and workshop held by government
  • Audience: Department of Urban Development, Taipei City Government
  • Leader: David Tseng, Professor; Shuchang Kung, Associate Professor
  • Execution: To propose and demonstrate, via our solar house prototype, the possibility that it can transform the rooftops and increase the provision of social housing. It has been a common practice for city housing to extend upwards by utilizing the roof area which was idle. This is most evident in urban row-houses and duplex-houses in order to gain more livable space. However, we see this as an opportunity to convince the government to provide policy support in such build up but prescribe the use for affordable housing to those who are in need. Currently, the supply of social housing in Taiwan is relatively low, at a mere 0.8%, when compared to other neighboring countries such as Japan (6.06%). The possibility lies in the fact that the government is motivated to provide such incentives for existing housing owners to collaborate. Therefore, we strongly believe our roof-top transformation via the Orchid House approach is a fantastic solution. The values created via Orchid House are listed below:

  1. Adaptive Strategy
  2. Modulized Assembly
  3. Smart Living
  4. Self-Sufficiency
  5. Social Benefit
  6. Collaborative Approach

  ii. Academic Conference:
  • Project: Innovated, industrialized construction progress via academic collaboration with enter prises - modularized and pre-fabrication system.
  • Objectives: To offer a combination of seminar and forum to the community of academia and professionals who are committed to sustainability and green practices in order to generate more awareness and discussion.

• Time: March~September 2014
• Channel: Publication, seminar, forum
• Audience: Academia such as NCKU, NTUST, delegates from enterprises, professionals from as sociations of architects, engineers, and students
• Execution: The focus of the conference will be - for the conservation and efficiency of energy we developed the Green Core System which serve as the heart inside the Orchid House. It provides not only the cooling effect but also helps ventilation. The most unique part is that it also maintains a comfortable balance between air and moisture for the interior. We wish to share this result of research with the audience and, via exchange and dialogues, messages and innovative concepts will be spread around the professional community.

iii. Open Panel – the Orchid House and Current Technology:
• Project: New Living Container - the Orchid House
• Objectives: To create an open channel for the general public and continue to promote the basics of the sustainable practices and the Orchid House
• Time: October 2013, January, March-September 2014
• Channel: Publication, forum
• Audience: General public who are interested in architecture and sustainability
• Execution: Forums and lectures will be offer at several government-backed locations

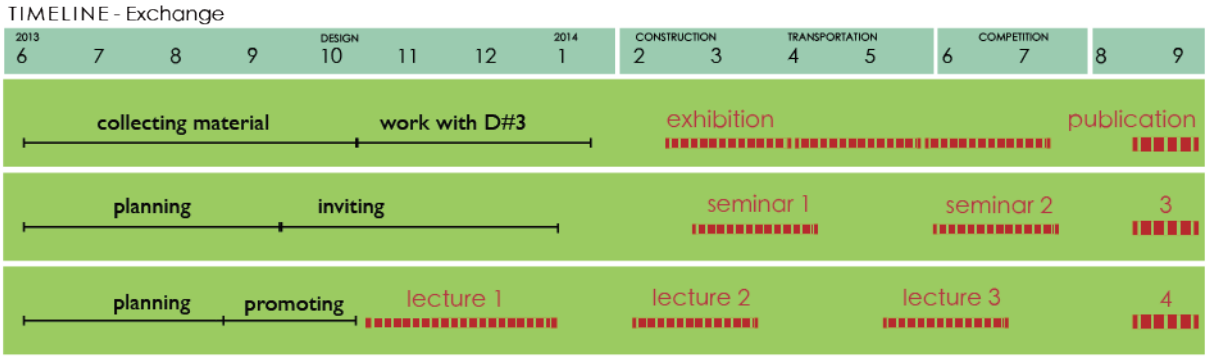
1. Taipei URS (Urban Regeneration Station) , three forums will be held to general public. Professors from NCTU who are involved in the SDE project will be the speakers. This forum presents the general background of SDE and the knowledge of the green field, energy, urban, as well as the design. The topics will include sustainability, urban, and innovation.
- 2014/01/23: Architects' Midnight-Oasis-Bistrot Light-Forum
Location: URS-21/FUT Foundation
Lecturer: Shuchang Kung, Associate Professor; Chia-Hao Lin, Student Leader

2. NCTU, seminars on Transdisciplinary Integration and Innovation is a class designed for every Tuesday in Graduation Institute of Architecture. This seminar offers series of lectures on various topics and subjects and hands-on workshops related to how urban and architectural issues to be solved through cross-boundary integration and innovation. Listed below information are sample lectures:
- 2013/10/01: Arts & Digital Technology - acoustic exploration through digital interaction
- 2013/10/15: Big Data & Open Resources
- 2013/10/22: Hackathon & Design Thinking
- 2013/10/29: Smarter City
- 2013/11/10: Urban Location-based Services
- 2013/11/24: New business model and transdisciplinary innovation
- 2013/12/01: The Possibility of Future Media
- 2013/12/08: Cash Flow and Business Model

3. NCTU YA Talk is the one that has been enjoying the greatest popularity. It is the best platform to share the updates and knowledge with students. It is regularily held on Tuesday on a monthly basis.
- 2013/10/15: Thomas Tsang
- 2013/12/12: Andrew Huang-
- 2013/12/21: Open Studio
- 2014/01/07: John C.H. Lin
- 2014/02/26: Chen-Yu, Chiu

- 2014/03/17: Wayne Ko
- 2014/04/28: Benjimin, Tang

We are confident, with these three platforms of information sharing, we can effectively reach out to a broad range of audience whether general public or professional.



Outreach - Education Strategy
Planting the solar seeds (for a better future)

We regard education as the most important communication strategy in our plan since it directly reaches our next generation – the foundation for our future. Therefore, we have designed such strategy to aim at mainly the high school students who have the basic interest in architecture, urban living, sustainability, and renewable energy. It will be executed in Phase 2.

- **Definition of the Communication Objective / Message**
  Encourage interchange of knowledge and techniques involved with the creation of the Orchid House
- **Identitfication of the Target Group:**
  High school students
- **Message/s Establishment**
  To promote the six Values within our Orchid House design.
- **Action's description / Projects**
  i.NCTU Orchid House Winter Camp:
  • Project: Introduce and demonstrate the Orchid House, idea exchange and discussion, workshop and exhibition
  • Objectives: To impress and to influence
  • Time: 2014/02/07-2014/02/09
  • Channel: Exhibition, lectures and workshop
  • Audience: High schoolers
  • Leader: NCTU/Unicode students and faculty, Senior High School Teachers
  • Execution: We invite high school students who express interests in sustainable practices as well as high school science/art teachers to a highly interactive camp at Taipei. We wish to ignite their curiosities and aspiration for a better future. The camp is a high-energy, intensive task-based campaign - Members are introduced to the basic of environmental and sustainable issues and an orientation of the Orchid House design is offered. Members then are prompted to participate in a charrette, basically a reduced-version of solar decathlon competition. The competition focus on the process more than its result, aiming at using their imagination and innovative ideas. The workshop activities are also designed to promote teamwork and collaborations with each other. In addition, Four lectures provide to generate higher interest in continue the pursuit in this field when they plan for their college education. At the end of the winter camp, it is the apex of

the entire activity – a final presentation of their ideas! Various types of presentation methods encouraged, whether drawing, collage, model, slides, animations, or any type of performing arts. Finally, we choose one of them to be an ambassador to Versailles with Team Unicode. Listed are further details for reference:

Mission:
(i) To Publicize - the information of SDE through public events
(ii) To Inspire - the younger generation
(iii) To Interact - exchange and dialogue among public
(iv) To Generate – extended interest and support

Lecture:
A forum in roundtable fashion that starts with moderator's lead commentary of major agenda. Participating members will be invited to participate by sharing their ideas regarding green energy, smart living and their vision of the future city.

Recruit:
The recruitment of members to join the Winter Camp will be conducted in the form of presentations made at various selected high schools as well on our website to the general public. Primary targets are those who have been highly interested in environmental and sustainability issues. Some members may also participate on referral basis from credited sources, such as:
(i) Teachers
(ii) SDE assistant staff
(iii) High school students

Workshop:
(i) Members divide into smaller groups (7 senior high schoolers per group) , one young architect and one SDE studio student.
(ii) Each group guides to start generating visions, ideas, and concepts, followed by discussion and the physical production of presentation by using any material pertinent to their needs.

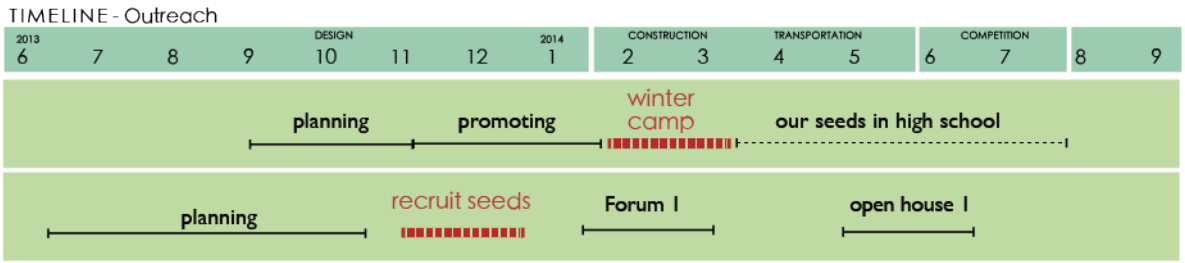
Exhibition:
Following the Winter Camp, an exhibition of their projects as well as other information of Orchid House design hold and open to the general public.

Objectives:
(i) Publicity for SDE 2014 and our project - Orchid House
(ii) Opportunity to participate in an activity related to sustainability
(iii) Exchange of vision, idea, and solutions
(iv) A showcase to rally for government policy support
(v) A bridging channel between the academia and enterprise
(vi) An opportunity to raise public awareness on sustainability issues and efforts

ii. NCTU/UNICODE Orchid House Solar Seedlings Foundation:
- Project: Planting the solar seeds (for a better future).
- Objectives: To influence the architecture school students who had interested in the Orchid House and expect them to be our event volunteers.
- Time: February, 2014
- Channel: Lecture, open house.

- Audience: 20 NCTU students and other architecture school students
- Leader: Team Unicode students.
- Execution: In order to recruit the best qualified volunteers, we will conduct three types of activities in schools to"plant the seeds".

(i) High schools attended by current college architecture students. They serve as the best ambassdors to encourage junior schoolmates to participate.
(ii) NCTU Leadership Course students will be encouraged to join us and help with the communication related works.
(iii) Social network such as Facebook friends and fans will also be exposed to daily renewed news, messages, updates, and records of activities such as photos and videos.



News - Strategic Press Exposure

Analysis of the situation
Revival of solar energy in the anti-nuclear age.

The main goal is to maximize media exposure with organized strategies. Various research articles will be publicized in synch with major milestones, news conference, and PR events. This will be implemented through Phases 2 and 3.

- **Definition of the Communication Objective**
  Maximize the public exposure to SDE and NCTU/UNICODE Team and the Orchid House
- **Identitfication of the Target Group:**
  General public, subscribers and readers of our selected media platforms.
- **Action's description / Projects**

i. Media Platform Lists

- Newspaper:
  The following newspaper are the most popular ones:
  CTNews: http://www.chinatimes.com/
  UDN: http://udn.com/NEWS/mainpage.shtml
  The Liberty Times: http://www.libertytimes.com.tw/
  NextMedia: http://tw.nextmedia.com/
  Upaper: http://reading.udn.com/upaper/
  Sharpdaily: http://sharpdaily.tw/
  PowerNews: http://www.twpowernews.com/home/index.php
  Pots Weekly: http://www.pots.tw/
  Economic Daily News: http://edn.udn.com/

- Magazine:
  To encourage curiosity and debate about renewable energy through columns written by well-known people. These selected magazines are as following:

BUSINESS WEEKLY: http://www.businessweekly.com.tw/
CommonWealth: http://english.cw.com.tw/front.do?action=index
Global Views: http://www.gvm.com.tw/
Interior: http://www.interior-mj.com.tw/
DFUN: http://www.dfunmag.com.tw/
La Vie: http://www.wowlavie.com/

• Website:
To spread the news of Solar Decathlon Europe 2014 and encourage public excitement over NCTU/UNICODE's participation via internet. The platform and website such as youtube, FB, Blog, google, Yahoo.
IOH: http://ioh.tw/
XIN Forum: http://www.xinmedia.com/xinforum/
Forgemind ArchiMedia: http://www.forgemind.net/xoops/modules/news/
ArchicultureForum: http://www.archiforum.org.tw/
JUT Foundation For Arts and Architecture: http://www.jut-arts.org.tw/cht/index.php
City yeast: http://www.cityyeast.com/
Archicake: http://www.mmag.com.tw/ad/
Change Taipei: http://changetaipei.net/
Village Taipei: http://www.urstaipei.net/

• TV/Radio:
To increase the exposure and spark widespread interest in Orchid House project. The TV program or the radio such as ICRT will play an important role to spread the information. We expect to have some interview with well-known architects.
- 2013/12/16: FM97.5 IC Broadcasting
- 2013/12/25: FM97.5 IC Broadcasting

• PR:
Creating the public relationship with sponsors as well as French Institute in Taipei, aim to have a collaboration with each other.

• Activities:
We are going to hold workshop as well as exhibition during winter vacation for senior high school students, in addition to having forum to general public.

ii. Portfolio Publication - Orchid House
• Project: A documentary portfolio of the entire process participating in SDE 2014.
• Objectives: To document and to publicize.
• Time: August, 2014
• Channel: NCTU or a mjaor publisher in Taiwan.
• Audience: General public and professionals.
• Leader: David Tseng, Professor.
• Execution: The portfoilio shall focus on the following four agenda:

(i) Building - What does a building do? To explore and discuss the role of a building in today's urban context, what are the meanings to the inhabitants? How does a building perform as the interface between living space and public space?

EXPECTED MEDIA LIST

Media	Type of Media	Date of Publication	Type of Publication	Website address
NCTU News	newspaper	2013.04.01	print, online	http://www.chss.nctu.edu.tw/News/news-more.php?id=54
		2013.06.19	online	
		2013.11.07	online	
CTNews	newspaper	2014.02.07	print, online	http://www.chinatimes.com/
UDN	newspaper	2014.02.10	print, online	http://udn.com/NEWS/mainpage.shtml
		2014.02.07	print, online	
		2014.01.25	print, online	
The Liberty Times	newspaper	2014.02.08	print	http://www.libertytimes.com.tw/
NextMedia	newspaper	2014.02.07	print	http://tw.nextmedia.com/
Upaper	newspaper	2014.02.07	print	http://reading.udn.com/upaper/
Sharpdaily	newspaper		print	http://sharpdaily.tw
PowerNews	newspaper		print	http://www.twpowernews.com/home/index.php
Pots Weekly	newspaper		print	http://www.pots.tw/
Economic Daily New	newspaper	2014.02.09	print	http://edn.udn.com/
Taipei Times	newspaper	2014.02.07	print, online	http://www.taipeitimes.com/
Merit Times	newspaper	2013.11.08	print, online	http://www.merit-times.com/
BUSINESS WEEKLY	magazine		print	http://www.businessweekly.com.tw/
CommonWealth	magazine	2014.04.16	print	http://english.cw.com.tw/front.do?action=index
Global Views	magazine		print	http://www.gvm.com.tw/
Interior	magazine	2014.03.01	print	http://www.interior-mj.com.tw/
DFUN	magazine		print	http://www.dfunmag.com.tw/
La Vie	magazine	2014.02.05	print	http://www.wowlavie.com/
		2014.04.05		
Taiwan Today	website	2013.11.08	online	http://www.taiwantoday.tw/mp.asp?mp=9
Cdnews	website	2014.02.07	online	http://www.cdnews.com.tw/cdnews_site/
WorldJournal	website	2014.02.07	online	http://www.worldjournal.com/
YonthDailyNews	website	2013.11.08	online	http://gpwd.mnd.gov.tw/onweb.jsp?webno=3333333613
Radio Taiwan International	website	2013.11.07	online	http://www.rti.org.tw/index.aspx
PCHomeNews	website	2013.12.31	online	http://news.pchome.com.tw/
EpochTimes	website	2013.11.07	online	http://www.epochtimes.com/b5/ncnews.htm
SeniorNews	website	2014.02.13	online	http://www.srnews.com.tw/main.asp
IOH	website	2014.02.09	online	http://ioh.tw/
xin forum	website	2014.02.09	online	http://www.xinmedia.com/xinforum/
Forgemind ArchiMedia	website	2014.02.09	online	http://www.forgemind.net/xoops/modules/news/
		2014.12.14	online	
JUT Foundation For Arts and Architecture	website		online	http://www.jut-arts.org.tw/cht/index.php
City yeast	website	2014.02.09	online	http://www.cityyeast.com/
Archicake	website		online	http://www.mmag.com.tw/ad/
Change Taipei	website		online	http://changetaipei.net/
LowestCarbon	website	2013.12.23	online	http://lowestc.blogspot.tw/
IC975Radio	website	2013.12.23	online, Radio	http://www.ic975.com/
MoneyDJ	website	2014.02.09	online	http://www.moneydj.com/KMDJ/
Village Taipei	website		online	http://www.urstaipei.net/
C N A	website	2014.02.09	online	http://www.cna.com.tw/
Search Home	website	2014.03.07	online	http://www.searchome.net/
giamag	website	2014.03.17	online	http://www.gizmag.com/orchid-house-taiwan-greenhouse/31255/

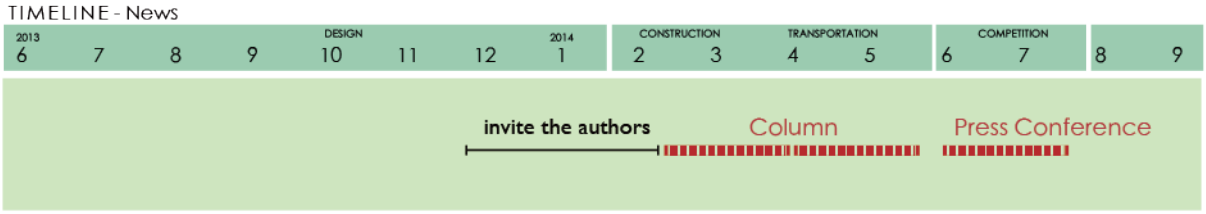
- *Appendix 1 _ Expected Media List*

(ii) Sustainability - What does sustainability truly mean?
NCTU/UNICODE use the rooftop as a penertrating object to explore the social significance of a building componant. Roofscape aside, discussion will also evolve around its influence in the future. We will further investigate the feasibility of reviving the existing buildings with the least impact, as well as the various alternatives. We shall emphasize that the significance of sustainability are revealed not only in technical terms but also in social terms.

(iii) Possibility - How is it done?
The prototype we designed and to be built in Versaille, France 2014 is an attempt to probe the possibilities in solving several serious pressing issue – How are the green concepts be translated into reality?

How do solar energy, water, and other natural resources work together to achieve more efficient result? Are there better ways to both reduce the consumption of energy as well as to provide safer, greener energy?

(iv) Reality – What does the Orchid House Do for us?
The process of planning, design, and building the Orchid House will be a pioneering example in Taiwan and we wish to leave our footprints for the next generation to follow.



Production - Documentary Team (information production team)

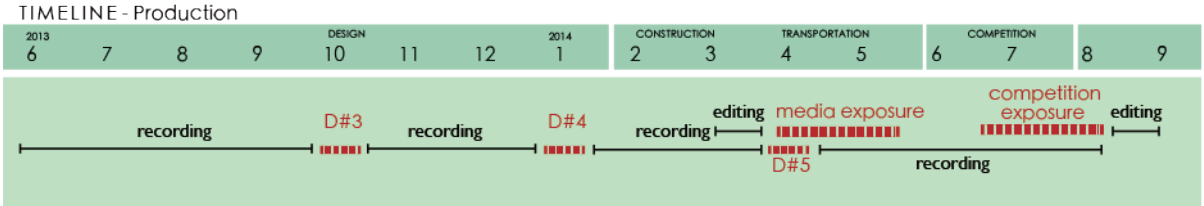
Analysis of the situation
Interactive and entertaining documentaries about urban rooftop regeneration.

The main goal is to provide records in various forms such as text, charts, drawings, photograph, and video. We have been carefully keeping records and documents through the process. Additionally, images and videos will be used in the presentation of the Orchid House during the competition. This will take place in Phase 3.

- **Definition of the Communication Objective**
  Provide documented records for the Public Relations Team.
- **Identitfication of the Target Group:**
  General public, subscribers over various media platforms.
  i. Social Media Management
  Official website, Facebook, Instagram, Pinterest, and Twitter are to be utilized as primary channels. Progress update, countdown weeks posters, milestones demonstrations, event documents, etc., will be posted and to generate regular viewership. Special announcement or PR opportunities will be rallied throughout the entire process to generate discussions, opinions, and social exchange over these networks.

  ii. Print and Images Media Management
  The print team will be responsible for all text-based releases and event announcements. They will also manage all image-based materials for a variety of uses.

  iii. Video Recordings
  The Video Team is to be responsible for all documentation of the audio and video format materials.



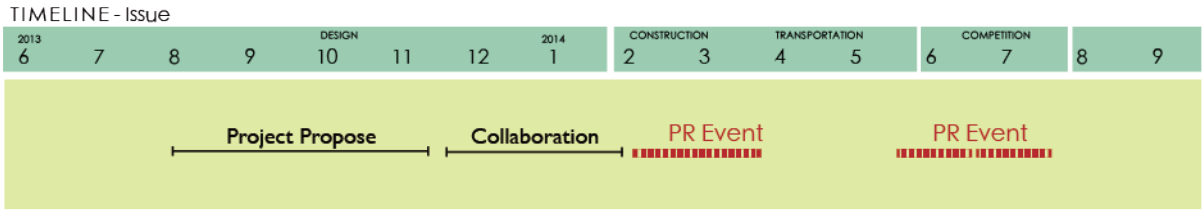
Issues - Promotional Events

Analysis of the situation
Exhibition at NCTU Campus, Hsinchu

One part of the Orchid House shows up at NCTU Campus, locates at the end of the University Boulevard, acts as a hub for gather students together and form a creative social space. Activities in this aspect will take place in Phase 3.

- **Definition of the Communication Objective / Message**
  To publicize the project and to interact with the general public
- **Identitfication of the Target Group:**
  General public.
- **Action's description / Projects**

i. Exhibition at NCTU Campus, Hsinchu
• Project: Public exhibition
• Objectives: To demonstrate and showcase our commitment and achievement pursuing SDE 2014.
• Time: February 2014-May 2014
• Channel: Exhibition, lectures and workshop
• Audience: General public
• Leader: Team NCTU/UNICODE
• Execution: This will be the outreach period before the competition, we may promote sustainable issues with special activities such as workshop or press conference with sponsor's foundation. Images and videos from the event will be shown through media channels within our plan.



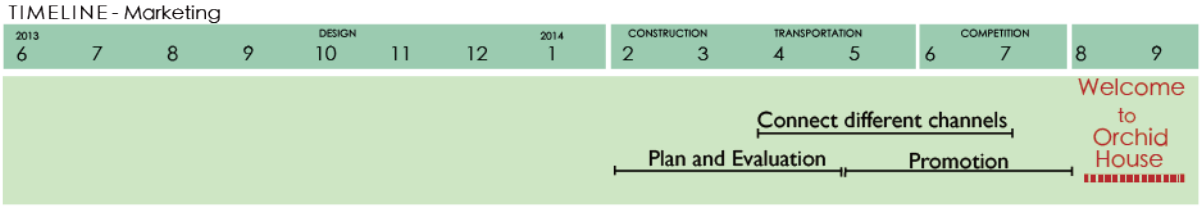
Marketing - Marketing Projects

Analysis of the situation
Huashan 1914 Creative Park is a renewed urban industrial site with historical significance. It is now the hotspot for cultural activities in Taipei. It is also a major sponsor for our SDE project. Sponsors and our team will be using this platform as the base for all major promotional activities. The primary goal for marketing is to extend the promotion of SDE's theme subjects post-competition. The focal subject is the re-assembled Orchid House to be located in Huashan 1914 Creative Park, Taipei. It will serve as the base for exhibition of SDE competition, continuing updates of our research at NCTU, and other design achievements done by other institutions in Taiwan. The key concept is to maintain the presense of agenda and a permanent milestone display. The marketing projects will take place in phase 4, after the SDE competition.

- **Definition of the Communication Objective / Message**
  Maintain the focus on sustainable energy, urban renewal, and improvements on social housing after the competition.
- **Identitfication of the Target Group:**
  Travelers, those who are interested in architecture and general public.
- **Messages / Establishment**
  A showcase of commitment to sustainability and social housing agenda.
- **Action's description / Projects**

  i.NCTU Orchid House Display:
  • Time: September 2014~
  • Channel: Exhibition, actual house on-site display
  • Audience: Travelers, those who are interested in architecture and general public
  • Leader: Team NCTU/UNICODE

  ii. Orchid House – related products:
  To provide souvenirs, which can also be used in the previous five strategies for PR's purpose. Potential items of merchandising may be the Orchid House portfolio book, scaled model of the Orchid House, postcard with Versailles campus, mug, notebook, DVD, etc. The design and production of these merchandising may be done via collaborations between our students and sponsoring enterprises.



Previous to the competition

Before the Competition is phase 1 and 2, in these two phases we develop our design and disseminate to general public. firstly, we focus on sharing and exchanging with the public what we have learned and experienced through our research and design. There will be held in Seminar and Forum. Secondly, we focus on the academic part and regard education as the most important communication strategy in our plan since it directly reaches our next generation – the foundation for our future. Therefore, we hold the winter camp, find the solar seedlings to aim at mainly the high schoolers who have the basic interest in architecture, urban living, sustainability, and renewable energy.

During the Competition

During the Competition, we provide the public tour for the general public in site. We think that visitors will be guided throughout the House to experience, feel, and appreciate this project from all perspectives. Besides, we will provide a brochure while general public is visiting Orchid House.

Tracking Table of the Communication actions

Tracking Table of Communication Plan

| ITEM | PERSON IN CHARGE | September, 2013 w40 | w39 | w38 | w37 | October, 2013 w36 | w35 | w34 | w33 | November, 2013 w32 | w31 | w30 | w29 | w28 | December, 2013 w27 | w26 | w25 | January, 2014 w24 | w23 | w22 | w21 | February, 2014 w20 | w19 | w18 | w17 | March, 2014 w16 | w15 | w14 | w13 | w12 | April, 2014 w11 | w10 | w9 | May, 2014 w8 | w7 | w6 | w5 | w4 | June, 2014 w3 | w2 | w1 | July, 2014 W2 | W3 | W4 | W5 | W6 | W7 | August, 2014 W8 | W9 | W10 | September, 2014 W11 | W12 | W13 | W14 | W15 | October, 2014 W16 | W17 | W18 | W19 | W20 | W21 | November, 2014 W22 |
|---|---|---

Tracking Table of Communication Plan
ITEM
PERSON IN CHARGE
September, 2013
October, 2013
November, 2013
December, 2013
January, 2014
February, 2014
March, 2014
April, 2014
May, 2014
June, 2014
July, 2014
August, 2014
September, 2014
October, 2014
November, 2014
w40 w39 w38 w37 w36 w35 w34 w33 w32 w31 w30 w29 w28 w27 w26 w25 w24 w23 w22 w21 w20 w19 w18 w17 w16 w15 w14 w13 w12 w11 w10 w9 w8 w7 w6 w5 w4 w3 w2 w1 W2 W3 W4 W5 W6 W7 W8 W9 W10 W11 W12 W13 W14 W15 W16 W17 W18 W19 W20 W21 W22
Disassembly after Competition
B Benjimin Tang
Dissemination
website
posters
newsletters
others
Eric Chuang
Eric Chuang
Eric Chuang
Eric Chuang
Eric Chuang
Orchid House Display in Taiwan
Public Tour
PR 1
PR 2
Press Conference 1
Press Conference 2
Grand Opening Ceremony
Closing Ceremony
Disassembly after Event
C David Tseng
C David Tseng
C David Tseng
C David Tseng
C David Tseng
C David Tseng
C David Tseng
C David Tseng
Dissemination
website
posters
newsletters
others
Eric Chuang
Eric Chuang
Eric Chuang
Eric Chuang
Eric Chuang
Orchid House Portfolio
PR 1
Press Conference
Forum 1
others
C David Tseng
C David Tseng
C David Tseng
C David Tseng
C David Tseng
Dissemination
website
posters
newsletters
Eric Chuang
Eric Chuang
Eric Chuang
Eric Chuang

5.7.3 Public Tour Description

The Scenario of Tours for General Public

The Orchid House was designed for general public who have a highly interest in sustainable future. Visitors will be guided throughout the Orchid House to experience, feel, and appreciate this project from all perspectives. The guided tour reveals in progression of important aspects related to its concept, design, material, and the attempt behind it to provide a social, accessible solution to urban issues.

Firstly, visitors will be mostly drawn towards our house from the west of the site in queue and be greeted by being distributed the selected booklets in a hand-carry-bag style, which with architectural diagrams and exploded axon on both sides, is very practical and handy of reference. Besides, it is easily for visitors to reuse during the 14-day-competition.

By walking over the ramp, attention will be immediately drawn by the thermal mass wall which is made by the recycled plastic bottles called POLLI-Brick™. Visitors can enjoy a translucent glimpse into the house through the window next to the POLLI-Brick™. When reaching the end of the ramp, they will mostly enjoy taking a photo with friends in front of the special corner of Orchid House.

At the moment, we expect most people wonder why Team Unicode choose the plastic material for building a future house. To be honest, we did it on purpose because of the sustainable reason. To use the material made from recycled PET bottles, the lightweight bricks can not only offer excellent acoustic and thermal insulation function in Orchid House, but also create skylights and beautiful walls of light. And the most important point is we extend its life cycle!

Prior to entering, visitors will be able to see the engine/hub of the House - mechanical room and be briefed of its functionalities. Inside the House, visitors are organized to tour along a prescribed route and our team members will be stationed and offering the highlights at each area as well as answering any questions.

Team Unicode creates three keywords of the Orchid House Project, first, is “Green Core” which serves as the heart of the house, where it moderates the temperature, exchange fresh air and using recycling system for irrigation of plants. Besides, it will minimize the energy consumption for cooling and heating the living space. The “green-core” consists of greeneries that also serves to reduce and regulate the microenvironment as well as indoor planting area. Thus, “green” in Orchid House represents not only the nature in the house, but also the manifestation of sustainability.

Our members will explain the feature and design related to each of the areas. The kitchen serves a multifunctional task – the center piece is an island that can be converted into a dining table for formal occasions. The Living Room features abundant natural light and can be filtered and adjusted by louvers as well as the liquid thermal mass wall on the west side. Further details will be provided to explain how the thermal wall conserves energy and maintains comfortable temperatures both day and night.

You may ask what is the special point of the ordinary space? Take a look at the furniture and the scenario we bring into the house. The main characters of this hosue are chef couple who love to travel all over the world. With the interest, the house and the decoration make the ordinary space vitality. Moreover, the tea table, locates in the semi-outdoor area with multifunctional purposes.

It is sheltered by a double-height canopy which is also used for exhibition but also offers visitors shading comfort while they enjoy traditional Chinese Tea, is another extraordinary story. It is made by recycled woods which is abandoned in the garbage dump.

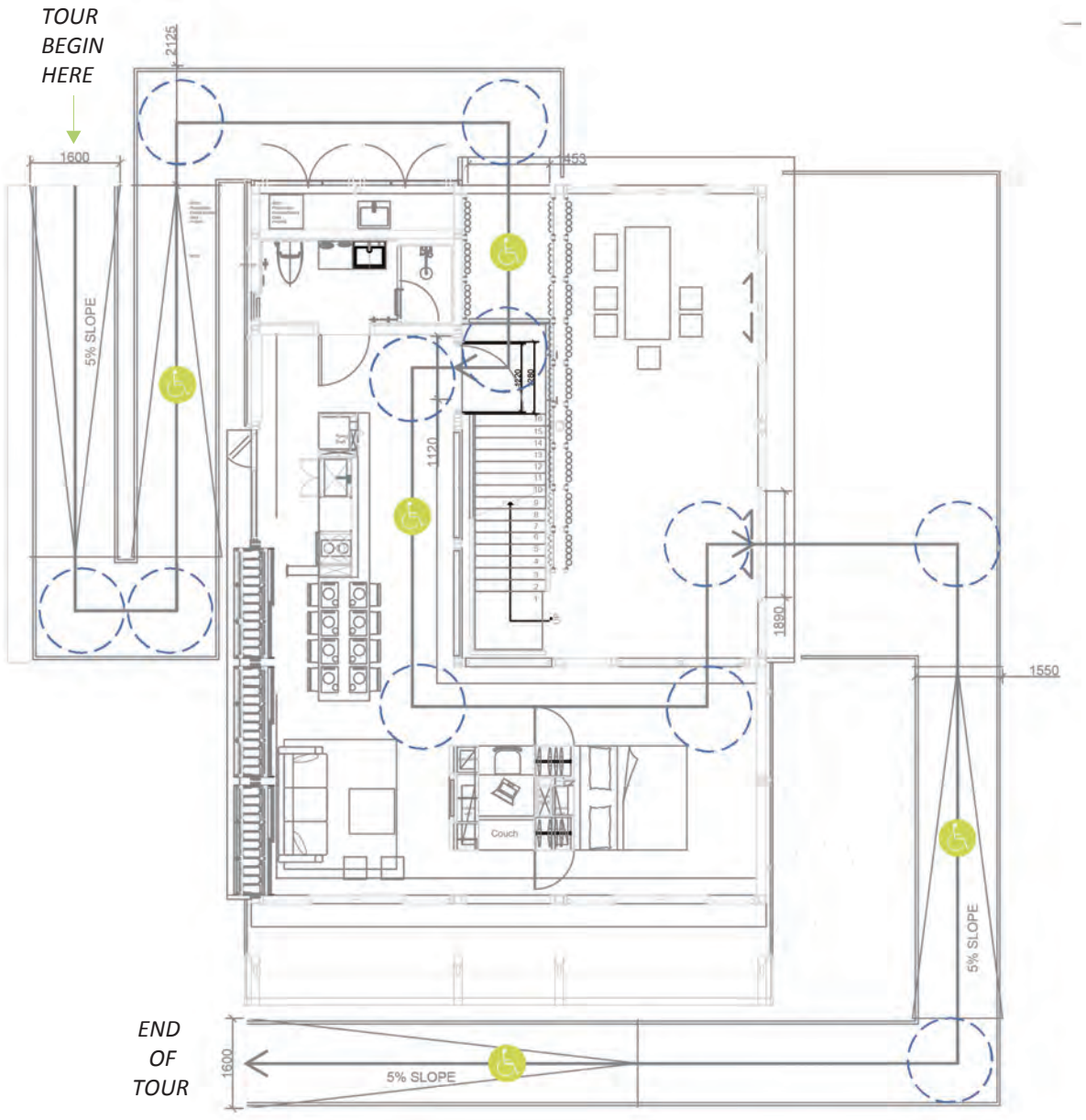
After touring the house, should the traffic allowed, visitors will be encouraged to go about the house to further experience, appreciate in a more casual fashion, and take another photoshot.

Entertainment for the public while waiting in line

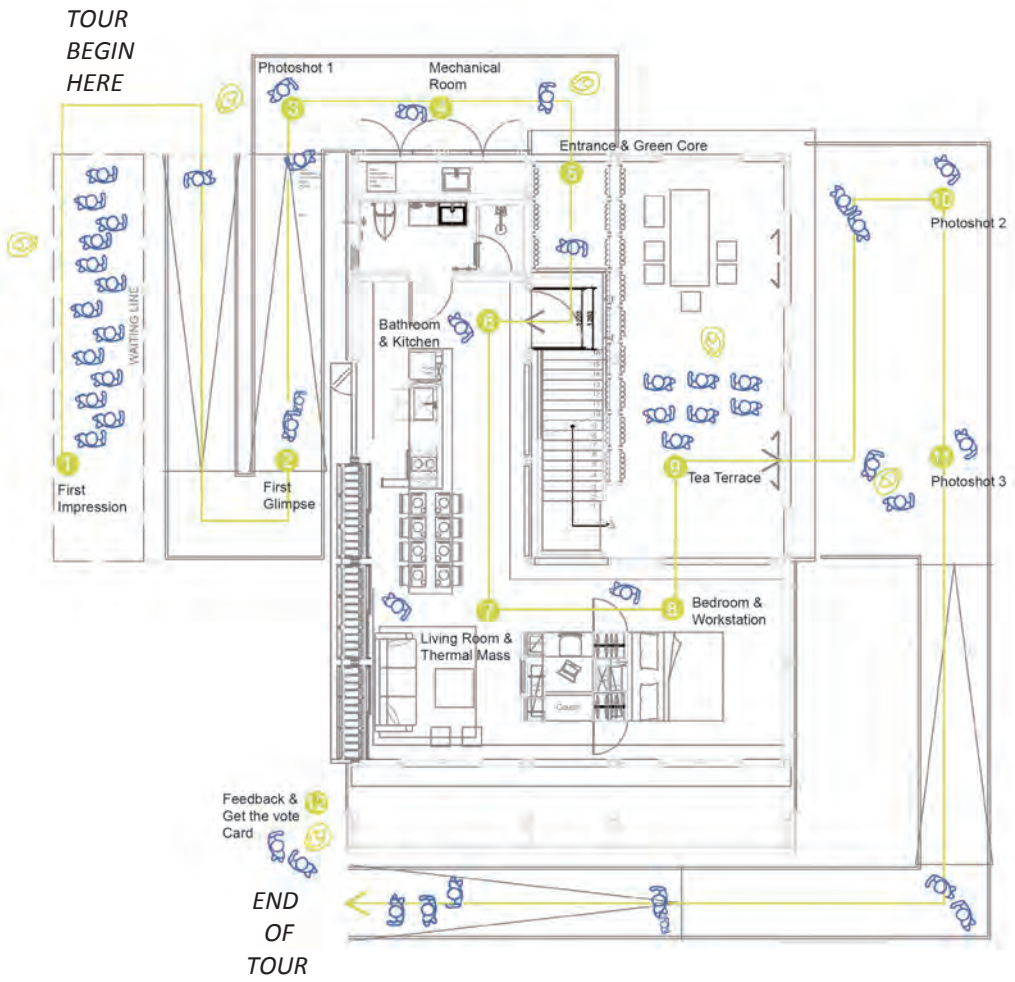
Team Unicode prepares the brochure for general public while waiting in line. This brochure is designed in a hand-carry-bag shape with information on both sides. On one side of the bag, the Orchid House logo indicates the main idea of our key concept, which is displayed in green and blue to represent sustainability and water/skyline respectively. The other side of the brochure provides the general information of the whole project, including the exploded axon and the architectural diagrams. Team Unicode believes that general public can get overall idea of the project and enjoy while waiting in line.

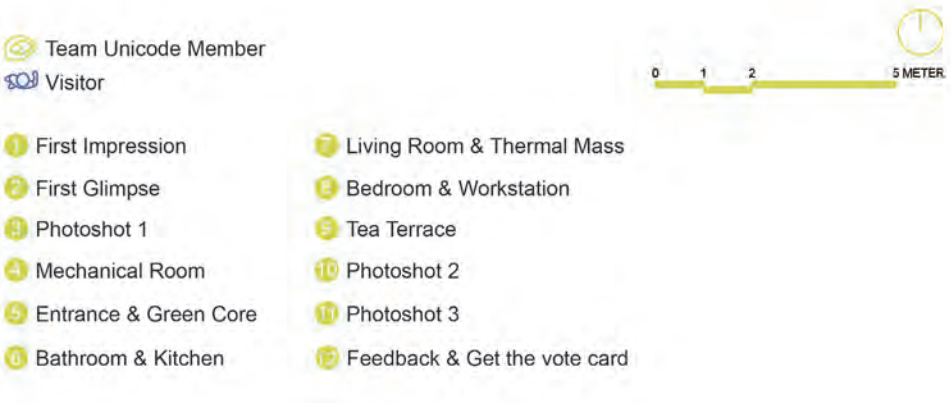
Drawings Showing the route and contouring

For Disable People



For General Public





Tour for General Public

Spot	Name	Duration	Description
1	First Impression	depends on the visitors in queue	Visitors will get a general view of Orchid House. Then experience the passage designed to access the house.
2	First Glimpse	10 secs	At the middle of the west ramp, we provide a translucent glimpse into the House through the window.
3	Photoshot 1	1 min	Experience the northwest side of Orchid house. Guide will explain the concept, design and background knowledge of Orchid house and the city issue in Taipei. Friendly guide will start the tour from this spot, introducing the concept of Orchid House.
4	Mechanical Room	3 mins	Guide will explain the machine system including.
5	Entrance & Green Core	3 mins	Guide will introduce the concept of Green Core and Taiwanese orchid.
6	Bathroom & Kitchen	2 mins	The kitchen serves a multifunctional task – the center piece is an island that can be converted into a dining table for formal occasions.
7	Living room & Thermal mass	2 mins	The Living Room features abundant natural light and can be filtered and adjusted by louvers as well as the liquid thermal mass wall on the west side. Further details will be provided to explain how the thermal wall conserves energy and maintains comfortable temperatures both day and night.
8	Bedroom & Workstation	2 mins	Guide will explain how we conceived the L-shape house and how it serves as a prototypical solution to Taipei rooftop. Some general description of city issues will be provided.
9	Tea Terrace	5 mins	The space offers visitors shading comfort while they enjoy traditional Chinese Tea and appreciating the conceptual model from the winter camp made by the senior high schoolers.
10	Photoshot 2 & Garden	2 mins	After experiencing the tea terrace, this deck offers a space for occasional rest.
11	Photoshot 3 & Garden	2 mins	Experience the southeast side of the house, seeing the well-designed garden.

12	Feedback & Get the vote card	3 mins	Get more Q&A before finish the tour and get a vote card.
Total		Estimate 25 mins	

Tour for Judges

Spot	Name	Duration	Description
1	First Impression	depends on the visitors in queue	Visitors will get a general view of Orchid House. Then experience the passage designed to access the house.
2	First Glimpse	10 secs	At the middle of the west ramp, we provide a transluscent glimpse into the House through the window.
3	Photoshot 1	1 min	Experience the northwest side of Orchid house. Guide will explain the concept, design and background knowledge of Orchid house and the city issue in Taipei. Friendly guide will start the tour from this spot, introducing the concept of Orchid House.
4	Mechanical Room	3 mins	Guide will explain the machine system including.
5	Entrance & Green Core	3 mins	Guide will introduce the concept of Green Core and Taiwanese orchid.
6	Bathroom & Kitchen	2 mins	The kitchen serves a multifunctional task – the center piece is an island that can be converted into a dining table for formal occasions.
7	Living room & Thermal mass	2 mins	The Living Room features abundant natural light and can be filtered and adjusted by louvers as well as the liquid thermal mass wall on the west side. Further details will be provided to explain how the thermal wall conserves energy and maintains comfortable temperatures both day and night.
8	Bedroom & Workstation	2 mins	Guide will explain how we conceived the L-shape house and how it serves as a prototypical solution to Taipei rooftop. Some general description of city issues will be provided.
9	Go upstairs through the Green Core	1 min	Get more further information of Green Core and the water system.
10	Tea Lounge	3 mins	Invite judges to enjoy traditional Chinese Tea.

11	Smart Skin Show	1 mins	They will proceed to be entertained by a demonstration of the “smart skin” – a showcase of another interactive building exterior design.
12	Tea Terrace	3 mins	The space offers visitors shading comfort and appreciating the conceptual model from the winter camp made by the senior high schoolers.
13	Photoshot 2 & Garden	2 mins	After experiencing the tea terrace, this deck offers a space for occasional rest.
14	Photoshot 3 & Garden	2 mins	Experience the southeast side of the house, seeing the well-designed garden.
15	Feedback & Get the vote card	3 mins	Get more Q&A before finish the tour and get a vote card.
Total		Estimate 30 mins	

Visit Description

1)Tour for General Public:
The overall guided tour will conducted in both English and Mandarin/French. Each tour will be organized up to eight people at a time. The entire tour is estimated to take 25 minutes, with two to four minutes scheduled for each station inside the House.
i. First Impression (duration depends on the visitors in queue)
By walking over the ramp, visitors will be invited to our journey in Orchid House.

ii. First glimpse (10 secs)
At the middle of the west ramp, we provide a transluscent glimpse into the House through the window.

iii. Photoshot 1 (1 min)
At the end of the ramp, we will provide a selected photos opportunity before entering the Orchid House.

iv. Mechanical Room (3 mins)
Prior to entering the Orchid House, visitors will be able to see the engine/hub of the Orchid House-mechanical room and be briefed of its functionalities.

v. Entrance and Green Core (3 mins) The Green Core serves as the heart/engine of the House - it keeps the temperature in balance, provides the exchange of fresh air, and kicks off recycling system for the irrigation of plants. The difference in temperature will be immediately sensible to visitors who enter the House and they will be briefed in details by our team how the Green Core performs and functions to achieve such result.

vi. Bathroom, Kitchen and Living Room (4 mins) Our members will explain the feature and design related to each of the areas. The kitchen serves a multifunctional task – the center piece is an island that can be converted into a dining table for formal occasions. The Living Room features abundant natural light and can be filtered and adjusted by louvers as well as the liquid thermal mass wall on the west side. Further details will be provided to explain how the thermal wall conserves energy and maintains comfortable temperatures both day and night.

vii. Work Station and Bedroom (2 mins) Other than the general features, our member will specifically explain how we concieved the L-shape house and how it serves as a prototypical solution to Taipei rooftop. Towards the end of the tour, visitors are able to exit via the bedroom and onto the Tea Terrace.

viii. Tea Terrace (3 mins) This is a semi-outdoor area with multifunctional purposes. It is sheltered by a double-height canopy which is also used for exhibition but also offers visitors shading comfort while they enjoy traditional Chinese Tea. Conceptual models from the Winter Camp will be displayed here taking the opportunity to showcase the imagination and innovation by the younger generation from Taiwan.

ix. Photoshot 2,3 & Garden (4 mins) After touring the house, should the traffic allowed, visitors will be encouraged to go about the house to fruther experience and appreciate in a more casual fashion. This deck also offers a space for occasional rest.

x. Feedback & Get the vote card (4 mins)
At the end of the tour in Orchid House, we will like to provide a Q&A for visitors who are interested in the project. Finally, a brochure with surprising format will be provided.

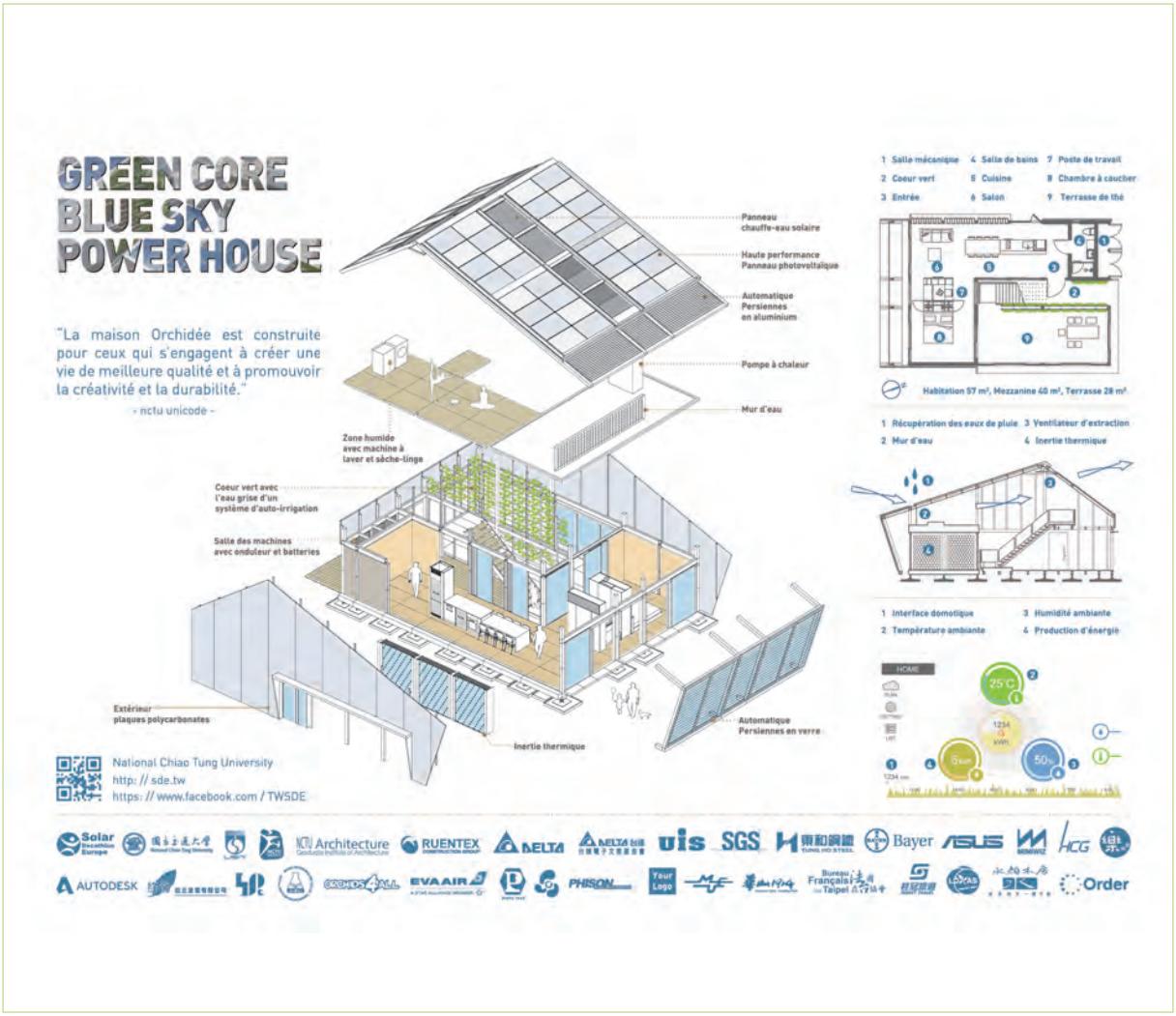
2)Tour for VIP-Judges:
The overall guided tour will conducted in both English and Mandarin/French. The judges will tour the House along the same route as the normal visitors. The only exception is a detoured visit up to the mezzanine after passing the Green Core, where our guide member will provide information regarding the garden plot and the potential for the area as a socializing space. The entire tour is estimated to take 30 minutes, with two to four minutes scheduled for each station inside the House.

Life Demonstrations
NCTU/UNICODE has no intention of giving live demonstrations of mobile elements.

Brochure and handout
We will provide brochure at La Cité du Soleil®, the following images are the 1st version.

Back side of the brochure

Front side of the brochure



5.7.4 Visual Identity Manual

Name of Team and Hous e

NCTU/UNICODE was so named to stress the unique integration of our team which consists of of members from multiple disciplines. “UNICODE” fruther impress the unified nature not just among the team members but also the universal application of the solution to urban issues. ORCHID HOUSE depicts as well such universal prototype offers adaptive strategy generated from domestic environment. Orchid, being a sensitive planet, is also a strong iconic representation of our commitments to create an organic, livable residential solution that maintain sustainable balance with natural light and water.

Rule of Use

The NCTU/UNICODE logo and the Orchid House logo should only be applied to relevant and appropriate material by NCTU or SDE 2014. Any other parties that wish to use the logos must contact the NCTU/UNICODE team for negotiations.

Main Logo and Chosen Typography

BANK GOTHIC / LIGHT FOR NCTU
DINPro / Black for ORCHID HOUSE

ORCHID
HOUSE
K:100
K:80
K:60
K:40
K:20
K:0

NCTUNICODE
K:100
K:80
K:60
K:40
K:20
K:0

Three Logo Versions

Envelope, Business Cards, Sticker Design

For Different Occations

New Year Special Screen

New Year Special Card Design

Keyword, Slogan and Uniform

Slogan

Uniform Design

5.7.5 Sponsorship Manual

Supporting institutions and companies' tracking

The Orchid House project brings academic institution and technology industries in Taiwan together. NCTU/UNICODE provides Taiwanese institutions and companies an opportunity to present their ideas and products to global market during the competition process. Depending on the contribution to the project, each sponsor is entitled as SDE partner, platinum, gold, silver, bronze and citation. Each category can enjoy the different degree of benefit from the project.

PARTNERSHIP MANUAL

Partner	Type of sponsorship	Team contact's name	Team contact's phone	Team contact's mail
AUTHORITIES				
Solar Decathlon Europe	financial support	David Tseng	03-5712121 #58468	cdtseng@arch.nctu.edu.tw
Bureau France in Taipei	cultural support	David Tseng	03-5712121 #58468	cdtseng@arch.nctu.edu.tw
University System of Taiwan	financial, cultural support	David Tseng	03-5712121 #58468	cdtseng@arch.nctu.edu.tw
Minstry of Culture	cultural support	David Tseng	03-5712121 #58468	cdtseng@arch.nctu.edu.tw
Minstry of Foreign Affairs	cultural support	David Tseng	03-5712121 #58468	cdtseng@arch.nctu.edu.tw
STRUCTURE AND CONSTRUCTION				
Ruentex	financial, design and construction support	Bojiun Tang	03-5712121 #31895	benjamin@arch.nctu.edu.tw
Tung Ho Steel	financial, design and construction support	Bojiun Tang	03-5712121 #31895	benjamin@arch.nctu.edu.tw
ELECTRICITY				
Delta	financial, design and construction support	Bojiun Tang	03-5712121 #31895	benjamin@arch.nctu.edu.tw
MECHANICAL				
SGS	technical support	Minnie Jan	03-5712121 #58467	mjan@nctu.edu.tw
UIS	technical support	Chenwu Chung	03-5712121 #58468	chenwu_chung@yahoo.com
Mason Universal Enterprise	technical support	Bojiun Tang	03-5712121 #31895	benjamin@arch.nctu.edu.tw
MATERIAL				
Bayer	product support	Minnie Jan	03-5712121 #58467	mjan@nctu.edu.tw
Miniwiz	product support	David Tseng	03-5712121 #58468	cdtseng@arch.nctu.edu.tw
Berlin Co., Ltd.	product support	Bojiun Tang	03-5712121 #31895	benjamin@arch.nctu.edu.tw
Mega Master Technology	product support	Bojiun Tang	03-5712121 #31895	benjamin@arch.nctu.edu.tw
Spring Pool	product support	Bojiun Tang	03-5712121 #31895	benjamin@arch.nctu.edu.tw
Fuh Shan co.,Ltd.	product support	Bojiun Tang	03-5712121 #31895	benjamin@arch.nctu.edu.tw
COMPUTER DEVICES				
Asus	devices support	Minnie Jan	03-5712121 #58467	mjan@nctu.edu.tw
ORCHID				
Grand Biotechnology	product support	Minnie Jan	03-5712121 #58467	mjan@nctu.edu.tw
Orchid4All	product support	Minnie Jan	03-5712121 #58467	mjan@nctu.edu.tw
BATHROOM				
HCG	product support	Eric Chuang	03-5712121 #58467	ec2331@gmail.com
ASAZWA INDUSTRUAL	product support	Bojiun Tang	03-5712121 #31895	benjamin@arch.nctu.edu.tw
SOFTWARE				
Autodesk	software support	Pei Hsien Hsu	03-5712121 #31977	phsu@arch.nctu.edu.tw
LOGISTIC				
EVA Airways	ticket support	Bojiun Tang	03-5712121 #31895	benjamin@arch.nctu.edu.tw
Signet Travel	Service support	David Tseng	03-5712121 #58468	cdtseng@arch.nctu.edu.tw
SITE/ACTIVITY				
Huashan 1914, Creative Park	site, activities support	David Tseng	03-5712121 #58468	cdtseng@arch.nctu.edu.tw
LOHAS Biotech	Ingredient Support, Training Support	David Tseng	03-5712121 #58468	cdtseng@arch.nctu.edu.tw
PHISON Electronics Corp.	product support	June-Hao Hou	03-5712121 #31895	jhou@arch.nctu.edu.tw
Tien Yin Corp.	product support	Minnie Jan	03-5712121 #58467	mjan@nctu.edu.tw
DECORATION/FURNITURE				
Shoeiyan Workshop	Furniture support	Bojiun Tang	03-5712121 #31895	benjamin@arch.nctu.edu.tw
Order System Company	Furniture support	Bojiun Tang	03-5712121 #31895	benjamin@arch.nctu.edu.tw
Mao's Pottery	Furniture support	Bojiun Tang	03-5712121 #31895	benjamin@arch.nctu.edu.tw
OTHERS				
SHU CHANG & ASSOCIATES, ARCHITECTS	financial donation	David Tseng	03-5712121 #58468	cdtseng@arch.nctu.edu.tw

Supporting institutions and Sponsor`s Logos

ORGANIZER

Solar Decathlon Europe

INSTITUTION

國立交通大學 National Chiao Tung University · NCTU Architecture Graduate Institute of Architecture · Bureau Français de Taipei 法國在台協會

SDE PARTNER

RUENTEX CONSTRUCTION GROUP

PLATINUM SPONSOR

東和鋼鐵 TUNG HO STEEL · DELTA · DELTA 台達 台達電子文教基金會

GOLD SPONSOR

uis · SGS

SILVER SPONSOR

Bayer · ASUS · MINIWIZ · AUTODESK · HCG

BRONZE SPONSOR

ORCHIDS4ALL · PHISON Knows What You Need · 張楨建築師事務所 · EVA AIR A STAR ALLIANCE MEMBER

SPONSOR

Order · 阿原 YUAN · 桂冠旅遊 · 華山1914 Huashan1914 · Creative Park

SPONSORSHIP MANUAL

		partner	Promotion + all PR event	Invitation to event	Logo in PR publications	Logo in team suit
TWD						
20 million +	SDE partner	o	o	o	o	o
10 million ~ 20 million	Platinum		o	o	o	o
5 million ~ 10 million	Gold			o	o	o
1 million ~ 5 million	Silver			o	o	o
100 K ~1 million	Bronze			o	o	o
100 K	Citation				o	o

1 EURO ≒ 42 TWD

1. Definition of Sponosr：Supporting SDE 2014-Orchid House Project, pays for or contributes to the costs involved in finanical, technical, Cultural, product, service, design support, etc.

Presentation used to raise sponsorships

5.7.6 Budget Plan

The financial structure of NCTU/Team Unicode has been divided into 3 sources: subsidies from SDE Europe (€100,000), monetary and material donation from private sector and NGOs, government research funds and local government spatial and cultural authorities.

In terms of monetary and material donation from private sector and NGOs, UNICODE team have fortunately secured €500K from Dr. Samuel Yin, President of Ruentax Group(http://www.ruentex.com.tw/). Unicode team enjoys the sponsorship from Delta group (http://www.deltaww.com/) for Photovoltaic panels and energy system, and Delta Foundation for education, Public relations and outreach programme. Significant sponsors include wall and painting sponsor IT & communication sponsor ASUS (www.asus.com/) Bayer Taiwan (www.bayer.com.tw/), Logistic sponsor Eva Air (www.evergreen-group.com/), Cultural and Media sponsor Huashan 1914 Creative Park (www.huashan1914.com/) ,domestic appliance sponsor HCG (www.hcg.com.tw), recycled Steel sponsor Tung Ho Steel (http://www.tunghosteel.com/). More sponsorship is listed in the Orchid House Posters.

The post competition of Orchid House will have larger impacts on urban policies and regeneration. Local spatial and cultural authorities are closed working with NCTU/Team Unicode who will study the way of relaxing regulation on rooftop construction, and demonstrate its contribution to green life and sustainable urban governance. National Science Council is the highest research institute in Taiwan who is the target for Team Unicode to communicate for wider application and introduction of solar technology into building design and construction.

The cost of Communication Plan is €49900 exVAT in which Research, design, model&mockup, academic conferences, actions&exhibition, press conference and communication material.

COMMUNICATION BUDGET

Item	Type of Participation	Location	Number	Unit	Budget			Budget
				EURO	Subtotal	VAT EURO	Total	TWD
RESEARCH, DESIGN, MODEL & MOCKUP								
1:25 Architectural Models	Model materials, stationary, display boxes, etc	Hsinchu		310	310	16	326	13,020
1:1 Architectural Models	Recycled steel, Polli-bricks, Aluminum material, Acrylic material, wood, scaffolding, stone, sand, etc	Hsinchu		4,005	4,005	200	4,205	168,210
Smart Living & Water Wall Research Models	Acrylic material, metal spring, thermometer, etc	Hsinchu		870	870	44	914	36,540
Training Courses	Fork Lift, Boom Lift, First Aid, H&S, Culture, Plumbing, Carpenter, Revit, etc	Hsinchu		4,750	4,750	238	4,988	199,500
ACADEMIC CONFERENCES								
Presentation of proposal	Formal Presentation	Taipei	10	0	0	0	0	0
Forum_academic and enterprise	Forum	Taipei	1	1,475	1,475	74	1,549	61,950
Taipei URS	Lecture and Forum	Taipei	3	75	225	11	236	9,450
NCTU Seminar	Lecture and Forum	Hsinchu	11	75	825	41	866	34,650
YA Talk	Lecture	Hsinchu	8	75	600	30	630	25,200
ACTIONS & EXHIBITIONS								
Recurit of Seedlings	Forum and Recruitment	Taipei	5	0	0	0	0	0
Orchid House Winter Camp	Workshop	Taipei	1	9,500	9,500	475	9,975	399,000
Orchid House Winter Camp Fair	Exhibition	Taipei	1	0	0	0	0	0
Orchid House Pre-Assembly Display	Orchid House Prototype Exhibition	Hsinchu	1	0	0	0	0	0
Orchid House 2014	Orchid House Prototype Exhibition and on-site display	Taipei	1	14,000	14,000	700	14,700	588,000
PRESS CONFERENCE								
Orchid House Official Press Conference 1	Press Conference	Taipei	1	0	0	0	0	0
Orchid House Official Press Conference 2	Press Conference	Hsinchu	1	0	0	0	0	0
Orchid House Award	Press Conference	Taipei	1	500	500	25	525	21,000
Orchid House Shipping Ceremony	Press Conference	Taipei	1	0	0	0	0	0
Orchid House Taipei	Press Conference	Taipei	1	0	0	0	0	0
Orchid House Portfolio Publication	Press Conference	Taipei	1	300	300	15	315	12,600
Orchid House 2014	TV interview	Taipei	1	0	0	0	0	0
COMMUNICATION MATERIAL								
Perspective - Orchid House	Video Recordings	Taipei, Hsinchu	1	3,750	3,750	188	3,938	157,500
Documentation: printing poster, newletters, T-shirts, stickers, brochures, others	Documentation		1	5,000	5,000	250	5,250	210,000
VIP Dinner	PR	Taipei, Hsinchu	3	600	1,800	90	1,890	75,600
Web Page	Creation and Maintenance			2,000	2,000	100	2,100	84,000
								Grand Total
				47,285	49,910	2,496	52,406	2,096,220

5.7.7 Winter Camp

NCTU Graduation Institute of Architecture and the cross-boundary team, NCTU/ UNICODE isone of the 20 university teams which are selected by Solar Decathlon Europe 2014 organization. We will participate in the competition in Versaille, France on June to July 2014.

The first Solar Decathlon was held in 2002 in United States; the competition has since occurred biennially in 2005, 2007, 2009, 2011 and 2013. The winner of the competition is the team that best blends affordability, consumer appeal, and design excellence with optimal energy production and maximum efficiency.
website (http://www.solardecathlon.gov/about.html)

NCTU/ UNICODE wants to spark students about the sustainability issue and create an opportunity for them by holding the winter camp. We hope that all the students can provide their unique idea and concern about the environment as well as encourage them to discuss the ideas with others.

NCTU Orchid House Winter Camp

- Host: NCTU / UNICODE
- Site: Delta Foundation Building
- Time: 2014/02/07-2014/02/09
- Audience: High schoolers
- Leader: NCTU/Unicode students and faculty
- e-mail: sde@arch.nctu.edu.tw

- Mission:

To Publicize - the information of SDE through public events
To Inspire - the younger generation
To Interact - exchange and dialogue among public
To Generate – extended interest and support

We are planning to invite high school students who express interests in sustainable practices as well as high school science teachers to an highly interactive camp at NCTU campus. We wish to ignite their curiosities and aspiration for a better future. The camp will be a high-energy, intensive task-based campaign-Members will be introduced to the basic of environmental and sustainable issues and an orientation of the OrchidHouse design will be offered.

Members will then be prompted to participate in a charrette, basically a reduced-version of solar decathlon competition. The competition focus on the process more than its result, aiming at using their imagination and innovative ideas. The workshop activities will also be deisgned to promote teamwork and collaborations with each others. In addition, two to three lectures will be provided to generate higher interest in continue the pursuit in this field when they plan for their college education.

At the end of the winter camp, it will be the apex of the entire activity – a final presentation of their ideas! Various types of presentation methods will be encouraged, whether drawing, collage, model, slides, animations, or any type of performing arts.

ORCHID
HOUSE
Solar
Decathlon
Europe
GREEN CORE
BLUE SKY
POWER HOUSE
2014
太陽種子冬令營
台達陽光能源教育基地 台北市內湖區陽光街256號
2014/02/07 - 2014/02/09
www.facebook.com/TWSDE | sde.tw
主辦單位
承辦單位
DELTA 台達
台達電子文教基金會
國立交通大學
National Chiao Tung University
NCTU Architecture
國立交通大學建築研究所
NCTUNICODE

15 2014 DAY1

太陽種子冬令營-冬令營時程

2/14	
09:00-09:15	開幕式/主持人：龔書章老師
09:15-09:30	UNICODE團隊介紹：龔書章老師
09:30-09:45	SDE發表：SDE競賽簡介
09:45-10:00	
10:00-10:15	SDE發表：永續建築設計
10:15-10:30	
10:30-10:45	SDE發表：智慧生活
10:45-11:00	
11:00-11:15	Q&A
11:15-11:30	
11:30-12:00	歡迎PARTY
12:00-12:30	
12:30-12:45	冬令營精神及參與人員介紹：龔書章老師
12:45-13:00	冬令營實作發題：屋頂上的100種生活方式
13:00-13:30	
13:30-14:00	屋頂上的100種生活方式 屋頂生活型態CASE STUDY
14:00-14:30	
14:30-15:00	
15:00-15:30	小型分享會
15:30-16:00	
16:00-16:15	參觀「關於城市的一堂通識課」展覽
16:15-16:30	
16:30-17:00	屋頂的100種生活： 16:30-17:30 基地配置討論/屋頂設備 17:30-18:30 屋頂元件配置/想像
17:00-17:30	
17:30-18:00	
18:00-18:30	
18:30-19:00	晚餐
19:00-19:30	
19:30-20:00	小電影播映會：鳥目台灣
20:00-20:30	對談：齊柏林導演/曾瑞瑤製片/張楨乾/龔書章

16 2014 DAY2

太陽種子冬令營-冬令營時程

2/15	
09:00-09:15	簽到/歡迎早餐會
09:15-09:30	
09:30-09:45	氣候、都市、創新演講系列(一)
09:45-10:00	
10:00-10:15	Q&A
10:15-10:30	氣候、都市、創新演講系列(二)
10:30-10:45	
10:45-11:00	Q&A
11:00-11:15	氣候、都市、創新演講系列(三)
11:15-11:30	
11:30-11:45	Q&A
11:45-12:00	氣候、都市、創新演講系列(四)
12:00-12:15	
12:15-12:30	Q&A
12:30-13:00	午餐
13:00-14:00	屋頂上的100種生活：配置討論 / 模型製作
14:00-14:30	
14:30-14:45	休息
14:45-15:30	
15:30-16:00	
16:00-16:15	屋頂上的100種生活：模型製作 / 設計收尾
16:15-16:30	
16:30-17:00	
17:00-17:30	小型發表會
17:30-18:00	
18:00-18:30	晚餐
18:30-19:00	
19:00-19:30	
19:30-20:00	屋頂上的100種生活：隔日簡報製作準備
20:00-20:30	

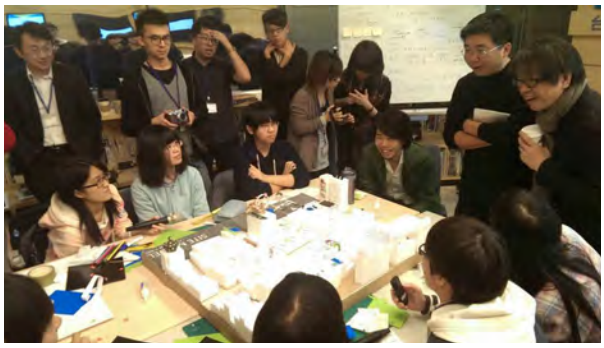
17 2014 DAY3

太陽種子冬令營-冬令營時程

2/16	
09:00-09:15	簽到/歡迎早餐會
09:15-09:30	
09:30-09:45	
09:45-10:00	
10:00-10:15	
10:15-10:30	
10:30-10:45	發表會前排演： 工作營評圖準備
10:45-11:00	
11:00-11:15	
11:15-11:30	
11:30-12:00	
12:00-12:30	午餐
12:30-12:45	中正高中 發表 / 12:45-13:00評審講評
12:45-13:00	
13:00-13:15	師大附中 發表 / 13:15-13:30評審講評
13:15-13:30	
13:30-13:45	新竹高中 發表 / 13:45-14:00評審講評
13:45-14:00	
14:00-14:15	中山女中 發表 / 14:15-14:30評審講評
14:15-14:30	
14:30-14:45	聯隊 發表 / 14:45-15:00評審講評
14:45-15:00	
15:00-15:10	交大蘭花屋計劃團隊致詞
15:10-15:20	台達電子文教基金會致詞
15:20-15:30	頒獎典禮 / 合照
15:30-15:45	記者發問
15:45-16:00	邀請記者看「關於一堂城市的通識課」展覽
16:00-16:15	總結
16:15-16:45	參加學員心得分享
16:45-17:00	閉幕致詞
17:00-17:15	拍照

SITE 1 - Twatutia

The mention of “Twatutia” inevitably conjures up the imagery of New-Year Vendors Avenue, Dihua Street, where multitudes of wholesale merchants and retailers hawk Taiwanese products, produce and bulk commodities. From a bird’s-eye view, one can clearly see the long row houses and the small courtyards that separate the business buildings from the residential ones, which are characteristics distinctive of this neighborhood. Under the influence of urban regeneration, many of the historic townhouses are gradually being converted into modernity. As a result, we consider both the present-day architectural characteristics of Twatutia with the needs of residents and tourists in the design of our model.

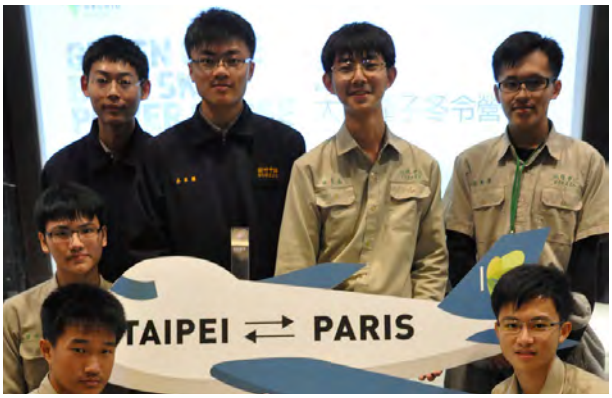


SITE 2 - Minsheng neighborhood

The Minsheng neighborhood is the first example of an American-style neighborhood in Taiwan, with all the necessary community facilities, such as post offices, banks, parking lots, locations for leisure activities, and exercise facilities. There are also residential building apartments ranging from three to five stories high that are shaded by trees. The neighborhood is linked by green bands formed by the two parks, resulting in an atmosphere separate from that of the adjacent main roads such as Minsheng East Road. Pedestrians can feel the calm atmosphere at every corner of this neighborhood.

SITE 3 - Ximending

After surveying the actual location, we offer our own perspective of Ximending: the youth culture is prevalent, there are many abandoned houses, rooftops are of uneven heights, there are quiet spaces for relaxation, etc. With a starting point of "create an aerial space that reflects and contrasts to the Ximending on the ground level," we hope to give new life to the high-lofted "aerial Ximending." We have delineated the region into four regions: "Extreme Challenges," "Art Village," "Mountain City," and "Eye of the Storm."



SITE 4 - Renai Traffic Circle Area

Bustling crowds, busy streets, time is of the essence here. This area is the epitome of Taipei City, with skyscrapers encircling a cluster of buildings 4-5 stories high. The people who live in these buildings, office workers and university students, are also typical of those who live in Taipei City, leading busy lives. And thus our concept was born – the best way to escape from Taipei City.

Sunlight, water, and wind. We hope that our method of "leaving" the city will bring people of the city closer to these natural elements and help them find a healthier and more intimate lifestyle.

SITE 5 - NanJiChang

The regeneration of old houses has roots in the rooftop-NanJiChang
The future of the South Airport apartment complex begins with the rooftop. A greener space; the linking of a community; unobstructed movement. The regeneration of old houses has roots in the rooftop. The future of the South Airport apartment complex begins with the rooftop. A greener space; the linking of a community; unobstructed movement. The regeneration of old houses has roots in the rooftop. Under the advice of the teacher, I was inspired to shape the chaotic ordering of sheet-metal roofs into a structured and aesthetically pleasing wave pattern. After analyzing, we found within the chaotic design of the South Airport complex a common and unifying characteristic.

Orchid House Winter Camp 2014
Sponsors Display

Solar Ambassador

Team Unicode regards education as the most important communication outreach since it directly reached our next generation - the foundation for our future. We held the Winter Camp and recruit the solar seedlings from different high schools in Taipei. We believe that through holding the activity, younger generation will highly enjoy the public events and earn more by sharing their ideas regarding green issue with others.

We select an elite student to compete for the Solar Ambassador position from the winter camp. The winner is Tim Chen, a student from Hsin-Chu High School. He is a 10th grader, who is extremely enthusiastic during the workshop, and speak fluent English. Tim will participate the Solar Decathlon Europe 2014, with scholarship provided by Delta Foundation. During the competition, solar ambassador will visit and record for all solar houses, and share his experience with other students after coming back to Taiwan.

The mission before departure

Tim shows a high interest in the sustainable issue, which he usually does lots of reasearch by himself. In order to comprehend the Orchid House project within 4 months, we highly appreciate Tim to read the project manual and join the discussion with NCTU students. We encourage him to focus on the social awareness, sustainability and urban issue in Taiwan, and these are what Team Unicode want to share with general public.

The mission in Versailles

As a Solar Ambassador, Tim will be the youngest student on site. His mission is to record for all the solar houses, and write the blog or diary to share his experience everyday with others. We will suggest Tim to visit 2 houses per day, and jot down notes while visiting; share or have a discussion with us. To be the ambassador, his interaction with decathlete will be the most valuable lesson.

The mission after Versailles

Tim will share his experience and what he has learnt from being an ambassador with his classmates and general public. He will be invited by Team Unicode to participant in the activities helding for communication.

CommonWealth
16 Apr. 2014

社會與環境 Living

打造十項全能綠建築

交大學生 挑戰太陽能世界盃

交大「改變華人屋頂」的太陽能屋計劃，讓測泰總裁尹衍樑聽了二十分鐘，便掏出了兩千萬元。六月，他們將遠渡凡爾賽宮，代表台灣參加國際建築界奧運，和世界好手較量。

文／周原

156 社會與環境
158 人文反思
166 個人健康
168 新書搶先讀

想像台灣盛產水果，國人自己都吃不到，或開開車聊水果大廳，台灣卻沒參加，但不幸這就是台灣太陽能電池的狀況。

台灣是全球第二大的太陽能電池生產國，去年市佔率達二〇%，僅次於中國大陸，但是，太陽能佔我國發電量不到一%。

而位於二〇一年開始，有國際建築界奧運之稱，強調將太陽能發電融入建築設計的「二十項全能綠色建築競賽」（SDE），就是由歐美國家的頂尖大學舉辦的競賽，例如美國的麻省理工學院、史丹佛大學、哈佛台灣始終缺席。

今年，來自台灣交通大學的「蘭花屋」團隊，希望在法國的凡爾賽宮舉辦這一切，由交通大學人文社會學院院長曾旭正帶隊，成為首次代表台灣參加太陽能的世界盃。

或許，建築所加裝的綠色設備可以減少碳排放，但是，太陽能板的製造過程，卻是高耗能、高污染的產業，要如何解決？

解決未來城市的問題

他們的挑戰包括「十項全能」的評分標準，不只是太陽能板的轉換效率，還包括室內的舒適度和健康度，以及一般民眾對房子的接受度。

參賽團隊要在長達八個賽次的十天內，建造預先構想好的太陽能屋，然後，在接下來的兩星期，向前來參觀的三十萬人發銷自己的作品，最後和其他團隊比較分數。這要求腦力、耐力、和溝通的能力。

還是三月底前台，對參賽的交大同學們為首定，但是建築師、其他十九個團隊它在學參學家、教師與建任的籌能回答這個問題：「人類將如何活在未來的城市？」

台灣經驗 改變亞洲格局

爬上最近的高樓往下看，就能理解，對亞洲國家來說，這是個問題回答的問題。「都市裡有一百萬個屋頂，等於就是一百萬個屋頂，等於就是一百萬個發電廠，這個龐大的學生第地是綠能綠建築，」團隊的以台北市為例，近一半的建築是三十年以上、四到五樓的公寓，這樣的環境造成缺電的問題。民宅給窗打開冷氣，能伸造成缺電的問題。

交大團隊要讓到，要用太陽能造改造台灣的房子，首先要解決這最大的問題，也是台灣的技術。

值得想出的解答是，在屋頂加蓋一「層子」——正好是太陽能電池。

池，裡面是種花等蓄氣，陽光曬在太陽能電池上發電，能降低室內的溫度，冬暖的熱度，前由植物蓄氣組成的「綠層」調節，如此一來，每棟公寓的頂端都有一座能發電和降溫的空中花園，增加住戶能能使用的共享空間。

智慧感應指出，交大團隊這次的產品有地利優勢，因為科技業的產業鏈大多位於新竹，業界重視節能減碳的重要來源。

能源管理，為了讓居住者與產業集團體驗分衍樑，關尊交大「改變華人世界的屋頂」的理想，尹衍樑聽了二十分鐘，便掏出兩千萬元，等於是一半的經費，包括電和台灣科技材料也提供支援與管理和建材方面的協助。

花費半個預算，比賽上每分其次，重點是台灣的太陽能電池，結合建築師的方案，跨出這成軟體影響的第一步。

鄰近的香港、新加坡、印尼等國家的都市樣貌和氣候，都與台灣相似，用台灣的技術，為國內的問題尋找解答，同時也是解決鄰國的問題，這種軟實力的輸出，才是真正的太陽能王國擁有的地位。

EVENT

勾畫城市 綠色天際線

交大蘭花屋團隊 6月攻SDE 2014決賽

2014年農曆春節過後，交大建築研究所即已忙不迭地展開為期三日的「太陽種子冬令營」，這項活動鎖定其名，多校高中學子以城市天際線為共同主題，將台北舊型街廓建築特徵做於歷史建街中，在思辨與協同現況下，展開城市記憶的探索和另一種想像。最活動具有建中、北一女、師大附中、中山女中、中正高中、新竹高中等35位高中生暨團隊賽，針對台灣特有的屋頂加蓋現象，以一種全球在地視野並合平衡今綠能意識的觀點，替台灣尋找新空間方案，發營後共計有5位學子脫穎而出，今年6月將和交大「蘭花屋」團隊遠赴法國，一齊參與2014年歐洲志『十項全能綠色建築競賽』(Solar Decathlon Europe 2014, SDE 2014)。

「太陽種子冬令營」活動，主辦能回歸至交大超海建築計劃——「蘭花屋」(Orchid-House)，這種環保概念屋，其建築原型基於綠帶重建，圍繞屬設等綠色核心，並含有台灣原頂空間的美感覺醒，替都市天際線發聲。2013年由交大建築研究所師生組成的UNICODE團隊，去年12月以「蘭花屋」計劃回應「十項全能綠建築競賽」，這場國際學術賽事共有800組團隊角逐，交大突破重圍後被選入前20強提共計畫，青年國角師曉，交大建築研究所指出，「十項全能綠建築競賽」性質上屬屬學生競賽，但強度都且偏重家研發實力，前2034年時，UNICODE團隊將前往法國凡爾賽宮，在短時間內搭建「蘭花屋」原型，並與他國19強對手，共同開啟競築舞。

十大綠標指標 建築界的奧林匹克

發軔於2002年的「十項全能綠色建築競賽」(The Solar Decathlon Competition)，是一項專屬大專院校生所舉辦競賽，開始設佰公頭一手設計，建造並落實運作一個具有創能與經濟效益的屋子，並使之滿圖建築美感，整個競賽最終宏旨，在於讓參與學子和大眾瞭解，綠色能源產品及其設計方案，確實存在節約與低環境衝擊的優點；其次，向大眾證明，由環保建築工法，可將生態源系統所共同營造的住家。在今日已經證可行，最後期是提供學生實際課練，成為日後國家需學能源的資產者。

根據Solar Decathlon官網所載，最得青睞的條佰，住宅整體性必須整合下述特徵，包括：第一，新建築必須美觀，可負擔以及擁有便利自在的生活機能性；第二，可維持舒適與健康的室內環境；第三，呈以提供餘裕能源，作為每個家戶烹飪、洗滌清潔和娛樂所用；第四，能供應適足的熱水；第五，一個家庭單位下，其能源生產遠多於消耗，為了評加權競賽實作品是否達到水準門檻，能源風或標建築界的奧林匹克「十項全能」競賽項目，從健康、市場性、工程、情感溝通、經濟可負擔性、舒適感、熱水供應、家用電器，居家娛樂性以及能源平衡十個項目，逐一進行積分評比。

2014年國賽將於6月27日至7月14日法國巴黎凡爾賽宮花園的永續村（The Sustainable City Village）舉行，為國家與歐洲盃的「十項全能綠色建築競賽」是來自學術界對未來社會議題的回應，並將問題預向研發，迄今已有152 個大學團隊參與此一跨領域之永續綠能住宅原型之研發，該項競賽未來將持續性的建立並發展永續教育的方略，擴張，計劃與團隊，已經影響直接參與的數以千計學生，間接影響力已擴及全球，目前累計已有17,000個大學／產學人次投入。

LaVie, Magazine
05 Apr. 2014

02

交大綠能蘭花屋計畫

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ARCHITECTURE

Orchid House concept inspired by Taiwan's greenhouse technologies

By Nick Lavars
March 17, 2014

2 Comments
12 Pictures

The design of the Orchid House was inspired by Taiwan's innovative greenhouse technologies uses to cultivate the Orchid flower

Image Gallery (12 images)

In high-density areas like the Taiwanese capital of Taipei, people have long looked to expand vertically to make use of the limited land, resulting in a lack of vegetation, high humidity and high energy usage. According to Unicode, a team of Taiwanese architects and designers, 50 percent of the county's housing constructions are either common multiple-story rowhouses or larger duplex apartment buildings, many of which have illegal makeshift shelters on their rooftops to provide extra living space. Unicode has developed a concept house which would give these shelters a greenhouse-inspired makeover, shifting reliance to renewable energy sources and improving Taipei's sustainability in the process.

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The Orchid House design is inspired by the Taiwan's avant-garde greenhouse technologies that saw the prized Orchid flower develop into a mass-market commodity. The team says that integrating the technologies that already exist in an industrialized market will keep construction costs low and the housing more affordable.

The energy system is founded on a system where the leaves of the plant create dewdrops, the roots absorb water to be circulated through the stems and the leaves perform photosynthesis, creating a cycle of water and energy supplied to the entire plant.

Custom-made photovoltaic panels sit atop the roof to absorb sunlight, with the energy then converted to heat via a solar thermal water device, creating a hot water system that flows underneath to radiate warmth from below the floor.

In the summertime, louvers are opened to let air filter through a smaller water tank causing an evaporative effect, with the cooler air then circulating the house before being drawn outside by silent fans on the opposite side.

The west side of the house is lined with a 30 cm (11.8 in) thick wall filled with 6-liter (1.58 US gal) water-filled bottles made from recyclable polyethylene terephthalate (PET). The team says that this thermal wall is vital for the building to store heat for the winter months, while rejecting warmth during the summer.

The east side of the house features swinging doors which open up to a shade-filled decking and allow extra air flow through the home.

In terms of the layout, the team have figured in their plans space for a bathroom, kitchen, living room, work station, bedroom, terrace space and a "Green Core." The core is walled with vegetation to assist with cooling in the summer and encloses a staircase leading up to a mezzanine. Outside is a a terrace space with planting areas that are integrated into the water system and sustained via drip irrigation.

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The team claims that the Orchid House concept has the potential to generate 987 gigawatt-hours (GWh) of energy per year. It also says that 20,448 tons of rainwater will be collected each year, reducing the burden on sewerage systems, keeping the houses cool and watering vegetation which will help to alleviate heat in the city.

In addition to the impact the Orchid House could have with regards to sustainability, Unicode says that its overarching objective is to revamp the social housing system in Taiwan and create low-cost housing options for disadvantaged groups. It anticipates that if the Orchid House design were to be implemented, it would drive the percentage of social housing in Taipei from where it currently sits at 0.64 percent, up to 12.71 percent.

Team Unicode will be showcasing the concept at the Solar Decathlon Europe 2014 in Versailles in June and July. Following the competition, the team will submit the Orchid House as a proposal to the Ministry of the Interior of Taiwan.

You can hear an explanation of the concept in the video below.

Source: Orchid House

The Liberty Times
8 Feb. 2014

2014年2月20日

自由時報 電子報
The Liberty Times

交大綠能蘭花屋 前進凡爾賽宮 (2014-2-8)

〔記者陳怡靜／台北報導〕台灣綠能屋前進法國凡爾賽宮！交通大學建築所師生組成UNICODE團隊，入圍「Solar Decathlon Europe」，ＳＤＥ（十項全能綠建築競賽），六月將在法國凡爾賽宮花園中打造「蘭花屋」，交大也是華人圈大學唯一入圍者。

交大師生6月底將於法國凡爾賽宮打造概念屋「蘭花屋」。（交大提供）

華人圈唯一入圍大學

首屆ＳＤＥ於二○○二年在美國華盛頓特區國家廣場舉辦以來，全球已有一百五十二個大學參與這項永續綠能住宅原型研發賽，包括麻省理工學院、史丹佛大學等頂尖大學。今年有十九國、二十個團隊入圍，將於六月底挑戰十天搭建綠能屋。

交大UNICODE團隊計畫打造地坪五十坪、兩層樓、可快速組裝的綠能「蘭花屋」。以太陽能板做為屋頂，西曬牆面採用含水寶特瓶組成的「蓄熱牆」，可有效調節屋內外的溫度，做到「冬暖夏涼」或「日涼夜暖」。

盼解決頂樓加蓋問題

交大建築所學生吳雅婷說，台灣許多建築物頂樓有高溫與漏水等問題，加蓋情形普遍，但實在不美觀，團隊希望以蘭花屋解決頂樓加蓋問題。

蘭花屋設計概念來自蘭花生存環境的溫濕度都適合人居住，並根據台灣在地環境設計，採用輕鋼架與太陽能整合系統，以可組式結構板牆取代隔間，讓房屋可快速組裝，並如蘭花依附在其他植物般、依附在原本建築物上。

蘭花屋擁有好比心臟的「綠核（Green Core）」，團隊以蘭花與其他植物栽植成直立於室內的「綠核」，可以調節室內溫度並提升空氣品質。計畫經費約五千萬到六千萬元，潤泰集團總裁尹衍樑與台達電董事長鄭崇華等人將贊助。

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交通大學建築所師生組成UNICODE團隊，以「蘭花屋計畫」參賽，領先全台百度入選參加具有國際級國家研發實力的建築奧運賽—「十項全能綠建築競賽」，今年6月底在法國凡爾賽宮花園裡舉行，將以10天時間蓋出一棟未來概念屋，和來自全球的20個學生團隊爭奪桂冠。

交大表示，「十項全能綠建築競賽」由美國能源總署推動，2002年首次在美國舉行，該比賽已成為世界第一流大學與研發團隊，展現其前瞻的研發能力並落實與社會接軌的指標性競賽型博覽會，交大在全球800餘名學生中脫穎而出，將有來自17個國家、20個團隊參加6月底在法國巴黎凡爾賽宮花園裡舉行的決賽。

團隊成員之一的吳雅婷說，蘭花屋造價超過5000萬元，還好有企業支持，才得以實現，該建築以太陽能板作為屋頂，最大特色是屋內以蘭花和其他植物栽植而成的「綠核」，也就是蘭花屋的心臟，可以調節調節室內溫度、提昇室內空氣品質，蘭花屋也設計自動澆灌系統，可蒐集雨水澆灌植物，解決台灣夏季降雨密集的排水問題。（許敏溶／台北報導）

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Taipei Times
8 Feb. 2014

2014年2月20日 Taipei Times

TAIPEI TIMES

‘Orchid house’ vies for award

WINNING DESIGN? : The prototype includes rooftop solar panels, a ‘Green Core,’ which is composed of orchids regulating temperature, and an automatic watering system

By Lee I-chia / Staff reporter
Sat, Feb 08, 2014 - Page 3

A squad from National Chiao Tung University (NCTU) has become the first Taiwanese team to be selected for the Solar Decathlon Europe (SDE) competition with its Solar Decathlon-Orchid House — an ecological prototype house that incorporates progressive greenhouse technology in the cultivation of Taiwanese orchids.

The Solar Decathlon is an international competition, first held by the US Department of Energy in 2002, which challenges collegiate teams to design, build and operate solar-powered houses that are cost-effective, energy-efficient and attractive.

After a memorandum of understanding was signed between the US and Spain, the SDE was established in 2007.

Judges will be looking for the winning team to best blend affordability, consumer appeal and design excellence with optimal energy production and maximum efficiency over the course of the competition’s 10 contests.

At a press conference held by the NCTU in Taipei yesterday, the school said its UNICODE Lab, consisting of professors and students in architecture, engineering, science, design, management and several other disciplines, was selected in December last year out of a pool of many teams from around the world to compete at the SDE this summer.

The school said the team plans to set off to Versailles, France, where the competition is held this year, in late June to compete among 20 teams from 17 countries.

The team’s task is to rebuild the solar house within 10 days.

Team member Wu Ya-ting (吳雅婷), a student at NCTU’s Graduate Institute of Architecture, said because the living space in densely populated metropolitan areas is often limited, rooftop additions are a popular scene in Taiwan, and the team hopes to redefine Taiwan’s city skyline with its new design.

Wu said the orchid is an important Taiwanese export crop, for which a high-tech cultivation method is used, which made it appropriate to be feature as the theme for the team’s Solar Decathlon-Orchid House.

Wu added that the house uses rooftop solar panels, but its best feature is its “Green Core” —

http://www.taipeitimes.com/News/taiwan/print/2014/02/08/2003583028 1/2

ChinTimes
8 Feb. 2014

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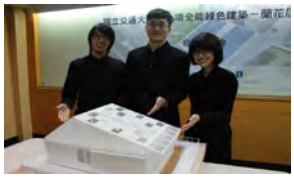

由30位交大學生組成的「UNICODE」團隊，以「台灣蘭花」為設計主軸，打造出一棟漂亮、工法簡單、材料在地化，又能代替鐵皮屋功能的「綠能蘭花屋」（photo by 交通大學、邱惠恩/台灣醒報）

【台灣醒報記者邱惠恩台北報導】台灣常見的鐵皮屋將走進歷史了！由30位交大學生組成的「UNICODE」團隊，以「台灣蘭花」為設計主軸，打造出一棟漂亮、工法簡單、材料在地化，又能代替鐵皮屋功能的「綠能蘭花屋」，成為東南亞華人圈第一個拿到「十項全能綠色建築競賽」入圍門票的國家，「綠能蘭花屋」將於今年6月蓋在法國凡爾賽宮花園。

為了隔熱與防漏水，台灣幾乎隨處可見以鐵皮屋加蓋的現象，這也成為台灣特有的都市屋頂奇觀。但造價便宜的鐵皮屋卻也帶來冬冷夏熱、不符環保的問題。交通大學人文社會學院院長曾成德，率領30位交大學組成的「UNICODE」團隊，以「台灣蘭花」為設計發想，打造出兼顧美學及功能性的「綠能蘭花屋」。

「我們想解決鐵皮屋這個必要之惡的屋頂亂象，並帶來一種『新都市天際線』。」「綠能蘭花屋」可代替蓋在舊建築屋頂上的鐵皮屋，利用綠色植物與蘭花達到空間的美感，並兼具調節室內溫度、進行室內外換氣，再利用回收水資源來澆灌植物。

為了進一步達到「綠」建築的需求，利用回收鋼鐵、環保木材、裝水的寶特瓶作為材料的蓄熱牆等方式，達到減少建築碳足跡，「UNICODE」團隊表示，最熱的西曬面，室內外溫差可達2到3度溫度。太陽能板也可以「租用」或「電價回饋」等方式降低成本。

除了綠建築考量外，設計團隊指出，希望將「綠能蘭花屋」，進一步推廣成「社會住宅」、「老宅再生」，

China Times
7 Feb. 2014

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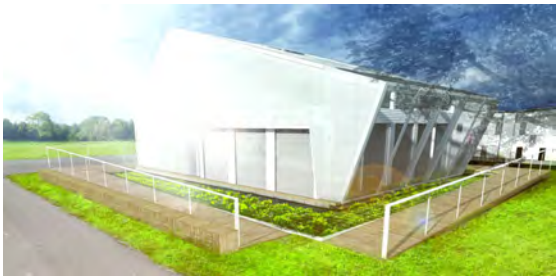
推銷綠建築 蘭花屋將赴法參賽

廖政貿 (/author/liao)　2014/02/09 19:16　點閱 784 次



交通大學的能源屋計畫即將到法國參與世界綠色建築大賽，新竹高中學生陳彥廷將陪同觀摩。（photo by廖政貿/台灣醒報）

【台灣醒報記者廖政貿台北報導】交通大學即將到法國參與世界綠色建築大賽！台達電子文教基金會與交通大學合辦的「太陽種子冬令營」成果發表，新竹高中學生陳彥廷獲選與交大團隊一同至法國參與競賽。交大能源屋計畫成員曾聖凱表示，本次競賽機會十分難得，他們會透過綠色建築把屬於台灣的意象帶出去。

台達電子文教基金會與交通大學合辦的「太陽種子冬令營」9日舉辦成果發表，有來自全國6所高中共計35名高中生參與他們透過分組競賽，對台灣的城市建築與環境問題提出意見，並實際設計出相關的改革方案。這次活動也將選出一名學生，和交大能源屋團隊一同至法國凡爾賽宮參與「2014十

udn e-news
9 Feb. 2014 / 10 Feb. 2014

2014年2月20日　太陽種子冬令營 推廣環境意識與綠能教育 | 生活 | 即時新聞 | 聯合新聞網

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太陽種子冬令營 推廣環境意識與綠能教育

【聯合報系攝影中心／記者林伯東／即時報導】　2014.02.09 03:51 pm

台達電子文教基金會與交通大學合辦「太陽種子冬令營」，推廣環境意識與綠能教育，吸引來自建中、北一女、師大附中、中山女中、中正高中、新竹高中等35位優秀高中生參與。圖為中山女中學生與她們製作的模型。

記者林伯東／攝影　分享

【2014/02/09 聯合報系攝影中心】 ◎ http://udn.com/

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2014年2月20日　udn文教職考 - 校園榜單物

聯合新聞網 校園博覽會

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打造空中西門町 竹中生奪冠

【聯合報／記者陳皓嬌／台北報導】

如果西門町有空中花園，會是什麼樣子？一群過去從未去過西門町的新竹中學學生，打造出充滿創意的空中西門町，驚豔評審，奪得都市屋頂改造競賽冠軍。團隊成員之一陳彥廷更獲選為能源教育親善大使，將赴法觀摩歐洲「十項全能綠色建築競賽」。

台達電子文教基金會與交大合辦「太陽種子冬令營」，新竹高中獲選為最佳團隊，成員陳彥廷（右一）更獲選為「能源教育青年大使」，將赴法觀摩「十項全能綠色建築競賽」。 記者林伯東／攝影

台達電文教基金會和交通大學日前合辦「太陽種子冬令營」，讓高中生以實驗、和建築專家討論，以屋頂上的100種生活為題，打造台灣節能屋頂。

竹中團隊實地觀察西門町，發現該區一樓都是商店，但二樓及以上的樓層多處於廢棄狀態，未加利用。於是創意發想，要用天橋將各棟的屋頂串連起來，設環狀空中步道，民眾可以散步、騎腳踏車，步道上還有發電裝置，人車踩踏時就能發電。

街區東北角規畫為青少年活動專區，可在屋頂上玩極限運動、練街舞，還有大片可追趕跑跳的草地和露天電影院。

西北角的老舊大樓被打通，作為文創中心，藝術家、刺青師們擁有自己的工作室，屋頂除裝有太陽能板供電，更有空中農園，可種植作物，樓頂則是種植景觀植物的梯田。

陳彥廷是設計團隊的靈魂人物，他還因外語、表達能力佳，想法清晰且環境意識突出，被選為能源教育親善大使，去凡爾賽宮觀摩國際比賽。

陳彥廷說，他很喜歡具實用性的設計，對生活事物也常有許多設計想法，「像竹中的制服外套型垮易髒，就可重新設計。」

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Delta Foundation News
23 Dec. 2013

2014年2月20日 低碳生活部落格: 當頂樓加蓋 成綠建築符碼

低碳生活部落格

2013年12月23日星期一

當頂樓加蓋 成綠建築符碼

這座企圖改寫台灣頂樓加蓋史的綠建築小屋，除了屋頂採用太陽能發電、整棟建築可協助吸納極端化的降雨外，也透過植物來調節室內的溫度與空氣品質。

文／張簡敬仕(台灣電子文教基金會副執行長，本文原刊於12月22日聯合報元氣周報)

圖／交大能源屋的模型(更多相片請見網誌貼文)

頂樓加蓋，早已是台灣存在已久的世代文化，其實不需要官員機，只消給住戶稍住下就能看見，台灣城市的頂樓風景，幾乎都是各色違法搭建的鐵皮屋頂。

這些加蓋在老舊公寓上的眾多建築，大部份除了解決住戶額外增加空間外，更已侵犯到全棟住戶使用屋頂的權利。然而，或許是為了因應此問題，更是因為政府對於違建拆除的態度，有愈來愈不積極的趨勢，甚至把政府拆除違建的預算刪到剩下一千元，地方政府即便想執法，都早已無能為力。

就地合法的呼聲，在近乎年年有選舉的台灣，當然沒有新鮮，有關鄰避情結的地方設施，這一兩年搭著能源的風潮，利用太陽能的設備發電與節能減碳的理由，一方面放寬規定，讓頂有太陽能板的頂樓建物，在符合此項以內免計入建築物高度；另外還提行業者提供最高，只要把頂樓加蓋建物的牆面去除，屋頂還建原可孤身一變，成為可合法生財的太陽能機，一樣二樣地在海台灣地處地開了起來。

然而，對於經常被用於出租的加蓋頂樓，較為便宜的租金，其實解決了許多社會弱勢人居住的需求，因此，除了讓屋頂發電以外，若能讓加蓋的頂樓，不但能成為遮陽綠建築的示範地域，還能把屋頂的公共性帶回來，成為出租不實的青年住宅，如此一來，則包括屋頂私有化，都市熱島效應加劇，零星城市綠地成生態孤島的問題，或許都能即時被解決。

這樣的想像，正是「交大能源屋計劃」團隊所試圖解決的問題。該團隊目前進駐交通大學建築所所長，交大建築所所內也有許多社會企業支持，成立了一個研究當前環境問題與未來生活的實驗工廠，就叫 LAB (實驗室)。學生除了一般學校的上課程之外，必須直接面對實際問題，找出實際能夠執行的方案。「交大能源設計劃」團隊的學生在這裡不斷地設計提案經建立了三個核心思想：如何以綠色環境作為核心(Green Core)、推廣屋頂的天際線(Blue Sky)、提能源概念為一般社會引導(Power House)，透過團隊的設想，讓那市再生，對台灣社會帶來改善的力量。而學生所思考的課題正是：如何面對台灣都市特有困境以面現象，設法讓都市從實際生活的未來能夠實現。

如今，這個兼具理想與務實的設計，打入了明年在法國舉行的歐洲設立建能源十項全能建築競賽決賽「2014 Solar Decathlon Europe」。交大的團隊將在夏至前後，由交大校長吳妍華博士與人文社會學院院長曾成德領軍，將他們的概念實際蓋成一棟小屋，搭建在巴黎凡爾賽宮前的廣場，與其他來自於全球各十個國家以上組成的十九所頂尖大學團隊所設計的綠建築，一決雌雄。

Edited by DELTA 台達

「低碳生活部落格」是由台達電子基金會所編輯，目的在提供讀者生活上可行的減碳方案，讓讀者在不影響日常生活作徵收革命的前提下，也能節省減碳的目標前進。

部落格主編：阿能

http://lowestc.blogspot.tw/2013/12/blog-post_23.html 1/3

udn e-news
25 Jan. 2014

2014年2月20日 udn聯讀藝文 - 建築

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天際一抹綠 頂樓加蓋變能源屋

【聯合報／記者陳宛茜／台北報導】

布滿違章建築的屋頂，是台灣令人搖頭的城市風景；房價太高造成年輕人無法進駐市中心，則是影響台灣城市創造力的關鍵問題。建築師龔書章帶領交大建築所學生設計「交大能源屋」，計畫以綠建築取代屋頂違章建築，並成為青年住宅。

龔書章曾獲遠東建築獎，在建築界十多年後轉戰學界，出任交大建築研究所所長。他與交大人文社會學院院長曾成德以多年實務經驗，協助學生發想設計「交大能源屋」，企圖一次解決台灣都市景觀與居住問題。

交大建築所學生設計「能源屋」，計畫以其取代屋頂上的違章建築，並成為青年住宅。 圖／交大建築所提供非報系

紐約、柏林、東京等大城近年掀起「屋頂運動」，改造高樓屋頂成為公園或綠色能源中心，打造「綠色天際線」。這波屋頂運動促使龔書章思索「台灣新的屋頂風景是什麼？」

龔書章指出，台灣的頂樓加蓋歷史悠久，這些違章建築多以低廉租金租給學生或社會新鮮人，「可不可能轉型為青年住宅？」許多老房子拆除的原因是缺少節能設施，「可不可以在屋頂加蓋能源屋補足？」在交大師生的靈感激盪之下，誕生「交大能源屋」。

「交大能源屋」基地設定為城市中四到七層的老公寓屋頂，屋內空間一半做為綠能機電空間，讓底下的老房子不必拆除，便能蛻變成「綠色住宅」。其設計核心類似溫室，透過植物來調節室內溫度與空氣品質，減緩熱島效應。

能源屋另一半做青年住宅，只租不賣。龔書章說，年輕人以便宜房租進駐，但須負管理責任，使其成為居民休閒交流、種花種菜的公共空間。

「交大能源屋」構想大膽，卻非紙上談兵。該計畫已獲台達電等企業贊助經費，七月將先到巴黎凡爾賽宮廣場展出成品，參加「歐洲歪永續能源十項全能建築競賽決賽」，與十九所全球頂尖大學團隊所設計的綠建築競賽。

龔書章說，「交大能源屋」返國後，他們將設定「三年計畫」。先與北市府合作，找到一兩處老城區的屋頂改造，成為二〇一六年台北做為「世界設計之都」的創意風景，再推展至全台。他估算，全台符合能源屋基地條件的老房子，若皆能在屋頂加蓋一間能源屋，將使社會

http://mag.udn.com/mag/reading/printpage.jsp?f_ART_ID=496473 1/2

CDNews
7 Feb. 2014

2014年2月20日 中央日報網路報-教育藝文

中央日報 網路報 www.CDNEWS.com.tw

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交大綠能蘭花屋 前進凡爾賽宮

【中央網路報】

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China Times
7 Feb. 2014

2014年2月20日 交大師生 將在凡爾賽宮前蓋蘭花屋 - 中時電子報

交大師生 將在凡爾賽宮前蓋蘭花屋

2014年02月07日 12:29

記者會前，團隊成員曾聖凱（左）向台達電榮譽董事長鄭崇華（右）介紹交大蘭花屋的建造理念。（劉宗龍攝）

http://www.chinatimes.com/realtimenews/20140207003021-260412 1/3

NCTU Newspaper
April 2013

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交大人文通訊

APRIL 2013 第六期

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主編 | 人文社會學院 葉宇修 副院長
副編 | 圖書館．吳金忠

交通大學建築研究所入圍 Solar Decathlon Europe 國際太陽能建築決賽，2014 年將赴凡爾賽為校爭光

人社院訊

人社三館新建工程重新招標

人社三館新建工程工程(資格標)已於 102 年 3 月 28 日第一次開標，投標廠商僅有一家，因未達三家所以流標。學校已於 3 月 28 日重新上網公告，工程(資格標)預計於 102 年 4 月 16 日第二次開標。

院長遴選委員會籌組事項

本院郭良文院長任期將於 102 年 12 月 31 日屆滿，為籌組院長遴選委員會，已於 3 月 21 日推選八名院內委員，分別為傅播所李秀珠教授、教育所周倩教授、英教所葉修文教授、外文系劉辰生教授、社文所劉紀蕙教授、音樂所李子聲副教授、應藝所陳一平副教授及建築所龔書章副教授。另 3 月 29 日校長已簽示意見，由林副校長擔任主任委員，並預訂聘請本校蔡文祥教授、張維安教授及中研院語言所曾志朗院士、民族所黃樹民院士擔任院外委員。後續本院將儘快連絡委員，以召開院長遴選委員會，進行院長遴選作業。

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【建築所】恭喜交大建築所及跨領域團隊入選 Solar Decathlon Europe 決賽

交大建築所及校內跨領域團隊 NCTU Team Unicode 於 Solar Decathlon Europe 2014 與世界各大學角逐競賽，本賽事共有 44 個隊伍提出參賽計畫書，最後篩選出 20 個隊伍入選，包含瑞士、西班牙、日本、法國等參賽國家及學校，交大的建築所跨領域團隊也在其中取得了參賽權。

Solar Decathlon 首次於 2002 年自美國首府華盛頓特區的國家廣場 (National Mall) 前舉辦。“十項全[能]” Solar Decathlon 由美國能源總署推動，研發新世紀永續社會之智慧生活環境與居住實驗方案，是參賽大學展現其前瞻研發能力並落實與社會接軌的指標性競賽型博覽會，目標為設計並建造出高度能源效率的全太陽能住屋，並考量實際應用。

本屆 Solar Decathlon Europe 決賽將於 2014 年 6/7 月間假法國巴黎塞浮宮前舉行，目前已由校長帶領建築所曾成德教授向尹衍樑董事長募款兩千萬元以補助團隊為校爭光。

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Taiwan Today
8 Nov. 2013

Maisons solaires : une équipe taiwanaise sur la ligne de départ du Solar Decathlon Europe

Zeng Cheng-de (à d.) et un étudiant de la NTCU posent devant la maquette du projet taiwanais de maison solaire.
CNA

Vendredi 8 novembre 2013

Une équipe taiwanaise de l'Université nationale Chiao Tung (NTCU) participera du 28 juin au 15 juillet 2014 à la compétition internationale Solar Decathlon Europe 2014 qui se tiendra à Versailles, en France. Ce prestigieux concours universitaire, placé sous l'égide de l'Etat français, mettra en compétition 20 équipes d'étudiants venus du monde entier, autour d'un défi : concevoir et construire une maison solaire autonome en énergie.

Annoncée l'an dernier, la sélection comprend des équipes originaires de 16 pays dont la France, les Pays-Bas, l'Inde, l'Allemagne, l'Espagne, le Japon et le Mexique. L'échéance arrive à grands pas et une délégation de la NTCU, menée par le professeur Zeng Cheng-de [曾成德], a participé cette semaine à un atelier de présentation des maquettes des projets à la Cité de l'architecture, à Paris, en présence de

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Dinner Party Menu

6.0 Introduction

Chinese cuisine is widely seen as showing happy atmosphere and richest cultural heritage in the world. It means family/friends can gather together to enjoy the dining time. Thus, team Unicode wants to bring the relaxing dining time and share the experience to other team members.

At the Orchid House, we would like to bring our guests an unforgettable and spectacular dinner, Taiwanese style. Taiwan is a country of food, we hope our guests can enjoy not only food, but the special drinks which make Taiwanese cuisine known in the world.

Gaoliang

Botargo (Mullet Roe)

Chinese Seasoned Spinach Salad

To welcome our guests, we begin with a toast to a more sustainable future, with Taiwan made special Gaoliang Liquor, which is often drunk during celebration. The cook then takes the liquor and start making the welcoming appetizer right in front of the guests, which is *Botargo (Mullet Roe).* Dry Botargo is best soaked in Gaoliang for a minute then put in the pan to cook with slow heat, until it is golden brown. The delicate texture of Botargo is tangy and soft. While our guests is enjoying the food, friendly host would give an introduction of Orchid House and Team Unicode.

After the welcoming, the guests whould be lead to the tea table in semi-outdoor area, where the guests would learn to make dumplings in a traditional way. Guests would also be very welcome to create their own style of dumplings.

How to make dumplings by hands

Chinese Style Steamed Fish

Chinese Pork Belly

To start the meal, we would invite our guest to be sitted inside. For starters, which is Seasoned Spinach with Botargo Salad Roll. The main course would be the Chinese Style Steamed Fish or Chinese Pork Belly (Depands on the date of dinner party), which are both Asian flavored dish, specially prepared with the freshest ingredients.

Our 3rd course is the famous Pork Cabbage Dumpling, which is cooked just after hand-filling and served right away. Guests could enjoy their self-produced dumplings (if they sucessfully survive the boiling water). We would also prepare traditional dipping for add flavor. The dish is simple, but it sure will leave a great impression to our guests.

Hand-made Dumplings side with Dipping

Shampignon Stew Rice

For Main staple food, we would serve Shampignon (Agaricus blazei) Stew Rice. Shampignon is a special kind of mushroom grown in highly controlled environment, and it is one of the most innovative agriculture produce nowadays. Instead of cutting trees to grew mushroom, Shampignon can be planted in a shredded wood chips in a controlled environment. It represents the mushroom from absorbing any type of pollution, making it a healthier food product. It is full of fragrance, which make it perfect to go with rice and with other ingredients.

We also serve Shampignon Cashew Chicken Soup and alternitve Shampignon Bamboo shoot Chicken Soup.

Shampignon Cashew Chicken Soup

Shampignon Bamboo shoot Chicken Soup

Winter Melon Punch

Finally, we bring the sweet Tofu Pudding (or Aiyu Jelly) to satisfy the taste pallet of everyone. It often decorates with flower petal, and this time, we will use the beautiful orchid petal on the plate. It does not only tastes great, it is visually pleasing, too.

To conclude our dinner party, we would like to invite our guests to the Tea terrace. In Taiwan, families and friends often enjoy tea and chitchat after dinner. Our guests will enjoy the Taiwanese high mountain tea and have a relaxing time. Taiwanese is also famous for our hospitalities, and we never let our guests go home empty handed. Thus, guests can go home with a box of pineapple cake to share with their friends.

Sweet Tofu Pudding

Aiyu Jelly

Taiwanese Tea

6.1.0 Name of courses and drinks

ORCHID HOUSE

Dinner Party Menu specially for SDE 2014
Meal A

Salad & Starter
Seasoned Spinach with Botargo Salad Roll

Main course
Chinese Style Steamed Fish
Pork Cabbage Dumpling

Main staple food
Shampignon Stew Rice

Soup
Shampignon Cashew Chicken Soup

Dessert
Sweet Tofu Pudding with Traditional Syrup

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Beverages

Soft
Winter Melon Punch

Alcoholics
Kaoliang
Taiwan Beer
Taiwan Fruit Beer

ORCHID HOUSE

Dinner Party Menu specially for SDE 2014
Meal B

Salad & Starter
Seasoned Spinach with Botargo Salad Roll

Main course
Chinese Pork Belly
Pork Cabbage Dumpling

Main staple food
Vegetable Stew Rice top with Shampignon

Soup
Shampignon Bamboo shoot Chicken Soup

Dessert
Aiyu Jelly

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Beverages

Soft
Winter Melon Punch

Alcoholics
Kaoliang
Taiwan Beer
Taiwan Fruit Beer

6.2.0 List of ingredients and quantities per course (Eight serving)

6.2.1 Salad & Starter

Course	Ingredients	Quantities
Seasoned Spinach salad	Spinach	1 pound
	Garlic	2 cloves
	Salt	1 Teaspoon
	Sesame oil	2 Teaspoons
	Soba sauce (soy sauce)	1 Tbsp
	White sesame seed	1 Tbsp
Botargo salad roll	Dry Botargo (grey mullet roe)	2 slices
	Michiu (rice wine)	5 Tbsp
	White radish	1/2 pound
	Green garlic	1/4 pound
	Cucumber	1/2 pound
	Mayonnaise	1 Tbsp
	Egg	4 eggs
	sugar	1/2 Tbsp
	Cooking oil	2 Tbsp

6.2.2 Main course

Course	Ingredients	Quantities
Chinese Style Steamed fish	Halibut Fillet	4 Ounce
	Green Onions	2 Stalks
	Ginger Root	2 inch Piece
	Thai Chilies	1/4 Teaspoon
	Soy Sauce	2 Tbsps
	Drinking water	2 Tbsps
	Sesame Oil	1/8 Teaspoon
	Cooking Oil	1 Tbsp

Course	Ingredients	Quantities
Chinese Pork Belly	raw pork belly	1-1/4 pounds
	vegetable oil	1/4 cup
	soy sauce	1/3 cup
	dark soy sauce	1/3 cup
	Michiu (rice wine)	2/3 cup
	Chinese rock sugar	5 ozs
	fresh ginger (peeled and grated)	1 tbsp
	sliced spring onions	10 slices

Course	Ingredients	Quantities
Dumpling filling	Finely Ground pork	1 pound
	Cabbage	1 pound
	Fresh grated ginger	1 Tbsp
	scallions	2 stalks
	Drinking water	2 Tbsps
	soy sauce	4 Tbsps
	Michiu (rice wine)	1 Tbsp
	sesame oil	2 teaspoons
	salt	1 teaspoon
	Pepper	Pinches
Dipping sauce	soy sauce	3 tablespoons
	Chinese black vinegar	1 teaspoon
	sesame oil	1 teaspoon
	Chinese hot pepper oil	1 teaspoon
Dumpling wrappers		1 package

6.2.3 Main staple food

Course	Ingredients	Quantities
Shampignon (Agaricus blazei) Stew Rice	Shampignon mushroom(Agaricus blazei)	1 pound
	Rice	4 cups
	Water	2 cups
	Broth	2 cups
	Olive oil	2 teaspoons

Course	Ingredients	Quantities
Vegetable Stew Rice top with Shampignon (Agaricus blazei)	Shampignon mushroom(Agaricus blazei)	1/4 pound
	Pok coy (cruciferous)	2 pounds
	Taiwanese sausage	1 pound
	Rice	4 cups
	Water	2 cups
	Broth	2 cups
	Olive oil	2 teaspoons

6.2.4 Soup

Course	Ingredients	Quantities
Shampignon (Agaricus blazei) Cashew Chicken Soup	Chopped Chicken leg	2-3 Pounds
	Dry Shampignon (Agaricus blazei)	1 pound
	Cashew nuts	1/4 pound
	Ginger	5 slices
	Chinese jujube	1/4 pound
	Michiu (rice wine)	1 Tbsp
	Salt	1 Tbsp

Course	Ingredients	Quantities
Shampignon (Agaricus blazei) Bamboo shoot Chicken Soup	Chopped Chicken leg	2-3 Pounds
	Dry Shampignon (Agaricus blazei)	1 pound
	Bamboo shoot	1 1/2 pound
	Ginger	5 slices
	Chinese jujube	1/4 pound
	Michiu (rice wine)	1 Tbsp
	Salt	1 Tbsp

6.2.5 Dessert and Soft beverage

Course	Ingredients	Quantities
Sweet tofu pudding with traditional syrup	Soy milk (non-sugar)	8 cups
	Agar powder	10 g
	Blackstrap molasses	3 Tbsps
	Drinking water	1 cups

Course	Ingredients	Quantities
Aiyu Jelly	Aiyu seed	1 1/2 pound
	Lemonade	1 cup
	Sugar	5 Tbsps
	Drinking water	10 cups

Course	Ingredients	Quantities
Winter Melon punch	Winter melon sugar	2 pound
	Drinking water	15 cups
	Green lemonade	2 cups
	Sliced lemon	8 slices

6.3.0 Food preparation

6.3.1 Salad & Starter

Seasoned Spinach with Botargo Salad Roll

PREP	15 mins	**Pot in use**	16 mins
COOK	16 mins	**Pan in use**	0 min
READY IN	35 mins		

PREP	20 mins	**Pot in use**	0 mins
COOK	3 mins	**Pan in use**	15 mins
READY IN	23 mins		

Instructions:
A. Seasoned Spinach salad
1. Blanch the spinach in boiling water (3 cups) for 30 seconds.
2. Remove spinach quickly and rinse in cold water.
3. Gently squeeze the spinach to remove excess water.
4. Combine soy sauce, sesame oil, seeds, salt, garlic, and sugar and mix into spinach.

B. Botargo salad roll
1. Soak botargo in michiu for 10 minutes per face and remove the skin of botargo
2. Slice botargo and saute each face for 15 seconds.
3. Mix eggs and sugar, then add oil in hot pan.
4. Add 1/4 egg mixture in pan to make roll wrappers.
5. Roll up botargo, chopped White radish, Green garlic, cucumber and Mayonnaise with egg wrappers.
6. Cut the roll in proper size.

6.3.2 Main course

Chinese Style Steamed fish

PREP	20 mins	**Pot in use**	20 mins
COOK	15 mins	**Pan in use**	5 mins
READY IN	35 mins		

Instructions:
1. Take the green onions and ginger and julienne into 2-3 inch strips.
2. Place a few pieces of green onion on a heat safe plate and put the fish fillet on top of the onions and lay the ginger out on top of the fish fillet.
3. Heat up a pot filled with 2 cups of water and place a steamer rack. Put the fish with plate when the water is boiling.
4. Steam 5 minutes make the fish looks opaque and flakey.
5. Mix up soy sauce and water.

6. Heat up cooking oil and add in sauce mixture and sesame oil.
7. Remove the ginger on top of the cooked fish. Put the remaining green onions and chilies on top of the fillet.
8. Pour the boiling sauce over.

Chinese Pork Belly (Stir-fried Pork)

PREP	20 mins	**Pot in use**	50 mins
			30 on stove
			20 off stove
COOK	50 mins	**Pan in use**	0 min
READY IN	1hr 50 mins		

Instructions:
1. Slice the pork belly into 2-inch wide strips. Bring a large pot of water to a boil, and stir in the pork slices; reduce heat to a simmer, and cook the meat for 10 minutes. Remove from the water, and blot dry with paper towels.
2. Heat the vegetable oil over medium-high heat in a large wok, and brown the pork strips well on all sides. Pork will splatter - use a splatter shield for this step.
3. While pork is browning, mix together the light soy sauce, dark soy sauce, rice wine, rock sugar, ginger, and spring onions in a large soup pot or stockpot. Bring the mixture to a boil, stirring to dissolve the sugar. Reduce heat to a gentle simmer, and lay the pork strips into the liquid. Cover, and simmer until the meat is very tender, 1 1/2 to 2 hours. (Add water as needed to keep the liquid from going completely dry.)

Pork Cabbage Dumpling

PREP	30 mins	**Pot in use**	35 mins
COOK	20 mins	**Pan in use**	0 min
READY IN	50 mins		

Instructions:
Pork filling
1. Cook cabbage in boiling water (3 cups).Squeeze cabbage to remove all liquid and cut into dice.
2. Place grated ginger in a small bowl; cover with water and steep for a few minutes.
3. Slice scallions lengthwise, then thinly slice. Add to a bowl with pork.
4. Place a strainer over the pork bowl; strain the ginger so that the juices are added to the bowl. Press down on ginger to squeeze out all juices. Discard ginger left in strainer.
5. Add soy sauce, Michiu, sesame oil, salt, and pepper to the meat mixture. Stir in chopped cabbage until completely incorporated.

Dumpling
1. Put meat mixture on dumpling wrappers.
2. Using fingertip, wet the outer edge of the dumpling wrapper with water. Fold up the sides of the dumpling into a half-moon shape and firmly press the edge.
3. Boil up a pot of water.
4. Cook dumplings for 5 minutes till the dumpling floating.

Dipping Sauce
1. Mix the ingredients for the sauce in a small bowl and serve on the side.

6.3.3 Main staple food

Shampignon (Agaricus blazei) Stew Rice

PREP	10 mins	**Pot in use**	25 mins
			15 on stove
			10 off stove
COOK	20 mins	**Pan in use**	0 min
READY IN	30 mins		

Instructions:
1. Wash rice twice, drain and put it in pot.
2. Chop 1/2 pound of Shampignon mushroom in dine, mix with rice.
3. Pour water, broth in pot and cook with cover for 15 minutes and place aside for another 10 minutes till finely cooked.
4. Slice Shampane mushroom and saute with olive oil till the color turn brown.
5. Decorate slice mushroom on top of cooked rice.

Vegetable Stew Rice top with Shampignon (Agaricus blazei)

PREP	15 mins	**Pot in use**	30 mins
			20 on stove
			10 off stove
COOK	20 mins	**Pan in use**	0 min
READY IN	30 mins		

Instructions:
1. Wash rice twice, drain and put it in pot.
2. Cook Pok coy with boil water for 3 minutes. Divide pok coy by stems and leaves and chop in dine.
3. Chop Taiwanese sausage in dine. Fry in pan until the surface turn brown.
4. Add rice and chopped stems in the pan, cook for 5 minutes.
5. Pour water, broth in pot and cook with cover for 10 minutes and place aside for another 10 minutes till finely cooked.
6. Slice Shampignon mushroom and saute with olive oil till the color turn brown.
7. Decorate slice mushroom on top of cooked rice.

6.3.4 Soup

Shampignon (Agaricus blazei) Cashew Chicken Soup

PREP	15 mins	**Pot in use**	40 mins
			20 on stove
			20 off stove
COOK	40 mins	**Pan in use**	0 min
READY IN	45 mins		

Instructions:
1. Cook chicken meat with boiling water for 1 minute to remove blood and impurity.
2. Soak dry Shampignon mushroom in water to soften.
3. Put chicken, Cashew nuts, Ginger, Chinese jujube, Michiu and soften Shampignon mushroom wirh the soaking water in pot.
4. Pour 4-5 cups of water, cover and stew for 20 minutes.
5. Add salt in soup to make more flavor.

Shampignon (Agaricus blazei) Bamboo shoot Chicken Soup

PREP	15 mins	**Pot in use**	40 mins
			20 on stove
			20 off stove
COOK	40 mins	**Pan in use**	0 min
READY IN	45 mins		

Instructions:
1. Cook chicken meat with boiling water for 1 minute to remove blood and impurity.
2. Soak dry Shampignon mushroom in water to soften.
3. Put chicken, Bamboo shoot, Ginger, Chinese jujube, Michiu and soften Shampignon mushroom wirh the soaking water in pot.
4. Pour 4-5 cups of water, cover and stew for 20 minutes.
5. Add salt in soup to make more flavor.

6.3.5 Dessert

Sweet tofu pudding with traditional syrup

PREP	5 mins	**Pot in use**	15 mins
COOK	15 mins	**Pan in use**	0 min
COOL DOWN	40 mins		
READY IN	1 hr		

Instructions:
1. Finely mix ager powder with 1 cup of soy milk.
2. Mix with the remaining soy milk and heat-up till boiling.
3. Cool down and make it solidify in refrigerator.
4. Dilute Blackstrap with water for syrup.
5. Slice solidified sweet tofu and top with syrup for serving.

Aiyu Jelly

PREP	5 mins	**Pot in use**	15 mins
COOK	15 mins	**Pan in use**	0 min
COOL DOWN	40 mins		
READY IN	1 hr		

Instructions:
1. Wash aiyu seed in water till thick to make jelly. Put jelly in refrigerator to solidify.
2. Add sugar into boiling water, stir to mix.
3. Cool down the sweetened water and mix with lemonade.
4. Combine jelly and syrup and top with slice lemon for serving.

6.3.6 Soft beverage

Winter Melon punch

PREP	5 mins	**Pot in use**	20 mins
			15 on stove
			5 off stove
COOK	20 mins	**Pan in use**	0 min
COOL DOWN	40 mins		
READY IN	1 hr		

Instructions:
1. Boil winter melon sugar with water till totally mix.
2. Cool down and shake with ice and lemonade.
3. Put slice lemon on top.

6.4.0 Cost evaluation of the menu

The data is culculated based on the recipe served for 8 adults and refer to the markert price in Taiwan.

6.4.1 Cost per Course

Menu A	
Courses	**Price(€)**
Seasoned Spinach with Botargo Salad	32.5
Chinese Style Steamed Fish	15
Pork Cabbage Dumpling	22.8
Shampignon Stew Rice	15
Shampignon Cashew Chicken Soup	21.4
Sweet Tofu Pudding with Traditional Syru	9.5
Winter Melon Punch	9
Kaoliang	11.9
Taiwan Beer	8
Taiwan Fruit Beer	8
Total	153.1

Menu B	
Courses	**Price(€)**
Seasoned Spinach with Botargo Salad	32.5
Chinese Pork Belly	13.2
Pork Cabbage Dumpling	22.8
Vegetable Stew Rice top with Shampignor	15
Shampignon Bamboo shoot Chicken Soup	23.1
Aiyu Jelly	8.4
Winter Melon Punch	9
Kaoliang	11.9
Taiwan Beer	8
Taiwan Fruit Beer	8
Total	151.9

6.5.0 Energy Consumption for cooking evaluation

The data is culculated based on the recipe served for 8 adults and the two stoves in the Orchid House Kitchen.

6.5.1 Stove energy consumption

stove	energy consumption W
major stove	1800
minor stove	1200

6.5.2 Courses consumption table

Categgories	Courses	Hours of cooking	W	Energy Consumption (KWH)
Salad & Starter	Seasoned Spinach with Botargo Salad Roll	0.25	1800	0.45
		0.25	1200	0.3
Main course	Chinese Style Steamed Fish	0.5	1800	0.9
		0.1	1200	0.12
	Chinese Pork Belly	0.5	1800	0.9
	Pork Cabbage Dumpling	0.5	1800	0.9
Main staple food	Shampignon Stew Rice	0.25	1800	0.45
	Vegetable Stew Rice top with Shampignon	0.33	1800	0.594
Soup	Shampignon Cashew Chicken Soup	0.33	1800	0.594
	Shampignon Bamboo Shoot Chicken Soup	0.33	1800	0.594
Dessert	Sweet Tofu Pudding with Traditional Syrup	0.25	1200	0.3
	Aiyu Jelly	0.25	1200	0.3
Beverage	Winter Melon Punch	0.25	1800	0.45
			Total	**6.852**

6.6.0 Nutrition data compared to guest needs

6.6.1 Suggested serving

Food type	Suggested serving based on 2,000 daily calorie intake
Grains	6-8 servings/day
Vegetables	4-5 servings /day
Fruits	4-5 servings / day
Fat-free low-fat dairy products	2-3 servings / day
Lean meat, poultry, and seafood	3-6 oz/day
Fats and oils	2-3 servings/day
Nuts, seeds, and legumes	4-5 servings / week
Sweets and masses sugars	5 servings/ week

6.6.2 Dinner party courses nutrition

Course	Grains	Vegetables	Fruits	Dairy	Lean meat ,poultry and seafood (oz)	Fats & oils	Nuts, seeds, and legumes	Sweets and masses sugars
Seasoned Spinach with Botargo Salad Roll	0.0	1.0	0.0	0.0	0.5	0.3	0.0	0.0
Chinese Style Steamed fish	0.0	0.0	0.0	0.0	3.0	0.3	0.0	0.0
Chinese Pork Belly (Stir-fried Pork)	0.0	0.5	0.0	0.0	3.0	1.0	0.0	0.0
Pork Cabbage Dumpling	0.3	0.3	0.0	0.0	1.0	0.3	0.0	0.0
Shampignon (Agaricus blazei) Stew Rice	2.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0
Vegetable Stew Rice top with Shampignon (Agaricus	2.0	0.5	0.0	0.0	0.5	0.0	0.0	0.0
Shampignon (Agaricus blazei) Cashew Chicken	0.0	0.3	0.0	0.0	1.5	0.0	1.0	0.0
Shampignon (Agaricus blazei) Bamboo shoot	0.0	0.5	0.0	0.0	1.5	0.0	0.0	0.0
Sweet tofu pudding with traditional syrup	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.5
Aiyu Jelly	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.5
Winter Melon punch	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.5

The quantity of serving in each food group.

6.7.0 Local content of ingredients

Shampignon

Shampignon (known as Agaricus subrufescens, Agaricus blazei) is a rare and precious species of mushroom from Piedade, Brazil. Shampignon was cultivated with pesticide-free herbage. There is a clear traceability, so customers can eat safely.

Nutritional Value

Shampignon contains much more glucan polysaccharides, vitamins and minerals and fiber than other species of mushroom. It can significantly enhance human body's immunity to diseases. Long-term consumption Shampignon can help to regulate physiological functions, and prevent tumor, cardiovascular disease and diabetes.

Cultivation

Shampignon was cultivated with pesticide-free compost and herbage instead of traditional straw or sawdust as cultivated base. Therefore, Shampignon has no concern of heavy metal residue. It is natural, non-toxic , safe and healthy. Moreover, this cultivation method help for forest conservation and reduce tree felling.

Farmers' Hoping Project

The Cultivation of Shampignon has developed maturely and is less susceptible to weather impact. Therefore, teaching the techniques to farmers can help them obtain a stable income. Farmers improve the quality of life, so that young generational are willing to come back their rural hometown. On the other hand, customers can also enjoy a stable and excellent quality Shampignon.

Orchid House and Shampignon

In recent years, the life standard has increased. People are pursuing health in both living environment and diet. The comfortable indoor environment in orchid house allows the delicate orchids growing well. Shampignon also grew in safe and non-pollution environment. Enjoy the nutritious and delicious Shampignon in comfortable orchid house is a kind of simple and happy lifestyle.

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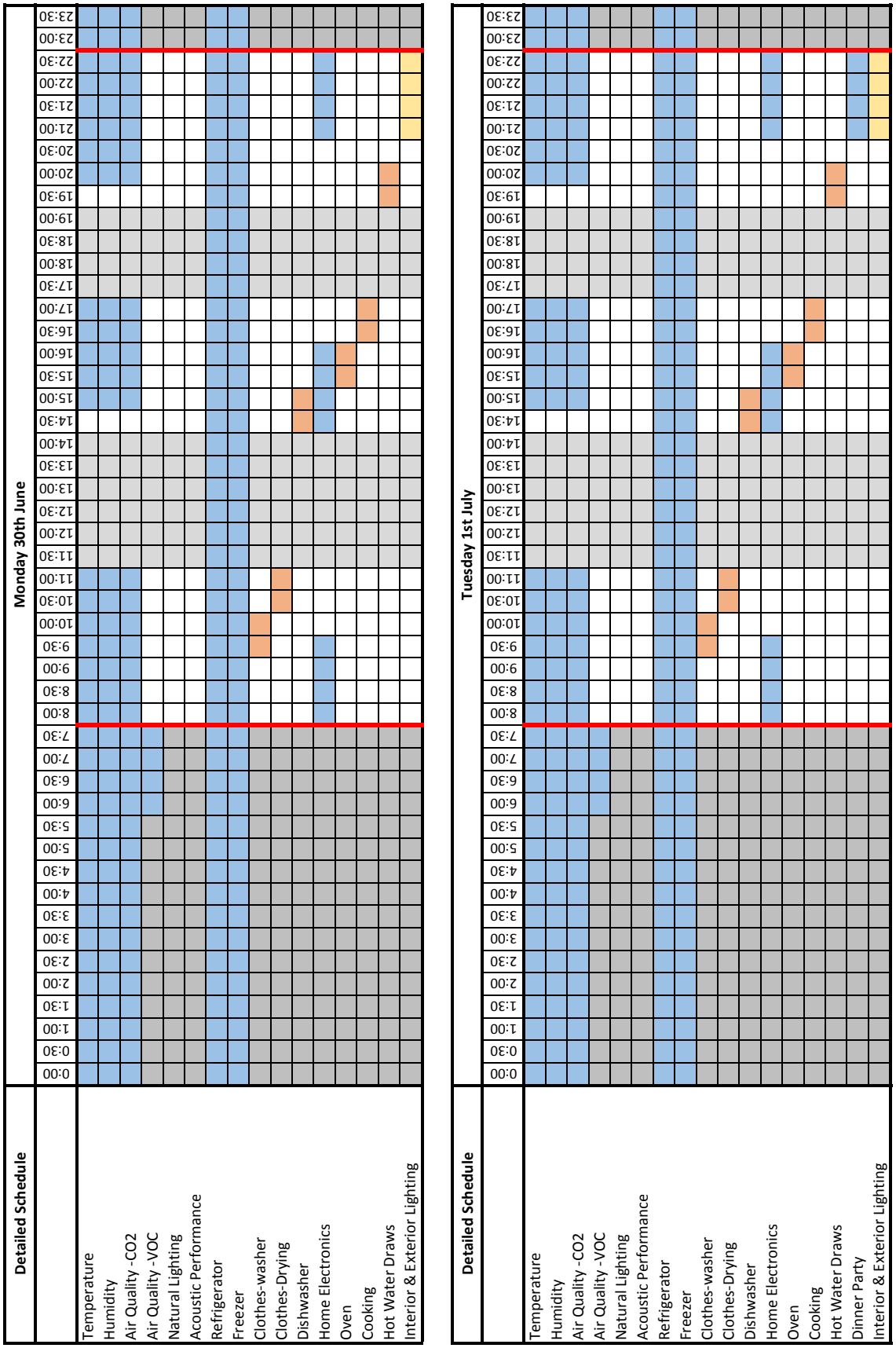
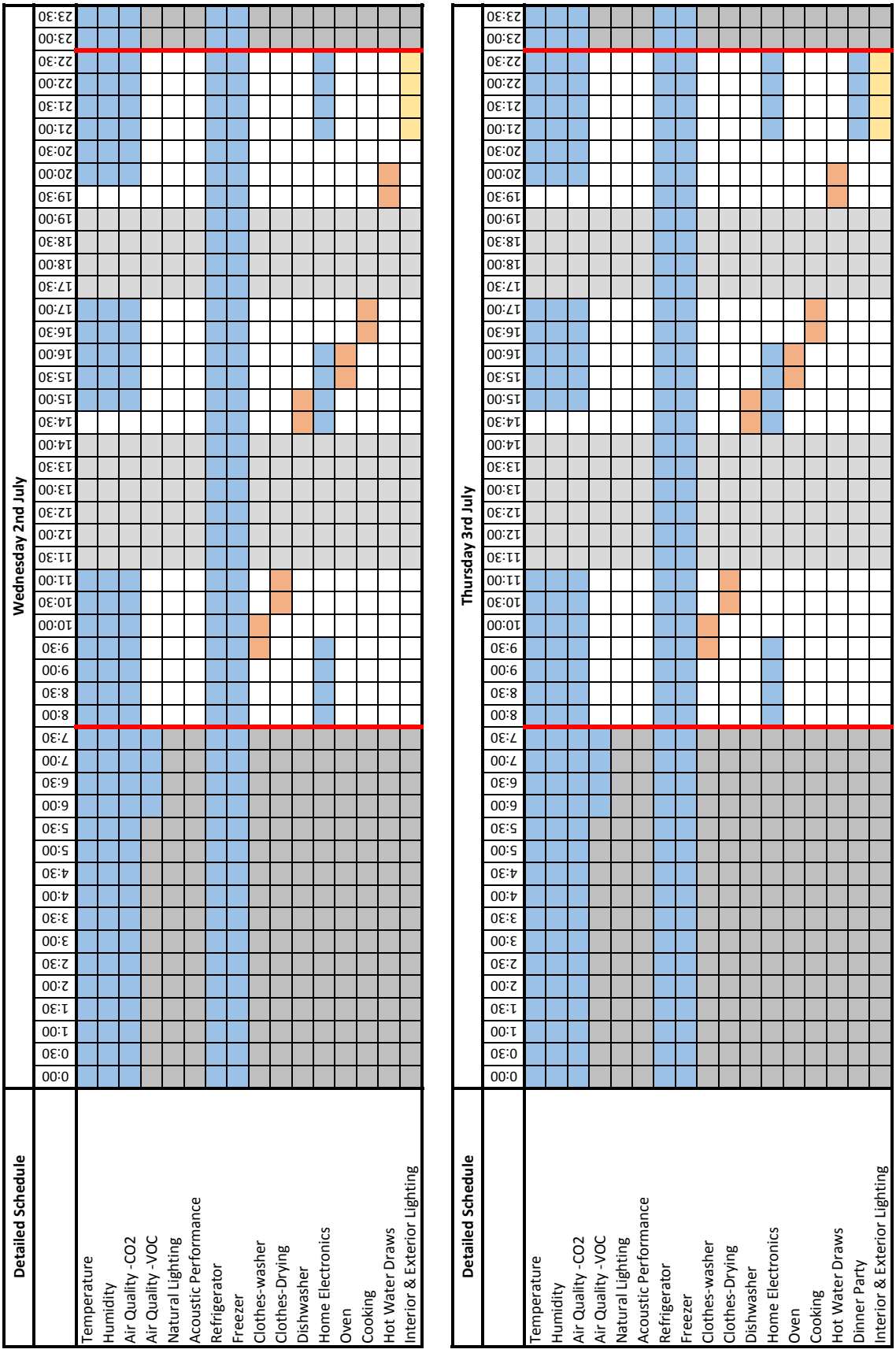
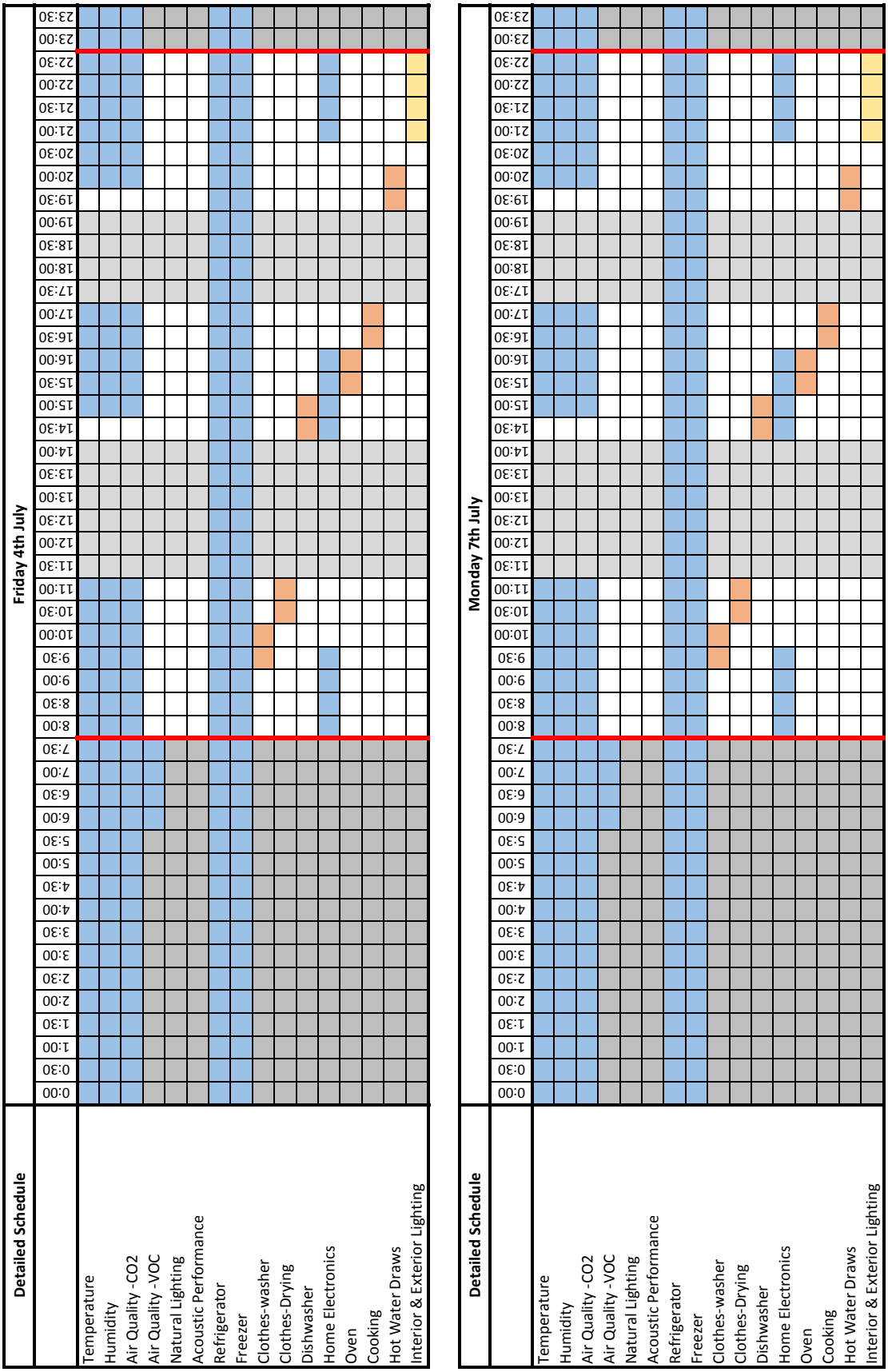
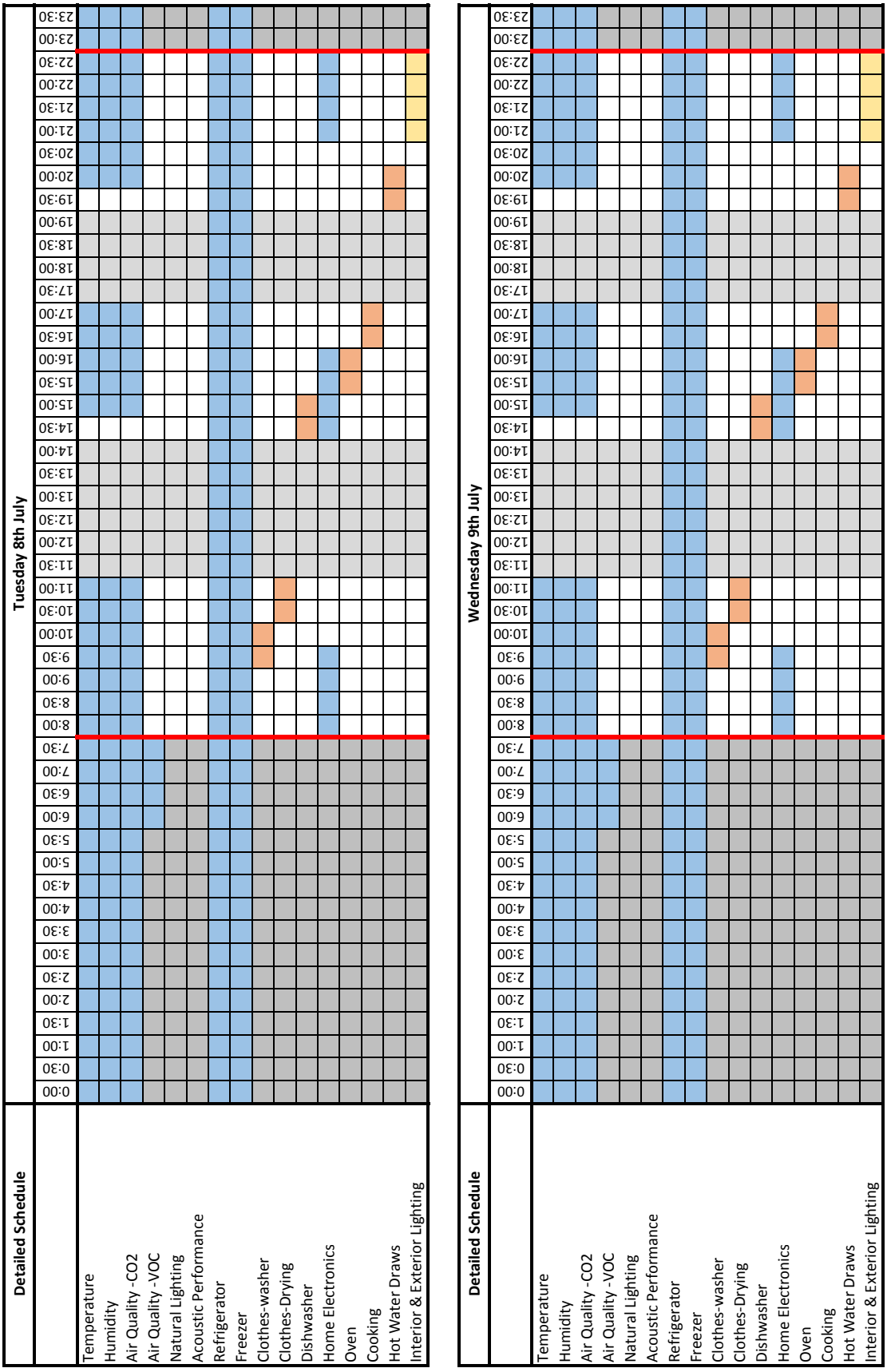
Contest Week Tasks' Planning


Monday 30th June
Detailed Schedule
Temperature
Humidity
Air Quality -CO2
Air Quality -VOC
Natural Lighting
Acoustic Performance
Refrigerator
Freezer
Clothes-washer
Clothes-Drying
Dishwasher
Home Electronics
Oven
Cooking
Hot Water Draws
Interior & Exterior Lighting
0:00 0:30 1:00 1:30 2:00 2:30 3:00 3:30 4:00 4:30 5:00 5:30 6:00 6:30 7:00 7:30 8:00 8:30 9:00 9:30 10:00 10:30 11:00 11:30 12:00 12:30 13:00 13:30 14:00 14:30 15:00 15:30 16:00 16:30 17:00 17:30 18:00 18:30 19:00 19:30 20:00 20:30 21:00 21:30 22:00 22:30 23:00 23:30
Tuesday 1st July
Detailed Schedule
Temperature
Humidity
Air Quality -CO2
Air Quality -VOC
Natural Lighting
Acoustic Performance
Refrigerator
Freezer
Clothes-washer
Clothes-Drying
Dishwasher
Home Electronics
Oven
Cooking
Hot Water Draws
Dinner Party
Interior & Exterior Lighting
0:00 0:30 1:00 1:30 2:00 2:30 3:00 3:30 4:00 4:30 5:00 5:30 6:00 6:30 7:00 7:30 8:00 8:30 9:00 9:30 10:00 10:30 11:00 11:30 12:00 12:30 13:00 13:30 14:00 14:30 15:00 15:30 16:00 16:30 17:00 17:30 18:00 18:30 19:00 19:30 20:00 20:30 21:00 21:30 22:00 22:30 23:00 23:30


Wednesday 2nd July
Detailed Schedule
Temperature
Humidity
Air Quality -CO2
Air Quality -VOC
Natural Lighting
Acoustic Performance
Refrigerator
Freezer
Clothes-washer
Clothes-Drying
Dishwasher
Home Electronics
Oven
Cooking
Hot Water Draws
Interior & Exterior Lighting
Thursday 3rd July
Detailed Schedule
Temperature
Humidity
Air Quality -CO2
Air Quality -VOC
Natural Lighting
Acoustic Performance
Refrigerator
Freezer
Clothes-washer
Clothes-Drying
Dishwasher
Home Electronics
Oven
Cooking
Hot Water Draws
Dinner Party
Interior & Exterior Lighting


Detailed Schedule
Friday 4th July
Monday 7th July
Temperature
Humidity
Air Quality -CO2
Air Quality -VOC
Natural Lighting
Acoustic Performance
Refrigerator
Freezer
Clothes-washer
Clothes-Drying
Dishwasher
Home Electronics
Oven
Cooking
Hot Water Draws
Interior & Exterior Lighting


Tuesday 8th July
Detailed Schedule
Temperature
Humidity
Air Quality -CO2
Air Quality -VOC
Natural Lighting
Acoustic Performance
Refrigerator
Freezer
Clothes-washer
Clothes-Drying
Dishwasher
Home Electronics
Oven
Cooking
Hot Water Draws
Interior & Exterior Lighting
Wednesday 9th July
Detailed Schedule
Temperature
Humidity
Air Quality -CO2
Air Quality -VOC
Natural Lighting
Acoustic Performance
Refrigerator
Freezer
Clothes-washer
Clothes-Drying
Dishwasher
Home Electronics
Oven
Cooking
Hot Water Draws
Interior & Exterior Lighting

Detailed Schedule
Thursday10th July
Temperature
Humidity
Air Quality -CO2
Air Quality -VOC
Natural Lighting
Acoustic Performance
Refrigerator
Freezer
Clothes-washer
Clothes-Drying
Dishwasher
Home Electronics
Oven
Cooking
Hot Water Draws
Dinner Party
Interior & Exterior Lighting
0:00 0:30 1:00 1:30 2:00 2:30 3:00 3:30 4:00 4:30 5:00 5:30 6:00 6:30 7:00 7:30 8:00 8:30 9:00 9:30 10:00 10:30 11:00 11:30 12:00 12:30 13:00 13:30 14:00 14:30 15:00 15:30 16:00 16:30 17:00 17:30 18:00 18:30 19:00 19:30 20:00 20:30 21:00 21:30 22:00 22:30 23:00 23:30

Detailed Schedule
Friday 11th July
Temperature
Humidity
Air Quality -CO2
Air Quality -VOC
Natural Lighting
Acoustic Performance
Refrigerator
Freezer
Clothes-washer
Clothes-Drying
Dishwasher
Home Electronics
Oven
Cooking
Hot Water Draws
Water Balance
Interior & Exterior Lighting
0:00 0:30 1:00 1:30 2:00 2:30 3:00 3:30 4:00 4:30 5:00 5:30 6:00 6:30 7:00 7:30 8:00 8:30 9:00 9:30 10:00 10:30 11:00 11:30 12:00 12:30 13:00 13:30 14:00 14:30 15:00 15:30 16:00 16:30 17:00 17:30 18:00 18:30 19:00 19:30 20:00 20:30 21:00 21:30 22:00 22:30 23:00 23:30

8

Cost Estimate and Project Financial Summary

Business and Fund-Rasing Plan:

1. Description of overall project

NCTU / UNICODE, team of National Chiao Tung University, is taking Solar Decathlon Europe as the opportunity to develop a prototype house for co-existing with nature by focusing on the green house technology that has been developed for cultivating orchid in Taiwan combining with the research institute here in NCTU. The university's main campus is located at the center of the Hsinchu Science Park, Taiwan's national research center. The area is referred to as the Silicon Valley of Asia. More than 400 technology companies have been established in the park.

2. Project Budget

See the list below

3. Interaction with other departments

In terms of inter-university departmental collaborations, NCTU/NICODE tem is base in The Graduate School of Architecture and is in the process of collaborating with the following schools in various aspects related to SDE 2014 project:

NCTU President's Office
1. Administrative and overall support
2. Alumni relations and resource advice
3. School-wide and nation-wide media, communication, and press release

NCTU School of Engineering
1. General engineering solutions and prototyping
2. Database management and technology advice
3. Simulation and specifications

NCTU School of Management
1. Multidisciplinary coordination management
2. Risks management advice
3. Communication planning and strategy

NCTU School of Science
1. Research on various subjects related to horticulture, nursery, and industry
2. Database sourcing related to weather, environment, and other academies

4. Fund-Raising Plan

4.1 Goals and Objectives

4.1.1 To engage the leading industry leaders in each of the key areas of our design as strategic support

4.1.2 To engage the most relevant technology/capacity providers that are capable of extending our research into materialization and commercialization

4.1.3 To engage leaders of sustainability promoters for expanding the public and market awareness of our design

4.2 Strategy
4.2.1 To identify key merits and values in our design and the overall SDE-related activities – by consolidating the driving values inside and out of our design of the solar house project, we will then leverage these key merits for the entire fund-raising activities as our Core Values.
4.2.2 To establish database and contact information - which includes government agencies, private corporations, research-backing institutions, and special interest communities and groups.

4.2.3 To research and engage initial contact – based on internal research of target candidate's creditability, relevance, and likelihood of support, the team will engage initial contact and communication towards a short-list of candidates for in-depth communication and fund-raising activities.
4.2.4 To solicit government or special interest group's endorsement and reference in approaching potential candidates.

4.3 Target Candidates (categorized by sector)
4.3.1 Solar/PV Technology
4.3.2 General Building Construction
4.3.3 General Mechanical, Electric, Environmental Control Provider
4.3.4 Housing Builder
4.3.5 Orchid Horticulture Enabler
4.3.6 Urban Regeneration/Renewal Promoter
4.3.7 Logistics
4.3.8 Alumni Office and Development Office at NCTU
4.3.9 Media, PR Agencies and Advertiser

Cost Estimate:

Solar Decathlon Europe	SDE 2014 COMPETITION EN FRANCE			
	Team's Abbreviations	UNI		
	School's Name	NCTU		
	Team's Name	UNICODE		
Nº	Name	Description	Budget	% Total
			ex VAT / VAT	on ex VAT
A. DEVELOPMENT PHASE_COST ESTIMATE				
A.1	Personnel			
	Faculty & Researcher	10 persons* 25 hours/month *6 months* €12 hourly rate	18,000 €	900 €
		6% salary for pension fund 10* 25 *6* €12*6%	1,080 €	54 €
	Granted Student	5 persons* 60 hours/month *6 months* €2 Hourly Rate	3,600 €	180 €
		6% salary for pension fund 5* 60 *6* €2*6%	216 €	11 €
	Administration	1person* 120 hours/month *6 months* €5.5 Hourly Rate	3,960 €	198 €
		6% salary for pension fund 1* 120 *6* €5.5*6%	238 €	12 €
		Personnel	27,094 €	1,355 € 1.4%
A.2	Communication			
	1:25 Architectural Models	Model materials, stationary, display boxes, etc.	310 €	16 €
	1:1 Architectural Models	Recycled steel, POLLI-Brick™, aluminum material, acrylic material, wood, scaffolding, stone, sand, etc.	4,005 €	200 €
	Smart Living & Water Wall Research Models	Acrylic material, metal spring, thermometer, etc	870 €	44 €
	Winter Camp	Co-organised with Delta Foundation A 3-days camp of students from 9 high schools	9,500 €	475 €
	Videos	Video #1, 2, 3, 4A,4B	3,750 €	188 €
	Communication Documentation		5,000 €	250 €
	Actions & Exhibitions, On-Site Display	Exhibition with winter camp, Orchid Hut activities	14,000 €	700 €
	VIP Dinner		1,800 €	90 €
	Press Conference		800 €	40 €
	Web Page (creation and maintenance)		2,000 €	100 €
	Academic Conferences	Seminar, Talk, Forum, etc.	3,125 €	156 €
	Training Courses	Fork lift, boom lift, first aid, H&S, culture, plumbing, carpenter, revit, etc.	4,750 €	238 €
		Communication	49,910 €	2,496 € 2.6%
A.3	First Workshop			
	Travel & Transport	Team Members 3 * Unit Cost €1000	3,000 €	150 €
	Lodging	Team Members 3* Unit Cost €465	1,395 €	70 €
	Expenses Allowance	Team Members 3 * Unit Cost €330	990 €	50 €
	Miscellaneous Expenses	Team Members 3 * Unit Cost €100	300 €	15 €
		First Workshop	5,685 €	284 € 0.3%
A.4	Second Workshop			
	Travel & Transport	Team Members 10* Unit Cost €1082	10,820 €	541 €
	Lodging	Team Members 10* Unit Cost €465	4,650 €	233 €
	Expenses Allowance	Team Members 10* Unit Cost €200	2,000 €	100 €
	Miscellaneous Expenses	Team Members 10* Unit Cost €100	1,000 €	50 €
		Second Workshop	18,470 €	924 € 1.0%
A.5	Administrative and miscellaneous			
	Consumables and office supplies	Stationary, copier, whiteboard, documentation, etc.	4,060 €	203 €
	Business Travel expenses	Tickets, parking fee, etc.	350 €	18 €
	Other expenses		350 €	18 €

		SDE 2014 COMPETITION EN FRANCE			
		Team's Abbreviations	UNI		
		School's Name	NCTU		
		Team's Name	UNICODE		
Nº	Name	Description	Budget		% Total
			ex VAT	VAT	on ex VAT
		Administrative and miscellaneous	4,760 €	238 €	0.3%
		Sub-Total_Development Phase Cost Estimate	105,919 €	5,296 €	5.6%
B. HOUSE CONSTRUCTION_COST ESTIMATE					
B.1	Direct Materials				
	Photovoltaic Energy (Solar Panel) system	Solar Panel/ solar invertor/ monitor port/ distribution panel/ patented product by Delta	5,430 €	272 €	
	Domestic Appliance	2 sets: European and Taiwan spacifications washing machine, television, refrigerator, projectors, oven/ grill, air ventilator, microwave	70,387 €	3,519 €	
	Electronic Converter	110V/220V converter AC/DC converter	47,619 €	2,381 €	
	ASUS IT Solutions	Server/ computers/ LED HD monitor/ padphone/ Nexus pad/laptop	25,238 €	1,262 €	
	Insulation Panel	VIP eco-foam	15,765 €	788 €	
	Aaluminum Window & Frame	YKK window/door frame and glass	18,353 €	918 €	
	Vacuum thermal material	BAYER Thermal panel & vacuum tech - Makrolon® Polycarbonate	35,715 €	1,786 €	
	Auto-controlled Louvre	Fuh Shan electronic louvre & sensor	42,752 €	2,138 €	
	Steel Frame & Construction	TUNG HO STEEL house frame	142,860 €	7,143 €	
	External Walls with Water Tank	Miniwiz thermal wall-POLLI-Brick™ and water tank	20,000 €	1,000 €	
	Connection Units (Floor-Wall)	Construction joints	7,500 €	375 €	
	Foundation Units	Independent foundation footing, sand, etc.	10,800 €	540 €	
	Indoor Staircases & Railing	Steel staircase & railings	9,000 €	450 €	
	Glass/ Insulation material	Spring Pool glass & Eco-Foam material applied on walls/ floor/ ceiling	16,753 €	838 €	
	Wood panel, floor and doors for interior design	4 ft*6 ft(120cm*240cm, T=18mm) *360 sheets 4 ft*6 ft(120cm*240cm, T=12mm) *170 sheets 4 ft*6 ft(120cm*240cm, T=6.5mm) *80 sheets etc. Indoor wooden floor Interior wooden doors	47,460 €	2,373 €	
	Garden Lamps	Solar energy lamps	840 €	42 €	
	Landscape (Versailles)	Greenery on open spaces	15,000 €	750 €	
	Landscape (Taipei)	Greenery on open spaces	5,000 €	250 €	
	Outdoor Handrail	Steel units	15,060 €	753 €	
	Restroom Units & Kitchen Decoration	HCG life design products (sink, toilet, shower..) , ceramic panel	7,600 €	380 €	
	Greencore Structure & Green	Greencore structure, "Orchid 4 All" orchid & green plants	7,500 €	375 €	
	Furniture & Interior Decoration	Tea table, chairs, cooking pots, kitchen gadgets, table cloth, curtain, containers, lamps, vases, etc.	13,744 €	687 €	
	Door	Main door	2,330 €	117 €	
	Fire-Proof Painting	Wooden & steel	32,210 €	1,611 €	
	Equipment	Helmet, vest, hammer, screwdriver, pvc tarpaulin, welding goggle, safety harness, grinder, etc.	18,570 €	929 €	
	Uniform Suits/ T-shirt for Team Members	Uniform suits/ T-shirt	5,000 €	250 €	
		Total Direct Materials	638,486 €	31,924 €	33.6%
B.2	Material Overhead				

		SDE 2014 COMPETITION EN FRANCE			
		Team's Abbreviations	UNI		
		School's Name	NCTU		
		Team's Name	UNICODE		
Nº	Name	Description	Budget		% Total
			ex VAT	VAT	on ex VAT
	Material Overhead	5% Estimated Rate * Total Direct Materials	31,924 €	1,596 €	
		Total Material Overhead	31,924 €	1,596 €	1.7%
B.3	Direct Labor, Labor Overhead & Fringe Benefits				
	Faculty & Researcher	10 persons* 60 hours/month *12 months* €12 Hourly Rate	86,400 €	4,320 €	
		6% Salary for Pension Fund 10* 60 *12* €12*6%	5,184 €	259 €	
	Granted Student	30 persons* 60 hours/month *12 months* €6 Hourly Rate	129,600 €	6,480 €	
		10% Overhead & Benefits 30 * 120 *6 * €6 *10%	12,960 €	648 €	
	Technicians/ Labourers (incl. French translator)	6 persons* 176 hours/month *3 months* €8 Hourly Rate	25,344 €	1,267 €	
		15% Overhead/ weekend & Benefit 6* 176 *3 * €8*15%	3,802 €	190 €	
	Administration	1 person* 176 hours/month *8 months* €6 Hourly Rate	8,448 €	422 €	
		6% Salary for Pension Fund 1* 176 *8* €6* 6%	507 €	25 €	
	Advisors (incl. French Architect)	5 persons* 15 hours/month *12 months* €8 Hourly Rate	7,200 €	360 €	
		6% Salary for Pension Fund 5* 15 *12* €8* 6%	432 €	22 €	
	Volunteer guide & Stewards	5 persons *60 days* €15 benefits	4,500 €	225 €	
		Total Direct Labor	284,376 €	14,219 €	15.0%
B.4	Lower - Tier Subcontractors				
	Subcontractor for electricity installation		3,600 €	180 €	
	Subcontractor for Bayer Makrolon® Polycarbonate installation		1,200 €	60 €	
	Leveling & Footing & Steel Frame Assembly		2,000 €	100 €	
	Carpenter		21,400 €	1,070 €	
		Total Lower - Tier Subcontractors	28,200 €	1,410 €	1.5%
B.5	Consultants				
	Local architectural advisors	TC Lee Architect	1,600 €	80 €	
	Building Code advisors	Runtex developer	2,400 €	120 €	
	Structural Engineer (licensed engineer certificate)	Runtex building structural consultation	1,200 €	60 €	
	Delta PV and electricity design and installation advisor	Delta consultation	1,800 €	90 €	
	HVAC and plumbing engineer	UIS Electronic & AC design	2,000 €	100 €	
	Graphic design	UNICODE Team	-	-	
	Energy Efficiency Design and Monitor	GIS Building technology & analysis	1,500 €	75 €	
		Total Consultants	10,500 €	525 €	0.6%
B.6	Other Direct Costs				
	Site Preparation	Scaffolding, temporary container, etc.	950 €	48 €	
	Water Supply & Clean		1,000 €	50 €	
	On Site Security and Public Hygiene		890 €	45 €	
	Rent for Warehouse		4,700 €	235 €	
	Crane/ Fork Lift Trucks		4,100 €	205 €	
	Electricity		1,692 €	85 €	
	Site Leveling		800 €	40 €	
		Other Direct Costs	14,132 €	707 €	0.7%

		SDE 2014 COMPETITION EN FRANCE			
		Team's Abbreviations	UNI		
		School's Name	NCTU		
		Team's Name	UNICODE		
Nº	Name	Description	Budget		% Total
			ex VAT	VAT	on ex VAT
		Sub-Total_House Construction Cost Estimate	1,007,619 €	50,381 €	53.0%
C. HOUSE DISASSEMBLY IN ORIGIN AND TRANSPORTATION					
C.1	Disassembly in origin				
	Construction Site Temporary Work	Scaffolding, temporary container, etc.	950 €	48 €	
	Crane/ Fork Lift Trucks		4,100 €	205 €	
	Material and Equipment	Stationary, tent, traffic cone, etc.	1,120 €	56 €	
		Disassembly in origin	6,170 €	309 €	0.3%
C.2	House Transportation				
	Transport	Shipping & customs	173,800 €	8,690 €	
	Transport Insurance		2,080 €	104 €	
		House Transportation	175,880 €	8,794 €	9.3%
		Sub-Total_House Disassembly in Origin Cost Estimate	182,050 €	9,103 €	9.6%
D. FINAL PHASE IN LE CITE DU SOLEIL:COST ESTIMATE					
D.1	Travels & Costs for Final Phase in Versailles				
	Travel & Transport (Professors/ advisors)	Eva Air-Team Members 12* flight €1000	12,000 €	600 €	
	Travel & Transport (Students)	Eva Air-Team Members 30* flight €1000	30,000 €	1,500 €	
	Travel & Transport (Consultants)	Eva Air-Team Members 16* flight €1000	16,000 €	800 €	
	Lodging(Professors/ advisors)	Team Members 12* €100* 30days	36,000 €	1,800 €	
	Lodging(Students)	Free Rooms offered by SDE Organisation	-	-	
		Team Members 30* €100* 30days	90,000 €	4,500 €	
	Lodging(Consultants)	Team Members 16* €100* 10days	16,000 €	800 €	
	Expenses Allowance (Professors/ advisors)	Team Members 12* €40* 30days	14,400 €	720 €	
	Expenses Allowance (Students)	Team Members 30* €40* 40days	48,000 €	2,400 €	
	Expenses Allowance(Consultants)	Team Members 16* €40* 10days	6,400 €	320 €	
	Miscellaneous Expenses (Professors/ advisors)	Local transportation/ Peer meeting €1000	1,000 €	50 €	
	Miscellaneous Expenses (Students)	Local transportation/ Peer meeting €2000	2,000 €	100 €	
	Miscellaneous Expenses(Consultants)	Team Members 16* €40* 10days	6,400 €	320 €	
	UNICODE Youth Ambassador in Versailles	Flight Ticket, Accommodation, Daily expenses,Local transportation	2,500 €	125 €	
		Total Travels & Costs for Final Phase in Versailles	280,700 €	14,035 €	14.8%
D.2	Assembly and Disassembly Processes / French VAT=19.6%				
	Crane/ Fork Lift Trucks		8,000 €	1,568 €	
	Equipment and machinery	CE branding helmets, uniforms, shoes, etc.	4,540 €	890 €	
	Assembly in Le Cité du Soleil ©	Car rental, PR, mobile, brochure, daily Ingredients, etc.	8,480 €	1,662 €	
	Disassembly in Le Cité du Soleil ©	Car rental, PR, mobile	4,520 €	886 €	
	Other Expenses	Volunteers daily expenses, drinking water, brochure, etc.	1,500 €	294 €	
		Total Assembly, Transport, Disassembly Processes	27,040 €	5,300 €	1.4%
D.3	Insurance Policies / French VAT=19.6%				
	Liability Insurance		400 €	78 €	
	Transport Insurance		600 €	118 €	
	Accident Insurance		1,200 €	235 €	

Solar Decathlon Europe	SDE 2014 COMPETITION EN FRANCE			
	Team's Abbreviations		UNI	
	School's Name		NCTU	
	Team's Name		UNICODE	

Nº	Name	Description	Budget		% Total
			ex VAT	VAT	on ex VAT
	Medical Insurance		400 €	78 €	
		Total Insurance Policies	2,600 €	510 €	0.1%
		Sub-Total_Final Phase in La Cité du Soleil® Cost Estimate	310,340 €	19,844 €	16.3%
E. POST EVENT COST ESTIMATE					
E.1	House Permanent Assembly				
	Personnel	10 persons* 60 hours/month *12 months* €12 Hourly Rate	86,400 €	4,320 €	
		6% Salary for Pension Fund 10* 60 *12* €12*6%	5,184 €	259 €	
	Press Conference		300 €	15 €	
	Web Page (creation and maintenance)		2,000 €	100 €	
	Maintenance Materials & expenses		23,000 €	1,150 €	
	Machinery and Equipment		10,800 €	540 €	
	Post Competition Events in Taiwan (as a part of 2016 World Design CapitalSeries Event)	Proposed a joint event with National Research Committee/ Taipei City Government	40,000 €	2,000 €	
		Sob-Total House permanent Assembly	167,684 €	8,384 €	8.8%
E.2	As built				
	Faculty & Researcher	5 persons* 60 hours/month *12 months* €12 Hourly Rate	43,200 €	2,160 €	
		6% Salary for Pension Fund 5* 60 *12* €12*6%	2,592 €	130 €	
	Granted Student	15 persons* 60 hours/month *12 months* €6 Hourly Rate	64,800 €	3,240 €	
		10% Overhead & Benefits 15 * 120 *6 * €6 *10%	6,480 €	324 €	
	Consumables and office supplies	Stationary, copier, whiteboard, documentation, etc.	5,000 €	250 €	
	Business Travel expenses	Tickets, parking fee, etc.	2,500 €	125 €	
	Other expenses		2,500 €	125 €	
		As Built	127,072 €	6,354 €	6.7%
		Sub-Total_Post Event Cost Estimate	294,756 €	14,738 €	15.5%
		Total Price / Cost Estimated	1,900,683.38 €	99,361.61 €	100 % Total
Please CHECK (X) your status >>>		If you benefit VAT Recovering		(99,362 €)	
	X	If you don't	99,362 €		
		Total Price / Cost Estimated included VAT	2,000,045 €	1,900,683 €	

Solar Decathlon Europe	**SDE 2014 COMPETITION EN FRANCE**					
	Team's Abbreviations	UNI				
	School's Name	NCTU				
	Team's Name	UNICODE				
SDE 2014 _ Construction Cost Budget						
cod.	descriptions	UNIT OF MEAS.	QUANTITY	PRICE €	TOTAL	
1	**STRUCTURE**					
1.1	**FOUNDATION**					
	Wooden Beams 400x600x120 and fitting elements	n.	102		2,000 €	
	Wooden Beams - **BASEMENT**					
	N. 2 size = 200x200x5240	m³	2	1,500 €	3,000 €	
	N. 2 size = 200x200x4010	m³	1.6	1,500 €	2,400 €	
	N. 2 size = 200x200x2200	m³	1	1,500 €	1,500 €	
	Wooden Beams 200x200 - **Skylight structure**	m³	0.32	1,800 €	576 €	
	Fixing and hooks for wooden structure (25% of Timber structure costs)	a corpo			1,500 €	**10,976 €**
1.2	**STRUCTURE FLOORS SLABS**					
	Basement slabs (+0.00) - "RUBNER", Modular or customize (base module125*125) Thicknes s = 31.60 (OSB panel s = 18mm; PAVATEX timber beams S= 200mm; OSB s =18mm; Cork/STYRODUR CS 500 s=100mm; StamisolPACK 500 s=0.70mm)	m²	65.5	150 €	9,825 €	
	Roof Slabs 1 - "RUBNER", Modular or customize, Thicknes s = 38.37 (OSB panel s = 18mm; Pavaflex and timber beams s=200mm; OSB panel s =18mm; PAVATHERM PLUS s = 80mm; Pavatex Isolair-L s = 0.35mm; STAMOSOL PACK 500 s=0.70mm; Ventilater cavity+wood battens s =70mm; OSB panel s =18mm; Waterproof layer Derbigum3=3mm;	m²	45.5	170 €	7,735 €	**17,560 €**
1.3	**PARTITION AND EXTERNAL**					
	WALL 01_Exterior Wall (EAST-WEST) -	m²	48.42	180 €	8,716 €	
	WALL 02_North Wall with Painting fresco "Catalano" -	m²	38.66	200 €	7,732 €	
	WALL 03_Wall Interior -	m²	14	120 €	1,680 €	
	WALL 04_Exterior Wall Technical core, tickness s= ……	m²	7.76	150 €	1,164 €	**19,292 €**

2	**ARCHITECTURE**					
2.1	**OPENINGS**					
	Inner doors-"Rubner" - doors in wood	n.	3	600 €	1,800 €	
	MAIN DOOR	n.	1	3,000 €	3,000 €	
	Windows -	m²	24	650 €	15,600 €	
	Windows -	m²	8.5	500 €	4,250 €	
	Windows -	m²	21.5	250 €	5,375 €	
	SHADING System- curtain linen finishing color: natural	m²	19	50 €	950 €	
	rainwater collecting eaves, finishing color: black	ml.	12	150 €	1,800 €	**32,775 €**
2.2	**FINISHES**					
	Interior Floor in Larch wood S=20mm	m²	60	30 €	1,800 €	
	Interior coating in Clay panels: Pro Crea Fondo	m²	100	40 €	4,000 €	
	Outer coatings	m²	70	60 €	4,200 €	**10,000 €**
2.3	**FURNISHING**					
	Wc_Bidet Washbasin Glaze finish	a corpo			1,500 €	1,500 €
3	**SYSTEMS INSTALLATION**					
3.1	**FIRE SUPPRESSION**					
	estinguishing	a corpo			800 €	800 €
3.2	**PLUMBING SYSTEM**					
	Pipes system is grouped into: Hot water piper will be ... PET pipes The plumbing system.... ELEMENT: Piping system in the core module Piping system between house and tanks	a corpo			$ 8,000.00	**$ 8,000.00**
3.3	**HVAC**					
	HVAC-	a corpo			15,000 €	**15,000 €**
	radiant comfort systems "Eurotherm"	m²	30	100 €	3,000 €	**3,000 €**
	3D core	a corpo			1,000 €	**1,000 €**
3.4	**ELECTRICAL SYSTEM**					
	Electrical Plant:	a corpo			7,000 €	**7,000 €**
	LIGHTING 1. Ceiling 2. Suspension led	a corpo			6,000 €	**6,000 €**

3.5	**SOLAR SYSTEMS - PHOTOVOLTAIC**					
	PV PLANT					
	pv panel structure - modular elements in aluminium tickness s=15cm	a corpo			**12,000 €**	
	PV PLANT:	kwatt	3	**1,200 €**	**3,600 €**	
	fixing sistems	a corpo			**2,000 €**	**17,600 €**
3.6	**TELECOMUNICATIONS AND BUILDING AUTOMATIZATION**					
	HOME AUTOMATION -sensor network and Gateway -Sensor for: temperature with two dispositives: ... -Gateway -Power Control Board				10,000 €	**10,000 €**
						160,503 €
	COMPETITION FEATURES					
	Ground leveling	a corpo				
	Ramps	a corpo				
		m²	53.28	120 €	**6,394 €**	
	APPLIANCES	m²	180	60 €	**10,800 €**	
				TOTAL	**17,194 €**	

Income Details:

SDE 2014 COMPETITION	
Team's Abbreviations	UNI
School's Name	NCTU
Team's Name	UNICODE

Company Name	Collaboration Details	Amount of support	% Total
Institutional Support			
Solar Decathlon Europe	financial support	100,000	
Minstry of Culture	cultural support	-	
Minstry of Foreign Affairs	cultural support	-	
Bureau France in Taipei	cultural support	-	
University System of Taiwan	financial, cultural support	8,100	
		108,100.00 €	7%
Industrial Partners & Sponsors			
Ruentex	design and construction support	2,381	
Tung Ho Steel	design and construction support	142,857	
Delta	design and construction support	123,436	
SGS	technical support	15,476	
UIS	technical support	15,476	
Mason Universal Enterprise Ltd.	technical support	-	
Bayer	product support	35,714	
Miniwiz	product support	-	
Berlin Co., Ltd.	product support	14,245	
Mega Master Technology	product support	-	
Spring Pool	product support	2,857	
Fuh Shan co.,Ltd.	product support	42,752	
Grand Biotechnology	product support	5,000	
Orchid4All	product support	2,500	
HCG	product support	4,802	
Asus	devices support	25,238	
Autodesk	software support	108,429	
EVA Airways	ticket support	20,952	
Signet Travel	Service support	-	
LOHAS Biotech	Ingredient Support, Training Support	-	
PHISON Electronics Corp.	product support	-	
Shoeiyan Workshop	Furniture support	1,595	
Order System Company	Furniture support	714	
Mao's Pottery	Furniture support	110	
Tien Yin Corp.	product support	1,429	
ASAZWA INDUSTRUAL Co.,Ltd	product support	-	
		565,964.33 €	38%
Other Income Details			
Ruentex	financial donation	785,714	
Delta Foundation	financial donation	31,554	
SHU CHANG & ASSOCIATES, ARCHITECTS	financial donation	11,905	
		829,173.10 €	55%

Solar Decathlon Europe	SDE 2014 COMPETITION	
	Team's Abbreviations	UNI
	School's Name	NCTU
	Team's Name	UNICODE

Company Name	Collaboration Details	Amount of support	% Total
		1,503,237.43 €	100 % Total

Cash Flow:

Solar Decathlon Europe	SDE 2014 COMPETITION EN FRANCE					
	Team's Abbreviations		UNI			
	School's Name		NCTU			
	Team's Name		UNICODE			
Cash Flow	2013				2014	
ITEM	Q1	Q2	Q3	Q4	Q1	Q2
Inflow / Sponsorship						
Ruentex	476,190 €	0 €	0 €	0 €	0 €	309,524 €
Delta Foundation	0 €	0 €	0 €	31,554 €	0 €	0 €
Shu Chang & Associates, Architects	0 €	0 €	0 €	0 €	0 €	11,905 €
Photovoltaic Energy (Solar Panel) system	0 €	0 €	0 €	0 €	5,430 €	0 €
Domestic Appliance	0 €	0 €	0 €	0 €	0 €	70,387 €
Electronic Converter	0 €	0 €	0 €	0 €	47,619 €	0 €
ASUS - IT Solutions	0 €	0 €	0 €	25,238 €	0 €	0 €
Bayer - Vacuum thermal material	0 €	0 €	0 €	0 €	0 €	35,715 €
Fuh Shan - Auto-controlled Louvre	0 €	0 €	0 €	0 €	0 €	42,752 €
TUNG HO STEEL - Steel Frame & Construction	0 €	0 €	0 €	0 €	0 €	142,860 €
Miniwiz - External Walls with Water Tank	0 €	0 €	0 €	20,000 €	0 €	0 €
Spring Pool/Mega Master Tech- Glass/ Insulation material	0 €	0 €	0 €	0 €	0 €	16,753 €
HCG - Restroom Units & Kitchen Decoration	0 €	0 €	0 €	0 €	0 €	7,600 €
BioTech/Orchid 4 All" Orchid & Green Plants	0 €	0 €	0 €	0 €	0 €	7,500 €
Berlin - Fire-Proof Painting	0 €	0 €	0 €	0 €	0 €	14,285 €
SUBTOTAL	476,190 €	0 €	0 €	76,792 €	53,049 €	659,281 €
Outflow						
Personnel — Faculty, researcher, student, administration, consultant and other personnel	13,500 €	13,594 €	142,000 €	142,376 €	5,250 €	7,750 €
Communication — 1:25 Architectural models, 1:1 architectural models, smart living & water wall research models, winter camp, videos, events & exhibitions, on-site display, and communication documentation	1,100 €	3,100 €	1,235 €	3,750 €	27,800 €	12,925 €
Administrative and Miscellaneous — Office supply	793 €	793 €	793 €	793 €	793 €	793 €
Workshop Expenses — 1st & 2nd	5,685 €	0 €	0 €	18,470 €	0 €	0 €
Travels & Costs for Final Phase in Versailles — Tickets, accommodation, transporation, and other expenses	0 €	0 €	0 €	0 €	0 €	280,700 €
SUBTOTAL	21,078 €	17,487 €	144,028 €	165,389 €	33,843 €	302,168 €
Costs						
Personnel — Contractors	0 €	0 €	0 €	0 €	18,200 €	10,000 €

Solar Decathlon Europe	SDE 2014 COMPETITION EN FRANCE					
	Team's Abbreviations	UNI				
	School's Name	NCTU				
	Team's Name	UNICODE				
Cash Flow	2013				2014	
ITEM	Q1	Q2	Q3	Q4	Q1	Q2
Inflow / Sponsorship						
Ruentex	476,190 €	0 €	0 €	0 €	0 €	309,524 €
Direct Material (Photovoltaic energy (solar panel) system, insulation panel, vacuum thermal material, and foundation units)	0 €	0 €	0 €	0 €	10,925 €	627,561 €
Transporation (Shipping & customs)	0 €	0 €	0 €	0 €	0 €	175,880 €
Other Direct Costs (Site preparation, storage, on site security and public hygiene, crane/ fork lift, trucks, and other equipments)	0 €	0 €	0 €	0 €	14,132 €	6,170 €
Assembly and Disassembly (On site)	0 €	0 €	0 €	0 €	0 €	32,400 €
Insurance	0 €	0 €	0 €	0 €	0 €	26,000 €
SUBTOTAL	0 €	0 €	0 €	0 €	43,257 €	878,011 €
SUBTOTAL	455,112 €	437,625 €	293,596 €	204,999 €	180,948 €	(339,951 €)

9

Site Operation Report

9.1 General Data

Modular Design

The Orchid House is designed to be constructed with prefabricated modular units. In this way, it will be assembled and disassembled with sufficient time and skill. This is not only suitable for the rooftop extension plan in its real condition in Taiwan, but also suitable for the SDE2014 competition 10-day construction schedule in La Cite' du Soleil®.

The Orchid House is assembled with 26 module units, which includes 7 box structure units and 19 panel structure units. Every unit is connected by footing or connection panel joints. Through this way, the NCTU Unicode team creates a stable and adjustable construction system with independent structures. The structural system is flexible to fit different site conditions.

Assembly Phase

To assemble the Orchid House, the team tries to establish the goals of easy, quick and safe. To achieve these goals, the assembly process is divided into 10 phases.

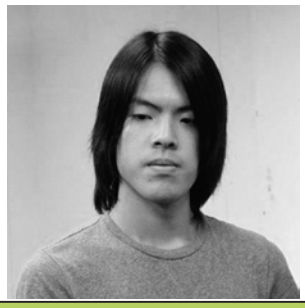
The assembly phases are:
1. Site-Preparation
2. Module Units
3. Insulation
4. MEP System
5. Roof Structure
6. Roof Panel
7. Green Core
8. Facade
9. Waterproof
10. Furnishing and Planting

Disassembly Phase

The disassembly process is still under the pressure of time limit. In addition, the packing time and sequence are also concerned. For this purpose, the disassembly phases are somehow different from the assembly phases.

The disassembly phases are:
1. Furnishing and Planting
2. Outdoor Deck Units
3. Ground Floor
4. Mezzanine Floor
5. Roof Panels
6. East Roof Structure
7. West Roof Structure
8. Tea Terrance Units
9. Box Units
10. Footing

9.2 Site operations coordinators

Photo	Name	Mobile Phone No.	E-Mail
Group A			
	Yating Wu	+886 921-147-216	yatingwu@arch.nctu.edu.tw
Group B			
	Dennis Lin	+886 961-070-768	dennis01215@arch.nctu.edu.tw
Group C			
	Sky Tseng	+886 988-204-763	sky@arch.nctu.edu.tw

9.3 Logistic outside of La Cité du Soleil®

9.3.1 Transportation Route

1. Shipping Route

The NCTU Unicode Team plans a shipping route from Taiwan to France by sea. The shipping schedule has a two week advance time to avoid shipping lag or climate effects. It is also necessary to find a temporary storage site in case of arriving earlier than schedule.

Figure 9.3.1.1 Shipping Route from TAIWAN to FRANCE

Phase	Port	Arrival	Departure
1	KAOHSIUNG	2014/04/29 10:00	2014/04/30 08:00
2	YANTIAN	2014/05/01 08:00	2014/05/02 08:00
3	SINGAPORE	2014/05/05 16:00	2014/05/06 22:00
4	ROTTERDAM	2014/05/26 01:00	2014/05/27 10:00
5	LE HAVRE	2014/06/01 06:00	2014/06/02 06:00

Table 9.3.1.1 Shipping Route location and schedule

2. Trucks Route

Distance: 191 km, 114 min

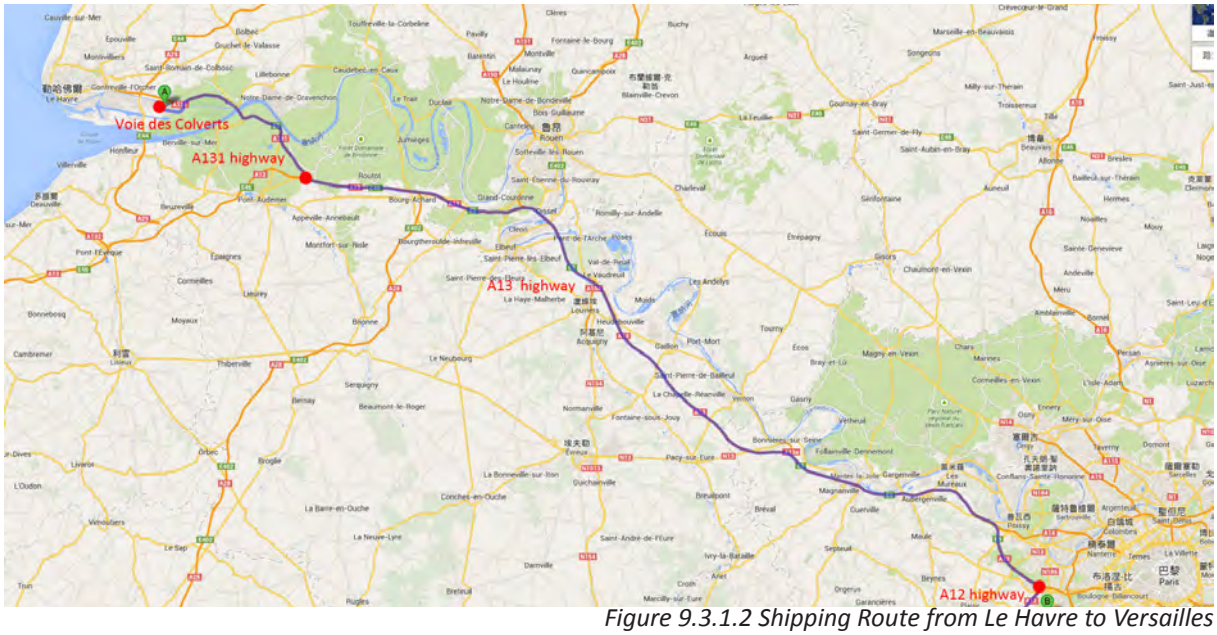


Figure 9.3.1.2 Shipping Route from Le Havre to Versailles

Trailer Frequency	Transport Date	Location & Directions	Travel Time (min.)
15	6/16~6/25	Voie des Colverts (Start)	0
		A131 Highway	7
		A13 Highway	16
		A12 Highway	60
		D10 Road	26
		Versailles (End)	5
Total			114
16	7/15~7/19	Versailles (Start)	0
		D10 Road	5
		A12 Highway	26
		A13 Highway	60
		A131 Highway	16
		Voie des Colverts (End)	7
Total			114

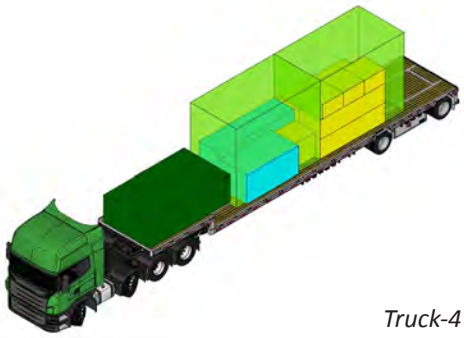
Table 9.3.1.2 Trucks Route location and schedule

3. Shipping Timetable

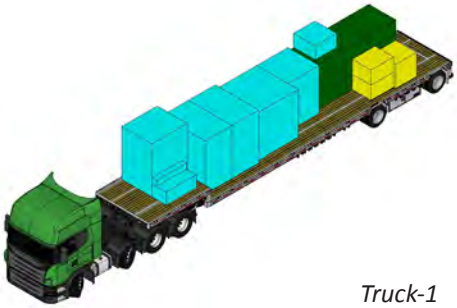
Shipping, Freight, Demand, Process Timetable				
Date	Local	Project target	Demand Help	Self assist
4/16~4/29	Taiwan	Apply to customs	Declaration process guidance	Customs detail, customs declaration
4/7~4/13	Taiwan	Component packaging and protection	Packaging and protective materials to provide	Packaging and Protection
4/13~4/16	Taiwan	Component transport (Container *14)	Hsinchu→Container port	
4/13~4/16	Taiwan	Component Loading(Container*14)	Loading location and Equipment evaluation	Component classification
4/29~6/1	Ship	Taiwan→France	Transport	The number of containers and the declaration content
6/1~6/5	France	Immigration Customs	Declaration process guidance	Customs detail, the number of containers and the
6/5~6/10	France	Component Discharge (Container*14)(Trailers Trucks *15)	Component Discharge	Component Discharge
6/10~6/15	France	Component transport (Trailers Trucks *15)	France transport (Trailers Trucks *13)	Trucks size
6/5~6/25 7/15~7/25	France	Pre Construction Warehouse (H-5M,400m^2 Warehouse) Heavy equipment rental	Warehouse Lodging Near Warehouse Forklift ,Bridge Crane or small crane ,Scaffolding, air Compressors	Warehouse size
6/16~6/25	France	Transport sequence	Transport	Transport sequence in 10 Days
7/15~7/24	France	Disassembly Warehouse (H-5M,400m^2 Warehouse)	Forklift, Bridge crane or small crane ,Scaffolding, air Compressors	
7/19~7/24	France	Component packaging and protection	Packaging and protective materials to provide	Packaging and Protection
7/21~7/24	France	Component transport (Trailers Trucks *14)	Warehouse→Port	
7/25	France	Outbound Customs	Declaration process guidance	Customs detail, customs declaration
8/1	Taiwan	Transportation back to Taiwan		

9.3.2.1 Assembly trucks specifications and shipments

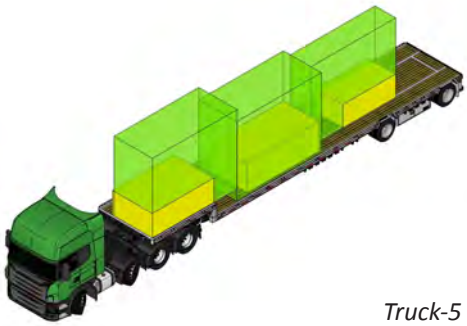
- Pallet film packaging
- Wooden case packaging
- Steel structural unit pallet packaging
- Exposed pallet packaging



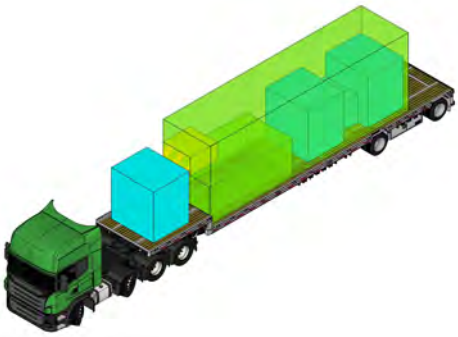
Truck-4



Truck-1



Truck-5



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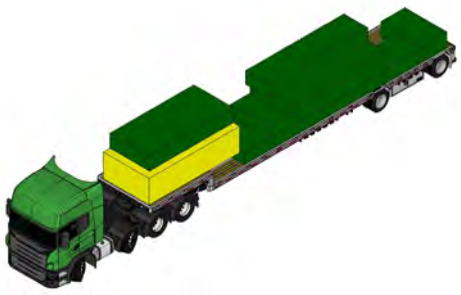

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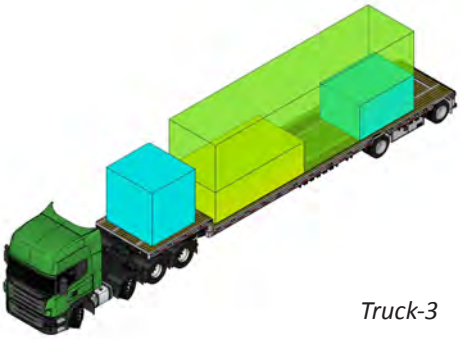

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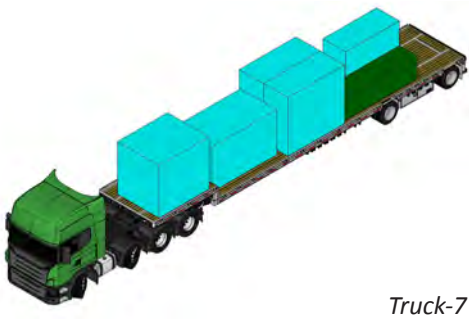
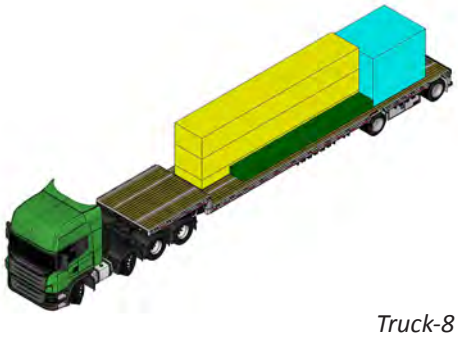


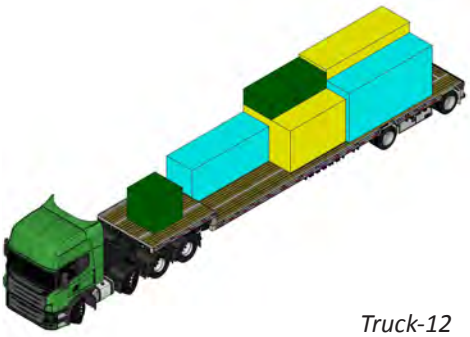
Truck-7

9.3.2.2 Assembly trucks specifications and shipments List

Truck No.(A)	Type	Designation	Package No.	Assembly No	QTY	Weight(kg)	Dimensions(mm)			Arrival
							L	W	H	
1	Flat	Tool	N30	1	1	150	1500	1500	1500	6/16 08:00
1	Flat	Tool	N32	1	1	10	1500	900	800	6/16 08:00
1	Flat	Tool	N33	1	1	50	1500	500	500	6/16 08:00
1	Flat	Tool	N25	3	1	150	1000	1000	1000	6/16 08:00
1	Flat	Wooden Sandbox	P27	4	1	150	2100	1300	1090	6/16 08:00
1	Flat	Wooden Sandbox	P28	4	1	150	2100	1300	1090	6/16 08:00
1	Flat	Wooden Sandbox	P31	4	1	150	1700	1450	1210	6/16 08:00
1	Flat	Steel Structure Footing	P14	6	1	440	1300	1300	620	6/16 08:00
1	Flat	Steel Structure Footing	P15	6	1	440	1300	1300	620	6/16 08:00
1	Flat	Steel Structure Footing	P16	6	1	440	1300	1300	620	6/16 08:00
1	Flat	Steel Structure Footing	P17	6	1	440	1300	1300	620	6/16 08:00
1	Flat	Steel Structure Footing	P18	6	1	440	1300	1300	620	6/16 08:00
1	Flat	Plastic Bucket	W1	11	1	890	1100	900	630	6/16 08:00
1	Flat	Plastic Bucket	W2	11	1	120	1100	900	630	6/16 08:00
1	Flat	Tool	P48-w	11	1	680	1500	1500	2000	6/16 08:00
1	Flat	Steel Structure Footing	P19	326	1	440	1300	1300	620	6/16 08:00
1	Flat	Steel Structure Footing	P20	326	1	440	1300	1300	620	6/16 08:00
1	Flat	Steel Structure Footing	P21	326	1	440	1300	1300	620	6/16 08:00
1	Flat	Steel Structure Footing	P22	326	1	440	1300	1300	620	6/16 08:00
1	Flat	Sand Bag	N34	1	1	6000	2000	2000	2000	6/16 08:00
total					20	12460				
Truck No.(A)	Type	Designation	Package No.	Assembly No	QTY	Weight(kg)	Dimensions(mm)			Arrival
							L	W	H	
2	Low	Steel Structure UNIT 12	P09	11	1	2640	9500	2275	3450	6/16 12:00
2	Low	Steel Structure UNIT 10	P07	51	1	550	4000	2200	1545	6/16 12:00
2	Low	GL Lower Wooden Box	P50	98	1	80	1865	1150	1140	6/16 12:00
2	Low	GL Lower Wooden Box	P52	98	1	180	1865	1150	1140	6/16 12:00
2	Low	Steel Structure Connection	P13-w	121	1	350	1300	1300	755	6/16 12:00
2	Low	ML Lower Wooden Box	P58	1	1	2500	2030	1710	1210	6/16 12:00
2	Low	ML Lower Wooden Box	P59	1	1	2500	2030	1710	1210	6/16 12:00
total					7	8800				
Truck No.(A)	Type	Designation	Package No.	Assembly No	QTY	Weight(kg)	Dimensions(mm)			Arrival
							L	W	H	
3	Low	Steel Structure UNIT 11	P08	15	1	2345	9500	2200	3450	6/16 14:00
3	Low	Aluminum Window Frame	W3	57	1	260	4450	2200	1300	6/16 14:00
3	Low	ML Upper Wooden Box	P60	122	1	420	2000	2000	2000	6/16 14:00
3	Low	Ceiling Structure	P46	178	1	70	1622	960	420	6/16 14:00
total					4	3095				
Truck No.(A)	Type	Designation	Package No.	Assembly No	QTY	Weight(kg)	Dimensions(mm)			Arrival
							L	W	H	
4	Low	Steel Structure UNIT 05	P05	20	1	1150	4000	2200	3450	6/16 15:00
4	Low	Eform	N31	24	1	150	4000	2000	2000	6/16 15:00
4	Low	Steel Structure UNIT 04	P04	27	1	1025	4000	2200	3450	6/16 15:00
4	Low	Electrical Pipe	W22	32	1	80	3100	1000	800	6/16 15:00
4	Low	Water Pipe	W23	32	1	110	3100	1000	800	6/16 15:00
4	Low	Steel Structure UNIT 06	P06	54	1	1500	3850	2200	1130	6/16 15:00
4	Low	Vacuum Insulation Panel	P76	122	1	120	2480	1303	1200	6/16 15:00
4	Low	UIS Tool	N24	147	1	70	1000	1000	600	6/16 15:00
4	Low	UIS Tool	N21	147	1	70	1000	1000	600	6/16 15:00
4	Low	UIS Tool	N22	147	1	70	1000	1000	600	6/16 15:00
4	Low	UIS Tool	N23	147	1	70	1000	1000	1000	6/16 15:00
4	Low	Air Pipe	W24	153	1	50	3100	1000	800	6/16 15:00
4	Low	Exhaust Fan Air Pipe	W25	198	1	250	3100	1000	800	6/16 15:00
4	Low	PV Cable Tray	w25	244	1	250	3100	1000	800	6/16 15:00
total					14	4965				
Truck No.(A)	Type	Designation	Package No.	Assembly No	QTY	Weight(kg)	Dimensions(mm)			Arrival
							L	W	H	
5	Low	Tool	N12	3	1	835	2900	1890	1000	6/16 16:00
5	Low	Tool	N11	3	1	800	3400	1690	1200	6/16 16:00
5	Low	Steel Structure UNIT 03	P03	34	1	950	4000	1810	3450	6/16 16:00
5	Low	Steel Structure UNIT 02	P02	41	1	1000	4000	1790	3450	6/16 16:00
5	Low	Steel Structure UNIT 01	P01	46	1	900	4000	975	3450	6/16 16:00
5	Low	Wooden Sheet	W31	178	1	150	2600	1300	800	6/16 16:00
total					6	4635				
Truck No.(A)	Type	Designation	Package No.	Assembly No	QTY	Weight(kg)	Dimensions(mm)			Arrival
							L	W	H	
6	Flat	Steel Structure Beam	P37	83	1	1660	4030	1900	630	6/16 23:00
6	Flat	Steel Structure Stair	P39	92	1	350	4730	1150	565	6/16 23:00
6	Flat	Steel Structure Stair	P40	92	1	200	1890	1305	540	6/16 23:00
6	Flat	Steel Structure Stair	P38	92	1	400	2010	1150	690	6/16 23:00
6	Flat	Steel Structure Beam	P34	102	1	1540	4507.6	1900	480	6/16 23:00
6	Flat	Steel Structure Beam	P36	102	1	920	5451.5	1900	480	6/16 23:00
6	Flat	GL Upper Wooden Box	W26	122	1	760	4350	2200	1100	6/16 23:00
6	Flat	Steel Structure Column	P33	188	1	1700	6674.3	1900	480	6/16 23:00
total					8	7530				



Truck-8



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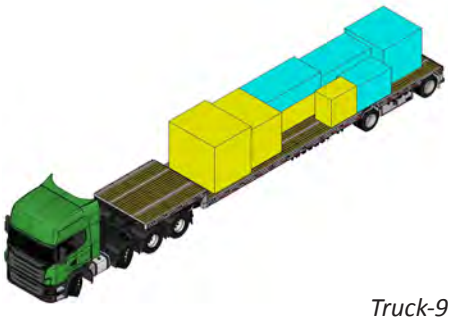

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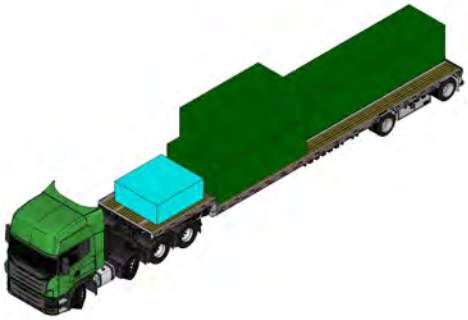
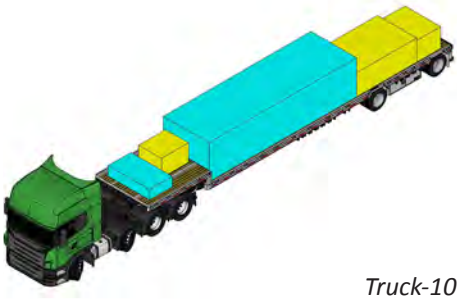
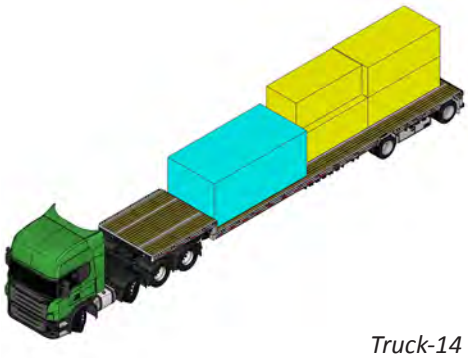


Truck-13



Truck-10



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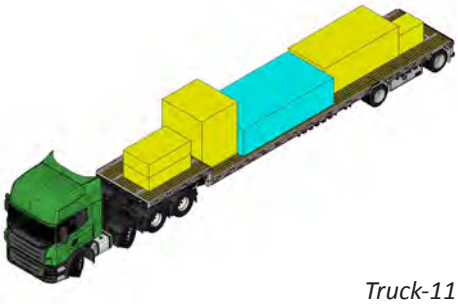
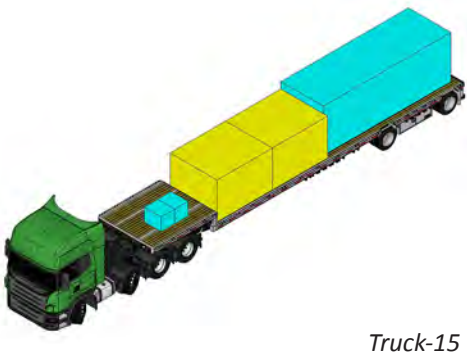


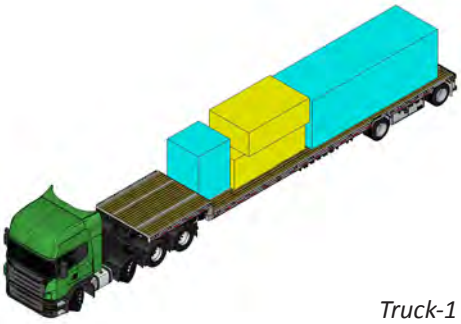
Truck-11



Truck-15

Truck No.(A)	Type	Designation	Package No.	Assembly No	QTY	Weight(kg)	Dimensions(mm)			Arrival
							L	W	H	
7	Flat	Bedroom Cabinet	P64	130	1	200	2515	1065	1000	6/17 02:00
7	Flat	Steel Structure Small Beam (South	P35	102	1	800	3530	1900	930	6/17 02:00
7	Flat	Wooden Box (Wall)	P61	125	1	2000	2650	1140	1236	6/17 02:00
7	Flat	Wooden Box (Wall)	P62	125	1	2000	2650	1140	1236	6/17 02:00
7	Flat	Kitchen Finish	P73	129	1	300	3050	1700	1830	6/17 02:00
7	Flat	Bedroom Cabinet	P74	130	1	220	2350	1950	2130	6/17 02:00
total					6	5520				
Truck No.(A)	Type	Designation	Package No.	Assembly No	QTY	Weight(kg)	Dimensions(mm)			Arrival
							L	W	H	
8	Flat	Steel Structure Canopy	P82	140	1	300	6250	700	300	6/17 08:00
8	Flat	Wooden Box	P77	146	1	360	2540	2000	2020	6/17 08:00
8	Flat	Stainless Steel Pool	W9	161	1	190	7600	1310	390	6/17 08:00
8	Flat	FRP Clean Water Tank	W35	162	1	110	7600	1310	880	6/17 08:00
8	Flat	FRP Gray Water Tank	W36	162	1	110	7600	1310	880	6/17 08:00
total					5	1070				
Truck No.(A)	Type	Designation	Package No.	Assembly No	QTY	Weight(kg)	Dimensions(mm)			Arrival
							L	W	H	
9	Flat	Small Wooden Box	P65	125	1	350	2500	1300	1440	6/18 06:00
9	Flat	Ceramic Panel	P75	146	1	860	2700	1320	720	6/18 06:00
9	Flat	Toilet equipment	W13	179	1	300	2100	1650	1680	6/18 06:00
9	Flat	Washing Machine	W11	207	1	150	800	1260	1180	6/18 06:00
9	Flat	Panasonic CO2 Heat Pump Tank	W12	207	1	270	1800	2250	1980	6/18 06:00
9	Flat	Hot Water Tank	P72	207	1	150	1700	1000	1080	6/18 06:00
9	Flat	Polli-Brick	P45	225	1	160	1900	1900	1730	6/18 06:00
9	Flat	Thermal Wall Outside Structure	W30	226	1	500	2500	1300	950	6/18 06:00
total					8	2740				
Truck No.(A)	Type	Designation	Package No.	Assembly No	QTY	Weight(kg)	Dimensions(mm)			Arrival
							L	W	H	
10	Flat	PV Module	N26	242	1	160	1500	800	600	6/19 02:00
10	Flat	PV Module	N13	242	1	720	2900	1890	1000	6/19 02:00
10	Flat	Smart Skin UNIT	N14	243	1	275	1730	1150	900	6/19 02:00
10	Flat	Electrical equipment	W14	248	1	150	1100	1300	820	6/19 02:00
10		Bayer PC Hollow Sheet	P78	281	1	900	7100	2200	1630	6/19 02:00
total					5	2205				
Truck No.(A)	Type	Designation	Package No.	Assembly No	QTY	Weight(kg)	Dimensions(mm)			Arrival
							L	W	H	
11	Flat	Glass Louver	W5	258	1	950	712	1200	740	6/19 14:00
11	Flat	kitchen&living equipment	W10	268	1	460	1900	1700	2130	6/19 14:00
11	Flat	Exhaust Fan	W15	270	1	200	1230	2020	550	6/19 14:00
11	Flat	Exhaust Fan	W16	270	1	200	1230	2020	550	6/19 14:00
11	Flat	Aluminum Louver Frame	W4	307	1	2000	3560	1750	1230	6/19 14:00
11	Flat	Plastic Wood Unit	P67	378	1	4200	4350	2200	1100	6/19 14:00
total					6	8010				
Truck No.(A)	Type	Designation	Package No.	Assembly No	QTY	Weight(kg)	Dimensions(mm)			Arrival
							L	W	H	
12	Flat	Aluminum Windows	W32	258	1	140	2600	2200	2200	6/20 16:00
12	Flat	Steel Column Green Core	N6	276	1	2200	3900	1290	1215	6/20 16:00
12	Flat	Steel Column Green Core	N7	276	1	2200	3900	1290	1215	6/20 16:00
12	Flat	Steel Structure Footing	P23	326	1	440	1300	1300	620	6/20 16:00
12	Flat	Steel Structure Footing	P24	326	1	440	1300	1300	620	6/20 16:00
12	Flat	Steel Structure Footing	P25	326	1	440	1300	1300	620	6/20 16:00
12	Flat	Steel Structure Footing	P26	326	1	440	1300	1300	620	6/20 16:00
12	Flat	Plastic Wood Small Piece	N20	378	1	2000	3600	1200	1400	6/20 16:00
12	Flat	Sand Bag	N36	400	1	6000	2000	2000	2000	6/20 16:00
total					9	14300				
Truck No.(A)	Type	Designation	Package No.	Assembly No	QTY	Weight(kg)	Dimensions(mm)			Arrival
							L	W	H	
13	Flat	Solar Water Heater Frame	P44	328	1	220	2200	2000	800	6/23 01:00
13	Flat	Steel Structure UNIT 13	P10	334	1	1950	4300	2275	1430	6/23 01:00
13	Flat	Steel Structure UNIT 23	P11	334	1	3800	7000	1700	1430	6/23 01:00
13	Flat	Steel Structure UNIT 22	P12	334	1	1450	3700	2225	1180	6/23 01:00
total					4	7420				
Truck No.(A)	Type	Designation	Package No.	Assembly No	QTY	Weight(kg)	Dimensions(mm)			Arrival
							L	W	H	
14	Flat	FRP Rain Water Tank	W37	162	1	150	3100	1400	1180	6/23 15:00
14	Flat	Plastic Wood Unit	P68	378	1	4440	4350	2200	1830	6/23 15:00
14	Flat	Steel Outdoor Handrail	N1	396	1	800	3400	1685	1215	6/23 15:00
14	Flat	Steel Outdoor Handrail	N3	396	1	800	3400	1685	1215	6/23 15:00
14	Flat	Steel Outdoor Handrail	N2	396	1	800	3400	1685	1215	6/23 15:00
total					5	6990				
Truck No.(A)	Type	Designation	Package No.	Assembly No	QTY	Weight(kg)	Dimensions(mm)			Arrival
							L	W	H	
15	Flat	Home accessories	N27	410	1	80	800	400	400	6/24 16:00
15	Flat	Furniture	W33	410	1	260	2600	2200	2200	6/24 16:00
15	Flat	Furniture	W34	410	1	650	2600	2200	2200	6/24 16:00
15	Flat	Planting	N35	400	1	3000	7000	2000	2000	6/24 16:00
total					4	3990				

9.3.2.3 Disassembly trucks specifications and shipments



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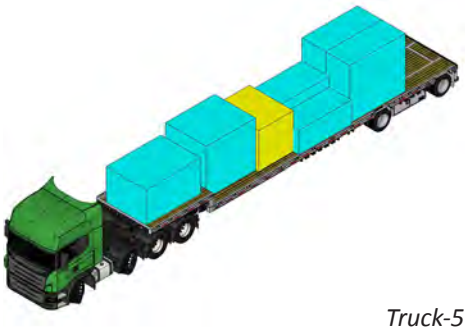

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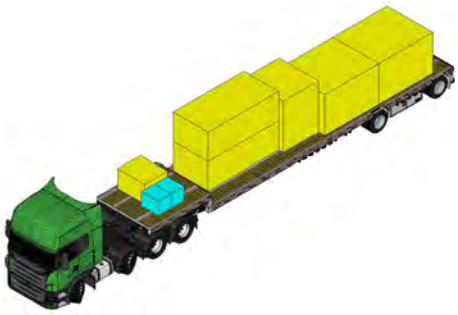

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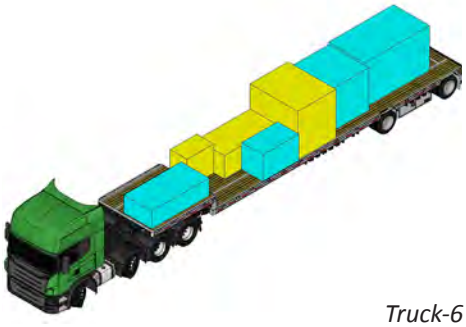

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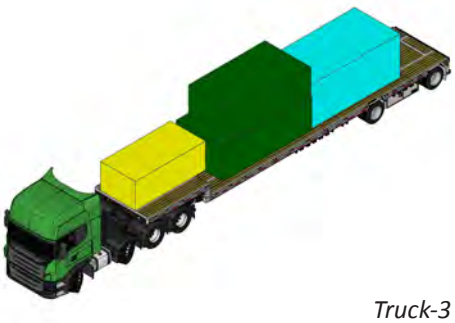

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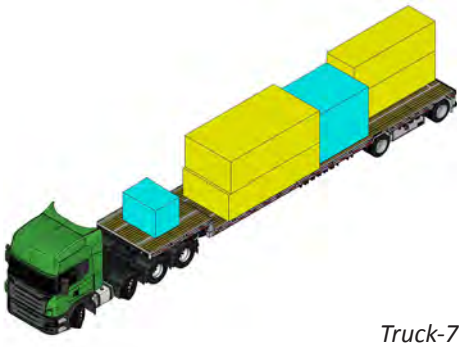

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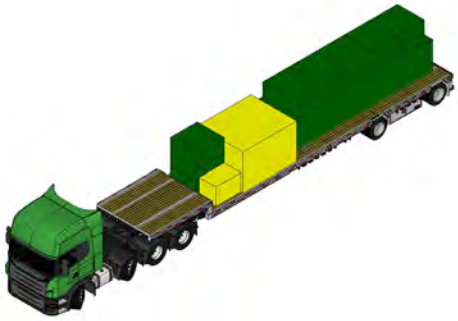

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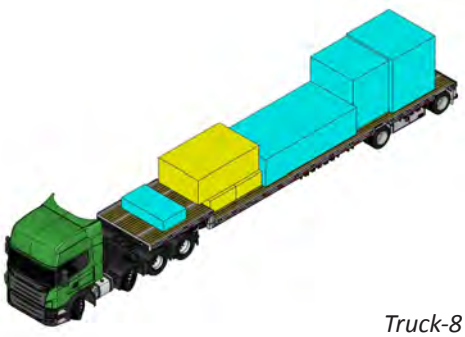
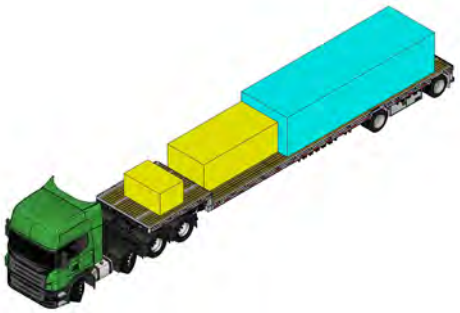


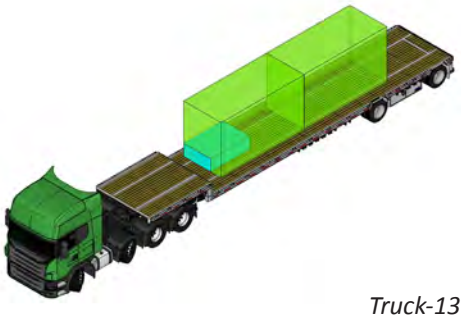
Truck-8

9.3.2.4 DisAssembly trucks specifications and shipments List

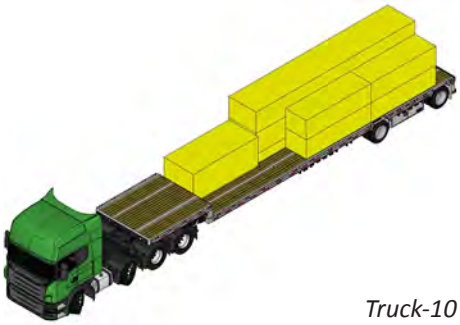
Truck No.(B)	Type	Designation	Package No.	Dismantling No	QTY	Weight(kg)	Dimensions(mm)			Arrival
							L	W	H	
1	Flat	Tool	N30	0	1	150	3400	1800	1100	7/15 10:00
1	Flat	Tool	N32	0	1	10	2900	1700	1100	7/15 10:00
1	Flat	Tool	N33	0	1	50	2000	2000	2000	7/15 10:00
1	Flat	Planting	N35	150	1	3000	7000	2000	2000	7/15 10:00
total					4	3210				
Truck No.(B)	Type	Designation	Package No.	Dismantling No	QTY	Weight(kg)	Dimensions(mm)			Arrival
							L	W	H	
2	Flat	Electrical equipment	W14	4	1	150	1100	1300	820	7/15 15:00
2	Flat	kitchen&living equipment	W10	3	1	460	1900	1700	2130	7/15 15:00
2	Flat	Steel Outdoor Handrail	N1	6	1	800	3400	1685	1215	7/15 15:00
2	Flat	Steel Outdoor Handrail	N2	6	1	800	3400	1685	1215	7/15 15:00
2	Flat	Home accessories	N27	1	1	80	800	400	400	7/15 15:00
2	Flat	Furniture	W33	2	1	260	2600	2200	2200	7/15 15:00
2	Flat	Furniture	W34	2	1	650	2600	2200	2200	7/15 15:00
total					7	3200				
Truck No.(B)	Type	Designation	Package No.	Dismantling No	QTY	Weight(kg)	Dimensions(mm)			Arrival
							L	W	H	
3	Flat	Steel Structure UNIT 13	P10	8	1	1950	4300	2275	1430	7/15 20:00
3	Flat	Steel Structure UNIT 22	P12	8	1	1450	3700	2225	1180	7/15 20:00
3	Flat	Plastic Wood Unit	P68	7	1	4440	4350	2200	1830	7/15 20:00
3	Flat	Steel Outdoor Handrail	N3	6	1	800	3400	1685	1215	7/15 20:00
total					4	8640				
Truck No.(B)	Type	Designation	Package No.	Dismantling No	QTY	Weight(kg)	Dimensions(mm)			Arrival
							L	W	H	
4	Flat	Glass Louver	W5	12	1	950	712	1200	740	7/16 01:00
4	Flat	Aluminum Windows	W32	15	1	140	2600	2200	2200	7/16 01:00
4	Flat	Steel Structure Footing	P19	9	1	440	1300	1300	620	7/16 01:00
4	Flat	Steel Structure Footing	P20	9	1	440	1300	1300	620	7/16 01:00
4	Flat	Steel Structure Footing	P21	9	1	440	1300	1300	620	7/16 01:00
4	Flat	Steel Structure Footing	P22	9	1	440	1300	1300	620	7/16 01:00
4	Flat	Steel Structure Footing	P23	9	1	440	1300	1300	620	7/16 01:00
4	Flat	Steel Structure Footing	P24	9	1	440	1300	1300	620	7/16 01:00
4	Flat	Steel Structure Footing	P25	9	1	440	1300	1300	620	7/16 01:00
4	Flat	Steel Structure Footing	P26	9	1	440	1300	1300	620	7/16 01:00
4	Flat	Steel Structure UNIT 23	P11	8	1	3800	7000	1700	1430	7/16 01:00
total					11	8410				
Truck No.(B)	Type	Designation	Package No.	Dismantling No	QTY	Weight(kg)	Dimensions(mm)			Arrival
							L	W	H	
5	Flat	Bedroom Cabinet	P64	25	1	200	2515	1065	1000	7/16 06:00
5	Flat	Wooden Box (Wall)	P61	21	1	2000	2650	1140	1236	7/16 06:00
5	Flat	Wooden Box (Wall)	P62	21	1	2000	2650	1140	1236	7/16 06:00
5	Flat	Small Wooden Box	P65	21	1	350	2500	1300	1440	7/16 06:00
5	Flat	Bedroom Cabinet	P74	25	1	220	2350	1950	2130	7/16 06:00
5	Flat	Ceiling Structure	P46	20	1	70	1622	960	420	7/16 06:00
5	Flat	Toilet equipment	W13	22	1	300	2100	1650	1680	7/16 06:00
total					7	5140				
Truck No.(B)	Type	Designation	Package No.	Dismantling No	QTY	Weight(kg)	Dimensions(mm)			Arrival
							L	W	H	
6	Flat	Kitchen Finish	P73	23	1	300	3050	1700	1830	7/16 12:00
6	Flat	Ceramic Panel	P75	31	1	860	2700	1320	720	7/16 12:00
6	Flat	Washing Machine	W11	28	1	150	800	1260	1180	7/16 12:00
6	Flat	Panasonic CO2 Heat Pump Tank	W12	28	1	270	1800	2250	1980	7/16 12:00
6	Flat	Hot Water Tank	P72	28	1	150	1700	1000	1080	7/16 12:00
6	Flat	Polli-Brick	P45	26	1	160	1900	1900	1730	7/16 12:00
6	Flat	Thermal Wall Outside Structure	W30	26	1	500	2500	1300	950	7/16 12:00
total					7	2390				
Truck No.(B)	Type	Designation	Package No.	Dismantling No	QTY	Weight(kg)	Dimensions(mm)			Arrival
							L	W	H	
7	Flat	Aluminum Window Frame	W3	38	1	260	4450	2200	1300	7/16 23:00
7	Flat	GL Lower Wooden Box	P50	39	1	80	1865	1150	1140	7/16 23:00
7	Flat	GL Upper Wooden Box	W26	36	1	760	4350	2200	1100	7/16 23:00
7	Flat	Wooden Box	P77	31	1	360	2540	2000	2020	7/16 23:00
7	Flat	Steel Column Green Core	N6	35	1	2200	3900	1290	1215	7/16 23:00
7	Flat	Steel Column Green Core	N7	35	1	2200	3900	1290	1215	7/16 23:00
total					6	5860				
Truck No.(B)	Type	Designation	Package No.	Dismantling No	QTY	Weight(kg)	Dimensions(mm)			Arrival
							L	W	H	
8	Flat	GL Lower Wooden Box	P52	39	1	180	1865	1150	1140	7/17 09:00
8	Flat	ML Upper Wooden Box	P60	37	1	420	2000	2000	2000	7/17 09:00
8	Flat	PV Module	N26	0	1	160	1500	800	600	7/17 09:00
8	Flat	PV Module	N13	50	1	720	2900	1890	1000	7/17 09:00
8	Flat	Exhaust Fan	W15	45	1	200	1230	2020	550	7/17 09:00
8	Flat	Exhaust Fan	W16	45	1	200	1230	2020	550	7/17 09:00
8	Flat	Plastic Wood Unit	P67	40	1	4200	4350	2200	1100	7/17 09:00
total					7	6080				



Truck-9



Truck-13



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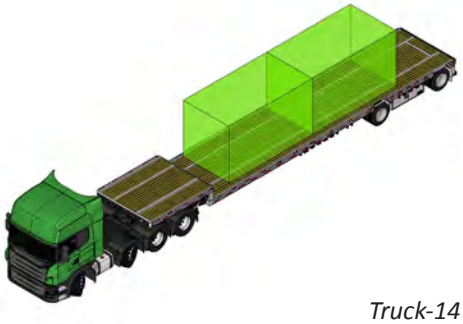
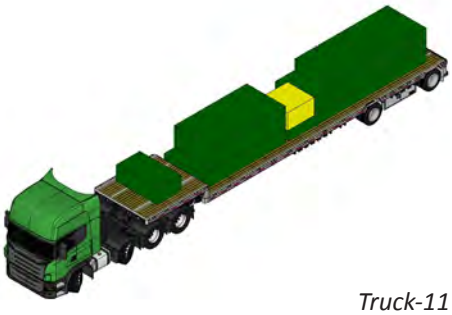
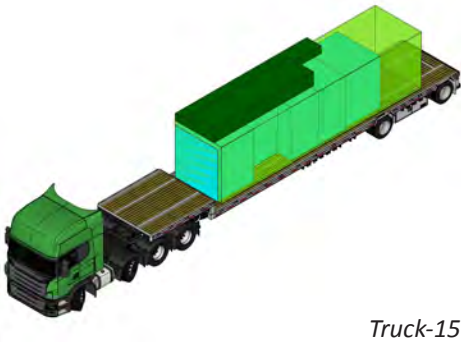


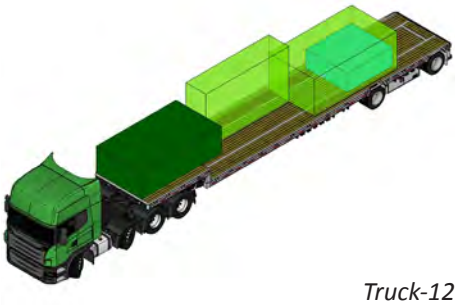
Truck-14



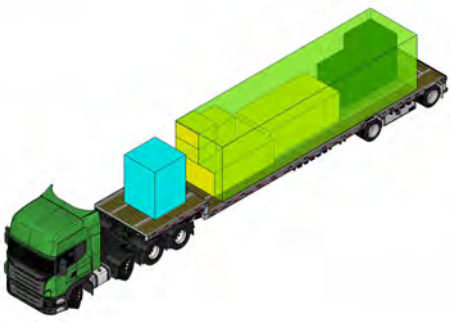
Truck-11



Truck-15



Truck-12



Truck-16

Truck No.(B)	Type	Designation	Package No.	Dismantling No	QTY	Weight(kg)	Dimensions(mm)			Arrival
							L	W	H	
9	Flat	Smart Skin UNIT	N14	51	1	275	1730	1150	900	7/17 15:00
9	Flat	Bayer PC Hollow Sheet	P78	55	1	900	7100	2200	1630	7/17 15:00
9	Flat	Aluminum Louver Frame	W4	53	1	2000	3560	1750	1230	7/17 15:00
total					3	3175				
Truck No.(B)	Type	Designation	Package No.	Dismantling No	QTY	Weight(kg)	Dimensions(mm)			Arrival
							L	W	H	
10	Flat	Electrical Pipe	W22	56	1	80	3100	1000	800	7/17 16:00
10	Flat	Water Pipe	W23	56	1	110	3100	1000	800	7/17 16:00
10	Flat	Air Pipe	W24	30	1	50	3100	1000	800	7/17 16:00
10	Flat	Stainless Steel Pool	W9	29	1	190	7600	1310	390	7/17 16:00
10	Flat	FRP Clean Water Tank	W35	57	1	110	7600	1310	880	7/17 16:00
10	Flat	FRP Gray Water Tank	W36	57	1	110	7600	1310	880	7/17 16:00
10	Flat	FRP Rain Water Tank	W37	57	1	150	3100	1400	1180	7/17 16:00
10	Flat	Exhaust Fan Air Pipe	W25	56	1	250	3100	1000	800	7/17 16:00
10	Flat	PV Cable Tray	w25	56	1	250	3100	1000	800	7/17 16:00
total					9	1300				
Truck No.(B)	Type	Designation	Package No.	Dismantling No	QTY	Weight(kg)	Dimensions(mm)			Arrival
							L	W	H	
11	Flat	Steel Structure Beam	P37	133	1	1660	4030	1900	630	7/18 23:00
11	Flat	Steel Structure Stair	P38	133	1	400	2010	1150	690	7/18 23:00
11	Flat	Steel Structure Small Beam	P35	122	1	800	3530	1900	930	7/18 23:00
11	Flat	Steel Structure Beam	P34	122	1	1540	4507.6	1900	480	7/18 23:00
11	Flat	Steel Structure Beam	P36	122	1	920	5451.5	1900	480	7/18 23:00
11	Flat	Steel Structure Connection	P13-w	124	1	350	1300	1300	755	7/18 23:00
11	Flat	Steel Structure Column	P33	105	1	1700	6674.3	1900	480	7/18 23:00
total					7	7370				
Truck No.(B)	Type	Designation	Package No.	Dismantling No	QTY	Weight(kg)	Dimensions(mm)			Arrival
							L	W	H	
12	Low	Steel Structure UNIT 01	P01	141	1	900	4000	975	3450	7/19 02:00
12	Low	Steel Structure UNIT 10	P07	138	1	550	4000	2200	1545	7/19 02:00
12	Low	Steel Structure UNIT 06	P06	134	1	1500	3850	2200	1130	7/19 02:00
12	Low	Solar Water Heater Frame	P44	54	1	220	2200	2000	800	7/19 02:00
total					4	3170				
Truck No.(B)	Type	Designation	Package No.	Dismantling No	QTY	Weight(kg)	Dimensions(mm)			Arrival
							L	W	H	
13	Low	Steel Structure UNIT 03	P03	143	1	950	4000	1810	3450	7/19 03:00
13	Low	Steel Structure UNIT 02	P02	142	1	1000	4000	1790	3450	7/19 03:00
13	Low	Steel Structure Stair	P40	132	1	200	1890	1305	540	7/19 03:00
total					3	2150				
Truck No.(B)	Type	Designation	Package No.	Dismantling No	QTY	Weight(kg)	Dimensions(mm)			Arrival
							L	W	H	
14	Low	Steel Structure UNIT 05	P05	145	1	1150	4000	2200	3450	7/19 04:00
14	Low	Steel Structure UNIT 04	P04	144	1	1025	4000	2200	3450	7/19 04:00
total					2	2175				
Truck No.(B)	Type	Designation	Package No.	Dismantling No	QTY	Weight(kg)	Dimensions(mm)			Arrival
							L	W	H	
15	Low	Wooden Sandbox	P27	149	1	150	2100	1300	1090	7/19 05:00
15	Low	Wooden Sandbox	P28	149	1	150	2100	1300	1090	7/19 05:00
15	Low	Wooden Sandbox	P31	149	1	150	1700	1450	1210	7/19 05:00
15	Low	Steel Structure UNIT 11	P08	147	1	2345	9500	2200	3450	7/19 05:00
15	Low	Steel Structure Stair	P39	132	1	350	4730	1150	565	7/19 05:00
15	Low	Steel Structure Canopy	P82	131	1	300	6250	700	300	7/19 05:00
15	Low	ML Lower Wooden Box	P58	150	1	2500	2030	1710	1210	7/19 05:00
15	Low	ML Lower Wooden Box	P59	150	1	2500	2030	1710	1210	7/19 05:00
total					8	8445				
Truck No.(B)	Type	Designation	Package No.	Dismantling No	QTY	Weight(kg)	Dimensions(mm)			Arrival
							L	W	H	
16	Low	Tool	N12	150	1	835	2900	1890	1000	7/19 12:00
16	Low	Tool	N25	150	1	150	1000	1000	1000	7/19 12:00
16	Low	Tool	N11	150	1	800	3400	1690	1200	7/19 12:00
16	Low	Steel Structure Footing	P14	149	1	440	1300	1300	620	7/19 12:00
16	Low	Steel Structure Footing	P15	149	1	440	1300	1300	620	7/19 12:00
16	Low	Steel Structure Footing	P16	149	1	440	1300	1300	620	7/19 12:00
16	Low	Steel Structure Footing	P17	149	1	440	1300	1300	620	7/19 12:00
16	Low	Steel Structure Footing	P18	149	1	440	1300	1300	620	7/19 12:00
16	Low	Steel Structure UNIT 12	P09	148	1	2640	9500	2275	3450	7/19 12:00
16	Low	Plastic Bucket	W1	150	1	890	1100	900	630	7/19 12:00
16	Low	Plastic Bucket	W2	150	1	120	1100	900	630	7/19 12:00
16	Low	Tool	P48-w	150	1	680	1500	1500	2000	7/19 12:00
16	Low	Sand Bag	N34	150	1	6000	2000	2000	2000	7/19 12:00
16	Low	Sand Bag	N36	150	1	6000	2000	2000	2000	7/19 12:00
total					14	20315				

9.4.0 Logistic outside of La Cité du Soleil®

9.4.1 Infrastructures

In La Cite' du Soleil®, The NCTU Unicode Team tries to use an simple but efficient way to create a safe work environment. Besides of the infrastructure provided by SDE2014 Organization which includes electrical box connected to the grid, lots lighting, and video recording. The infrastructures of the site will include the following items:

Tent
Because of the site is an outdoor space, a tent, whose size is 3m x 3m x 3m, is necessary to be built as a rest space with shade. All Team members will be protected from the sunlight.
treat as a rest space with shade. All Team members will not exposure to sunlight all the work time.

Construction Recorder
Although the SDE2014 Organization will provide a video recorder, the NCTU Unicode Team will setup another two time-lapse cameras in different location to catch up different angles. These time-lapse videos will be treated as communication material and construction research material.

These two time-lapse cameras use AAA batteries as its power source, and do not need any maintenance. They will be setup on the lots lighting equipment which will be provided by the SDE2014 Organization.

9.4.2 Construction working teams

● Boom Lift License ● Fork Lift License ● Car License

A Team working

Name	*Position*	*Mail*
Yating Wu ●	Site Operation Coordinator	yatingwu@arch.nctu.edu.tw
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Tze-Chun Chen ●	Decathlete	tcchen@arch.nctu.edu.tw
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B Team working

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Chi-Ming Chien ●	Decathlete	s9390306@gmail.com
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Ruby Tu ●	Decathlete	Ruby_@arch.nctu.edu.tw

C Team working

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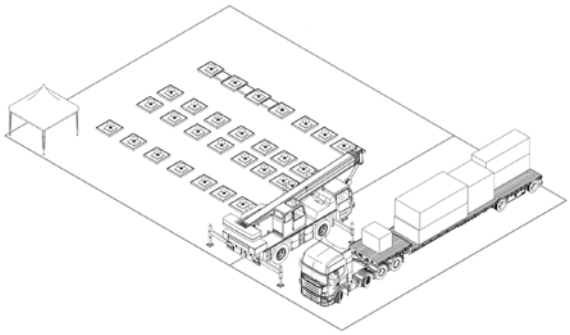
Jeff Lin ●	Tool Manager	bluerice@arch.nctu.edu.tw
Rui Lin ●	Material Manager	ruikisa@arch.nctu.edu.tw
Henry Ko ●	Decathlete	henryko@arch.nctu.edu.tw
Trista Wang ● ●	Decathlete	jou-hsuan@arch.nctu.edu.tw
Chester Hu ●	Decathlete	chian@arch.nctu.edu.tw
Leslie Yen ●	Decathlete	lieles.yen@arch.nctu.edu.tw
Andrew Su ● ●	Decathlete	andrewsudog@arch.nctu.edu.tw

9.4.3.1 Assembly Phases description

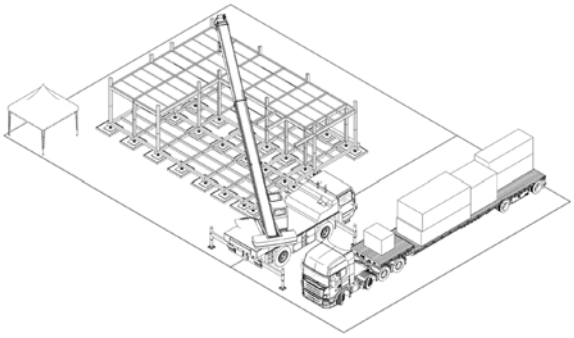
Phase 1: Site Preparation
Necessary Timing: 4 Hr

-Datum point
-Spacing
-Sand Box
-Coordinate positioning
-Horizontal correction



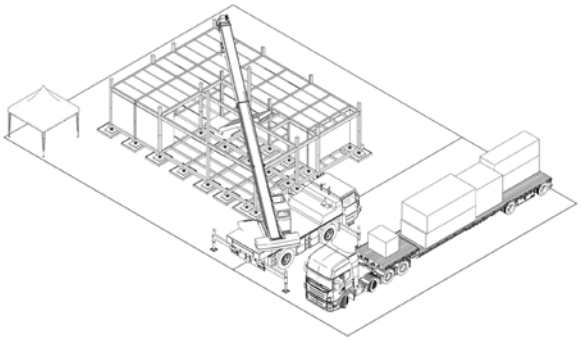
Phase 2: Establishment of the module unit
Necessary Timing: 44 Hr

-Modular Unit 1~5
-Modular Unit 11~12
-M.E.P. System
-Under Unit
-Unit combination
-Building positioning correction



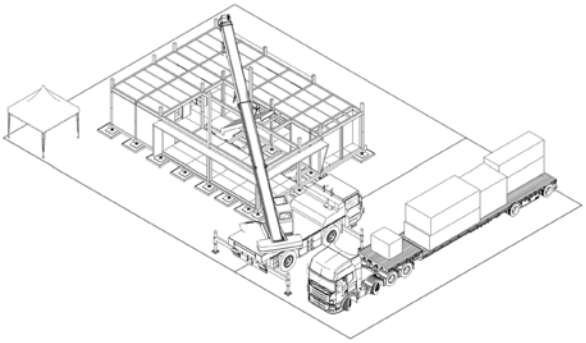
Phase 3: Insulation
Necessary Timing: 42 Hr

-Stair unit and terrance unit
-Assembly and lifting
-Interior insulation assembly
-M.E.P. system tube and trunking
-Interior upper floor insulation



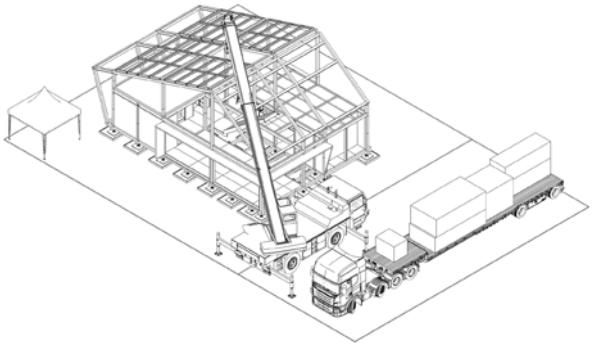
Phase 4: Installation of the MEP System
Necessary Timing: 42 Hr

-Additional components
-M.E.P. System shaft



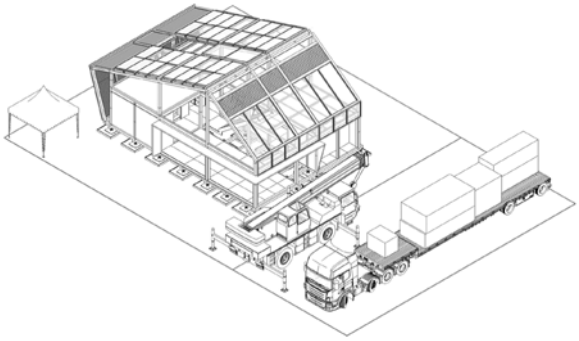
Phase 5: Roof Structure
Necessary Timing: 20 Hr

-2F Main structure
-Roof unit



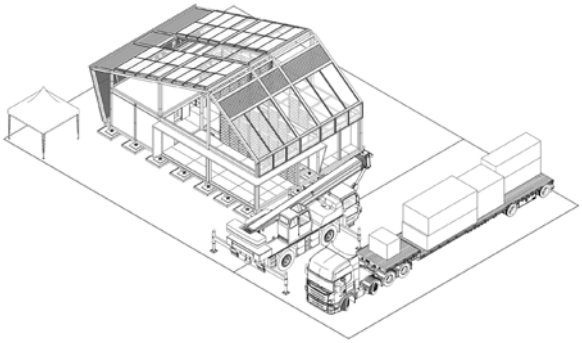
Phase 6: Roof Panel
Necessary Timing: 16 Hr

-Solar panel and solar panel electricity system
-Bayer roof panel
-Louver panel



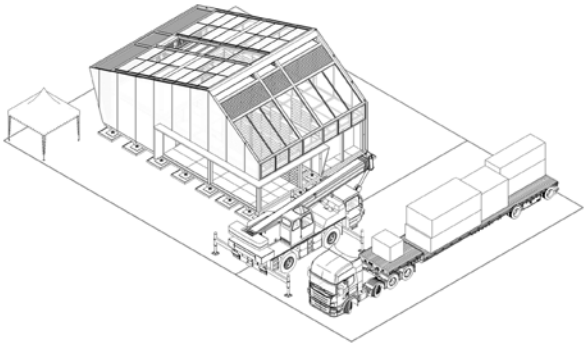
Phase 7: Green Core
Necessary Timing: 8 Hr

-Green core structure and Panel and Water system
-M.E.P. wiring and piping system



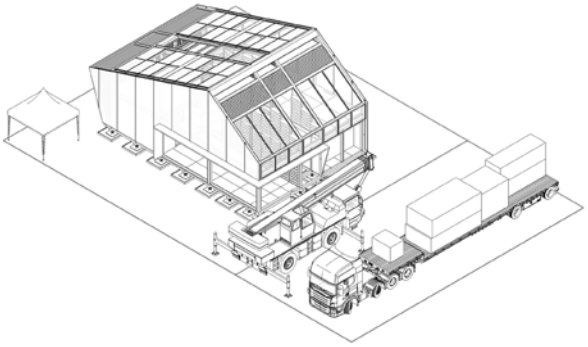
Phase 8: Facade
Necessary Timing: 24 Hr

-Bayer wall system structure and panel
-Roof cover and gutter system



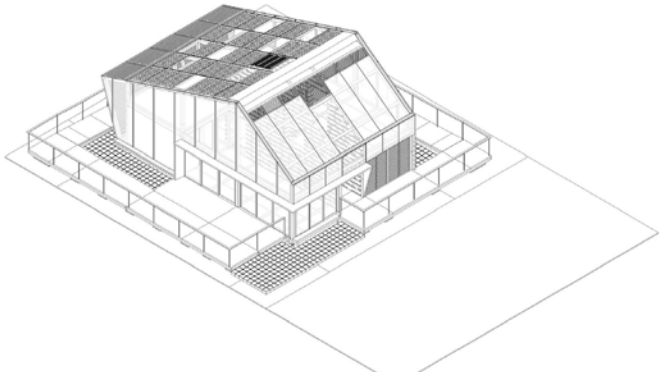
Phase 9: Waterproof
Necessary Timing: 32 Hr

-Roof waterproof
-Equipment and lighting test



Phase 10 : Furnishing and Planting
Necessary Timing: 24 Hr

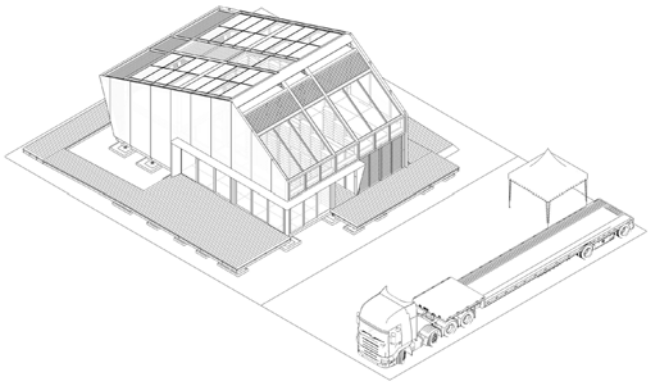
-Outdoor terrance structure and handrail and lighting
-Outdoor planting and Green core planting
-Furniture
-Appliances
-System test
-Lot clean



9.4.3.2 Disassembly Phases description

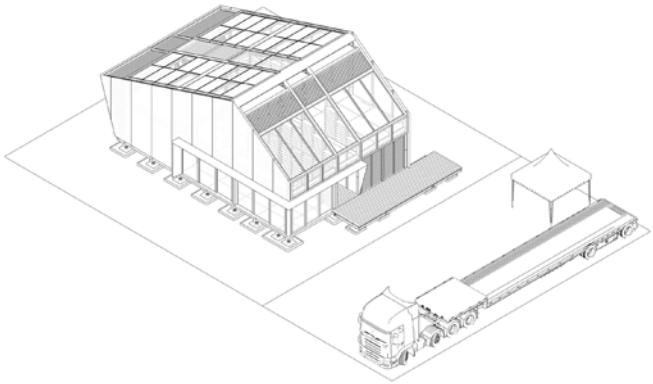
Phase 1: Furnishing and Planting
Necessary Timing: 6 Hr

Truck-1.2
-Plants
-Accessory
-Furniture
-Kitchen/Appliance/Lamp equipment
-Outside handrail



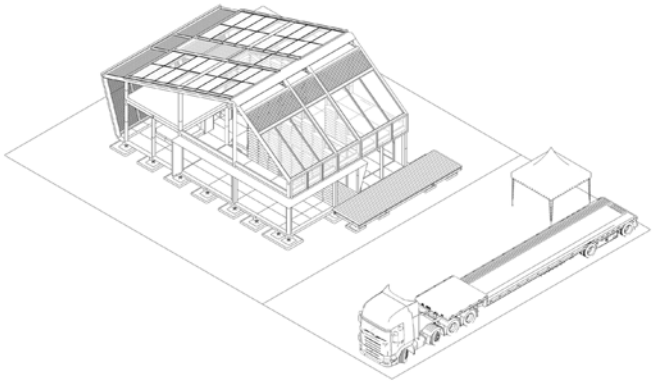
Phase 2: Outdoor Deck Units
Necessary Timing: 11 Hr

Truck-3
-Outside WPC/deck
-Outside footing
-East/West Bayer board
-South Eletric Blinds



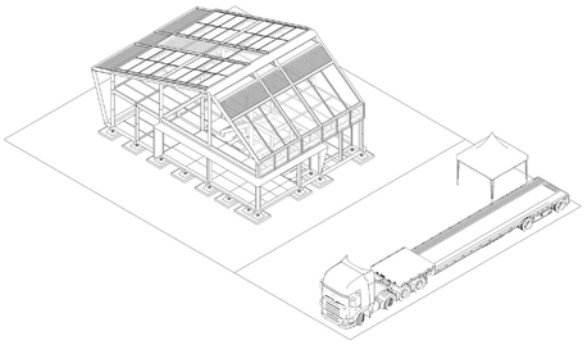
Phase 3: Ground Floor
Necessary Timing: 9 Hr

Truck-4.5
-1F Interior floor
-Aluminium window
-1F Ceiling
-Wooden wall
-Bathroom
-Kitchen Island
-Work Station
-Thermal wall



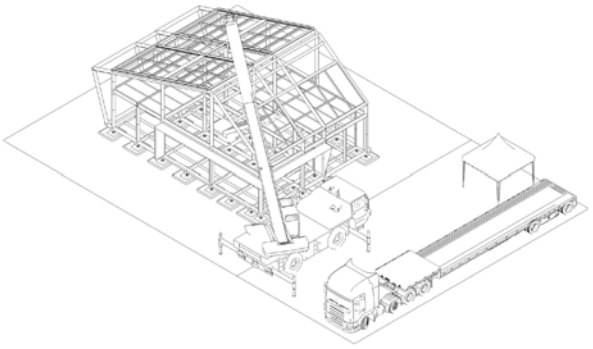
Phase 4: Mezzanine Floor
Necessary Timing: 11 Hr

Truck-6
-2F WPC
-2F Equipment/Appliance
-Green core



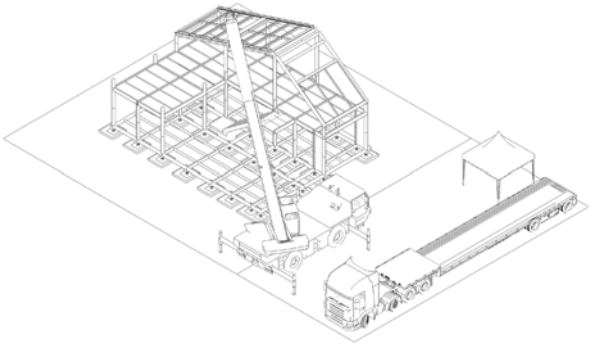
Phase 5: Roof Panels
Necessary Timing: 8 Hr

Truck-7.8.9.10
-1F/2F Upper wooden box
-Window/Door disassembly
-1F Lower wooden box
-Tea terrance/Entrance WPC
-Roof cover
-Roof Bayer board
-Smart skin
-Solar panel
-North Eletric Blinds
-Base pipline
-Water tank



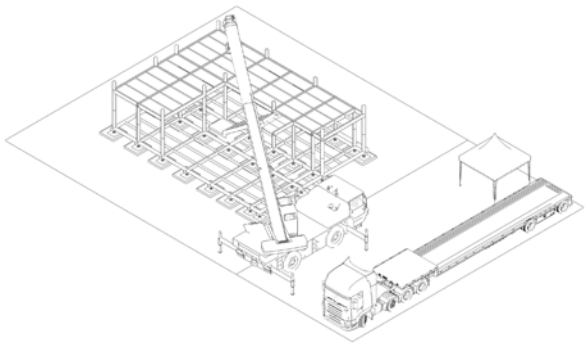
Phase 6: East Roof Structure
Necessary Timing: 10 Hr

-E2-E3 beam
-E1-E2 unit disassembly
-E3-E4 unit disassembly
-Roof Unit 5~7 disassembly
-Roof Unit 9~11 disassembly
-East column disassembly



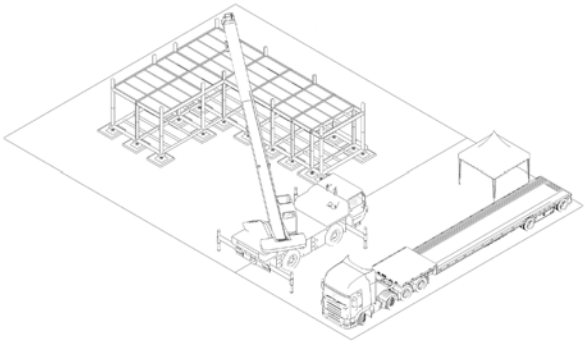
Phase 7: West Roof constructure
Necessary Timing: 7 Hr

-Roof Unit 1~3 disassembly
-2F octagon disk removing
-2F unit disassemby
-West column
-East/North canopy



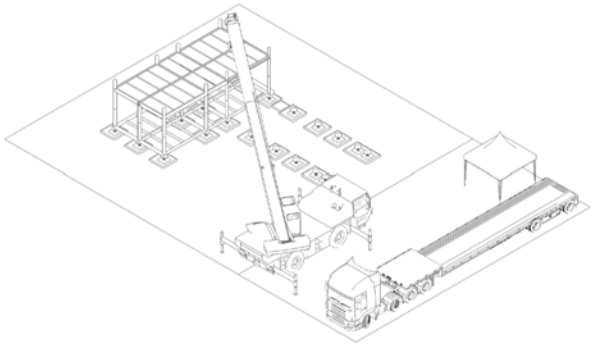
Phase 8: Tea Terrance Units
Necessary Timing: 8 Hr

Truck-11
-Stair constructure
-Unit 6~10 disassembly
-Tea terrance footing



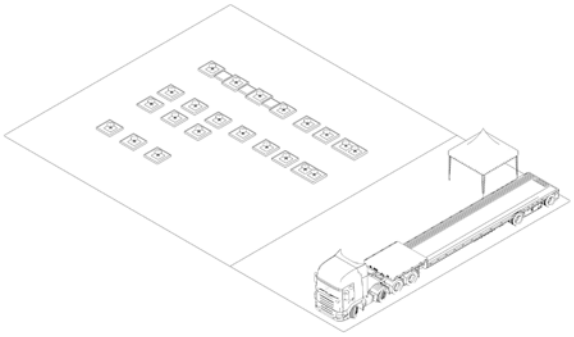
Phase 9: Box Units
Necessary Timing: 6 Hr

Truck-12.13.14
-Unit 1~5 disassembly
-Unit 1~5 removing
-Tea terrance footing



Phase 10: Footing
Necessary Timing: 5 Hr

Truck-15.16
-Unit 11.12 disassembly
-Unit 11.12 removing
-Footing removing
-Site cleaning



9.4.4 Waste Management

Keep Trash off the Ground

In Taiwan, people believe that “Keep Trash off the Ground” is the best solution to manage waste. This is how people treat their waste in daily life. People classify their waste and bring them to specific location at specific time.

In La Cite’ du Soleil®, there are 20 teams assembling and disassembling their house at the same time. Each team will produce their specific waste during the assembly and disassembly period. It is difficult to treat specific waste and reuse or recycle the waste material. In other words, this is not site-friendly way to manage waste.

The NCTU Unicode Team decides to keep trash off the ground in La Cite’ du Soleil®. The team will remove all trash from the assembly site every day to maintain a clean environment.

Zero Footprint

The NCTU Unicode Team tries to use site-friendly way to create a zero footprint site, which means no waste will be left in La Cite’ du Soleil®.

The team modules the Orchid House, and fabricates the module units in the factory. All units are assembled in La Cite’ du Soleil®. Most of the fabrication waste is collected in the factory that will be easier to be reused of recycled.

In La Cite’ du Soleil®, only some packing waste such as PE packing Film, packing band, and wooden sheets will be produced. For the zero footprint purpose, the team will take all the waste away to the storage warehouse, which is provided by the packing company with specific waste collection and processing facilities.

Through these ways, the NCTU Unicode Team will manage their waste effectively.

9.5.0 Assembly / Disassembly schedules

9.5.1 Assembly Timetable Chart

Work Group Sheet		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
									TEAM-A								TEAM-B								
Group - A	Student	10				Technical staff						5													
Group - B	Student	10				Technical staff						4													
Group - C	Student	9				Technical staff						7													
Group - A-4	Student	6				Technical staff						5													
Group - B-4	Student	5				Technical staff						4													
Group - A-5	Student	5				Technical staff																			
Group - B-5	Student	4				Technical staff																			
Group - B+	Student	10				Technical staff						7													

Crane hour	12	Day				1			2014/6/16													Mon			
Group	A , B , C																								
Work detail		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Lofting																									
Truck-1																									
Unload																									
Sand Box Set																									
Footing Set																									
Truck-2																									
Unload																									
Unit 12																									
Truck-3																									
Unload																									
Unit 11																									
Truck-4																									
Unload																									
Unit 05																									
Unit 04																									
Truck-5																									
Unload																									
Unit 03																									
Unit 02																									
Unit 01																									
Unit 10																									
Unit 09																									
Unit 08																									
Unit 07																									
Unit 06																									
Truck-6																									
Stair Unit																									
Window Frames																									

Crane hour	20	Day	2	2014/6/17	Tue
Group	A , B , C				

Work detail	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Stair Unit																								
Truck-7																								
2F Column																								
1F Up Floor																								
1F Wall Insulation																								
2F Up Floor																								
Workstation Unit																								
Kitchen Unit																								
Truck-8																								
Orientation Correction																								
Terrace Column																								
Terrace Beam																								
Shelter																								
Roof Unit 5																								
Roof Unit 6																								
Roof Unit 7																								
Roof Unit 9																								
Roof Unit 10																								
1,2 F Shaft																								
1,2 F M.E.P System																								
Water Tank System																								

Crane hour	20	Day	3	2014/6/18	Wed
Group	A , B , C				

Work detail	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Roof Unit 11																								
Truck-9																								
1F Bathroom																								
1F Wall System																								
1F Ceiling System																								
Stair Finish																								
Thermall Wall																								
2F Cloumn																								
Roof Unit 12																								
Roof Unit 8																								
Roof Unit 4																								
Roof Unit 3																								
Roof Unit 2																								
Roof Unit 1																								
1,2 F M.E.P System																								

Crane hour	4	Day	4	2014/6/19	Thu
Group	A , B , C				

Work detail	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Roof Unit 1																								
Truck-10																								
1F Wall System																								
1F Ceiling System																								
Thermall Wall																								
Structural correction																								
Truck-11																								
M.E.P System																								
Roof Panel																								
Solar Panel																								
Solar M.E.P System																								
Smart Skin																								

Crane hour	-	Day	5	2014/6/17	Fri
Group	A , B , C				

Work detail	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Roof Panel																								
Interior Floor Finish																								
Terrace Floor Finish																								
Lighting System																								
Sensor System																								
M.E.P System																								
Roof Fan System																								
Truck-12																								
Green Core System																								
Bayer Exterior System																								

Crane hour	-	Day	6	2014/6/17	Sat
Group	A-4 , B-4 , C				

Work detail	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Bayer Exterior System																								
2F Interior Floor																								
Roof Water Proof																								
M.E.P System Check																								

Crane hour	-	Day	7	2014/6/17	Sun
Group	A , B , C				

Work detail	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Roof Water Proof																								
Exterior System																								
Exterior Water Proof																								

Crane hour	8	Day	8	2014/6/17	Mon
Group	A , B+ , C				

Work detail	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Structure Clean																								
Truck-13																								
Paint Repair																								
Interior Repair																								
Heat Water Panel																								
Outdoor Footing Set																								
Outdoor Sand Box Set																								
Outdoor Ramp																								
Truck-14																								
Outdoor Floor																								
Outdoor M.E.P System																								
Outdoor Lighting																								
Outdoor Furniture																								

Crane hour	-	Day	9	2014/6/17	Tue
Group	A , B+ , C				

Work detail	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Outdoor Floor																								
Outdoor Ramp																								
Outdoor Lighting																								
Outdoor Handrails																								
Truck-15																								
Planting																								
M.E.P System Check																								
Interior Clean																								

Crane hour	-	Day	10	2014/6/17	Th
Group	A , C				

Work detail	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Planting																								
Furnishing and Planting																								
Clean																								
Tool Transport																								

Actions	Dates
Planned deadline for wind-and-water tight	2014.06.23
Planned deadline for electrical connection to village grid	2014.06.23
Planned deadline for house delivery	2014.06.25

9.5.2 Disassembly Timetable Chart

Hours of crane usage		4			D1 7/15 Tue.																							
Step	Work detail	Group	Number of Worker		Working Hours	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
			Student	Tech.																								
0	Plants removing	A	10		0.5																							
	Truck 1 uploading			3																								
1	Accessory withdrawing		4		1																							
2	Furniture removing		6		2																							
3	equipment		4		2																							
4	Machinery room		2		3																							
5	Outside pipeline/Lamps		4		2																							
6	Outside handrail		4		2																							
	Truck 2 uploading			3																								
7	Outside WPC		6+2		4																							
8	Outside deck	B	4+2		4																							
	Truck 3 uploading			3																								
9	Outside footing		2		1																							
10	East Bayer board		3+2		4																							
11	West Bayer board		3+2		4																							
12	South Eletric Blinds		2		2																							
13	South Eletric Blinds		3		2																							
14	1F Interior floor		4		1																							
15	Aluminium window		2		1																							
16	Sensor removing		2		2																							
17	1F Ceiling		2+2		1																							
18	1F Ceiling constrcture		2+2		1																							
19	1F Ceiling pipline		2		2																							
20	Wooden wall (finish side)	C	4		1																							

Hours of crane usage		0			D2 7/16 Wed.																							
Step	Work detail	Group	Number of Worker		Working Hours	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
			Student	Tech.																								
	Truck 4 uploading			3																								
21	1F Wooden wall	C	6		2																							
22	Bathroom		4		2																							
23	Kitchen Island		3		2																							
24	Air conditioner removing		1	2	1																							
25	Work Station removing		4		2																							
	Truck 5 uploading			3																								
26	Thermal wall removing		4		3																							
	2F WPC		3		3																							
27	2F safety handrail		2		1																							
28	2F Equipment/Appliance		4+1		3																							
29	Water wall removing	A	4+4		2																							
30	2F pipline		4		3																							
31	2F Furniture		2+1		1																							
	Truck 6 uploading			3																								
32	Green core water system		4		2																							
33	2F Green core		4		3																							
34	1F Green core		4		2																							
35	Green core construction		4		2																							
36	1F Upper wooden box	B	4+2		3																							
37	2F Upper wooden box		6		2																							
38	Window/Door disassembly		4		4																							
39	1F Lower wooden box		6		2																							
	Truck 7 uploading			3																								
40	Tea terrance/Entrance WPC		8		2																							
41	Roof safety handrail		2		2																							
42	Roof ridge cover board	C	4		1																							
43	Roof edge cover board		4		2																							
44	North Bayer board		2+1		2																							

Hours of crane usage		12			D3 7/17 Thu.																							
Step	Work detail	Group	Number of Worker		Working Hours	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
			Student	Tech.																								
43	Roof edge cover board	C	4		2																							
44	North Bayer board		2+1		2																							
45	Roof ridge Fans		4		2																							
46	Lower Smart skin		3		2																							
47	RU3-1/RU11-1 solar panel		3		2																							
48	RU3-2/RU11-2 solar panel		3		2																							
49	Roof cable tray		4		2																							
50	RU2/RU10 solar panel		3+1		3																							

	Truck 8 uploading			3		
51	Upper Smart skin		2		2	
52	North roof Bayer board		4		3	
53	North Eletric Blinds		4		3	
54	Solar water heater		2		2	
55	South Bayer Board		4		3	
	Truck 9 uploading			3		
56	Base pipline	A	2		2	
57	Water tank		6		2	
	Truck 10 uploading			3		
101	E2-E3 beam		2+1	1	1	
102	E1-E2 unit removing		2+2	1	1	
103	E1-E2 unit disassembly		4	1	1	
104	E3-E4 unit removing		2+2	1	1	
105	E3-E4 unit disassembly		4	1	1	
106	Roof Unit 5~7 disassembly		2+1	1	2	
107	Roof Unit 9 removing	B	2+2	1	2	
108	Roof Unit 9 disassembly		4	1	2	
109	Roof Unit 10 removing		2+2	1	2	
110	Roof Unit 10 disassembly		4	1	2	
111	Roof Unit 11 removing		2+2		2	

Hours of crane usage		20			D4 7/18 Fri.																							
Step	Work detail	Group	Number of Worker		Working Hours	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
			Student	Tech.																								
113	Stair beam		2+1	1	1																							
114	A3-A4 column		2+1		1																							
115	B3-B4 column	C	2+1		1																							
116	C3-C4 column		2+1		1																							
117	D3-D4 column		2+1		1																							
118	Roof Unit 1 removing		2+2	1	2																							
119	Roof Unit 1 disassembly		4	1	2																							
120	Roof Unit 2 removing		2+2	1	2																							
121	Roof Unit 2 disassembly	A	4	1	2																							
122	Roof Unit 3 removing		2+2	1	2																							
123	Roof Unit 3 disassembly		4	1	2																							
124	2F octagon disk removing		4	1	2																							
125	2F unit disassemby		6	1	2																							
126	A1-A2 column		2+1	1	1																							
127	B1-B2 column		2+1	1	1																							
128	C1-C2 column		2+1	1	1																							
129	D1-D2 column		2+1	1	1																							
130	East canopy		4+2	1	2																							
131	North canopy		4+2	1	2																							
132	Stair constructure		2+2	1	1																							
133	Stair landing		2+2	1	1																							
	Truck 11 uploading	B		3																								
134	Unit 6 disassembly		3+1	1	1																							
135	Unit 7 disassembly		3+1	1	1																							
136	Unit 8 disassembly		3+1	1	1																							
137	Unit 9 disassembly		3+1	1	1																							
138	Unit 10 disassembly		3+1	1	1																							
139	Tea terrance footing		4	1	1																							
140	Unit 1~5 disassembly		6	1	2																							
141	Unit 1 removing		4		1																							
142	Unit 2 removing		4		1																							
143	Unit 3 removing	C	4		1																							
144	Unit 4 removing		4		1																							

Total crane using time		3			D5 7/19 Sat.																							
Step	Work detail	Group	Number of Worker		Working Hours	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
			Student	Tech.																								
	Truck 12 uploading			3																								
145	Unit 5 removing		4		1																							
146	Unit 11-12 disassembly		6		1																							
	Truck 13 uploading			3																								
	Truck 14 uploading	C		3																								
147	Unit 11 removing		4		1																							
148	Unit 12 removing		4		1																							
149	Footing removing		6		2																							
	Truck 15 uploading			3																								
150	Site cleaning	A	10		4																							
	Truck 16 uploading																											

9.6.0 Equipment requirement Chart

EQUIPMENT RENTAL CHART
TEAM UNICODE

CATEGORIE 1 : MOBILE CRANE

PLEASE COMPLETE THE ASSEMBLY & DISASSEMBLY CHARTS

CATEGORIE 2 : CONSTRUCTION EQUIPMENT

HANDLING			
DESIGNATION	REFERENCE	U	QUANTITY NEEDED
Forklift	H.FL.01	u	1
Telehandler	H.TH.01	u	-

ELEVATION			
DESIGNATION	REFERENCE	U	QUANTITY NEEDED
Boom Lift	E.BL.01	u	2

CATEGORIE 3 : OTHER EQUIPMENT

EQUIPMENT			
DESIGNATION	REFERENCE	U	QUANTITY NEEDED
Pallet Truck	O.OE.01	u	1
Individual Platform 2,90m to 3,60m	O.OE.02	u	2
Scaffolding 5 m	O.OE.03	u	2
Fences HERAS (including plots)	O.OE.04	m	100

9.7.0 Assembly & Disassembly Chart

9.7.1 Assembly Chart

Solar Decathlon Europe 2014

ASSEMBLY/DISASSEMBLY CHART
TEAM UNICODE

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RÉPUBLIQUE FRANÇAISE

DAY 1 - 16.06.2014	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Trucks in CDS®	T1				T2	T3	T4	T5								T6
Cranes					35 Tn											
Trucks in Matelots	T2	T3	T4	T5									T6		T7	

DAY 2 - 17.06.2014	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Trucks in CDS®		T7							T8															
Cranes	35 Tn								35 Tn															
Trucks in Matelots	T7				T8																			

DAY 3 - 18.06.2014	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Trucks in CDS®							T9																	
Cranes	35 Tn								35 Tn															
Trucks in Matelots			T9																				T10	

DAY 4 - 19.06.2014	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Trucks in CDS®			T10												T11									
Cranes	35 Tn																							
Trucks in Matelots	T10										T11													

DAY 5 - 20.06.2014	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Trucks in CDS®																		T12						
Cranes																								
Trucks in Matelots													T12											

DAY 6 - 21.06.2014	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Trucks in CDS®																								
Cranes																								
Trucks in Matelots																								

DAY 7 - 22.06.2014	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Trucks in CDS®																								
Cranes																								
Trucks in Matelots																					T13			

DAY 8 - 23.06.2014	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Trucks in CDS®	T13															T14								
Cranes									35 Tn															
Trucks in Matelots												T14												

DAY 9 - 24.06.2014	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Trucks in CDS®																	T15							
Cranes																								
Trucks in Matelots													T15											

DAY 10 - 25.06.2014	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Trucks in CDS®																								
Cranes																								
Trucks in Matelots																								

DAY 11 - 26.06.2014	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
	INSPECTION DAY																							

9.7.2 Disassembly Chart

Solar Decathlon Europe 2014

ASSEMBLY/DISASSEMBLY CHART
TEAM UNICODE

Liberté • Égalité • Fraternité
RÉPUBLIQUE FRANÇAISE

DAY 1 - 15.07.2014	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Trucks in CDS®			T1					T2					T3			
Cranes							35 Tn									
Trucks in Matelots	T1			T2					T3					T4		

DAY 2 - 16.07.2014	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Trucks in CDS®		T4				T5							T6											T7
Cranes																								
Trucks in Matelots	T4		T5						T6											T7				

DAY 3 - 17.07.2014	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Trucks in CDS®										T8						T9	T10							
Cranes									35 Tn							35 Tn								
Trucks in Matelots						T8						T9	T10											

DAY 4 - 18.07.2014	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Trucks in CDS®																								T11
Cranes	35 Tn								35 Tn															
Trucks in Matelots																				T10			T12	T13

DAY 5 - 19.07.2014	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Trucks in CDS®			T12	T13	T14	T15							T16											
Cranes	35 Tn																							
Trucks in Matelots	T14	T15							T16															

Trucks in Matelots	Trucks which are waiting in Allée des Matelots along la Cité du Sol

USAGE OF THE CRANE during **ASSEMBLY**	
Crane capacity	*Usage time*
35 Tn	64 Hours

USAGE OF THE CRANE during **DISASSEMBLY**	
Crane capacity	*Usage time*
35 Tn	39 hours

9.8 Site Operations Chart

SITE OPERATION CHART
TEAM UNICODE

0. GENERAL INFORMATION		FUNCTION	CONSTRUCTION WORKING TEAM	NAME	TELEPHONE NUMBER
	1	Site Operations Coordinators	Working Team A	Ya-ting Wu	+886 -921-147-216
	2		Working Team B	Chia-Hao Lin	+886 988-204-763
	3		Working Team C	Sheng-Kai Tseng	+886 988-204-763

1. MODULES AND MAIN COMPONENTS		NAME	DIMENSIONS [m]	WEIGHT [kg]	MACHINERY USE FOR UNLOADING/LOADING
	1	Structure Unit 1	L 3.75 x W 0.87 x H 3.25	600	Crane
	2	Structure Unit 2	L 3.75 x W 1.69 x H 3.25	1640	Crane
	3	Structure Unit 3	L 3.75 x W 1.71 x H 3.25	1640	Crane
	4	Structure Unit 4	L 3.75 x W 2.1 x H 3.25	1640	Crane
	5	Structure Unit 5	L 3.75 x W 2.1 x H 3.25	4975	Crane
	6	Structure Unit 11	L 9.15 x W 2.1 x H 3.25	5000	Crane
	7	Structure Unit 12	L 9.15 x W 2.17 x H 3.25	5100	Crane

2. VEHICULES (Trucks, Vans, etc.)		TYPE	DIMENSIONS [m] (Tractor unit + Trailer)	WEIGHT [kg] (Truck + Loading)
	1A	Flatbed	L : 18 x W : 2.7x H :3.9	12500
	2A	Low Bed	L : 18 x W : 2.7x H :4.2	8800
	3A	Low Bed	L : 18 x W : 2.7x H :4.2	3100
	4A	Low Bed	L : 18 x W : 2.7x H :4.2	5000
	5A	Low Bed	L : 18 x W : 2.7x H :4.2	4700
	6A	Flatbed	L : 18 x W : 2.7x H :3.4	7600
	7A	Flatbed	L : 18 x W : 2.7x H :3.8	5600
	8A	Flatbed	L : 18 x W : 2.7x H :3.6	1100
	9A	Flatbed	L : 18 x W : 2.7x H :3.4	2800
	10A	Flatbed	L : 18 x W : 2.7x H :3.4	2300
	11A	Flatbed	L : 18 x W : 2.7x H :3.6	8100
	12A	Flatbed	L : 18 x W : 2.7x H :3.9	14300
	13A	Flatbed	L : 18 x W : 2.7x H :4.0	7500
	14A	Flatbed	L : 18 x W : 2.7x H :3.9	7000
	15A	Flatbed	L : 18 x W : 2.7x H :3.4	4000
	1B	Flatbed	L : 18 x W : 2.7x H :3.6	3300
	2B	Flatbed	L : 18 x W : 2.7x H :3.8	3200
	3B	Flatbed	L : 18 x W : 2.7x H :3.9	8700
	4B	Flatbed	L : 18 x W : 2.7x H :3.4	8500
	5B	Flatbed	L : 18 x W : 2.7x H :3.8	5200
	6B	Flatbed	L : 18 x W : 2.7x H :3.4	2400
	7B	Flatbed	L : 18 x W : 2.7x H :3.8	5900
	8B	Flatbed	L : 18 x W : 2.7x H :3.6	6100
	9B	Flatbed	L : 18 x W : 2.7x H :3.4	3200
	10B	Flatbed	L : 18 x W : 2.7x H :3.6	1300
	11B	Flatbed	L : 18 x W : 2.7x H :3.4	7400
	12B	Low Bed	L : 18 x W : 2.7x H :4.2	3200
	13B	Low Bed	L : 18 x W : 2.7x H :4.2	2200
	14B	Low Bed	L : 18 x W : 2.7x H :4.2	2200
	15B	Low Bed	L : 18 x W : 2.7x H :4.2	8500
	16B	Low Bed	L : 18 x W : 2.7x H :4.2	20400

3. CRANES		CAPACITY	USAGE TIME
	1	35 TN Crane in Assembly	64
	2	35 TN Crane in Disassembly	39

SITE OPERATION CHART
TEAM UNICODE

4. GENERAL DESCRIPTION OF THE PHASES			PHASE	MATERIAL AND EQUIPMENT RESOURCES	HUMAN RESOURCES	DURATION
	ASSEMBLY	1	Site-Preparation	Forklift	10	4
		2	Module Unit	Scaffolding , Crane , Forklift	10	44
		3	Insulation	Individual Platform , Forklift	10	42
		4	M.E.P System	Individual Platform , Forklift	10	42
		5	Roof Structure	Scaffolding , Crane , Forklift , Boom Lift	10	20
		6	Roof Panel	Scaffolding , Crane , Forklift , Boom Lift	10	16
		7	Green Core	Scaffolding , Crane , Forklift , Boom Lift	10	8
		8	Façade	Scaffolding , Crane , Forklift , Boom Lift	10	24
		9	Waterproof	Scaffolding , Crane , Forklift , Boom Lift	10	32
		10	Furnishing and Planting	Individual Platform	10	24
	DISASSEMBLY	1	Furnishing and Planting	Forklift	10	6
		2	Outdoor Deck Units	Scaffolding , Crane , Forklift	10	11
		3	Ground Floor	Scaffolding , Forklift	10	9
		4	Mezzanine Floor	Scaffolding , Forklift	10	11
		5	Roof Panels	Scaffolding , Forklift , Boom Lift	10	8
		6	East Roof Structure	Crane , Forklift , Boom Lift	10	10
		7	West Roof Structure	Crane , Forklift , Boom Lift	10	7
		8	Tea Terrance Units	Scaffolding , Crane , Forklift , Boom Lift	10	8
		9	Box Units	Crane , Forklift	10	6
		10	Footing	Forklift	10	5

5. WASTE MATERIALS			TYPE	VOLUM [m3] or WEIGHT [kg]
	ASSEMBLY	1	NA	NA
		2	NA	NA
		...		
	DISASSEMBLY	1	NA	NA
		2	NA	NA
		3	NA	NA
		...		

6. COMPONENTS TO BE STORED DURING COMPETITION PHASE		DESIGNATION	DIMENSIONS [m]	WEIGHT [kg]
	1	Hand Tool Basket 1	0.9(L) x 0.6(W) x 0.6(H)	70
	2	Hand Tool Basket 2	0.9(L) x 0.6(W) x 0.6(H)	70
	3	Hand Tool Basket 3	0.9(L) x 0.6(W) x 0.6(H)	70
	4	Hand Tool Basket 4	0.9(L) x 0.6(W) x 0.6(H)	70
	5	Hand Tool Basket 5	0.9(L) x 0.6(W) x 0.6(H)	70
	6	Hand Tool Basket 6	0.9(L) x 0.6(W) x 0.6(H)	70
	7	Hand Tool Basket 7	0.9(L) x 0.6(W) x 0.6(H)	70
	8	Hand Tool Basket 8	0.9(L) x 0.6(W) x 0.6(H)	70
	9	Hand Tool Basket 9	0.9(L) x 0.6(W) x 0.6(H)	70
	10	Hand Tool Basket 10	0.9(L) x 0.6(W) x 0.6(H)	70

10

Health and Safety Plan

1.0 Health and Safety Plan Precedents and Aim

The primary purposes of H&S plan is to ensure the decathletes of NCTU UNICODE team construct and operate Orchid house with appropriate training and skills, are familiar with and follow the H&S rules during trial assembly, assembly and disassembly phases. All UNICODE decathletes has attended the first aid and CPR training courses in 10th October 2013, and passed the examination before receiving the certification. With the pre-competition training, decathletes are aware the importance of H&S plan.

H&S Plan is structured as i) key information of emergency and accident in Versailles; ii) health condition and requirement for decathletes; iii) safety information and condition of construction site; iv) risk identification and prevention for construction, critical work and operation; v) safety rules for visitors, contractor and sub-contractor; and vi)site clean and order during operation and post competition.

The Orchid House is considered as a prototype of urban regeneration method for the rooftop of old apartments in Taiwan. The H&S plan aims to demonstrate the constriction method of Orchid House has its potential to be widely applicable in compact urban environment and can be built and operated by trained ordinary apartment owners. Hence the H&S Plan has intentions to provide guidance to apartment owners on the possibility of self-built rooftop and the ways to prevent risks.

Health and Safety Checklist

LEGAL CONTENTS	LOCATION IN THE REPORT OR DRAWINGS
Name and address of SDE 2014, HS Coordinator, Prevention authorities, Team	PM: 10.2
Number of workers	PM: 10.5
Contact information of the Site Operations Coordinator	PM: 10.5
Description of works	PM: 10.4.8
First aid procedure	PM: 10.12
Name and number of first aid certificated worker	PM: 10.12
Description of the Team's first aid kit.	PM: 10.12.2
Description of hygiene conditions (toilet, changing room, restroom…)	SDE HS General Coordination Plan
Detailed description of operating modes	PM: 10.6
Risk assessment – risks generated by other	PD: HS-401 ~ HS-610
Risk assessment – risks generated by environment	PD: HS-401 ~ HS-610
Risk assessment – risks generated on other	PD: HS-401 ~ HS-610
Risk assessment – self generated risks	PD: HS-401 ~ HS-610
Procedures to adapt collective protection	PM: 10.8 10.9 10.10 10.11 10.17

2.0 General Data of the Project

This section provides primary information of Orchid House on its size, materials, structural methods and local information of E&A.

1.1 Prototype builder

NCTU / UNICODE, team of National Chiao Tung University, is taking Solar Decathlon Europe as the opportunity to develop a prototype house for co-existing with nature by focusing on the green house technology that has been developed for cultivating orchid in Taiwan combining with the research institute here in NCTU. The university's main campus is located at the center of the Hsinchu Science Park, Taiwan's national research center. The area is referred to as the Silicon Valley of Asia. More than 400 technology companies have been established in the park.

1.2 Nature of the project

Architectural footprint: 150m^2
Height: 7m
Length: 12.6m
Width: 9m
Assembly duration: 10 days
Disassembly duration: 4 days
Clean duration: 1 day
Major material: Steel structure with insulation wall, wooden floor and French windows.
Construction method: Pre-fabricated units assembled on site.

1.3 HS team coordinator during design

Wan-Ling Cheng
Tel: +886 929 558 039
minaling814@gmail.com

1.4 Two Contruction sites in Taiwan

- Graduate Institute of Architecture,
  1001 Ta Hsueh Road, Hsinchu City 300, Taiwan
  Tel: +886 (3) 573 1977
  Fax: +886 (3) 575 2308

- No.80-15, Houbi, Houbi Dist.,
  Tainan City 731, Taiwan
  Tel: +886 (6) 687 3928
  Fax: +886 (6) 687 3930

1.5 The nearest hospital of Lot

177 Rue de Versailles
Address: 177 Rue de Versailles, 78150 Le Chesnay, France
Tel: 01.39.63.91.33

1.6 The nearest police office of Lot

Commissariat de Police (5.8km, 9mins)
Address:1 Rue de la Division Leclerc
8280 Guyancourt, France

1.7 The nearest fire station of Lot
Sapeurs Pompiers des Yvelines (11.3km, 18mins)
Address: Avenue de Pépinière
78450 Villepreux, France

1.8 The stakeholders of SDE 2014
Solar Decathlon Europe 2014 – CSTB Solar
Jérôme MAT
Address: 10, cours Louis Lumière
94 300 Vincennes - France
Tel: 00.33.(0)1.40.50.29 34
jerome.mat@solardecathlon2014.fr

Solar Decathlon Europe 2014 – SPS Design Coordinator
C. PEYRONEL
Address: 17A, avenue, Robert Schuman
13235 Marseille, Cedex 2
Tel: 04.96.17.13.50
Fax: 04.91.56.18.73
christophe.peyronel@fr.bureauveritas.com

3.0 Health and Safety plan Objectives

The Health and safety plan has crystal clear objectives to ensure the safety of all NCTU UNICODE decathletes, juries, visitors, and contractors. The language of H&S Plan is plain language with picture to guarantee all warning signs, notice items and message are clearly express on site and before entering the site. The H&S coordinator will request those who enter the site to read the signs and check their health condition, dressing, helmet, footwear and tools meet the safety requirement before permitting entering the assembly/ disassembly site.
These signs are standardized warning signs in French, which have detailed description in Project Drawing. The objectives include:

- Avoid risks: All possible risks are investigated and identified in H&S Plan. By preventing risk in advance, we can avoid risk and minimize conflict of works.
- Collective safety measures: All possible measures which contribute to safety are taken into account in H&S Plan. The pre-fabrication construction method reduces danger on site.
- Individual protection equipment: All decathletes and those people enter the site are required to wear helmet and protection equipment for safety.
- Use new safety technologies: Major construction units are labeled with QR Code in which the installation tools and safety notices are shown to decathletes. The QR Code enables time management and risk prevention.
- Demand to the sub-contractor to comply with the legal regulations: Contractor and consultants are required to follow H&S rules.

4.0 Conditions of the site

The focus here is the specific condition for the UNICODE site related to H&S, key concerns include site fences and access control, crane usage and its risk to road users, trucks loading area, and methods of assembly.

4.1 Constructive process

Constructive process	*Corresponding HS Drawings*
Site-Preparation	HS-401
Assembly Module Unit	HS-402
Assembly Main structure	HS-403
Assembly M.E.P System	HS-404
Assembly Roof Panel	HS-405
Assembly Exterior System	HS-406
Assembly Insulation	HS-407
Assembly Interior	HS-408
Assembly Out door Floor System	HS-409
Furniture & Planting	HS-410
Clean	HS-410
Interior Equipment Remove	HS-601
Outside Disassembly	HS-602
Disassembly First Floor	HS-603
Disassembly Second Floor	HS-604
Disassembly Floor board / Roof	HS-605
Disassembly East Roof Constructure	HS-606
Disassembly West Roof Constructure	HS-607
Disassembly Second Floor/Tea Terrance Constructure	HS-608
Disassembly First Floor structure	HS-609
Disassembly Site Cleaning	HS-610

4.2 Type and characteristics of the materials and elements

Material and elements	*Rick possible*	*Preventions*
Wood	Splinter Collision (very long pieces)	Follow the safety rules Protective equipment faultless
Steel	Change shape Cutting or skinning with sharp ends Collision	Follow the safety rules Protective equipment faultless
Electrical appliances	Collision Electric shock	Follow the safety rules Protective equipment faultless
Batteries	Collision Risks of burns due to the acid	Follow the safety rules Protective equipment faultless
Plant(Orchid)	Collision Withered during shipping	Follow the safety rules Protective equipment faultless

4.3 Site description

Localization
In the Southeast of Palace of Versailles, and the nearest station is Gare de Versailles – Chantiers.

Name
"La Cité du Soleil®" (Sun City)

Geographic location
The Cité du Soleil will be located within the Versailles Castle domain, on the site referred to as Mortemets. The site is accessible via the D10 roadway, then by the Allée des Matelots.

Figure 4.3.1 Localization of the La Cité du Soleil

Figure 4.3.2 Main facilities of the La Cité du Soleil

Construction site

The site have two main entrances, UNICODE site is located in a block with four teams.

R- UNI , NCTU Unicode

P- LUC, Lucerne

Q- BUC, Bucharest

S- RHOM, Rh0ME

Figure 4.3.3 Repartition of the lot in the La Cité du Soleil

Waste disposal area

The nearest "waste disposal area" of our lot is next "T" in the competition

Lot number
R

Elements around the lot
We have a border with the lot number R and we are situated on the export of trucks' route

Lot size
20 x 20M

Figure 4.3.4 View of the La Cité du Soleil

Figure 4.3.5 View of the La Cité du Soleil

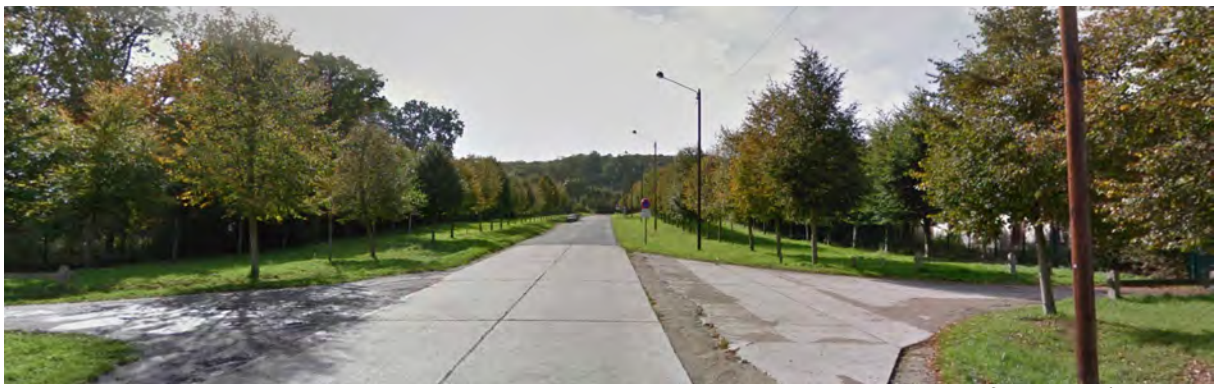


Figure 4.3.6 View of the La Cité du Soleil

4.4 Climate description

During the competition in July for Paris
Average High Temp: 25°C
Average Low Temp: 15°C
Average Rainfall Days: 7days
Precipiation: 21.4mm
Average Rainfall Days: 13m/s to 17m/s
Daily weather reports can be obtained from the France national meteorological service (METEO France station, Tel.: 0892 680 213)

4.5 Accesses and paths for vehicles

Sea transportation

Figure 4.5.1 Route from TAIWAN to FRANCE

Trucks route
distance: 191 km, 1 hour 56mins

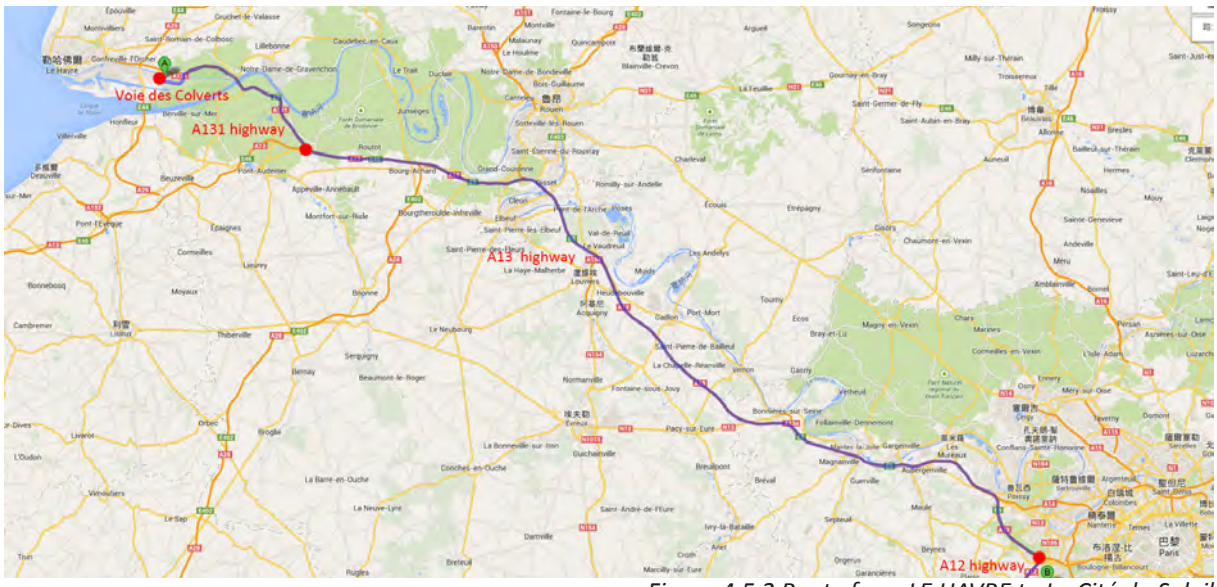


Figure 4.5.2 Route from LE HAVRE to La Cité du Soleil

4.5.1 Trucks route location

Trailer Frequency	Transport Date	Location & Directions	Travel time(min)
15	6/16-6/25	Voie des Colverts(start	0
		A131 Highway	7
		A13 Highway	16
		A12 Highway	60
		D10 Road	26
		Versailles(end)	5
TOTAL			114
16	7/15-7/19	Versailles(start)	0
		D10 Road	5
		A12 Highway	26
		A13 Highway	60
		A131 Highway	16
		Voie des Colverts(end)	7
TOTAL			114

4.5.2 Shipping route location

Phase	Port	Arrival	Departure
1	KAOHSIUNG	2014/4/29 10:00	2014/4/30 08:00
2	YANTIAN	2014/5/1 08:00	2014/5/2 08:00
3	SINGAPORE	2014/5/5 16:00	2014/5/6 22:00
4	ROTTERDAM	2014/5/26 01:00	2014/5/27 10:00
5	LE HAVRE	2014/6/1 06:00	2014/6/2 06:00

4.5.3 Shipping timetable

Shipping, Freight, Demand, Process Timetable				
Date	Local	Project target	Demand Help	Self assist
4/16~4/29	Taiwan	Apply to customs	Declaration process guidance	Customs detail, customs declaration
4/7~4/13	Taiwan	Component packaging and protection	Packaging and protective materials to provide	Packaging and Protection
4/13~4/16	Taiwan	Component transport (Container *14)	Hsinchu→Container port	
4/13~4/16	Taiwan	Component Loading(Container*14)	Loading location and Equipment evaluation	Component classification
4/29~6/1	Ship	Taiwan→France	Transport	The number of containers and the declaration content
6/1~6/5	France	Immigration Customs	Declaration process guidance	Customs detail, the number of containers and the
6/5~6/10	France	Component Discharge (Container*14)(Trailers Trucks *15)	Component Discharge	Component Discharge
6/10~6/15	France	Component transport (Trailers Trucks *15)	France transport (Trailers Trucks *13)	Trucks size
6/5~6/25 7/15~7/25	France	Pre Construction Warehouse (H-5M,400m^2 Warehouse) Heavy equipment rental	Warehouse Lodging Near Warehouse Forklift ,Bridge Crane or small crane ,Scaffolding, air Compressors	Warehouse size
6/16~6/25	France	Transport sequence	Transport	Transport sequence in 10 Days
7/15~7/24	France	Disassembly Warehouse (H-5M,400m^2 Warehouse)	Forklift, Bridge crane or small crane ,Scaffolding, air Compressors	
7/19~7/24	France	Component packaging and protection	Packaging and protective materials to provide	Packaging and Protection
7/21~7/24	France	Component transport (Trailers Trucks *14)	Warehouse→Port	
7/25	France	Outbound Customs	Declaration process guidance	Customs detail, customs declaration
8/1	Taiwan	Transportation back to Taiwan		

Figure 3.1.1 Route from TAIWAN to FRANCE

4.6 Determining factors for the house placing

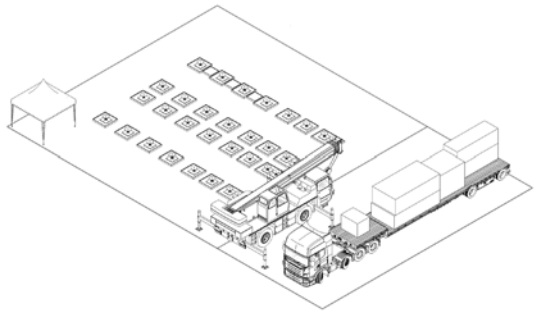
The Orchid House has adjusted its entrance and roof direction responding to the micro-climate condition and sun direction of Assembly Site. The site is benefit from short distance from main entrance of solar village, it is considered to draw visitors attention by install green core in entrance as a welcome sign.

4.7 Overlaps with the affected services and other circumstances or activities of the environment, able to cause risks during the construction

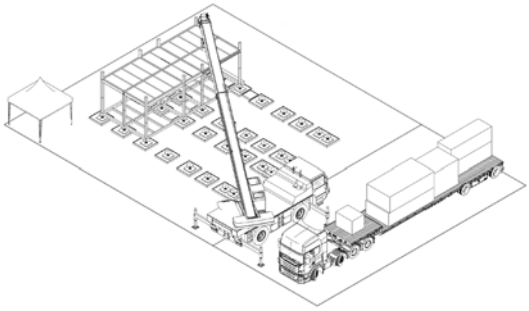
The possible assembly activities may cause conflicts are interface of crane, trucks, and electricity installation. Those activities are of danger and require highly skills. Hence the operators of these activities have been fully informed the risks and other team's process. This is to ensure all process are learned by each teams.

4.8 Planned activities

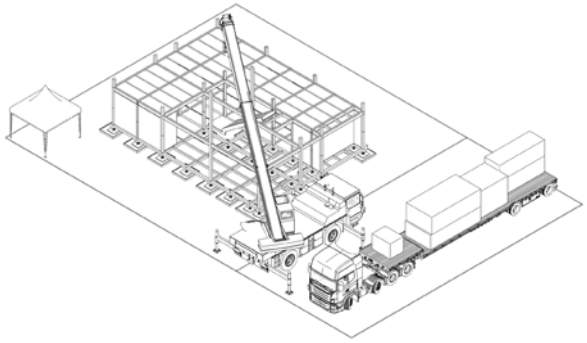
Assembly



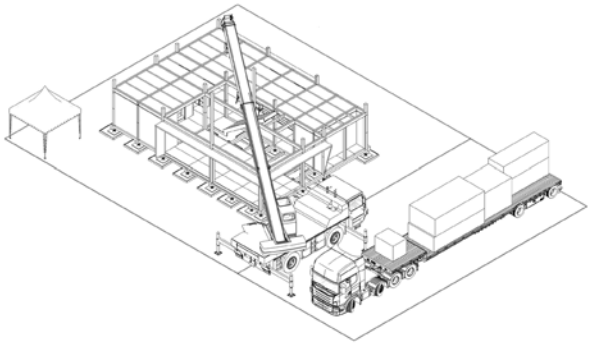
Phase 1: Site-Preparation



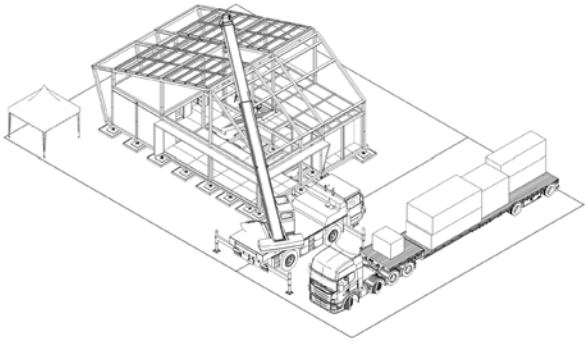
Phase 2: Module Unit



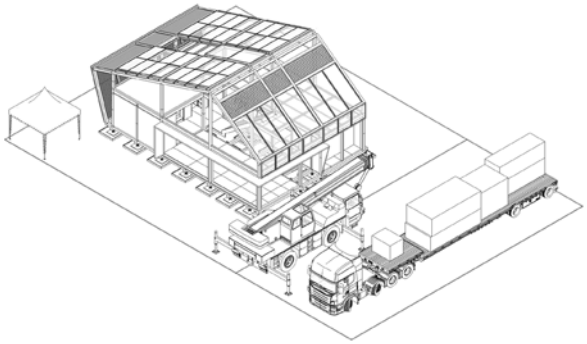
Phase 3: Main structure



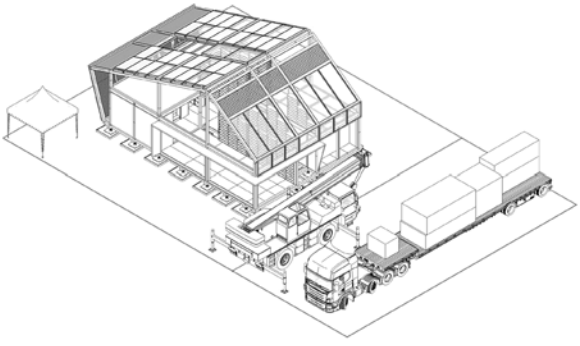
Phase 4: M.E.P System



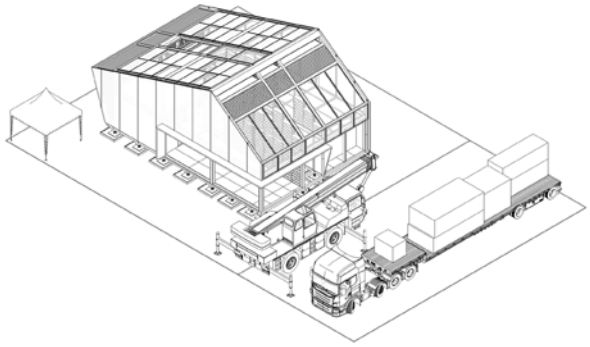
Phase 5: Roof Panel



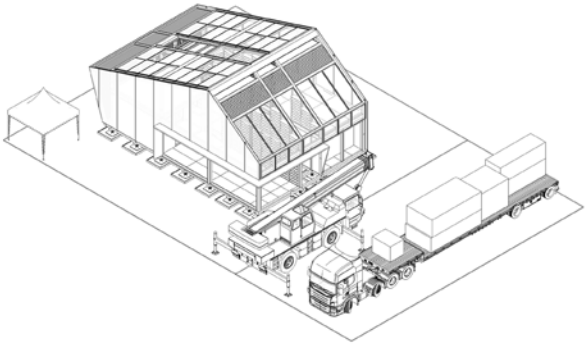
Phase 6: Exterior System



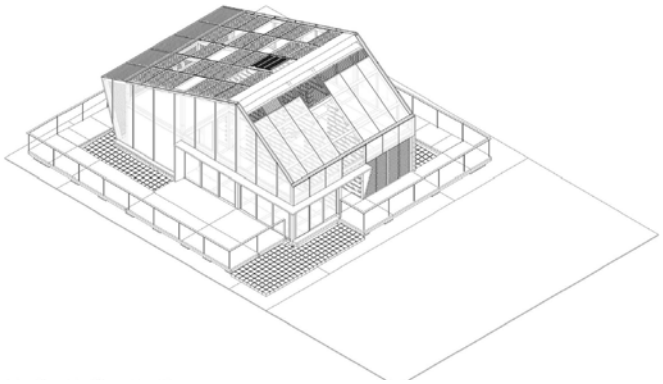
Phase 7: Insulation



Phase 8: Interior



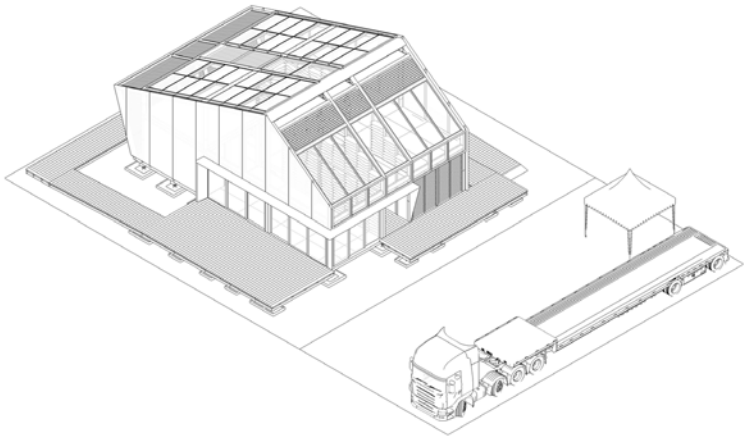
Phase 9: Out door Floor System



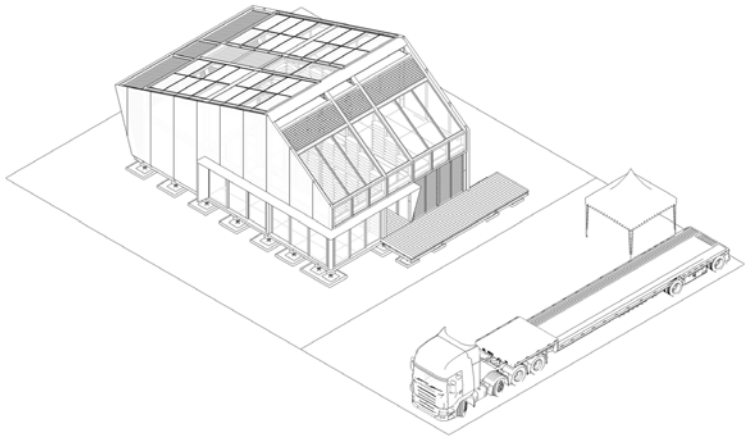
Phase 10: Furniture & Planting

After cleaning the site, the house function will be tested.

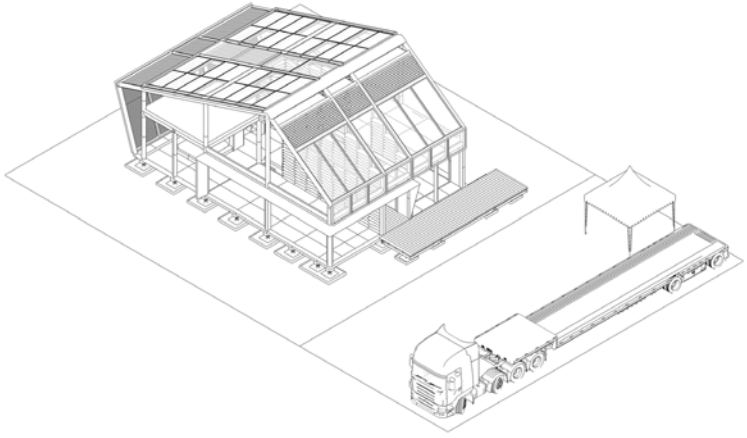
Disassembly



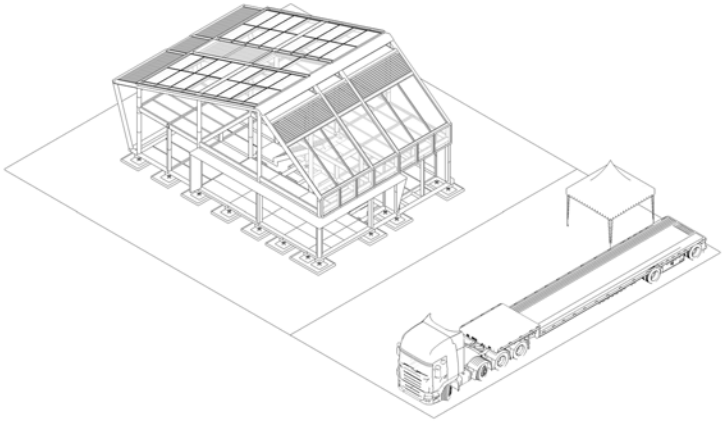
Phase 1: Interior Equipment



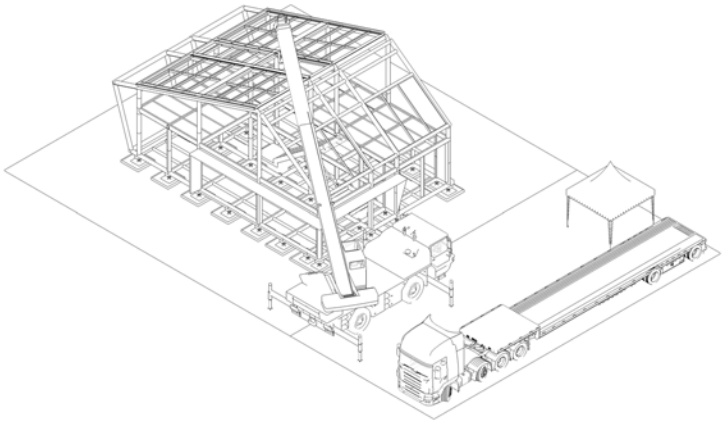
Phase 2: Outside disassembly



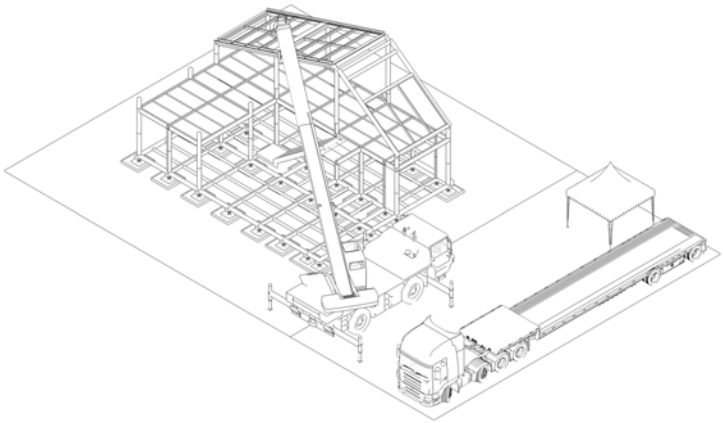
Phase 3: First Floor



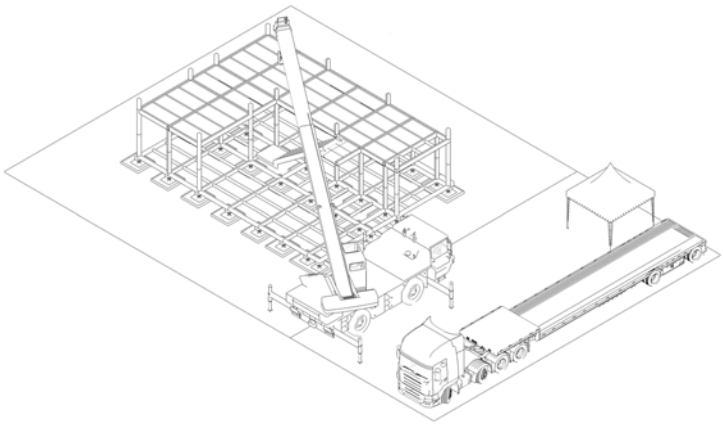
Phase 4: Second Floor



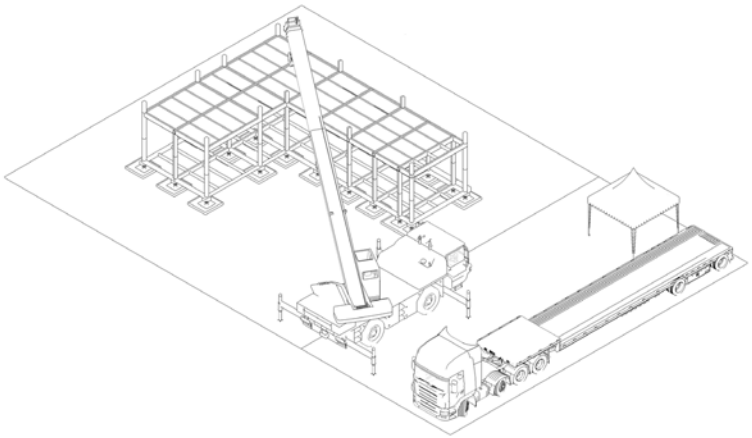
Phase 5: Floor Board / Roof



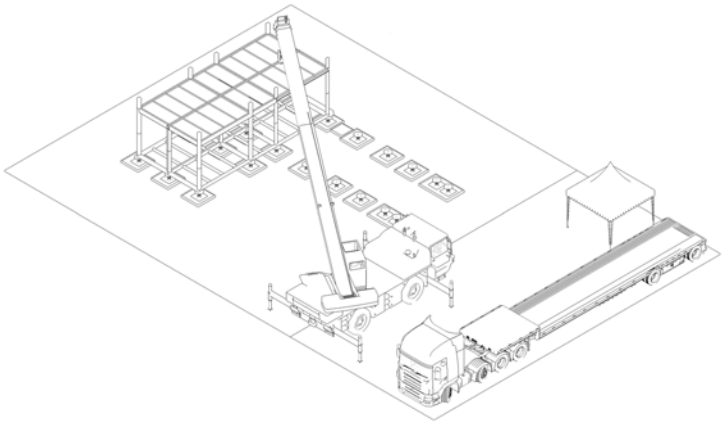
Phase 6: East Roof Constructure



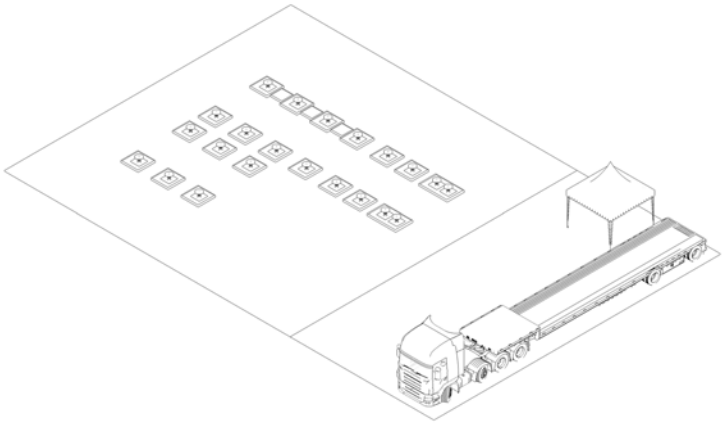
Phase 7: West Roof Constructure



Phase 8: Second Floor/Tea Terrance Constructure



Phase 9: First Floor Structure



Phase 10: Site Cleaning

4.9 Trades whose intervention is affected by the risks prevention

All related workers & visitors who appear on the site should follow labour risk prevention

- For our own team
- With the teams who will be our direct neighbors and visiting workers
- With transport company
- With supporting companies working on-site
- With organizer
- Visitors and Guests
- Guides

4.10 Auxiliary resources planned for the construction

Local architect with engineering background is expected to join as a consultant during assembly and disassembly phase. Electricity installation may need local licensed technician t advise local electricity rules.

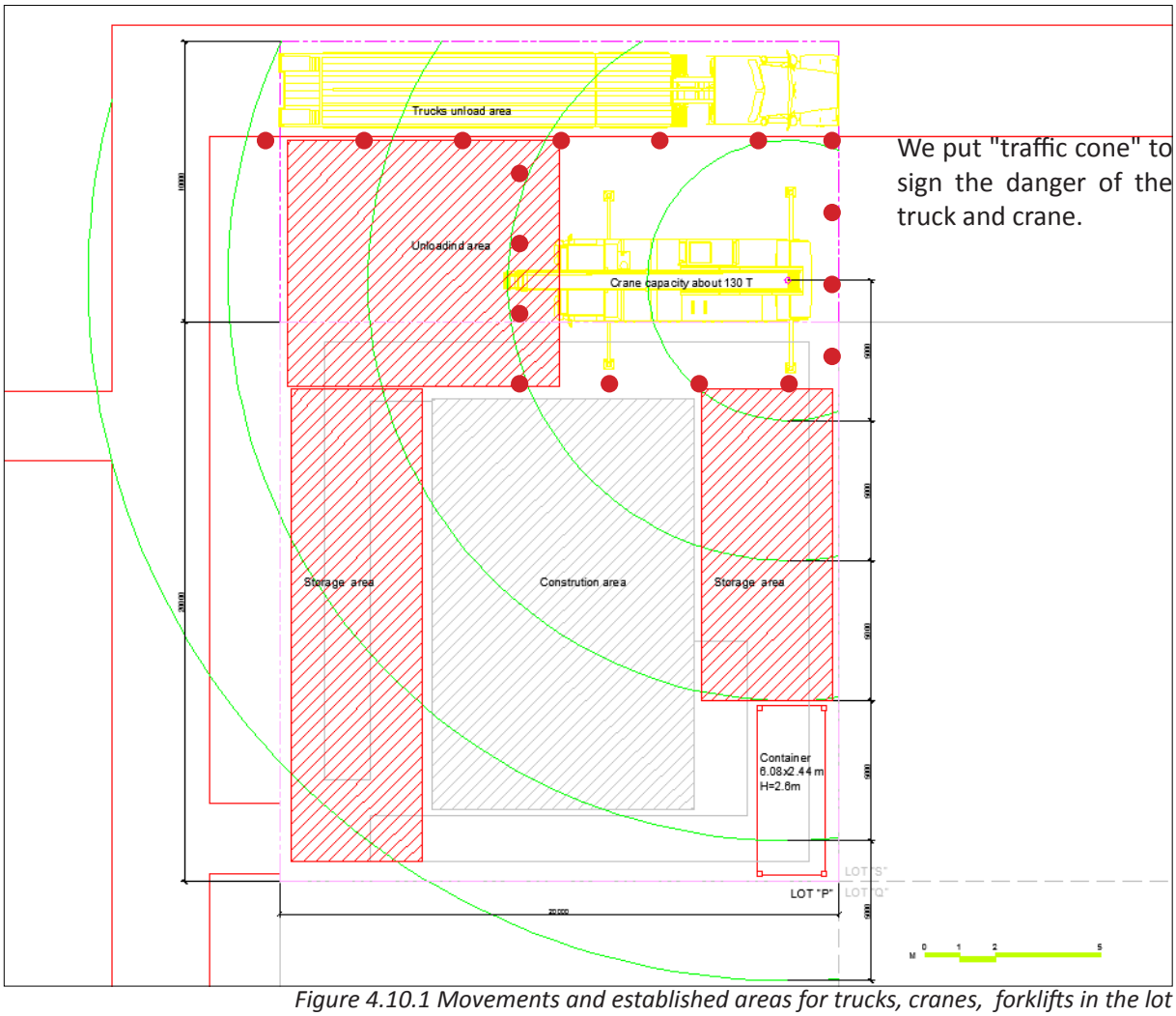


Figure 4.10.1 Movements and established areas for trucks, cranes, forklifts in the lot

Auxiliary Resources	*Where*	*When*
Trucks	At the north of the lot (see Project Drawing SO-102)	When a truck arrives and waits for being unload or load.
Crane	At the north of the lot (see Project Drawing SO-102)	During all the construction
Tools storage container	At the southeast of the lot (see Project Drawing SO-102)	During all the construction

4.11 Machinery planned for the construction

There are two categories of machinery may be used on site. One is heavy machine which requires local licensed person to operate, such as crane, truck, PV technicians. The other machines are used by decathletes such as domestic appliances.

4.12 Construction site installations

Three installations are required: PV and energy system installation, water and plumbing system installation.

4.13 Characteristics table for the stocks

Assembly trucks specifications and shipments List

Truck No.(A)	Type	Designation	Package No.	Assembly No	QTY	Weight(kg)	Dimensions(mm) L	W	H	Arrival
1	Flat	Tool	N30	1	1	150	1500	1500	1500	6/16 08:00
1	Flat	Tool	N32	1	1	10	1500	900	800	6/16 08:00
1	Flat	Tool	N33	1	1	50	1500	500	500	6/16 08:00
1	Flat	Tool	N25	3	1	150	1000	1000	1000	6/16 08:00
1	Flat	Wooden Sandbox	P27	4	1	150	2100	1300	1090	6/16 08:00
1	Flat	Wooden Sandbox	P28	4	1	150	2100	1300	1090	6/16 08:00
1	Flat	Wooden Sandbox	P31	4	1	150	1700	1450	1210	6/16 08:00
1	Flat	Steel Structure Footing	P14	6	1	440	1300	1300	620	6/16 08:00
1	Flat	Steel Structure Footing	P15	6	1	440	1300	1300	620	6/16 08:00
1	Flat	Steel Structure Footing	P16	6	1	440	1300	1300	620	6/16 08:00
1	Flat	Steel Structure Footing	P17	6	1	440	1300	1300	620	6/16 08:00
1	Flat	Steel Structure Footing	P18	6	1	440	1300	1300	620	6/16 08:00
1	Flat	Plastic Bucket	W1	11	1	890	1100	900	630	6/16 08:00
1	Flat	Plastic Bucket	W2	11	1	120	1100	900	630	6/16 08:00
1	Flat	Tool	P48-w	11	1	680	1500	1500	2000	6/16 08:00
1	Flat	Steel Structure Footing	P19	326	1	440	1300	1300	620	6/16 08:00
1	Flat	Steel Structure Footing	P20	326	1	440	1300	1300	620	6/16 08:00
1	Flat	Steel Structure Footing	P21	326	1	440	1300	1300	620	6/16 08:00
1	Flat	Steel Structure Footing	P22	326	1	440	1300	1300	620	6/16 08:00
1	Flat	Sand Bag	N34	1	1	6000	2000	2000	2000	6/16 08:00
total					20	12460				
Truck No.(A)	Type	Designation	Package No.	Assembly No	QTY	Weight(kg)	Dimensions(mm) L	W	H	Arrival
2	Low	Steel Structure UNIT 12	P09	11	1	2640	9500	2275	3450	6/16 12:00
2	Low	Steel Structure UNIT 10	P07	51	1	550	4000	2200	1545	6/16 12:00
2	Low	GL Lower Wooden Box	P50	98	1	80	1865	1150	1140	6/16 12:00
2	Low	GL Lower Wooden Box	P52	98	1	180	1865	1150	1140	6/16 12:00
2	Low	Steel Structure Connection	P13-w	121	1	350	1300	1300	755	6/16 12:00
2	Low	ML Lower Wooden Box	P58	1	1	2500	2030	1710	1210	6/16 12:00
2	Low	ML Lower Wooden Box	P59	1	1	2500	2030	1710	1210	6/16 12:00
total					7	8800				
Truck No.(A)	Type	Designation	Package No.	Assembly No	QTY	Weight(kg)	Dimensions(mm) L	W	H	Arrival
3	Low	Steel Structure UNIT 11	P08	15	1	2345	9500	2200	3450	6/16 14:00
3	Low	Aluminum Window Frame	W3	57	1	260	4450	2200	1300	6/16 14:00
3	Low	ML Upper Wooden Box	P60	122	1	420	2000	2000	2000	6/16 14:00
3	Low	Ceiling Structure	P46	178	1	70	1622	960	420	6/16 14:00
total					4	3095				
Truck No.(A)	Type	Designation	Package No.	Assembly No	QTY	Weight(kg)	Dimensions(mm) L	W	H	Arrival
4	Low	Steel Structure UNIT 05	P05	20	1	1150	4000	2200	3450	6/16 15:00
4	Low	Eform	N31	24	1	150	4000	2000	2000	6/16 15:00
4	Low	Steel Structure UNIT 04	P04	27	1	1025	4000	2200	3450	6/16 15:00
4	Low	Electrical Pipe	W22	32	1	80	3100	1000	800	6/16 15:00
4	Low	Water Pipe	W23	32	1	110	3100	1000	800	6/16 15:00
4	Low	Steel Structure UNIT 06	P06	54	1	1500	3850	2200	1130	6/16 15:00
4	Low	Vacuum Insulation Panel	P76	122	1	120	2480	1303	1200	6/16 15:00
4	Low	UIS Tool	N24	147	1	70	1000	1000	600	6/16 15:00
4	Low	UIS Tool	N21	147	1	70	1000	1000	600	6/16 15:00
4	Low	UIS Tool	N22	147	1	70	1000	1000	600	6/16 15:00
4	Low	UIS Tool	N23	147	1	70	1000	1000	1000	6/16 15:00
4	Low	Air Pipe	W24	153	1	50	3100	1000	800	6/16 15:00
4	Low	Exhaust Fan Air Pipe	W25	198	1	250	3100	1000	800	6/16 15:00
4	Low	PV Cable Tray	w25	244	1	250	3100	1000	800	6/16 15:00
total					14	4965				
Truck No.(A)	Type	Designation	Package No.	Assembly No	QTY	Weight(kg)	Dimensions(mm) L	W	H	Arrival
5	Low	Tool	N12	3	1	835	2900	1890	1000	6/16 16:00
5	Low	Tool	N11	3	1	800	3400	1690	1200	6/16 16:00
5	Low	Steel Structure UNIT 03	P03	34	1	950	4000	1810	3450	6/16 16:00
5	Low	Steel Structure UNIT 02	P02	41	1	1000	4000	1790	3450	6/16 16:00
5	Low	Steel Structure UNIT 01	P01	46	1	900	4000	975	3450	6/16 16:00
5	Low	Wooden Sheet	W31	178	1	150	2600	1300	800	6/16 16:00
total					6	4635				
Truck No.(A)	Type	Designation	Package No.	Assembly No	QTY	Weight(kg)	Dimensions(mm) L	W	H	Arrival
6	Flat	Steel Structure Beam	P37	83	1	1660	4030	1900	630	6/16 23:00
6	Flat	Steel Structure Stair	P39	92	1	350	4730	1150	565	6/16 23:00
6	Flat	Steel Structure Stair	P40	92	1	200	1890	1305	540	6/16 23:00
6	Flat	Steel Structure Stair	P38	92	1	400	2010	1150	690	6/16 23:00
6	Flat	Steel Structure Beam	P34	102	1	1540	4507.6	1900	480	6/16 23:00
6	Flat	Steel Structure Beam	P36	102	1	920	5451.5	1900	480	6/16 23:00
6	Flat	GL Upper Wooden Box	W26	122	1	760	4350	2200	1100	6/16 23:00
6	Flat	Steel Structure Column	P33	188	1	1700	6674.3	1900	480	6/16 23:00
total					8	7530				

Truck No.(A)	Type	Designation	Package No.	Assembly No	QTY	Weight(kg)	Dimensions(mm)			Arrival
							L	W	H	
7	Flat	Bedroom Cabinet	P64	130	1	200	2515	1065	1000	6/17 02:00
7	Flat	Steel Structure Small Beam (South	P35	102	1	800	3530	1900	930	6/17 02:00
7	Flat	Wooden Box (Wall)	P61	125	1	2000	2650	1140	1236	6/17 02:00
7	Flat	Wooden Box (Wall)	P62	125	1	2000	2650	1140	1236	6/17 02:00
7	Flat	Kitchen Finish	P73	129	1	300	3050	1700	1830	6/17 02:00
7	Flat	Bedroom Cabinet	P74	130	1	220	2350	1950	2130	6/17 02:00
total					6	5520				
Truck No.(A)	Type	Designation	Package No.	Assembly No	QTY	Weight(kg)	Dimensions(mm)			Arrival
							L	W	H	
8	Flat	Steel Structure Canopy	P82	140	1	300	6250	700	300	6/17 08:00
8	Flat	Wooden Box	P77	146	1	360	2540	2000	2020	6/17 08:00
8	Flat	Stainless Steel Pool	W9	161	1	190	7600	1310	390	6/17 08:00
8	Flat	FRP Clean Water Tank	W35	162	1	110	7600	1310	880	6/17 08:00
8	Flat	FRP Gray Water Tank	W36	162	1	110	7600	1310	880	6/17 08:00
total					5	1070				
Truck No.(A)	Type	Designation	Package No.	Assembly No	QTY	Weight(kg)	Dimensions(mm)			Arrival
							L	W	H	
9	Flat	Small Wooden Box	P65	125	1	350	2500	1300	1440	6/18 06:00
9	Flat	Ceramic Panel	P75	146	1	860	2700	1320	720	6/18 06:00
9	Flat	Toilet equipment	W13	179	1	300	2100	1650	1680	6/18 06:00
9	Flat	Washing Machine	W11	207	1	150	800	1260	1180	6/18 06:00
9	Flat	Panasonic CO2 Heat Pump Tank	W12	207	1	270	1800	2250	1980	6/18 06:00
9	Flat	Hot Water Tank	P72	207	1	150	1700	1000	1080	6/18 06:00
9	Flat	Polli-Brick	P45	225	1	160	1900	1900	1730	6/18 06:00
9	Flat	Thermal Wall Outside Structure	W30	226	1	500	2500	1300	950	6/18 06:00
total					8	2740				
Truck No.(A)	Type	Designation	Package No.	Assembly No	QTY	Weight(kg)	Dimensions(mm)			Arrival
							L	W	H	
10	Flat	PV Module	N26	242	1	160	1500	800	600	6/19 02:00
10	Flat	PV Module	N13	242	1	720	2900	1890	1000	6/19 02:00
10	Flat	Smart Skin UNIT	N14	243	1	275	1730	1150	900	6/19 02:00
10	Flat	Electrical equipment	W14	248	1	150	1100	1300	820	6/19 02:00
10		Bayer PC Hollow Sheet	P78	281	1	900	7100	2200	1630	6/19 02:00
total					5	2205				
Truck No.(A)	Type	Designation	Package No.	Assembly No	QTY	Weight(kg)	Dimensions(mm)			Arrival
							L	W	H	
11	Flat	Glass Louver	W5	258	1	950	712	1200	740	6/19 14:00
11	Flat	kitchen&living equipment	W10	268	1	460	1900	1700	2130	6/19 14:00
11	Flat	Exhaust Fan	W15	270	1	200	1230	2020	550	6/19 14:00
11	Flat	Exhaust Fan	W16	270	1	200	1230	2020	550	6/19 14:00
11	Flat	Aluminum Louver Frame	W4	307	1	2000	3560	1750	1230	6/19 14:00
11	Flat	Plastic Wood Unit	P67	378	1	4200	4350	2200	1100	6/19 14:00
total					6	8010				
Truck No.(A)	Type	Designation	Package No.	Assembly No	QTY	Weight(kg)	Dimensions(mm)			Arrival
							L	W	H	
12	Flat	Aluminum Windows	W32	258	1	140	2600	2200	2200	6/20 16:00
12	Flat	Steel Column Green Core	N6	276	1	2200	3900	1290	1215	6/20 16:00
12	Flat	Steel Column Green Core	N7	276	1	2200	3900	1290	1215	6/20 16:00
12	Flat	Steel Structure Footing	P23	326	1	440	1300	1300	620	6/20 16:00
12	Flat	Steel Structure Footing	P24	326	1	440	1300	1300	620	6/20 16:00
12	Flat	Steel Structure Footing	P25	326	1	440	1300	1300	620	6/20 16:00
12	Flat	Steel Structure Footing	P26	326	1	440	1300	1300	620	6/20 16:00
12	Flat	Plastic Wood Small Piece	N20	378	1	2000	3600	1200	1400	6/20 16:00
12	Flat	Sand Bag	N36	400	1	6000	2000	2000	2000	6/20 16:00
total					9	14300				
Truck No.(A)	Type	Designation	Package No.	Assembly No	QTY	Weight(kg)	Dimensions(mm)			Arrival
							L	W	H	
13	Flat	Solar Water Heater Frame	P44	328	1	220	2200	2000	800	6/23 01:00
13	Flat	Steel Structure UNIT 13	P10	334	1	1950	4300	2275	1430	6/23 01:00
13	Flat	Steel Structure UNIT 23	P11	334	1	3800	7000	1700	1430	6/23 01:00
13	Flat	Steel Structure UNIT 22	P12	334	1	1450	3700	2225	1180	6/23 01:00
total					4	7420				
Truck No.(A)	Type	Designation	Package No.	Assembly No	QTY	Weight(kg)	Dimensions(mm)			Arrival
							L	W	H	
14	Flat	FRP Rain Water Tank	W37	162	1	150	3100	1400	1180	6/23 15:00
14	Flat	Plastic Wood Unit	P68	378	1	4440	4350	2200	1830	6/23 15:00
14	Flat	Steel Outdoor Handrail	N1	396	1	800	3400	1685	1215	6/23 15:00
14	Flat	Steel Outdoor Handrail	N3	396	1	800	3400	1685	1215	6/23 15:00
14	Flat	Steel Outdoor Handrail	N2	396	1	800	3400	1685	1215	6/23 15:00
total					5	6990				
Truck No.(A)	Type	Designation	Package No.	Assembly No	QTY	Weight(kg)	Dimensions(mm)			Arrival
							L	W	H	
15	Flat	Home accessories	N27	410	1	80	800	400	400	6/24 16:00
15	Flat	Furniture	W33	410	1	260	2600	2200	2200	6/24 16:00
15	Flat	Furniture	W34	410	1	650	2600	2200	2200	6/24 16:00
15	Flat	Planting	N35	400	1	3000	7000	2000	2000	6/24 16:00
total					4	3990				

DisAssembly trucks specifications and shipments List

Truck No.(B)	Type	Designation	Package No.	Dismantling No.	QTY	Weight(kg)	Dimensions(mm)			Arrival
							L	W	H	
1	Flat	Tool	N30	0	1	150	3400	1800	1100	7/15 10:00
1	Flat	Tool	N32	0	1	10	2900	1700	1100	7/15 10:00
1	Flat	Tool	N33	0	1	50	2000	2000	2000	7/15 10:00
1	Flat	Planting	N35	150	1	3000	7000	2000	2000	7/15 10:00
total					4	3210				
Truck No.(B)	Type	Designation	Package No.	Dismantling No.	QTY	Weight(kg)	Dimensions(mm)			Arrival
							L	W	H	
2	Flat	Electrical equipment	W14	4	1	150	1100	1300	820	7/15 15:00
2	Flat	kitchen&living equipment	W10	3	1	460	1900	1700	2130	7/15 15:00
2	Flat	Steel Outdoor Handrail	N1	6	1	800	3400	1685	1215	7/15 15:00
2	Flat	Steel Outdoor Handrail	N2	6	1	800	3400	1685	1215	7/15 15:00
2	Flat	Home accessories	N27	1	1	80	800	400	400	7/15 15:00
2	Flat	Furniture	W33	2	1	260	2600	2200	2200	7/15 15:00
2	Flat	Furniture	W34	2	1	650	2600	2200	2200	7/15 15:00
total					7	3200				
Truck No.(B)	Type	Designation	Package No.	Dismantling No.	QTY	Weight(kg)	Dimensions(mm)			Arrival
							L	W	H	
3	Flat	Steel Structure UNIT 13	P10	8	1	1950	4300	2275	1430	7/15 20:00
3	Flat	Steel Structure UNIT 22	P12	8	1	1450	3700	2225	1180	7/15 20:00
3	Flat	Plastic Wood Unit	P68	7	1	4440	4350	2200	1830	7/15 20:00
3	Flat	Steel Outdoor Handrail	N3	6	1	800	3400	1685	1215	7/15 20:00
total					4	8640				
Truck No.(B)	Type	Designation	Package No.	Dismantling No.	QTY	Weight(kg)	Dimensions(mm)			Arrival
							L	W	H	
4	Flat	Glass Louver	W5	12	1	950	712	1200	740	7/16 01:00
4	Flat	Aluminum Windows	W32	15	1	140	2600	2200	2200	7/16 01:00
4	Flat	Steel Structure Footing	P19	9	1	440	1300	1300	620	7/16 01:00
4	Flat	Steel Structure Footing	P20	9	1	440	1300	1300	620	7/16 01:00
4	Flat	Steel Structure Footing	P21	9	1	440	1300	1300	620	7/16 01:00
4	Flat	Steel Structure Footing	P22	9	1	440	1300	1300	620	7/16 01:00
4	Flat	Steel Structure Footing	P23	9	1	440	1300	1300	620	7/16 01:00
4	Flat	Steel Structure Footing	P24	9	1	440	1300	1300	620	7/16 01:00
4	Flat	Steel Structure Footing	P25	9	1	440	1300	1300	620	7/16 01:00
4	Flat	Steel Structure Footing	P26	9	1	440	1300	1300	620	7/16 01:00
4	Flat	Steel Structure UNIT 23	P11	8	1	3800	7000	1700	1430	7/16 01:00
total					11	8410				
Truck No.(B)	Type	Designation	Package No.	Dismantling No.	QTY	Weight(kg)	Dimensions(mm)			Arrival
							L	W	H	
5	Flat	Bedroom Cabinet	P64	25	1	200	2515	1065	1000	7/16 06:00
5	Flat	Wooden Box (Wall)	P61	21	1	2000	2650	1140	1236	7/16 06:00
5	Flat	Wooden Box (Wall)	P62	21	1	2000	2650	1140	1236	7/16 06:00
5	Flat	Small Wooden Box	P65	21	1	350	2500	1300	1440	7/16 06:00
5	Flat	Bedroom Cabinet	P74	25	1	220	2350	1950	2130	7/16 06:00
5	Flat	Ceiling Structure	P46	20	1	70	1622	960	420	7/16 06:00
5	Flat	Toilet equipment	W13	22	1	300	2100	1650	1680	7/16 06:00
total					7	5140				
Truck No.(B)	Type	Designation	Package No.	Dismantling No.	QTY	Weight(kg)	Dimensions(mm)			Arrival
							L	W	H	
6	Flat	Kitchen Finish	P73	23	1	300	3050	1700	1830	7/16 12:00
6	Flat	Ceramic Panel	P75	31	1	860	2700	1320	720	7/16 12:00
6	Flat	Washing Machine	W11	28	1	150	800	1260	1180	7/16 12:00
6	Flat	Panasonic CO2 Heat Pump Tank	W12	28	1	270	1800	2250	1980	7/16 12:00
6	Flat	Hot Water Tank	P72	28	1	150	1700	1000	1080	7/16 12:00
6	Flat	Polli-Brick	P45	26	1	160	1900	1900	1730	7/16 12:00
6	Flat	Thermal Wall Outside Structure	W30	26	1	500	2500	1300	950	7/16 12:00
total					7	2390				
Truck No.(B)	Type	Designation	Package No.	Dismantling No.	QTY	Weight(kg)	Dimensions(mm)			Arrival
							L	W	H	
7	Flat	Aluminum Window Frame	W3	38	1	260	4450	2200	1300	7/16 23:00
7	Flat	GL Lower Wooden Box	P50	39	1	80	1865	1150	1140	7/16 23:00
7	Flat	GL Upper Wooden Box	W26	36	1	760	4350	2200	1100	7/16 23:00
7	Flat	Wooden Box	P77	31	1	360	2540	2000	2020	7/16 23:00
7	Flat	Steel Column Green Core	N6	35	1	2200	3900	1290	1215	7/16 23:00
7	Flat	Steel Column Green Core	N7	35	1	2200	3900	1290	1215	7/16 23:00
total					6	5860				
Truck No.(B)	Type	Designation	Package No.	Dismantling No.	QTY	Weight(kg)	Dimensions(mm)			Arrival
							L	W	H	
8	Flat	GL Lower Wooden Box	P52	39	1	180	1865	1150	1140	7/17 09:00
8	Flat	ML Upper Wooden Box	P60	37	1	420	2000	2000	2000	7/17 09:00
8	Flat	PV Module	N26	0	1	160	1500	800	600	7/17 09:00
8	Flat	PV Module	N13	50	1	720	2900	1890	1000	7/17 09:00
8	Flat	Exhaust Fan	W15	45	1	200	1230	2020	550	7/17 09:00
8	Flat	Exhaust Fan	W16	45	1	200	1230	2020	550	7/17 09:00
8	Flat	Plastic Wood Unit	P67	40	1	4200	4350	2200	1100	7/17 09:00
total					7	6080				

Truck No.(B)	Type	Designation	Package No.	Dismantling No.	QTY	Weight(kg)	Dimensions(mm)			Arrival
							L	W	H	
9	Flat	Smart Skin UNIT	N14	51	1	275	1730	1150	900	7/17 15:00
9	Flat	Bayer PC Hollow Sheet	P78	55	1	900	7100	2200	1630	7/17 15:00
9	Flat	Aluminum Louver Frame	W4	53	1	2000	3560	1750	1230	7/17 15:00
total					3	3175				
Truck No.(B)	Type	Designation	Package No.	Dismantling No.	QTY	Weight(kg)	Dimensions(mm)			Arrival
							L	W	H	
10	Flat	Electrical Pipe	W22	56	1	80	3100	1000	800	7/17 16:00
10	Flat	Water Pipe	W23	56	1	110	3100	1000	800	7/17 16:00
10	Flat	Air Pipe	W24	30	1	50	3100	1000	800	7/17 16:00
10	Flat	Stainless Steel Pool	W9	29	1	190	7600	1310	390	7/17 16:00
10	Flat	FRP Clean Water Tank	W35	57	1	110	7600	1310	880	7/17 16:00
10	Flat	FRP Gray Water Tank	W36	57	1	110	7600	1310	880	7/17 16:00
10	Flat	FRP Rain Water Tank	W37	57	1	150	3100	1400	1180	7/17 16:00
10	Flat	Exhaust Fan Air Pipe	W25	56	1	250	3100	1000	800	7/17 16:00
10	Flat	PV Cable Tray	w25	56	1	250	3100	1000	800	7/17 16:00
total					9	1300				
Truck No.(B)	Type	Designation	Package No.	Dismantling No.	QTY	Weight(kg)	Dimensions(mm)			Arrival
							L	W	H	
11	Flat	Steel Structure Beam	P37	133	1	1660	4030	1900	630	7/18 23:00
11	Flat	Steel Structure Stair	P38	133	1	400	2010	1150	690	7/18 23:00
11	Flat	Steel Structure Small Beam	P35	122	1	800	3530	1900	930	7/18 23:00
11	Flat	Steel Structure Beam	P34	122	1	1540	4507.6	1900	480	7/18 23:00
11	Flat	Steel Structure Beam	P36	122	1	920	5451.5	1900	480	7/18 23:00
11	Flat	Steel Structure Connection	P13-w	124	1	350	1300	1300	755	7/18 23:00
11	Flat	Steel Structure Column	P33	105	1	1700	6674.3	1900	480	7/18 23:00
total					7	7370				
Truck No.(B)	Type	Designation	Package No.	Dismantling No.	QTY	Weight(kg)	Dimensions(mm)			Arrival
							L	W	H	
12	Low	Steel Structure UNIT 01	P01	141	1	900	4000	975	3450	7/19 02:00
12	Low	Steel Structure UNIT 10	P07	138	1	550	4000	2200	1545	7/19 02:00
12	Low	Steel Structure UNIT 06	P06	134	1	1500	3850	2200	1130	7/19 02:00
12	Low	Solar Water Heater Frame	P44	54	1	220	2200	2000	800	7/19 02:00
total					4	3170				
Truck No.(B)	Type	Designation	Package No.	Dismantling No.	QTY	Weight(kg)	Dimensions(mm)			Arrival
							L	W	H	
13	Low	Steel Structure UNIT 03	P03	143	1	950	4000	1810	3450	7/19 03:00
13	Low	Steel Structure UNIT 02	P02	142	1	1000	4000	1790	3450	7/19 03:00
13	Low	Steel Structure Stair	P40	132	1	200	1890	1305	540	7/19 03:00
total					3	2150				
Truck No.(B)	Type	Designation	Package No.	Dismantling No.	QTY	Weight(kg)	Dimensions(mm)			Arrival
							L	W	H	
14	Low	Steel Structure UNIT 05	P05	145	1	1150	4000	2200	3450	7/19 04:00
14	Low	Steel Structure UNIT 04	P04	144	1	1025	4000	2200	3450	7/19 04:00
total					2	2175				
Truck No.(B)	Type	Designation	Package No.	Dismantling No.	QTY	Weight(kg)	Dimensions(mm)			Arrival
							L	W	H	
15	Low	Wooden Sandbox	P27	149	1	150	2100	1300	1090	7/19 05:00
15	Low	Wooden Sandbox	P28	149	1	150	2100	1300	1090	7/19 05:00
15	Low	Wooden Sandbox	P31	149	1	150	1700	1450	1210	7/19 05:00
15	Low	Steel Structure UNIT 11	P08	147	1	2345	9500	2200	3450	7/19 05:00
15	Low	Steel Structure Stair	P39	132	1	350	4730	1150	565	7/19 05:00
15	Low	Steel Structure Canopy	P82	131	1	300	6250	700	300	7/19 05:00
15	Low	ML Lower Wooden Box	P58	150	1	2500	2030	1710	1210	7/19 05:00
15	Low	ML Lower Wooden Box	P59	150	1	2500	2030	1710	1210	7/19 05:00
total					8	8445				
Truck No.(B)	Type	Designation	Package No.	Dismantling No.	QTY	Weight(kg)	Dimensions(mm)			Arrival
							L	W	H	
16	Low	Tool	N12	150	1	835	2900	1890	1000	7/19 12:00
16	Low	Tool	N25	150	1	150	1000	1000	1000	7/19 12:00
16	Low	Tool	N11	150	1	800	3400	1690	1200	7/19 12:00
16	Low	Steel Structure Footing	P14	149	1	440	1300	1300	620	7/19 12:00
16	Low	Steel Structure Footing	P15	149	1	440	1300	1300	620	7/19 12:00
16	Low	Steel Structure Footing	P16	149	1	440	1300	1300	620	7/19 12:00
16	Low	Steel Structure Footing	P17	149	1	440	1300	1300	620	7/19 12:00
16	Low	Steel Structure Footing	P18	149	1	440	1300	1300	620	7/19 12:00
16	Low	Steel Structure UNIT 12	P09	148	1	2640	9500	2275	3450	7/19 12:00
16	Low	Plastic Bucket	W1	150	1	890	1100	900	630	7/19 12:00
16	Low	Plastic Bucket	W2	150	1	120	1100	900	630	7/19 12:00
16	Low	Tool	P48-w	150	1	680	1500	1500	2000	7/19 12:00
16	Low	Sand Bag	N34	150	1	6000	2000	2000	2000	7/19 12:00
16	Low	Sand Bag	N36	150	1	6000	2000	2000	2000	7/19 12:00
total					14	20315				

5.0 Activities for risks prevention

Shift: 8 hours, breaks: 1 x 30 min and 2 x 15 min

We will work in three shifts, with 8 team members in every shift.

A Team working

Name	*Position*	*Mail*
Yating Wu	Site Operation Coordinator	yatingwu@arch.nctu.edu.tw
Ming-Hong She	Decathlete	miluchopperr@arch.nctu.edu.tw
Chin-Yuan Fan	Material Manager	cyfan@arch.nctu.edu.tw
Pei-Ling Wu	Health and Safety Officer	plhojita@arch.nctu.edu.tw
Yung-Yen Teng	Decathlete	yungyen@arch.nctu.edu.tw
Yiting Chen	Tool Manager	annchen@arch.nctu.edu.tw
Chin-Ju Chen	Decathlete	chen.chin.ju@arch.nctu.edu.tw
Yu-Ming Su	Decathlete	ymsu@arch.nctu.edu.tw
Tze-Chun Chen	Decathlete	tcchen@arch.nctu.edu.tw
Shao-yi Lu	Decathlete	theolu@arch.nctu.edu.tw

B Team working

Name	*Position*	*Mail*
Chi-Ming Chien	Site Operation Coordinator	s9390306@gmail.com
Sunny Chou	Decathlete	cyt@arch.nctu.edu.tw
Dennis Lin	Decathlete	dennis01215@arch.nctu.edu.tw
Jason Huang	Decathlete	jason@arch.nctu.edu.tw
Oswalt Ho	Decathlete	oswalt_mitsui@arch.nctu.edu.tw
Summer Lee	Tool Manager	siminlee@arch.nctu.edu.tw
Cheng-Wei Wang	Decathlete	hanise@arch.nctu.edu.tw
Wan-Ling Cheng	Health and Safety Officer	minaling814@arch.nctu.edu.tw
I-Chih Chen	Material Manager	inaohlala@arch.nctu.edu.tw
Ruby Tu	Decathlete	Ruby_@arch.nctu.edu.tw

C Team working

Name	*Position*	*Mail*
Sky Tseng	Site Operation Coordinator	sky@arch.nctu.edu.tw
Chester Hu	Decathlete	chian@arch.nctu.edu.tw
Andrew Su	Decathlete	andrewsudog@arch.nctu.edu.tw
Henry Ko	Decathlete	henryko@arch.nctu.edu.tw
Rui Lin	Material Manager	ruikisa@arch.nctu.edu.tw
Trista Wang	Decathlete	jou-hsuan@arch.nctu.edu.tw
Sophie Chen	Health and safety Officer	wantsi@arch.nctu.edu.tw
Leslie Yen	Decathlete	lieles.yen@arch.nctu.edu.tw
Jeff Lin	Tool Manager	bluerice@arch.nctu.edu.tw

6.0 Critical work phases for risks prevention

6.1 Assembly Timetable Chart

Work Group Sheet		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
									TEAM-A								TEAM-B								
Group - A	Student	10				Technical staff						5													
Group - B	Student	10				Technical staff						4													
Group - C	Student	9				Technical staff						7													
Group - A-4	Student	6				Technical staff						5													
Group - B-4	Student	5				Technical staff						4													
Group - A-5	Student	5				Technical staff																			
Group - B-5	Student	4				Technical staff																			
Group - B+	Student	10				Technical staff						7													

Crane hour	12	Day				1			2014/6/16													Mon			
Group	A , B , C																								
Work detail		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Lofting																									
Truck-1																									
Unload																									
Sand Box Set																									
Footing Set																									
Truck-2																									
Unload																									
Unit 12																									
Truck-3																									
Unload																									
Unit 11																									
Truck-4																									
Unload																									
Unit 05																									
Unit 04																									
Truck-5																									
Unload																									
Unit 03																									
Unit 02																									
Unit 01																									
Unit 10																									
Unit 09																									
Unit 08																									
Unit 07																									
Unit 06																									
Truck-6																									
Stair Unit																									
Window Frames																									

Crane hour	20	Day	2	2014/6/17	Tue
Group	A , B , C				

Work detail	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Stair Unit																								
Truck-7																								
2F Column																								
1F Up Floor																								
1F Wall Insulation																								
2F Up Floor																								
Workstation Unit																								
Kitchen Unit																								
Truck-8																								
Orientation Correction																								
Terrace Column																								
Terrace Beam																								
Shelter																								
Roof Unit 5																								
Roof Unit 6																								
Roof Unit 7																								
Roof Unit 9																								
Roof Unit 10																								
1,2 F Shaft																								
1,2 F M.E.P System																								
Water Tank System																								

Crane hour	20	Day	3	2014/6/18	Wed
Group	A , B , C				

Work detail	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Roof Unit 11																								
Truck-9																								
1F Bathroom																								
1F Wall System																								
1F Ceiling System																								
Stair Finish																								
Thermall Wall																								
2F Cloumn																								
Roof Unit 12																								
Roof Unit 8																								
Roof Unit 4																								
Roof Unit 3																								
Roof Unit 2																								
Roof Unit 1																								
1,2 F M.E.P System																								

Crane hour	4	Day	4	2014/6/19	Thu
Group	A , B , C				

Work detail	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Roof Unit 1																								
Truck-10																								
1F Wall System																								
1F Ceiling System																								
Thermall Wall																								
Structural correction																								
Truck-11																								
M.E.P System																								
Roof Panel																								
Solar Panel																								
Solar M.E.P System																								
Smart Skin																								

Crane hour	-	Day	5	2014/6/17	Fri
Group	A , B , C				

Work detail	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Roof Panel																								
Interior Floor Finish																								
Terrace Floor Finish																								
Lighting System																								
Sensor System																								
M.E.P System																								
Roof Fan System																								
Truck-12																								
Green Core System																								
Bayer Exterior System																								

Crane hour	-	Day	6	2014/6/17	Sat
Group	A-4 , B-4 , C				

Work detail	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Bayer Exterior System																								
2F Interior Floor																								
Roof Water Proof																								
M.E.P System Check																								

Crane hour	-	Day	7	2014/6/17	Sun
Group	A , B , C				

Work detail	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Roof Water Proof																								
Exterior System																								
Exterior Water Proof																								

Crane hour	8	Day	8	2014/6/17	Mon
Group	A , B+ , C				

Work detail	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Structure Clean																								
Truck-13																								
Paint Repair																								
Interior Repair																								
Heat Water Panel																								
Outdoor Footing Set																								
Outdoor Sand Box Set																								
Outdoor Ramp																								
Truck-14																								
Outdoor Floor																								
Outdoor M.E.P System																								
Outdoor Lighting																								
Outdoor Furniture																								

Crane hour	-	Day	9	2014/6/17	Tue
Group	A , B+ , C				

Work detail	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Outdoor Floor																								
Outdoor Ramp																								
Outdoor Lighting																								
Outdoor Handrails																								
Truck-15																								
Planting																								
M.E.P System Check																								
Interior Clean																								

Crane hour	-	Day	10	2014/6/17	Th
Group	A , C				

Work detail	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Planting																								
Furnishing and Planting																								
Clean																								
Tool Transport																								

6.2 Disassembly Timetable Chart

Hours of crane usage		4				D1 7/15 Tue.																							
Step	Work detail	Group	Number of Worker		Working Hours	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
			Student	Tech.																									
0	Plants removing	A	10		0.5																								
	Truck 1 uploading			3																									
1	Accessory withdrawing		4		1																								
2	Furniture removing		6		2																								
3	equipment		4		2																								
4	Machinery room		2		3																								
5	Outside pipeline/Lamps		4		2																								
6	Outside handrail		4		2																								
	Truck 2 uploading			3																									
7	Outside WPC		6+2		4																								
8	Outside deck	B	4+2		4																								
	Truck 3 uploading			3																									
9	Outside footing		2		1																								
10	East Bayer board		3+2		4																								
11	West Bayer board		3+2		4																								
12	South Eletric Blinds		2		2																								
13	South Eletric Blinds		3		2																								
14	1F Interior floor		4		1																								
15	Aluminium window		2		1																								
16	Sensor removing		2		2																								
17	1F Ceiling		2+2		1																								
18	1F Ceiling constrcture		2+2		1																								
19	1F Ceiling pipline		2		2																								
20	Wooden wall (finish side)	C	4		1																								

Hours of crane usage		0				D2 7/16 Wed.																							
Step	Work detail	Group	Number of Worker		Working Hours	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
			Student	Tech.																									
	Truck 4 uploading			3																									
21	1F Wooden wall	C	6		2																								
22	Bathroom		4		2																								
23	Kitchen Island		3		2																								
24	Air conditioner removing		1	2	1																								
25	Work Station removing		4		2																								
	Truck 5 uploading			3																									
26	Thermal wall removing		4		3																								
	2F WPC		3		3																								
27	2F safety handrail		2		1																								
28	2F Equipment/Appliance		4+1		3																								
29	Water wall removing	A	4+4		2																								
30	2F pipline		4		3																								
31	2F Furniture		2+1		1																								
	Truck 6 uploading			3																									
32	Green core water system		4		2																								
33	2F Green core		4		3																								
34	1F Green core		4		2																								
35	Green core construction		4		2																								
36	1F Upper wooden box	B	4+2		3																								
37	2F Upper wooden box		6		2																								
38	Window/Door disassembly		4		4																								
39	1F Lower wooden box		6		2																								
	Truck 7 uploading			3																									
40	Tea terrance/Entrance WPC		8		2																								
41	Roof safety handrail		2		2																								
42	Roof ridge cover board	C	4		1																								
43	Roof edge cover board		4		2																								
44	North Bayer board		2+1		2																								

Hours of crane usage		12				D3 7/17 Thu.																							
Step	Work detail	Group	Number of Worker		Working Hours	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
			Student	Tech.																									
43	Roof edge cover board	C	4		2																								
44	North Bayer board		2+1		2																								
45	Roof ridge Fans		4		2																								
46	Lower Smart skin		3		2																								
47	RU3-1/RU11-1 solar panel		3		2																								
48	RU3-2/RU11-2 solar panel		3		2																								
49	Roof cable tray		4		2																								
50	RU2/RU10 solar panel		3+1		3																								

	Truck 8 uploading			3																											
51	Upper Smart skin		2		2																										
52	North roof Bayer board		4		3																										
53	North Eletric Blinds		4		3																										
54	Solar water heater		2		2																										
55	South Bayer Board		4		3																										
	Truck 9 uploading			3																											
56	Base pipline	A	2		2																										
57	Water tank		6		2																										
	Truck 10 uploading			3																											
101	E2-E3 beam		2+1	1	1																										
102	E1-E2 unit removing		2+2	1	1																										
103	E1-E2 unit disassembly		4	1	1																										
104	E3-E4 unit removing		2+2	1	1																										
105	E3-E4 unit disassembly		4	1	1																										
106	Roof Unit 5~7 disassembly		2+1	1	2																										
107	Roof Unit 9 removing	B	2+2	1	2																										
108	Roof Unit 9 disassembly		4	1	2																										
109	Roof Unit 10 removing		2+2	1	2																										
110	Roof Unit 10 disassembly		4	1	2																										
111	Roof Unit 11 removing		2+2		2																										

Hours of crane usage		20			D4 7/18 Fri.																										
Step	Work detail	Group	Number of Worker		Working Hours	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
			Student	Tech.																											
113	Stair beam		2+1	1	1																										
114	A3-A4 column		2+1		1																										
115	B3-B4 column	C	2+1		1																										
116	C3-C4 column		2+1		1																										
117	D3-D4 column		2+1		1																										
118	Roof Unit 1 removing		2+2	1	2																										
119	Roof Unit 1 disassembly		4	1	2																										
120	Roof Unit 2 removing		2+2	1	2																										
121	Roof Unit 2 disassembly	A	4	1	2																										
122	Roof Unit 3 removing		2+2	1	2																										
123	Roof Unit 3 disassembly		4	1	2																										
124	2F octagon disk removing		4	1	2																										
125	2F unit disassemby		6	1	2																										
126	A1-A2 column		2+1	1	1																										
127	B1-B2 column		2+1	1	1																										
128	C1-C2 column		2+1	1	1																										
129	D1-D2 column		2+1	1	1																										
130	East canopy		4+2	1	2																										
131	North canopy		4+2	1	2																										
132	Stair constructure		2+2	1	1																										
133	Stair landing		2+2	1	1																										
	Truck 11 uploading	B		3																											
134	Unit 6 disassembly		3+1	1	1																										
135	Unit 7 disassembly		3+1	1	1																										
136	Unit 8 disassembly		3+1	1	1																										
137	Unit 9 disassembly		3+1	1	1																										
138	Unit 10 disassembly		3+1	1	1																										
139	Tea terrance footing		4	1	1																										
140	Unit 1~5 disassembly		6	1	2																										
141	Unit 1 removing		4		1																										
142	Unit 2 removing		4		1																										
143	Unit 3 removing	C	4		1																										
144	Unit 4 removing		4		1																										

Total crane using time		3			D5 7/19 Sat.																										
Step	Work detail	Group	Number of Worker		Working Hours	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
			Student	Tech.																											
	Truck 12 uploading			3																											
145	Unit 5 removing		4		1																										
146	Unit 11-12 disassembly		6		1																										
	Truck 13 uploading			3																											
	Truck 14 uploading	C		3																											
147	Unit 11 removing		4		1																										
148	Unit 12 removing		4		1																										
149	Footing removing		6		2																										
	Truck 15 uploading			3																											
150	Site cleaning	A	10		4																										
	Truck 16 uploading																														

7.0 Risks identification and efficiency evaluation of the adopted protections

7.1 Location and identification of the areas where the works involving special risks will be developed

- Fall of persons at a different level
- Fall of persons at the same level
- Fall of objects because of collapse
- Fall of objects because they come loose
- Fall of objects because of manipulation
- Stepping on objects
- Colliding with still objects
- Colliding with objects in motion
- Knocked by objects or tools
- Flying fragments or particles
- Accidents caused by living beings
- Trapped by or between objects13. Trapped by turned over machines, tractors or vehicles
- Overexertion
- Exposure to extreme environmental temperatures
- Thermal contact
- Exposure to electric connections
- Exposure to radiation
- Exposure to harmful substances
- Contact with caustic or corrosive substances
- Explosion
- Fire
- Run over or hit by vehicles
- Non traumatic pathologies

7.2 Risks identification and efficiency evaluation of the adopted protections

Check information see HS Drawing (HS-101, HS-201, HS-301, HS-401)

8.0 Collective protections to use

Give the assembly site is open space. Contractors of other team may enter the site in error. UNICODE plan corrective protection from site clearance, staff entrance check, temporary work, and health and medical assistance.

8.1 Site clearance

- Cones and ribbons: they will be used to mark critical areas like storage area or to indicate a hazard.

8.2 Staff entrance check

- Entrance check point: To check team member's identity and provide H&S information.
- Tent and sun-shelter: it will be used to provide shade for team members. We will put in this tent: drinking water, sunscreen, etc.

8.3 Temporary work

- Cones and ribbons: they will be used to mark critical areas like storage area or to indicate a hazard
- Waterproof plugs: it will be used to do outside connection.
- Railing: it will be include in the upper element to protect people doing the connection of power grids, air "ow and hydraulic.
- Rolling safety ladder
- Interior scaffolds
- Handrails: they will be handrails on the staircase to prevent fall

8.4 Health and medical assistance

- Drinking water
- First aid bag : a description is given in section 12
- Extinguisher: they will be « AB » Fire extinguisher in the container.

9.0 Individual protection resources to use

All safety rules must be followed

Fall because of barriers

Don't stand under forklift

First aid kit

Fall of objects

Authorized personnel only

Point of ressemblement

Forklift way

Don't made fire

Warning

Don't run on worksite

Fire extinguisher

Loading area

Don't pass under load

!

PPE MUST BE WORN ON THIS SITE

10.0 Safe working procedures of every Team member

The safe working procedures define the possible risk on the assembly/ disassembly phase and its prevention measure and equipments.
The procedures are written according to French building code & construction regulation. These involve, at lease, the following categories: Site and machinery / vehicle operation, emergency response, electricity supply & safety, general rules and protection on workers, safety on using temporary structure, warning and monitor system.

Safe working procedure	*Team member*
Site and machinery / vehicle operation	-Access control -Cranes and rigging -First and medical assistance -Heavy equipment operation -Motor vehicle operation -Truck movement
emergency response	-Accident report -Fire prevention and responses
electricity supply & safety	-Electrical and energy system -PV system
general rules and protection on team member / contractor	-Alcohol & drug -Hand and power tools -Hearing protection -Night work protection -House keeping -Personal protective equipment -Weather damage protection -Working time shift
safety on using temporary structure	-Ladders -Lifting -Fall protection -Scaffolds
warning and monitor system	-Hazard communication -Signs and barricades -Check & information for team member -Medical monitor

10.1 Personal H&S card

In case of accident, we have realize a personal data sheet of each person on the advice of a doctor. This sheet will be available at all times on the construction site. You will fine this sheet below.

ORCHID HOUSE

Personal h&s card

Name_____

Date of birth_____

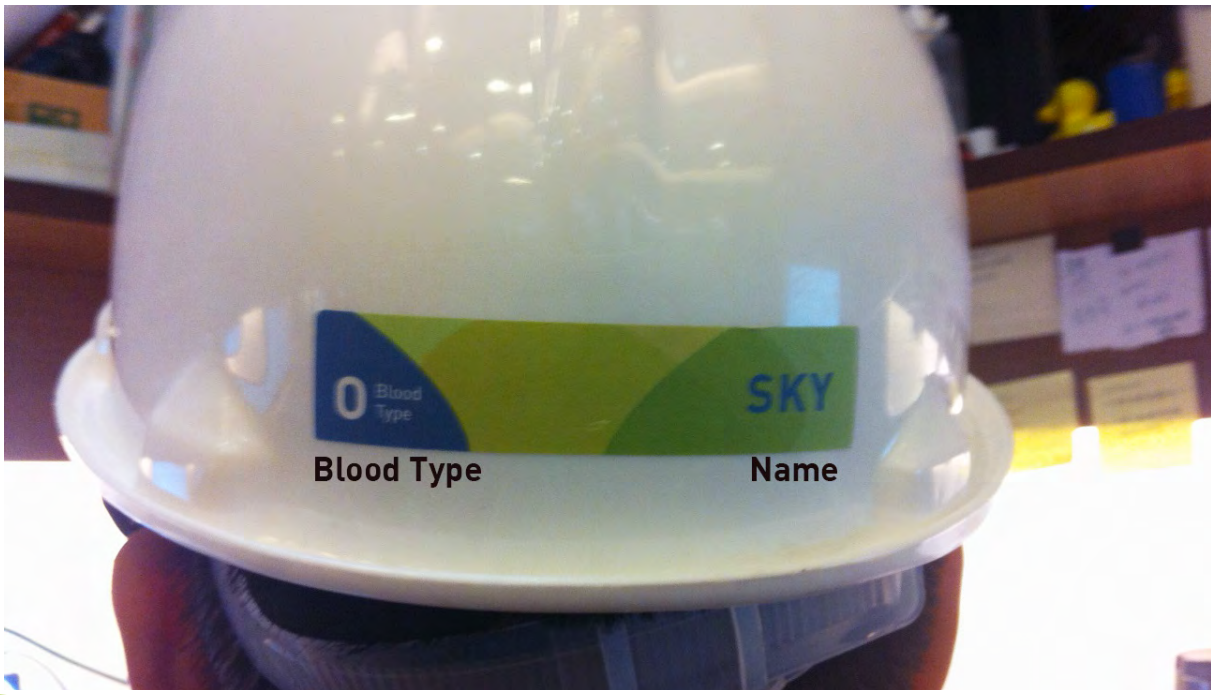
Nationality_____ Blood type_____

ID number_____ Allergy_____

Tel_____ Heart problem_____

Mail_____ Special medical treatment _____

10.2 Safety helmet with name and blood type



11.0 Machinery and auxiliary resources

We will obey the safe user's manual from the manufacturer of every machine, tool and/or auxiliary resource.

Figure 11.0.1 Training tool and machine

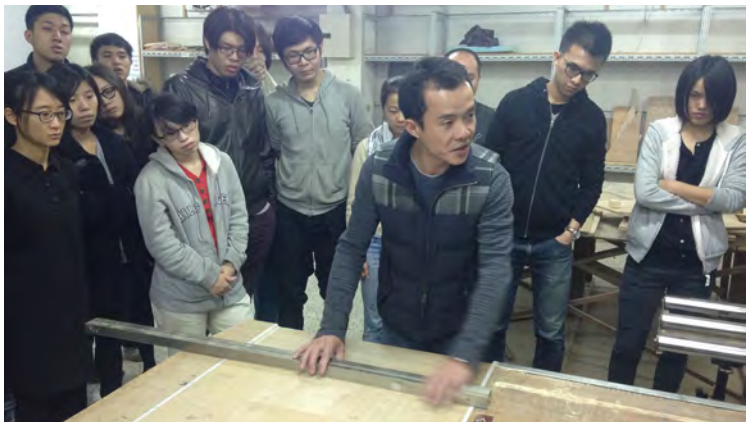


Figure 11.0.2 Carpentry training course

Figure 11.0.3 Plumb training course

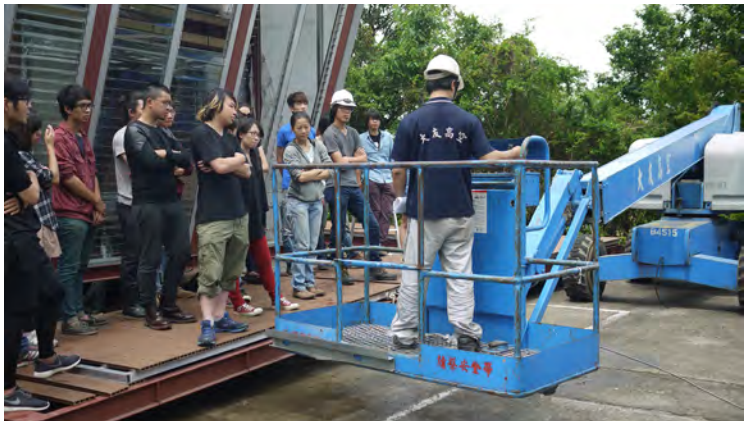


Figure 11.0.4 Boom lift training course

Figure 11.0.5 Forklift training course

12.0 Planned Measures in case of accident

12.1 First aids

We have the obtained a “Certificate of Basic Life Support Training”

基本救命術合格證書
Certificate of Basic Life Support Training
姓　　名 (Name) : 曾聖凱
身分證字號 (ID No) : A128031568
出生年月日 (Date of Birth) : 1984/10/26
有效日期 (Valid Through) : 2015/10/10
證書字號 (Certificate No) : BLS0163626
臺灣急救教育推廣與諮詢中心
National Resuscitation Council of Taiwan

Figure 12.1.1 Certificate of Basic Life Support Training

12.2 Training members

A team

Name
Yating Wu
Ming-Hong She
Chin-Yuan Fan
Pei-Ling Wu
Yung-Yen Teng
Yiting Chen
Chin-Ju Chen
Yu-Ming Su
Tze-Chun Chen
Shao-yi Lu

B team

Name
Dennis Lin
Sunny Chou
Chi-Ming Chien
Jason Huang
Oswalt Ho
Summer Lee
Cheng-Wei Wang
Wan-Ling Cheng
I-Chih Chen
Ruby Tu

C team

Name
Sky Tseng
Chester Hu
Andrew Su
Henry Ko
Rui Lin
Trista Wang
Sophie Chen
Leslie Yen
Jeff Lin

基本救命術合格證書
Certificate of Basic Life Support Training
姓　　名 (Name)：陳姵頤
身分證字號 (ID No)：R223845273
出生年月日 (Date of Birth)：1990/11/21
有效日期 (Valid Through)：2015/10/10
證書字號 (Certificate No)：BLS0163646
臺灣急救教育推廣與諮詢中心
National Resuscitation Council of Taiwan

基本救命術合格證書
Certificate of Basic Life Support Training
姓　　名 (Name)：范欽媛
身分證字號 (ID No)：A226810009
出生年月日 (Date of Birth)：1988/12/28
有效日期 (Valid Through)：2015/10/10
證書字號 (Certificate No)：BLS0163624
臺灣急救教育推廣與諮詢中心
National Resuscitation Council of Taiwan

基本救命術合格證書
Certificate of Basic Life Support Training
姓　　名 (Name)：陳敬儒
身分證字號 (ID No)：B122372696
出生年月日 (Date of Birth)：1988/03/29
有效日期 (Valid Through)：2015/10/10
證書字號 (Certificate No)：BLS0163621
臺灣急救教育推廣與諮詢中心
National Resuscitation Council of Taiwan

基本救命術合格證書
Certificate of Basic Life Support Training
姓　　名 (Name)：吳雅婷
身分證字號 (ID No)：F225316543
出生年月日 (Date of Birth)：1982/02/03
有效日期 (Valid Through)：2015/10/10
證書字號 (Certificate No)：BLS0163627
臺灣急救教育推廣與諮詢中心
National Resuscitation Council of Taiwan

基本救命術合格證書
Certificate of Basic Life Support Training
姓　　名 (Name)：鄭婉伶
身分證字號 (ID No)：S223783322
出生年月日 (Date of Birth)：1987/08/14
有效日期 (Valid Through)：2015/10/10
證書字號 (Certificate No)：BLS0163623
臺灣急救教育推廣與諮詢中心
National Resuscitation Council of Taiwan

基本救命術合格證書
Certificate of Basic Life Support Training
姓　　名 (Name)：胡文謙
身分證字號 (ID No)：A126532900
出生年月日 (Date of Birth)：1990/06/04
有效日期 (Valid Through)：2015/10/10
證書字號 (Certificate No)：BLS0163620
臺灣急救教育推廣與諮詢中心
National Resuscitation Council of Taiwan

基本救命術合格證書
Certificate of Basic Life Support Training
姓　　名 (Name)：林家豪
身分證字號 (ID No)：A125683631
出生年月日 (Date of Birth)：1987/10/04
有效日期 (Valid Through)：2015/10/10
證書字號 (Certificate No)：BLS0163625
臺灣急救教育推廣與諮詢中心
National Resuscitation Council of Taiwan

基本救命術合格證書
Certificate of Basic Life Support Training
姓　　名 (Name)：林育賢
身分證字號 (ID No)：A127136493
出生年月日 (Date of Birth)：1988/10/08
有效日期 (Valid Through)：2015/10/10
證書字號 (Certificate No)：BLS0163622
臺灣急救教育推廣與諮詢中心
National Resuscitation Council of Taiwan

基本救命術合格證書
Certificate of Basic Life Support Training
姓　　名 (Name)：王柔玄
身分證字號 (ID No)：F226423869
出生年月日 (Date of Birth)：1986/05/14
有效日期 (Valid Through)：2015/10/10
證書字號 (Certificate No)：BLS0163619
臺灣急救教育推廣與諮詢中心
National Resuscitation Council of Taiwan

基本救命術合格證書
Certificate of Basic Life Support Training
姓　　名 (Name)：林育如
身分證字號 (ID No)：D222282299
出生年月日 (Date of Birth)：1989/05/09
有效日期 (Valid Through)：2015/10/10
證書字號 (Certificate No)：BLS0163648
臺灣急救教育推廣與諮詢中心
National Resuscitation Council of Taiwan

基本救命術合格證書
Certificate of Basic Life Support Training
姓　　名 (Name)：佘明鴻
身分證字號 (ID No)：E123918288
出生年月日 (Date of Birth)：1988/03/04
有效日期 (Valid Through)：2015/10/10
證書字號 (Certificate No)：BLS0163651
臺灣急救教育推廣與諮詢中心
National Resuscitation Council of Taiwan

基本救命術合格證書
Certificate of Basic Life Support Training
姓　　名 (Name)：楊博輔
身分證字號 (ID No)：A126185287
出生年月日 (Date of Birth)：1989/11/09
有效日期 (Valid Through)：2015/10/10
證書字號 (Certificate No)：BLS0163618
臺灣急救教育推廣與諮詢中心
National Resuscitation Council of Taiwan

基本救命術合格證書
Certificate of Basic Life Support Training
姓　　名 (Name)：呂勇為
身分證字號 (ID No)：A126067819
出生年月日 (Date of Birth)：1990/08/10
有效日期 (Valid Through)：2015/10/10
證書字號 (Certificate No)：BLS0163647
臺灣急救教育推廣與諮詢中心
National Resuscitation Council of Taiwan

基本救命術合格證書
Certificate of Basic Life Support Training
姓　　名 (Name)：陳佐婷
身分證字號 (ID No)：G221684649
出生年月日 (Date of Birth)：1986/06/01
有效日期 (Valid Through)：2015/10/10
證書字號 (Certificate No)：BLS0163649
臺灣急救教育推廣與諮詢中心
National Resuscitation Council of Taiwan

基本救命術合格證書
Certificate of Basic Life Support Training
姓　　名 (Name)：杜懷茹
身分證字號 (ID No)：A225873324
出生年月日 (Date of Birth)：1990/02/23
有效日期 (Valid Through)：2015/10/10
證書字號 (Certificate No)：BLS0163617
臺灣急救教育推廣與諮詢中心
National Resuscitation Council of Taiwan

12.2 First aids bag

First aid kits available via normal retail routes have traditionally been intended for treatment of minor injuries only. Typical contents include adhesive bandages, regular strength pain medication, gauze and low grade disinfectant.

Contents:
- Arnica
- Adhesive tape
- Alcohol wipes or ethyl alcohol
- Antiseptic solution
- Assorted Washproof Plasters
- Elastic bandage
- Eyewash solution
- First aids manual
- Heated blanket (not sterile)
- Hemostatic dressing
- Hemostatic pads for the nos
- Moist Wipes
- Pairs of Gloves
- Plastic bag
- Resuscitation Mouth shield with Valve
- Safety pins
- Scissors
- Sterile gauze
- Sterile saline wipes
- Triangular bandage
- Tweezers

12.3 Preventive medicine

All workers have past a medical examination and are healthy; they are able to work on the construction site from a medical point. And all worker take their medicine by themselves.

12.4 Accident victims evacuation

Figure 12.4.1 Route to the nearest hospital

A: La Cite du Soleil

-Head south on "Allée des Matelots"
-Turn right to stay on "Allée des Matelots"
-Turn right onto "D10"
-Turn left onto "Rue de l'Indépendance Américaine"
-Continue onto "Rue Saint-Julien"
-Turn left onto "Rue des Récollets"
-Turn right onto "Av. Nepveu Sud"
-Slight left onto "Av. Rockefeller"
-Continue onto "Rue Hoche/D186"
-Continue onto "Rue Carnot"
-Keep right to stay on "Rue Carnot"
-Slight right onto "Rue des Réservoirs"
-At the roundabout, take the 2nd exit onto "Bd du Roi/D186"
-At the roundabout, take the 4th exit onto "Rue de Versailles"
-Keep left to stay on "Rue de Versailles"
-At the roundabout, take the 4th exit

Distance: 6 km , 15 mins

B: 177 Rue de Versailles
Address: 177 Rue de Versailles,
78150 Le Chesnay, France

Tel.: 01.39.63.91.33

Figure 12.4.2 Route to the nearest fire department

A: La Cite du Soleil

-Head northeast on Allée des Matelotstoward D10
-Turn left onto D10
-Slight right onto Av. de la Division Leclerc/D10
-Turn right onto Av. Jean Jaurès/D11
Continue to follow D11
-At the roundabout, take the 2nd exit ontoRue Jules Massenet/D98
-Turn left onto D98

Distance: 11.3km , 18 mins

B: Sapeurs Pompiers des Yvelines
Address: Avenue de Pépinière
78450 Villepreux, France

Figure 12.4.3 Route to the nearest police office

A: La Cite du Soleil

-Head northeast on Allée des Matelotstoward D10
-Turn left onto D10
-Slight right onto Av. de la Division Leclerc/D10
-At the roundabout, take the 1st exit onto the Av. des Frères Lumière/D127 ramp
- Keep left at the fork, follow signs for D127/Guyancourt/Quartier saint quentin
-Turn left onto Av. des Frères Lumière/D127
-Turn right onto Rue de la Division Leclerc

Distance: 5.8km , 9 mins

B: Commissariat de Police
Address: 1 Rue de la Division Leclerc
8280 Guyancourt, France

13.0 Risks identification for possible later works

See item 10.7.1 of this document to see the declaration about the efficacy of “Risks identification and efficiency evaluation of the adopted protections”.

14.0 Useful plans and information for possible later works

Write the three documents after work to let members of the next work sheet know construction state.

Construction Note			
Date		Name	
Title			
Description			

Problems Report of Construction			
Phase		Date	
Item		Name	
Questioner		Respondent	
Problems Description			
Drawing No.			
Solution			

Daily Report of Construction				
Name		Team		
Date		Weather		
Attend		Material require	Tool require	Company require
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
Daily Work				
Note				

15.0 Adopted system for the level of health and safety control during works

Solar Decathlon Europe

遵守勞工安全衛生紀律承諾書
Complying With Workplace Safety & Health Discipline Undertaking

ORCHID HOUSE

承諾者姓名 Name	鄭婉伶 Cheng Wan-Ling	負責事項 Responsiblity	Safety & health PR
身分證字號 ID	S223783322	承諾日期 Date	2014 . 2 . 14

本人承諾遵守下列事項
I promise to comply with following rules.

承諾事項
Undertake item

1. 在工地除休息區外，我會戴好安全帽，並扣上繫帶。
I will wear a safety helmet with the chin strap buckle fastened at the construction site.
2. 在高處作業時，我會將我的安全帶扣在安全母索上。
I will fasten my safety belt to a lifeline while working at height.
3. 我絕不攜帶高度兩公尺以上的合梯進場工作。
I will never bring a stepladder which is two meters high or more into the construction site.
4. 在施工架上作業時，我絕不使用梯子、合梯或踏凳等從事作業。
I will never use ladders, stepladders or footstool while working on scaffold.
5. 我絕對遵從規定進出工地。
I will absolutely comply with rules while entering and exiting the construction site.
6. 未經主管許可，我絕不接近吊車吊舉範圍及作業車輛、機具之作業半徑內。
I will never get close to the lifting range of crane, vehicles that operated and working radius of machines without permission.
7. 我會遵照施工器具設備上標示牌索標示的安全事項辦理。
I will follow the general safety instructions labeled on equipment while operating the device.
8. 在工地我絕對不會隨意丟垃圾及拋棄口香糖殘渣。
I will never litter and split chewing gum at construction site.
9. 未經主管許可，我絕對不會在工地生火燃燒廢物。
I will never incinerate waste at construction site without permission.
10. 我會遵守識別證管制區之規定，在我的作業區內工作，未經報備，絕不到其他管制區。
I will stay and work at the permitted area under identity control. I will never go to those restricted zone unless authorized.
11. 未經主管許可，我絕不跨越護欄及警示帶。
I will never cross the guard rails and warning tapes without permission.
12. 在高處作業時，我絕對不會任意嬉戲冒險，或將物件任意拋落。
I will never play around or drop objects while working at height.
13. 我會將用電設備接在規定在電源插座上，絕不私自亂接。
I will plug power-consuming equipment in record receptacle.
14. 未經主管許可，我絕不拆除圍籬、大門、護欄、護蓋、安全網、安全母索、警示帶、施工架踏板、漏電斷路器、自動電擊防止裝置等安全防護裝置或使其失去功能。
Without permission, I will never dismantle or disable the safety protective equipment, such as fence, doors, guards , safety nets, lifeline, warring tapes, scaffold, residual current circuit breaker, voltage reducing device for AC arc welding.
15. 工作前及工作時我絕不飲用含酒精之飲料。
I will never drink alcoholic beverage before and during working.
16. 在公告禁止吸菸的區域，我絕不吸菸。
I will never smoke at non-smoking area.
17. 我絕對會將以上規定及其他有關的安全衛生守則，確實提醒本隊伍所有參與工程之工作人員共同遵守。
I will comply with and remind all the team members of the standard which is listed above and other related safety and health instructions.

* 此為代表國家之國際級重大比賽。如違反上列事項，本人願意接受交大建築所最嚴厲處分！
I understand it is an important international competition and we are a team which represents Taiwan. I promise to comply with the standards and rules. I will accept the responsibility for violations and sanctions by Graduate Institution of Architecture, National Chiao-Tung University.

此至Submitted to 交大 UNICODE 團隊

NCTUNICODE

承諾者Promisor（簽名Signature）：鄭婉伶 Cheng, Wan-Ling

Solar Decathlon Europe

遵守勞工安全衛生紀律承諾書
Complying With Workplace Safety & Health Discipline Undertaking

ORCHID HOUSE

承諾者姓名 Name	吳雅婷 Yating Wu	負責事項 Responsibility	Student Leader
身分證字號 ID	F225318543	承諾日期 Date	20140214

本人承諾遵守下列事項
I promise to comply with following rules.

承諾事項
Undertake Item

1. 在工地除休息區外，我會戴好安全帽，並扣上繫帶。
I will wear a safety helmet with the chin strap buckle fastened at the construction site.
2. 在高處作業時，我會將我的安全帶扣在安全母索上。
I will fasten my safety belt to a lifeline while working at height.
3. 我絕不攜帶高度兩公尺以上的合梯進場工作。
I will never bring a stepladder which is two meters high or more into the construction site.
4. 在施工架上作業時，我絕不使用梯子，合梯或踏凳等從事作業。
I will never use ladders, stepladders or footstool while working on scaffold.
5. 我絕對遵從規定進出工地。
I will absolutely comply with rules while entering and exiting the construction site.
6. 未經主管許可，我絕不接近吊車吊臂範圍及作業半徑內。
I will never get close to the lifting range of crane, vehicles that operated and working radius of machines without permission.
7. 我會遵照施工器具設備上標示牌來標示的安全事項辦理。
I will follow the general safety instructions labeled on equipment while operating the device.
8. 我絕對不會隨意丟棄垃圾及嚼口香糖進場。
I will never litter and spit chewing gum at construction site.
9. 未經主管許可，我絕對不會在工地生火燃燒廢物。
I will never incinerate waste at construction site without permission.
10. 我會遵守進出管制區之規定，在我的作業區內工作，未經報備，絕不對其他管制區。
I will stay and work at the permitted area under identity control. I will never go to those restricted zone unless authorized.
11. 未經主管許可，我絕不跨越護欄及警示帶。
I will never cross the guard rails and warning tapes without permission.
12. 在高處作業時，我絕對不會任意隨意丟擲，或將物件任意散落。
I will never play around or drop objects while working at height.
13. 我會將用電設備接在規定有電源插座上，絕不私自亂接。
I will plug power-consuming equipment in record receptacle.
14. 未經主管許可，我絕不拆除圍籬、大門、護欄、護蓋、安全網、安全母索、警示帶、施工架踏板、漏電斷路器、自動電擊防止裝置等安全防護裝置或使其失去功能。
Without permission, I will never dismantle or disable the safety protective equipment, such as fence, doors, guards , safety nets, lifeline, warning tapes, scaffold, residual current circuit breaker, voltage reducing device for AC arc welding.
15. 工作前及工作時我絕不飲用含酒精之飲料。
I will never drink alcoholic beverage before and during working.
16. 在公告禁止吸菸的區域，我絕不吸菸。
I will never smoke at non-smoking area.
17. 我絕對會將以上規定及其他有關的安全衛生守則，確實提醒本場佔用有參與工程之工作人員共同遵守。
I will comply with and remind all the team members of the standard which is listed above and other related safety and health instructions.

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此致Submitted to 交大 UNICODE 團隊 NCTUNICODE

承諾者Promisor（簽名Signature）：吳雅婷 Yating Wu

Solar Decathlon Europe

遵守勞工安全衛生紀律承諾書
Complying With Workplace Safety & Health Discipline Undertaking

ORCHID HOUSE

承諾者姓名 Name	林家豪 Lin Chia Hao	負責事項 Responsibility	Student Leader
身分證字號 ID	A125083031	承諾日期 Date	2014. 02. 14

本人承諾遵守下列事項
I promise to comply with following rules.

承諾事項
Undertake Item

1. 在工地除休息區外，我會戴好安全帽，並扣上繫帶。
I will wear a safety helmet with the chin strap buckle fastened at the construction site.
2. 在高處作業時，我會將我的安全帶扣在安全母索上。
I will fasten my safety belt to a lifeline while working at height.
3. 我絕不攜帶高度兩公尺以上的合梯進場工作。
I will never bring a stepladder which is two meters high or more into the construction site.
4. 在施工架上作業時，我絕不使用梯子，合梯或踏凳等從事作業。
I will never use ladders, stepladders or footstool while working on scaffold.
5. 我絕對遵從規定進出工地。
I will absolutely comply with rules while entering and exiting the construction site.
6. 未經主管許可，我絕不接近吊車吊臂範圍及作業半徑內。
I will never get close to the lifting range of crane, vehicles that operated and working radius of machines without permission.
7. 我會遵照施工器具設備上標示牌來標示的安全事項辦理。
I will follow the general safety instructions labeled on equipment while operating the device.
8. 我絕對不會隨意丟棄垃圾及嚼口香糖進場。
I will never litter and spit chewing gum at construction site.
9. 未經主管許可，我絕對不會在工地生火燃燒廢物。
I will never incinerate waste at construction site without permission.
10. 我會遵守進出管制區之規定，在我的作業區內工作，未經報備，絕不對其他管制區。
I will stay and work at the permitted area under identity control. I will never go to those restricted zone unless authorized.
11. 未經主管許可，我絕不跨越護欄及警示帶。
I will never cross the guard rails and warning tapes without permission.
12. 在高處作業時，我絕對不會任意隨意丟擲，或將物件任意散落。
I will never play around or drop objects while working at height.
13. 我會將用電設備接在規定有電源插座上，絕不私自亂接。
I will plug power-consuming equipment in record receptacle.
14. 未經主管許可，我絕不拆除圍籬、大門、護欄、護蓋、安全網、安全母索、警示帶、施工架踏板、漏電斷路器、自動電擊防止裝置等安全防護裝置或使其失去功能。
Without permission, I will never dismantle or disable the safety protective equipment, such as fence, doors, guards , safety nets, lifeline, warning tapes, scaffold, residual current circuit breaker, voltage reducing device for AC arc welding.
15. 工作前及工作時我絕不飲用含酒精之飲料。
I will never drink alcoholic beverage before and during working.
16. 在公告禁止吸菸的區域，我絕不吸菸。
I will never smoke at non-smoking area.
17. 我絕對會將以上規定及其他有關的安全衛生守則，確實提醒本場佔用有參與工程之工作人員共同遵守。
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此致Submitted to 交大 UNICODE 團隊 NCTUNICODE

承諾者Promisor（簽名Signature）：林家豪 Lin Chia Hao

Solar Decathlon Europe

遵守勞工安全衛生紀律承諾書
Complying With Workplace Safety & Health Discipline Undertaking

ORCHID HOUSE

承諾者姓名 Name	Wei Tseng	負責事項 Responsibility	Safe operation
身分證字號 ID	D120785787	承諾日期 Date	17th/FEB/2014

本人承諾遵守下列事項
I promise to comply with following rules.

承諾事項
Undertake Item

1. 在工地除休息區外，我會戴好安全帽，並扣上繫帶。
I will wear a safety helmet with the chin strap buckle fastened at the construction site.
2. 在高處作業時，我會將我的安全帶扣在安全母索上。
I will fasten my safety belt to a lifeline while working at height.
3. 我絕不攜帶高度兩公尺以上的合梯進場工作。
I will never bring a stepladder which is two meters high or more into the construction site.
4. 在施工架上作業時，我絕不使用梯子，合梯或踏凳等從事作業。
I will never use ladders, stepladders or footstool while working on scaffold.
5. 我絕對遵從規定進出工地。
I will absolutely comply with rules while entering and exiting the construction site.
6. 未經主管許可，我絕不接近吊車吊臂範圍及作業半徑內。
I will never get close to the lifting range of crane, vehicles that operated and working radius of machines without permission.
7. 我會遵照施工器具設備上標示牌來標示的安全事項辦理。
I will follow the general safety instructions labeled on equipment while operating the device.
8. 我絕對不會隨意丟棄垃圾及嚼口香糖進場。
I will never litter and spit chewing gum at construction site.
9. 未經主管許可，我絕對不會在工地生火燃燒廢物。
I will never incinerate waste at construction site without permission.
10. 我會遵守進出管制區之規定，在我的作業區內工作，未經報備，絕不對其他管制區。
I will stay and work at the permitted area under identity control. I will never go to those restricted zone unless authorized.
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I will never cross the guard rails and warning tapes without permission.
12. 在高處作業時，我絕對不會任意隨意丟擲，或將物件任意散落。
I will never play around or drop objects while working at height.
13. 我會將用電設備接在規定有電源插座上，絕不私自亂接。
I will plug power-consuming equipment in record receptacle.
14. 未經主管許可，我絕不拆除圍籬、大門、護欄、護蓋、安全網、安全母索、警示帶、施工架踏板、漏電斷路器、自動電擊防止裝置等安全防護裝置或使其失去功能。
Without permission, I will never dismantle or disable the safety protective equipment, such as fence, doors, guards , safety nets, lifeline, warning tapes, scaffold, residual current circuit breaker, voltage reducing device for AC arc welding.
15. 工作前及工作時我絕不飲用含酒精之飲料。
I will never drink alcoholic beverage before and during working.
16. 在公告禁止吸菸的區域，我絕不吸菸。
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17. 我絕對會將以上規定及其他有關的安全衛生守則，確實提醒本場佔用有參與工程之工作人員共同遵守。
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此致Submitted to 交大 UNICODE 團隊 NCTUNICODE

承諾者Promisor（簽名Signature）：Wei Tseng 17th/FEB/2014

Solar Decathlon Europe

遵守勞工安全衛生紀律承諾書
Complying With Workplace Safety & Health Discipline Undertaking

ORCHID HOUSE

承諾者姓名 Name	簡志明	負責事項 Responsibility	組裝吊裝
身分證字號 ID	A124315269	承諾日期 Date	2/14

本人承諾遵守下列事項
I promise to comply with following rules.

承諾事項
Undertake Item

1. 在工地除休息區外，我會戴好安全帽，並扣上繫帶。
I will wear a safety helmet with the chin strap buckle fastened at the construction site.
2. 在高處作業時，我會將我的安全帶扣在安全母索上。
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3. 我絕不攜帶高度兩公尺以上的合梯進場工作。
I will never bring a stepladder which is two meters high or more into the construction site.
4. 在施工架上作業時，我絕不使用梯子，合梯或踏凳等從事作業。
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此致Submitted to 交大 UNICODE 團隊 NCTUNICODE

承諾者Promisor（簽名Signature）：Chien, Chih-Ming Lawrence

Solar Decathlon Europe

遵守勞工安全衛生紀律承諾書
Complying With Workplace Safety & Health Discipline Undertaking

ORCHID HOUSE

承諾者姓名 Name	曾聖凱	負責事項 Responsibility	Student Leader
身分證字號 ID	A12803568	承諾日期 Date	2014. 03. 14

本人承諾遵守下列事項
I promise to comply with following rules.

承諾事項 Undertake Item
1. 在工地除休息區外，我會戴好安全帽，並扣上繫帶。 I will wear a safety helmet with the chin strap buckle fastened at the construction site.
2. 在高處作業時，我會將我的安全帶扣在安全母索上。 I will fasten my safety belt to a lifeline while working at height.
3. 我絕不攜帶高度兩公尺以上的合梯進場工作。 I will never bring a stepladder which is two meters high or more into the construction site.
4. 在施工架上作業時，我絕不使用梯子、合梯或踏凳等從事作業。 I will never use ladders, stepladders or footstool while working on scaffold.
5. 我絕對遵從規定進出工地。 I will absolutely comply with rules while entering and exiting the construction site.
6. 未經主管許可，我絕不接近吊車吊臂範圍及作業半徑內。 I will never get close to the lifting range of crane, vehicles that operated and working radius of machines without permission.
7. 我會遵循施工器具設備上標示牌案標示的安全事項辦理。 I will follow the general safety instructions labeled on equipment while operating the device.
8. 在工地我絕對不會隨意丟垃圾及嚼口香糖殘渣。 I will never litter and spill chewing gum at construction site.
9. 未經主管許可，我絕對不會在工地生火燃燒廢物。 I will never incinerate waste at construction site without permission.
10. 我會遵守識別證管制區之規定，在我的作業區內工作，未經報備，絕不到其他管制區。 I will stay and work at the permitted area under identity control. I will never go to those restricted zone unless authorized.
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12. 在高處作業時，我絕對不會任意搞戲冒險，或將物件任意拋落。 I will never play around or drop objects while working at height.
13. 我會將用電設備接在規定在電源插座上，絕不私自亂接。 I will plug power-consuming equipment in record receptacle.
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15. 工作前及工作時我絕不飲用含酒精之飲料。 I will never drink alcoholic beverage before and during working.
16. 在公告禁止吸菸的區域，我絕不吸菸。 I will never smoke at non-smoking area.
17. 我絕對會將以上規定及其他有關的安全衛生守則，確實提醒本隊伍所有參與工程之工作人員共同遵守。 I will comply with and remind all the team members of the standard which is listed above and other related safety and health instructions.

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此致Submitted to　交大 UNICODE 團隊　NCTUNICODE

承諾者Promisor（簽名Signature）：曾聖凱 Sheng-Kai Tseng

Solar Decathlon Europe

遵守勞工安全衛生紀律承諾書
Complying With Workplace Safety & Health Discipline Undertaking

ORCHID HOUSE

承諾者姓名 Name	Benjamin Tang	負責事項 Responsibility	
身分證字號 ID	T120340077	承諾日期 Date	2014、04、22.

本人承諾遵守下列事項
I promise to comply with following rules.

承諾事項 Undertake Item
1. 在工地除休息區外，我會戴好安全帽，並扣上繫帶。 I will wear a safety helmet with the chin strap buckle fastened at the construction site.
2. 在高處作業時，我會將我的安全帶扣在安全母索上。 I will fasten my safety belt to a lifeline while working at height.
3. 我絕不攜帶高度兩公尺以上的合梯進場工作。 I will never bring a stepladder which is two meters high or more into the construction site.
4. 在施工架上作業時，我絕不使用梯子、合梯或踏凳等從事作業。 I will never use ladders, stepladders or footstool while working on scaffold.
5. 我絕對遵從規定進出工地。 I will absolutely comply with rules while entering and exiting the construction site.
6. 未經主管許可，我絕不接近吊車吊臂範圍及作業半徑內。 I will never get close to the lifting range of crane, vehicles that operated and working radius of machines without permission.
7. 我會遵循施工器具設備上標示牌案標示的安全事項辦理。 I will follow the general safety instructions labeled on equipment while operating the device.
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9. 未經主管許可，我絕對不會在工地生火燃燒廢物。 I will never incinerate waste at construction site without permission.
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12. 在高處作業時，我絕對不會任意搞戲冒險，或將物件任意拋落。 I will never play around or drop objects while working at height.
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此致Submitted to　交大 UNICODE 團隊　NCTUNICODE

承諾者Promisor（Signature）：Benjamin Tang 鄧博鈞

Solar Decathlon Europe

遵守勞工安全衛生紀律承諾書
Complying With Workplace Safety & Health Discipline Undertaking

ORCHID HOUSE

承諾者姓名 Name	王柔玄	負責事項 Responsibility	Interior Design
身分證字號 ID	F226430869	承諾日期 Date	2014. 4. 21

本人承諾遵守下列事項
I promise to comply with following rules.

承諾事項 Undertake Item
1. 在工地除休息區外，我會戴好安全帽，並扣上繫帶。 I will wear a safety helmet with the chin strap buckle fastened at the construction site.
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12. 在高處作業時，我絕對不會任意搞戲冒險，或將物件任意拋落。 I will never play around or drop objects while working at height.
13. 我會將用電設備接在規定在電源插座上，絕不私自亂接。 I will plug power-consuming equipment in record receptacle.
14. 未經主管許可，我絕不拆除圍籬、大門、護欄、護蓋、安全網、安全母索、警示帶、施工架踏板、漏電斷路器、自動電擊防止裝置等安全防護裝置或使其失去功能。 Without permission, I will never dismantle or disable the safety protective equipment, such as fence, doors, guards , safety nets, lifeline, warning tapes, scaffold, residual current circuit breaker, voltage reducing device for AC arc welding.
15. 工作前及工作時我絕不飲用含酒精之飲料。 I will never drink alcoholic beverage before and during working.
16. 在公告禁止吸菸的區域，我絕不吸菸。 I will never smoke at non-smoking area.
17. 我絕對會將以上規定及其他有關的安全衛生守則，確實提醒本隊伍所有參與工程之工作人員共同遵守。 I will comply with and remind all the team members of the standard which is listed above and other related safety and health instructions.

* 此為代表國家之國際級重大比賽，如違反上列事項，本人願意接受交大建築所最嚴厲處分！
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此致Submitted to　交大 UNICODE 團隊　NCTUNICODE

承諾者Promisor（Signature）：王柔玄 Wang Jou-Hsuan

Solar Decathlon Europe

遵守勞工安全衛生紀律承諾書
Complying With Workplace Safety & Health Discipline Undertaking

ORCHID HOUSE

承諾者姓名 Name	顏伯勳	負責事項 Responsibility	都市設計，施工記錄，
身分證字號 ID	S123540898	承諾日期 Date	2014. 04. 22

本人承諾遵守下列事項
I promise to comply with following rules.

承諾事項 Undertake Item
1. 在工地除休息區外，我會戴好安全帽，並扣上繫帶。 I will wear a safety helmet with the chin strap buckle fastened at the construction site.
2. 在高處作業時，我會將我的安全帶扣在安全母索上。 I will fasten my safety belt to a lifeline while working at height.
3. 我絕不攜帶高度兩公尺以上的合梯進場工作。 I will never bring a stepladder which is two meters high or more into the construction site.
4. 在施工架上作業時，我絕不使用梯子、合梯或踏凳等從事作業。 I will never use ladders, stepladders or footstool while working on scaffold.
5. 我絕對遵從規定進出工地。 I will absolutely comply with rules while entering and exiting the construction site.
6. 未經主管許可，我絕不接近吊車吊臂範圍及作業半徑內。 I will never get close to the lifting range of crane, vehicles that operated and working radius of machines without permission.
7. 我會遵循施工器具設備上標示牌案標示的安全事項辦理。 I will follow the general safety instructions labeled on equipment while operating the device.
8. 在工地我絕對不會隨意丟垃圾及嚼口香糖殘渣。 I will never litter and spill chewing gum at construction site.
9. 未經主管許可，我絕對不會在工地生火燃燒廢物。 I will never incinerate waste at construction site without permission.
10. 我會遵守識別證管制區之規定，在我的作業區內工作，未經報備，絕不到其他管制區。 I will stay and work at the permitted area under identity control. I will never go to those restricted zone unless authorized.
11. 未經主管許可，我絕不跨越護欄及警示帶。 I will never cross the guard rails and warning tapes without permission.
12. 在高處作業時，我絕對不會任意搞戲冒險，或將物件任意拋落。 I will never play around or drop objects while working at height.
13. 我會將用電設備接在規定在電源插座上，絕不私自亂接。 I will plug power-consuming equipment in record receptacle.
14. 未經主管許可，我絕不拆除圍籬、大門、護欄、護蓋、安全網、安全母索、警示帶、施工架踏板、漏電斷路器、自動電擊防止裝置等安全防護裝置或使其失去功能。 Without permission, I will never dismantle or disable the safety protective equipment, such as fence, doors, guards , safety nets, lifeline, warning tapes, scaffold, residual current circuit breaker, voltage reducing device for AC arc welding.
15. 工作前及工作時我絕不飲用含酒精之飲料。 I will never drink alcoholic beverage before and during working.
16. 在公告禁止吸菸的區域，我絕不吸菸。 I will never smoke at non-smoking area.
17. 我絕對會將以上規定及其他有關的安全衛生守則，確實提醒本隊伍所有參與工程之工作人員共同遵守。 I will comply with and remind all the team members of the standard which is listed above and other related safety and health instructions.

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此致Submitted to　交大 UNICODE 團隊　NCTUNICODE

承諾者Promisor（Signature）：顏伯勳 Boshio Yen.

Solar Decathlon Europe

遵守勞工安全衛生紀律承諾書
Complying With Workplace Safety & Health Discipline Undertaking

ORCHID HOUSE

承諾者姓名 Name	陳奕至 I-chih Chen	負責事項 Responsibility	Mock up
身分證字號 ID	A229242256	承諾日期 Date	2014.2.13

本人承諾遵守下列事項
I promise to comply with following rules.

承諾事項
Undertake item

1. 在工地除休息區外，我會戴好安全帽，並扣上繫帶。
I will wear a safety helmet with the chin strap buckle fastened at the construction site.
2. 在高處作業時，我會將我的安全帶扣在安全母索上。
I will fasten my safety belt to a lifeline while working at height.
3. 我絕不攜帶高度兩公尺以上的合梯進場工作。
I will never bring a stepladder which is two meters high or more into the construction site.
4. 在施工架上作業時，我絕不使用梯子、合梯或踏凳等從事作業。
I will never use ladders, stepladders or footstool while working on scaffold.
5. 我絕對遵從規定進出工地。
I will absolutely comply with rules while entering and exiting the construction site.
6. 未經主管許可，我絕不接近吊車吊臂範圍及作業車輛、機具之作業半徑內。
I will never get close to the lifting range of crane, vehicles that operated and working radius of machines without permission.
7. 我會遵照施工器具設備上標示牌素標示的安全事項辦理。
I will follow the general safety instructions labeled on equipment while operating the device.
8. 在工地我絕對不會隨意丟垃圾及拋置口香糖殘渣。
I will never litter and split chewing gum at construction site.
9. 未經主管許可，我絕對不會在工地生火燃燒廢物。
I will never incinerate waste at construction site without permission.
10. 我會遵守識別證制區之規定，在我的作業區內工作，未經報備，絕不到其他管制區。
I will stay and work at the permitted area under identity control. I will never go to those restricted zone unless authorized.
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12. 在高處作業時，我絕對不會任意雜亂置物，或將物件任意拋落。
I will never play around or drop objects while working at height.
13. 我會將用電設備接在規定在電源插座上，絕不私自亂接。
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14. 未經主管許可，我絕不拆除圍籬、大門、護欄、護蓋、安全網、安全母索、警示帶、施工架踏板、漏電斷路器、自動電擊防止裝置等安全防護裝置或使其失去功能。
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15. 工作前及工作時我絕不飲用含酒精之飲料。
I will never drink alcoholic beverage before and during working.
16. 在公告禁止吸菸的區域，我絕不吸菸。
I will never smoke at non-smoking area.
17. 我絕對會將以上規定及其他有關的安全衛生守則，確實提醒本隊伍所有參與工程之工作人員共同遵守。
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此至Submitted to 交大 UNICODE 團隊 NCTUNICODE

承諾者Promisor（簽名Signature）：陳奕至 I-chih Chen

Solar Decathlon Europe

遵守勞工安全衛生紀律承諾書
Complying With Workplace Safety & Health Discipline Undertaking

ORCHID HOUSE

承諾者姓名 Name	呂紹緯 Shao-Yi Lu	負責事項 Responsibility	assembly Mock-up 安裝組裝
身分證字號 ID	H123496806	承諾日期 Date	02/14/2014

本人承諾遵守下列事項
I promise to comply with following rules.

承諾事項
Undertake item

1. 在工地除休息區外，我會戴好安全帽，並扣上繫帶。
I will wear a safety helmet with the chin strap buckle fastened at the construction site.
2. 在高處作業時，我會將我的安全帶扣在安全母索上。
I will fasten my safety belt to a lifeline while working at height.
3. 我絕不攜帶高度兩公尺以上的合梯進場工作。
I will never bring a stepladder which is two meters high or more into the construction site.
4. 在施工架上作業時，我絕不使用梯子、合梯或踏凳等從事作業。
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5. 我絕對遵從規定進出工地。
I will absolutely comply with rules while entering and exiting the construction site.
6. 未經主管許可，我絕不接近吊車吊臂範圍及作業車輛、機具之作業半徑內。
I will never get close to the lifting range of crane, vehicles that operated and working radius of machines without permission.
7. 我會遵照施工器具設備上標示牌素標示的安全事項辦理。
I will follow the general safety instructions labeled on equipment while operating the device.
8. 在工地我絕對不會隨意丟垃圾及拋置口香糖殘渣。
I will never litter and split chewing gum at construction site.
9. 未經主管許可，我絕對不會在工地生火燃燒廢物。
I will never incinerate waste at construction site without permission.
10. 我會遵守識別證制區之規定，在我的作業區內工作，未經報備，絕不到其他管制區。
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I will never drink alcoholic beverage before and during working.
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17. 我絕對會將以上規定及其他有關的安全衛生守則，確實提醒本隊伍所有參與工程之工作人員共同遵守。
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此至Submitted to 交大 UNICODE 團隊 NCTUNICODE

承諾者Promisor（簽名Signature）：呂紹緯 Shao-Yi Lu

Solar Decathlon Europe

遵守勞工安全衛生紀律承諾書
Complying With Workplace Safety & Health Discipline Undertaking

ORCHID HOUSE

承諾者姓名 Name	詹明旎 Minnie Jan	負責事項 Responsibility	Architectural Design
身分證字號 ID	E222146143	承諾日期 Date	02/17/2014

本人承諾遵守下列事項
I promise to comply with following rules.

承諾事項
Undertake item

1. 在工地除休息區外，我會戴好安全帽，並扣上繫帶。
I will wear a safety helmet with the chin strap buckle fastened at the construction site.
2. 在高處作業時，我會將我的安全帶扣在安全母索上。
I will fasten my safety belt to a lifeline while working at height.
3. 我絕不攜帶高度兩公尺以上的合梯進場工作。
I will never bring a stepladder which is two meters high or more into the construction site.
4. 在施工架上作業時，我絕不使用梯子、合梯或踏凳等從事作業。
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6. 未經主管許可，我絕不接近吊車吊臂範圍及作業車輛、機具之作業半徑內。
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7. 我會遵照施工器具設備上標示牌素標示的安全事項辦理。
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10. 我會遵守識別證制區之規定，在我的作業區內工作，未經報備，絕不到其他管制區。
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13. 我會將用電設備接在規定在電源插座上，絕不私自亂接。
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17. 我絕對會將以上規定及其他有關的安全衛生守則，確實提醒本隊伍所有參與工程之工作人員共同遵守。
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承諾者Promisor（簽名Signature）：詹明旎

Solar Decathlon Europe

遵守勞工安全衛生紀律承諾書
Complying With Workplace Safety & Health Discipline Undertaking

ORCHID HOUSE

承諾者姓名 Name	陳柏樵 Shao-Biao Chen	負責事項 Responsibility	MEP
身分證字號 ID	A123155287	承諾日期 Date	2/17/2014

本人承諾遵守下列事項
I promise to comply with following rules.

承諾事項
Undertake item

1. 在工地除休息區外，我會戴好安全帽，並扣上繫帶。
I will wear a safety helmet with the chin strap buckle fastened at the construction site.
2. 在高處作業時，我會將我的安全帶扣在安全母索上。
I will fasten my safety belt to a lifeline while working at height.
3. 我絕不攜帶高度兩公尺以上的合梯進場工作。
I will never bring a stepladder which is two meters high or more into the construction site.
4. 在施工架上作業時，我絕不使用梯子、合梯或踏凳等從事作業。
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承諾者Promisor（簽名Signature）：陳柏樵 Shao-Biao Chen

Solar Decathlon Europe

遵守勞工安全衛生紀律承諾書
Complying With Workplace Safety & Health Discipline Undertaking

ORCHID HOUSE

承諾者姓名 Name	Teng Yung Yen 鄧詠燕	負責事項 Responsibility	測量與放樣 Layout survey
身分證字號 ID	J222559932	承諾日期 Date	2014 / 2 / 14

本人承諾遵守下列事項
I promise to comply with following rules.

承諾事項
Undertake item

1. 在工地除休息區外，我會戴好安全帽，並扣上繫帶。
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4. 在施工架上作業時，我絕不使用梯子、合梯或踏凳等從事作業。
I will never use ladders, stepladders or footstool while working on scaffold.
5. 我絕對遵從規定進出工地。
I will absolutely comply with rules while entering and exiting the construction site.
6. 未經主管許可，我絕不接近吊車吊舉範圍及作業半徑內。
I will never get close to the lifting range of crane, vehicles that operated and working radius of machines without permission.
7. 我會遵照施工器具設備上標示牌索標示的安全事項辦理。
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I will never litter and split chewing gum at construction site.
9. 未經主管許可，我絕對不會在工地生火燃燒廢物。
I will never incinerate waste at construction site without permission.
10. 我會遵守識別證制監之規定，在我的作業區內工作，未經報備，絕不到其他管制區。
I will stay and work at the permitted area under identity control. I will never go to those restricted zone unless authorized.
11. 未經主管許可，我絕不跨越護欄及警示帶。
I will never cross the guard rails and warning tapes without permission.
12. 在高處作業時，我絕對不會任意搬戲冒險，或將物件任意拋落。
I will never play around or drop objects while working at height.
13. 我會將用電設備接在規定在電源插座上，絕不私自亂接。
I will plug power-consuming equipment in record receptacle.
14. 未經主管許可，我絕不拆除圍籬、大門、護欄、護蓋、安全網、安全母索、警示帶、施工架踏板、漏電斷路器、自動電擊防止裝置等安全防護裝置或使其失去功能。
Without permission, I will never dismantle or disable the safety protective equipment, such as fence, doors, guards , safety nets, lifeline, warring tapes, scaffold, residual current circuit breaker, voltage reducing device for AC arc welding.
15. 工作前及工作時我絕不飲用含酒精之飲料。
I will never drink alcoholic beverage before and during working.
16. 在公告禁止吸菸的區域，我絕不吸菸。
I will never smoke at non-smoking area.
17. 我絕對會將以上規定及其他有關的安全衛生守則，確實提醒本隊伍所有參與工程之工作人員共同遵守。
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此至Submitted to 交大 UNICODE 團隊 NCTUNICODE

承諾者Promisor（簽名Signature）：鄧詠燕 Teng Yung Yen

Solar Decathlon Europe

遵守勞工安全衛生紀律承諾書
Complying With Workplace Safety & Health Discipline Undertaking

ORCHID HOUSE

承諾者姓名 Name	范駕源 FAN, CHIN-YUAN	負責事項 Responsibility	測量與放樣 Layout Survey
身分證字號 ID	A226810009	承諾日期 Date	2014 / 02 / 14

本人承諾遵守下列事項
I promise to comply with following rules.

承諾事項
Undertake item

1. 在工地除休息區外，我會戴好安全帽，並扣上繫帶。
I will wear a safety helmet with the chin strap buckle fastened at the construction site.
2. 在高處作業時，我會將我的安全帶扣在安全母索上。
I will fasten my safety belt to a lifeline while working at height.
3. 我絕不攜帶高度兩公尺以上的合梯進場工作。
I will never bring a stepladder which is two meters high or more into the construction site.
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6. 未經主管許可，我絕不接近吊車吊舉範圍及作業半徑內。
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7. 我會遵照施工器具設備上標示牌索標示的安全事項辦理。
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10. 我會遵守識別證制監之規定，在我的作業區內工作，未經報備，絕不到其他管制區。
I will stay and work at the permitted area under identity control. I will never go to those restricted zone unless authorized.
11. 未經主管許可，我絕不跨越護欄及警示帶。
I will never cross the guard rails and warning tapes without permission.
12. 在高處作業時，我絕對不會任意搬戲冒險，或將物件任意拋落。
I will never play around or drop objects while working at height.
13. 我會將用電設備接在規定在電源插座上，絕不私自亂接。
I will plug power-consuming equipment in record receptacle.
14. 未經主管許可，我絕不拆除圍籬、大門、護欄、護蓋、安全網、安全母索、警示帶、施工架踏板、漏電斷路器、自動電擊防止裝置等安全防護裝置或使其失去功能。
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15. 工作前及工作時我絕不飲用含酒精之飲料。
I will never drink alcoholic beverage before and during working.
16. 在公告禁止吸菸的區域，我絕不吸菸。
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17. 我絕對會將以上規定及其他有關的安全衛生守則，確實提醒本隊伍所有參與工程之工作人員共同遵守。
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此至Submitted to 交大 UNICODE 團隊 NCTUNICODE

承諾者Promisor（簽名Signature）：范駕源 FAN, CHIN-YUAN

Solar Decathlon Europe

遵守勞工安全衛生紀律承諾書
Complying With Workplace Safety & Health Discipline Undertaking

ORCHID HOUSE

承諾者姓名 Name	杜懷茹 Tu, Huai Ju	負責事項 Responsibility	Smart Skin
身分證字號 ID	A225873324	承諾日期 Date	2-14.02.14

本人承諾遵守下列事項
I promise to comply with following rules.

承諾事項
Undertake item

1. 在工地除休息區外，我會戴好安全帽，並扣上繫帶。
I will wear a safety helmet with the chin strap buckle fastened at the construction site.
2. 在高處作業時，我會將我的安全帶扣在安全母索上。
I will fasten my safety belt to a lifeline while working at height.
3. 我絕不攜帶高度兩公尺以上的合梯進場工作。
I will never bring a stepladder which is two meters high or more into the construction site.
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此至Submitted to 交大 UNICODE 團隊 NCTUNICODE

承諾者Promisor（簽名Signature）：杜懷茹 Tu, Huai Ju

Solar Decathlon Europe

遵守勞工安全衛生紀律承諾書
Complying With Workplace Safety & Health Discipline Undertaking

ORCHID HOUSE

承諾者姓名 Name	陳怡廷 Chen-Yi Ting	負責事項 Responsibility	生活辦品/組裝/工具運輸
身分證字號 ID	I220015293	承諾日期 Date	2014, 02, 14

本人承諾遵守下列事項
I promise to comply with following rules.

承諾事項
Undertake item

1. 在工地除休息區外，我會戴好安全帽，並扣上繫帶。
I will wear a safety helmet with the chin strap buckle fastened at the construction site.
2. 在高處作業時，我會將我的安全帶扣在安全母索上。
I will fasten my safety belt to a lifeline while working at height.
3. 我絕不攜帶高度兩公尺以上的合梯進場工作。
I will never bring a stepladder which is two meters high or more into the construction site.
4. 在施工架上作業時，我絕不使用梯子、合梯或踏凳等從事作業。
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10. 我會遵守識別證制監之規定，在我的作業區內工作，未經報備，絕不到其他管制區。
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此至Submitted to 交大 UNICODE 團隊 NCTUNICODE

承諾者Promisor（簽名Signature）：陳怡廷 chen yi ting

Solar Decathlon Europe

遵守勞工安全衛生紀律承諾書
Complying With Workplace Safety & Health Discipline Undertaking

ORCHID HOUSE

承諾者姓名 Name	吳佩玲 Wu, Pei-Ling	負責事項 Responsiblity	醫療安全 Safety and Health
身分證字號 ID	F226926940	承諾日期 Date	2014.2.14

本人承諾遵守下列事項
I promise to comply with following rules.

承諾事項
Undertake item

1. 在工地除休息區外，我會戴好安全帽，並扣上繫帶。
I will wear a safety helmet with the chin strap buckle fastened at the construction site.
2. 在高處作業時，我會將我的安全帶扣在安全母索上。
I will fasten my safety belt to a lifeline while working at height.
3. 我絕不攜帶高度兩公尺以上的合梯或梯工作。
I will never bring a stepladder which is two meters high or more into the construction site.
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6. 未經主管許可，我絕不接近吊車吊臂範圍及作業車輛、機具之作業半徑內。
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7. 我會遵照施工器具設備上標示牌素標示的安全事項辦理。
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此致Submitted to 交大 UNICODE 團隊 NCTUNICODE

承諾者Promisor（簽名Signature）：吳佩玲 Wu, Pei-Ling

Solar Decathlon Europe

遵守勞工安全衛生紀律承諾書
Complying With Workplace Safety & Health Discipline Undertaking

ORCHID HOUSE

承諾者姓名 Name	林育賢 Yu-hsien, Lin	負責事項 Responsiblity	室內之材料研究 Indoor & material research
身分證字號 ID	A127136493	承諾日期 Date	2014/02/14

本人承諾遵守下列事項
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承諾事項
Undertake item

1. 在工地除休息區外，我會戴好安全帽，並扣上繫帶。
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17. 我絕對會將以上規定及其他有關的安全衛生守則，確實提醒本隊伍所有參與工程之工作人員共同遵守。
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此致Submitted to 交大 UNICODE 團隊 NCTUNICODE

承諾者Promisor（簽名Signature）：林育賢 Yu-hsien, Lin

Solar Decathlon Europe

遵守勞工安全衛生紀律承諾書
Complying With Workplace Safety & Health Discipline Undertaking

ORCHID HOUSE

承諾者姓名 Name	柯禹亨	負責事項 Responsiblity	Mock up
身分證字號 ID	A125505285	承諾日期 Date	2014.02.17

本人承諾遵守下列事項
I promise to comply with following rules.

承諾事項
Undertake item

1. 在工地除休息區外，我會戴好安全帽，並扣上繫帶。
I will wear a safety helmet with the chin strap buckle fastened at the construction site.
2. 在高處作業時，我會將我的安全帶扣在安全母索上。
I will fasten my safety belt to a lifeline while working at height.
3. 我絕不攜帶高度兩公尺以上的合梯或梯工作。
I will never bring a stepladder which is two meters high or more into the construction site.
4. 在施工架上作業時，我絕不使用梯子、合梯或踏凳等從事作業。
I will never use ladders, stepladders or footstool while working on scaffold.
5. 我絕對遵從規定進出工地。
I will absolutely comply with rules while entering and exiting the construction site.
6. 未經主管許可，我絕不接近吊車吊臂範圍及作業車輛、機具之作業半徑內。
I will never get close to the lifting range of crane, vehicles that operated and working radius of machines without permission.
7. 我會遵照施工器具設備上標示牌素標示的安全事項辦理。
I will follow the general safety instructions labeled on equipment while operating the device.
8. 在工地我絕對不會隨意丟垃圾及拋棄口香糖殘渣。
I will never litter and spit chewing gum at construction site.
9. 未經主管許可，我絕對不會在工地生火燃燒廢物。
I will never incinerate waste at construction site without permission.
10. 我會遵守識別證管制區之規定，在我的作業區內工作，未經報備，絕不到其他管制區。
I will stay and work at the permitted area under identity control. I will never go to those restricted zone unless authorized.
11. 未經主管許可，我絕不跨越護欄及警示帶。
I will never cross the guard rails and warning tapes without permission.
12. 在高處作業時，我絕對不會任意煙蒂丟擲，或將物件任意拋落。
I will never play around or drop objects while working at height.
13. 我會將用電設備插在規定在電源插座上，絕不私自亂接。
I will plug power-consuming equipment in record receptacle.
14. 未經主管許可，我絕不拆除圍籬、大門、護欄、護蓋、安全網、安全母索、警示帶、施工架踏板、潮電顧跟器、自動電擊防止裝置等安全防護裝置或使其失去功能。
Without permission, I will never dismantle or disable the safety protective equipment, such as fence, doors, guards , safety nets, lifeline, warring tapes, scaffold, residual current circuit breaker, voltage reducing device for AC arc welding.
15. 工作前及工作時我絕不飲用含酒精之飲料。
I will never drink alcoholic beverage before and during working.
16. 在公告禁止吸菸的區域，我絕不吸菸。
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17. 我絕對會將以上規定及其他有關的安全衛生守則，確實提醒本隊伍所有參與工程之工作人員共同遵守。
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此致Submitted to 交大 UNICODE 團隊 NCTUNICODE

承諾者Promisor（簽名Signature）：柯禹亨 KO Yu Heng

Solar Decathlon Europe

遵守勞工安全衛生紀律承諾書
Complying With Workplace Safety & Health Discipline Undertaking

ORCHID HOUSE

承諾者姓名 Name		負責事項 Responsiblity	
身分證字號 ID		承諾日期 Date	

本人承諾遵守下列事項
I promise to comply with following rules.

承諾事項
Undertake item

1. 在工地除休息區外，我會戴好安全帽，並扣上繫帶。
I will wear a safety helmet with the chin strap buckle fastened at the construction site.
2. 在高處作業時，我會將我的安全帶扣在安全母索上。
I will fasten my safety belt to a lifeline while working at height.
3. 我絕不攜帶高度兩公尺以上的合梯或梯工作。
I will never bring a stepladder which is two meters high or more into the construction site.
4. 在施工架上作業時，我絕不使用梯子、合梯或踏凳等從事作業。
I will never use ladders, stepladders or footstool while working on scaffold.
5. 我絕對遵從規定進出工地。
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6. 未經主管許可，我絕不接近吊車吊臂範圍及作業車輛、機具之作業半徑內。
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I will never litter and spit chewing gum at construction site.
9. 未經主管許可，我絕對不會在工地生火燃燒廢物。
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10. 我會遵守識別證管制區之規定，在我的作業區內工作，未經報備，絕不到其他管制區。
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13. 我會將用電設備插在規定在電源插座上，絕不私自亂接。
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14. 未經主管許可，我絕不拆除圍籬、大門、護欄、護蓋、安全網、安全母索、警示帶、施工架踏板、潮電顧跟器、自動電擊防止裝置等安全防護裝置或使其失去功能。
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16. 在公告禁止吸菸的區域，我絕不吸菸。
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此致Submitted to 交大 UNICODE 團隊 NCTUNICODE

承諾者Promisor（簽名Signature）：

遵守勞工安全衛生紀律承諾書
Complying With Workplace Safety & Health Discipline Undertaking

承諾者姓名 Name	周洋存 Chou, Yang-Tsun	負責事項 Responsiblity	Mockup, Assembly, Tool
身份證字號 ID	B122283801	承諾日期 Date	2014. 02. 14

本人承諾遵守下列事項
I promise to comply with following rules.

承諾事項
Undertake item

1. 在工地除休息區外，我會戴好安全帽，並扣上繫帶。
I will wear a safety helmet with the chin strap buckle fastened at the construction site.
2. 在高處作業時，我會將我的安全帶扣在安全母索上。
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3. 我絕不攜帶高度兩公尺以上的合梯進場工作。
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5. 我絕對遵從規定進出工地。
I will absolutely comply with rules while entering and exiting the construction site.
6. 未經主管許可，我絕不接近吊車吊舉範圍及作業半徑內。
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此至Submitted to 交大 UNICODE 團隊 NCTUNICODE

承諾者Promisor（簽名Signature）：周洋存 Chou, Yang-Tsun.

遵守勞工安全衛生紀律承諾書
Complying With Workplace Safety & Health Discipline Undertaking

承諾者姓名 Name	蘇建華 Su, Chien-Hua	負責事項 Responsiblity	Mock-up, 建材實驗, 吊裝組裝,
身份證字號 ID	K122473267	承諾日期 Date	2014.2.14

本人承諾遵守下列事項
I promise to comply with following rules.

承諾事項
Undertake item

1. 在工地除休息區外，我會戴好安全帽，並扣上繫帶。
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承諾者Promisor（簽名Signature）：蘇建華 Su, Chien-Hua

遵守勞工安全衛生紀律承諾書
Complying With Workplace Safety & Health Discipline Undertaking

承諾者姓名 Name	陳敬倫 Ching-Lun Chen	負責事項 Responsiblity	Site operation
身份證字號 ID	B122372496	承諾日期 Date	2014. 02. 14

本人承諾遵守下列事項
I promise to comply with following rules.

承諾事項
Undertake item

1. 在工地除休息區外，我會戴好安全帽，並扣上繫帶。
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此至Submitted to 交大 UNICODE 團隊 NCTUNICODE

承諾者Promisor（簽名Signature）：陳敬倫 Ching-Lun Chen.

遵守勞工安全衛生紀律承諾書
Complying With Workplace Safety & Health Discipline Undertaking

承諾者姓名 Name	李思敏 Si-Min Lee	負責事項 Responsiblity	PM Composing Dinner Party
身份證字號 ID	F227325942	承諾日期 Date	2014/02/14

本人承諾遵守下列事項
I promise to comply with following rules.

承諾事項
Undertake item

1. 在工地除休息區外，我會戴好安全帽，並扣上繫帶。
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10. 我會遵守識別證管制區之規定，在我的作業區內工作，未經報備，絕不到其他管制區。
I will stay and work at the permitted area under identity control. I will never go to those restricted zone unless authorized.
11. 未經主管許可，我絕不跨越護欄及警示帶。
I will never cross the guard rails and warning tapes without permission.
12. 在高處作業時，我絕對不會任意墬載冒險，或將物件任意拋落。
I will never play around or drop objects while working at height.
13. 我會將用電設備接在規定在電源插座上，絕不私自亂接。
I will plug power-consuming equipment in record receptacle.
14. 未經主管許可，我絕不拆除圍籬、大門、護欄、護蓋、安全網、安全母索、警示帶、施工架踏板、避電斷路器、自動電擊防止裝置等安全防護裝置或使其失去功能。
Without permission, I will never dismantle or disable the safety protective equipment, such as fence, doors, guards , safety nets, lifeline, warring tapes, scaffold, residual current circuit breaker, voltage reducing device for AC arc welding.
15. 工作前及工作時我絕不飲用含酒精之飲料。
I will never drink alcoholic beverage before and during working.
16. 在公告禁止吸菸的區域，我絕不吸菸。
I will never smoke at non-smoking area.
17. 我絕對會將以上規定及其他有關的安全衛生守則，確實提醒本隊伍所有參與工程之工作人員共同遵守。
I will comply with and remind all the team members of the standard which is listed above and other related safety and health instructions.

* 此為代表國家之國際級重大比賽，如違反上列事項，本人願意接受交大建築所最嚴厲處分！
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此至Submitted to 交大 UNICODE 團隊 NCTUNICODE

承諾者Promisor（簽名Signature）：李思敏 Si-Min Lee

Solar Decathlon Europe

遵守勞工安全衛生紀律承諾書
Complying With Workplace Safety & Health Discipline Undertaking

ORCHID HOUSE

承諾者姓名 Name	蘇育民 Yu-Min Su	負責事項 Responsibility	Green Core 測量 Blue Wall 試組裝
身分證字號 ID	F127677127	承諾日期 Date	2014.02.17

本人承諾遵守下列事項
I promise to comply with following rules.

承諾事項
Undertake item

1. 在工地除休息區外，我會戴好安全帽，並扣上繫帶。
I will wear a safety helmet with the chin strap buckle fastened at the construction site.
2. 在高處作業時，我會將我的安全帶扣在安全母索上。
I will fasten my safety belt to a lifeline while working at height.
3. 我絕不攜帶高度兩公尺以上的合梯進場工作。
I will never bring a stepladder which is two meters high or more into the construction site.
4. 在施工架上作業時，我絕不使用梯子、合梯或踏凳等從事作業。
I will never use ladders, stepladders or footstool while working on scaffold.
5. 我絕對遵從規定進出工地。
I will absolutely comply with rules while entering and exiting the construction site.
6. 未經主管許可，我絕不接近吊車吊線範圍及作業車輛、機具之作業半徑內。
I will never get close to the lifting range of crane, vehicles that operated and working radius of machines without permission.
7. 我會遵照施工器具設備上標示機索標示的安全事項辦理。
I will follow the general safety instructions labeled on equipment while operating the device.
8. 在工地我絕對不會隨意丟垃圾及嚼口香糖殘渣。
I will never litter and spit chewing gum at construction site.
9. 未經主管許可，我絕對不會在工地生火燒燒廢物。
I will never incinerate waste at construction site without permission.
10. 我會遵守識別證管制區之規定，在我的作業區內工作，未經報備，絕不到其他管制區。
I will stay and work at the permitted area under identity control. I will never go to those restricted zone unless authorized.
11. 未經主管許可，我絕不跨越護欄及警示帶。
I will never cross the guard rails and warning tapes without permission.
12. 在高處作業時，我絕對不會任意繞越冒險，或將物件任意拋落。
I will never play around or drop objects while working at height.
13. 我會將用電設備確在規定在電源插座上，絕不私自亂接。
I will plug power-consuming equipment in record receptacle.
14. 未經主管許可，我絕不拆除圍籬、大門、護欄、護蓋、安全網、安全母索、警示帶、施工架踏板、漏電斷路器、自動電擊防止裝置等安全防護裝置或使其失去功能。
Without permission, I will never dismantle or disable the safety protective equipment, such as fence, doors, guards , safety nets, lifeline, warning tapes, scaffold, residual current circuit breaker, voltage reducing device for AC arc welding.
15. 工作前及工作時我絕不飲用含酒精之飲料。
I will never drink alcoholic beverage before and during working.
16. 在公告禁止吸菸的區域，我絕不吸菸。
I will never smoke at non-smoking area.
17. 我絕對會辦以上規定及其他有關的安全衛生守則，確實提醒本隊伍所有參與工程之工作人員共同遵守。
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此為代表國家之國際級重大比賽，如違反上列事項，本人願意接受交大建築所依嚴厲處分！
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此至Submitted to　　交大 UNICODE 團隊 NCTUNICODE

承諾者Promisor（簽名Signature）：蘇育民 (Yu-Min Su)

Solar Decathlon Europe

遵守勞工安全衛生紀律承諾書
Complying With Workplace Safety & Health Discipline Undertaking

ORCHID HOUSE

承諾者姓名 Name	陳孜君 Tze-Chun Chen	負責事項 Responsibility	Safety & Health
身分證字號 ID	T225837196	承諾日期 Date	2014/2/14

本人承諾遵守下列事項
I promise to comply with following rules.

承諾事項
Undertake item

1. 在工地除休息區外，我會戴好安全帽，並扣上繫帶。
I will wear a safety helmet with the chin strap buckle fastened at the construction site.
2. 在高處作業時，我會將我的安全帶扣在安全母索上。
I will fasten my safety belt to a lifeline while working at height.
3. 我絕不攜帶高度兩公尺以上的合梯進場工作。
I will never bring a stepladder which is two meters high or more into the construction site.
4. 在施工架上作業時，我絕不使用梯子、合梯或踏凳等從事作業。
I will never use ladders, stepladders or footstool while working on scaffold.
5. 我絕對遵從規定進出工地。
I will absolutely comply with rules while entering and exiting the construction site.
6. 未經主管許可，我絕不接近吊車吊線範圍及作業車輛、機具之作業半徑內。
I will never get close to the lifting range of crane, vehicles that operated and working radius of machines without permission.
7. 我會遵照施工器具設備上標示機索標示的安全事項辦理。
I will follow the general safety instructions labeled on equipment while operating the device.
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I will never litter and spit chewing gum at construction site.
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13. 我會將用電設備確在規定在電源插座上，絕不私自亂接。
I will plug power-consuming equipment in record receptacle.
14. 未經主管許可，我絕不拆除圍籬、大門、護欄、護蓋、安全網、安全母索、警示帶、施工架踏板、漏電斷路器、自動電擊防止裝置等安全防護裝置或使其失去功能。
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15. 工作前及工作時我絕不飲用含酒精之飲料。
I will never drink alcoholic beverage before and during working.
16. 在公告禁止吸菸的區域，我絕不吸菸。
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17. 我絕對會辦以上規定及其他有關的安全衛生守則，確實提醒本隊伍所有參與工程之工作人員共同遵守。
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此至Submitted to　　交大 UNICODE 團隊 NCTUNICODE

承諾者Promisor（簽名Signature）：陳孜君 Tze-Chun Chen

Solar Decathlon Europe

遵守勞工安全衛生紀律承諾書
Complying With Workplace Safety & Health Discipline Undertaking

ORCHID HOUSE

承諾者姓名 Name	謝文潔 Wen-Chieh, Hsieh	負責事項 Responsibility	建築 Architecture
身分證字號 ID	A126532900	承諾日期 Date	2014,02,25

本人承諾遵守下列事項
I promise to comply with following rules.

承諾事項
Undertake item

1. 在工地除休息區外，我會戴好安全帽，並扣上繫帶。
I will wear a safety helmet with the chin strap buckle fastened at the construction site.
2. 在高處作業時，我會將我的安全帶扣在安全母索上。
I will fasten my safety belt to a lifeline while working at height.
3. 我絕不攜帶高度兩公尺以上的合梯進場工作。
I will never bring a stepladder which is two meters high or more into the construction site.
4. 在施工架上作業時，我絕不使用梯子、合梯或踏凳等從事作業。
I will never use ladders, stepladders or footstool while working on scaffold.
5. 我絕對遵從規定進出工地。
I will absolutely comply with rules while entering and exiting the construction site.
6. 未經主管許可，我絕不接近吊車吊線範圍及作業車輛、機具之作業半徑內。
I will never get close to the lifting range of crane, vehicles that operated and working radius of machines without permission.
7. 我會遵照施工器具設備上標示機索標示的安全事項辦理。
I will follow the general safety instructions labeled on equipment while operating the device.
8. 在工地我絕對不會隨意丟垃圾及嚼口香糖殘渣。
I will never litter and spit chewing gum at construction site.
9. 未經主管許可，我絕對不會在工地生火燒燒廢物。
I will never incinerate waste at construction site without permission.
10. 我會遵守識別證管制區之規定，在我的作業區內工作，未經報備，絕不到其他管制區。
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13. 我會將用電設備確在規定在電源插座上，絕不私自亂接。
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14. 未經主管許可，我絕不拆除圍籬、大門、護欄、護蓋、安全網、安全母索、警示帶、施工架踏板、漏電斷路器、自動電擊防止裝置等安全防護裝置或使其失去功能。
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15. 工作前及工作時我絕不飲用含酒精之飲料。
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16. 在公告禁止吸菸的區域，我絕不吸菸。
I will never smoke at non-smoking area.
17. 我絕對會辦以上規定及其他有關的安全衛生守則，確實提醒本隊伍所有參與工程之工作人員共同遵守。
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此至Submitted to　　交大 UNICODE 團隊 NCTUNICODE

承諾者Promisor（Signature）：謝文潔, Creator

Solar Decathlon Europe

遵守勞工安全衛生紀律承諾書
Complying With Workplace Safety & Health Discipline Undertaking

ORCHID HOUSE

承諾者姓名 Name	Daisuke Nagatani	負責事項 Responsibility	Design Director
身分證字號 ID	KC00617730	承諾日期 Date	Feb. 25, 2014

本人承諾遵守下列事項
I promise to comply with following rules.

承諾事項
Undertake item

1. 在工地除休息區外，我會戴好安全帽，並扣上繫帶。
I will wear a safety helmet with the chin strap buckle fastened at the construction site.
2. 在高處作業時，我會將我的安全帶扣在安全母索上。
I will fasten my safety belt to a lifeline while working at height.
3. 我絕不攜帶高度兩公尺以上的合梯進場工作。
I will never bring a stepladder which is two meters high or more into the construction site.
4. 在施工架上作業時，我絕不使用梯子、合梯或踏凳等從事作業。
I will never use ladders, stepladders or footstool while working on scaffold.
5. 我絕對遵從規定進出工地。
I will absolutely comply with rules while entering and exiting the construction site.
6. 未經主管許可，我絕不接近吊車吊線範圍及作業車輛、機具之作業半徑內。
I will never get close to the lifting range of crane, vehicles that operated and working radius of machines without permission.
7. 我會遵照施工器具設備上標示機索標示的安全事項辦理。
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8. 在工地我絕對不會隨意丟垃圾及嚼口香糖殘渣。
I will never litter and spit chewing gum at construction site.
9. 未經主管許可，我絕對不會在工地生火燒燒廢物。
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12. 在高處作業時，我絕對不會任意繞越冒險，或將物件任意拋落。
I will never play around or drop objects while working at height.
13. 我會將用電設備確在規定在電源插座上，絕不私自亂接。
I will plug power-consuming equipment in record receptacle.
14. 未經主管許可，我絕不拆除圍籬、大門、護欄、護蓋、安全網、安全母索、警示帶、施工架踏板、漏電斷路器、自動電擊防止裝置等安全防護裝置或使其失去功能。
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15. 工作前及工作時我絕不飲用含酒精之飲料。
I will never drink alcoholic beverage before and during working.
16. 在公告禁止吸菸的區域，我絕不吸菸。
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17. 我絕對會辦以上規定及其他有關的安全衛生守則，確實提醒本隊伍所有參與工程之工作人員共同遵守。
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此至Submitted to　　交大 UNICODE 團隊

承諾者Promisor（Signature）：Daisuke

Solar Decathlon Europe

遵守勞工安全衛生紀律承諾書
Complying With Workplace Safety & Health Discipline Undertaking

ORCHID HOUSE

承諾者姓名 Name	余明鴻 She. Ming hung	負責事項 Responsibility	Site operation
身分證字號 ID	E123918288	承諾日期 Date	2014. 02. 14

本人承諾遵守下列事項
I promise to comply with following rules.

承諾事項
Undertake Item

1. 在工地除休息區外，我會戴好安全帽，並扣上繫帶。
I will wear a safety helmet with the chin strap buckle fastened at the construction site.
2. 在高處作業時，我會將我的安全帶扣在安全母索上。
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3. 我絕不攜帶高度兩公尺以上的合梯進場工作。
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5. 我絕對遵從規定進出工地。
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6. 未經主管許可，我絕不接近吊車吊掛範圍及作業車輛、機具之作業半徑內。
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7. 我會遵照施工器具設備上標示辨索標示的安全事項辦理。
I will follow the general safety instructions labeled on equipment while operating the device.
8. 在工地我絕對不會隨意丟垃圾及檳榔渣。
I will never litter and spit chewing gum at construction site.
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I will never play around or drop objects while working at height.
13. 我會將用電設備接在規定在電源插座上，絕不私自亂接。
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16. 在公告禁止吸菸的區域，我絕不吸菸。
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17. 我絕對會遵從以上規定及其他有關的安全衛生守則，確實提醒本隊伍所有參與工程之工作人員共同遵守。
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此致Submitted to 交大 UNICODE 團隊 NCTUNICODE

承諾者Promisor（簽名Signature）：

Solar Decathlon Europe

遵守勞工安全衛生紀律承諾書
Complying With Workplace Safety & Health Discipline Undertaking

ORCHID HOUSE

承諾者姓名 Name	陳依璘	負責事項 Responsibility	
身分證字號 ID	G221684649	承諾日期 Date	民2014. 4. 22

本人承諾遵守下列事項
I promise to comply with following rules.

承諾事項
Undertake Item

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I will wear a safety helmet with the chin strap buckle fastened at the construction site.
2. 在高處作業時，我會將我的安全帶扣在安全母索上。
I will fasten my safety belt to a lifeline while working at height.
3. 我絕不攜帶高度兩公尺以上的合梯進場工作。
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I will never use ladders, stepladders or footstool while working on scaffold.
5. 我絕對遵從規定進出工地。
I will absolutely comply with rules while entering and exiting the construction site.
6. 未經主管許可，我絕不接近吊車吊掛範圍及作業車輛、機具之作業半徑內。
I will never get close to the lifting range of crane, vehicles that operated and working radius of machines without permission.
7. 我會遵照施工器具設備上標示辨索標示的安全事項辦理。
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8. 在工地我絕對不會隨意丟垃圾及檳榔渣。
I will never litter and spit chewing gum at construction site.
9. 未經主管許可，我絕對不會在工地生火燃燒廢物。
I will never incinerate waste at construction site without permission.
10. 我會遵守識別證管制區之規定，在我的作業區內工作，未經報備，絕不到其他管制區。
I will stay and work at the permitted area under identity control. I will never go to those restricted zone unless authorized.
11. 未經主管許可，我絕不跨越護欄及警示帶。
I will never cross the guard rails and warning tapes without permission.
12. 在高處作業時，我絕對不會任意搞破壞除，或將物件任意拋落。
I will never play around or drop objects while working at height.
13. 我會將用電設備接在規定在電源插座上，絕不私自亂接。
I will plug power-consuming equipment in record receptacle.
14. 未經主管許可，我絕不拆除圍籬、大門、護欄、護索、安全網、安全母索、警示帶、施工架踏板、漏電斷路器、自動電擊防止裝置等安全防護裝置或使其失去功能。
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15. 工作前及工作時我絕不飲用含酒精之飲料。
I will never drink alcoholic beverage before and during working.
16. 在公告禁止吸菸的區域，我絕不吸菸。
I will never smoke at non-smoking area.
17. 我絕對會將以上規定及其他有關的安全衛生守則，確實提醒本隊伍所有參與工程之工作人員共同遵守。
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此致Submitted to 交大 UNICODE 團隊 NCTUNICODE

承諾者Promisor（簽名Signature）：陳依璘 YI-CHING, CHEN

Solar Decathlon Europe

遵守勞工安全衛生紀律承諾書
Complying With Workplace Safety & Health Discipline Undertaking

ORCHID HOUSE

承諾者姓名 Name	林育如 (Lin Yu-Ju)	負責事項 Responsibility	
身分證字號 ID	D222822979	承諾日期 Date	2014/2/14

本人承諾遵守下列事項
I promise to comply with following rules.

承諾事項
Undertake Item

1. 在工地除休息區外，我會戴好安全帽，並扣上繫帶。
I will wear a safety helmet with the chin strap buckle fastened at the construction site.
2. 在高處作業時，我會將我的安全帶扣在安全母索上。
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3. 我絕不攜帶高度兩公尺以上的合梯進場工作。
I will never bring a stepladder which is two meters high or more into the construction site.
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6. 未經主管許可，我絕不接近吊車吊掛範圍及作業車輛、機具之作業半徑內。
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10. 我會遵守識別證管制區之規定，在我的作業區內工作，未經報備，絕不到其他管制區。
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11. 未經主管許可，我絕不跨越護欄及警示帶。
I will never cross the guard rails and warning tapes without permission.
12. 在高處作業時，我絕對不會任意搞破壞除，或將物件任意拋落。
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14. 未經主管許可，我絕不拆除圍籬、大門、護欄、護索、安全網、安全母索、警示帶、施工架踏板、漏電斷路器、自動電擊防止裝置等安全防護裝置或使其失去功能。
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此致Submitted to 交大 UNICODE 團隊 NCTUNICODE

承諾者Promisor（簽名Signature）：林育如 (Lin Yu-Ju)

Solar Decathlon Europe

遵守勞工安全衛生紀律承諾書
Complying With Workplace Safety & Health Discipline Undertaking

ORCHID HOUSE

承諾者姓名 Name	何鎮宇 Ho Chen-Yu	負責事項 Responsibility	Project Manual
身分證字號 ID	B122505597	承諾日期 Date	2014/2/14

本人承諾遵守下列事項
I promise to comply with following rules.

承諾事項
Undertake Item

1. 在工地除休息區外，我會戴好安全帽，並扣上繫帶。
I will wear a safety helmet with the chin strap buckle fastened at the construction site.
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承諾者Promisor（簽名Signature）：何鎮宇 Ho Chen-Yu

Solar Decathlon Europe

ORCHID HOUSE

遵守勞工安全衛生紀律承諾書
Complying With Workplace Safety & Health Discipline Undertaking

承諾者姓名 Name	黃智勤 Huang Chih-Chin	負責事項 Responsiblity	Project Manual
身分證字號 ID	F127767500	承諾日期 Date	2014/02/14

本人承諾遵守下列事項
I promise to comply with following rules.

承諾事項
Undertake item

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此至Submitted to 交大 UNICODE 團隊 NCTUNICODE

承諾者Promisor（簽名Signature）：黃智勤 Huang Chih-Chin

Solar Decathlon Europe

ORCHID HOUSE

遵守勞工安全衛生紀律承諾書
Complying With Workplace Safety & Health Discipline Undertaking

承諾者姓名 Name	許倍禊 Pei-Hsien Hsu	負責事項 Responsiblity	智慧家庭系統
身分證字號 ID	E121039944	承諾日期 Date	103、2、19

本人承諾遵守下列事項
I promise to comply with following rules.

承諾事項
Undertake item

1. 在工地除休息區外，我會戴好安全帽，並扣上繫帶。
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承諾者Promisor（簽名Signature）：許倍禊

Solar Decathlon Europe

ORCHID HOUSE

遵守勞工安全衛生紀律承諾書
Complying With Workplace Safety & Health Discipline Undertaking

承諾者姓名 Name	侯君豪 June-Hao Hou	負責事項 Responsiblity	Technology and Academic Consultant 科技與學術諮詢
身分證字號 ID	V120307312	承諾日期 Date	2014、02、19

本人承諾遵守下列事項
I promise to comply with following rules.

承諾事項
Undertake item

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14. 未經主管許可，我絕不拆除圍籬、大門、護欄、護蓋、安全網、安全母索、警示帶、施工架踏板、漏電斷路器、自動電擊防止裝置等安全防護裝置或使其失去功能。
Without permission, I will never dismantle or disable the safety protective equipment, such as fence, doors, guards , safety nets, lifeline, warring tapes, scaffold, residual current circuit breaker, voltage reducing device for AC arc welding.
15. 工作前及工作時我絕不飲用含酒精之飲料。
I will never drink alcoholic beverage before and during working.
16. 在公告禁止吸菸的區域，我絕不吸菸。
I will never smoke at non-smoking area.
17. 我絕對會將以上規定及其他有關的安全衛生守則，確實提醒本隊伍所有參與工程之工作人員共同遵守。
I will comply with and remind all the team members of the standard which is listed above and other related safety and health instructions.

* 此為代表國家之國際級重大比賽，如違反上列事項，本人願意接受文大建築所最嚴厲處分！
I understand it is an important international competition and we are a team which represents Taiwan. I promise to comply with the standards and rules. I will accept the responsibility for violations and sanctions by Graduate Institution of Architecture, National Chiao-Tung University.

此至Submitted to 交大 UNICODE 團隊 NCTUNICODE

承諾者Promisor（簽名Signature）：侯君豪 JunHaoHou

16.0 Formation and information about health and safety

16.1 Responsibility person

Title	Name	Address / Email / Phone
Faculty Advisor	David Tseng	National Chiao Tung University, Graduate Institute of Architecture, 1001 Ta Hsueh Road Hsinchu, TW, 300
		cdavidtseng@gmail.com
		+886-3-571-2121 #58468
Project Manager	Chih-Ming Chien	National Chiao Tung University, Graduate Institute of Architecture, 1001 Ta Hsueh Road Hsinchu, TW, 300
		s9390306@gmail.com
		+886-3-571-2121 #58467
Project Architect	Sheng-Kai Sky Tseng	National Chiao Tung University, Graduate Institute of Architecture, 1001 Ta Hsueh Road Hsinchu, TW, 300
		sky@arch.nctu.edu.tw
		+886-3-571-2121 #58467
Project Engineer	Chia-Hao Lin	National Chiao Tung University, Graduate Institute of Architecture, 1001 Ta Hsueh Road Hsinchu, TW, 300
		dennis01215@arch.nctu.edu.tw
		+886-3-571-2121 #58467
Structural Engineer	Sheng-I Yen	Ruentex Construction Group 10/F, No.308, Sec. 2, Bade Road, Taipei, Taiwan 10492
		+886-2-8161-9999 #7446
		rt009172@mail.ruentex.com.tw
Electrical Engineer	Robert Lour	Delta Electronics, Inc. 186 Ruey Kuang Rd, Neihu, Taipei 11491 Taiwan
		+886-2-8797-2088 #6000
		robert.luor@delta.com.tw
Student Team Leader	Sheng-Kai Sky Tseng	National Chiao Tung University, Graduate Institute of Architecture, 1001 Ta Hsueh Road Hsinchu, TW, 300
		sky@arch.nctu.edu.tw
		+886-3-571-2121 #58467
Health & Safety Team Coordinator	Tze-Chun Chen	National Chiao Tung University, Graduate Institute of Architecture, 1001 Ta Hsueh Road Hsinchu, TW, 300
		tcchen@arch.nctu.edu.tw
		+886-3-571-2121 #58467
Safety Officers	Chin-Yuan Fan	National Chiao Tung University, Graduate Institute of Architecture, 1001 Ta Hsueh Road Hsinchu, TW, 300
		cyfan@arch.nctu.edu.tw
		+886-3-571-2121 #58467
Site Operation Coordinators	Ming-Hung She	National Chiao Tung University, Graduate Institute of Architecture, 1001 Ta Hsueh Road Hsinchu, TW, 300
		miluchopperr@arch.nctu.edu.tw
		+886-3-571-2121 #58467
Contest Captain	Yu-hsien Lin	National Chiao Tung University, Graduate Institute of Architecture, 1001 Ta Hsueh Road Hsinchu, TW, 300
		bluerice@arch.nctu.edu.tw
		+886-3-571-2121 #58467
Instrumentation Contact	Yang-Tsun Chou	National Chiao Tung University, Graduate Institute of Architecture, 1001 Ta Hsueh Road Hsinchu, TW, 300
		cyt@arch.nctu.edu.tw
		+886-3-571-2121 #58467
Communications Coordinator	Ya-Ting Wu	National Chiao Tung University, Graduate Institute of Architecture, 1001 Ta Hsueh Road Hsinchu, TW, 300
		yatingwu@arch.nctu.edu.tw
		+886-3-571-2121 #58467
Sponsorship Manager	Ya-Ting Wu	National Chiao Tung University, Graduate Institute of Architecture, 1001 Ta Hsueh Road Hsinchu, TW, 300
		yatingwu@arch.nctu.edu.tw
		+886-3-571-2121 #58467

16.2 Licence

- General labor safety and health
- Certificate of Basic Life Support
- Boom lift
- Forklift truck
- Driver

See item 10.17.8-11 of this documents to see the licences.

17.0 Emergency evacuation plan during the assembly and disassembly periods

17.1 Emergency numbers

15 - emergency medical emergency, SAMU
17 - police,
18 - fire brigade(land line),
112 - fire brigade(mobile),
115 - social emergency,
It is not possible to call 112 without a SIM card.

In addition to French, the calls can be answered in 40 languages thanks to the help of interpreters.

17.2 Telephone numbers of first aids members

A Team working

Name	*Position*	*First Aids Number*
Yating Wu	Site Operation Coordinator	+886-989-075-815
Ming-Hong She	Decathlete	+886-920-738-811
Chin-Yuan Fan	Material Manager	+886-912-268-834
Pei-Ling Wu	Health and Safety Officer	+886-922-493-184
Yung-Yen Teng	Decathlete	+886-936-056-176
Yiting Chen	Tool Manager	+886-911-175-516
Chin-Ju Chen	Decathlete	+886-932-689-816
Yu-Ming Su	Decathlete	+886-922-151-908
Tze-Chun Chen	Decathlete	+886-933-233-594
Shao-yi Lu	Decathlete	+886-921-328-579

B Team working

Name	*Position*	*First Aids Number*
Dennis Lin	Site Operation Coordinator	+886-953-895-479
Sunny Chou	Decathlete	+886-953-381-616
Chi-Ming Chien	Decathlete	+886-939-710-545
Jason Huang	Decathlete	+886-988-602-880
Oswalt Ho	Decathlete	+886-928-685-801
Summer Lee	Tool Manager	+886-930-310-233
Cheng-Wei Wang	Decathlete	+886-3-4283339
Wan-Ling Cheng	Health and Safety Officer	+886-936-626-582
I-Chih Chen	Material Manager	+886-972-193-563
Ruby Tu	Decathlete	+886-910-192-370

C Team working

Name	*Position*	*First Aids Number*
Sky Tseng	Site Operation Coordinator	+886-952-065-206
Chester Hu	Decathlete	+886-923-606-733
Andrew Su	Decathlete	+886-919-702-782
Henry Ko	Decathlete	+886-932-199-258
Rui Lin	Material Manager	+886-921-278-635
Trista Wang	Decathlete	+886-926-379-839
Sophie Chen	Health and safety Officer	+886-912-094-737
Leslie Yen	Decathlete	+886-955-541-783
Jeff Lin	Tool Manager	+886-958-018-556

17.3 Annex 1: Individual protection

Safety Vest

Full Body Safety Harness

Earmuffs

Safety Helmet

Goggles

We will send the complete list of safety and health equipment which will be made as soon as possible

17.4 Annex 2: Collective protection: AED

www.philips.com/healthcare

Figure 17.6.1 Philips HeartStart OnSite Defibrillator

Figure 17.6.2 All of the worker members had a AED training course

17.5 Annex 3: Medical examination

0001113895　吳雅婷 Yating Wu

醫師診斷	醫師建議
體重過輕BMI=18。	建議可再增加5%的體重。
血球比容積、血色素及紅血球數量偏低，有輕微貧血。	請多補充蛋白質及鐵質，建議三個月後至家醫科門診追蹤。
血中尿素氮偏低。	不需特別處理。
糖鎖抗原(CA-199)偏高。	CA-199為胰臟癌或其他腸胃道疾病之相關指標，請至肝膽腸胃內科追蹤檢查。
已有德國麻疹抗體。	不用注射疫苗。
已經有B型肝炎表面抗體，表示已對B型肝炎免疫。	不用再注射疫苗。
無A型肝炎抗體。	建議至家庭醫學科門診施打A肝疫苗。
已有水痘抗體。	不需注射水痘疫苗。
沒有麻疹抗體。	請至家醫科注射預防針，注射後三個月內避免懷孕。
肺功能檢查： 輕微肺活量不足。	請多運動，增加肺功能，避免抽煙及吸二手煙並定期追蹤檢查。

醫師簽名：臺安醫師 翁珮瑄 VS C29

** 紅色字體只是警示，檢查結果應以醫師診斷為準 **

3 - 1

臺安醫院 健診中心 Taiwan Adventist Hospital P. E. C. TEL:2781-3394

臺安醫院

We will send the complete list of medical examinations which are under application process now.

17.6 Annex 4: Specific training - General labor safety and health training

一般安全衛生教育訓練結業證書
General Labor Safety and Health Training

證書編號 Certificate No.	142303
姓名 Name	曾聖凱
出生日期 Date of Birth	73.10.26
身分證字號 ID No.	A128031568

本訓練依據行政院勞工委員會發布之「勞工安全衛生教育訓練規則」第十六條辦理

訓練日期 Training Date	103.2.19 2014.2.19	訓練單位核章 Training Organization Signature
訓練時數 Training Hours	6 小時	
發證日期 Valid From	103.2.20 2014.2.20	
有效期限 Expiry	106.2.18 2017.2.20	

訓練單位：中國勞工安全衛生管理學會
地　　址：台北市北平東路 16 號 9 樓
電　　話：(02)2321-8195

Figure 17.8.1 General Labor Safety and Health Training

一般安全衛生教育訓練結業證書

證書編號	142327
姓名	何鎮宇
出生日期	79.6.24
身分證字號	B122505597

一般安全衛生教育訓練結業證書

證書編號	142322
姓名	柯禹亨
出生日期	79.6.15
身分證字號	A125505285

一般安全衛生教育訓練結業證書

證書編號	142316
姓名	鄧詠嫣
出生日期	79.7.1
身分證字號	J222559932

一般安全衛生教育訓練結業證書

證書編號	142328
姓名	黃智勤
出生日期	78.10.21
身分證字號	F127767500

一般安全衛生教育訓練結業證書

證書編號	142323
姓名	蘇建華
出生日期	79.4.15
身分證字號	K122473267

一般安全衛生教育訓練結業證書

證書編號	142317
姓名	陳慈君
出生日期	72.10.15
身分證字號	F225859196

一般安全衛生教育訓練結業證書

證書編號	142329
姓名	湯博鈞
出生日期	56.1.1
身分證字號	J120340077

一般安全衛生教育訓練結業證書

證書編號	142324
姓名	陳奕至
出生日期	73.12.25
身分證字號	A227242256

一般安全衛生教育訓練結業證書

證書編號	142318
姓名	吳佩玲
出生日期	75.7.3
身分證字號	F226424740

本訓練依據行政院勞工委員會發布之「勞工安全衛生教育訓練規則」第十六條辦理

一般安全衛生教育訓練結業證書
證書編號 142333
姓名 顏伯菘
出生日期 78.3.27
身分證字號 S123540898
本訓練依據行政院勞工委員會發布之「勞工安全衛生教育訓練規則」第十六條辦理
一般安全衛生教育訓練結業證書
證書編號 142325
姓名 蘇育民
出生日期 78.4.15
身分證字號 F127677127
本訓練依據行政院勞工委員會發布之「勞工安全衛生教育訓練規則」第十六條辦理
一般安全衛生教育訓練結業證書
證書編號 142319
姓名 李思敏
出生日期 79.1.19
身分證字號 F227325942
本訓練依據行政院勞工委員會發布之「勞工安全衛生教育訓練規則」第十六條辦理
一般安全衛生教育訓練結業證書
證書編號 142311
姓名 鄭婉伶
出生日期 76.8.14
身分證字號 S223783322
本訓練依據行政院勞工委員會發布之「勞工安全衛生教育訓練規則」第十六條辦理
一般安全衛生教育訓練結業證書
證書編號 142306
姓名 王柔玄
出生日期 75.5.14
身分證字號 F226423869
本訓練依據行政院勞工委員會發布之「勞工安全衛生教育訓練規則」第十六條辦理
一般安全衛生教育訓練結業證書
證書編號 142303
姓名 曾聖凱
出生日期 73.10.26
身分證字號 A128031568
本訓練依據行政院勞工委員會發布之「勞工安全衛生教育訓練規則」第十六條辦理
一般安全衛生教育訓練結業證書
證書編號 142312
姓名 余明鴻
出生日期 77.3.4
身分證字號 E123918288
本訓練依據行政院勞工委員會發布之「勞工安全衛生教育訓練規則」第十六條辦理
一般安全衛生教育訓練結業證書
證書編號 142307
姓名 林育如
出生日期 78.5.9
身分證字號 D222282299
本訓練依據行政院勞工委員會發布之「勞工安全衛生教育訓練規則」第十六條辦理
一般安全衛生教育訓練結業證書
證書編號 142301
姓名 簡志明
出生日期 70.11.1
身分證字號 A124315269
本訓練依據行政院勞工委員會發布之「勞工安全衛生教育訓練規則」第十六條辦理
一般安全衛生教育訓練結業證書
證書編號 142313
姓名 林育賢
出生日期 77.10.8
身分證字號 A127136493
本訓練依據行政院勞工委員會發布之「勞工安全衛生教育訓練規則」第十六條辦理
一般安全衛生教育訓練結業證書
證書編號 142308
姓名 陳佐崢
出生日期 75.6.1
身分證字號 G221684649
本訓練依據行政院勞工委員會發布之「勞工安全衛生教育訓練規則」第十六條辦理
一般安全衛生教育訓練結業證書
證書編號 142302
姓名 吳雅婷
出生日期 71.2.3
身分證字號 F225316543
本訓練依據行政院勞工委員會發布之「勞工安全衛生教育訓練規則」第十六條辦理
一般安全衛生教育訓練結業證書
證書編號 142314
姓名 周洋存
出生日期 76.6.2
身分證字號 B122203801
本訓練依據行政院勞工委員會發布之「勞工安全衛生教育訓練規則」第十六條辦理
一般安全衛生教育訓練結業證書
證書編號 142309
姓名 杜懷茹
出生日期 79.2.23
身分證字號 A225873324
一般安全衛生教育訓練結業證書
證書編號 142304
姓名 林家豪
出生日期 76.10.4
身分證字號 A125683631
本訓練依據行政院勞工委員會發布之「勞工安全衛生教育訓練規則」第十六條辦理
一般安全衛生教育訓練結業證書
證書編號 142332
姓名 胡文謙
出生日期 79.6.4
身分證字號 A126532900
本訓練依據行政院勞工委員會發布之「勞工安全衛生教育訓練規則」第十六條辦理
一般安全衛生教育訓練結業證書
證書編號 142310
姓名 范欽媛
出生日期 77.12.28
身分證字號 A226810009
本訓練依據行政院勞工委員會發布之「勞工安全衛生教育訓練規則」第十六條辦理
一般安全衛生教育訓練結業證書
證書編號 142305
姓名 陳敬儒
出生日期 77.3.29
身分證字號 B122372696
本訓練依據行政院勞工委員會發布之「勞工安全衛生教育訓練規則」第十六條辦理
一般安全衛生教育訓練結業證書
證書編號 142326
姓名 陳怡廷
出生日期 78.9.1
身分證字號 I200015293
本訓練依據行政院勞工委員會發布之「勞工安全衛生教育訓練規則」第十六條辦理
一般安全衛生教育訓練結業證書
證書編號 142320
姓名 呂劭翊
出生日期 77.5.31
身分證字號 H123496306
本訓練依據行政院勞工委員會發布之「勞工安全衛生教育訓練規則」第十六條辦理
一般安全衛生教育訓練結業證書
證書編號 142315
姓名 王晟瑋
出生日期 71.8.13
身分證字號 Q122961971
本訓練依據行政院勞工委員會發布之「勞工安全衛生教育訓練規則」第十六條辦理

17.7 Annex 5: Specific training - Boom lift training

Training members:
Andrew Su
Chester Hu
Yu-Ming Su
Sunny Chou
Ming-Hong She
Dennis Lin
Cheng-Wei Wang
Jason Huang
Shao-yi Lu

Figure 17.8.2 Boom lift training

自走式高空作業車
操 作 證
姓 名：胡文謙
身份證號：A126532900
種 類：直曲臂
發證日期：103.04.09
自走式高空作業車
操 作 證
姓 名：林家豪
身份證號：A125683631
種 類：直曲臂
發證日期：103.04.09
自走式高空作業車
操 作 證
姓 名：蘇育民
身份證號：F127677127
種 類：直曲臂
發證日期：103.04.09
自走式高空作業車
操 作 證
姓 名：王晟瑋
身份證號：Q122961971
種 類：直曲臂
發證日期：103.04.09
自走式高空作業車
操 作 證
姓 名：周洋存
身份證號：B122203801
種 類：直曲臂
發證日期：103.04.09
自走式高空作業車
操 作 證
姓 名：黃智勤
身份證號：F127767500
種 類：直曲臂
發證日期：103.04.09
自走式高空作業車
操 作 證
姓 名：余明鴻
身份證號：E123918288
種 類：直曲臂
發證日期：103.04.09
自走式高空作業車
操 作 證
姓 名：呂劭翊
身份證號：H123496306
種 類：直曲臂
發證日期：103.04.09

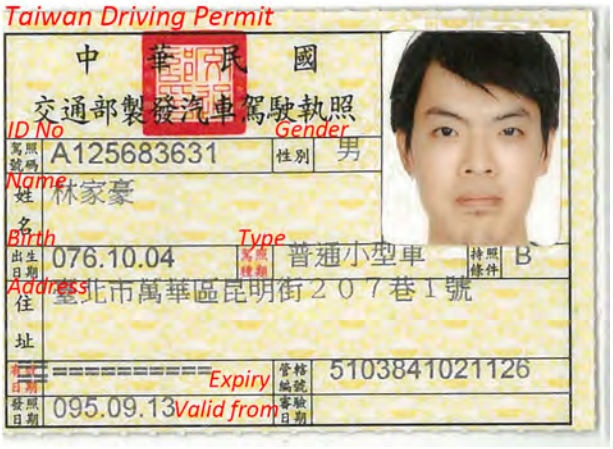
17.8 Annex 6: Specific training - Forklift truck training

We will send the complete list of forklift truck licences which are under applying process now.

Training members:
Ming-Hong She
Dennis Lin
Cheng-Wei Wang
Trista Wang
Sophie Chen
Chin-Ju Chen

17.9 Annex 7: Driver permit

We will send the complete list of driver permit licence which are under applying process now.



17.10 Annex 8: Identification of risks and evaluation of the efficiency of the adopted protections.

Assembly

SENMUT EXPERTO APPLIED PREVENTION EVALUATION TABLE																		
Phase 1: Site-Preparation								Evaluation place: during assembly										
Risks identification and its causes	Probability of the even			Determined Precaution				Consequence of the risk			Risk qualification with precaution applyed					Case of emergency		
	R	P	C	Ci	Pi	S	PP	L	G	Mo	T	To	M	I	In	FA	D	CA
Fall of persons at a different level		X		X	X	X		X			X					X		
Fall of objects because of collapse		X		X	X	X		X			X					X		
Fall of objects because they come loose		X		X	X	X		X			X					X		
Fall of objects because of manipulation		X		X	X	X		X				X				X		
Stepping on objects			X	X	X	X		X				X				X		
Knocked by objects or tools			X	X	X	X			X			X				X		X
Accidents caused by living beings		X		X	X	X		X			X					X		X
Trapped by or between objects		X		X	X				X		X					X		X
Trapped by turned over machines, tractors or vehicles		X		X	X							X				X		
Overexertion	X			X			X	X				X				X		
Exposure to extreme environmental temperatures		X		X	X				X			X				X		
Exposure to electric connections		X		X	X	X			X			X				X		
Exposure to harmful substances		X		X	X				X			X				X		
Fire		X		X	X				X			X				X		X
Run over or hit by vehicles		X		X	X	X			X			X				X		
Non traumatic pathologies		X		X	X			X			X					X		X
DESIGNED RISK PREVENTION, JOINT EFFECTIVENESS IS EVALUATED																		
Collective protection: someone could hold the ladder, one person must walk in front of the handler, one person must walk behind the handler, to look after																		
Personal Protection Equipment:																		
Signposting																		
Preventive Procedure:																		

SENMUT EXPERTO APPLIED PREVENTION EVALUATION TABLE

Phase 2: Module Unit								Evaluation place: during assembly										
Risks identification and its causes	Probability of the even			Determined Precaution				Consequence of			Risk qualification with precaution applyed					Case of emergency		
	R	P	C	Ci	Pi	S	PP	L	G	Mo	T	To	M	I	In	FA	D	CA
Fall of persons at a different level			X	X	X	X			X			X				X		X
Fall of persons at the same level			X	X	X			X				X				X		
Fall of objects because of collapse		X		X	X				X			X				X		X
Fall of objects because they come loose		X		X	X	X			X			X				X		X
Fall of objects because of manipulation		X		X	X				X			X				X		X
Stepping on objects		X		X	X			X			X					X		
Colliding with still objects		X		X	X	X		X			X					X		
Colliding with objects in motion		X		X	X			X			X					X		
Knocked by objects or tools		X		X	X			X			X					X		
Trapped by turned over machines, tractors or vehicles		X		X	X			X				X				X		
Overexertion	X			X	X		X	X					X			X		
Fire		X		X	X	X			X			X				X		X
Run over or hit by vehicles		X		X	X	X	X			X		X				X		X
Non traumatic pathologies		X		X	X			X			X					X		

DESIGNED RISK PREVENTION, JOINT EFFECTIVENESS IS EVALUATED
Collective protection: someone could hold the ladder, one person must walk in front of the handler, one person must walk behind the handler, to look after
Personal Protection Equipment:
Signposting
Preventive Procedure:

SENMUT EXPERTO APPLIED PREVENTION EVALUATION TABLE																		
Phase 3: Main structure								Evaluation place: during assembly										
Risks identification and its causes	Probability of the even			Determined Precaution				Consequence of			Risk qualification with precaution applyed					Case of emergency		
	R	P	C	Ci	Pi	S	PP	L	G	Mo	T	To	M	I	In	FA	D	CA
Fall of persons at a different level			X	X	X	X			X			X				X		X
Fall of persons at the same level			X	X	X			X				X				X		
Fall of objects because of collapse		X		X	X				X			X				X		X
Fall of objects because they come loose		X		X	X	X			X			X				X		X
Fall of objects because of manipulation		X		X	X				X			X				X		X
Stepping on objects		X		X	X			X			X					X		
Colliding with still objects		X		X	X	X		X			X					X		
Colliding with objects in motion		X		X	X			X			X					X		
Knocked by objects or tools		X		X	X			X			X					X		
Accidents caused by living beings			X	X	X			X			X					X		
Trapped by or between objects		X		X	X			X				X				X		
Trapped by turned over machines, tractors or vehicles		X		X	X			X				X				X		
Overexertion	X			X	X		X	X					X			X		
Exposure to extreme environmental temperatures		X		X	X			X				X				X		
Thermal contact		X		X	X			X				X				X		
Contact with caustic or corrosive substances	X			X	X	X			X				X			X		X
Explosion		X		X	X				X		X					X		X
Fire		X		X	X	X			X			X				X		X
Run over or hit by vehicles		X		X	X	X	X			X		X				X		X
Non traumatic pathologies		X		X	X			X			X					X		
DESIGNED RISK PREVENTION, JOINT EFFECTIVENESS IS EVALUATED																		
Collective protection: someone could hold the ladder, one person must walk in front of the handler, one person must walk behind the handler, to look after																		
Personal Protection Equipment:																		
Signposting																		
Preventive Procedure:																		

SENMUT EXPERTO APPLIED PREVENTION EVALUATION TABLE																		
Phase 4: M.E.P System								Evaluation place: during assembly										
Risks identification and its causes	Probability of the even			Determined Precaution				Consequence of			Risk qualification with precaution applyed					Case of emergency		
	R	P	C	Ci	Pi	S	PP	L	G	Mo	T	To	M	I	In	FA	D	CA
Fall of persons at a different level			X	X	X	X			X			X				X		X
Fall of persons at the same level			X	X	X			X				X				X		
Fall of objects because they come loose		X		X	X	X			X			X				X		X
Fall of objects because of manipulation		X		X	X				X			X				X		X
Stepping on objects		X		X	X			X			X					X		
Colliding with still objects		X		X	X	X		X			X					X		
Colliding with objects in motion		X		X	X			X			X					X		
Knocked by objects or tools		X		X	X			X			X					X		
Trapped by or between objects		X		X	X			X				X				X		
Trapped by turned over machines, tractors or vehicles		X		X	X			X				X				X		
Overexertion	X			X	X		X	X					X			X		
Exposure to extreme environmental temperatures		X		X	X			X				X				X		
Thermal contact		X		X	X			X				X				X		
Exposure to electric connections		X		X	X	X			X				X			X		X
Explosion		X		X	X				X		X					X		X
Fire		X		X	X	X			X			X				X		X
Run over or hit by vehicles		X		X	X	X	X			X		X				X		X
Non traumatic pathologies		X		X	X			X			X					X		
DESIGNED RISK PREVENTION, JOINT EFFECTIVENESS IS EVALUATED																		
Collective protection: someone could hold the ladder, one person must walk in front of the handler, one person must walk behind the handler, to look after																		
Personal Protection Equipment:																		
Signposting																		
Preventive Procedure:																		

SENMUT EXPERTO APPLIED PREVENTION EVALUATION TABLE																		
Phase 5: Roof Panel								Evaluation place: during assembly										
Risks identification and its causes	Probability of the even			Determined Precaution				Consequence of			Risk qualification with precaution applyed					Case of emergency		
	R	P	C	Ci	Pi	S	PP	L	G	Mo	T	To	M	I	In	FA	D	CA
Fall of persons at a different level			X	X	X	X			X			X				X		X
Fall of persons at the same level			X	X	X			X				X				X		
Fall of objects because of collapse		X		X	X				X			X				X		X
Fall of objects because they come loose		X		X	X	X			X			X				X		X
Fall of objects because of manipulation		X		X	X				X			X				X		X
Stepping on objects		X		X	X			X			X					X		
Knocked by objects or tools		X		X	X			X			X					X		
Accidents caused by living beings			X	X	X			X			X					X		
Trapped by turned over machines, tractors or vehicles		X		X	X			X				X				X		
Overexertion	X			X	X		X	X					X			X		
Exposure to extreme environmental temperatures		X		X	X			X				X				X		
Thermal contact		X		X	X			X				X				X		
Contact with caustic or corrosive substances	X			X	X	X			X				X			X		X
Fire		X		X	X	X			X			X				X		X
Non traumatic pathologies		X		X	X			X			X					X		
DESIGNED RISK PREVENTION, JOINT EFFECTIVENESS IS EVALUATED																		
Collective protection: someone could hold the ladder, one person must walk in front of the handler, one person must walk behind the handler, to look after																		
Personal Protection Equipment:																		
Signposting																		
Preventive Procedure:																		

SENMUT EXPERTO APPLIED PREVENTION EVALUATION TABLE

Phase 6: Exterior System								Evaluation place: during assembly										
Risks identification and its causes	Probability of the even			Determined Precaution				Consequence of			Risk qualification with precaution applyed					Case of emergency		
	R	P	C	Ci	Pi	S	PP	L	G	Mo	T	To	M	I	In	FA	D	CA
Fall of persons at the same level			X	X	X			X				X				X		
Fall of objects because of collapse		X		X	X				X			X				X		X
Fall of objects because they come loose		X		X	X	X			X			X				X		X
Fall of objects because of manipulation		X		X	X				X			X				X		X
Stepping on objects		X		X	X			X			X					X		
Colliding with still objects		X		X	X	X		X			X					X		
Colliding with objects in motion		X		X	X			X			X					X		
Knocked by objects or tools		X		X	X			X			X					X		
Accidents caused by living beings			X	X	X			X			X					X		
Trapped by or between objects		X		X	X			X				X				X		
Trapped by turned over machines, tractors or vehicles		X		X	X			X				X				X		
Overexertion	X			X	X		X	X					X			X		
Exposure to extreme environmental temperatures		X		X	X			X				X				X		
Exposure to electric connections		X		X	X	X			X				X			X		X
Fire		X		X	X	X			X			X				X		X
Non traumatic pathologies		X		X	X			X			X					X		

DESIGNED RISK PREVENTION, JOINT EFFECTIVENESS IS EVALUATED
Collective protection: someone could hold the ladder, one person must walk in front of the handler, one person must walk behind the handler, to look after
Personal Protection Equipment:
Signposting
Preventive Procedure:

SENMUT EXPERTO APPLIED PREVENTION EVALUATION TABLE

Phase 7: Insulation								Evaluation place: during assembly									
Risks identification and its causes	Probability of the even			Determined Precaution				Consequence of			Risk qualification with precaution applyed					Case of emergency		
	R	P	C	Ci	Pi	S	PP	L	G	Mo	T	To	M	I	In	FA	D	CA
Fall of persons at a different level			X	X	X	X			X			X				X		X
Fall of persons at the same level			X	X	X			X				X				X		
Fall of objects because of manipulation		X		X	X				X			X				X		X
Stepping on objects		X		X	X			X			X					X		
Colliding with still objects		X		X	X	X		X			X					X		
Colliding with objects in motion		X		X	X			X			X					X		
Flying fragments or particles		X		X	X			X				X				X		
Accidents caused by living beings			X	X	X			X			X					X		
Trapped by or between objects		X		X	X			X				X				X		
Trapped by turned over machines, tractors or vehicles		X		X	X			X				X				X		
Overexertion	X			X	X		X	X					X			X		
Exposure to extreme environmental temperatures		X		X	X			X				X				X		
Exposure to electric connections		X		X	X	X			X				X			X		X
Run over or hit by vehicles		X		X	X	X	X			X		X				X		X
Non traumatic pathologies		X		X	X			X			X					X		
DESIGNED RISK PREVENTION, JOINT EFFECTIVENESS IS EVALUATED																		
Collective protection: someone could hold the ladder, one person must walk in front of the handler, one person must walk behind the handler, to look after																		
Personal Protection Equipment:																		
Signposting																		
Preventive Procedure:																		

SENMUT EXPERTO APPLIED PREVENTION EVALUATION TABLE

Phase 8: Interior								Evaluation place: during assembly										
Risks identification and its causes	Probability of the even			Determined Precaution				Consequence of			Risk qualification with precaution applyed					Case of emergency		
	R	P	C	Ci	Pi	S	PP	L	G	Mo	T	To	M	I	In	FA	D	CA
Fall of persons at the same level			X	X	X			X				X				X		
Fall of objects because they come loose		X		X	X	X			X			X				X		X
Fall of objects because of manipulation		X		X	X				X			X				X		X
Stepping on objects		X		X	X			X			X					X		
Colliding with still objects		X		X	X	X		X			X					X		
Colliding with objects in motion		X		X	X			X			X					X		
Knocked by objects or tools		X		X	X			X			X					X		
Accidents caused by living beings			X	X	X			X			X					X		
Trapped by or between objects		X		X	X			X				X				X		
Trapped by turned over machines, tractors or vehicles		X		X	X			X				X				X		
Overexertion	X			X	X		X	X					X			X		
Exposure to extreme environmental temperatures		X		X	X			X				X				X		
Exposure to electric connections		X		X	X	X			X				X			X		X
Explosion		X		X	X				X		X					X		X
Fire		X		X	X	X			X			X				X		X
Run over or hit by vehicles		X		X	X	X	X			X		X				X		X
Non traumatic pathologies		X		X	X			X			X					X		

DESIGNED RISK PREVENTION, JOINT EFFECTIVENESS IS EVALUATED
Collective protection: someone could hold the ladder, one person must walk in front of the handler, one person must walk behind the handler, to look after
Personal Protection Equipment:
Signposting
Preventive Procedure:

SENMUT EXPERTO APPLIED PREVENTION EVALUATION TABLE

Phase 9: Out door Floor System								Evaluation place: during assembly										
Risks identification and its causes	Probability of the even			Determined Precaution				Consequence of			Risk qualification with precaution applyed					Case of emergency		
	R	P	C	Ci	Pi	S	PP	L	G	Mo	T	To	M	I	In	FA	D	CA
Fall of persons at a different level			X	X	X	X			X			X				X		X
Fall of persons at the same level			X	X	X			X				X				X		
Fall of objects because of collapse		X		X	X				X			X				X		X
Fall of objects because they come loose		X		X	X	X			X			X				X		X
Fall of objects because of manipulation		X		X	X				X			X				X		X
Stepping on objects		X		X	X			X			X					X		
Colliding with still objects		X		X	X	X		X			X					X		
Colliding with objects in motion		X		X	X			X			X					X		
Knocked by objects or tools		X		X	X			X			X					X		
Flying fragments or particles		X		X	X			X				X				X		
Accidents caused by living beings			X	X	X			X			X					X		
Trapped by turned over machines, tractors or vehicles		X		X	X			X				X				X		
Overexertion	X			X	X		X	X					X			X		
Exposure to extreme environmental temperatures		X		X	X			X				X				X		
Fire		X		X	X	X			X			X				X		X
Run over or hit by vehicles		X		X	X	X	X			X		X				X		X
Non traumatic pathologies		X		X	X			X			X					X		

DESIGNED RISK PREVENTION, JOINT EFFECTIVENESS IS EVALUATED
Collective protection: someone could hold the ladder, one person must walk in front of the handler, one person must walk behind the handler, to look after
Personal Protection Equipment:
Signposting
Preventive Procedure:

SENMUT EXPERTO APPLIED PREVENTION EVALUATION TABLE

Phase 10: Furniture & Planting & Cleaning								Evaluation place: during assembly									
Risks identification and its causes	Probability of the even			Determined Precaution				Consequence of			Risk qualification with precaution applyed					Case of emergency		
	R	P	C	Ci	Pi	S	PP	L	G	Mo	T	To	M	I	In	FA	D	CA
Fall of persons at the same level			X	X	X			X				X				X		
Fall of objects because of collapse		X		X	X				X			X				X		X
Fall of objects because they come loose		X		X	X	X			X			X				X		X
Fall of objects because of manipulation		X		X	X				X			X				X		X
Stepping on objects		X		X	X			X			X					X		
Colliding with still objects		X		X	X	X		X			X					X		
Colliding with objects in motion		X		X	X			X			X					X		
Accidents caused by living beings			X	X	X			X			X					X		
Trapped by or between objects		X		X	X			X				X				X		
Trapped by turned over machines, tractors or vehicles		X		X	X			X				X				X		
Overexertion	X			X	X		X	X					X			X		
Exposure to extreme environmental temperatures		X		X	X			X				X				X		
Exposure to electric connections		X		X	X	X			X				X			X		X
Exposure to radiation	X			X	X	X			X				X			X		X
Contact with caustic or corrosive substances	X			X	X	X			X				X			X		X
Explosion		X		X	X				X		X					X		X
Fire		X		X	X	X			X			X				X		X
Run over or hit by vehicles		X		X	X	X	X			X		X				X		X
Non traumatic pathologies		X		X	X			X			X					X		

DESIGNED RISK PREVENTION, JOINT EFFECTIVENESS IS EVALUATED

Collective protection: someone could hold the ladder, one person must walk in front of the handler, one person must walk behind the handler, to look after

Personal Protection Equipment:

Signposting

Preventive Procedure:

Disassembly

SENMUT EXPERTO APPLIED PREVENTION EVALUATION TABLE																		
Phase 1: Interior Equipment Remove								Evaluation place: during assembly										
Risks identification and its causes	Probability of the even			Determined Precaution				Consequence of			Risk qualification with precaution applyed					Case of emergency		
	R	P	C	Ci	Pi	S	PP	L	G	Mo	T	To	M	I	In	FA	D	CA
Fall of persons at the same level			X	X	X			X				X				X		
Fall of objects because they come loose		X		X	X	X			X			X				X		X
Fall of objects because of manipulation		X		X	X				X			X				X		X
Stepping on objects		X		X	X			X			X					X		
Colliding with still objects		X		X	X	X		X			X					X		
Colliding with objects in motion		X		X	X			X			X					X		
Knocked by objects or tools		X		X	X			X			X					X		
Accidents caused by living beings			X	X	X			X			X					X		
Trapped by or between objects		X		X	X			X				X				X		
Trapped by turned over machines, tractors or vehicles		X		X	X			X				X				X		
Overexertion	X			X	X		X	X					X			X		
Exposure to extreme environmental temperatures		X		X	X			X				X				X		
Exposure to electric connections		X		X	X	X			X				X			X		X
Explosion		X		X	X				X		X					X		X
Fire		X		X	X	X			X			X				X		X
Run over or hit by vehicles		X		X	X	X	X			X		X				X		X
Non traumatic pathologies		X		X	X			X			X					X		
DESIGNED RISK PREVENTION, JOINT EFFECTIVENESS IS EVALUATED																		
Collective protection: someone could hold the ladder, one person must walk in front of the handler, one person must walk behind the handler, to look after																		
Personal Protection Equipment:																		
Signposting																		
Preventive Procedure:																		

SENMUT EXPERTO APPLIED PREVENTION EVALUATION TABLE

Phase 2: Outside Disassembly								Evaluation place: during assembly									
Risks identification and its causes	Probability of the even			Determined Precaution				Consequence of			Risk qualification with precaution applyed					Case of emergency		
	R	P	C	Ci	Pi	S	PP	L	G	Mo	T	To	M	I	In	FA	D	CA
Fall of persons at a different level			X	X	X	X			X			X				X		X
Fall of persons at the same level			X	X	X			X				X				X		
Fall of objects because of collapse		X		X	X				X			X				X		X
Fall of objects because they come loose		X		X	X	X			X			X				X		X
Fall of objects because of manipulation		X		X	X				X			X				X		X
Stepping on objects		X		X	X			X			X					X		
Colliding with still objects		X		X	X	X		X			X					X		
Colliding with objects in motion		X		X	X			X			X					X		
Knocked by objects or tools		X		X	X			X			X					X		
Flying fragments or particles		X		X	X			X				X				X		
Accidents caused by living beings			X	X	X			X			X					X		
Trapped by turned over machines, tractors or vehicles		X		X	X			X				X				X		
Overexertion	X			X	X		X	X					X			X		
Exposure to extreme environmental temperatures		X		X	X			X				X				X		
Fire		X		X	X	X			X			X				X		X
Run over or hit by vehicles		X		X	X	X	X			X		X				X		X
Non traumatic pathologies		X		X	X			X			X					X		

DESIGNED RISK PREVENTION, JOINT EFFECTIVENESS IS EVALUATED
Collective protection: someone could hold the ladder, one person must walk in front of the handler, one person must walk behind the handler, to look after
Personal Protection Equipment:
Signposting
Preventive Procedure:

SENMUT EXPERTO APPLIED PREVENTION EVALUATION TABLE

Phase 3: Disassembly First Floor								Evaluation place: during assembly									
Risks identification and its causes	Probability of the even			Determined Precaution				Consequence of			Risk qualification with precaution applyed					Case of emergency		
	R	P	C	Ci	Pi	S	PP	L	G	Mo	T	To	M	I	In	FA	D	CA
Fall of persons at a different level			X	X	X	X			X			X				X		X
Fall of persons at the same level			X	X	X			X				X				X		
Fall of objects because of collapse		X		X	X				X			X				X		X
Fall of objects because of manipulation		X		X	X				X			X				X		X
Stepping on objects		X		X	X			X			X					X		
Colliding with still objects		X		X	X	X		X			X					X		
Colliding with objects in motion		X		X	X			X			X					X		
Knocked by objects or tools		X		X	X			X			X					X		
Flying fragments or particles		X		X	X			X				X				X		
Accidents caused by living beings			X	X	X			X			X					X		
Trapped by or between objects		X		X	X			X				X				X		
Trapped by turned over machines, tractors or vehicles		X		X	X			X				X				X		
Overexertion	X			X	X		X	X					X			X		
Exposure to extreme environmental temperatures		X		X	X			X				X				X		
Exposure to electric connections		X		X	X	X			X				X			X		X
Explosion		X		X	X				X		X					X		X
Fire		X		X	X	X			X			X				X		X
Run over or hit by vehicles		X		X	X	X	X			X		X				X		X
Non traumatic pathologies		X		X	X			X			X					X		

DESIGNED RISK PREVENTION, JOINT EFFECTIVENESS IS EVALUATED

Collective protection: someone could hold the ladder, one person must walk in front of the handler, one person must walk behind the handler, to look after

Personal Protection Equipment:

Signposting

Preventive Procedure:

SENMUT EXPERTO APPLIED PREVENTION EVALUATION TABLE

Phase 4: Disassembly Second Floor								Evaluation place: during assembly									
Risks identification and its causes	Probability of the even			Determined Precaution				Consequence of			Risk qualification with precaution applyed					Case of emergency		
	R	P	C	Ci	Pi	S	PP	L	G	Mo	T	To	M	I	In	FA	D	CA
Fall of persons at a different level			X	X	X	X			X			X				X		X
Fall of persons at the same level			X	X	X			X				X				X		
Fall of objects because of collapse		X		X	X				X			X				X		X
Fall of objects because of manipulation		X		X	X				X			X				X		X
Stepping on objects		X		X	X			X			X					X		
Colliding with still objects		X		X	X	X		X			X					X		
Colliding with objects in motion		X		X	X			X			X					X		
Knocked by objects or tools		X		X	X			X			X					X		
Flying fragments or particles		X		X	X			X				X				X		
Accidents caused by living beings			X	X	X			X			X					X		
Trapped by or between objects		X		X	X			X				X				X		
Trapped by turned over machines, tractors or vehicles		X		X	X			X				X				X		
Overexertion	X			X	X		X	X					X			X		
Exposure to extreme environmental temperatures		X		X	X			X				X				X		
Exposure to electric connections		X		X	X	X			X				X			X		X
Explosion		X		X	X				X		X					X		X
Fire		X		X	X	X			X			X				X		X
Run over or hit by vehicles		X		X	X	X	X			X		X				X		X
Non traumatic pathologies		X		X	X			X			X					X		

DESIGNED RISK PREVENTION, JOINT EFFECTIVENESS IS EVALUATED

Collective protection: someone could hold the ladder, one person must walk in front of the handler, one person must walk behind the handler, to look after

Personal Protection Equipment:

Signposting

Preventive Procedure:

SENMUT EXPERTO APPLIED PREVENTION EVALUATION TABLE

Phase 5: Disassembly Floor board / Roof								Evaluation place: during assembly										
Risks identification and its causes	Probability of the even			Determined Precaution				Consequence of			Risk qualification with precaution applyed					Case of emergency		
	R	P	C	Ci	Pi	S	PP	L	G	Mo	T	To	M	I	In	FA	D	CA
Fall of persons at a different level			X	X	X	X			X			X				X		X
Fall of persons at the same level			X	X	X			X				X				X		
Fall of objects because of collapse		X		X	X				X			X				X		X
Fall of objects because they come loose		X		X	X	X			X			X				X		X
Fall of objects because of manipulation		X		X	X				X			X				X		X
Stepping on objects		X		X	X			X			X					X		
Colliding with still objects		X		X	X	X		X			X					X		
Colliding with objects in motion		X		X	X			X			X					X		
Knocked by objects or tools		X		X	X			X			X					X		
Flying fragments or particles		X		X	X			X				X				X		
Accidents caused by living beings			X	X	X			X			X					X		
Trapped by or between objects		X		X	X			X				X				X		
Trapped by turned over machines, tractors or vehicles		X		X	X			X				X				X		
Overexertion	X			X	X		X	X					X			X		
Exposure to extreme environmental temperatures		X		X	X			X				X				X		
Exposure to electric connections		X		X	X	X			X				X			X		X
Explosion		X		X	X				X		X					X		X
Fire		X		X	X	X			X			X				X		X
Run over or hit by vehicles		X		X	X	X	X			X		X				X		X
Non traumatic pathologies		X		X	X			X			X					X		

DESIGNED RISK PREVENTION, JOINT EFFECTIVENESS IS EVALUATED
Collective protection: someone could hold the ladder, one person must walk in front of the handler, one person must walk behind the handler, to look after
Personal Protection Equipment:
Signposting
Preventive Procedure:

SENMUT EXPERTO APPLIED PREVENTION EVALUATION TABLE

Phase 6: Disassembly East Roof Constructure								Evaluation place: during assembly										
Risks identification and its causes	Probability of the even			Determined Precaution				Consequence of			Risk qualification with precaution applyed					Case of emergency		
	R	P	C	Ci	Pi	S	PP	L	G	Mo	T	To	M	I	In	FA	D	CA
Fall of persons at a different level			X	X	X	X			X			X				X		X
Fall of objects because of collapse		X		X	X				X			X				X		X
Fall of objects because they come loose		X		X	X	X			X			X				X		X
Fall of objects because of manipulation		X		X	X				X			X				X		X
Stepping on objects		X		X	X			X			X					X		
Colliding with still objects		X		X	X	X		X			X					X		
Colliding with objects in motion		X		X	X			X			X					X		
Knocked by objects or tools		X		X	X			X			X					X		
Flying fragments or particles		X		X	X			X				X				X		
Accidents caused by living beings			X	X	X			X			X					X		
Trapped by or between objects		X		X	X			X				X				X		
Trapped by turned over machines, tractors or vehicles		X		X	X			X				X				X		
Overexertion	X			X	X		X	X					X			X		
Exposure to extreme environmental temperatures		X		X	X			X				X				X		
Thermal contact		X		X	X			X				X				X		
Exposure to electric connections		X		X	X	X			X				X			X		X
Explosion		X		X	X				X		X					X		X
Fire		X		X	X	X			X			X				X		X
Non traumatic pathologies		X		X	X			X			X					X		

DESIGNED RISK PREVENTION, JOINT EFFECTIVENESS IS EVALUATED
Collective protection: someone could hold the ladder, one person must walk in front of the handler, one person must walk behind the handler, to look after
Personal Protection Equipment:
Signposting
Preventive Procedure:

SENMUT EXPERTO APPLIED PREVENTION EVALUATION TABLE

Phase 7: Disassembly West Roof Constructure								Evaluation place: during assembly									
Risks identification and its causes	Probability of the even			Determined Precaution				Consequence of			Risk qualification with precaution applyed					Case of emergency		
	R	P	C	Ci	Pi	S	PP	L	G	Mo	T	To	M	I	In	FA	D	CA
Fall of persons at a different level			X	X	X	X			X			X				X		X
Fall of objects because of collapse		X		X	X				X			X				X		X
Fall of objects because they come loose		X		X	X	X			X			X				X		X
Fall of objects because of manipulation		X		X	X				X			X				X		X
Stepping on objects		X		X	X			X			X					X		
Colliding with still objects		X		X	X	X		X			X					X		
Colliding with objects in motion		X		X	X			X			X					X		
Knocked by objects or tools		X		X	X			X			X					X		
Flying fragments or particles		X		X	X			X				X				X		
Accidents caused by living beings			X	X	X			X			X					X		
Trapped by or between objects		X		X	X			X				X				X		
Trapped by turned over machines, tractors or vehicles		X		X	X			X				X				X		
Overexertion	X			X	X		X	X					X			X		
Exposure to extreme environmental temperatures		X		X	X			X				X				X		
Thermal contact		X		X	X			X				X				X		
Exposure to electric connections		X		X	X	X			X				X			X		X
Explosion		X		X	X				X		X					X		X
Fire		X		X	X	X			X			X				X		X
Non traumatic pathologies		X		X	X			X			X					X		

DESIGNED RISK PREVENTION, JOINT EFFECTIVENESS IS EVALUATED
Collective protection: someone could hold the ladder, one person must walk in front of the handler, one person must walk behind the handler, to look after
Personal Protection Equipment:
Signposting
Preventive Procedure:

SENMUT EXPERTO APPLIED PREVENTION EVALUATION TABLE

Phase 8: Disassembly Second Floor/Tea Terrance Constructure								Evaluation place: during assembly										
Risks identification and its causes	Probability of the even			Determined Precaution				Consequence of			Risk qualification with precaution applyed					Case of emergency		
	R	P	C	Ci	Pi	S	PP	L	G	Mo	T	To	M	I	In	FA	D	CA
Fall of persons at a different level			X	X	X	X			X			X				X		X
Fall of persons at the same level			X	X	X			X				X				X		
Fall of objects because of collapse		X		X	X				X			X				X		X
Fall of objects because they come loose		X		X	X	X			X			X				X		X
Fall of objects because of manipulation		X		X	X				X			X				X		X
Stepping on objects		X		X	X			X			X					X		
Colliding with still objects		X		X	X	X		X			X					X		
Colliding with objects in motion		X		X	X			X			X					X		
Knocked by objects or tools		X		X	X			X			X					X		
Flying fragments or particles		X		X	X			X				X				X		
Accidents caused by living beings			X	X	X			X			X					X		
Trapped by or between objects		X		X	X			X				X				X		
Trapped by turned over machines, tractors or vehicles		X		X	X			X				X				X		
Overexertion	X			X	X		X	X					X			X		
Exposure to extreme environmental temperatures		X		X	X			X				X				X		
Thermal contact		X		X	X			X				X				X		
Exposure to electric connections		X		X	X	X			X				X			X		X
Explosion		X		X	X				X		X					X		X
Fire		X		X	X	X			X			X				X		X
Non traumatic pathologies		X		X	X			X			X					X		

DESIGNED RISK PREVENTION, JOINT EFFECTIVENESS IS EVALUATED
Collective protection: someone could hold the ladder, one person must walk in front of the handler, one person must walk behind the handler, to look after
Personal Protection Equipment:
Signposting
Preventive Procedure:

SENMUT EXPERTO APPLIED PREVENTION EVALUATION TABLE

Phase 9: Disassembly First Floor structure								Evaluation place: during assembly										
Risks identification and its causes	Probability of the even			Determined Precaution				Consequence of			Risk qualification with precaution applyed					Case of emergency		
	R	P	C	Ci	Pi	S	PP	L	G	Mo	T	To	M	I	In	FA	D	CA
Fall of persons at a different level			X	X	X	X			X			X				X		X
Fall of persons at the same level			X	X	X			X				X				X		
Fall of objects because of collapse		X		X	X				X			X				X		X
Fall of objects because they come loose		X		X	X	X			X			X				X		X
Fall of objects because of manipulation		X		X	X				X			X				X		X
Stepping on objects		X		X	X			X			X					X		
Colliding with still objects		X		X	X	X		X			X					X		
Colliding with objects in motion		X		X	X			X			X					X		
Knocked by objects or tools		X		X	X			X			X					X		
Flying fragments or particles		X		X	X			X				X				X		
Accidents caused by living beings			X	X	X			X			X					X		
Trapped by or between objects		X		X	X			X				X				X		
Trapped by turned over machines, tractors or vehicles		X		X	X			X				X				X		
Overexertion	X			X	X		X	X					X			X		
Exposure to extreme environmental temperatures		X		X	X			X				X				X		
Thermal contact		X		X	X			X				X				X		
Exposure to electric connections		X		X	X	X			X				X			X		X
Explosion		X		X	X				X		X					X		X
Fire		X		X	X	X			X			X				X		X
Non traumatic pathologies		X		X	X			X			X					X		

DESIGNED RISK PREVENTION, JOINT EFFECTIVENESS IS EVALUATED
Collective protection: someone could hold the ladder, one person must walk in front of the handler, one person must walk behind the handler, to look after
Personal Protection Equipment:
Signposting
Preventive Procedure:

17.11 Annex 9: Identification of risks for possible later works.

SENMUT EXPERTO APPLIED PREVENTION EVALUATION TABLE																		
Site Cleaning								Evaluation place: during assembly										
Risks identification and its causes	Probability of the even			Determined Precaution				Consequence of			Risk qualification with precaution applyed					Case of emergency		
	R	P	C	Ci	Pi	S	PP	L	G	Mo	T	To	M	I	In	FA	D	CA
Fall of persons at a different level			X	X	X	X			X			X				X		X
Stepping on objects		X		X	X			X			X					X		
Accidents caused by living beings			X	X	X			X			X					X		
Overexertion	X			X	X		X	X					X			X		
Exposure to extreme environmental temperatures		X		X	X			X				X				X		
Exposure to electric connections		X		X	X	X			X				X			X		X
Fire		X		X	X	X			X			X				X		X
Non traumatic pathologies		X		X	X			X			X					X		
DESIGNED RISK PREVENTION, JOINT EFFECTIVENESS IS EVALUATED																		
Collective protection: someone could hold the ladder, one person must walk in front of the handler, one person must walk behind the handler, to look after																		
Personal Protection Equipment:																		
Signposting																		
Preventive Procedure:																		

SENMUT EXPERTO APPLIED PREVENTION EVALUATION TABLE

Cleaning PV-panels								Evaluation place: during assembly										
Risks identification and its causes	Probability of the even			Determined Precaution				Consequence of			Risk qualification with precaution applyed					Case of emergency		
	R	P	C	Ci	Pi	S	PP	L	G	Mo	T	To	M	I	In	FA	D	CA
Fall of persons at a different level			X	X	X	X			X			X				X		X
Stepping on objects		X		X	X			X			X					X		
Accidents caused by living beings			X	X	X			X			X					X		
Overexertion	X			X	X		X	X					X			X		
Exposure to extreme environmental temperatures		X		X	X			X				X				X		
Exposure to electric connections		X		X	X	X			X				X			X		X
Termal contact		X		X	X	X			X			X				X		X
Exposure to harmful substances		X		X	X				X			X				X		
DESIGNED RISK PREVENTION, JOINT EFFECTIVENESS IS EVALUATED																		
Collective protection: someone could hold the ladder, one person must walk in front of the handler, one person must walk behind the handler, to look after																		
Personal Protection Equipment:																		
Signposting																		
Preventive Procedure:																		

11

Detailed Water Budget

11.0 Detail Water Budget

11.1 Water System Chart

Items	Volumn (L)
Water Storage Tank	
Cold Water Tank	2100
Solar Thermal and Heat Pump System Tank	670 (300+370)
Rain Water Tank	300
Gray Water Tank	1800
Black Water Tank	600
Drain Water System	
Cold Water Pipe	3.3
Hot Water Pipe	8.6
Make Up Water Pipe	9
Solar Hot Water System	
Pipe	10
Blue Wall System	
Stainless Steel Water Tray	1050
Pipe	23
Green Core Irrigation System	
Pipe	61
HVAC System	
Heating Coil	1
Pipe	1
Rain Water Collection System	
Pipe	1.8

11.2 Water Use Table

Items	Source	Volumn (L)
Tasks		
Clothes Washing	Cold Water Tank	46 / times
Dish Washer	Hot Water Tank	6.5 / times
Hot Water Draws	Hot Water Tank	50 / times
Cooking	Hot Water Tank	2.75 / times
Dinner	Cold Water Tank	14.5 / times
	Hot Water Tank	16.5 / times

11.3 Detail Water Budget Table

	Name	Cold Water Tank		Hot Water Tank		Rain Water Tank		Gray Water Tank		Black Water Tank		
	Volume (L)	2100		670		300		1800		600		
Date	Events	In / Out	Balance	In / Out	Balance	In / Out	Balance	In / Out	Balance	In / Out	Balance	Lost
6/22	Initial	0	0	0	0	0	0	0	0	0	0	0
6/23	SDE Organization 1st Water Deliver	2100	2100		0		0		0		0	2100
	Fill the Drain System Pipe	-20.9	2079.1		0		0		0		0	-20.9
	Fill the Hot Water Tank	-670	1409.1	670	670		0		0		0	0
	Fill the Solar Hot Water System Pipe	-10	1399.1		670		0		0		0	-10
	Fill the Blue Wall System	-1073	326.1		670		0		0		0	-1073
	Fill the Green Core irrigation System	-61	265.1		670		0		0		0	-61
	Fill the HVAC System	-2	263.1		670		0		0		0	-2
	Nature Evaporation	-1	262.1		670		0		0		0	-1
6/24	Clean the Orchid House	-10	252.1	-10	660		0	20	20		0	0
	Refill the Hot Water Tank	-10	242.1	10	670		0		20		0	0
6/25	SDE Organization 2rd Water Deliver	1857.9	2100		670		0		20		0	1857.9
6/26	Nature Evaporation	-5	2095		670		0		20		0	-5
6/27	Nature Evaporation	-5	2090		670		0		20		0	-5
6/28	Blue Wall System	-50	2040		670		0		20		0	-50
6/29	Blue Wall System	-50	1990		670		0		20		0	-50
6/30	Task: Clothes-washer	-46	1944		670		0	40	60		0	-6
	Task: Dishwasher		1944	-6.5	663.5		0		60	6.5	6.5	0
	Task: Cooking		1944	-2.75	660.75		0	2.75	62.75		0	0
	Task: Hot Water Draws 3 Times		1944	-150	510.75		0	100	162.75	50	56.5	0
	Refill the Hot Water Tank	-159.25	1784.75	159.25	670		0		162.75		0	0
7/1	Task: Clothes-washer	-46	1738.75		670		0	40	202.75		56.5	-6
	Task: Cooking		1738.75	-2.75	667.25		0	2.75	205.5		0	0
	Task: Hot Water Draws 3 Times		1738.75	-150	517.25		0	100	305.5	50	106.5	0
	Task: Dinner	-14.5	1724.25	-16.5	500.75		0		305.5	14.5	14.5	-16.5
	Refill the Hot Water Tank	-152.75	1571.5	152.75	653.5		0		305.5		106.5	0
7/2	Task: Clothes-washer	-46	1525.5		653.5		0	40	345.5		14.5	-6
	Task: Dishwasher		1525.5	-6.5	647		0		345.5	6.5	113	0
	Task: Cooking		1525.5	-2.75	644.25		0	2.75	348.25		14.5	0
	Task: Hot Water Draws 3 Times		1525.5	-150	494.25		0	100	448.25	50	163	0
	Refill the Hot Water Tank	-159.25	1366.25	159.25	653.5		0		448.25		14.5	0
7/3	Task: Clothes-washer	-46	1320.25		653.5		0	40	488.25		163	-6
	Task: Dishwasher		1320.25	-6.5	647		0		488.25	6.5	21	0
	Task: Cooking		1320.25	-2.75	644.25		0	2.75	491		163	0
	Task: Hot Water Draws 3 Times		1320.25	-150	494.25		0	100	591	50	71	0
	Task: Dinner	-14.5	1305.75	-16.5	477.75		0		591	14.5	177.5	-16.5
	Refill the Hot Water Tank	-159.25	1146.5	159.25	637		0		591		71	0
7/4	Task: Clothes-washer	-46	1100.5		637		0	40	631		177.5	-6
	Task: Dishwasher		1100.5	-6.5	630.5		0		631	6.5	77.5	0
	Task: Hot Water Draws 3 Times		1100.5	-150	480.5		0	100	731	50	227.5	0
	Refill the Hot Water Tank	-189.5	911	189.5	670		0		731		77.5	0
7/5	Blue Wall System	-50	861		670		0		731		227.5	-50
7/6	Blue Wall System	-50	811		670		0		731		77.5	-50

	Name	Cold Water Tank		Hot Water Tank		Rain Water Tank		Gray Water Tank		Black Water Tank		
	Volume (L)	2100		670		300		1800		600		
Date	Events	In / Out	Balance	In / Out	Balance	In / Out	Balance	In / Out	Balance	In / Out	Balance	Lost
7/7	SDE Organization 3rd Water Deliver	1289	2100		670		0		731		227.5	1289
	Task: Clothes-washer	-46	2054		670		0	40	771		77.5	-6
	Task: Dishwasher		2054	-6.5	663.5		0		771	6.5	234	0
	Task: Cooking		2054	-2.75	660.75		0	2.75	773.75		77.5	0
	Refill the Hot Water Tank	-9.25	2044.75	9.25	670		0		773.75		234	0
7/8	Task: Clothes-washer	-46	1998.75		670		0	40	813.75		77.5	-6
	Task: Cooking		1998.75	-2.75	667.25		0	2.75	816.5		234	0
	Refill the Hot Water Tank	-2.75	1996	2.75	670		0		816.5		77.5	0
7/9	Task: Clothes-washer	-46	1950		670		0	40	856.5		234	-6
	Task: Dishwasher		1950	-6.5	663.5		0		856.5	6.5	84	0
	Task: Cooking		1950	-2.75	660.75		0	2.75	859.25		234	0
	Task: Hot Water Draws 3 Times		1950	-150	510.75		0	100	959.25	50	134	0
	Refill the Hot Water Tank	-159.25	1790.75	159.25	670		0		959.25		234	0
7/10	Task: Clothes-washer	-46	1744.75		670		0	40	999.25		134	-6
	Task: Dishwasher		1744.75	-6.5	663.5		0		999.25	6.5	240.5	0
	Task: Cooking		1744.75	-2.75	660.75		0	2.75	1002		134	0
	Task: Hot Water Draws 3 Times		1744.75	-150	510.75		0	100	1102	50	290.5	0
	Task: Dinner	-14.5	1730.25	-16.5	494.25		0		1102	14.5	148.5	-16.5
	Refill the Hot Water Tank	-175.75	1554.5	175.75	670		0		1102		290.5	0
7/11	Task: Clothes-washer	-46	1508.5		670		0	40	1142		148.5	-6
	Task: Dishwasher		1508.5	-6.5	663.5		0		1142	6.5	297	0
	Task: Hot Water Draws 3 Times		1508.5	-150	513.5		0	100	1242	50	198.5	0
	Refill the Hot Water Tank	-156.5	1352	156.5	670		0		1242		297	0
7/12	Blue Wall System	-50	1458.5		513.5		0		1242		297	-50
7/13	Blue Wall System	-50	1408.5		513.5		0		1242		198.5	-50
7/14	Blue Wall System	-50	1358.5		513.5		0		1242		297	-50

		Total Cold Water	Total Hot Water	Total Rain Water	Total Gray Water	Total Black Water	Total Lost
7/15	Summary	5246.9	2003.5	0	1242	297	-1637.4
		Total Cold Water Usage	Total Hot Water Usage	Total Rain Water Usage	Total Grey Water		
		-4044.9	-1333.5	0	0		

12

Project Specifications

Section	Contexts	Relevant PD Sheet(s)	Page
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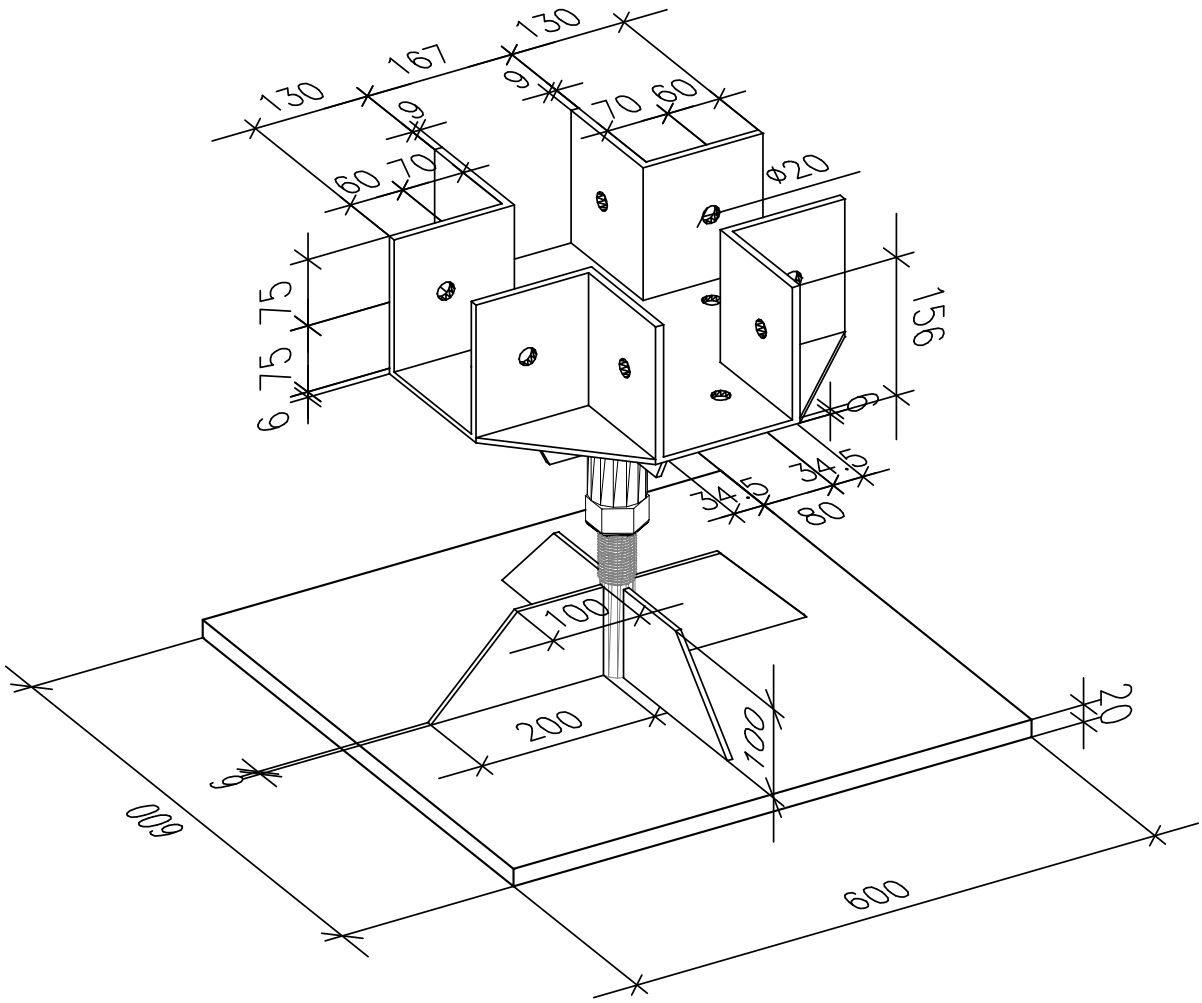
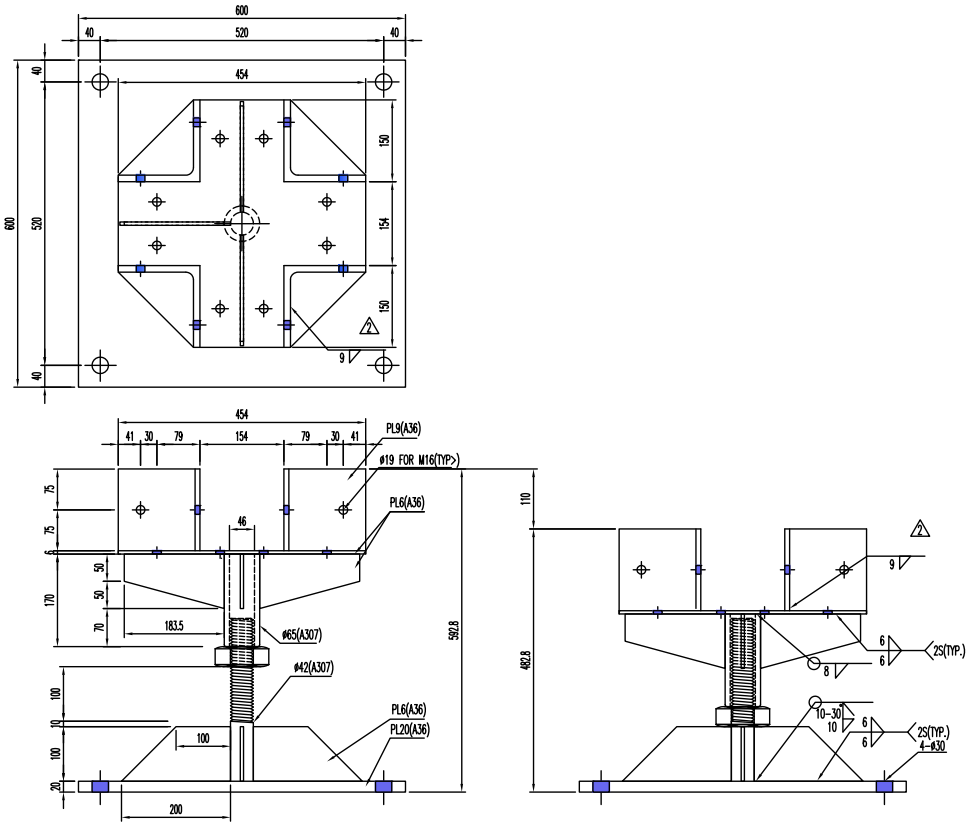
12.5.10	AED		833

Basic Type



Type	L (mm)	W (mm)	H (mm)	Travel (mm)	Quantity
K01	600	600	482.8~592.8	110	29
K02	600	600	482.8~592.8	110	1
K03	600	540	482.8~592.8	110	8
K04	600	600	482.8~592.8	110	8
K05	600	600	482.8~592.8	110	16
K07	600	600	482.8~592.8	110	3

K01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PL6(A36)
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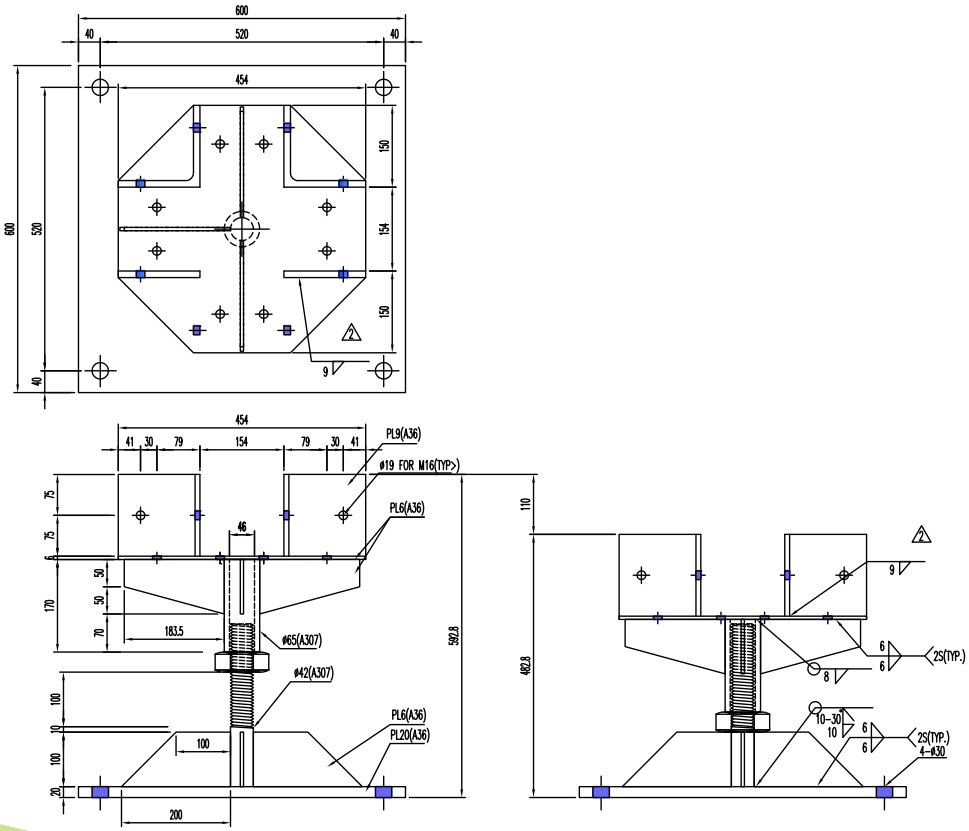
10~30
4-ø30

K02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2S(TYP.)
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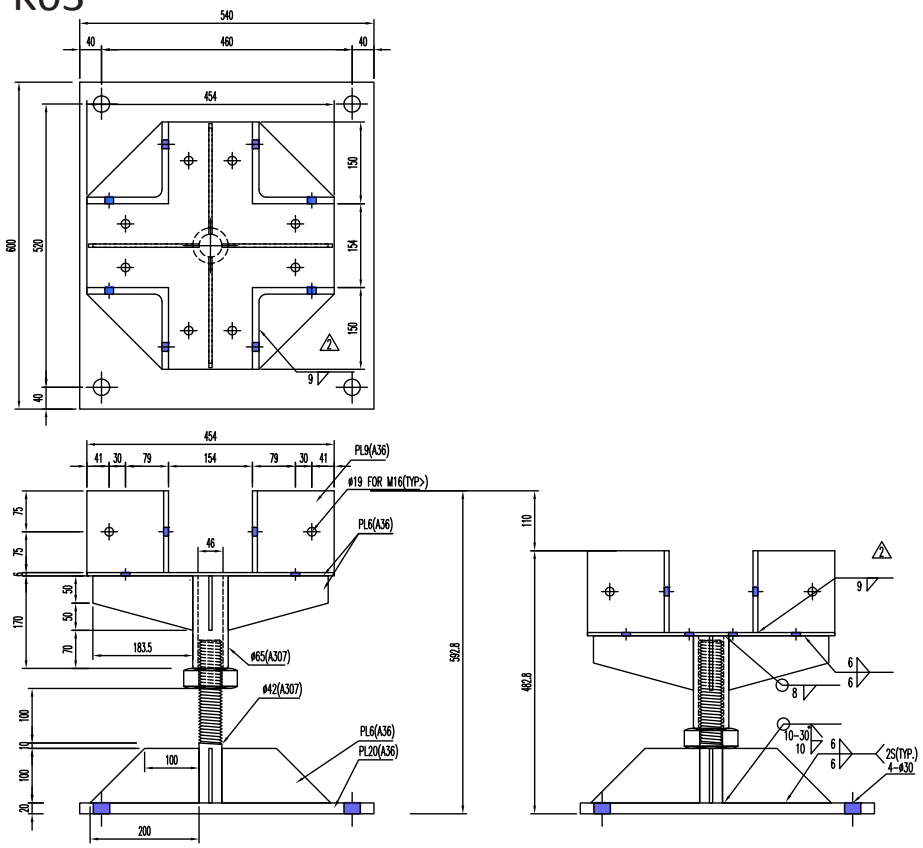
4-ø30

K03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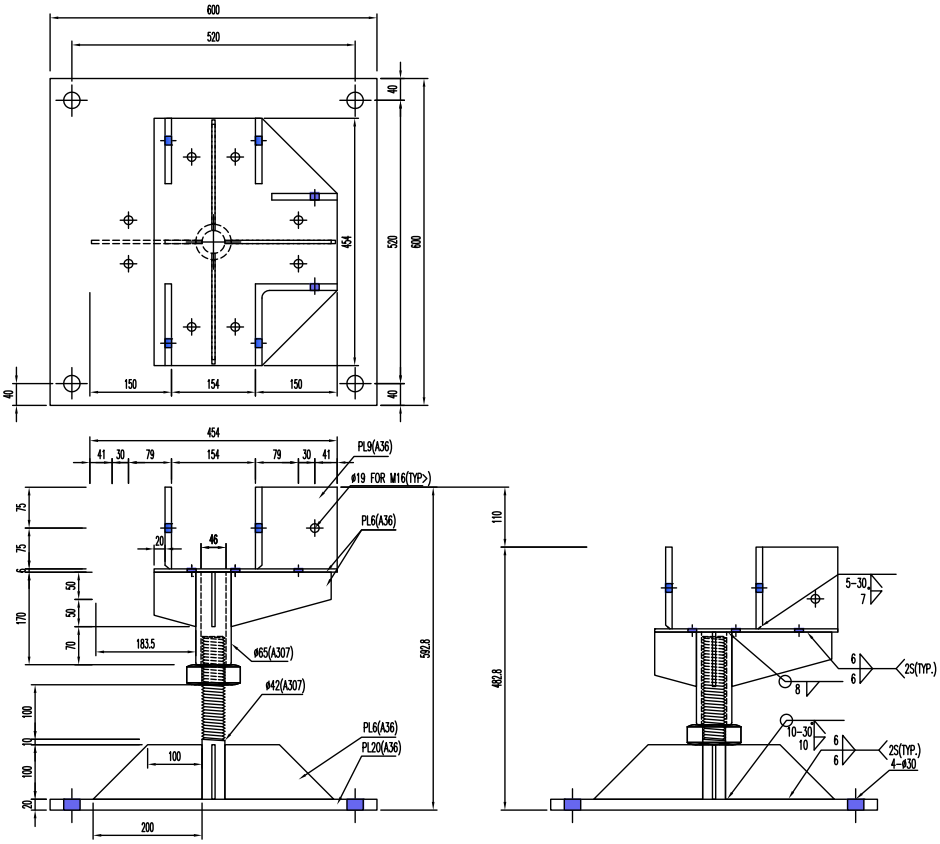
2S(TYP.)
4-ø30

K04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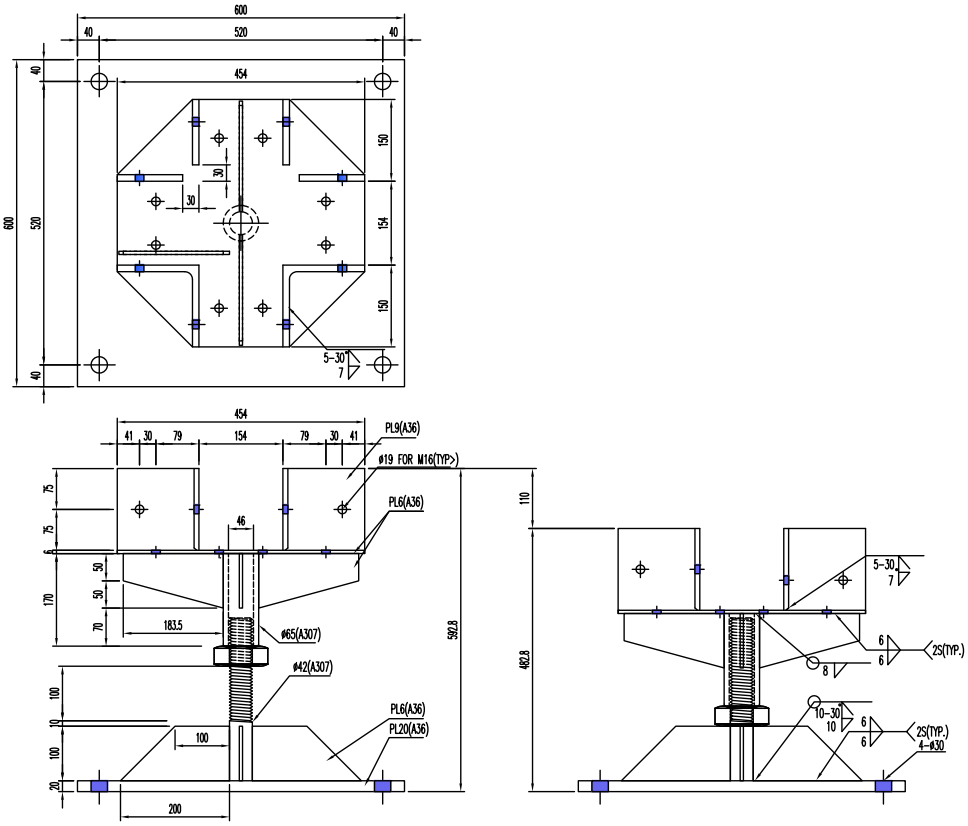
4-ø30

K05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PL9(A36)
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PL6(A36)
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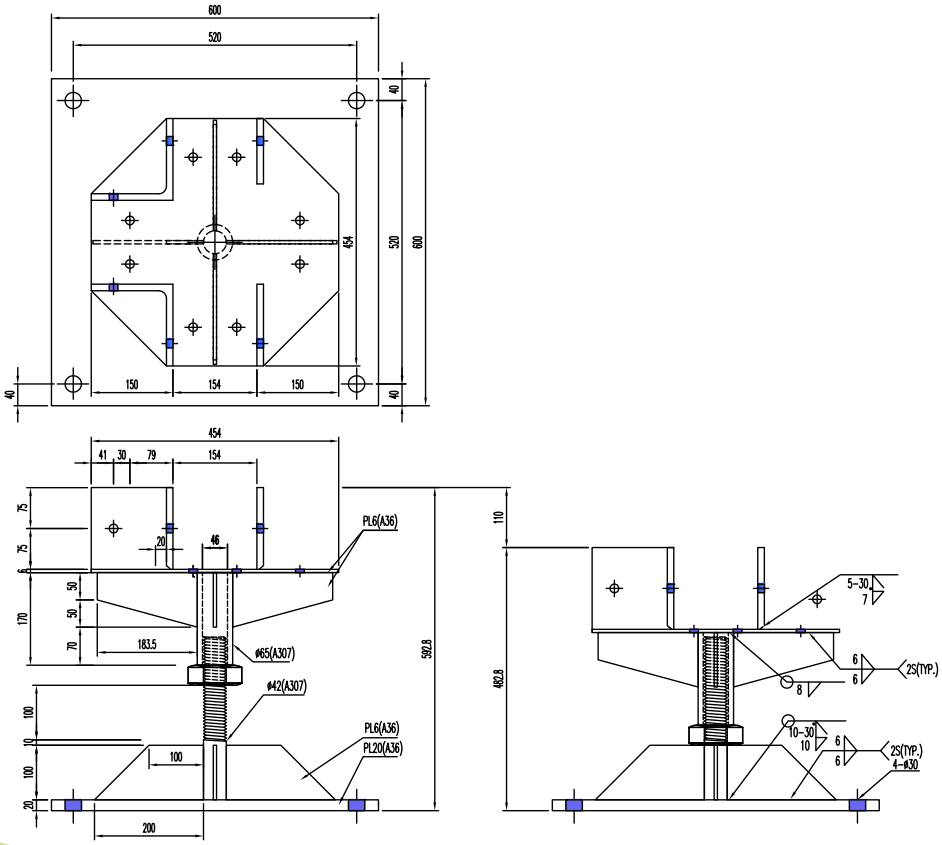
2S(TYP.)
10-30
4-ø30

K07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PL6(A36)
PL20(A36)
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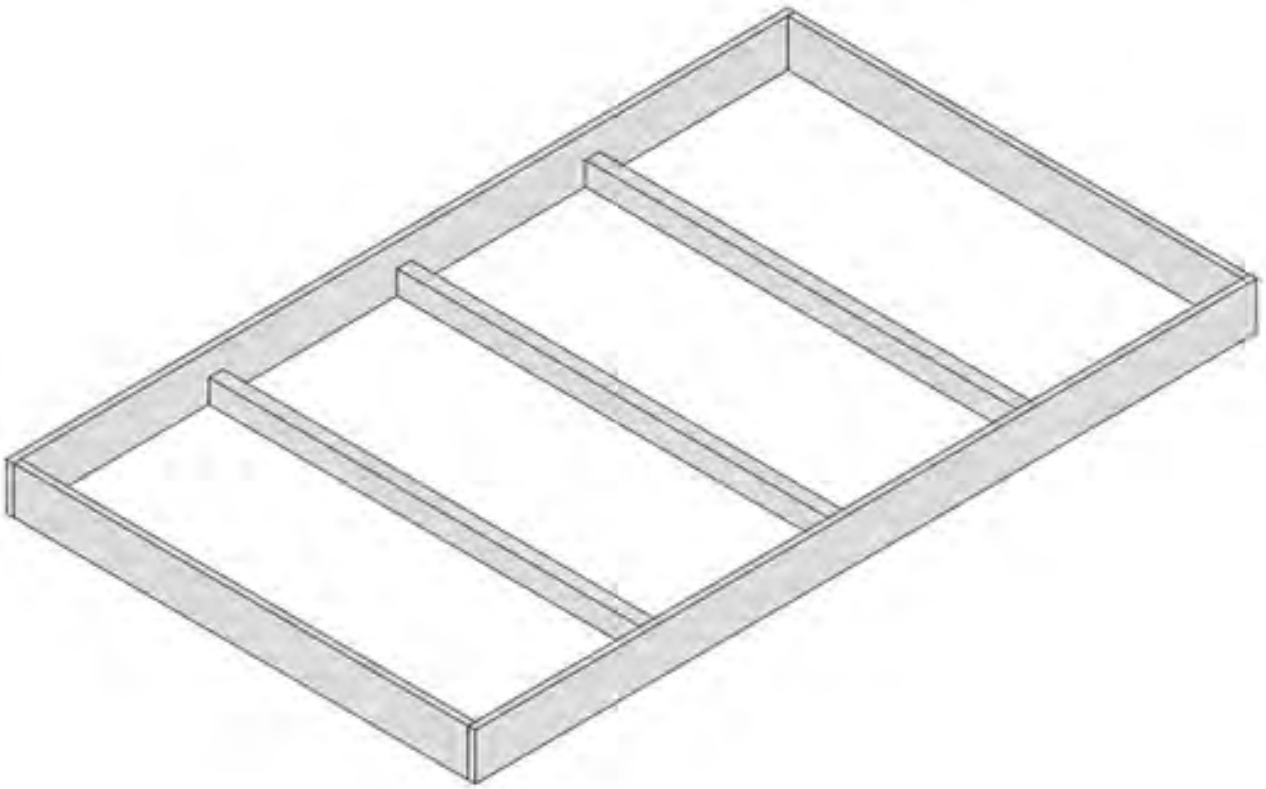
462.8
110
2S(TYP.)
10-30
4-ø30

Foundation 12.1.1.2

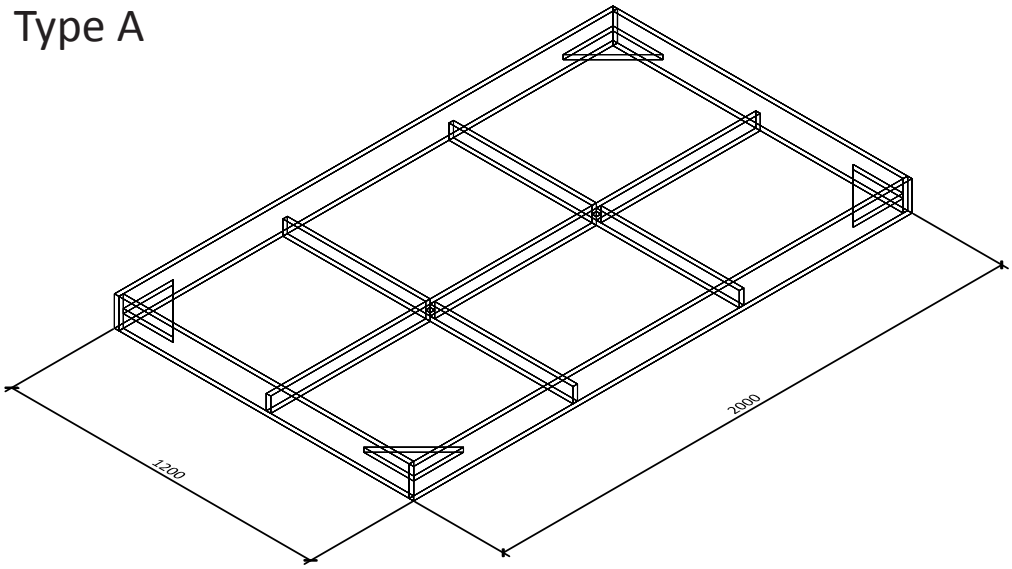
Wooden Sand Box

Basic Type



Type	L (mm)	W (mm)	H (mm)	Quantity
A	2000	1200	120	4
B	1200	1200	120	24
C	1350	800	120	7
D	800	800	120	10
E	1400	1350	120	1
F	1600	800	120	3

Type A



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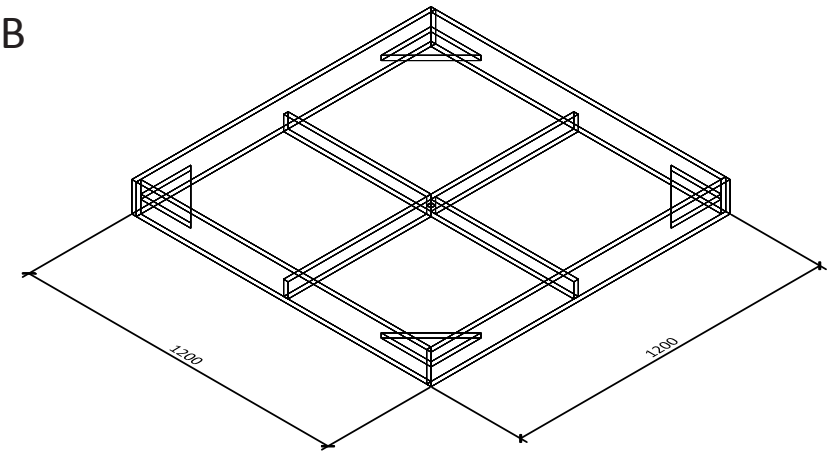

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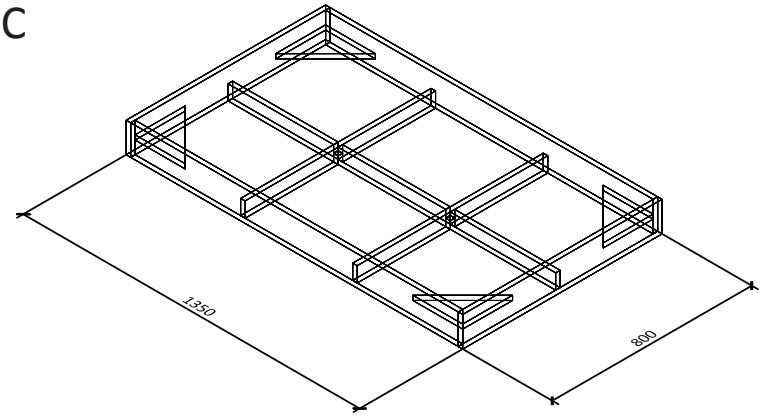

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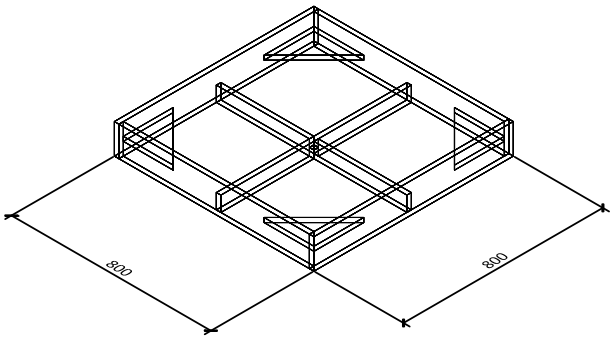

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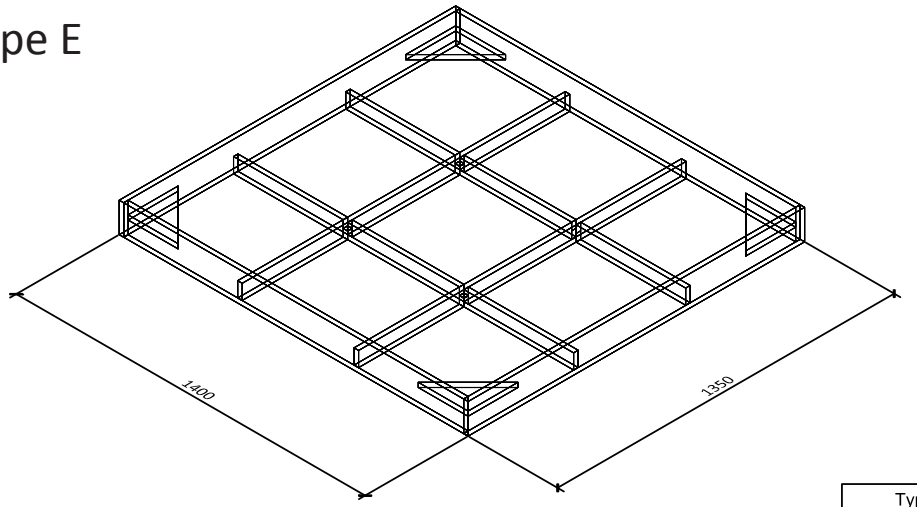

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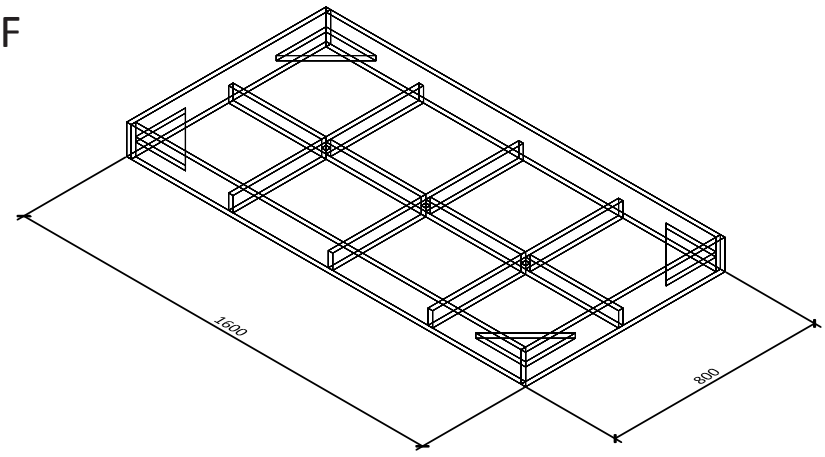
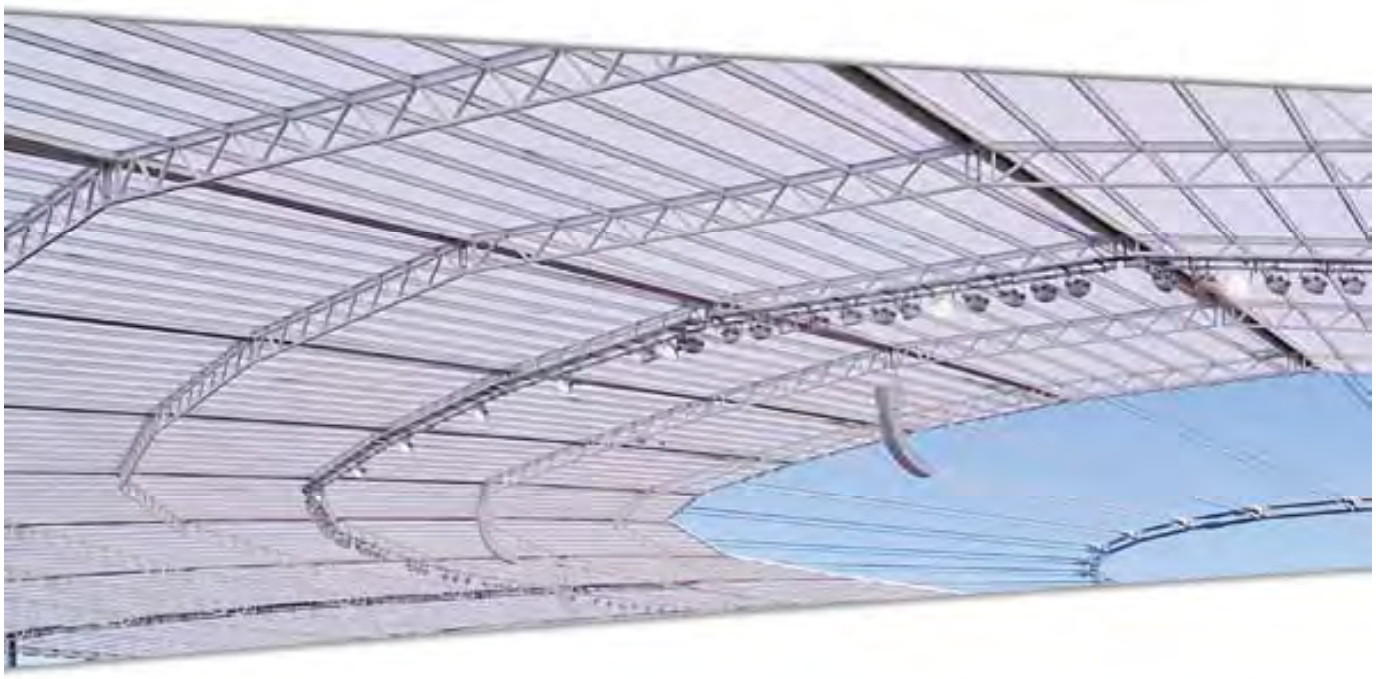


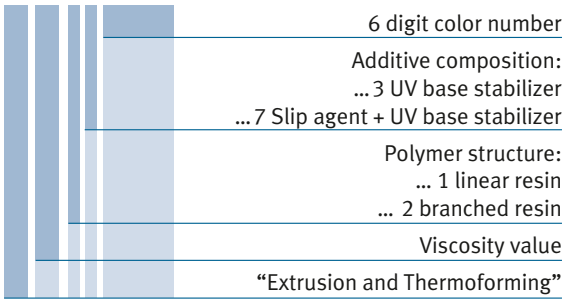


Base resins

The Makrolon® ET resin portfolio is divided into two subgroups: the base resins and the functional materials. The base resins follow the well-known Makrolon® nomenclature[1] as shown in the following scheme:

Makrolon®

ET 3 1 1 3 550115



[1] For additional information pls. refer to the general Makrolon® Product Brochure:
http://plastics.bayer.com/plastics/emea/en/product/makrolon/Product_description.html

Makrolon® Grade	Old Name	Linear/ Branched	MVR	
ET2613	2603 MAS157	Linear	12.5	
ET3113	3103 MAS157	Linear	6.0	
ET3117	DP1-1883	Linear	6.0	
ET3127	1243 MAS157	Branched	6.0	
ET3227	1143 MAS157	Branched	3.0	

excellent fit

can be advantageous under certain conditions/ machine setups

Bayer Polycarbonate

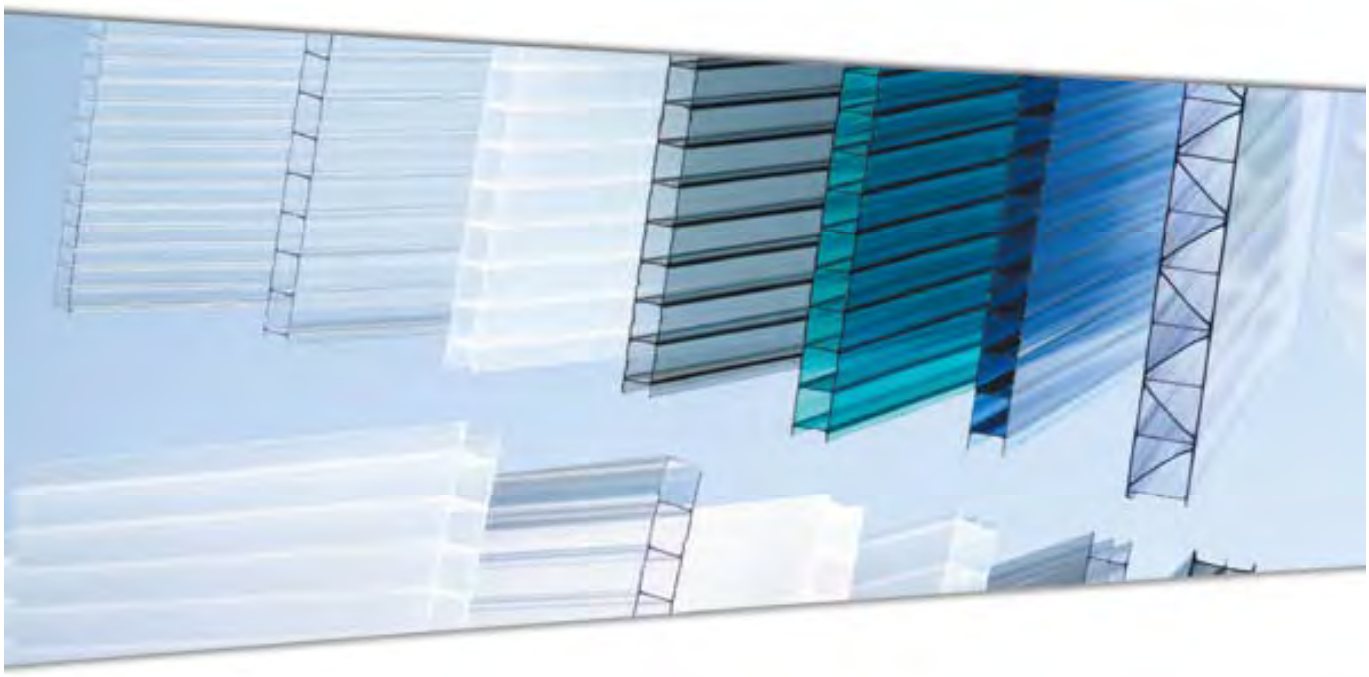
Makrolon® ET

The Makrolon® ET base resins are equipped with a low-volatile additive package to provide low plate-out and less deposits. All resins are available in clear transparent colors[2]; custom colors are available upon request. The following table gives an overview of the resins available, their basic properties and designated fields of application:

	UV base stabilizer[3]	Slip agent	Suitable for					Remarks
			Solid	Multi	Corr.	Panel	Profile	
	Yes	No	■					Advantageous for very thin sheets (< 1.5 mm)
	Yes	No	■		■			Standard resin for solid sheets
	Yes	Yes	■	■	■			For standard multiwall sheets; excellent mixing partner for branched Makrolon® ET grades for more complex sheet geometries
	Yes	Yes		■	■	■	■	For more complex multiwall sheet geometries
	Yes	Yes		■		■	■	Similar to Makrolon® ET3127; higher viscosity supports processing of multiwall sheets with very complex geometries

[2] The color of all Bayer MaterialScience materials is described by a 6 digit color number. This system is based largely on the RAL color system: the first two digits specify the basic color, while the other four digits indicate the various shades

[3] The UV base stabilization provides sufficient protection for most indoor applications. For outdoor use, additional protective measures are necessary, see “UV Protection”

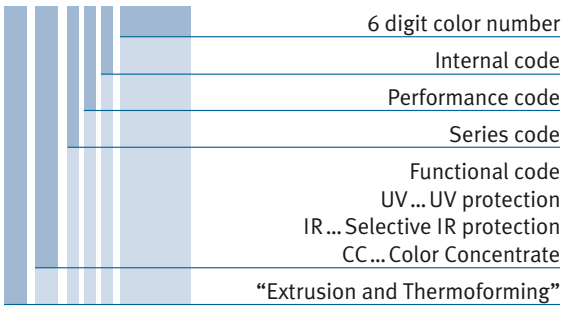


Functional materials

Resins providing special functions are grouped according to their basic functionality. They are marked by a 5-digit letter-figure combination as a detailed code.

Makrolon®

ET UV 1 1 0 550054



UV-Protection

The use of Makrolon® in applications subject to outdoor weathering requires additional protection against UV radiation on the exposed surface. The standard method used today is the application of a thin layer of a UV resin by coextrusion. With the Makrolon® ET UV resins Bayer MaterialScience offers a choice of materials, providing different levels of UV protection and processing performance.

The Makrolon® ET UV100 materials provide UV protection and processing properties on the high level which has been known in the market for many years. Makrolon® ET UV100 resins can be applied on both linear and branched base materials.

Makrolon® Grade	MVR	UV protection level	Remarks
ET UV110	9.0	+	Typically used for multi-wall sheets, profiles, corrugated sheets
ET UV130	10.0	++	Typically used on solid sheets

The Makrolon® ET UV500 product range exhibits a further improvement in processing performance. The deposit formation during extrusion is extremely low, which allows up to four times longer extrusion runs between cleaning cycles. Also, improved surface qualities were observed.

Again the Makrolon® ET UV500 product range can be used together with all ET base materials:

Makrolon® Grade	MVR	UV protection level	Remarks
ET UV510	9.0	+	Typically used for multi-wall sheet, profiles, corrugated sheet
ET UV530	10.0	++	Typically used on solid sheet
ET UV540	10.0	+++	High performance UV-Batch for applications in critical climate conditions; typically used on solid sheet

Flame Retardancy

Makrolon® is well known for its excellent flame retardancy. All Makrolon® ET resins have a UL yellow card describing the UL-94 performance (most recent versions are available at http://www.ul.com/).

Many products made from Makrolon® ET resins are used in applications which are subject to specific building codes or standards. This usually requires specific fire tests, which in most cases are performed as a component test and not as a material test. In these cases Bayer MaterialScience does not hold fire certificates for the Makrolon® ET resins. Nevertheless indications can be given whether sheets of Makrolon® ET meet certain specifications and standards. Furthermore Bayer MaterialScience offers assistance in evaluating the performance of your specific part by the Bayer MaterialScience fire testing laboratory (see "Technical Support").

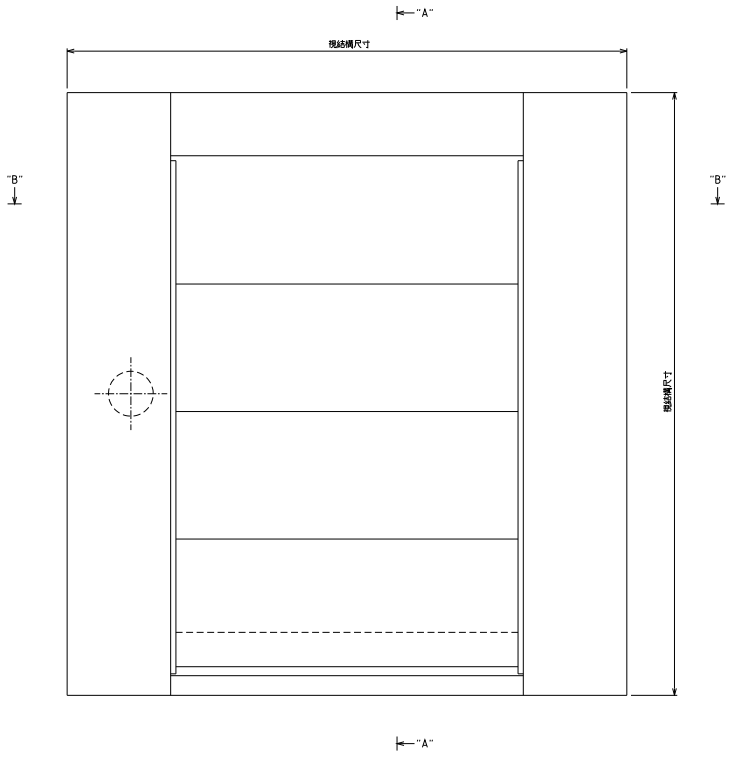
Further Information – Datasheets – Technical Support

This brochure is meant to give an overview of the Makrolon® extrusion resin portfolio. More detailed technical information on the Makrolon® ET products – like datasheets, processing recommendations and information on specific properties – can be obtained either from the Bayer MaterialScience tech center (www.plastics.bayer.com) or your local technical contact partner.

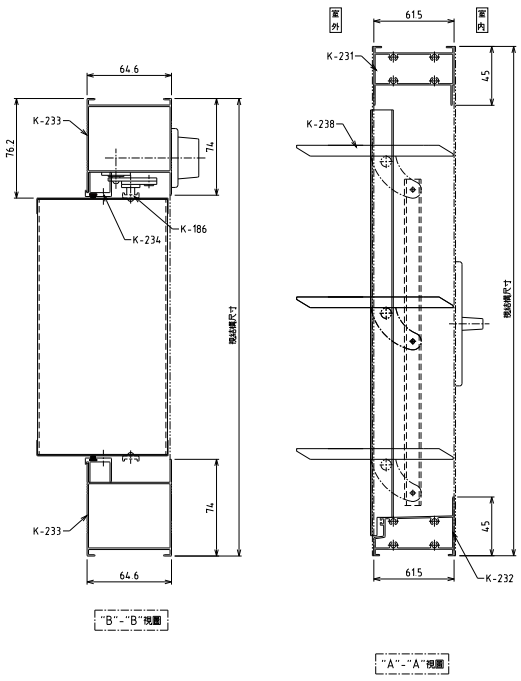
The Bayer MaterialScience technical team is ready to give assistance on any technical questions or queries concerning Makrolon® ET grades, e. g. special product data or support in processing of Makrolon® ET.

Enclosure 12.2.1.2

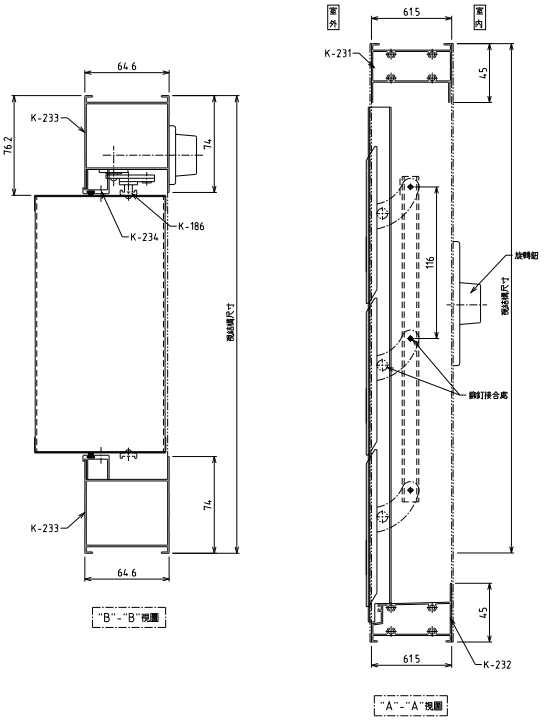
Glass Louver



開啓狀態
Opened

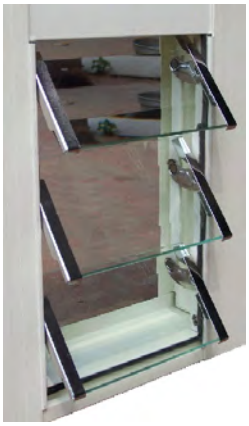


閉合狀態
Closed



舒適 環保 綠建築

活動玻璃百葉



產品特色

- 採光－透明玻璃採光效果佳。
- 防雨－葉片調整至45° 時，一般之雨水無法進入屋內並保持通風效益。
- 通風－可依室內需求隨意調整葉片之高度及傾斜度，得到最佳的採光及通風效果。
- 玻璃葉片－各式玻璃(10mm清玻璃、反光、霧化玻璃、強化玻璃、膠合玻璃、LOW-E玻璃)可按照需求搭配選擇。
- 視野－無遮蔽物擋住屋外美好的風景。
- 多一種的設計選擇，百葉窗配合建物整體造形，創造住宅外觀整體美。
- 不銹鋼12mm實心軸心防盜效果及佳。葉片調整不會卡死，開關容易。

富三企業有限公司
台中市北屯區環中路一段長生巷33-3號
TEL:(04)2421-3666 FAX:(04)2422-2853
e-mail:fuh.shan@msa.hinet.net
http://www.fuh3.com.tw

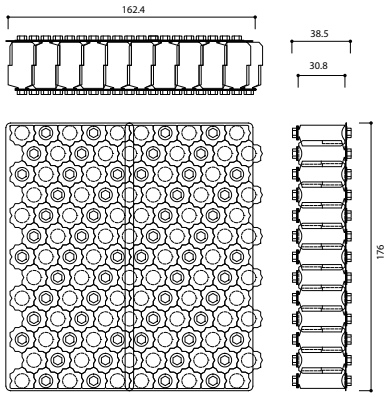
Technical Specs

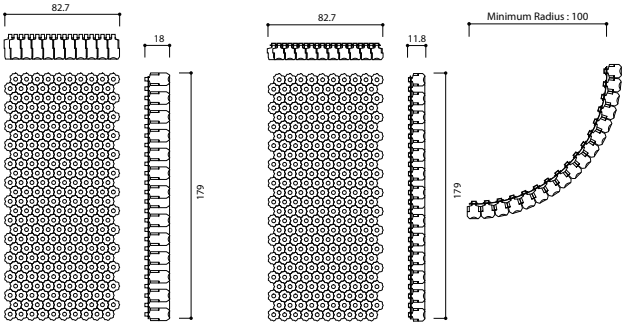
Standard POLLI-Brick™ Size

6,000mL

690mL

400mL





Technical Specs

Standard Module

Type	Exterior / Interior	Interior	
Components	- POLLI-Brick™ : made from 100% Recycled PET (Polyethylene terephthalate) - High Gloss PC (Polycarbonate) film - HDPE Cap + Washer		
Reinforcements	Welded wire fabric / PC sheet		
Wall Module Dimension*	162.4cm x 176cm	82.7cm x 179cm	82.7cm x 179cm
Wall Module Thickness	38.5cm	17.8cm	11.8cm
Wall Module Weight**	63kg approx.	17.4kg approx.	8.7kg approx.
Insulation (SI units) R value, Thermal Resistance Rate	12.0 K·m²/W	4.8 K·m²/W	2.4 K·m²/W
Color Options	Translucent/Semi Translucent/ White ***		
Loading	345kg/m²		
Wind Pressure	3300 Pascal / Category 5 Hurricane Sustained Winds		
Option Figure	- Integrated RGB/Single color LED tube - Solar Panel integration	- Backlight RGB/Single color LED	
Fireproof Performance Options	Self-extinguishing, fire retardant and flame retardant to Specification (translucency may vary)	B2/B1 Level (brick by brick/panelized)	

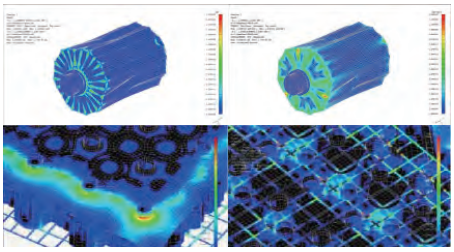
* Module can be modified into customized dimensions.
** Wall module weight may vary by design.
*** POLLI-Brick™ can be customized to different colors if a minimum quantity is met.

US & International Patent 12/869757

ASTM E-330/331
Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference

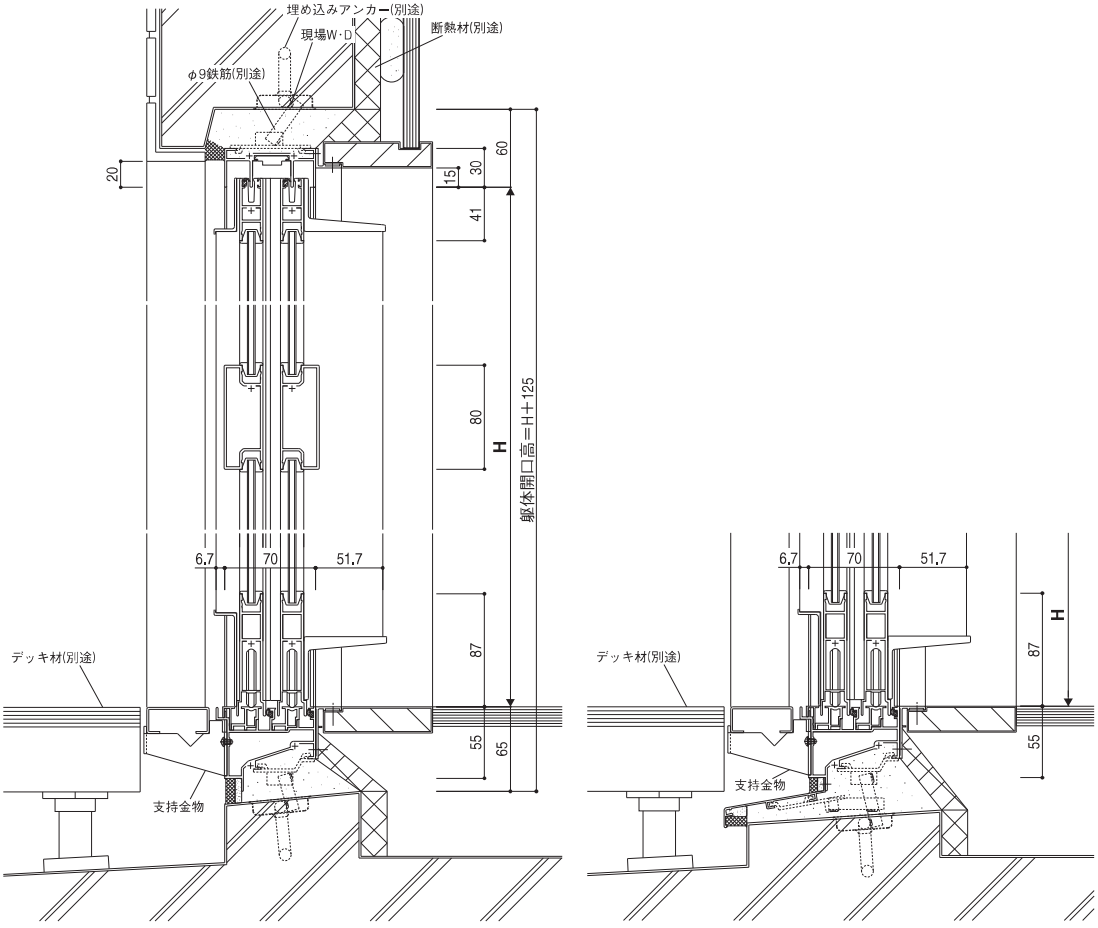
AAMA 501.4
Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference

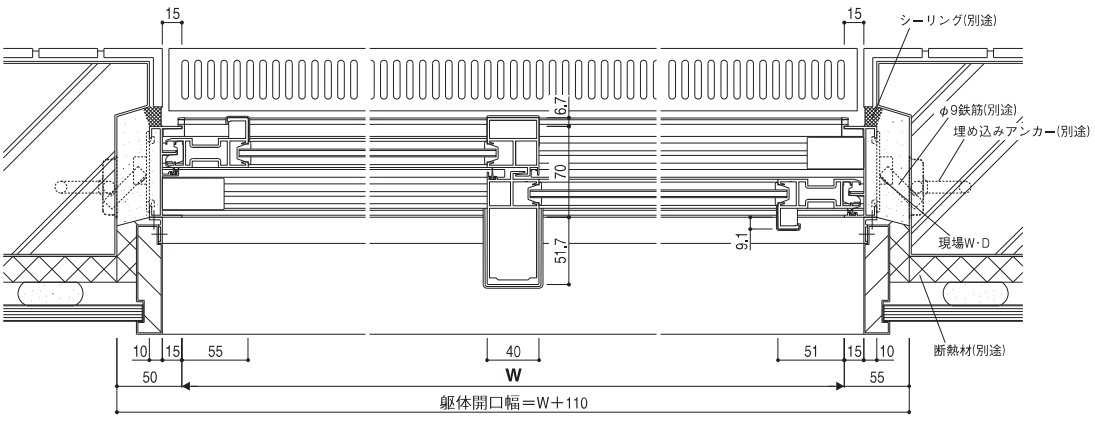
UL Certification E 98658
Plastics Component



EXIMA 31 納まり参考図【引違い窓【フラット下枠仕様】】

RC納まり　引違い窓【フラット下枠仕様】(2枚建)　Eタイプ／14mm溝幅　外装:タイル　【CAD_No.】H13200_E3RR7　S=1／5(単位:mm)





Bathroom

Toilet	
Brand	HCG
Model	C3016T
Dimension (mm)	840x814x501

Cabinet	
Brand	HCG
Model	LCP400-4115N
Dimension (mm)	600x680x500 (each)

Mirror	
Brand	HCG
Model	BA2826
Dimension (mm)	100x800x1200

Faucet	
Brand	HCG
Model	LF3167PT
Dimension (mm)	235x115x50

Sink	
Brand	HCG
Model	L400-4115N
Dimension (mm)	580x155x480

Shower Door	
Brand	HCG
Model	SB1E-SB2E-SB3E
Dimension (mm)	1372x1900

Shower Column	
Brand	HCG
Model	ST8791T
Dimension (mm)	1400x190x500

Wall	
Brand	ASAZWA Industrial Co.,LTD.
Dimension (mm)	24mm thick

Construction

Product Data Sheet
Edition 4, 2012
Sika® Unitherm® Steel S exterior

Sika® Unitherm® Steel S exterior
(formerly Sika® Unitherm® 38091 exterior)
Solvent based fire protection coating for steel, fast dry, interior/exterior use

Product Description

Sika® Unitherm® Steel S exterior is an ecological thin film fire protection coating system which has to be used for structural steelwork which is subject to weathering, high humidity, maritime environment etc. (exterior condition).

Sika® Unitherm® Steel S exterior can also be used for interior steel construction.

Sika® Unitherm® Steel S exterior is forming a heat insulating layer under the influence of fire and improves the fire resistance of steel parts like columns, girders and framework.

Sika® Unitherm® Steel S exterior is independently tested to BS 476: Part 21.

Uses

For exterior use on structural steel members like columns, girders and framework with a highly effective protection to delay the steel from reaching critical temperatures.

Note : With critical situation i.e. frequent formation of condensation and/or heating up of surfaces above 45°C, possible special measures should be taken.

Characteristics / Advantages

- Fast drying intumescent coating
- Applicable on steel constructions exposed to weathering
- Preserves the appearance of a steel construction
- Applicable to filigree and complex steel building elements
- Simple application, does not increase static load
- Individual coloration possible with corresponding topcoat, various colour shades in RAL, others available

Tests

Approval / Standards

BS 476: Part 21: 1987
30 minutes up to 120 minutes.

Product Data

Form

Colour	White
Packaging	25 kg/pail

Storage

Storage Conditions / Shelf-Life	18 months from date of production if stored properly in undamaged and unopened original sealed packaging in cool and dry conditions. Protect from direct sunlight and frost.

Technical Data

Density	Approx. 1.31 g/cm^3
Solid by Volume	71 ± 3% (according BCF Guidance Methode)
Flash point	+ 32°C
VOC Data	VOC content (ready to use) not exceeding 350 gm/litre [Type of regulated paint under the Air Pollution Control (volatile organic compounds). Regulation of Hong Kong.

System Information

Coating system	<u>Steel</u> Primer: SikaCor® EG 1 (Two component epoxy) or SikaCor® Zine R (Zinc rich epoxy) Intumescent coating: Sika® Unitherm® Steel S exterior Topcoat: Sika® Unitherm® Top S (Optional) <u>Galvanised steel</u> Primer: SikaCor® EG 1 Intumescent coating: Sika® Unitherm® Steel S exterior Topcoat: Sika® Unitherm® Top S (Optional)
Surface pre-treatment	<u>Steel</u> Blast cleaning to Sa 2½ according to EN ISO 12944, Part 4. <u>Galvanised steel</u> Free from dirt, oil, grease and corrosion products. <u>Existent anticorrosive primer/coatings</u> A compatibility test with the fire protection system is recommended. For testing and surface pre-treatment, please see special technical information sheet "Primers and surface testing for Sika® Unitherm® steel fire protection systems." Any damage (impact, corrosion, etc.) should be repaired prior to the application of coating.
Consumption / Coverage	Approx. 1.85 kg/m^2 for 1000 µm dry film thickness (1350-1400 µm wet film thickness). The fire rate of Sika® Unitherm® Steel S exterior depends on national standard, please refer to corresponding separate consumption table/diagram. Note : Ratio of dry film thickness or wet film thickness varies depending on application method.

Fire Proofing Paint

Application Instructions

Preparation of coating material	Stir thoroughly with slowly turning mechanical stirrer, free of lumps. Addition of thinner is not necessary.
Application conditions	Object temperature not below + 5°C, to max. + 40°C Relative humidity max. 80% Application temperature shall be at least ≥ 3°C above dew point. During application and drying of total Sika® Unitherm® coating system including Sika® Unitherm® Top S as well as transportation special protection measures must be taken against weathering. Furthermore, proper ventilation is recommended.
Application Method / Tools	Airless spraying : - material shall be applied undiluted - airless spraying machine with pressure ratio ≥ 45 : 1 - filters should be removed - hose diameter not below 3/8" - recommended nozzle size 0.46 - 0.66 mm or 0.019 - 0.027" - solvent resistant hoses must be used ! Brushing/rolling : - material shall be applied undiluted - a ribbed appearance may observed due to the nature of material - solvent resistant brush or roller must be used - more than one coat may be necessary to give equivalent dry film thickness of a single spray applied coat. Note : The Sika® Unitherm® basecoat shall be applied in several coats up to the final dry film thickness required. Wet film thickness max. 400 µm for 1st application coat on primer. Wet film thickness approx. 750 µm for each subsequent application coat is recommended.
Drying	Average drying time at 23°C : - touch-dry : < 1 hour - overcoatable : approx. 4 hours - dry-to-handle : this will depend on the total thickness of Sika® Unitherm® Steel S exterior to be applied Different temperature and relative humidity have an influence on drying time. Sika® Unitherm® Steel S exterior requires a minimum of 24 hours drying prior to application of topcoat Sika® Unitherm® Top S. Through-drying of Sika® Unitherm® Steel S exterior can be checked by "finger-nail-test"
Topcoat	Sika® Unitherm® Top S topcoat produced in RAL colour shades or on request for other colour shades. - interior use (decorative) : 1 x 160 g/m² - exterior use (exposed to weathering) : 2 x 140 g/m² (see separate product data sheet for topcoat).
Cleaning of Tools	Immediately after use with Sika® Unitherm® thinner.
Value Base	All technical data stated in this Product Data Sheet are based on laboratory tests. Actual measured data may vary due to circumstances beyond our control.

Construction

Health and Safety Information

Safety precautions

Please observe safety instruction on container labels and local regulations.

Dangerous Goods regulations have to be followed.

During application in closed rooms, pits and shafts etc., sufficient ventilation must be provided. Keep away open light, including welding.

In poorly lit rooms only electric safety lamps are permitted. The installed ventilation equipment must be spark-proof.

In a liquid, or not fully cured state, the thinner and the products contaminate water and should not be allowed to enter drains or be spilled onto open ground. All spillages and liquid waste must be removed according to local Health and Safety regulations.

Further details are contained in our instruction "Health protection and the prevention of accidents".

For information and advice on the safe handling, storage and disposal of chemical products, users shall refer to the Material Safety Data Sheet (available upon request) containing physical, ecological, toxicological and other safety-related data.

Legal Notes

The information, and, in particular, the recommendations relating to the application and end-use of Sika products, are given in good faith based on Sika's current knowledge and experience of the products when properly stored, handled and applied under normal conditions in accordance with Sika's recommendations. In practice, the differences in materials, substrates and actual site conditions are such that no warranty in respect of merchantability or of fitness for a particular purpose, nor any liability arising out of any legal relationship whatsoever, can be inferred either from this information, or from any written recommendations, or from any other advice offered. The user of the product must test the product's suitability for the intended application and purpose. Sika reserves the right to change the properties of its products. The proprietary rights of third parties must be observed. All orders are accepted subject to our current terms of sale and delivery. Users must always refer to the most recent issue of the local Product Data Sheet for the product concerned, copies of which will be supplied on request.

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ISO 9001 : 2008 Certificate No.: CC 446
ISO 14001 : 2004 Certificate No.: CC 2042

The product is manufactured under a HKQAA ISO 9001 / ISO 14001 certified quality / environmental management system.

Innovation & Consistency | since 1910

Fire Extingiusher

FIRE EXTINGUISHERS

PART 1 – GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Product Data (Refer to catalogue).

PART 2 - PRODUCTS

2.1 FIRE EXTINGUISHERS

A. Portable Fire extinguishers, listed and labeled for the type, rating, and classification of extinguisher.

1. Multipurpose Dry-chemical Type.
2. Fire-rated 21A: 113B:C, 4kg nominal capacity.
3. The cylinders are of steel construction, coated with epoxy powder for high corrosion resistance, and fitted with brass valves with pressure gauges.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install fire extinguishers in where indicated.

PART 1 – GENERAL

1.1 SECTION REQUIREMENTS
A. Submittals: Product Data (Refer to catalogue).

PART 2 - PRODUCTS

2.1 FIRE EXTINGUISHERS
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PART 3 - EXECUTION

3.1 INSTALLATION
A. Install fire extinguishers in where indicated.

Fire Alarm System

PART 1 – GENERAL

1.1 SUMMARY

A. Section Includes:
1. Smoke alarms / detectors and wiring.

1.2 SECTION REQUIREMENTS

A. System description: Non-codes, conventional, hardwired, zoned, 220V AC loop system.
B. Submittals: Product data and system operation.
C. Comply with Approved document B (Fire Safety).
D. CE listed and labeled.
E. Electrical components, devices, and accessories: Listed and labeled as defined in CE, by a qualified testing agency, and marked for intended location and application.

1.3 MATERIALS AND SERVICES

A. The system shall include, but not be limited to the following elements:
1. Smoke alarms / detectors.
2. Power supplies and batteries.
3. Wiring and raceway.
4. Installation, testing, certification, and training of Owner's operators.

PART 2 - PRODUCTS

2.1 ALARM – INITIATING DEVICES

A. Smoke alarms / detectors: CE, 220V AC with 9V DC battery backup, light-scattering photoelectric type, plug-in arrangement.
1. Basis of design: Horing Lih, 220V AC with battery backup smoke alarm / detector.
a. Model No. NQ9S-3.

2.2 WIRE AND CABLE

A. General: 600V 380℃ (HR), 1.25mm2/2C, 1.25mm2/4C or larger.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install and test fire detection system
Comply with Approved Document B (Fire Safety) and Approved Document P (Electrical Safety).
B. Wiring Method: Install wiring where indicated. All alarm are wired to a single, continuous (non-switched) power line, which is not protected by a ground fault interrupter.
C. Where more than one alarm is installed they should be linked so that the detection of smoke alarms / detectors by one unit operates the alarm signal in all of them. The manufacturers' instructions about the maximum number of units that can be linked should be observed.
D. Smoke alarms / detectors should be sited so that:

1. There is a smoke alarm in the circulation space within 7.5m of the door to every habitable room;

2. They are ceiling-mounted and at least 300mm from walls and light fittings (unless, in the case of light fittings, there is test evidence to prove that the proximity of the light fitting will not adversely affect the efficiency of the detector). Units designed for wall-mounting may also be used provided that the units are above the level of doorways opening into the space and they are fixed in accordance with manufacturers' instructions; and
3. The sensor in ceiling-mounted devices is between 25mm and 600mm below the ceiling.

Domestic Water Piping

DOMESTIC WATER PIPING

PART 1 – GENERAL

1.1 SECTION REQUIREMENTS

A. Comply with CNS for plastic, potable domestic water piping and components.

PART 2 - PRODUCTS

2.1 PIPE AND FITTINGS

A. Stainless steel double compression & dual pressure over parts SUS304 (CNS 13392 G3258 SISG3448) stainless steel pressure pipe.

1. Joining Materials: Meet CSN 14645, KS B1547, JWWA G116 standards tested.

B. PVC Pipe: CNS 1298 K3004, type B

1. PVC Fittings: CNS 2334 K3011, socket type.

C. Transition fittings: Manufactured piping coupling or specified piping system fitting. Same size as pipes to be joined and pressure rating at least equal to pipes to be joined.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with requirements in section 15141 & 15151 of Public construction Commission for basic piping installation requirements.

B. Install wall penetration system at each service pipe penetration through foundation wall. Make installation watertight.

C. Install shutoff valve, hose-end drain valve, strainer, pressure gage, and test tee with valve, inside the building at each domestic water service entrance.

D. Install domestic water piping without pitch for horizontal piping and plumb for vertical piping.

E. Rough-in domestic water piping for water-meter installation according to utility company's requirements.

3.2 INSPECTION AND CLEANING

A. Inspect and test piping systems as follows:

1. Fill domestic water piping. Check components to determine that they are not air bound and that piping is full of water.

2. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired by visual inspection of all joints.

B. Clean and disinfect potable domestic water piping by filling system with water/chlorine solution with at least 50 ppm (50 mg/L) of chlorine. Isolate with valves and allow to stand for 24 hours. Flush system with clean, potable water until no chlorine is in water coming from system after the standing time by flushing out a volume equal to the system volume, then stopping the flow of water for one hour, and then flushing the sytem.

3.3 VALVE SCHEDULE

A. Drawing indicate valve types to be used.

B. Install ball valves on inlet to each plumbing equipment item, on each supply to each plumbing fixture not having stops on supplies, and elsewhere as indicated.

C. Install spring check valve on discharge side of each pump and elsewhere as indicated.

D. Install ball valves in each hot-water circulating loop and discharge side of each pump.

Domestic Water Pump

DOMESTIC WATER PUMPS

PART 1 – GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Produce Data. Include certified performance operating characteristics, electrical characteristics, and furnished specialties and accessories.

B. Comply with section 15440 of Public Construction Commission for motor-operated water pumps.

PART 2 - PRODUCTS

2.1 MAIN PRESSURIZING DOMESTIC WATER PUMP

A. GRUNDFOX

1. 270W, 220Volt, maximum flow rate is 3.5m^3/hr and head maximum is 12m.
2. Part #: UPA 120.

2.2 CONTROLS

A. Pressure sensing pump: Electric; adjustable for control of hot and rain water circulation pump.

1. Type: Pressure tank combined with switch for installation in piping.
2. Settings: Pump turned on and off is actuating directly by pressure drop and raise.

PART 3 - EXECUTION

2.1 INSTALLATION

A. Install pumps with access for periodic maintenance, including removal of motors, impellers, couplings, and accessories.

B. Support pumps and piping so weight of piping is not supported by pump volute.

C. Install electrical connections for power, controls, and devices.

D. Connect piping with valves that are at least the same size as piping connecting to pumps.

E. Install suction and discharge pipe sizes equal to or greater than diameter of pump nozzles.

PART 1 – GENERAL

1.1 SECTION REQUIREMENTS

A. The tanks of this section are custom produts.

PART 2 - PRODUCTS

A. Clean Water Tank
1. Material: FRP
2. Dimension: 1000L x 7000W x 300H (mm)
3. Thickness: Cover: 3mm; side wall: 5mm; Bottom of tank: 5mm

B. Greywater Tank
1. Material: FRP
2. Dimension: 1000L x 600W x 300H (mm)
3. Thickness: Cover: 3mm; side wall: 5mm; Bottom of tank: 5mm

C. Black Water Tank
1. Material: FRP
2. Dimension: 2000L x 1000W x 300H (mm)
3. Thickness: Cover: 3mm; side wall: 3mm; Bottom of tank: 3mm

D. Rainwater Tank
1. Material: FRP
2. Dimension: 1500L x 700W x 300H (mm)
3. Thickness: Cover: 3mm; side wall: 3mm; Bottom of tank: 3mm

PART 3 - EXECUTION

3.1 INSTALLATION

A. Set units level, plumb, and true to line, without warp or rack of frames and panels and anchor securely in place.

B. Fasten securely in place, with provisions for thermal and structural movement. Install with concealed fasteners, unless otherwise indicated.

C. Separate dissimilar FRP and FRP products from contact with wood or cementitious materials.

D. Correct deficiencies in or remove and reinstall products that do not comply with requirements.

E. Repair, refinish, or replace products damaged during installation, as directed by Architect.

F. Adjust operating parts and hardware for smooth, quiet operation.

Heat Pump Unit

1.0 Heat Pump (Outdoor Unit)

Specifications

Heat pump 50/60 Hz <RXYMQ-PVE>

Model Name			**RXYMQ4PVE**
* 1 Cooling Capacity		Kcal/h	9,600
	Btu/h	38,200	
	kW	11.2	
* 2 Heating Capacity		Kcal/h	10,800
	Btu/h	42,700	
	kW	12.5	
Casing Color			Ivory White
Dimensions: (H×W×D)		mm	1,345 × 900 × 320
Heat Exchanger			Cross Fin Coil
Comp.	Type		Hermetically Sealed Scroll Type
	Piston Displacement	m^3/h	19.36
	Number of Revolutions	r.p.m	6,480
	Motor Output × Number of Units	kW	2.5 × 1
	Starting Method		Direct on line
Fan	Type		Propeller Fan
	Motor Output	W	70 × 2
	Air Flow Rate	m^3/min	106
	Drive		Direct Drive
Connecting Pipes	Liquid Pipe	Mm	ϕ9.5 (Flare Connection)
	Gas Pipe	Mm	Φ15.9 (Flare Connection)
Machine Weight		kg	125
Safety Devices			High pressure Switch, Fan Driver Overload Protector, Inverter Overload Protector, Fusible Plugs, Fuse
Defrost method			Reverse cycle defrosting
Capacity Control		%	24 ~ 100
Refrigerant	Refrigerant Name		R-410A
	Charge	Kg	4.0
	Control		Electronic Expansion Valve
Refrigerator Oil			DAPHNE FVC68D
	Charge Volume	L	1.5
Standard Accessories			Installation Manual, Operation Manual, Clamps

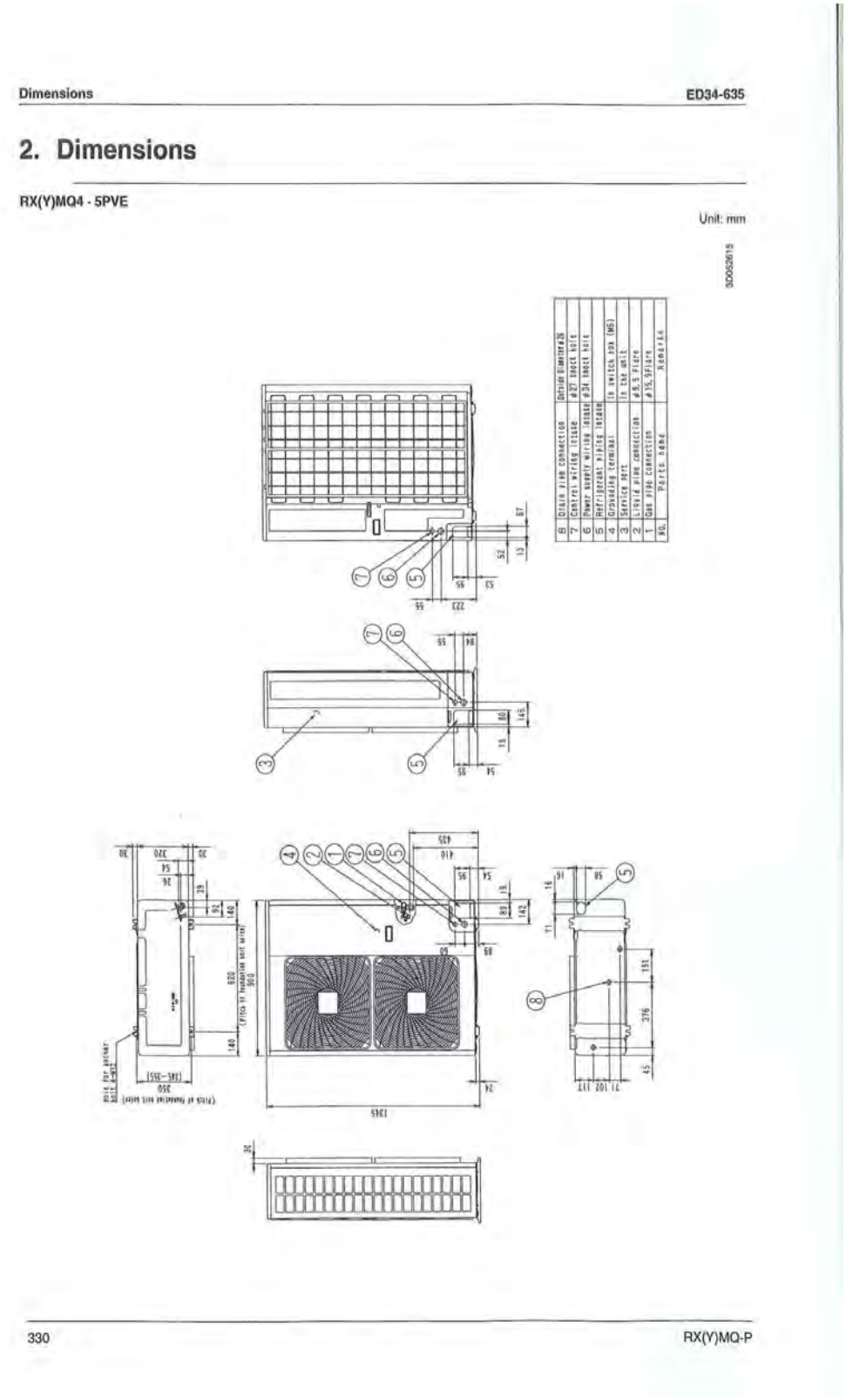
Note:

*1 Indoor temp. : 27°CDB, 19°CWB / outdoor temp. : 35°CDB / Equivalent piping length : 7.5 m, level difference : 0 m.

*2 Indoor temp. : 20°CDB / outdoor temp. : 7°CDB, 6°CWB / Equivalent piping length : 7.5 m, level difference : 0 m.

Dimensions

Unit: mm



Dimensions ED34-635

2. Dimensions

RX(Y)MQ4 - 5PVE

Unit: mm

8	Drain pipe connection	Outside diameter ø26
7	Control wiring intake	ø27 knock hole
6	Power supply wiring intake	ø34 knock hole
5	Refrigerant piping intake	
4	Grounding terminal	(M5 screw, with washer)
3	Service port	(1/4 nut)
2	Liquid pipe connection	ø6.5 Flare
1	Gas pipe connection	ø15.9 Flare
NO.	Parts name	Remarks

330 RX(Y)MQ-P

Heat Pump Unit

2.0 Heat Pump (Indoor Unit)

Specifications

Wall Mounted Type

Model Name			**FXAQ40MAVE**
* 1 Cooling Capacity (19.5°CWB)		Kcal/h	4,000
	Btu/h		16,000
	kW		4.7
* 2 Cooling Capacity (19.0°CWB)		kW	4.5
* 3 Heating Capacity		Kcal/h	4,300
	Btu/h		17,000
	kW		5.0
Casing Color			While (3.0Y8.5/0.5)
Dimensions: (H×W×D)		mm	290 × 1,050 × 230
Coil (Cross Fin Coil)	Rows × Stages × Fin Pitch	mm	2 × 14 × 1.4
	Face Area	m^2	0.213
Fan	Model		QCL9686M
			Cross Flow Fan
	Motor Output × Number of Units	W	43 × 1
	Air Flow Rate (H/L)	m^3/min	12/9
		cfm	424/318
	Drive		Direct Drive
Temperature Control			Microprocessor Thermostat for Cooling and Heatling
Sound Absorbing Thermal Insulation Material			Foamed polystyrene / Foamed Polyethylene
Air Filter			Resin Net (Washable)
Piping Connecting	Liquid Pipe	mm	ϕ6.4 (Flare Connection)
	Gas Pipe	mm	Φ12.7 (Flare Connection)
	Drain Pipe	mm	VP13 (External Dia.18 Internal Dia.13)
Machine Weight (mass)		Kg	14
*5 Sound Level (H/L) (220-240V)		dBA	39/34
Safety Devices			Fuse
Refrigerant Control			Electronic Expansion Valve
Connectable Outdoor Unit			R-410A P Series
Standard Accessories			Operation Manual. Installation Manual. Installation Panel. Paper Pattem for Installation. Insulation Tape. Clamps. Screws.

Note:

*1 Indoor temp. : 27°CDB, 19.5°CWB / outdoor temp. : 35°CDB / Equivalent piping length : 7.5 m, level difference : 0 m.

*2 Indoor temp. : 27°CDB, 19.5°CWB / outdoor temp. : 35°CDB / Equivalent piping length : 7.5 m, level difference : 0 m.

*3 Indoor temp. : 20°CDB / outdoor temp. : 7°CDB, 6°CWB / Equivalent piping length : 7.5 m, level difference : 0 m.

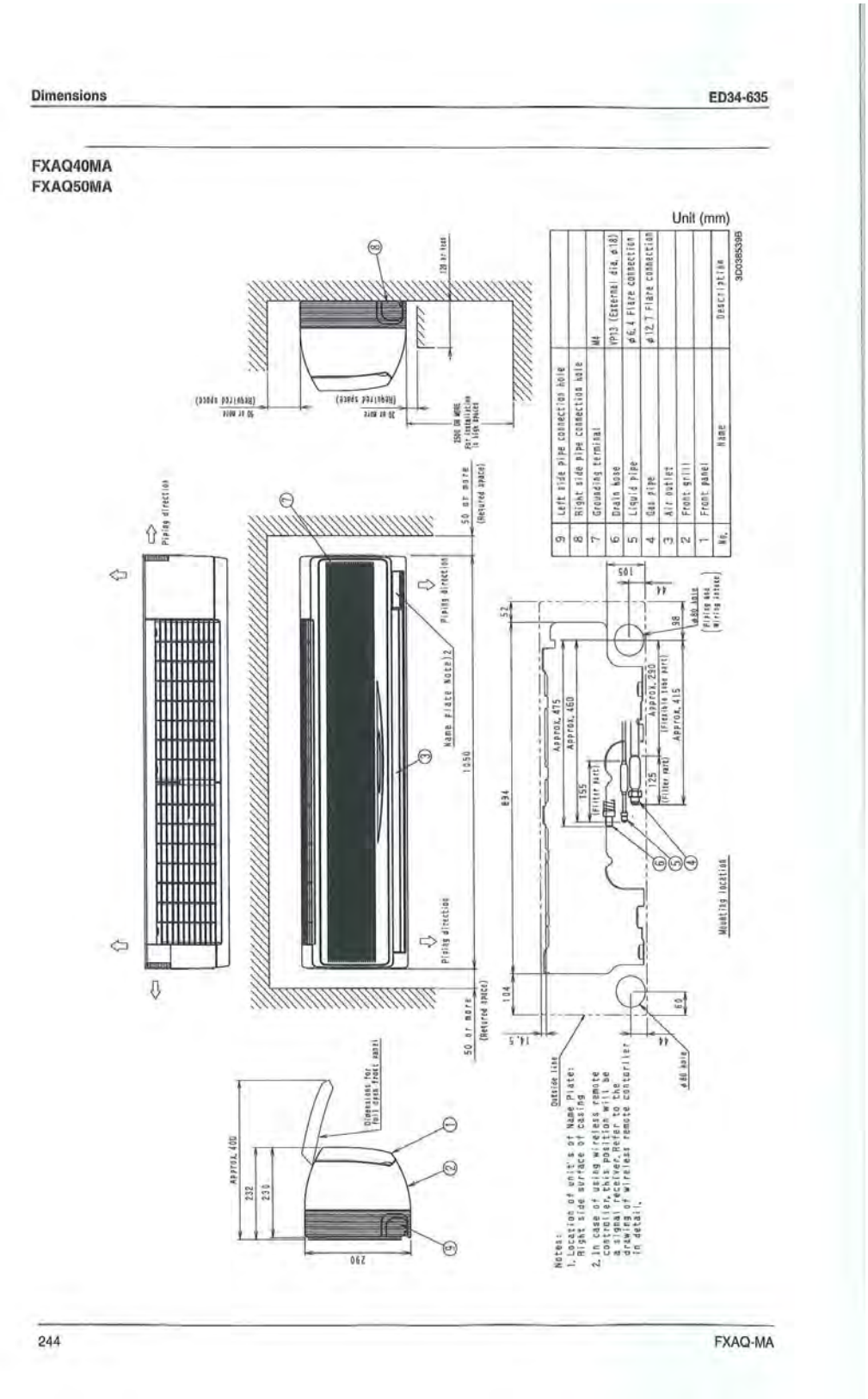
4 Capacities are net, including a deduction for cooling (an addition for heating) for indoor fan motor heat.

*5 Anechoic chamber conversion value, measured at a point 1 m in front of the unit and 1 m downward. During actual operation, these values are normally somewhat higher as a result of ambient conditions.

12.3 System Installation

Dimensions

Unit: mm



Heat Reclaim Vent.

Specifications

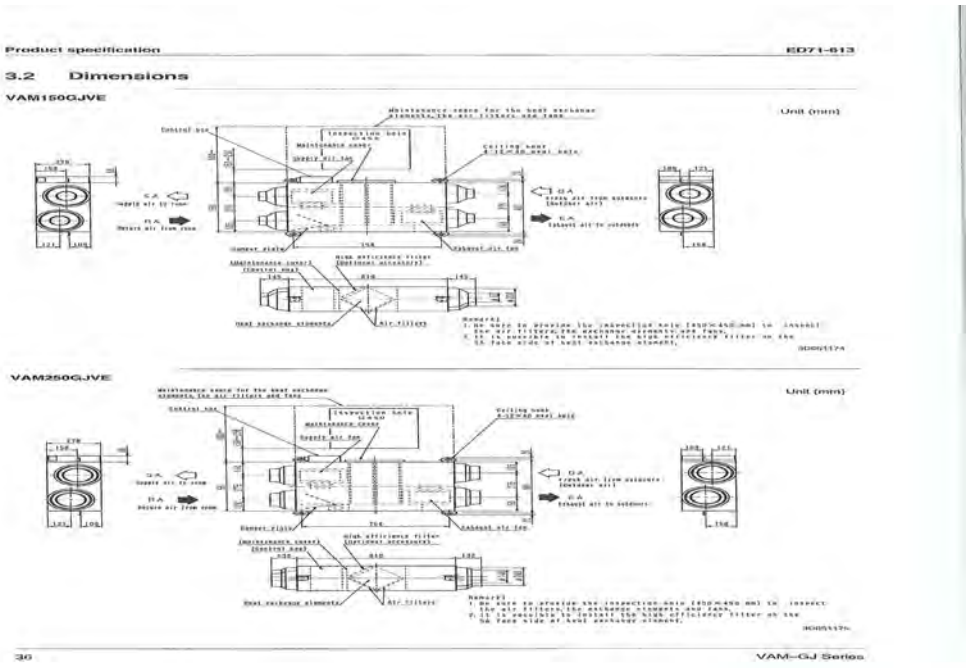
Model Name				VAM150GJVE
Power supply				Single phase 220-240V / 220V, 50/60 Hz
Temperature exchange efficiency		Ultra-High	%	79 / 79
		High	%	79 / 79
		Low	%	84 / 85
Enthalpy exchange efficiency	Cooling	Ultra-High	%	66 / 66
		High	%	66 / 66
		Low	%	70 / 70.5
	Heating	Ultra-High	%	72 / 72
		High	%	72 / 72
		Low	%	76 / 76.5
Casing				Galvanized steel plate
Insulation material				Self-extinguishable urethane foam
Dimensions		H × W × D	mm	278 × 810 × 551
Heat exchange system				Air to air cross flow total heat (sensible heat + latent heat) exchange
Heat exchange element				Specially processed nonflammable paper
Air filter				Multidirectional fibrous fleeces
Fan	Type			Sirroco fan
	Air flow rate	Ultra-High	m^3/h	150 / 150
		High	m^3/h	150 / 150
		Low	m^3/h	100 / 95
	External static pressure	Ultra-High	Pa	120 / 154
		High	Pa	106 / 131
		Low	Pa	56 / 6
Fan motor			Type	Open type capacitor permanent split-phase induction motor, 4 poles × 2
Motor output			kW	0.030 × 2
Operating sound	Heat exchange mode	Ultra-High	dBA	27 – 28.5 / 28.5
		High	dBA	26 – 27.5 / 27.5
		Low	dBA	20.5 – 21.5 / 21
	Bypass mode	Ultra-High	dBA	28.5 – 29.5 / 29.5
		High	dBA	27.5 – 28.5 / 28.5
		Low	dBA	22.5 – 23.5 /22
Operation range (Ambient)				-15°C to 50°CDB (80% RH or less)
Connection duct diameter			mm	ϕ100
Weight			kg	24

Test conditions are as follows.

Condition	Indoor		Outdoor	
	°CDB	R·H (%)	°CDB	R·H (%)
Cooling condition	27	50	35	60
Heating condition	20	40	7	70

Note:
operation sound is measured at 1.5 m below the center of the body.
Air flow rate can be changed over to Low mode or High mode.
Nomal AMP., input, efficiency depend on the other above conditions.
Operating sound is measured in an anechoic chamber.
Operating sound level generally may become greater than this value depending on the operating conditions, reflected sound, and peripheral noise.
The sound level at the air discharge port is about 8 dB higher than the unit's operating sound.
The specifications, designs and information here are subject to change without notice.
Temperature Exchange Efficiency is the mean value in cooling and heating.
Efficiency is measured under the following conditions.
Ratio of rated external static pressure has been kept as follows. Outdoor side to indoor side = 7 to 1.

Dimensions


Product specification
ED71-613
3.2 Dimensions
VAM150GJVE
Unit (mm)
VAM250GJVE
Unit (mm)
30
VAM-GJ Series

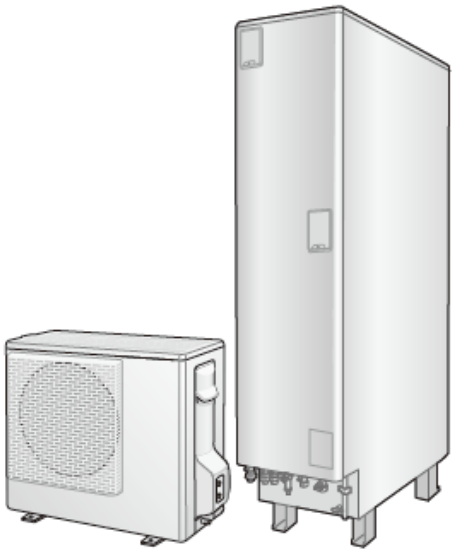
Panasonic

Installation Manual

工事説明書

家庭用ヒートポンプ給湯機

	■パワフル高圧力型フルオート 屋外用					
システム品番	HE-WU37GQS	HE-WU46GQS				
貯湯ユニット品番	HE-WU37GQ	HE-WU46GQ				
ヒートポンプユニット品番	HE-PWU45G	HE-PWU60G				
	■高圧力型フルオート 屋外用					
システム品番	HE-W37GQS	HE-W46GQS	HE-H37GQS	HE-H46GQS	HE-370HGQS	HE-460HGQS
貯湯ユニット品番	HE-W37GQ	HE-W46GQ	HE-H37GQ	HE-H46GQ	HE-370HGQ	HE-460HGQ
ヒートポンプユニット品番	HE-PW45G	HE-PW60G	HE-PH45G	HE-PH60G	HE-45PHG	HE-60PHG



＊工事をされる方へのお願い

この工事説明書は、工事作業者が正しく、安全な工事をするために必要な手引書です。工事開始前に必ずお読みください。本書の記載事項に従って工事をされなかったことが原因で生じた故障・事故などは、保証の対象になりませんので、ご注意ください。設置工事後、この工事説明書は取扱説明書と一緒に、お客様にお渡しください。

このヒートポンプ給湯機は申請によって、通電制御型としての料金割引が適用されます。電力契約をしている電力会社に、電力契約の申請手続きを行ってください。

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Panasonic

■仕様

型名	システム(セット)		HE−WU37GQS
	貯湯ユニット		HE−WU37GQ
	ヒートポンプユニット		HE−PWU45G
適用電力制度			時間帯別電灯通電制御型／季節別時間帯別電灯通電制御型
設置区分	ヒートポンプユニット		屋外専用型(運転使用範囲:−10℃〜43℃)
一般仕様／耐塩害仕様			一般仕様
設置可能最低外気温度		℃	−10
タンク容量		L	370 (185L×2タンク)
給水方式			先止め式／逃し弁、減圧弁による水道直結(水道局認可地区)
水側最高使用圧力		kPa	320
通電制御方式			マイコン制御
使用電源			単相200V(50/60Hz)
最大電流		A	16
安全装置			漏電しゃ断器・缶体保護弁
沸上げ温度範囲(※4)		℃	約65〜約90
給湯温度		℃	水温、32、35、38〜47、50、55、60(混合弁内蔵)
年間給湯保温効率 (JIS)(※1)			2. 7
	区分名		18
給水器具認証番号			W035−20020−119
外形寸法 (高さ×幅×奥行)	貯湯ユニット	mm	1843×1078×440 (梱包寸法:1933×1148×503)
	ヒートポンプユニット	mm	660×799(+68)×299 (梱包寸法:720×910×401)
アスペクト比(※7)			4. 2
製品質量	貯湯ユニット	kg	82(梱包質量:97)、満水時:452
	ヒートポンプユニット	kg	44(梱包質量:46)
加熱能力	中間期標準(※2)	kW	4. 5
	冬期高温(※3)(※5)	kW	4. 5
消費電力	中間期標準(※2)	W	950
	冬期高温(※3)	kW	1. 50
運転音(※6)	貯湯ユニット	dB(A)	沸き上げ運転時:35、保温運転時:40
	ヒートポンプユニット	dB(A)	中間期標準(※2):38、冬期高温(※3):44
設計圧力		MPa	高圧:14. 0(ゲージ)/低圧:9. 0(ゲージ)
待機電力		W	リモコン表示点灯時:5、リモコン表示消灯時:3
中間期標準運転電流(※2)		A	5. 25
ヒートポンプユニット主要部品	圧縮機 型式		スクロール式
	圧縮機 出力	kW	1. 8
	冷媒 使用冷媒		R744(CO2)
	冷媒 冷媒封入量	kg	0. 600
	送風機 形式		プロペラファン
	送風機 出力	W	40
	送風機 風量	m^3/分	28
貯湯ユニット主要部品	タンク		高耐食性ステンレス鋼板
	外装		前板、側板、後板:塗装溶融亜鉛メッキ鋼板(防汚仕様)
			天板:塗装溶融亜鉛メッキ鋼板
	外装塗装色		アイボリー
	保温材		高密度スチロール断熱材
	配管内蔵部材		減圧弁(設定圧力280kPa)、逃し弁(設定圧力320kPa)
	沸き上げ(積層)ポンプ		非自吸式DCポンプ、定格電圧DC24V、定格出力40W
	ふろ循環ポンプ		自吸式DCポンプ、定格電圧DC282V、定格出力60W
	追いだきポンプ		非自吸式DCポンプ、定格電圧DC24V、定格出力10W
	非常用取水栓		断水時災害時の非常用取水
ふろ	給湯設定温度	℃	水温、32、35、38〜47、50、55、60
	ふろ設定温度	℃	水温、36〜48 (高温たし湯60)
付属品	貯湯ユニット		取扱説明書、工事説明書、保証書、ご使用ガイド、サービス説明書
	ヒートポンプユニット		ドレンエルボ

注1. (※1),(※2),(※3)の値は、日本工業規格 JIS C 9220:2011に基づきます。

(※1) 年間給湯保温効率(JIS)は、消費者の使用実態を考慮に入れた給湯保温効率を示すために、1年間を通してある一定の条件のもとにヒートポンプ給湯器を運転した時の単位消費電力量あたりの給湯熱量およびふろ保温熱量を表したものです。
なお、値は省エネモードである「おまかせ節約」で測定した値であり、実際には、地域条件・運転モードの設定や使用条件等により変わります。
(沸き上げモード「おまかせ」に設定した場合やふろの沸かし直しをすると効率が低下し消費電力量が増える場合があります)
年間給湯保温効率(JIS)＝1年間で使用する給湯とふろ保温に係る熱量÷1年間で必要な消費電力量
年間給湯保温効率(JIS)算出時の条件
・着霜時高温条件:外気温(乾球温度/湿球温度)2℃/1℃、水温5℃、沸き上げ温度90℃
・給湯保温モード条件(冬期):外気温(乾球温度/湿球温度)7℃/6℃、水温9℃、沸き上げ温度70℃
・給湯保温モード条件(着霜期):外気温(乾球温度/湿球温度)2℃/1℃、水温5℃、沸き上げ温度70℃

(※2) 中間期標準作動条件:外気温(乾球温度/湿球温度)16℃/12℃、水温17℃、沸き上げ温度65℃

(※3) 冬期高温作動条件:外気温(乾球温度/湿球温度)7℃/6℃、水温9℃、沸き上げ温度90℃

(※4) ヒートポンプユニットで沸き上げる温度です。タンク内の湯温は配管の放熱などにより低くなります。

(※5) 低外気温時は除霜のため、加熱能力が低下することがあります。

(※6) 運転音は、反響音の少ない無響室で測定した値です。実際に据え付けた状態で測定すると、周囲の騒音や反響を受け、表示数値より大きくなります。

(※7) 貯湯ユニットの幅または、奥行きの小さい方に対する高さの比。

※ 年間給湯効率 (JRA)
3.0(運転モード:おまかせ節約)

■別販品リモコン

	品番	備考	
コミュニケーションリモコン	HE-WQFGW	台所リモコン 浴室リモコン	各1
ボイスリモコン	HE-WQVGW	台所リモコン 浴室リモコン	各1
増設リモコン	HE-RQVGZ	−	1

仕　様	
品名	家庭用ヒートポンプ給湯機
品番	HE−WU37GQS

作成日付	図面整理No.		改訂No.
2013年 7月 8日		HEWU37GQS-1	0

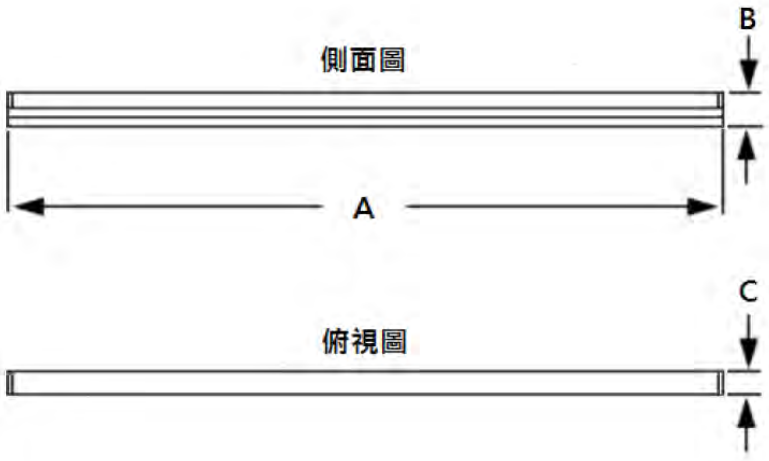
A4 パナソニック株式会社 エアコン事業部

T5 LED Link Light

➢ Feature 產品特性

- Aluminum heat-sink helps better feat dissipation
  鋁合金散熱器提高散熱效果，並確保產品壽命與光效維持
- Epistar Chip Inside 台灣晶元光電 LED 顆粒
- Energy saving than traditional fluorescent lamps 40%~50%, save more energy and Save more money
  較傳統燈管節能 40%至 50%，有效節約能源並節省更多電費
- Ecofriendly CO2 reduction, Mercury-free, No UV light
  符合綠色環保,減少二氧化碳排放,無汞汙染及無紫外線傷害
- Quick lighting up, no Glare, no Flicker 快速點燈，不眩光、不閃爍
- Meet CNS indoor lighting standard and Certified CNS
  燈光照度符合國家室內照明標準並通過 CNS 認證

➢ Dimension 尺寸



	A	B	C
FRVT5LED11	295 mm	32 mm	22 mm
FRVT5LED21	568 mm	32 mm	22 mm
FRVT5LED31	995 mm	32 mm	22 mm
FRVT5LED41	1270 mm	32 mm	22 mm

※ Tolerance is according to mechanical drawing unless otherwise noted (±3mm)
公差值依根據設計圖說規定，除非另有說明 (此為±3mm)

➢ Electronic Characteristic 電氣規格

	FRVT5LED11	FRVT5LED21	FRVT5LED31	FRVT5LED41
Net Weight 淨重 (零件包 70g)	燈具 90g (160g)	燈具 140g (210g)	燈具 190g (260g)	燈具 240g (310g)
Input Voltage 輸入電壓	100VAC~240VAC			
P.F(Power Factor) 功率因數	>90%			
LED Q'ty 顆數	4014 24ea(個)	4014 48ea(個)	4014 72ea(個)	4014 96ea(個)
Luminous Flux(lm) 全光束光通量(流明)	約 500 lm	約 1000 lm	約 1500 lm	約 2000 lm
Power Consumption(W) 消耗功率	5W±10% (瓦)	10W±10% (瓦)	15W±10% (瓦)	20W±10% (瓦)
Operating Temperature 使用環境溫度	0℃ ~ 40℃			
C.C.T. 色溫	3000K(暖白)、4000K(自然白)、6000K(晝白)±300K			
Beam Angle 發光角度	150°± 10°(度)			
C.R.I. 演色性	>76			
Lux @1M 1 米距離直下照度	約 350Lux	約 400Lux	約 450Lux	約 500Lux
Life Time @25℃ LED LED 晶片使用壽命	> 40000 hrs(小時)			

LED down light

Recessed Ceiling Luminaires

嵌入式燈DA-503系列

固定式
20°
截光角

可擺式
15°
截光角

- 高效輸出
- 性价比高

產品優勢

- 簡單容易的安裝設計，使施工過程節省時間，並確保燈具安裝穩固
- 精確的光學設計加上獨特光形處理技術，確保光傳輸效率高達85%以上，光形均勻圓潤
- 15度以上截光角設計，有效增加空間照明舒適度、享受悅到深處，美由心生的優質環境
- 固定式與擺動式兩種產品設計，可針對不同需求選擇應用
- 擺動式燈頭可雙向擺動30度，靈活調整照射方向
- 健康環保光源，使被照物免受紅、紫外線的危害

應用場所

- 適用於博物館、展覽館、美術館、畫廊、商業場所、居家場所及辦公室重點照明

DA-503AN
LEDx3(350mA)
LEDx3(700mA)
ø60

DA-504AN
LEDx4(350mA)
LEDx4(700mA)
ø70

DA-506AN
LEDx6(350mA)
LEDx6(700mA)
ø75

DA-509AN
LEDx9(350mA)
LEDx9(700mA)
ø85

DA-512AN
LEDx12(350mA)
LEDx12(700mA)
ø100

DA-515AN
LEDx15(350mA)
LEDx15(700mA)
ø100

DA-520AN
LEDx20(350mA)
LEDx20(700mA)
ø125

DA-503AD
LEDx3(350mA)
LEDx3(700mA)
ø75

DA-504AD
LEDx4(350mA)
LEDx4(700mA)
ø80

DA-506AD
LEDx6(350mA)
LEDx6(700mA)
ø90

DA-509AD
LEDx9(350mA)
LEDx9(700mA)
ø100

DA-512AD
LEDx12(350mA)
LEDx12(700mA)
ø125

DA-515AD
LEDx15(350mA)
LEDx15(700mA)
ø125

DA-520AD
LEDx20(350mA)
LEDx20(700mA)
ø150

■ 人性化防眩光設計

15 度以上截光角設計搭配黑色前罩有效減少眩光，增加空間照明舒適感

■ 結構設計

固定式與可擺動式的結構設計滿足不同應用需求

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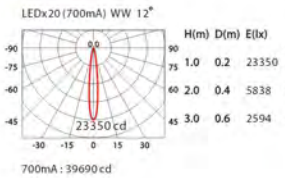
LED down light

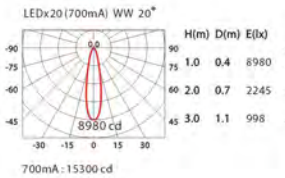
Recessed Ceiling Luminaires

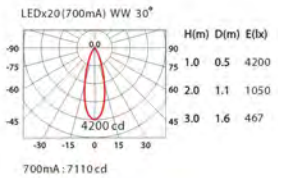
嵌入式燈DA-503系列

DA-520AN

光源：OSRAM LED
功率：LEDx20(350mA) / (700mA)
輸入電壓：AC 220-240V
LED 光色：■暖白 ■自然白 □冷白
角度：12°、20°、30°
顏色：□白色 ■黑色 ■銀灰
驅動器類型：外置
驅動器型號：PHILIPS 25W 0.3-0.7A I 230V(350mA)
PHILIPS 75W SH 0.3-1A 110V/230V(700mA)







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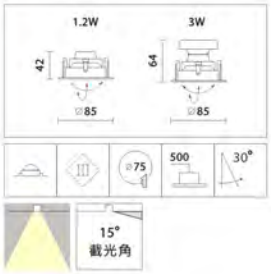
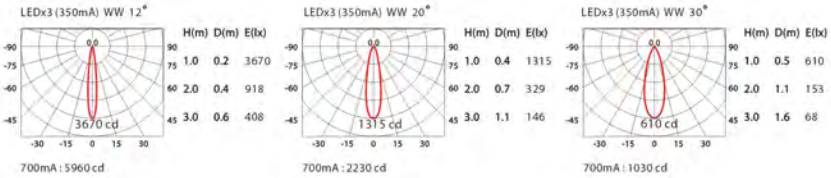
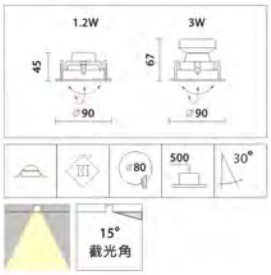
DA-503AD



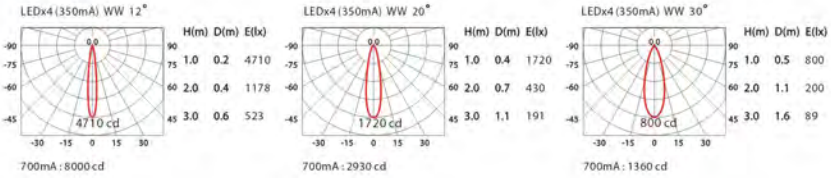
光源：OSRAM LED
功率：LEDx3(350mA) / (700mA)
輸入電壓：AC 100-240V
LED 光色：■暖白 ■自然白 □冷白
角度：12°、20°、30°
顏色：□白色 ■黑色 ■銀灰
驅動器類型：外置
驅動器型號：LSVC3AI-Z UNI(350mA)
LBVC9BI UNI(700mA)
垂直面雙向可30度調節



DA-504AD

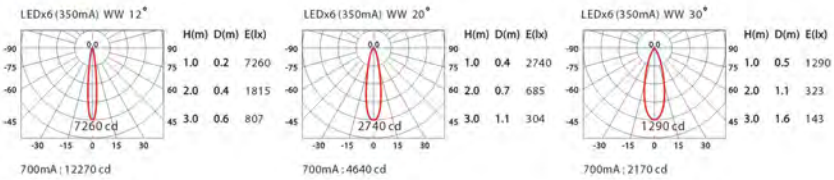


光源：OSRAM LED
功率：LEDx4(350mA) / (700mA)
輸入電壓：AC 100-240V
LED 光色：■暖白 ■自然白 □冷白
角度：12°、20°、30°
顏色：□白色 ■黑色 ■銀灰
驅動器類型：外置
驅動器型號：LFVC4AI-Z UNI(350mA)
LLVC12B UNI(700mA)
垂直面雙向可30度調節



DA-506AD

光源：OSRAM LED
功率：LEDx6(350mA) / (700mA)
輸入電壓：AC 100-240V
LED 光色：■暖白 ■自然白 □冷白
角度：12°、20°、30°
顏色：□白色 ■黑色 ■銀灰
驅動器類型：外置
驅動器型號：LMVC8AI UNI(350mA)
LTVC18B-Z UNI(700mA)
垂直面雙向可30度調節

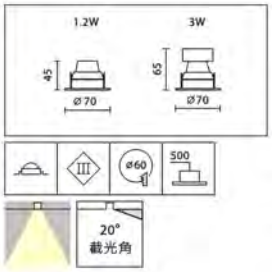


LED down light

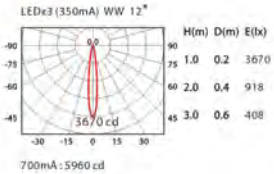
Recessed Ceiling Luminaires

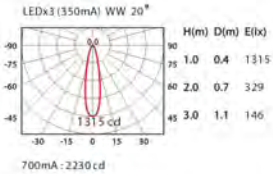
嵌入式燈DA-503系列

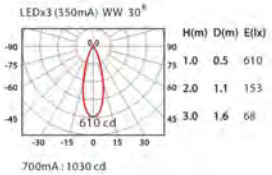
DA-503AN



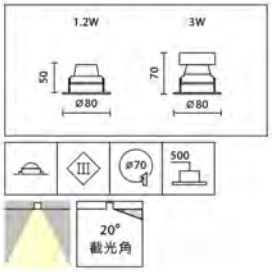
光源：OSRAM LED
功率：LEDx3(350mA) / (700mA)
輸入電壓：AC 100-240V
LED 光色：■ 暖白 ■ 自然白 □ 冷白
角度：12°、20°、30°
顏色：□ 白色 ■ 黑色 ■ 銀灰
驅動器類型：外置
驅動器型號：LSVC3AI-Z UNI(350mA)
LBVC9BI UNI(700mA)



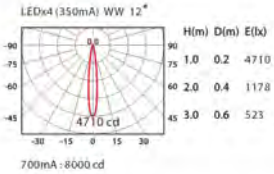


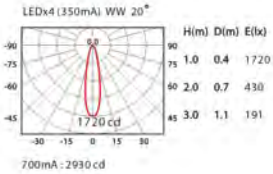


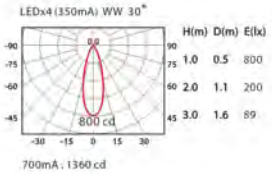
DA-504AN



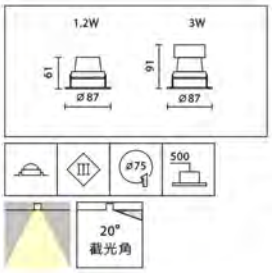
光源：OSRAM LED
功率：LEDx4(350mA) / (700mA)
輸入電壓：AC 100-240V
LED 光色：■ 暖白 ■ 自然白 □ 冷白
角度：12°、20°、30°
顏色：□ 白色 ■ 黑色 ■ 銀灰
驅動器類型：外置
驅動器型號：LFVC4AI-Z UNI(350mA)
LLVC12B UNI(700mA)



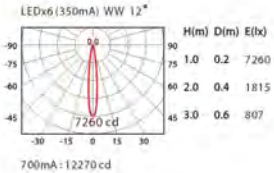


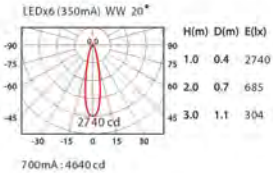


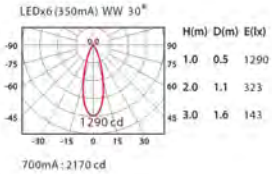
DA-506AN



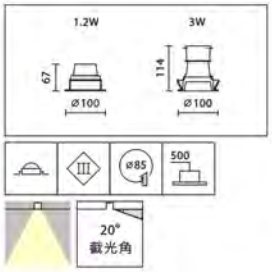
光源：OSRAM LED
功率：LEDx6(350mA) / (700mA)
輸入電壓：AC 100-240V
LED 光色：■ 暖白 ■ 自然白 □ 冷白
角度：12°、20°、30°
顏色：□ 白色 ■ 黑色 ■ 銀灰
驅動器類型：外置
驅動器型號：LMVC8AI UNI(350mA)
LTVC18B-Z UNI(700mA)



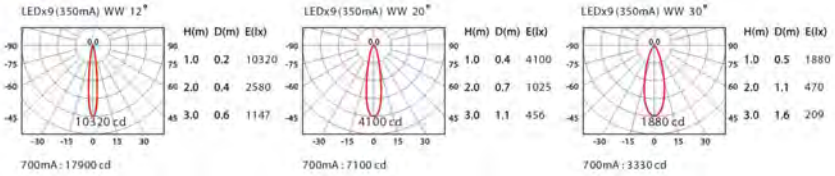




DA-509AN



光源：OSRAM LED
功率：LEDx9(350mA) / (700mA)
輸入電壓：AC 220-240V
LED 光色：■暖白 ■自然白 □冷白
角度：12°、20°、30°
顏色：□白色 ■黑色 ■銀灰
驅動器類型：外置
驅動器型號：LLVC12A UNI(350mA)
PHILIPS 25W 0.3-0.7A I 230V(700mA)



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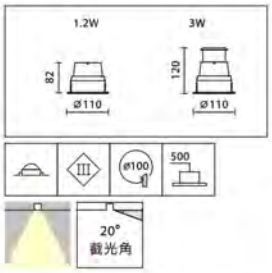
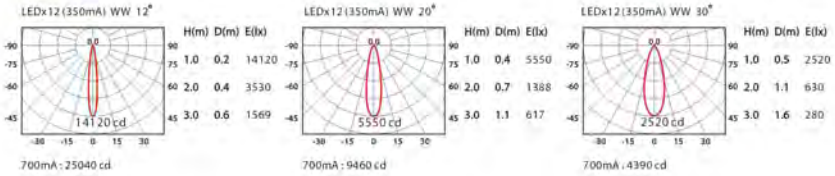
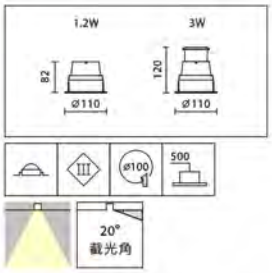


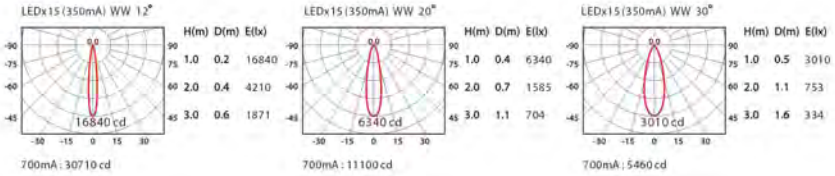
光源：OSRAM LED
功率：LEDx12(350mA) / (700mA)
輸入電壓：AC 220-240V
LED 光色：■暖白 ■自然白 □冷白
角度：12°、20°、30°
顏色：□白色 ■黑色 ■銀灰
驅動器類型：外置
驅動器型號：LTVC18A-Z UNI(350mA)
PHILIPS 50W SH 0.3-1A 62V I 230V(700mA)



DA-515AN



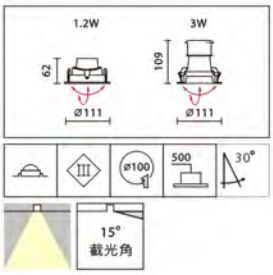
光源：OSRAM LED
功率：LEDx15(350mA) / (700mA)
輸入電壓：AC 220-240V
LED 光色：■暖白 ■自然白 □冷白
角度：12°、20°、30°
顏色：□白色 ■黑色 ■銀灰
驅動器類型：外置
驅動器型號：LTVC18A-Z UNI(350mA)
PHILIPS 50W SH 0.3-1A 62V I 230V(700mA)



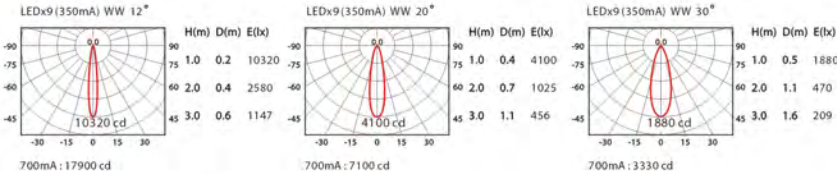
Recessed Ceiling Luminaires

嵌入式燈DA-503系列

DA-509AD



光源：OSRAM LED
功率：LEDx9(350mA) / (700mA)
輸入電壓：AC 220-240V
LED 光色：■暖白 ■自然白 □冷白
角度：12°、20°、30°
顏色：□白色 ■黑色 ■銀灰
驅動器類型：外置
驅動器型號：LLVC12A UNI(350mA)
PHILIPS 25W 0.3-0.7A I 230V(700mA)
垂直面雙向可30度調節



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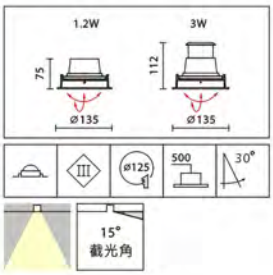
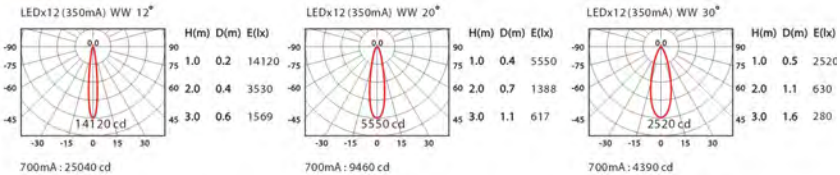


光源：OSRAM LED
功率：LEDx12(350mA) / (700mA)
輸入電壓：AC 220-240V
LED 光色：■暖白 ■自然白 □冷白
角度：12°、20°、30°
顏色：□白色 ■黑色 ■銀灰
驅動器類型：外置
驅動器型號：LTVC18A-Z UNI(350mA)
PHILIPS 50W SH 0.3-1A 62V I 230V(700mA)
垂直面雙向可30度調節



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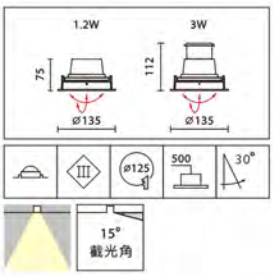
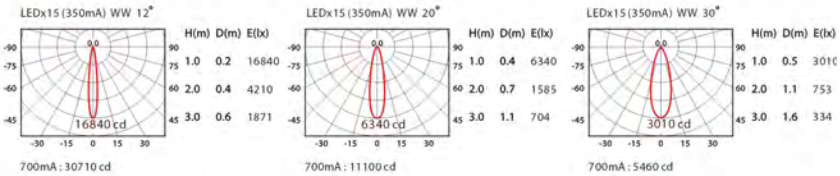
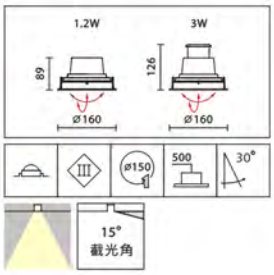


光源：OSRAM LED
功率：LEDx15(350mA) / (700mA)
輸入電壓：AC 220-240V
LED 光色：■暖白 ■自然白 □冷白
角度：12°、20°、30°
顏色：□白色 ■黑色 ■銀灰
驅動器類型：外置
驅動器型號：LTVC18A-Z UNI(350mA)
PHILIPS 50W SH 0.3-1A 62V I 230V(700mA)
垂直面雙向可30度調節

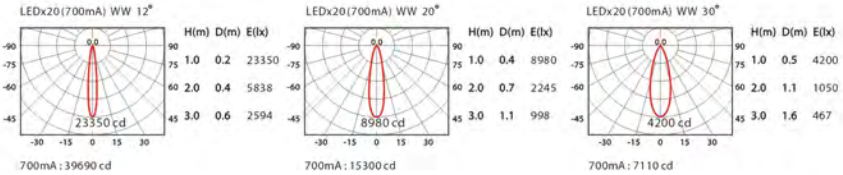


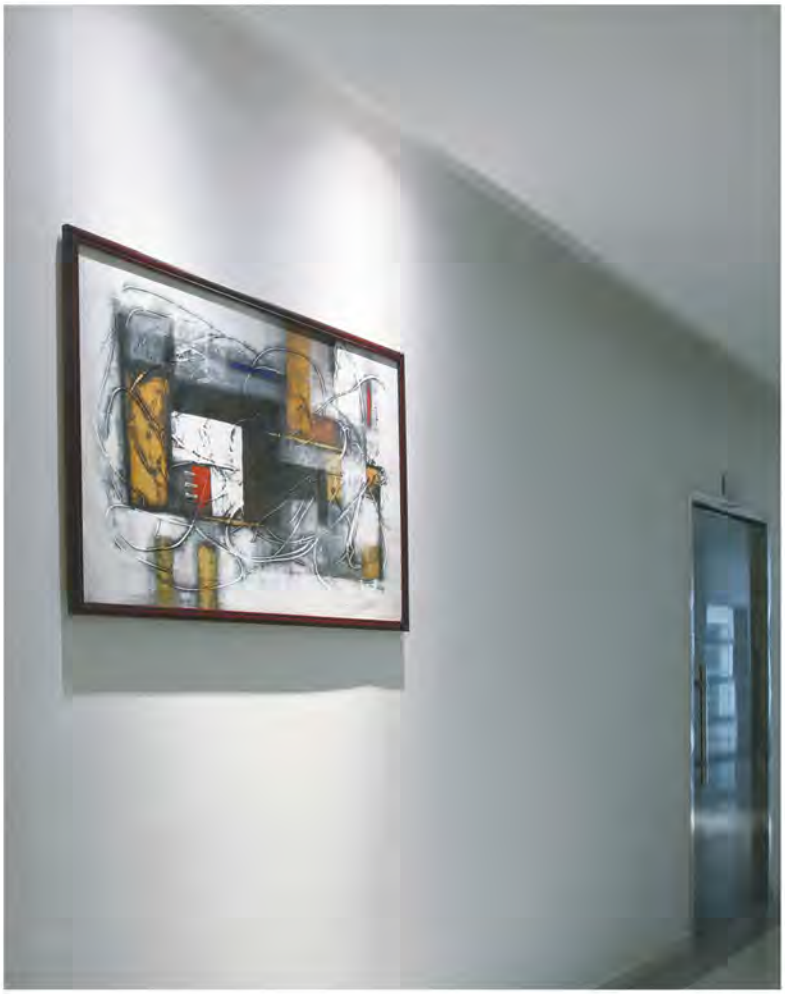
LED down light

DA-520AD



光源：OSRAM LED
功率：LEDx20(350mA) / (700mA)
輸入電壓：AC 220-240V
LED 光色：■暖白 ■自然白 □冷白
角度：12°、20°、30°
顏色：□白色 ■黑色 ■銀灰
驅動器類型：外置
驅動器型號：PHILIPS 25W 0.3-0.7A I 230V(350mA)
PHILIPS 75W SH 0.3-1A 110V/230V(700mA)
垂直面雙向可30度調節





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Tons:

FLOODLIGHTS 戶外投光燈系列

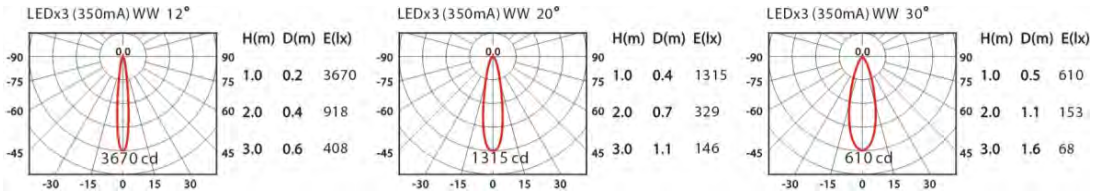
GA-123D

Product Features & Application areas 產品特點&適用場所

- 防護等級達到 IP67
- 優秀的光學設計,使得光形圓潤飽滿,質感出眾
- 專利的散熱設計結構,保證 LED 光源的超長壽命
- 採用國際品牌 LED 光源,高效節能
- 支架可水準方向轉動 355 度,燈頭可垂直擺動 120 度,滿足不同照明需求
- 人性化的防眩光設計為行人及車輛提供舒適的夜間照明
- 健康環保光線,光譜中不含紅、紫外線,為夜間照明提供節能環保的最佳選擇

適合用於庭院、園林、雕塑等戶外燈光工程

Photometic data 配光曲線圖



Product specifications 產品規格

光源(LightSource)	OSRAM OSLON LED	燈座(LampHolder)	/
瓦數(Watts)	1.2W*3 (350mA)	產品重量(Weight)	0.85kg
輸入電參數(AC Input)	100-240V 50HZ		
安定器/變壓器/驅動器(Ballast/Transformer/Driver)	益航 : LDR004-110-A0		
反射罩角度(Reflector Angle)	12°、20°、30°		
色溫(Color Temperature)	冷白、自然白、暖白		
安規執行標準(Standards of Safety)	●EN 60598-1:2008+A11:2009 ●EN 60598-2-6:1994+A1:1997 ●EN 60598-2-7:1989+A2:1996+A13:1997		
線材 / 長度 / 連接器(Connecting)	H05NR-F1-3G 電纜線, 2M		
產品材質(Material)	Aluminum 鋁		
顏色 / 表面處理方式(Color)	戶外黑、銀灰色		
包裝方式(Packing)	342 號內盒包裝 · 1PCS/盒 · 15PCS/箱		
安裝方式(Installation)	Surface-mounted 明裝式		
儲存溫度 / 濕度(Storage Temperature Range)	溫度:-20℃ to +50℃/濕度: 85%		

Accessories 配件

版本 : 1.0
2013.10.07

PART 1 – GENERAL

1.1 DESCRIPTION
This specification includes:

A. Conduit
B. Outlets
C. Wiring Devices
D. Junction and pull boxes
E. Cable trays

1.2 APPLICABLE CODES AND STANDARDS

A. IEC - International Electrotechnical Commission
B. CNS - China National Standard
Standard 1302 Rigid Nonmetallic Conduit
Standard 2606 Electrical Rigid Metal Conduit
Standard 4970 Rigid Nonmetallic Outlet Box
Standard 6079 Rigid Metal Conduit Fittings
Standard 6086 Rigid Metal Outlet Box
Standard 6109 Rigid Nonmetallic Conduit Fittings
Cable Trays
C. TPC - Regulations

1.3 SUBMITTALS: Product Data

PART 2 - PRODUCTS

2.1 CONDUIT

A. Electrical Metallic Tubing (EMT):
Electrical metallic tubing shall be mild steel, electrical welded and galvanized. EMT shall be in accordance with CNS standard.
B. Nonmetallic Conduit
Nonmetallic conduit shall be in accordance with CNS 1302 Standard. Conduit fittings, elbows and cement shall be provided by the same manufacturer. All joints shall be leakproof and be installed in strict accordance with manufacturer's recommendations.
C. EMT Steel Fittings: Set screw connecting devices shall be used on all EMT conduit except where conduit is to be installed in poured concrete. All EMT connection in poured concrete shall be compression type. Pressure cast type fittings are not acceptable.
D. PVC Fittings: Connecting devices shall be cleaned, dried and glued to PVC conduit per manufacturer's inspections. Couplings shall be female socket type of correct size to match conduit.

2.2 OUTLETS

A. Single or Multiple Gang Outlet Boxes: Provide a 100mm square, 38 mm or deeper outlet box with single or two-gang plaster ring mounted vertically for a flush wall switch, receptacle, or telephone. Where three or more devices are at one location, use a multiple gang box with a suitable plaster ring. Install one device per gang unless otherwise shown.
B. Lighting Fixture Outlets: Wall bracket and ceiling-mounted lighting fixture outlets to be 100 mm octagon, 38 mm deep with a 10 mm fixture stud.

Material and Methods

C. Surface Outlets: Surface outlets on exterior walls and in interior locations where exposed to moisture, and where specifically called for on the drawing shall be cast metal outlet boxes with conduit hubs matching device plates.
D. FLOOR BOXES: Floor boxes for receptacles, and other special outlets shall be provided if shown on the drawings. Floor boxes shall be flush mounted, cast metal adjustable, and watertight complete with gasket covers and bronze trim. Provide bronze carpet plate where appropriate.

2.3 WIRING DEVICES

A. Wall switches for control of lighting fixtures
1. Single-pole switch: 20 Ampere, 230 Volt.
2. Double-pole switch: 20 Ampere, 230 Volt.
3. Three-way switch: 20 Ampere, 230 Volt.
B. Receptacles
1. Single receptacle: 16A, 230 V, 3-wire, 2-pole, grounding type, with child protection.
2. Duplex receptacle: 16A, 230 V, 3-wire, 2-pole, grounding type, with child protection.

2.4 JUNCTION AND PULL BOXES

A. Junction boxes: Junction boxes having an internal volume of not over 0.0016m shall be as specified for outlet boxes, including grounding terminals, but not including other details applicable only to lighting fixture, switch, and receptacle outlet boxes, and shall have blank covers. Junction boxes having an internal volume of more than 0.002m shall be as hereinafter specified for pull boxes of corresponding sizes.
B. Pull Boxes: Pull boxes shall be made of galvanized steel, factory primed with zinc-chromate paint. Welded seams shall be continuous. Pull boxes shall be provided with grounding lugs welded to the box. Covers shall be fastened with screws and gasket as necessary. In addition, all outside surfaces of boxes and cover plates shall be given a factory finish coat of ANSI No.Z55.1 gray paint, except that finish may be omitted from outside surfaces of fully recessed boxes only. Boxes exposed to wet or rain conditions shall be cast waterproof type.
C. Fixtures: Each pull box shall be provided with sufficient clamps, grips, etc., to which cables shall be secured in a neat and orderly fashion permitting ready identification, so that no cable will have an unsupported length of more than 760mm.

2.5 CABLE TRAYS

A. General: Cable trays shall be ladder type trays with components, accessories and system interconnections as required.
B. Ratings
1. The cable tray, fittings, and connectors shall be designed for a working load of 75kg/m, with a load safety factor of 2.0 when tested in accordance with NEMA VE 1-3.01.
2. The design shall be based on a supported span length of 3.7m, NEMA class designation 12B.
3. Each rung shall be capable of supporting, without deformation, a load of 90kg placed at the midpoint of the rung.
4. The installation of a connector between two tray sections shall not decrease the strength of the tray.
C. Definitions: The definitions and manufacturing standards shall be in accordance with Parts 1 and 2 of NEMA VE 1.
D. Fittings
1. Fittings shall be designed and constructed exactly as the straight sections with respect to side rail and rung material, gauge, finish, and dimensions.
2. Unless otherwise shown, the inside radius of tray fittings shall be 300 mm.
3. Cable trays with covers shall be provided with straps or clamps for secure fastening of the covers.

PART 3 - EXECUTION

3.1 METHODS

A. General: Installation of materials shall be as specified herein.

3.2 CONDUIT INSTALLATION

A. General: Conceal conduit wherever possible unless otherwise shown or specified. Run all exposed conduit paralled with building walls using right-angle bends. Exposed diagonal runs of conduit will not be permitted unless specifically shown otherwise. Installation of electrical conduit shall conform to CNS Standard.

1. Size and routing of conduit shall be determined by Contractor. Conduit shall be installed without interference with other work. Metallic conduit and fittings shall be physically and electrically separated from reinforcing steel by the use of bitumastic paint or similar material.
2. The exact location of conduit runs shall be determined to suit field conditions.
3. Conduit shall run continuously between outlets and shall be provided with junction boxes for tap connections. Changes in direction shall be made with large radius bends or proper fittings.
4. Conduit size shall be determined from outside diameter of Contractor-furnished cable.

B. Supports

1. All supporting elements shall have adequate thread engagements. The amount of thread engaged and amount available for further adjustment shall be plainly in view. Sight holes shall be provided where necessary.

C. Flexible Connections: Provide flexible conduit connections for thermocouple assemblies, sensors and solenoids and connect raceway and cable as indicated.

D. Grounding Continuity: Metallic conduits and connections shall be electrically and mechanically continuous.

E. Nonmetallic Conduit Connections: Cut ends of plastic conduit shall be trimmed inside and outside to remove rough edges and shall be cleaned thoroughly. Joints in plastic conduit shall be made with manufacturer's recommended sealant and shall be watertight. Each conduit run complete with bends, elbows, and other fittings shall be capable of passing freely a ball 6mm smaller in diameter than the inside diameter of the conduit. Between cable pull points, a conduit run shall not contain more than a total of three 90 degree bends, totaling 270 degrees, including bends at outlets and fittings.

F. Install bends on embedded conduit in accordance with the following tabulations:

size of Nominal mm(CNS)	minimum radius of factory bend mm	minimum radius of field bend mm
16,20&28	200	250
42	250	300
54	300	380
70	380	460
82	460	610
104	610	760

Material and Methods

G. Hanger rods shall comply with the following schedule. Larger diameter rods may be necessary where the rod supports more than one conduit.

Conduit Diameter (mm CNS)	Rod Diameter (mm)
54 or less	10
70 to 104	12

H. Electrical Metallic Tubing (EMT)
1. Installation of EMT shall be in accordance with applicable instruction for exposed conduit unless otherwise specified.
2. Minimum size EMT shall be 15mm diameter.
3. EMT fittings shall be compression type.

3.3 OUTLET INSTALLATION

A. Outlets: outlets installed back-to-back in the same wall shall be offset from each other, 150 mm horizontally, to preclude noise transmission.
B. Outlet boxes: Install outlet boxes flush with the finished surface where outlets occur in finished walls or columns.
C. Supports: Outlet boxes shall be supported to masonry or concrete construction by expansion anchors and to steel beams by clamps, bolts, etc. Pull boxes shall be rigid under torsional and deflecting forces and, if necessary, shall be provided with angle iron frame for rigidity. Covers shall have a sufficient number of screws to ensure continuous contact with the box

3.4 JUNCTION AND PULL BOX INSTALLATION

Sheet metal boxes shall be adequately supported to maintain shape. Larger boxes shall be adequately formed or braced with structural steel welded into a rigid assembly to maintain alignment in shipment and installation.

3.5 CABLE TRAY INSTALLATION

A. General
1. Installation shall be in accordance with the manufacturer's written instructions.
2. Tray supports shall be designed and fabricated from steel or iron to rigidly support the trays under stress of cable installing and structure vibrations from equipment operation. Supports shall be constructed in accordance with details shown. Earthquake bracing shall be as required.
3. Expansion joints in the cable trays shall be installed at structure expansion joint crossings. Except where anchors are required, support elements shall be fabricated to permit free movement of raceways at crossings over structural expansion or contraction joints.
4. Each hanger shall be designed to permit adjustment after erection while supporting the load.1. Installation shall be in accordance with the manufacturer's written instructions.
5. Cable tray systems shall be coordinated with adjacent services and equipment to avoid interferences. Location of cable trays in accessible areas or directly underneath light fixtures will not be permitted.
B. Spacing of Supports: Supports for cable trays shall not be greater than 3.7m unless otherwise specified.
C. Attachment to Building Structures:Tray supports shall be attached to structural steel wherever possible.
D. Hanger Rods: Hanger rods shall be not less than 12mm diameter.
E. Trapeze Hangers:

1. A trapeze hanger with two or more hanger rods may be used for cable trays. Hanger rods shall not be less than 12mm in diameter.
2. Trapeze bars shall consist of special steel box channels with spring loaded nuts.

F. Tray Covers: Ladder type trays shall be provided with non-ventilated covers along their entire length. Covers shall be secured firmly with readily removable straps or clamps.

G. Grounding: Cable tray shall be grounded.

Wires and Cables

PART 1 – GENERAL

1.1 DESCRIPTION
This specification includes wires and cables used for power equipment, receptacle and lighting:

A. 16mm2 XLPE – LSFH (WD-YJY) / PVC
B. 10mm2 XLPE – LSFH (WD-YJY) / PVC
C. 6mm2 XLPE – LSFH (WD-YJY) / PVC
D. 4mm2 XLPE – LSFH (WD-YJY) / PVC
E. 2.5mm2 XLPE – LSFH (WD-YJY) / PVC

1.2 APPLICABLE CODES AND STANDARDS

A.	CNS 2655	C2047
B.	CNS 679	C2012
C.	IEC 60332	Tests on electric and optical fibre cables under fire condition
D.	IEC 61034	Measurement of smoke Density of Cables Burning under Defined Conditions
E.	IEC 60754	Test on Gases Evolved During Combustion of Materials from Cables

1.3 SUBMITTALS: Product Data

PART 2 - PRODUCTS

2.1
A. Multi core cable with copper conductor, XLPE insulated and LSHF material sheath cable are rated at 0.6/1KV and conform to IEC standard.
B. 2.5mm2, 4mm2, 6mm2, 10mm2, 16mm2 cable will be used for power, lighting and receptacle.

2.2
A. Single core cable with copper conductor, PVC insulated and PVC material sheath cable are rated at 0.6/1KV and confirm to IEC standard.
B. 2.5mm2, 4mm2, 6mm2, 10mm2, 16mm2 cable will be used for grounding.

PART 3 - EXECUTION

3.1 All installation shall be in accordance with specification and the manufacturer's written instructions.
3.2 Installation of wire and cable shall be accordance with plans and drawings.
3.3 Installation of Cable in Conduit
A. Wiring shall consist of insulated conductors installed in raceway. All conductors shall be continuous terminal to terminal.
B. Conduit wiring for lighting and receptacles shall be limited to three circuits per conduit.
C. The cables shall be unrolled from the drum in a manner to avoid kinking, undue tension, or crushing of the cores. The overall protective jacketing shall be maintained intact without scratches or abrasions.
D. Maximum pulling tension on cables with pulling eyes attached to the conductor or a basket grip shall not exceed manufacturer's published recommendations.

3.4 Installation of Cable in Trays

A. Installation shall be in accordance with the manufacturer's written instructions.

B. Routing of cable in trays shall be as shown in the drawings.

C. Cables ampacities and spacing in cable trays shall be in accordance with TPC regulation.

D. Rollers shall be used at all bends and elbows to minimize pulling stresses.

E. Tray covers shall be installed as indicated after installation and inspection of cable is complete.

F. Cables shall be protected against injury or damage during storage, transit, and installation.

G. In vertical runs, the cables shall be fastened to the tray at intervals of not more than 3m.

Panelboards

PART 1 – GENERAL

1.1 DESCRIPTION

This section covers designing, furnishing, installing, and testing power distribution panelboards and accessories.

1.2 APPLICABLE CODES AND STANDARDS

A. CNS - China National Standard

C4172 General Distribution Panel

B. IEC – International Electrotechnical Commission

60947 Low-Voltage switchgear and controlgear

60439 Low-Voltage switchgear and controlgear assemblies

1.3 SUBMITTALS: Product Data

PART 2 - PRODUCTS

2.1 REQUIREMENTS

A. General: All panelboards shall be rated for the indicated short circuit currents.

B. Panelboards:

1. Panelboards shall be wall-mounted, consisting of circuit breakers, and other associated equipment as indicated.

C. Enclosures

1. The enclosure shall be fabricated with welded seams and corners, a folded edge flat frame around the front of the enclosure to provide a mounting surface for the front trim panel, and mounting plates or bosses to support the interior unit.

D. Circuit Breakers

1. Circuit breakers shall be molded case type manually operated, trip free, with thermal magnetic trip, in accordance with an interrupting capacity as shown.
2. The circuit breakers shall be capable of carrying 80 percent rated current continuously for panel application.
3. Circuit breaker arrangement shall be as shown.

PART 3 - EXECUTION

3.1 INSTALLATION

All installation shall be in accordance with specification and the manufacturer's written instructions.

3.2 FIELD TESTS

After the equipment has been installed, inspected, and placed in operating condition, it shall be field-tested. The field test shall demonstrate the equipment and components function in compliance with the specification over the entire range of operation.

NEO SOLAR POWER

D6P_B3A-WS
240W - 260W
Multi-Crystalline Photovoltaic Module

- Positive power tolerance
  0~+4.99 watt
- Withstand strong wind/snow load up to 5400 Pa
  Pass ASTM E330
  Maximum wind speed: 197 km/h (safety factor 3)
- Excellent low light performance
  4% relative eff. reduction at low-irradiance (200W/m²)
- 100% EL inline inspection
  Better module reliability
- Prolonged aging test
  2000 hours damp heat test; 400 thermal cycles
- Certified ammonia resistance
  According to IEC 62716 Ed. 1
- Compliance with RoHS and REACH

Certificate No. BABT8518

Reliability & Certification

Product guarantee: 5-year (10-year optional)

Performance warranty

- 25-year: minimum 80% power output
- 10-year: minimum 90% power output

IEC 61215 / IEC 61730, UL 1703, CE, MCS

* Please refer to NSP product warranty for details

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Photovoltaic modules

NEO SOLAR POWER

Electrical Data

MODEL	D6P240B3A	D6P245B3A	D6P250B3A	D6P255B3A	D6P260B3A
Maximum Rating Power (Pmax)	240 W	245 W	250 W	255 W	260 W
Module Efficiency	14.7%	15.0%	15.3%	15.6%	15.9%
Open Circuit Voltage (Voc)	36.99 V	37.16 V	37.33 V	37.50 V	37.67 V
Maximum Power Voltage (Vpm)	29.76 V	30.05 V	30.34 V	30.64 V	30.93 V
Short Circuit Current (Isc)	8.54 A	8.61 A	8.69 A	8.76 A	8.83 A
Maximum Power Current (Ipm)	8.06 A	8.15 A	8.24 A	8.32 A	8.43 A

*Electrical data under Standard Test Conditions (STC): Cell Temperature of 25 °C, Irradiance 1000 W/m², AM 1.5
*Values w/o tolerance are typical numbers

Mechanical Data

Item	Specification
Dimension	1650 mm (L) x 990 mm (W) x 42 mm (D) / 65" (L) x 39" (W) x 1.65" (D)
Weight	18.3 kg / 40.3 lbs
Solar Cell	60 multicrystalline 6" silicon cells (156 mm x 156 mm)
Front Glass	Anti-reflective tempered solar glass, 3.2mm thickness
Cell Encapsulation	EVA (Ethylene-Vinyl-Acetate)
Back Cover	Composite film, white
Junction Box	IP 65 rated
Frame	Anodized aluminum frame, original or black

Operating Conditions

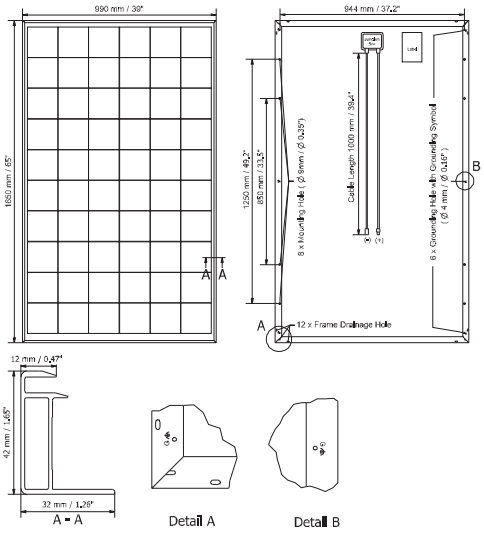
Item	Specification
Mechanical Load	5400 Pa (Certified by TUV Rheinland)
Maximum System Voltage	IEC: DC 1000 V / UL: DC 600 V
Series Fuse Rating	15 A
Operating Temperature	-40 to 85 °C

Temperature Characteristics

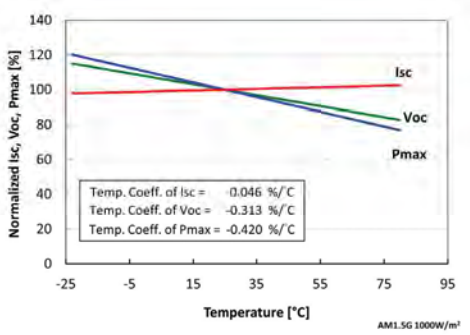
Item	Specification
Nominal Operating Cell Temperature	44.1 °C ± 2°C
Temperature Coefficient of Isc	0.046 % / °C
Temperature Coefficient of Voc	-0.313 % / °C
Temperature Coefficient of Pmax	-0.420 % / °C

* Normal Operating Cell Temperature (NOCT): Irradiance 800W/m², Ambient Temperature 20 °C, Wind Speed 1 m/s
* Please refer to NSP's Standard Module Installation Manual before using the product
* Reduction in efficiency from 1000 W/m² to 200 W/m² at 25 °C: 4% ± 2 %

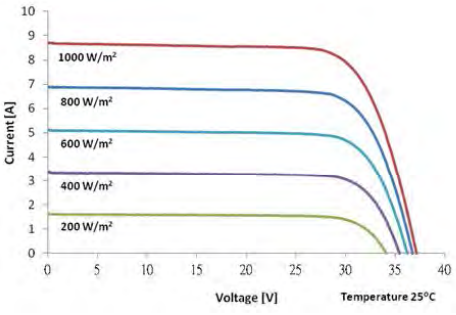
Front View & Back View



Dependence on Temperature



Dependence on Irradiance



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Website: www.nsp.com

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Specifications are subject to change without notice.

WSM-09-01-D6P_B3A-WS Ver.1.0

EC Declaration of Conformity

Producer:	Delta Energy Systems (Germany) GmbH
Address:	Tscheulinstr. 21, 79331 Teningen, Germany
Product description:	**Solar Inverter for Grid operation**

Model:		
	SOLIVIA2.0EUG4TR (1)	**EOE45010459**
	SOLIVIA2.5EUG4TR (1)	**EOE45010288**
	SOLIVIA3.0EUG4TR (1)	**EOE46010287**
	SOLIVIA3.3EUG4TR (1)	**EOE46010252**
	SOLIVIA3.6EUG4TR (1)	**EOE46010316**
	SOLIVIA5.0EUG4TR (2)	**EOE46010253**

The product described above in the form as delivered is in conformity with the provisions of the following European Directives:

2004/108/EC Council Directive on the approximation of the laws of the Member States relating to electromagnetic compatibility

Immunity	EN 61000-6-2 : 2005
Emission	EN 61000-6-3 : 2007 + A1 : 2011
Harmonics / Flicker	EN 61000-3-2 : 2006 + A1 : 2009 + A2 : 2009
	(1) EN 61000-3-3 : 2008
	(2) EN 61000-3-12 : 2005 + EN 61000-3-11 : 2000

2006/95/EC Council Directive on the approximation of the laws of the Member States related to electrical equipment designed for use within certain voltage limits

Safety	IEC 62109-1 : 2010
	EN 62109-1 : 2010
	IEC 62109-2 : 2011
	EN 62109-2 : 2012

Teningen, Oct 1st 2012

Klaus Gremmelspacher		Andreas Hoischen	
Head R&D LOB Solar	.....	Head of LOB Solar	.....
Name, Function	Signature	Name, Function	Signature

This declaration certifies the conformity to the specified directives but contains no assurance of properties. The safety documentation accompanying the product shall be considered in detail..

SOLIVIA 5.0 TR

High efficiency solar inverters for the European market -
Perfect choice for a single or multi-family house

Versatile applications

- Usable with all commercially available solar modules (mono, poly, amorphous)
- Wide input voltage range
- Suitable for indoor and outdoor applications (IP65)

Maximum profitability

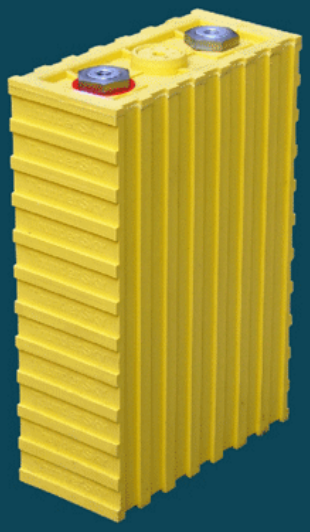
- Peak efficiency of 96 %
- Full output power up to 55 °C
- 10 years guarantee after online registration

www.solar-inverter.com

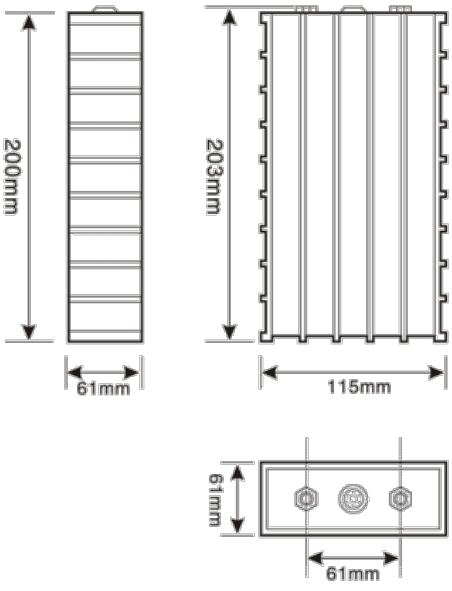
Winston Battery
Address: Winston Industrial Park, Third Industrial Zone, Lisonglang Village, Gongming Town, Shenzhen, Guangdong P.R.C
Tel: +86-755-8602 6789 Fax: +86-755-8602 6678
Http://www.winston-battery.com E-mail: winston@winston-battery.com

温斯頓牌稀土鋰釔動力電池性能説明
SPECIFICATION FOR WINSTON RARE EARTH LITHIUM YTTRIUM POWER BATTERY

單體電池尺寸 DIMENSIONS



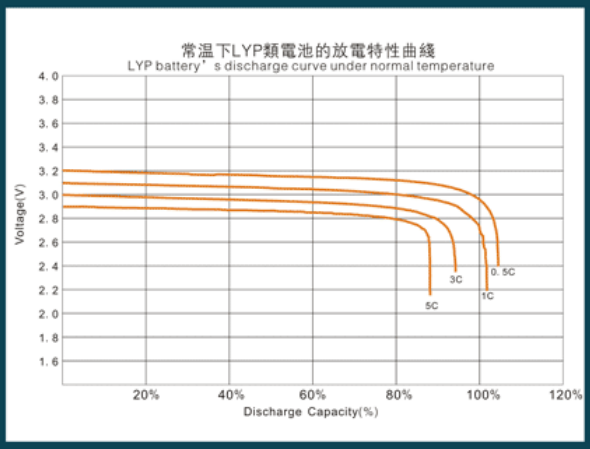
型号(MODEL)：WB-LYP60AHA

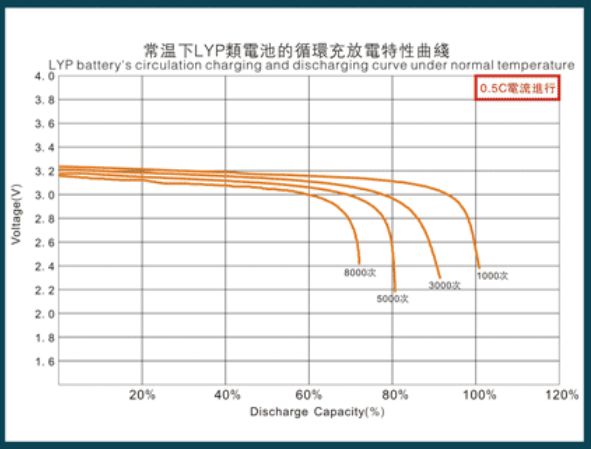


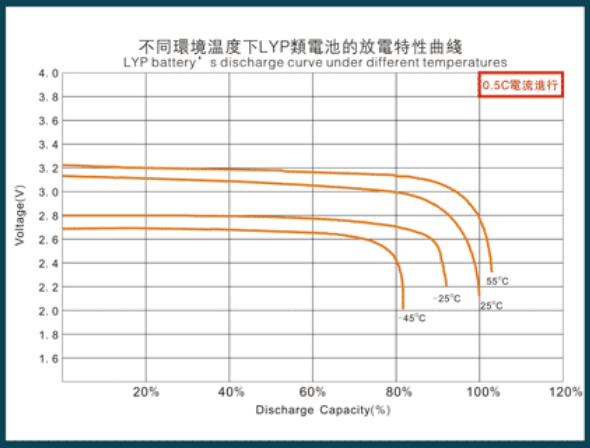
技術參數 SPECIFICATIONS

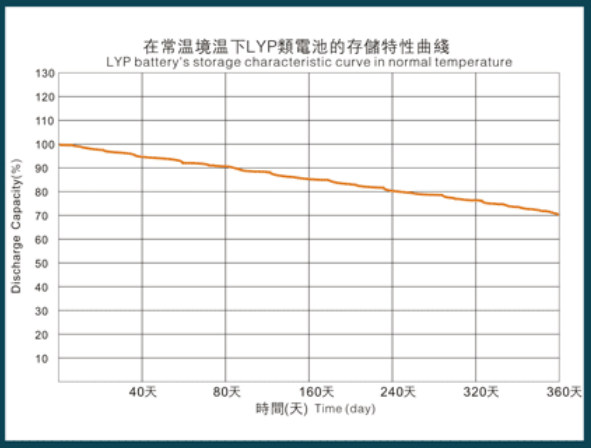
型號(MODEL)： WB-LYP60AHA		
標稱容量 Nominal Capacity	60Ah	
工作電壓 Operation Voltage	充電 (Charge)	4.0V
	放電 (Discharge)	2.8V
最大充電電流 Max Charge Current	≤3CA	
最大放電電流 Max Discharge Current	恒電流 (Constant Current)	≤3CA
	脉衝式 (Impulse Current)	≤20CA
標准充放電電流 Standard Charge/ Discharge Current	0.5CA	
循環壽命 Cycle Life	(80DOD%)	≥3000Times
	(70DOD%)	≥5000Times
殼體耐温性 Temperature Durability Of Case	≤200℃	
適應環境 Operating Temperature	充電 (Charge)	-45℃~85℃
	放電 (Discharge)	-45℃~85℃
自放電率(月) Self-discharge Rate	≤3% (Monthly)	
單體電池重量 Weight	2.3kg±50g	

WB-LYP60AHA型電池的充放電特性
WB-LYP60AHA CHARGE & DISCHARGE CHART









MSDS No.：WB-20130201 Creation date：01 Feb，2013

产品安全数据信息 MSDS

PRODUCT SAFETY DATA MSDS

产品名称：锂离子电池

PRODUCT NAME: LITHIUM-ION BATTERY

产品名称：锂离子电池
化学品用途：可反复充放电电池
厂商资料：
名称：温斯顿电池制造有限公司
地址：中国深圳宝安区公明镇李松蔚村第三工业区
电话： + 86 755 86026789 传真：+86 755 86026678
网址：www.winston-battery.com 电邮：winston@winston-battery.com
紧急联络方式：+ 86 755 27165653 (24h)
化学品运输紧急应变中心：1-800-424-9300
技术服务邮箱：service@winston-battery.com
Product Name: Lithium-Ion Battery
Chemical Use :Battery
Manufacturer:
Name: Winston Battery Limited
Address: No.3 Industrial Zone,Lisonglang Village, Gongming Town, Bao'an Dist, Shenzhen, P.R.C
Tel:+86 755 86026789 Fax:+86 755 86026678
Website：www.winston-battery.com Email: winston@winston-battery.com
Emergency Contact::+86 755 27165653(24h)
Chemical Transport Emergency Center : 1-800-424-9300
Technical Support email : service@winston-battery.com

产品信息 PRODUCT INFORMATION

a ）物质或化合物和供应商的标识 Substance/Compound And Supplier'S Logo；

1. 温斯顿锂离子电池 Winston Lithium-Ion Battery
2. 标识 **Logo**

b ）危险标识 Danger Sign：

MSDS No.：WB-20130201 Creation date：01 Feb，2013

Winston Battery

c ）成分构成/成分信息COMPOSITION/INFORMATION ON INGREDIENTS：

电池型号：LYP/LP Product Model:LYP/LP			
成分 Ingredient	重量% Weight %	化学文摘号 Cas No.	备注 Notes
稀土钇 Rare Earth Y	40.5%	7440-65-5	----------
碳酸锂 LI_2CO_3	16%	554-13-2	----------
猛 Mn	4.4%	7439-96-5	----------
钙 Ca	0.3%	7440-70-2	----------
碳纤维 Graphite	5%	7782-42-5	----------
钠 Na	1.5%	7440-23-5	----------
碳 C	3.1%	7440-44-0	----------
铁 Fe	3.4%	7439-89-6	----------
聚氨基甲酸酯 PE	3.3%	9002-88-4	----------
铜 Cu	10%	7440-50-8	----------
铝 Al	6%	7429-90-5	----------
钾 K	1.7%	7440-09-7	----------
氟 F	3.3%	7782-41-4	----------
锶 Sr	1.5%	7440-24-6	----------

d ）急救措施FIRST AID MEASURES：

1. 万一电池破裂、冒烟、燃烧的情况下，首先应疏散危险区人员，并且提供最大的烟气通风口来排除烟雾气体；同时立即用水喷淋或将冒烟燃烧的电池浸泡在水中。
   In case of battery rupture, fume or fire, evacuate personnel from contaminated area and provide maximum ventilation to clean out fumes/gases. Meantime, spray the battery with water or put the smoking battery into basin at once.

2. 万一以下情况发生时，请立即就医：
   In case the following occur, seek medical attention immediately.

⑴ 与眼睛接触：用大量清水冲洗至少 15 分钟（保持眼帘打开）或立即到医院就医。
Eye contact: Flush with plenty of water (eyelids held open) for at least 15 minutes or go to the hospital for help immediately.

⑵ 与皮肤接触：脱掉所有受污染的衣物，用大量的清水清洗受污染皮肤，肥皂清洗至少15 分钟，请勿使用任何油类及软药膏。

Skin contact : Remove all contaminated clothing and flush affected areas with plenty of Water and soap for at least 15 minutes Do not apply greases or ointments.

⑶ 摄入：用大量的水进行稀释并且立即就医，误吞食电池部分物质，不会造成即时危险。在确保感染者没有使用催吐剂，确保粘液没有阻隔呼吸道时，建议到医院就医。

Ingestion: Dilute by giving plenty of water and get immediate medical attention, swallowed part of the substance of the battery will not cause immediate danger. Assure that the victim does not aspirate vomited material by use of positional drainage. Assure that mucus does not obstruct the airway. Seek for medical attention.

⑷ 吸入：立即将受害者移至新鲜空气处并给受污染区域通风；必要时通氧气或者人工呼吸。

Inhalation: Remove to fresh air and ventilate the contaminated area. Give oxygen or artificial respiration if needed.

e ）消防措施FIRE-FIGHTING MEASURES：

1. 灭火媒介：如果电池冒烟或燃烧，最好的解决方法是采用水喷淋电池或者把冒烟燃烧的电池迅速放入到水中。

   Extinguishing media: spray the battery with water or put the smoking /fire battery into water at once if the battery fume or fire.

2. 灭火器材：D 型灭火器，二氧化碳灭火器，干粉灭火器及泡沫灭火器。

   Extinguishing tools : Type D extinguishers , Co2, Dry chemical or Foam extinguishers.

f ）事故排除措施 ACCIDENT RELEASE MEASURES：

万一电池破裂或在滥用的情况下、冒烟、着火，应立即把电池浸入水中，或者用大量持续的水喷淋，或者在其冷却后放在特定的容器中，并根据当地的相关规定处理。

In case of battery rupture,or fume/fire under abuse, put the smoking /fire battery into water at once ,or soak under water or spray with copious amounts of water , place in approved container after cooling, and dispose in accordance with local regulations

g ）搬运和存储 HANDLING AND STORAGE：

1. 搬运：可采用叉车或卡板搬运，电池搬运时只能立放，要轻拿轻放，不能倒放或侧放和丢摔。

   Carriage: can use forklifts or pallets, stand up the battery gently when move. Do not upside down or on its side or throw.

2. 存储：把电池存放在凉爽通风的环境下（最佳温度为+25℃±5℃），和远离水源，热源及火源，电池放置需与墙壁保持适当距离；不要挤压、穿透电池，或者是使用导电物质促使

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电池短路；不要直接加热或者焊接电池；不要把不同型号及品牌的电池混用；不要新旧电池混用；把电池置放在非导电托盘或者塑料托盘中。需要长期存放的电池，不能倒置储存，首先将电池充电至荷电 40-60％，以后需每月检查电池的开路电压，确定存放的同批电池的电压一致或相差在许可范围内，如发现电池电压低于 3. 0V 时应该尽快补充充电。一般正常情况下电池每月自放电率≤3％，每半年应补充充电一次即可。

Storage: Store in a cool preferably condition (optimum temperature at +25℃±5℃) and ventilated area away from moisture, sources of heat, open flames. Keep adequate clearance between walls and batteries. Do not crush, pierce, short (+) and (-) battery terminals with conductive goods. Do not directly heat or solder batteries. Do not mix batteries of different types and brands. Do not mix new and used batteries; keep batteries in non-conductive or plastic trays. If need long term storage, do not store upside down, charge the batteries to 40-60% at first, and check the battery's open circuit voltage monthly is needed, make sure the voltage in the same batch to be consistent or difference within permitted extent. Charge the batteries immediately if the voltage of the batteries under 3.0V. The regular self-discharge rate is less than 3% every month. Charge the batteries once per half a year.

h ）接触控制/人身保护 CONTACT CONTROLS/PERSONAL PROTECTION：

1. 放在儿童不可触到的地方。
2. 电池泄漏或破裂时，避免皮肤直接接触。
3. 皮肤组织防护：正常使用下无需使用。在处置泄露电池时，使用氟胶手套和遮蔽罩。
4. 眼部防护：正常使用下无需使用。在处置泄露或者破裂电池时，穿防护衣和防护镜。
5. 呼吸防护：正常使用下无需使用。在电池破裂时，使用自给全脸呼吸设备。

1.Keep out of reach from children.
2.Avoid contact with skin when the battery leak or rupture.
3. Skin protection: Not necessary under normal use. Use rubber apron and protective working in case of handling of a ruptured battery.
4.Eye protection: Not necessary under normal use. Wear safety goggles or glasses with side shields if handling a leaking or ruptured battery.
5. Respiratory protection: Not necessary under normal use. In case of battery rupture, use self-contained full-face respiratory equipment.

i ）物理和化学特性 PHYSICAL AND CHEMICAL PROPERTIES：

1. 物理特性：锂离子可充电电池是密封式外壳，在正常使用和电池无损坏和密封完整的情况下温斯顿 LYP/LP 系列电池不会产生爆炸和起火的危险。只有在电池被滥用（如： 机械能、热能、电能超标及受外来火源影响的情况下），导致电池安全阀的启动或者电池壳破裂，泄露出液体时，在潮湿或有水的情况下，电极物质可能发生反应或引发电池冒烟。为了预防电池由于内部过压及温度过高引发的危险，温斯顿电池设计了安全阀装置来确保电池壳不被损伤破裂。

Physical characteristics : The lithium-ion rechargeable batteries are with sealed case, and under normal use and the seals remain intact, Winston LYP/LP series batteries are with no risk of

explosion or fire .Only in case of abuse(i.e. over normal mechanical power、heat、electrical power and Under the influence of external sources of ignition),which leads to the activation of the safety valve or the rupture of the battery container, which cause the electrolyte leak, electrode materials reaction with moisture/water or battery vent. In case of excessive internal pressure ,Winston batteries design with a safety vent to protect the cell case from rupture.

2. 化学特性 Chemical Characteristics：

根据标准 67/548/EEC 指示的产品中含有危险物质的等级分类如下：
Classification of dangerous substances contained into the product as directive 67/548/EEC

物质 Substance		融化点 Melting Point	沸点 Boiling Point	分类 Classification			
CASNO	化学式 Chemical Formula			暴露极限 Exposure Limit	危险指示 Indication Of Danger	特殊风险（1） Special Risk(1)	安全指示（2） Safety Advice(2)
12190-79-3	LiFeYPO4	> 1000℃	N/A			R22 R43	S2 S22 S24 S26 S36 S37 S43 S45
EC：96-49-111 DMC：616-38-6 DEC:105-58-8 EA:141-78-6	有机溶液（ DC-DMC DEC-EA） Organic Solution	EC：38℃ DMC：4℃ DEC：-43℃ EA：-84℃	EC：24℃ DMC：90℃ DEC：127℃ EA：77℃	OSHA 中未规定 Unfound OSHA	易燃的 Inflammable	R21 R22 R41 R42 R43	S2 S24 S26 S36 S37 S45
21324-40-3	LiPF 6	N/A（分解于 160℃） N/A (Decomposing in 160℃)	N/A	OSHA 中未规定 Unfound OSHA	刺激物/腐蚀 Stimulator Corrosion	R14 R21 R22 R41 R43	S2 S8 S22 S24 S26 S36 S37 S45

j ）稳定性和反应性STABILITY AND REACTIVITY：

1. 应避免的条件：温度高于 85℃或者焚烧电池。使变形、毁坏、挤压、分解、拉长或者把电池置于潮湿的环境。
2. 电解质中的 LiPF6 与水发生的化学反应将产生氟氧化物及二氧化碳。
3. 在燃烧中可能会形成氟化物（HF）与磷氧化物。

1. Conditions To Avoid : Heat above 85 ° C or incinerate. Deform, mutilate, crush, disassemble, elongate or exposure to humid condition.

2. Reaction of $LiPF_6$ with water to form Oxyfluoride and CO_2.
3. Formation of Hydrogen fluoride (HF) and phosphorous oxides during fire.

k ）毒理学信息 TOXICOLOGICAL INFORMATION：

温斯顿锂离子充电电池不含有毒物。
Winston lithium rechargeable battery does not contain toxic materials.

l ）生态信息ECOLOGICAL INFORMATION：

当正确使用至电池寿命终止时，可回收再造，温斯顿锂离子充电电池不会带来环境污染。
Under normal conditions of use till the end of the battery life,it can recycle and won't bring any pollution to the environment.

m ）处理考虑DISPOSAL CONSIDERATIONS：

1. 根据可适用的规则处理，因各国法律而异。
2. 锂离子电池的电极必须保持绝缘并且最好在处理前用独立塑料包装袋包装。
3. 使用者不可焚烧电池，只能由权威的机构合理回收处理。

1. Dispose in accordance with applicable regulations, which vary from country to country.
2. Lithium-Ion batteries should have their terminals insulated and be preferably wrapped in individual plastic bags prior to disposal.
3. Do not dispose of the battery into fire except for authorized agency.

n ）运输信息TRANSPORT INFORMATION：

1. UN-NO.3480
ARD /RID
九类 二类包装 ARD/RID 标签 9
适当运输品名 锂离子电池，UN3480
Class 9 Packing Group II ADR/RID-Labels 9
Proper shipping name Lithium-ion batteries, UN3480
IMO
等级 二类包装 IMO-标签 9
适当运输品名 锂离子电池，UN3480
Class Packing Group II IMO-Labels 9
Proper shipping name Lithium-ion batteries, UN3480
IATA-DGR
等级 二类包装 ICAO-标签 9
适当运输品名 锂离子电池，UN3480
Class Packing Group II ICAO-Labels 9
Proper shipping name Lithium-ion batteries, UN3480

Winston Battery

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2. 温斯顿电池制造有限公司声明我们的产品符合联合国手册及测试标准下条理 38.3 的要求。
Winston Battery Ltd. declares that UN Manual of Tests and Criteria, Part III, sub-section 38.3 is met.

3. 在航空运输中，当他们能够满足 IATA 条款 UN3480 条款下 Ed. 54 规定的要求和 ICAO 包装要求 965 条款 II 的要求及每个包装不高于 35KG 的要求情况下，小容量的（单体≤20WH 或者电池组≤100WH）锂离子电池被认为是期望型产品。在通用的 IATA 规定下，标题货物可以像正常的货物一样运输。
In airfreight, small Lithium-ion batteries (cells≤20WH or packs≤100WH) are considered as “Expected Lithium-ion Batteries”, when they meet the requirements of Ed. 54of IATA regulations (UN3480) and ICAO Packing Instruction 965 section II, specifying less than 35kg gross per package. Caption shipment can move as normal cargo under current IATA .

4. 在其他情况下（针对电池容量单体 > 20WH 或者电池组 > 100WH），锂离子电池被认为是九类产品. 必须符合 DGR 里适用的要求。（如 PI 965，Section IA 条款要求 ） 。
In other cases (mainly for large cells >20WH or packs > 100WH), they are considered as Class 9.They must meet the requirements of DGR (See Packing Instruction PI965 section IA for airfreight).

5. 在航海运输中，当电池满足 IMO 中 IMDG 危险产品的规定（UN3480）情况下，密封的锂离子电池被认为是不受限制-锂离子电池。
In the shipping by sea , sealed Lithium-ion batteries are considered as “ Lithium-ion Batteries-Not Restricted”, when they meet the requirements of IMDG of IMO Dangerous Goods Regulations (UN3480).

6. 关于可充电锂离子电池的运输各种机构的相关规定，请参考 IATA，IMO，ADR/RID。
The transport of rechargeable lithium-ion batteries is regulated by various bodies, refer to: IATA, IMO, ADR/RID.

o ）管理信息 MANAGEMENT INFORMATION：

1. 温度范围 **Temperature range**

	持续Continuous	瞬间 Instant
储存Storage	+25℃±5℃	
放电 Discharge	-25℃/+75℃	-45℃/+85℃
充电 Charge	-25℃/+75℃	-45℃/+85℃

2. 比能：（备注： WH=标准电压*额定安时）KG=平均电池重量
Specific Energy: (Note: Wh = Normal voltage x Rated Ah) kg = Average battery weight)

3. 比脉冲功率：600W-1200W/KG, 视电池尺寸不同。
Specific Pulse Power: 600w-1200w/kg Varies depending upon size

4. 机械阻力：如 IEC 标准相关规定

Mechanical Resistance : As defined in relevant IEC standard

p ）其他信息/免责声明OTHER INFORMATION/DISCLAIMER：

1. 此资料从其编译来源上被认为是可靠的，据我们所知及确信从我们编辑之日起是可靠并且准确的。但是，这儿需要指出的对于此材料的制造精准，可靠性和完整性不作出任何形式的陈述及表达和隐含的担保。

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RenE-ES 6120
Battery Energy Storage System
Delta Energy Systems

Compact battery energy storage system is a complete solution for medium and small customer installations.
It collects electrical energy from the grid, when it is cost efficient and stores it in batteries. This energy can be then reused for local loads or sold back to the utility.
Installation is easy and does not require any changes to existing electrical installation. Just plug it in to your electrical socket!
The whole system is supervised by dedicated PLC controller, which gives the customer various possibilities of remote control, such as: system visualisation, change of state, load limitation, scheduled activities and alarms.

Main features

- Nominal power 3120VA, 230V AC
- Equipped with 6kWh batteries
- One point connection to the grid
- Easy installation without any need to interfere with existing installation (plug & play)
- Flexible operating modes for convenient power management.
- Compact and modular design enables easy expansion
- Possibility to equip with off-grid inverter and PV connection
- Remote management and access via RS-458 or Ethernet

Application:

Modern households, small industries

DELTA
Smarter. Greener. Together.

RenE-ES 6120
Battery Energy Storage System
Delta Energy Systems

Technical Specification (*)

1. General	
Nominal power	3120VA
AC voltage	230 V AC / 50Hz
Active elements	2 x Delta DPR2900B-48 12 x Delta DDP 260AB 1 x Battery LiIon 6kWh 1 x Controller PSC 1000N
Dimensions	600x600x1600 mm
Weight	140 kg
Standards	CE, IEC 62109, IEC 60950, VDE-AR-N 4105, EN61000-4-3-6, EN61000-6-3, EN61000-6-1, EN61000-3-2, EN 55022, UL 60950, CAN / CSA - C22.2

3. On-Grid Inverter	
Type	Delta Micro Inverter DDP 260 AB
AC voltage	230V AC
Nominal output frequency	47,5 - 51,5 Hz
Input voltage	20 - 59 V DC
Peak efficiency	>96%

4. Rectifier	
Type	2x Delta DPR2900B-48
Nominal power	2x2900 W
Input voltage	88 - 310 V AC
Output voltage	42 - 58 V DC

5. Battery	
Type	High density Lithium battery 30xWB-LY60AHA cells from Winston Battery
Nominal capacity	6kWh
Technology	LiFePO4
Voltage range	36,5 V – 56 V

Delta Energy Systems (Poland) Sp. z o.o.
Poleczki 23, 02-822 Warsaw, Poland
Phone: +48 22 335 2600, Fax: +48 22 335 2601
www.deltapowersolutions.com

Smarter. Greener. Together.

SPECIFICATIONS

Heat Pipe Vacuum Tube Solar Collector

Heat pipe solar thermal collector can be started quickly even under cloudy day. When vacuum tube absorber energy from sun, heat pipe transfer energy from tubes to manifold immediately. 360° absorber vacuum tube make the most efficient and sustained use of the sun's energy all year round. The vacuum between two glass tubes prevents heat loss even at Frigid Zone. Manifold made of aluminum-alloy with perfect injected polyurethane insulation layer. Interior manifold is made of copper

Technical Parameter

- Solar Collector

Absorber :Heat pipe evacuated tube
Thermal Absorption : > 0.86%
Thermal Emissive : < 0.08%
Coating :AL/AL-ALN; CU/SS-ALN

- Evacuated Tube

Outer Diameter :0.58 mm
Length :1700 mm
Material :High Boron Silicon Glass 3.3
Thickness :1.6 mm

- Manifold

Material :Copper
Outer Covering :Aluminum alloy
Connection :3/4" (Inlet & Outlet)
Pressure Resistance :0.7 Mpa

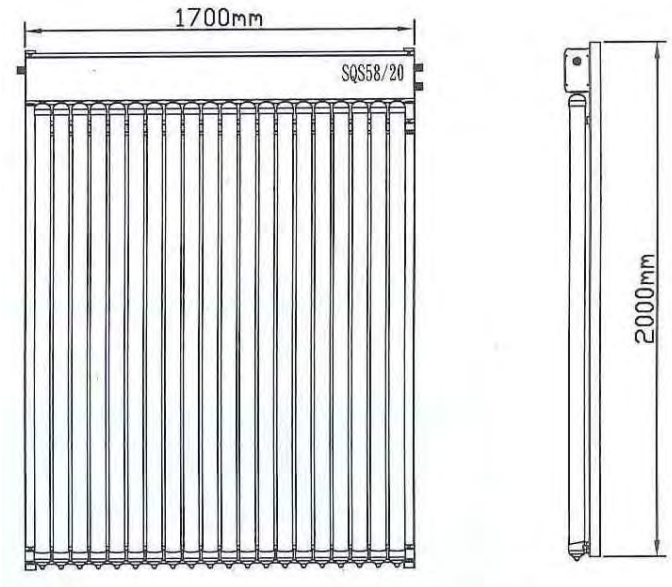
- Frames

Material :Aluminum alloy

Antifreeze

Antifreeze liquid refers to local relevant standard

Dimensions



The new PadFone Infinity

Platform

Android 4.2 (Jelly Bean)

Color

Milky white / gray meteorite

Size

PadFone deformation phone
143.5 x 72.8 x 8.9 mm (length x width x height) **PadFone tablet docking station** 264.6 x 181.6 x 10.6 mm (L x W x H)

Weight

Phone:
145 g (with battery)

CPU

Qualcomm Snapdragon 800 2.2GHz

Memory

2 GB RAM

Data Storage Applications

50GB free cloud space used for 2 years (ASUS WebStorage)

Memory slots

Micro-SD card (up to 64 GB)

Link Technology

WLAN 802.11a/b/g/n/ac
Bluetooth V4.0 + EDR + HS + A2DP, NFC

Internet technical standards

UMTS / LTE / WCDMA
DC-HSPA + UL: 5.76 Mbps / DL: 42 Mbps
LTE UL: 50 Mbps / DL: 150 Mbps **3G:** UMTS: 850/900/1900/2100 **2G:** EDGE / GPRS / GSM: 850/900 / 1800/1900, **4G:** LTE: 800/1800/2600

Navigation

GPS, GLONASS & AGPS

Screen

PadFone deformation Mobile:
5-inch, 1920 x 1080/441 PPI, IPS panel with multi-touch **tablet PadFone base:** 10.1-inch, 1920 x 1200/224 PPI, IPS panel with multi-touch

Battery

PadFone deformation phone
2400 mAh built-in rechargeable lithium battery **PadFone tablet dock** 5000 mAh built-in rechargeable lithium battery

Standby time

410 hours (3G)

Talk time

19 hours (3G)

Network Camera

PadFone phone deformation
front lens auto focus, 2.0 megapixel, F2.0 aperture
lens autofocus back, 13 million pixels, LED flash, F2.0 aperture **PadFone tablet dock** front camera 1,000,000 pixels

Video features

Video playback:
up to 1080p MPEG4
H.264
H.263
3GP
Ogg
Audio Recording:
up to 1080p @ 30fps MPEG4, 720p @ 60fps
H.264
H.263 VGA @ 30fps
Ogg
3GP

Audio jack

3.5mm

Sound

MP3/3GP/AAC/AAC +

Ring

MP3

Browser

Google Browser

Message

SMS / MMS / Google Talk / Email

E-mail

Google Mail/Exchange/POP3/IMAP4/SMTP

Inductor

Gravity sensor / electronic compass / Gyroscope / Proximity Sensor / Ambient Light Sensor / Motion Sensor

Fitting

Transformer USB adapter
USB sync cable
3.5mm wired headset microphone

Interior propagation spreading (Rules 51.3)

Type of material	Class	Location in Specifications in PD and PM
Covering (See Rule 51.3 Note 1)		
Bayer Makrolon	UL-94	PM 13.2.1 a
Ceiling (See Rule 51.3 Note 2)		
KD Wood Panel	Flame Retardant	
Walls (See Rule 51.3 Note 2)		
KD Wood Panel	Flame Retardant	
Flooring		
KD Floor Panel	CN7614	
Pipes and ducts (running through flooring, walls & ceilings)		
Stainless steel tube, galvanized sheet(ducting), EMT	A2-S1, d0	PM 5.3.4
Textile cover elements integrated into building		
N/A		
Thermal screen of thermal and acoustic insulation products	Fire resistance time	Location in Specifications in PD and PM
Glass Foam	Over 1 hour	PM 13.1.2

Fire Safety Table

Evacuation of occupants

Evacuation element	Width (m)	Specifications in PD and PM
Doors and doorways		
Entrance Door Entrance doorway	1.14 1.45	PT-001
Hallways and ramps		
West side entrance ramp South side exist ramp	1.6 1.6	PT-001

Fire protection systems

	Quantity and Efficiency	Specifications in PD and PM
Portable fire extinguisher(s) inside the house	2;21A, 113B, C	FP-002, 003
Portable fire extinguisher(s) outside the house	1;21A, 113B, C	FP-002

Fire resistance of the structure

Fire resistance of the structure	Specifications in PD and PM
R30	PM 13.1.2 i

1. **Safety against falls**

Floor class slipperiness

Type of floors	Where (Location in the project)	Floor classification - Specifications in PD and PM
Dry interior area: Surface's slope less than 5%	Kitchen, Living Room, Bedroom	AR-021
Dry interior area: Surface's slope equal or greater than 5%. Stairs included	Tea Terrace, Mezzanine	AR-021, 022
Humid interior area: Surface's slope less than 5%	Bathroom	AR-021
Humid interior area: Surface's slope equal or greater than 5%. Stairs included	Exterior Ramp	AR-002
Exterior areas	Deck	AR-021

Differences in the floor level, holes and opening (limit the risks of falling)

Where (in the project) and difference in floor level, holes and opening that represent a risk of falling	Type of protective barriers	Height of protective barriers where the difference in the floor level are more than 400mm - Specifications in PD and PM
Slope	Guardrail	1.0 M (AR-101)
Deck	Guardrail	1.0M (AR-101)

Restricted Areas stairs

	Value	Specifications in PD and PM
Width of the tread	1.26 M	AR-371
Height of the riser	0.17 M	AR-371
Depth of the tread	0.28 M	AR-371
Height of handrails	1.1 M	AR-371

Public Areas staircases

	Value	Specifications in PD and PM
Width of the tread	N/A	N/A
Length of the tread	N/A	N/A
Height of the riser	N/A	N/A
Depth of the tread	N/A	N/A
Height of handrails	N/A	N/A

Safety in use table

Ramps

	Value	Specifications in PD and PM
% slope value	5%	AR-002
Length of ramp	15.095M 16.61 M	AR-021
Width of ramp	1.6 M	AR-021
Height of handrails	1.0 M	AR-101
Size of the resting landings	1.875 M x 3.4 M 1.6 M x 6.48 M	AR-021

2. Safety for avoiding trapping and impact risk

Impact due to fixed elements (House Tours area)

	Minimum Value	Specifications in PD and PM
Clearance height in house	2.418 M	AR-201
Height of the doors threshold	2.415 M	AR-311
Height of fixed elements projecting from facades		
Projection of fixed elements in the walls that do not which do not start from the ground		

Impact due to opening elements (public tours areas)

	Value (circular freespace)	Specifications in PD and PM
Sweep of the doors on the sides of the hallway	1.5 M	PT-001

Impact due to fragile elements and not very perceptible elements.

Location in the project	Type of glazing (safety)	Specifications in PD and PM

Trapping

	Value (distance)	Specifications in PD and PM
Distance of manual sliding door to the nearest fixed element		

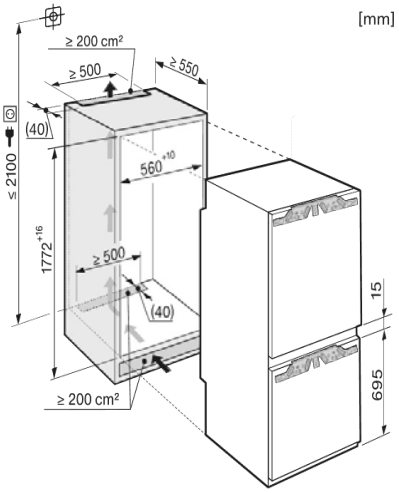
3. Safety against the risk of inadequate lighting

	Where- min. illumination level	Specifications in PD and PM
Light fittings for exterior areas		PD: EL-401,
Light fittings for interior areas	200 Lux	PD: EL-402, PM:5.2.3

12.5 Appliances

Appliance **12.5.1**

Refrigerator



Basic		
Brand	Miele	
Model	KFN 37452 i DE	
Dimension (mm)	560x550x1772	
Load Capacity	Fresh-Food Section Capacity 196 L	
	Freezer Capacity 60 L	
Energy		
Energy Efficiency Class	A++	
Energy Consumption	Annually (kWh)	229
	Annually (24 h in kWh)	0.627
	Current consumption in milliamps (mA)	1400
Sound emissions	39 in dB(A) re1pW	
Feature		
Temperature dispaly and Control	Touch control	
Optical door alarm	Yes	
Optical temperature alarm	Yes	
Climate class	SN-T	
Storage time event of a fault (kg)	20	
Freezer capacity in 24 h (kg)	10	

Appliance **12.5.1**

Refrigerator

Miele
IMMER BESSER

KFN 37452 i DE

Combiné réfrigérateur/congélateur encastrable

avec la touche personnelle grâce à l'éclairage des clayettes FlexiLight et IceMaker

- Eclairage des clayettes réglable individuellement grâce à FlexiLight
- Dégivrage automatique grâce au système NoFrost
- Entreposage des aliments où vous le souhaitez - DynaCool
- Nettoyage des compartiments de porte au lave-vaisselle - ComfortClean
- Préparation de glaçons grâce à la fabrique de glaçons indépendante

Ligne	
Ligne	Elégance
Type d'appareil	
Réfrigérateur	•
Modèle	
Intégrable/encastrable/habillable	•/–/–
Charnières de porte/modifiables/Montage Side-by-Side	droite/•/–
Eclairage zone de réfrigération	
Type d'éclairage	FlexiLight
Éclairage PerfectFresh Pro LED	–
Confort d'utilisation	
MasterFresh/PerfectFresh/SelfClose	•/–/•
PerfectFresh Pro avec système d'information	–
Fabrique à glaçons/Raccordement à eau fixe/Réservoir d'eau Mylce	•/–/•
ComfortClean/Froid dynamique DynaCool/NoFrost/VarioRoom	•/•/•/•
Amortisseur de porte SoftClose/Drop & Lock	•/–
Bandeau de commande	
Affichage et réglage électronique de la température	Touch
Possibilité de désactiver le réfrigérateur	•
Réglage indépendant du réfrigérateur et du congélateur	•
SuperFroid/SuperFrost	•/•
Nombre de zones de températures	2
Réfrigérateur	
Tablettes en verre sécurit, réglables en hauteur	•
Nombre de tablettes/dont divisibles	3/–
Clayettes en métal chromé	•
Nombre de bacs à légumes extractibles	1
Compartiment pour beurre et fromage	–
Eléments amovibles dans la contre-porte	–
Balconnets continus/Demi-balconnets	2/–
Cloison pour bouteilles dans la contre-porte	1
Congélateur	
Nombre de tiroirs/bacs de congélation extractibles	2+2
Tablettes en verre sécurit, réglables en hauteur	•

Efficacité énergétique et consommations d'énergie	
Classe d'efficacité énergétique	A++
Consommation d'énergie par an/en 24 h en kWh	229/0,627
Sécurité	
Fonction de verrouillage	•/•
Alarme de porte/de température sonore	•/•
Alarme de porte/de température optique	•/•
Caractéristiques techniques	
Dimensions de la niche en mm (H x L)	1.772 – 1.788 x 560 – 570
Technique de fixation de la porte	Directe
Charge max. de la porte du réfrigérateur/congélateur en kg	20-Dec
Classe climatique	SN-T
Volume utile en l	256
Réfrigération en l/Zone PerfectFresh en l/Congélateur en l	196/0/60
Niveau sonore dB(A) re1pW	39
Autonomie en cas de panne (en h)/Puissance de congélation (en kg)	20/10,0
Courant en milliampères (mA)	1400
Accessoires fournis	
Beurrier/balconnet à œufs	•/•
Prix de vente maximal conseillé en € TTC dont 13 € éco-part	2512
Disponibilité	Dispo nov. 2013

Miele

Operating and installation instructions

Frost free fridge-freezer with ice cube maker and DynamicCooling KFN 9755 iDE

To avoid the risk of accidents or damage to the appliance, it is **essential** to read these instructions before it is installed and used for the first time.

en - AU, NZ

M.-Nr. 09 307 630

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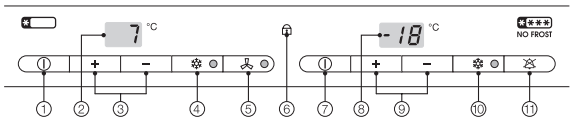
Appliance **12.5.1**

Refrigerator

Guide to the appliance



① On/Off button for switching the refrigerator section on and off separately

② Refrigerator section temperature display

③ Refrigerator section temperature selector buttons (+ for warmer; – for colder)

④ SuperCool button and indicator light

⑤ DynamicCooling button and indicator light

⑥ Safety lock indicator light

⑦ Master switch for switching the whole appliance on and off

⑧ Freezer section temperature display

⑨ Freezer section temperature selector buttons (+ for warmer; – for colder)

⑩ SuperFreeze button and indicator light

⑪ Alarm off button

5

Guide to the appliance

① DynamicCooling fan

② Butter and cheese compartment

③ Bottle rack

④ Egg tray/Condiment tray

⑤ Interior lighting

⑥ Adjustable shelves

⑦ Condensate channel and drain hole

⑧ Universal container

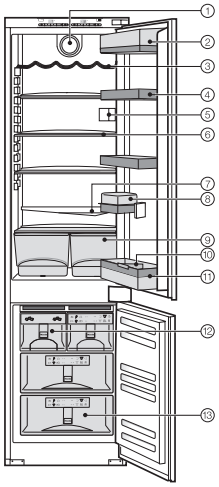
⑨ Fruit and vegetable containers

⑩ Bottle divider

⑪ Bottle shelf

⑫ Ice cube drawer with automatic ice cube maker

⑬ Freezer drawers with freezer calendar



6

Caring for the environment

Disposal of the packing material

The transport and protective packing has been selected from materials which are environmentally friendly for disposal and can normally be recycled.

Ensure that any plastic wrappings, bags, etc. are disposed of safely and kept out of the reach of babies and young children. Danger of suffocation.

Rather than just throwing these materials away, please ensure they are offered for recycling.

Disposing of your old appliance

Electrical and electronic appliances often contain materials which, if handled or disposed of incorrectly, could be potentially hazardous to human health and to the environment. They are, however, essential for the correct functioning of your appliance. Please do not therefore dispose of it with your household waste.

Please dispose of it at your local community waste collection / recycling centre and ensure that it presents no danger to children while being stored for disposal.

The plug must be rendered useless and the cable cut off directly behind the appliance or the machine to prevent misuse. Take care not to damage the pipework at the back of it before or during transportation to an authorised collection depot.
In this way, refrigerant in the pipework and oil in the compressor will be contained, and will not leak out into the environment.

7

Warning and Safety instructions

This appliance complies with all relevant legal safety requirements. Improper use of the appliance can, however, present a risk of both personal injury and material damage.

To avoid the risk of accidents and damage to the appliance, please read these instructions carefully before installation and before using it for the first time. They contain important notes on the installation, safety, operation and care of the appliance.

Keep these instructions in a safe place and pass them on to any future user.

Correct application

▶ This appliance is intended for domestic use only for the cool storage of food and drinks as well as for storing deep frozen food, freezing fresh food and for preparing ice.

This appliance is not suitable for outdoor use.

Any other usage is not supported by the manufacturer and could be dangerous. The manufacturer cannot be held liable for damage resulting from incorrect or improper use or operation.

▶ This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety.

Safety with children

▶ This appliance is not a toy! To avoid the risk of injury, do not allow children to play on or near it or to play with the controls. Older children may only use the appliance if its operation has been clearly explained to them and they are able to use it safely, recognising the dangers of misuse.

▶ Keep children away from the appliance at all times and supervise them whilst you are using it. Do not allow children to play with the appliance, for example to climb inside the drawers or to swing on the door.

8

Warning and Safety instructions

Technical safety

▶ Before setting up the appliance, check it for any externally visible damage.
Do not install and use a damaged appliance.

▶ This appliance contains the coolant Isobutane (R600a), a natural gas which is environmentally friendly. Although it is flammable, it does not damage the ozone layer and does not increase the greenhouse effect. The use of this environmentally friendly coolant has, however, led to a slight increase in the noise level of the appliance. In addition to the noise of the compressor, you might be able to hear the coolant flowing around the system. This is unavoidable, but does not have any adverse effect on the performance of the appliance.
Care must be taken during transportation and setting up of the appliance that no parts of the cooling system are damaged. Leaking coolant can damage the eyes.
In the event of any damage:
- avoid open fires and anything which creates a spark,
- disconnect from the mains,
- air the room in which the appliance is located for several minutes and
- contact the Miele for advice.

▶ The more coolant there is in an appliance, the larger the room it should be installed in. In the event of a leakage, if the appliance is in a small room, there is the danger of combustible gases building up.
For every 8 g of coolant at least 1 m^3 of room space is required. The amount of coolant in the appliance is stated on the data plate inside the appliance.

▶ Before connecting the appliance to the mains supply, make sure that the voltage and frequency correspond to the rating on the data plate.
This data must correspond in order to avoid the risk of damage to the appliance. Consult a qualified electrician if in any doubt.

▶ The electrical safety of this appliance can only be guaranteed when continuity is complete between it and an effective earthing system which complies with current local and national safety regulations. It is most important that this basic safety requirement is present and tested regularly, and where there is any doubt, the household wiring system should be inspected by a qualified electrician. The manufacturer cannot be held liable for damage or injury caused by the lack of or inadequacy of an effective earthing system (e.g. electric shock).

▶ If the connection cable is faulty it must only be replaced by a Miele approved service technician to protect the user from danger.

9

Warning and Safety instructions

▶ Safe operation of the appliance is only assured if it has been installed and connected in accordance with these operating and installation instructions.

▶ This appliance must not be installed and operated in mobile installations (e.g. on a ship).

▶ Installation work, maintenance and repairs may only be carried out by suitably qualified and competent persons in accordance with national and local safety regulations.
Repairs and other work by unqualified persons could be dangerous and the manufacturer will not be held liable.
Ensure current is not supplied to the appliance until after maintenance or repair work has been carried out.

▶ The manufacturer cannot be held liable for damage caused by a faulty connection to the mains water supply.

▶ Connection to the mains water supply and any repairs to the ice cube maker must only be carried out by a suitably qualified and competent person.

▶ The ice cube maker is not suitable for connection to a hot water supply.

▶ Before making plumbing connections, ensure the appliance is disconnected from the mains electricity supply.

▶ The appliance is only completely isolated from the electricity supply when:

– it has been switched off at the wall socket and the plug has been withdrawn.
– the fuse from the fused spur connection unit has been withdrawn, or
– the mains fuse has been withdrawn, or the screw-out fuse removed (in countries where this is applicable).

▶ Do not connect the appliance to the mains electricity supply by an extension lead.
Extension leads do not guarantee the required safety of the appliance (e.g. danger of overheating).

▶ In areas which may be subject to infestation by cockroaches or other vermin, pay particular attention to keeping the appliance and its surroundings in a clean condition at all times. Any damage which may be caused by cockroaches or other vermin will not be covered by the warranty.

10

Warning and Safety instructions

Correct use

▶ Never handle frozen food with wet hands. Your hands may freeze to the frozen food.

▶ Do not take ice cubes out with your bare hands and never place ice cubes or ice lollies in your mouth straight from the freezer.
The very low temperature of the frozen ice or lollies can cause frost burn to the lips and tongue.

▶ Do not re-freeze thawed or partially thawed food.
Defrosted food should be used up as quickly as possible as food soon loses it nutritional value and goes off.
Defrosted food may only be re-frozen after it has been cooked.

▶ Do not store explosive materials in the appliance or any products containing propellants (e.g. spray cans). Thermostats switching on may produce sparks which could present a fire hazard. Flammable compounds could explode.

▶ Do not operate any electrical equipment (e.g. an electric ice-cream maker) inside the appliance. Danger of sparking and explosion.

▶ If storing alcohol with a high percentage proof, make sure it is tightly closed and stored upright. Danger of explosion.

▶ Do not store cans or bottles containing carbonated drinks or liquids which could freeze in the freezer section. The cans or bottles could explode. Danger of injury and damage to the appliance.

▶ When cooling drinks quickly in the freezer, make sure bottles are not left in for more than one hour; otherwise they could burst, causing injury or damage.

▶ Observe the "use by" dates given on food to avoid the risk of food poisoning. Storage times will depend on several factors including the freshness and quality of the food as well as the temperature at which it is stored. Follow the instructions given on the food manufacturer's packaging on storage conditions required.

▶ Do not use sharp edged objects to

– remove frost and ice,
– separate frozen foods and remove ice trays.

They will damage the evaporator, causing irreversible damage to the appliance.

▶ Never place electric heaters or candles in the appliance to defrost it. These can damage the plastic parts.

▶ Do not use defrosting sprays or de-icers, as they might contain substances which could damage the plastic parts or which could cause a build-up of gases and pose a danger to health.

▶ Do not use mechanical devices or other means to accelerate the defrosting process, other than those recommended by the manufacturer.

11

Warning and Safety instructions

▶ Do not use any oils or grease on the door seals, as these will cause the seals to deteriorate and become porous with time.

▶ Do not store cooking oil in the refrigerator door. Traces of oil can cause stress cracks to occur in the plastic components in the door.

▶ Do not block the ventilation gap in the plinth or the top of the appliance housing unit as this would impair the efficiency of the appliance, increase the electricity consumption and could cause damage to the appliance.

▶ The appliance is designed for use within certain climate ranges (ambient temperatures), and should not be used outside this range. The climate range for your appliance is stated on the data plate inside the appliance.
Installing it in a room with too low an ambient temperature, e.g. a garage, can lead to the appliance switching off for longer periods so that it cannot maintain the required temperature.

▶ Never use a steam-cleaning appliance to defrost or clean this appliance. Pressurised steam could reach the electrical components and cause a short circuit.

Disposal of your old appliance

▶ Before disposing of an old appliance, first make the door latch or lock unusable.
This way you will prevent children from accidentally locking themselves in and endangering their lives.

▶ Be careful not to damage any part of the pipework whilst awaiting disposal, e.g. by

– puncturing the refrigerant channels in the evaporator.
– bending any pipework.
– scratching the surface coating.

Splashes of refrigerant can damage the eyes.

The manufacturer cannot be held liable for damage caused by non-compliance with these Warning and Safety instructions.

12

Refrigerator

How to save energy

	Normal energy consumption	Increased energy consumption
Installation	In a ventilated room.	In an enclosed, unventilated room.
	Protected from direct sunlight.	In direct sunlight.
	Not situated near a heat source (radiator, oven).	Situated near a heat source (radiator, oven).
	Where the ideal ambient room temperature is approx. 20 °C.	Where there is a high ambient room temperature.
	Do not cover the cross-section of the air inlet and outlet and keep free of dust.	
Temperature setting with a thermostat which is approximate (set in stages).	With a medium setting of 2 to 3.	With a high setting: the lower the temperature in the compartment, the higher the energy consumption.
Temperature setting with a thermostat which is exact to the degree (digital display).	Storage section 8 to 12 °C	On appliances with winter setting, please make sure that the winter setting is switched off when the ambient temperature is warmer than 16 °C.
	Refrigerator section 4 to 5 °C	
	PerfectFresh zone just above 0 °C	
	Freezer section -18 °C	
	Wine storage section 10 to 12 °C	
Use	Do not change the arrangement of the drawers and shelves.	
	Only open the doors when necessary and for as short a time as possible.	Frequent opening of the doors for long periods will cause a loss of coldness.
	Store food in an organised way.	If food is not stored in an organised way, searching for an item will mean the door is open for longer.
	Allow hot food and drinks to cool down before placing them in the appliance.	Placing hot food in the appliance will cause the compressor to run for a long time, as the appliance will have to work harder to lower the temperature.
	Store food covered or packaged.	The evaporation or condensation of liquids will cause a loss of coldness in the refrigerator.
	Place frozen food in the refrigerator to defrost.	
	Do not overfill the appliance to allow air to circulate.	
Defrosting (not applicable for Frost Free models with Automatic Defrost)	Defrost the freezer compartment when a layer of ice 0.5 cm thick has built up.	A layer of ice hinders the cold from reaching the frozen food, and causes an increase in energy consumption.

13

Switching on and off

Before using for the first time

Protective foil

The stainless steel strips and frames have a layer of protective foil to prevent scratching during transportation.

- Carefully remove the protective foil from the stainless steel strips.

Cleaning and care

- Immediately after removing the protective foil, apply the Original Miele Care product for stainless steel that comes with the appliance.

Important! This stainless steel cleaner gives long lasting protection and helps to prevent resoiling.

- Clean the inside of the appliance and the accessories with lukewarm water and a little washing-up liquid, and then dry with a soft cloth.

14

Switching the appliance on

The refrigerator and freezer sections are switched on together by pressing the master switch on the right-hand side of the control panel. This is also possible via the On/Off button on the left-hand side.

- Press the master switch on the right-hand side of the control panel.

The temperature display for the refrigerator section lights up, and the interior lighting comes on when the door is opened.
Bars light up in the temperature display for the freezer section until it reaches the set temperature.
The appliance starts cooling.

To enable the temperature to get sufficiently cold inside the appliance, allow the appliance to run for a few hours before placing food in it.

Cool pack

Place the cool pack in the top freezer drawer. The cool pack will be at its most effective after it has been in the freezer for approx. 24 hours.

Switching off

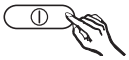
- Press the master switch on the right-hand side of the control panel until both temperature displays go out.

Switching on and off

The refrigerator section is switched off. (If this does not happen, the safety lock has been activated.)

Switching off the refrigerator section separately

The refrigerator section can be switched off whilst the freezer remains on. This is useful e.g. whilst on holiday.



- Press the On/Off button for the refrigerator section on the left-hand side of the control panel until the temperature display for the refrigerator section goes out.

The refrigerator section is now switched off while the freezer section remains on.

Switching on the refrigerator section again.

- Press the On/Off button on the left-hand side of the control panel again.

The temperature display for the refrigerator section lights up. The refrigerator section will start to cool, and the interior lighting will come on when the fridge door is opened.

Safety lock

You can secure the appliance against unwanted switching off with the safety lock.

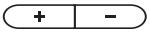
Switching the safety lock on and off

- Press and hold the SuperFreeze button for approx. 5 seconds.

The SuperFreeze indicator light flashes, and c flashes in the temperature display.

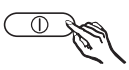
- Then press the SuperFreeze button again.

c will light up in the display.



- You can now choose between c 0 and c 1 by pressing the temperature selector buttons:
  0: The safety lock is deactivated,
  1: The safety lock is activated.
- Press the SuperFreeze button to save the setting.

The safety lock indicator will light up in the temperature display when the safety lock has been activated.



- Press the master switch on the right-hand side of the control panel to come out of the setting mode.

If you do not do this, the electronics will switch over to normal operation automatically after a couple of minutes.

15

Switching on and off

Switching off for longer periods of time

If the appliance is not going to be used for a longer period of time, e.g. whilst on holiday:

- switch the appliance off,
- switch off at the wall and withdraw the plug from the socket, or disconnect the mains fuse or remove the screw-out fuse in countries where this is applicable,
- turn off the tap for the water inlet,
- clean the appliance, and
- leave the door ajar to air the appliance.

If, during a long absence, the appliance is switched off but not cleaned out and the doors are left shut, there is a danger of mould and odours building up inside the appliance.

16

The correct temperature

It is very important to set the correct temperature for storing food in the appliance. Micro-organisms will cause food which is not stored at the correct temperature to deteriorate rapidly. Temperature influences the growth rate of these micro-organisms. Reducing the temperature reduces their growth rate.

The temperature in the appliance will rise:

- the more often the door is opened and the longer it is kept open,
- the more food that is stored in the appliance,
- the warmer the food is which is being put into it,
- the higher the ambient temperature surrounding the appliance.
  The appliance is designed for use in specific ambient temperatures (climate ranges). Do not use in ambient temperatures for which it is not designed.

. . . for the refrigerator section

We recommend a temperature of **4 °C**.

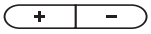
. . . in the freezer section

To freeze fresh food and to store frozen food for a long time, a temperature of **-18 °C** is required. At this temperature the growth of micro-organisms is generally halted. Should the temperature rise above -10 °C, the micro-organisms will become active in the food again so that it cannot be kept as long. For this reason, partially defrosted or defrosted food must not be re-frozen. Food may be re-frozen once it has been cooked, as the high temperatures achieved when cooking destroy most micro-organisms.

Setting the temperature in the refrigerator section / freezer section

Use the two buttons underneath the respective temperature displays to set the temperature for the refrigerator and freezer sections.

Press the



+ button: to raise the temperature (it gets warmer)
– button: to reduce the temperature (it gets cooler).

The temperature being set will flash in the display.

When pressing the buttons, the following information shows in the display:

- When first pressed, the **last temperature selected** flashes.

The correct temperature

- Each subsequent press of the button adjusts the temperature shown in 1 °C steps.
- Keeping the button pressed in adjusts the temperature continually.

Approx. 5 seconds after letting go of the button the **current, average** temperature of the refrigerator or freezer section is automatically shown.

If you have adjusted the temperature, **wait for approx. 6 hours if the appliance is not very full** and **for approx. 24 hours if the appliance is full** before checking the temperature display, as it will take this long for the display to give an accurate reading. If, after this time, the temperature is still too high or too low, you will need to adjust it again.

Temperature range

The temperature can be adjusted:

- In the refrigerator section from 4 °C to 9 °C
- In the freezer section from -16 °C to -26 °C.

The ambient temperature in the room and the installation location can affect the time it takes for the appliance to reach the lowest temperature. If the ambient temperature is too high, the appliance may not reach the lowest temperature.

Temperature display

During normal operation, the temperature displays on the control panel show the temperature in the middle of the refrigerator section and the temperature in the warmest part of the freezer section.

If the temperatures in the appliance are not within the range that the appliance is able to display, bars will flash in the temperature displays.

The **temperature displays flash** if

- a different temperature is being set,
- the temperature in the appliance has risen by several degrees, indicating that the appliance is warming up too much.

This loss of coldness is no cause for concern in the following circumstances:

- when the door has been left open for a while, e.g. for removing or storing a large amount of food,
- when fresh food is being frozen.

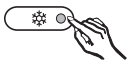
However, if the temperature in the freezer section remains above -18 °C for a long time, check that the frozen food has not started to defrost. If it has started thawing, check that the food is safe to use and if it is, use it as quickly as possible.

The correct temperature

Temperature display brightness

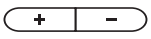
The display goes out when the door is closed.
The appliance is supplied with the brightness of the temperature display set as low as possible. However, if the door is opened, a setting changed or if the alarm is sounding, the temperature display will appear much brighter for approx. 1 minute.

The level of brightness can be adjusted:



■ Press and hold the SuperFreeze button for approx. 5 seconds.

The SuperFreeze indicator light flashes and a *c* flashes in the temperature display.



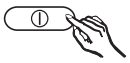
■ Press one of the temperature selector buttons repeatedly until *h* appears in the display.

■ Then press the SuperFreeze button again.

h lights up in the display.

■ You can now adjust the level of brightness by pressing the temperature selector buttons. You can choose from settings *1* to *5*:
1: dimmest setting,
5: brightest setting.

■ Press the SuperFreeze button to save the setting.



■ Press the master switch on the right hand side of the control panel to come out of the setting mode.

Otherwise the electronics will revert to normal operation after a couple of minutes.

Alarm

Your appliance has been fitted with a warning system which ensures that the temperature in the appliance cannot rise unnoticed and to avoid energy being wasted if the door is left open.

Activating the alarm system

The alarm system is always active. It does not have to be switched on manually.

Temperature alarm

If the **freezer section temperature** becomes too warm, an alarm will sound and the freezer section temperature display and the alarm off indicator light will flash.
The temperature the appliance is set at determines the temperature the appliance recognises as being too warm.

The alarm will sound and the temperature display and alarm off indicator light will flash, for example:

- if the freezer door has been left open for a while, e.g. in order to load, re-arrange or take food out.
- when freezing large amounts of food at once.
- in the event of a power cut.

If the temperature in the freezer remains above -18 °C for a long time, check that the frozen food has not started to defrost. If it has, check that the food is safe to use and if it is, then use it as soon as possible.

Once the set temperature has been reached in the freezer section, the alarm switches off and the temperature display and alarm off indicator light stop flashing and light up constantly.

Door alarm

The alarm will sound if the door is left open for more than 60 seconds.

The alarm will stop as soon as the door is closed.

Switching off the alarm early

If the noise disturbs you, you can switch the alarm off early if you wish.

■ Press the alarm off button.

The alarm will stop.
The temperature display and the alarm off indicator light will continue to flash until the set temperature has been reached. They then stop flashing and light up constantly.

Using SuperCool, SuperFreeze and DynamicCooling

SuperCool

The SuperCool function can be used to rapidly reduce the temperature in the refrigerator section to its lowest setting (depending on the room temperature).

Switching on SuperCool

SuperCool is particularly recommended for the faster chilling of large amounts of fresh food or drink.

- Press the SuperCool button; the SuperCool indicator light will come on.

  The appliance works at full power to lower the temperature in the refrigerator section.

Switching off SuperCool

The SuperCool function will switch itself off automatically after approx. 6 hours. The indicator light will go out and the appliance will run at normal power again.

To save energy, the SuperCool function can be switched off once food and drinks are sufficiently chilled.

- Press the SuperCool button. The SuperCool indicator light will go out, and the appliance will continue running at normal power.

SuperFreeze

Switch the SuperFreeze function on before putting fresh food into the freezer.

This helps food to freeze quickly and retain its nutrients, vitamins, flavours and appearance.

SuperFreeze is not necessary:

- when putting in food that is already frozen.
- when freezing up to 2 kg fresh food daily.

Switching on SuperFreeze

When freezing small quantities of food in the freezer, the SuperFreeze function should be switched on **6 hours beforehand**. When freezing **the maximum load of food** the SuperFreeze function should be switched on **24 hours beforehand**.

- Press the SuperFreeze button. The SuperFreeze indicator light will come on.

  The appliance works at full power to lower the temperature in the freezer section.

Using SuperCool, SuperFreeze and DynamicCooling

Switching off SuperFreeze

Depending on the amount of food placed in the freezer section, the SuperFreeze function will switch off automatically after approx. 30 to 60 hours. The SuperFreeze indicator light will go out and the appliance will continue running at normal power.

To save energy, the SuperFreeze function can be switched off once a constant temperature of -18 °C or colder has been reached in the freezer section.

- Press the SuperFreeze button. The SuperFreeze indicator light will go out, and the appliance will continue running at normal power.

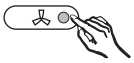
DynamicCooling

When the DynamicCooling function is not switched on, the natural circulation of air in the appliance will cause different temperature zones in the refrigerator as the cold, heavy air will sink to the lowest section of the appliance. You should bear this in mind when placing food in the appliance (see "Using the refrigerator efficiently"). However, if you are placing a large amount of food in the refrigerator at any one time, it is a good idea to switch on DynamicCooling. This way you can distribute the temperature inside the appliance to all areas more evenly so that all the food will be chilled to about the same degree.
The temperature is set as normal with the temperature control.

DynamicCooling should also be selected when:

- the ambient temperature in the room is high (above approx. 33 °C), and
- the room humidity level is high.

Switching on DynamicCooling



- Press the DynamicCooling button. The DynamicCooling indicator light will come on.

Switching off DynamicCooling

- Press the DynamicCooling button. The DynamicCooling indicator light will go out.

To save energy, the fan for DynamicCooling switches off whilst the door is open.

Using the refrigerator efficiently

Different storage zones

Due to the natural circulation of the air in the appliance, there are different temperature zones in the refrigerator. Cold, heavy air sinks to the lowest section of the appliance. Make use of the different zones when placing food in the appliance.

This appliance has DynamicCooling, which helps to keep an even temperature when the fan is running. When DynamicCooling is switched on, the difference between the various zones is less pronounced.

Warmest area

The warmest area is in the top section of the door. Use this for storing butter and cheese.

Coldest area

The coldest area in a refrigerator is directly above the vegetable containers.

Use this for all delicate and highly perishable food, e.g.

- fish, meat, poultry,
- sausage products, ready meals,
- dishes or baked goods containing eggs or cream,
- fresh dough, cake mixtures, pizza or quiche dough,
- soft cheese and other dairy products,
- pre-packed vegetables and other fresh food with a label stating it should be kept at a temperature of approx. 4 °C.

Do not store explosive materials in the appliance or any products containing propellants (e.g. spray cans). Danger of explosion.

If storing alcohol with a high percentage proof, make sure it is tightly closed, and store upright.

Do not store cooking oil in the refrigerator door. Traces of oil can cause stress cracks to occur in the plastic components in the door.

Food must not touch the back wall of the refrigerator as it may freeze to the back wall.

To allow air to circulate efficiently, do not pack food too closely together in the refrigerator. Do not cover the fan in the rear wall of the refrigerator as this is essential for keeping the appliance cool.

Using the refrigerator efficiently

Food which should not be stored in a refrigerator

Not all food is suitable for refrigeration, as some food is sensitive to cold. Cucumbers, for example, become glassy, eggplants bitter and potatoes sweet. Tomatoes and oranges lose their aroma, and the peel on citrus fruit hardens.

Food which should not be stored in a refrigerator includes:

- pineapple, pomegranate, bananas, avocado, mangos, papaya, passionfruit, citrus fruit
- fruit which is not yet ripe
- eggplants, cucumbers, potatoes, capsicum, tomatoes, zucchinis
- some hard cheeses, e.g. Parmesan

When shopping for food

The freshness of food when first placed in the appliance is an important factor in determining how long it stays fresh, and how long it can be kept in the refrigerator. Time out of the refrigerator, e.g. during transportation, should be kept to a minimum. For example, do not allow food to stay in a hot car for too long. Once food has started to deteriorate, this process cannot be reversed. As little as two hours outside the refrigerator can cause food to start deteriorating.

Storing food correctly

Food should generally be stored covered or packaged. This will prevent food smells from affecting other foods, food from drying out, and also any cross-contamination of bacteria. The growth of bacteria, such as salmonella, can be avoided by setting the correct temperature and maintaining good standards of hygiene.

Fruit and vegetables

Fruit and vegetables may be stored loose in the vegetable containers. Please be aware that not all types of fruit and vegetables are suitable for storing in the same container. Aromas and flavours can transfer from one type of food to another (e.g. carrots absorb the smell and flavour of onions very easily). Some food also gives off a natural gas (ethylene) which speeds up the rate at which other food perishes.

- **Examples of fruit and vegetables which produce a large amount of this natural gas are:**

  Apples, apricots, pears, nectarines, peaches, plums, avocado, figs, blueberries, melons and beans.

Using the refrigerator efficiently

– **Examples of fruit and vegetables which react strongly to the natural gases given off by other types of fruit and vegetables are:**

Kiwis, broccoli, cauliflower, Brussels sprouts, mangos, honeydew melons, apples, apricots, cucumbers, tomatoes, pears, nectarines and peaches.

Example: Broccoli should not be stored with apples, as apples produce a large amount of natural gas to which broccoli is very sensitive. The result is a shorter than expected storage time for the broccoli.

Unpacked meat and vegetables

Unpackaged meat and vegetables should be stored separately. To avoid any microbiological cross-contamination, these foods may only be stored together if they are wrapped.

Protein rich foods

Please note that foods rich in protein deteriorate faster than others. Shellfish, for example, deteriorates faster than fish, and fish deteriorates faster than meat.

Meat

Meat should be stored unwrapped. (Undo wrappings slightly to leave meat loosely covered, and leave containers open). This permits air to circulate around the meat, allowing the surface to dry slightly, which helps prevent the growth of bacteria. To prevent the risk of bacterial cross-contamination and meat deteriorating, do not let one type of meat come into direct contact with another type.

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Adjusting the interior fittings

Moving the shelves

The shelves can be adjusted according to the height of the food:

- Raise the shelf, and pull it forwards slightly until the notch at the side is in line with the shelf support. It can then be raised or lowered to the required level.

The raised edge at the back must face upwards to prevent food from touching the back of the appliance and freezing to it.

Stoppers prevent the shelves from being dislodged by mistake.

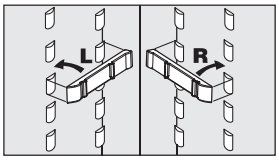
Split shelf

In order to accommodate tall items in the appliance, one of the shelves is divided. The front section can be pushed under the rear section.

- Push the rear half of the glass shelf up slightly from below.
- At the same time, pull the front half of the glass shelf forwards slightly and then push it carefully under the rear half.

To move the split shelf:

- Take both halves of the split glass shelf out.



- Fit the two brackets onto the supports on either side at the required height.
- Push the glass shelves in one after the other.
  The shelf with the raised edge must be at the back.

Fruit and vegetable drawers on roller frames

(depending on model)

The fruit and vegetable drawers run on rollers and can be fully pulled out for loading and unloading. The roller shelves can also be removed for cleaning.

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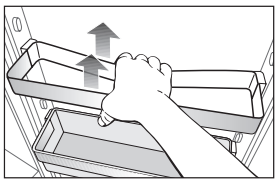
Adjusting the interior fittings

Adjusting the condiment tray/bottle shelf

- Lift the tray/shelf up and out of the stainless steel frame to remove.
- Push up the stainless steel frame, and remove.
- Replace the frame at the required height. Ensure that it is securely pushed back into position.

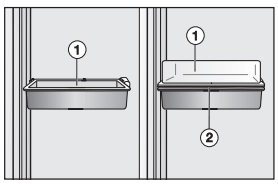


- Some stainless steel frames can be removed and refitted more easily if they are held together with the rear plastic frame and lifted up and out (see picture).
- Replace the tray/shelf in the frame.

The tray/shelf can be completely removed for loading and unloading and put back in.
In this way, the tray/shelf can be used as a serving tray on the table.

Universal container

The universal container can be used both to store and serve food.



It consists of a deep tray ① and a shallow tray ②. Both trays fit in the stainless steel frame.

If you wish to use the universal container to serve food,

- place the shallow tray ② in the stainless steel frame, and use the deep tray as a lid ①.

You can lift the universal container, including contents, out of the frame and take it to the table.

Moving the bottle divider

The bottle divider can be moved to the left or right to ensure that bottles are held securely in position when the door is opened and shut.

The bottle divider can be removed completely (e.g. for cleaning).

- To do this, push up the front edge of the bottle divider, and disengage it.

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Freezing and storing food

Maximum freezing capacity

To ensure that fresh food placed in the freezer freezes through to the core as quickly as possible, the maximum freezing capacity must not be exceeded. The maximum freezing capacity for freezing within a 24-hour period is given on the data plate: "Freezing capacity ....kg/24 hrs".

Freezing fresh food

Fresh food should be frozen as quickly as possible. This way the nutritional value of the food, its vitamin content, appearance and taste are not impaired.

Food which takes a long time to freeze will lose more water from its cells, which then shrink.
During the defrosting process, only some of this water is reabsorbed by the cells; the rest collects around the food.

If food is frozen quickly, the cells have less time to lose moisture, so they shrink less. As there is not so much moisture loss, it is easier for the food to re-absorb it during the defrosting process, and very little water collects around the defrosted food.

Storing frozen food

When buying frozen food to store in your freezer, check

– that the packaging is not damaged,

– the use-by date,

– the temperature at which the frozen food is being stored in the shop. The length of time it can be kept is reduced if it has been stored at a temperature warmer than -18 °C.

- Buy frozen food once you have finished the rest of your shopping, and wrap it in newspaper or use a cool bag or cool box to transport it.
- Store it in the freezer as soon as possible.

Never re-freeze partially or fully defrosted food. Consume defrosted food as soon as possible as it will lose its nutritional value and spoil if left for too long. Defrosted food may only be re-frozen after it has been cooked.

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Freezing and storing food

Home freezing

Only freeze fresh food which is in a good condition.

Hints on home freezing

– The following types of food **are suitable** for freezing:
Fresh meat, poultry, game, fish, vegetables, herbs, fresh fruit, dairy products, pastry, leftovers, egg yolks, egg whites and a range of pre-cooked meals.

– The following types of food **are not suitable** for freezing:
Grapes, lettuce, radishes, sour cream, mayonnaise, eggs in their shells, onions, whole raw apples and pears.

– To retain colour, taste and vitamin C, vegetables should be blanched after they have been trimmed and washed.
To blanch: bring a large saucepan of water to the boil, immerse the vegetables in the fast boiling water for 2-3 minutes, depending on variety. Remove, and plunge into ice-cold water to cool quickly. Drain and pack ready for freezing.

– Lean meat freezes better than fatty meat, and can be stored for considerably longer.

– To prevent chops, steaks, cutlets or rolled meat from freezing together in solid blocks when packed, separate with a sheet of plastic freezer film.

– Do not season fresh foods or blanched vegetables before freezing. Only season cooked food lightly before freezing, but care should be taken as the taste of some spices alters when frozen.

– Do not place hot foods or drinks in the freezer. This causes already frozen food to thaw, and increases the energy consumption considerably. Allow hot foods and drinks to cool down before placing them in the freezer.

Packing

■ Freeze food in portions.

Unsuitable packing material
- wrapping paper
- grease-proof paper
- cellophane
- bin bags
- plastic carrier bags

Suitable packing material
- plastic freezer film
- freezer bags
- aluminium foil
- freezer containers

■ Expel as much air as possible from bags etc. before sealing them, to prevent freezer-burn on food.

■ Close the packaging tightly with
- rubber bands
- plastic clips
- string or bag ties
- freezer tape.

Freezer bags may also be sealed using home heat sealing kits.

Freezing and storing food

■ Make a note of the contents and the date of freezing on the packaging.

Before placing food in the freezer

■ When freezing more than 2 kg of fresh food, switch on the SuperFreeze function for some time before placing the food in the freezer (see "SuperFreeze").
This also helps to prevent food that is already in the freezer from starting to defrost.

Placing food in the freezer

The following maximum load capacities need to be adhered to:
– Freezer drawer = 25 kg
– Glass plate = 35 kg

Make sure that food already frozen does not come into contact with fresh food being frozen as this could cause the frozen food to begin to defrost.

■ Make sure that the packaging and containers are dry to prevent them sticking together when frozen.

– Freezing small items

Place small items in the upper freezer drawers.

■ Place the food flat at the bottom of the drawers so that it freezes through to the core as quickly as possible.

When removing freezer drawers, please note:
The lowest freezer drawer must always remain in the appliance. Place the food on the glass plate so that the ventilation slits in the back wall of the appliance are not blocked. They are important for trouble-free operation of the appliance and maintaining normal energy consumption.

– Freezing the maximum quantity of food (see data plate)

■ Take out the bottom freezer drawer.

■ Place the food flat on the upper glass plates so that it freezes through to the core as quickly as possible.

At the end of the freezing process:

■ Place the frozen food in the freezer drawer and push it back into the appliance.

– Freezing large items

If you wish to freeze large items such as a turkey or game, the glass cold plates between the drawers can be removed. To do this:

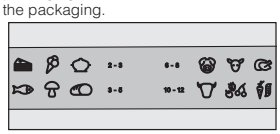
■ Remove the upper freezer drawers and carefully lift and slide out the glass cold plates.

Freezing and storing food

Freezer calendar

The freezer calendar on the freezer drawer gives the length of time in months which various foods can be stored for effectively.

Where the storage time given on the packaging differs, follow the advice on the packaging.



2-3 months:
Cakes, ice cream, stews

3-5 months:
Fish, mushrooms, bread

6-8 months:
Pork, veal, poultry

10-12 months:
Beef, fruit, vegetables

Defrosting

Frozen food can be defrosted in different ways:

– in a microwave oven,

– in an oven using the "Fan" or "Defrost" setting,

– at room temperature,

– in the refrigerator (the cold given off by the frozen food helps to keep the other food cold),

– in a steam oven.

Poultry It is particularly important to observe food hygiene rules when defrosting poultry. Do not use the liquid from defrosted poultry. Pour it away and wash the container it was in, the sink and your hands. Danger of salmonella poisoning.

Fruit should be defrosted at room temperature in its packaging, or in a covered bowl.

Most vegetables can be cooked while still frozen. Just put straight into boiling water or hot fat. The cooking time is slightly less than that of fresh vegetables due to changes in the cell structure.

Never re-freeze partially or fully defrosted food. Consume defrosted food as soon as possible as it will lose its nutritional value and spoil if left for too long. Defrosted food may only be re-frozen after it has been cooked.

Freezing and storing food

Cooling drinks

Do not store cans or bottles containing carbonated drinks or liquids which could freeze in the freezer section. The cans or bottles could explode.

When cooling drinks (only non-carbonated) quickly, make sure bottles are **not left in the freezer section for more than one hour**, as they could burst.

Cool pack

The cool pack prevents the temperature in the freezer rising too quickly in the event of a power cut.

Place the cool pack in the top drawer of the freezer section, directly on top of the food. The cool pack will be at its most effective after it has been in the freezer for approx. 24 hours.

If there is a power cut, place the cool pack directly on top of the frozen food in the top drawer so that the food will be kept cold for as long as possible.

When placing fresh food in the freezer, use the cool pack to separate the fresh food from the food which is already frozen so that the frozen food does not begin to thaw.

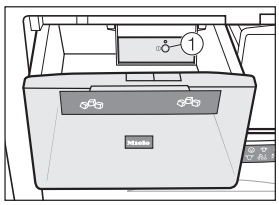
The cool pack can also be used in a cool bag to keep food or drinks cool for a short period of time.

Making ice cubes

For the automatic ice cube maker to operate, it must be connected to the mains water supply.

Switching on the ice cube maker

- Switch on the freezer section.
- Pull the ice cube drawer out a little.



- Press the On/Off button ① on the ice cube maker. The indicator light will come on.
- Close the ice cube drawer.

The drawer must be completely shut for ice cubes to be produced.

After the appliance is switched on for the first time, it can take up to 24 hours for the first ice cubes to drop out of the ice cube maker and collect in the drawer.
Thereafter, when the ice cube maker is switched off and then on again, it will take up to a maximum of 6 hours for ice cubes to be produced.

To ensure that the water pipes are thoroughly flushed through before use, ice cubes from the first three ice cube making processes must not be consumed.
This applies not only to when the appliance is installed for the first time but also if the appliance has been out of use for a longer period (e.g. whilst on holiday).

Making a large amount of ice cubes

The amount of ice cubes which the appliance makes depends on the temperature in the freezer. The lower the temperature, the more ice cubes are produced within a certain time frame.

Ice cube production is halted automatically as soon as the ice cube drawer is full.

If you require a large amount of ice cubes,

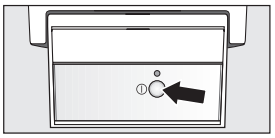
- Switch the full ice cube drawer with the drawer on the right-hand side.

The ice cube maker will begin to produce ice cubes again as soon as this new drawer has been placed in position and closed properly.

Making ice cubes

Switching off the ice cube maker

The ice cube maker can be switched off independently of the freezer section if you do not want the appliance to make any ice cubes.



- Press the On/Off button on the ice cube maker until the indicator light goes out.

If the ice cube maker is switched off, the ice cube drawer can be used as an extra drawer for freezing fresh food and storing frozen food.

Automatic defrost

Refrigerator section

The refrigerator defrosts automatically.

Condensate and frost can build up on the back wall of the refrigerator section whilst it is in use. You do not need to remove this, as it will defrost and evaporate automatically with the warmth generated by the appliance.

The condensate is drained away via a channel and drain hole into an evaporation system at the back of the appliance.

Ensure that the condensate channel and drain hole are kept clean and are never blocked so that condensate can flow away without hindrance.

Freezer section

This appliance is equipped with a "Frost free" system. The freezer section defrosts automatically.

The moisture generated in the appliance collects on the condenser and is automatically defrosted and dissipated by the condenser from time to time.

This automatic defrosting system enables the freezer section to remain permanently ice-free, however, the food stored in the freezer section will not defrost.

Cleaning and care

In order to take care of the stainless steel surfaces on the appliance, use the Original Miele Care product for stainless steel (available from Miele or at www.miele-shop.com).
This product contains substances that are gentle to stainless steel surfaces and, unlike stainless steel cleaners, it does not contain polishing agents. Soiling is gently removed and each time the Original Miele Care product for stainless steel is used, it forms a protective film against dirt and water.

Do not let water get into the electronic unit or the light.

Do not let water get into the drainage channel and drain hole when cleaning.

Do not use a steam cleaning apparatus to clean the appliance. Steam could reach the electrical components and cause a short circuit.

The data plate located inside the appliance must not be removed. It contains information which is required in the event of a service call.

To avoid damaging the outer surfaces of your appliance, do not use:

- cleaning agents containing soda, ammonia, acids or chlorides,
- cleaning agents containing descaling agents,
- abrasive cleaning agents, e.g. powder cleaners and cream cleaners,
- solvent-based cleaning agents,
- stainless steel cleaners,
- dishwasher cleaner,
- oven sprays,
- glass cleaning agents,
- hard, abrasive sponges and brushes, e.g. pot scourers,
- dirt erasers,
- sharp metal scrapers.

Cleaning and care

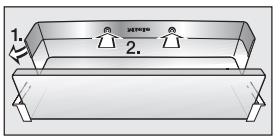
Before cleaning

- Switch off the appliance.
- Disconnect the appliance from the mains. Switch off at the wall and withdraw the plug from the socket, or disconnect the mains fuse or remove the screw-out fuse in countries where this is applicable.
- Take any food out of the appliance and store it in a cool place.
- Take out any removable parts, e.g. shelves, for cleaning.
- The serving trays and containers in the door can be removed from their stainless steel frames for cleaning.

To remove the stainless steel panel from the lid of the butter and cheese compartment, proceed as follows:

- Take out the entire butter and cheese compartment.
- Open the lid.

The stainless steel panel is fitted tightly to the plastic lid and needs to be removed firmly.



- Disconnect the stainless steel panel from the edge of one side of the lid (1.) first.
- Push the white plastic locating pins out of the holes (2.).
- Reconnect the stainless steel panel to the butter and cheese compartment in the reverse order after cleaning.

Cleaning the interior and accessories

- Clean the appliance at least once a month.

Clean any soiling immediately. Do not allow it to dry first.

Use lukewarm water with a little washing-up liquid.

The following components are all dishwasher safe:

– butter dish, egg tray, ice cube tray (available depending on model)

– serving trays and containers in the door (without stainless steel frame)

– butter and cheese compartment (without stainless steel panel)

Cleaning and care

The stainless steel frames and panel in the door are **not** dishwasher safe.

The temperature of the dishwasher programme must not exceed 55 °C. Plastic components may discolour in the dishwasher if they come into contact with natural dyes from foods such as carrots, tomatoes and tomato sauce.
This discolouration will not affect the stability of the components.

- Clean the shelves and drawers by hand as they are **not**dishwasher safe.
- Clean the condensate channel and drain hole frequently, so that condensate can drain away unhindered. Use a straw or similar to clear the drain if necessary.
- After cleaning, wipe the interior and accessories with a damp cloth and dry with a soft cloth.
  Leave the door open to air the appliance for a short while.
- Remove any soiling on stainless steel surfaces with the Original Miele Care product for stainless steel.
- Apply the Original Miele Care product for stainless steel to stainless steel panels and frames each time you clean the appliance.
  This will help to protect stainless steel surfaces and prevent resoiling for a period of time.

Cleaning the ice cube tray

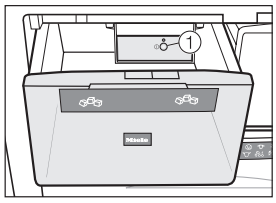
The ice cubes form in the ice cube tray before falling into the ice cube drawer.

Clean the ice cube tray regularly with a little washing-up liquid and warm water to remove ice and water residues.

The ice cube tray cannot be removed and must therefore be cleaned whilst still in the appliance.

The ice cube maker should also be cleaned before switching off the appliance for a long period of time (e.g. whilst on holidays).

- Connect the appliance to the electricity supply.



- Pull the ice cube drawer out a little.
- Press the On/Off button ① on the ice cube maker. The indicator light will come on.
- Empty the ice cube drawer.
- Press and hold the On/Off button on the ice cube maker for at least 12 seconds.

The indicator flashes slowly and then quickly.

Cleaning and care

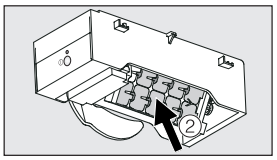
- Push the ice cube drawer in as far as it will go within the next 60 seconds.

You will hear the ice cube tray rotating.

- Wait until the ice cube tray has completed this rotation before continuing.

Then clean the ice cube tray while still in the appliance:

- Remove the ice cube drawer. Clean the drawer.



- Clean the ice cube tray ② in the ice cube maker.

After cleaning:

- Press the On/Off button on the ice cube maker.
- Push the ice cube drawer back in completely.

You will hear the ice cube tray rotating into its starting position.

The ice cube maker will begin to produce ice cubes again after a maximum of 6 hours.

Discard the ice cubes from the first three ice cube making processes. They are not suitable for consumption due to washing-up liquid being used during cleaning.

Ventilation gaps

- The ventilation gaps should be cleaned on a regular basis with a brush or vacuum cleaner. A build-up of dust will increase the energy consumption of the appliance.

Door seals

Do not use any oils or grease on the door seals as these will cause the seals to deteriorate and become porous over time.

The door seals should be cleaned regularly with clean water, and then wiped dry with a soft cloth.

After cleaning

- Replace all shelves and accessories in the refrigerator section.
- Reconnect the appliance to the electricity supply and switch it on.
- Switch on the SuperFreeze function so that the freezer can cool down quickly. The indicator light will come on.
- Once the freezer has reached the required temperature, place the food back in the freezer baskets and put them back in the freezer.
- Switch off SuperFreeze by touching the SuperFreeze sensor when the temperature in the freezer is a constant -18 °C or colder.
  The indicator light will go out.

Problem solving guide

Repair work to electrical appliances must only be carried out by a suitably qualified and competent person in strict accordance with current local and national safety regulations. Repairs and other work by unqualified persons could be dangerous. The manufacturer cannot be held liable for unauthorised work.

What to do if . . .

. . . the appliance does not get cold.

- Check whether the respective section is switched on. The relevant temperature display must be lit up.
- Check that the plug is correctly inserted into the socket and switched on.
- Check whether the mains fuse has tripped or whether the fridge freezer, mains voltage or another appliance is faulty.
  Contact a qualified electrician or Miele.
- Check the temperature settings.

. . . the temperature in the refrigerator or freezer is too cold.

- Select a warmer temperature.
- The SuperFreeze function is still on and the indicator light is illuminated. The SuperFreeze function automatically switches off after approx. 30-60 hours.
- The SuperCool function is still on and the indicator light is illuminated. The SuperCool function automatically switches off after approx. 6 hours.
- Check that the appliance doors are closed properly.
- Has a large amount of fresh food been put in at the same time for freezing?
  This makes the compressor run for longer, causing the temperature to fall automatically.

. . . the door will not open because it has been opened and closed too many times in succession.

- This is not a fault. The suction caused by opening and closing the door is preventing the door from opening. Wait a few minutes and then try again. It should then open without force.

. . . the compressor is switching on too frequently and for too long.

- Check whether the ventilation gaps in the plinth at the bottom and in the housing unit at the top have been covered over or become too dusty.
- The doors have been opened too frequently, or a large amount of fresh food has been put in at once for freezing.
- Check that the doors close properly.

. . . the compressor runs continuously.

To save energy, the compressor runs at a lower speed when less cooling is required. In this case, the compressor runs for longer.

Problem solving guide

. . . the frozen food is thawing because the freezer is too warm.

- Is the room temperature lower than the ambient temperature for which the appliance is designed?

  If so, raise the temperature of the room.

Operating in a room which is too cold will cause the cooling system to switch off for too long, causing the freezer to become too warm.

. . . food has frozen together.

Use a blunt instrument, e.g. a spoon handle or plastic scraper, to prise it apart carefully.

. . the alarm sounds.

Has the appliance door been open for longer than 60 seconds?

- Close the appliance door.

. . . the alarm sounds and the freezer section temperature display flashes.

The temperature in the freezer section has risen above the set temperature because

- the door has been opened too frequently, or large amounts of fresh food have been placed in the appliance at once.

The alarm will stop and the temperature display will light up constantly again as soon as the temperature has dropped down to the correct level again.

Problem solving guide

. . . bars light up or flash in the temperature displays.

Check the temperature displays about 6 hours after switching on the appliance. Only temperatures within the range the appliance can display will be shown.

. . . one of the fault codes "*F0*" to "*F5*" appears in one of the temperature displays.

There is a fault. Call Miele.

. . . the SuperFreeze indicator light and the temperature display are both flashing at the same time.

There is a fault. Call Miele.

. . . the SuperFreeze indicator light is not illuminated even though the appliance is running.

The indicator light doesn't work. Call Miele.

. . . you cannot switch the appliance off.

The safety lock has been activated.

Problem solving guide

. . . "*nA*" appears in the freezer section temperature display.

The temperature has risen too high at some point during the last couple of days because of a power cut.

- Touch the alarm off sensor whilst "nA" is lit up in the display.

  The alarm will stop and the temperature display will show the warmest temperature recorded in the freezer section during the power cut.

Check the condition of the food in the freezer. If it has defrosted or started to defrost, check that it is still safe to use and, if so, use it as soon as possible. Defrosted food may only be refrozen after it has been cooked.

The warmest temperature will be displayed for about 1 minute. The display will then revert to showing the current temperature in the freezer.

At the end of a power cut, the appliance will start operating again at the last temperature setting selected.

. . . you cannot switch the ice cube maker on.

- Check whether the appliance is connected to the electricity supply.

. . . the ice cube maker is not producing any ice cubes.

- Was the water inlet pipe purged of air by a qualified and competent person before the appliance was used for the first time?
- Check whether the ice cube maker is switched on.
- Check whether the freezer section is switched on.
- Check whether the water inlet is open.
- Check that the ice cube drawer has been closed properly.

Remember it can take up to 24 hours to produce the first ice cubes.

. . . the indicator light on the ice cube maker is flashing.

There is a fault. Call Miele.

. . . the interior lighting in the refrigerator section is not working.

Has the refrigerator door been left open for too long? To avoid overheating, the lighting switches itself off automatically after approx. 15 minutes if the door is left open.

If it does not come on when the door is opened briefly, but the temperature display does, then the lighting is defective.

- Call Miele.

The LED lighting may only be repaired or changed by a Miele service technician because there are live parts under the cover. Danger of injury and damage!

Problem solving guide

The cover must not be removed. Should the cover be damaged or removed due to damage, **exercise caution**. Never look at the lighting with optical instruments (magnifying glass or similar).

. . . the floor of the refrigerator section is wet.

The condensate drain hole is blocked.

- Clean the condensate channel and drain hole.

If you still cannot remedy the fault having followed these suggestions, please contact Miele. However, a call-out charge will be applied for unnecessary service visits where the problem could have been rectified as described in these Operating instructions.
To prevent unnecessary loss of temperature, it is advisable not to open the door while waiting for the appliance to be serviced.

Noises

Normal noises	What causes them
Brrrrr ...	Humming noise made by the motor (compressor). This noise can get louder for brief periods when the motor is switching on.
Blubb, blubb....	A gurgling noise can be heard when coolant is circulating through the pipes.
Click ...	Clicking sounds are made when the thermostat switches the motor on and off.
Sssrrrrr ...	On multi-zone and frost-free appliances you can sometimes just hear the movement of the fan inside the appliance.
Crack ...	A cracking sound can be heard when materials expand inside the appliance.

Remember that the noise of the compressor and the coolant circulating in the system is unavoidable.

Noises that you can easily rectify	What causes them, and what can you do about them?
Rattling, vibrating	**The appliance is uneven: Realign the appliance using a spirit level, by raising or lowering the screw feet underneath the appliance.**
	The appliance is touching another appliance or piece of furniture: Move it away.
	Drawers, baskets or shelves are unstable or sticking: Check all removable items and refit them correctly.
	Are any bottles or containers unstable or knocking against each other? Separate them.
	The transport cable clips are hanging loose at the back of the appliance: Remove the clips.

After Sales

In the event of a fault which you cannot correct yourself, please contact:

– your Miele Chartered Agent

or

– Miele.

You will find the address and telephone number of Miele on the back cover of the manual.

When contacting your Chartered Agent or Miele, please quote the model and serial number of your appliance. This information is given on the data plate inside your appliance.

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Mains water connection

Notes on connecting to the mains water supply

Connection to the mains water supply should only be carried out by a qualified and competent person in accordance with national and local regulations (AS/NZS 3500.1 & AS/NZS 3500.2).

The water quality must conform to the requirements for drinking water in the country the appliance is being installed in.

– This appliance complies with IEC 61770 and EN 61770 (ATS 5200.101 in Australia).

– All items used for connecting the appliance to the mains water supply must comply with the current national and local safety regulations in the country in which the appliance is being installed.

– The appliance is only suitable for connection to the cold water supply.

– The water pressure (flow rate) must be between 1.5 and 6 bar.

– The stainless steel hose is 1.5 m long. This may only be lengthened by means of a Miele extension hose. This extension hose is available from Miele and must only be fitted by a suitably qualified fitter.

– A tap must be provided between the stainless steel hose and the household water supply to ensure that the water supply can be cut off if necessary.

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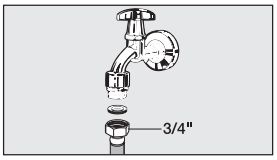
The tap should be easily accessible after the appliance has been built-in.

Connection to the water inlet

Before making plumbing connections, ensure the appliance is disconnected from the mains electricity supply.

Connection to the mains water supply should incorporate a mains tap with $^{3}/_{4}$" thread.



■ Connect the stainless steel hose to the tap.

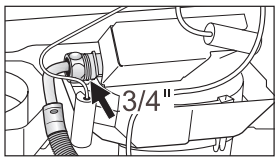
■ Ensure that it is screwed into position correctly.

Before using the appliance for the first time the water inlet pipe should be purged of air by a qualified and competent person.

– To do so the stainless steel hose should be filled as far as possible with water before being connected to the solenoid valve.

– Mop up any spillages with a cloth.

Mains water connection



■ The stainless steel hose should be attached to the solenoid valve at the base of the appliance at the back.

■ Ensure that the hose is fitted correctly and that it is water tight.

■ Turn on the tap slowly and check the whole water system for leaks.

■ The appliance can then be connected to the electricity supply.

■ Push the appliance into its final position.

When doing so, make sure that the stainless steel hose is not kinked or damaged.

After a maximum of 24 hours the first ice cubes will drop out of the ice cube maker and collect in the drawer.

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Electrical connection

Electrical connection

All electrical work should be carried out by a suitably qualified and competent person in strict accordance with current local and national safety regulations.

The appliance is supplied with a mains cable and moulded plug ready for connection to an AC single phase 220-240 V 50 Hz supply.

The voltage and frequency are given on the data plate. Please ensure that these match the household mains supply. The fuse rating is quoted on the plug.

Connection should be made via a suitable switched socket which is easily accessible. For extra safety it is advisable to install a suitable residual current device (RCD).

Do not connect the appliance to the mains electricity supply by an extension lead or a plug adapter. Extension leads do not guarantee the required safety of the appliance (e.g. danger of overheating).

Do not connect the machine to an inverter such as those used with an autonomous energy source e.g. **Solar power**.

When switched on, peak loads in the system can cause the safety switch off mechanism to be triggered. This can damage the electronic unit.

The machine must not be used with so-called **Energy saving devices** either. These reduce the amount of energy supplied to the machine, causing it to overheat.

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WARNING
THIS APPLIANCE MUST BE EARTHED

For India only: Due to extreme fluctuations in the electrical network, we recommend operating the appliance with a voltage stabiliser.

Installation advice

This appliance must be built in, otherwise it could tip over.

Location

This appliance should be installed in a dry, well-ventilated room. It should not be installed where it is exposed to direct sunlight or directly adjacent to a heat-producing appliance such as an oven or a radiator. The room temperature should not go above or below the climate range for which the appliance is designed.
The higher the ambient temperature of the room, the more energy the appliance requires to operate.

Important: tropical / humid environments
During periods of high humidity, some condensation may appear on outside surfaces of cooling appliances. This condensation will disappear when humidity levels drop. For prevention, it is advisable to install the appliance with sufficient ventilation in a dry and/or an air-conditioned room.
Please ensure that doors are closing and sealing properly.
Please ensure that the appliance is installed in accordance with these installation instructions and that the handle is fitted correctly. Should you require further assistance please contact Miele.

Climate range

The appliance is designed for use within certain climate ranges (ambient temperatures), and should not be used outside this range. The climate range of the appliance is stated on the data plate inside the appliance.

Climate range	Ambient room temperature
SN	+10°C to +32°C
N	+16°C to +32°C
ST	+16°C to +38°C
T	+16°C to +43°C

Operating in a room which is too cold will result in the cooling system switching off for too long, causing the internal temperature in the appliance to rise with the risk of food deteriorating and going off or frozen food defrosting.

Ventilation

Air at the back of the appliance gets warm. The appliance housing unit must be constructed to allow sufficient space for ventilation.

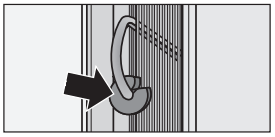
A ventilation gap of at least 38 mm depth must be allowed for behind the appliance for air to circulate. The air inlet to the appliance is via the plinth in the refrigerator.
The cross-section of the air inlet and outlet under the room ceiling must be at least 200 cm^2 to ensure that air can circulate without hindrance. Otherwise the appliance has to work harder, resulting in an increase in electricity consumption.

Installation advice

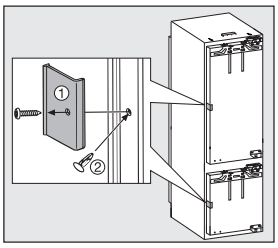
The air vents must not be covered or blocked in any way.
They should be dusted on a regular basis.

Before installation

- Before installation, remove the cover strip, sealing strip and other accessories from inside the appliance and from the external rear wall of the appliance.



- On no account should the spacers be removed from the back of the appliance. These ensure the gap required between the back of the appliance and the wall is maintained.
- Remove any cable clips from the back of the appliance.

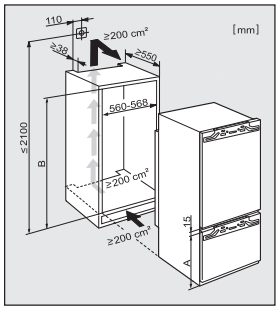


- Remove the red transit bars ① and seal the resulting holes with the caps ② supplied.
- Check that all parts at the back of the appliance are unhindered. Carefully remove any hindrance.

Did your old appliance have a different hinging mechanism?

If your old appliance had a different type of hinging, the furniture door can still be used. Remove the old hinges from the housing unit. They are no longer required because the furniture door is now fitted to the appliance door. All the necessary parts are supplied or can be ordered from Miele.

Building-in dimensions



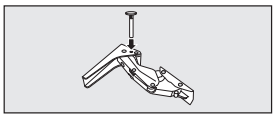
	Freezer section height	Niche height
	A	B
KFN 9755 iDE	695	1772 - 1788

Adjusting the door hinges

The door hinges are set ex-works to enable the door to be opened wide.

However, if the opening angle of the door needs to be limited for any reason, the hinge can be adjusted to accommodate this.

For example, if the appliance door hits an adjacent wall when opened, the opening angle can be limited to 90°.



- Place the locking pins supplied for limiting the door opening into the hinges from above.

The door opening angle is now limited to 90°.

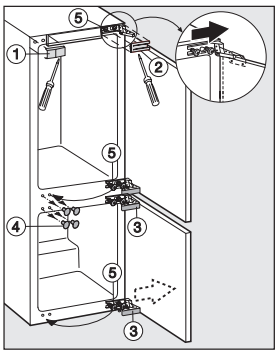
Changing the door hinging

Before building the appliance in, you will need to decide on which side the door is to be hinged. If left hand door hinging is required, follow the instructions below.

To change the door hinging you will need the following tools:

– a cross-slotted screwdriver,
– a flat-bladed screwdriver,
– a selection of Torx screwdrivers,
– a spanner.

■ Open both appliance doors.



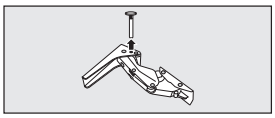
■ Remove covers ①, ② and ③ and caps ④ with a screwdriver.

■ Slightly loosen fixing screws ⑤ at the top, middle and bottom of the appliance.

■ Push each of the doors outwards and take them off their hinges.

■ Unscrew fixing screws ⑤ completely, and loosely screw them in at the top, middle and bottom on the opposite side of the appliance.

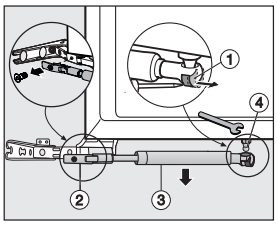
If you have put locking pins into the hinges to stop the door opening too far:



■ Remove the locking pins from the top of the hinges.

To remove the soft-close mechanism

■ Place the doors with the outer side downwards on a stable surface.



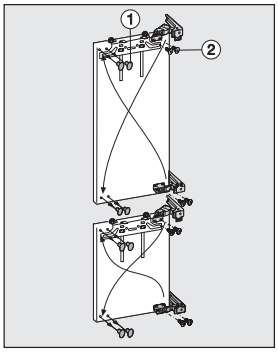
■ Using a screwdriver, carefully push tension spring ① outwards.

Warning. The soft-close mechanism snaps shut when dismantled. Danger of injury.

■ Unscrew mounting ② and pull soft-close mechanism ③ downwards to remove it.

Changing the door hinging

■ Undo ball joint ④ using a spanner and remove it.



■ Stand the appliance doors up one by one, and slacken the hinges at the front (the hinges remain open).

■ Remove caps ① from the top and bottom of each door (if the caps are not in place, they will have been supplied separately with the appliance).

■ Remove screws ② from all of the hinges, and refit each hinge in its diagonally opposite corner.

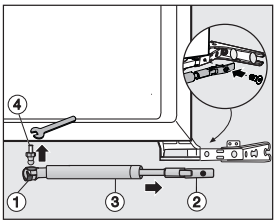
Do not close up the hinges. Danger of injury.

■ Use a powered screwdriver to secure the hinges; screws ② are self-tapping.

■ Replace caps ① in the vacant holes on the opposite side.

To secure the soft-close mechanism

■ Place the two doors with the outer side downwards on a stable surface.



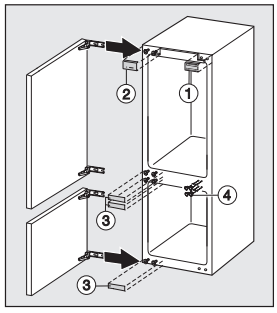
■ Screw ball joint ④ of soft-close mechanism ③ into the new fixing holes.

■ Push tension spring ① inwards again.

■ Screw mounting ② onto the hinge and tighten securely.

■ Open out soft-close mechanism ③ and hook it onto ball joint ④.

Changing the door hinging

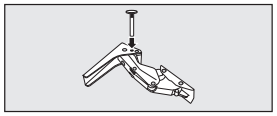


■ Hang the doors onto the pre-fitted screws, and push the doors inwards.

■ Tighten the screws at the top, middle and bottom securely.

■ Replace covers ①, ② and ③.

■ Then replace caps ④ in the vacant holes.



■ Replace the locking pins into the top of the hinges to prevent the doors opening too far.

Building in the appliance

All fitting instructions given are for a **right hand hinged** appliance. If you have converted the appliance to left hand hinging you will need to adapt these instructions accordingly.

To install the appliance you will need the following:

– a cross-slotted screwdriver,
– a selection of Torx screwdrivers,
– a hexagon spanner.

Weight of the furniture doors

Before fitting furniture doors, ensure that the weight of the door does not exceed the maximum permitted:

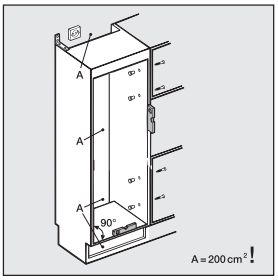
Appliance	max. weight of upper door in kg	max. weight of lower door in kg
KFN 9755 iDE	14	12

Fitting a door which is heavier than the maximum permitted could damage the hinges.

Building into a peninsular run

When built into a peninsular run, the rear of the building-in niche must be fitted with a kitchen furniture panel.

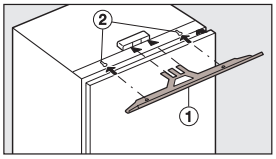
Aligning the housing unit



The housing unit must be carefully aligned using a spirit level before installing the appliance. The unit corners must be at right angles, as otherwise the furniture door will not align correctly with the 4 corners of the appliance.

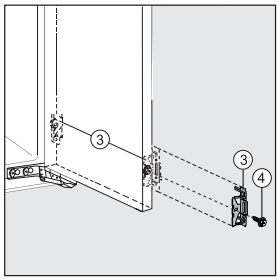
Building in the appliance

Preparing the appliance



■ Slide cover strip ① into the holder as shown, with the bumps facing downwards. The bumps will fit into keyhole slots ②.

■ Position the mains electricity cable so that the appliance can be connected easily once installed.

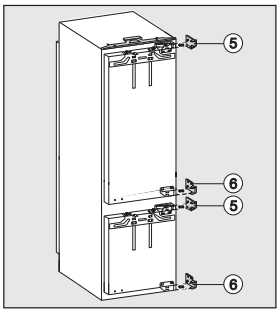


■ Secure fixing brackets ③ (supplied) to the appliance doors by screwing a hexagon screw ④ into the pre-drilled holes.

(With large furniture doors, attach a third pair of fixing brackets ③ in the handle region of the doors).

■ Push the appliance two-thirds of the way into its niche.
When doing this, make sure that the mains cable does not get trapped.

With 16 mm thick unit walls:



■ Clip spacers ⑤ onto the top hinges and spacers ⑥ onto the bottom hinges.

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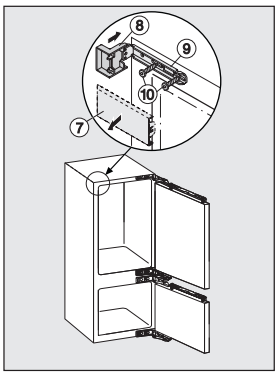
Building in the appliance

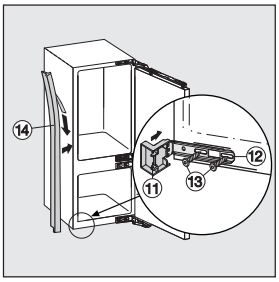
■ Open both appliance doors.



■ Using a screwdriver, remove cover ⑦ from the top corner of the appliance.

■ Fit cover ⑧ onto fixing bracket ⑨.

■ Secure fixing bracket ⑨ to the top of the appliance with screws ⑩ (M5 x 15).



■ Fit cover ⑪ onto fixing bracket ⑫.

■ Secure fixing bracket ⑫ to the bottom of the appliance with screws ⑬ (M5 x 15).

■ Carefully remove the protective foil from sealing strip ⑭.

■ Apply the sealing strip to the side of the appliance on which the door is opened so that it is flush with the front edge of the appliance.
Fit the sealing strip so that it meets up with the lower edge of top cover ⑧ and then cut the sealing strip 2 - 3 mm above bottom fixing bracket ⑫.

■ Push the appliance into the niche until covers ⑧ and ⑪ touch the front edge of the side walls of the housing unit.

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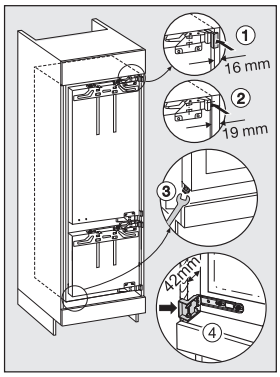
Building in the appliance

Building in the appliance



– **With 16 mm thick walls:**
The spacers should touch the front edge at the top and bottom of the side walls of the housing unit, detail ①.

– **With 19 mm thick walls:**
The front edges of the top and bottom hinges sit flush with the front edge of the housing side walls, detail ②.

■ Make sure that the covers on the top and bottom fixing brackets sit flush with the front edges of the housing unit side walls, detail ④.

This will create a gap all round of **42 mm** to the front edges of the housing unit side walls.

On furniture with door fittings (e.g. stubs, seals etc) the dimension of these must be taken into account when making sure there is a gap all round of **42 mm**.

■ Pull the appliance forwards by the dimension of the door fitting to keep the gap at 42 mm all round.

The hinges and the covers will now protrude by the dimension of the door fitting.

Tip: Remove the door fittings. This will ensure that the doors are flush with the surrounding kitchen unit furniture doors.

> If the all round gap of 42 mm is not maintained between the appliance casing and the front edge of the housing unit side wall the doors may not shut properly.
> This could lead to a build-up of ice and condensation and also cause operational faults.

■ Align the appliance height on both sides by altering the adjustable feet using the spanner supplied ③.

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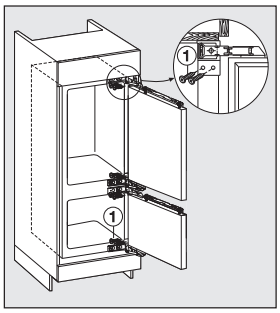
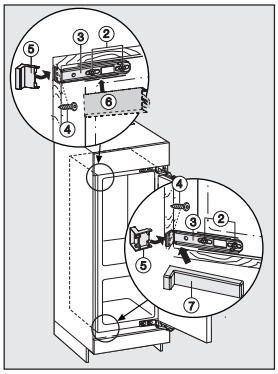
Building in the appliance

Securing the appliance in the niche



■ Press the appliance against the housing unit on the hinge side.

■ To fix the appliance to the housing unit at the top and bottom, screw the long 4 x 20 mm chip board screws ① into the hinges at the top and bottom.



■ Loosen screws ② on the top and bottom fixing brackets ③.

■ Press fixing bracket ③ against the side wall and tighten screws ②.

■ Attach fixing bracket ③ to the housing unit side wall with screws ④. Drill holes in the housing unit side walls if necessary.

■ Break off the protruding end of top cover ⑤, turn the cover around and fit it on top fixing bracket ③.

■ Fit oblong cover ⑥ onto top fixing bracket ③.

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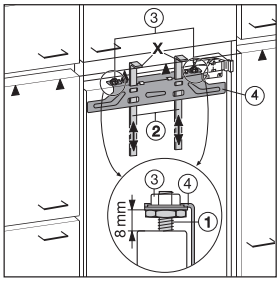
Appliance **12.5.1**

Refrigerator

Building in the appliance

- Break off the protruding end of bottom cover ⑤. It is no longer required.
- Fit angled cover ⑦ onto bottom fixing bracket ③.
- Close the appliance doors.

Fitting the furniture doors



- A gap of 8 mm ① must be set between the appliance door and the central fixing bracket.
- Push fitting aids ② up to the height of the furniture door: the lower edge X of the fitting aids must be at the same height as the upper edge of the furniture door being fitted (see ▲ on the diagram).
- Undo nuts ③ and take fixing bracket ④ off together with the fitting aids.

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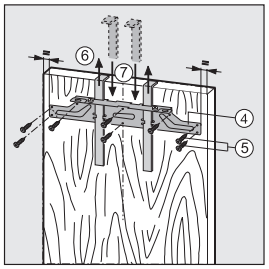

- Using a pencil, lightly mark a line down the centre of the inside of the furniture door.
- Hang fixing bracket ④ with the fitting aids onto the **inside** of the furniture door. Align the fixing bracket centrally.
- Attach the fixing bracket securely using at least 6 short 4 x 14 mm chipboard screws ②. (On cassette doors only use 4 screws on the edges).
- Pull the fitting aids upwards to remove them ⑥.
- Turn them around and fit them into the middle slots on fixing bracket ⑦ for safe keeping.

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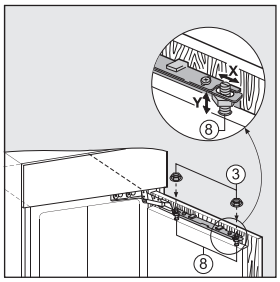
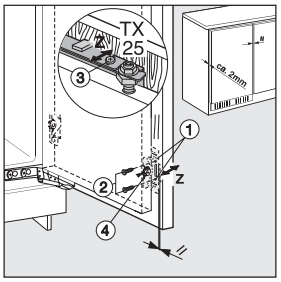
Building in the appliance



- Hang the furniture door onto adjusting bolts ⑧.
- Loosely attach nuts ③ on the adjusting bolts.
- Close the door and check the distance between the door and neighbouring furniture doors.
- Align to match neigbouring doors if necessary:
  Side adjustments X are made by sliding the furniture door, and height adjustments Y by turning adjusting bolts ⑧ with a screwdriver.
- Tighten nuts ③.

Securing the appliance doors to the furniture doors:



- Drill fixing holes ① in the furniture doors and screw in the 4 x 14 mm screws ②.
  Make sure the two metal edges are alligned (Symbol //).
- Align depth Z on the furniture door: Loosen screws ③ at the top of the appliance door, and loosen the hexagon-headed screw ④ at the bottom of the fixing bracket. By moving the furniture doors, create a gap of 2 mm between the furniture doors and the front edge of the housing unit.

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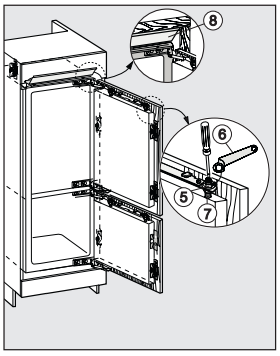
Building in the appliance



- Close both of the doors, and align them with the neighbouring furniture doors.
- Whilst counterholding adjusting bolts ⑦ with a screwdriver, tighten nuts ① on the appliance doors with ring spanner ⑥.
- Cover strip ⑧ must be completely hidden in the niche, and must not protrude.
- Tighten all screws again.

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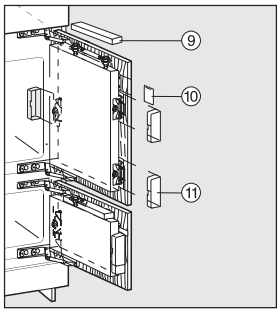

- Replace top cover ⑨, and snap it into place.
- Replace side covers ⑩, making sure they snap into place.
- Replace side covers ⑪, making sure they snap into place.

Building in the appliance

To make sure the appliance is correctly fitted:

- The doors must close properly.
- The doors must not touch the housing unit.
- The seals at the top edge of the handle side must fit properly.

- To double check place a torch in the appliance and close the doors. Turn the lights out in the room. If you can see any light shining out from the sides double check the installation.

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KFN 9755 iDE

CE

Appliance **12.5.2**

Washing Machine

Basic		
Brand	Miele	
Model	Miele W 664	
Dimension (mm)	460 x 600 x 900	
Weight (kg)	59	
Load Capacity	5.5 kg	
Energy		
Energy Efficiency Class	A+++	
Washing Efficiency Class	A	
Spin Efficiency Class	B	
Energy Consumption	per year (kWh)	136
	in kWh (60° C)	0.77
	kW*h/kg	0.14
Water Consumption	per year (liter) (60° C)	8580
	per use (liter) (60°C)	46
Sound emissions	Noise Level Spinning Phase (dB)	73
	Noise Level (dB)	51
Feature		
Load Type	Top load	
Control	Electronic control	
Out-of-balance Control	Yes	
Anti-Foam Control	Yes	
Wool Wash Program	Yes	
Spin Speed	1200 RPM	
Spin Control	Yes	
Leak Protection	Full protection	
Child Control	No	
EAN	4002515193792	

Miele

Mode d'emploi
Lave-linge

Lisez **impérativement** ce mode d'emploi avant d'installer et de mettre en service cet appareil. Vous vous protégerez ainsi et éviterez de détériorer votre appareil.
Conformément à la directive 2006/42/EC, ce lave-linge à usage domestique ne doit pas être détourné à des fins professionnelles.

fr - FR M.-Nr. 09 696 120

Votre contribution à la protection de l'environnement

Elimination de l'emballage

L'emballage protège les lave-linge des avaries de transport. Les matériaux utilisés sont choisis en fonction de critères écologiques, de façon à en faciliter le recyclage.

Le recyclage de l'emballage économise les matières premières et réduit le volume des déchets à éliminer. En principe, le revendeur reprend l'emballage à sa mise en service.

Enlèvement de l'ancien appareil

Les anciens appareils électriques et électroniques contiennent souvent encore des matériaux recyclables. Ils contiennent également des matériaux nocifs, nécessaires au bon fonctionnement et à la sécurité de l'appareil. Ces matériaux peuvent être dangereux pour les hommes et l'environnement s'ils restent dans la collecte de déchets ou s'ils sont mal manipulés. Ne jetez par conséquent en aucun cas votre appareil avec les déchets.

Faites appel au service d'enlèvement mis en place par votre commune ou rapportez votre appareil dans un point de collecte spécialement adapté à l'évacuation de ce type d'appareils.

Gardez l'ancien appareil hors de portée des enfants jusqu'à son enlèvement, pour éviter tout accident.

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Prescriptions de sécurité et mises en garde

Ce lave-linge est conforme aux réglementations de sécurité en vigueur. Une utilisation non conforme comporte des risques pour les personnes et le lave-linge.

Lisez attentivement ce mode d'emploi avant d'utiliser le lave-linge pour la première fois. Il vous fournit des informations importantes sur la sécurité, l'utilisation et l'entretien du lave-linge. Vous vous protégerez ainsi et éviterez des détériorations sur votre lave-linge.

Conservez soigneusement ce mode d'emploi pour pouvoir le transmettre à un éventuel futur propriétaire.

Utilisation conforme

▶ Ce lave-linge est destiné à être utilisé dans le cadre domestique ou dans des conditions d'installation semblables au cadre domestique.

▶ Ce lave-linge ne convient pas à une utilisation en extérieur.

▶ Le lave-linge est réservé à un usage domestique et doit uniquement servir au lavage de textiles déclarés lavables en machine par leur fabricant sur l'étiquette d'entretien.
Tout autre type d'utilisation est interdit. Miele n'est pas responsable de dommages causés par une utilisation incorrecte, non conforme aux prescriptions.

▶ Les personnes qui ne sont pas en mesure d'utiliser ce lave-linge en toute sécurité en raison de déficiences physiques, sensorielles ou mentales, de leur inexpérience ou manque de connaissances ne doivent pas l'utiliser sans la surveillance d'une personne responsable.

Prescriptions de sécurité et mises en garde

Précautions à prendre avec les enfants

▶ Les enfants à partir de huit ans sont autorisés à utiliser, nettoyer ou entretenir le lave-linge sans surveillance uniquement si vous leur avez expliqué comment l'utiliser, le nettoyer ou l'entretenir sans danger. Les enfants doivent être en mesure d'appréhender et de comprendre les risques encourus en cas de mauvaise manipulation.

▶ Les enfants de moins de huit ans doivent être tenus à l'écart du lave-linge à moins d'être constamment surveillés.

▶ Surveillez les enfants lorsqu'ils jouent à proximité du lave-linge. Les enfants ne doivent jamais jouer avec le lave-linge.

Prescriptions de sécurité et mises en garde

Sécurité technique

▶ Contrôlez si l'appareil ne présente pas de détériorations visibles avant de l'installer.
N'installez pas et ne mettez pas en service un appareil endommagé.

▶ Comparez impérativement les données de branchement (fusible, tension et fréquence) portées sur la plaque signalétique avec celles du réseau électrique. Dans le doute, interrogez un électricien.

▶ La sécurité électrique de ce lave-linge n'est garantie que s'il est raccordé à un système de mise à la terre homologué.
Il est très important que cette condition de sécurité élémentaire, et, en cas de doute toute l'installation domestique, soient contrôlées par un professionnel.
Miele ne peut être tenu responsable de dommages causés par une mise à la terre manquante ou défectueuse.

▶ Pour des raisons de sécurité, n'utilisez pas de rallonge (risque d'incendie dû à la surchauffe).

▶ Remplacer les pièces défectueuses uniquement par des pièces détachées d'origine Miele, que nous garantissons répondre totalement aux exigences de sécurité en vigueur.

▶ Veuillez tenir compte des instructions au chapitre "Installation et raccordement" ainsi qu'au chapitre "Caractéristiques techniques"

▶ La prise doit toujours être accessible pour pouvoir débrancher le lave-linge de l'alimentation électrique.

Prescriptions de sécurité et mises en garde

▶ Les réparations incorrectes peuvent entraîner de graves dangers pour l'utilisateur pour lesquels le fabricant décline toute responsabilité. Les interventions techniques ne doivent être exécutées que par des spécialistes.

▶ Si le cordon d'alimentation électrique est endommagé, celui-ci doit impérativement être remplacé par un technicien SAV agréé par Miele afin d'éviter tout risque pour l'utilisateur.

▶ Pour réparer, nettoyer ou entretenir l'appareil, déconnectez-le en :

– débranchant la fiche ou en

– déclenchant le fusible.

▶ Il faut impérativement utiliser un jeu de tuyaux neufs pour le raccordement à l'eau. Les tuyaux usagés sont proscrits.

▶ Ce lave-linge ne doit pas être utilisé sur des unités mobiles (bateaux par exemple).

▶ N'effectuez pas de modifications sur le lave-linge si elles ne sont pas expressément autorisées par Miele.

9

Prescriptions de sécurité et mises en garde

Installation et utilisation

▶ La capacité maximale de charge est de 6,0 kg (linge sec). Vous pouvez consulter les capacités de charge maximales des différents programmes au chapitre "Tableau des programmes".

▶ N'installez pas votre lave-linge dans une pièce exposée au gel. Les tuyaux gelés peuvent se fendre ou éclater. Des températures en dessous de 0 °C peuvent diminuer la fiabilité de la platine électronique.

▶ Enlevez les sécurités de transport à l'arrière de l'appareil avant la mise en service (voir chapitre "Installation", "Démontage des sécurités de transport"). Des sécurités de transport non enlevées peuvent provoquer à l'essorage des détériorations sur la machine et sur les meubles/appareils contigus.

▶ Fermez le robinet d'eau en cas d'absence prolongée (vacances par ex.) surtout s'il n'existe pas de vidange au sol (regard) à proximité de l'appareil.

▶ Risque d'inondation !
Vérifiez que l'eau s'écoule suffisamment vite avant d'accrocher le tuyau de vidange dans un évier ou un lavabo.
Bloquez le tuyau de vidange pour éviter qu'il ne glisse. Autrement la force de refoulement de l'eau vidangée pourrait pousser le tuyau hors de l'évier.

▶ Assurez-vous qu'il n'y a pas de corps étrangers dans votre linge avant de le laver (par ex. clous, épingles, pièces ou trombones) afin de ne pas le détériorer. Les corps étrangers peuvent également endommager certaines pièces de l'appareil (cuve, tambour par ex.) qui peuvent à leur tour détériorer le linge.

10

Prescriptions de sécurité et mises en garde

▶ Il n'est pas nécessaire de détartrer l'appareil si vous dosez les lessives correctement. Si votre appareil était malgré tout entartré, utilisez un détartrant avec protection anticorrosion disponible chez votre revendeur Miele ou auprès du service après-vente Miele. Suivez strictement les instructions d'utilisation.

▶ Rincez les textiles traités aux produits contenant des solvants à l'eau claire avant de les laver dans l'appareil.

▶ N'utilisez en aucun cas de détergents contenant des solvants dans le lave-linge. Ils risquent de détériorer les pièces de l'appareil et de dégager des vapeurs nocives. Il y a en outre un danger d'incendie et d'explosion.

▶ N'utilisez en aucun cas de détergents contenant des solvants pour nettoyer la façade ou le dessus du lave-linge. Les surfaces en plastique pourraient être endommagées.

▶ Les teintures que vous utilisez doivent être appropriées à une utilisation en machine. La fréquence des teintures doit correspondre à une utilisation domestique moyenne. Respectez impérativement les instructions du fabricant de la teinture.

▶ Les décolorants contiennent du soufre, qui peut provoquer une corrosion de la machine. N'utilisez pas de décolorants en machine.

▶ Si de la lessive liquide est projetée dans les yeux, la rincer immédiatement abondamment avec de l'eau tiède. En cas d'ingestion, prévenir immédiatement un médecin. Les personnes qui ont une peau sensible ou des lésions cutanées doivent éviter le contact avec la lessive liquide.

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Prescriptions de sécurité et mises en garde

Accessoires

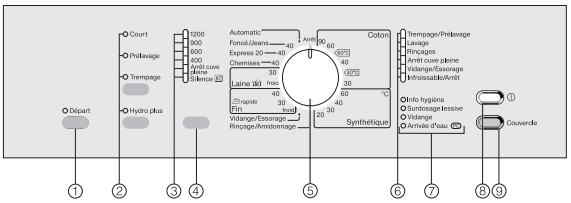
▶ Montez uniquement des accessoires autorisés par Miele.
Le montage d'autres pièces exclut le bénéfice de la garantie.

Miele ne peut être tenu pour responsable des dégâts dus au non-respect des prescriptions de sécurité et des mises en garde.

12

Description de l'appareil

Bandeau de commande



① **Touche *Départ***
pour démarrage du programme

② **Touches Fonctions additionnelles**
pour sélectionner les options
La touche supérieure permet de sélectionner une des options suivantes : *Court*, *Prélavage*, *Trempage*.
Avec la touche inférieure, vous pouvez sélectionner l'option *Hydro plus*.
Diode allumée = option sélectionnée
Diode éteinte = option non sélectionnée

③ **Diodes d'essorage**

④ **Touche de vitesse d'essorage**
pour sélectionner la vitesse d'essorage, *Arrêt cuve pleine* ou *Silence*.

⑤ **Sélecteur de programmes**
pour sélectionner un programme standard et la température correspondante. Se tourne indifféremment dans les deux sens.

⑥ **Affichage de déroulement à diodes**
indique la phase de programme en cours.

⑦ **Diodes de contrôle**

⑧ **Touche** ⏻
pour mettre en marche/arrêter le lave-linge.
Le lave-linge s'arrête automatiquement pour des raisons d'économie d'énergie. Il s'arrête 15 minutes après la fin du programme/rotation Infroissable ou après la mise en marche, si aucune sélection n'est effectuée.

⑨ **Touche *Couvercle***
ouvre le couvercle

Première mise en service

Installer et raccorder l'appareil correctement avant la première mise en service. Veuillez lire le chapitre "Installation".

Ce lave-linge a été soumis à un test de fonctionnement complet dans notre usine, c'est pourquoi il reste un peu d'eau dans le tambour.

Pour des raisons de sécurité, il est impossible d'essorer avant la première mise en service. Pour activer l'essorage, il faut effectuer un programme de lavage sans linge ni lessive.

En cas d'utilisation de lessive, il peut se produire une formation excessive de mousse !

La vanne sphérique de la vidange est également activée. La vanne sphérique de vidange permet désormais d'utiliser complètement la lessive.

- Ouvrez le robinet.
- Pressez la touche ⏻.
- Tournez le sélecteur de programme sur *Coton 60°C*.
- Appuyez sur la touche *Départ*.
- Arrêtez le lave-linge une fois le lavage terminé.

La première mise en service est terminée.

Lavage écologique

Consommation d'énergie et d'eau

- Utilisez la charge maximale de chaque programme.
  La consommation d'énergie et d'eau est plus avantageuse pour une charge pleine.
- Si la quantité de linge est faible, la capacité variable automatique du lave-linge réduit la consommation en eau et en énergie et raccourcit la durée. Ainsi, il peut se produire que la durée de programme soit rectifiée pendant le lavage.
- Utilisez le programme *Express 20* pour les petites quantités de linge.
- Les lessives modernes permettent de laver à des températures abaissées (par ex. *20°C*). Pour économiser l'énergie, utilisez les réglages de température corrects.
- Pour l'hygiène du lave-linge, il est conseillé d'effectuer occasionnellement un lavage avec une température de 60°C minimum. Avec le message *Info hygiène*, le lave-linge vous le rappelle.

Lessive

- Ne dépassez pas les dosages de lessive indiqués sur l'emballage.
- Lors du dosage, faites attention au degré de salissure du linge.
- Réduisez la quantité de lessive pour les petites charges de linge (env. $^1/_3$ de lessive en moins pour une demie-charge).

Sélection de la fonction additionnelle (Court, Trempage, Prélavage)

Sélectionnez pour :

- le linge peu sale sans taches visibles un programme avec l'option *Court*.
- le linge normalement ou très sale avec taches visibles un programme de lavage sans option.
- le linge très sale un programme de lavage avec l'option *Trempage*.
- les textiles avec des salissures importantes (p. ex. poussière, sable), utiliser l'option *Prélavage*.

Conseil en cas de séchage en machine

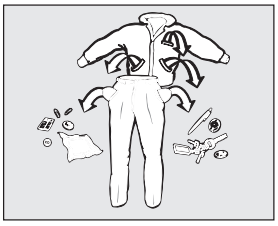
Pour économiser de l'énergie lors du séchage, essorez le linge avec la vitesse d'essorage la plus élevée du programme de lavage.

Bonne utilisation de votre lave-linge

Mode d'emploi rapide

Pour apprendre rapidement comment vous servir de votre lave-linge, reportez-vous aux instructions précédées d'un chiffre (❶, ❷, ❸ ...).

❶ Préparez le linge



- Videz les poches.

⚠ Les corps étrangers (pièces de monnaie, vis, clous, trombones, etc.,) peuvent endommager le linge et certaines pièces de l'appareil.

Traitez les taches

- Avant de laver les textiles, enlevez les taches de préférence tant qu'elles ne sont pas sèches. Tamponnez-les avec un chiffon blanc. Ne pas frotter !

Certaines taches (sang, oeuf, café, thé, etc.) peuvent parfois être enlevées avec des astuces. Si vous n'arrivez pas à vous débarrasser de certaines taches, posez la question à votre revendeur Miele.

⚠ Si vous traitez le linge avec des produits nettoyants contenant des solvants (par exemple du white spirit), prenez garde de ne pas en verser sur les pièces en plastique.

⚠ N'utilisez en aucun cas des détergents chimiques contenant des solvants dans cet appareil !

Triez le linge

- Triez le linge par couleur, tout en prenant en compte le symbole figurant sur l'étiquette d'entretien (au col ou sur la couture latérale).

Les textiles foncés déteignent souvent aux premiers lavages. Afin que rien ne déteigne, lavez le linge clair et foncé séparément.

Conseils

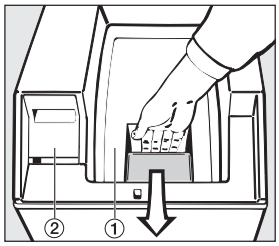
- Voilages : enlevez les crochets et petits plombs ou placez-les dans un sac.
- Soutien-gorge : recoudre les baleines ou les enlever.
- Tricots, jeans, pantalons et vêtements en maille : retournez-les lorsque le fabricant le recommande.
- Fermez les fermetures éclair, les boutons pression avant le lavage.
- Fermez les couettes et les oreillers afin que les petites pièces de linge ne se prennent pas dedans.

Ne lavez aucun textile marqué **non lavable** (symbole d'entretien ☒).

Bonne utilisation de votre lave-linge

❷ Ouvrez le couvercle de machine et le couvercle de cuve.

- Enfoncez la touche *Marche/Arrêt*.
- Pressez la touche *Couvercle* et ouvrez le couvercle de machine jusqu'à la butée.



- Ouvrez le couvercle de cuve.

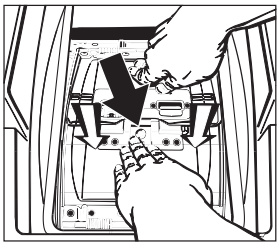
① Couvercle de cuve

② Boîte à produits

Bonne utilisation de votre lave-linge

❸ Ouvrez le tambour

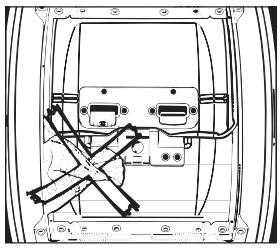
⚠ Attention ! Les deux parties du verrouillage de tambour sont montées sur ressorts.

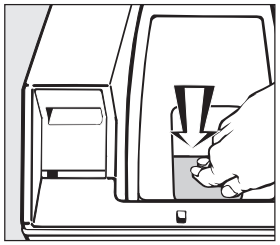


- Maintenez la partie arrière de la main.
- Pressez la sécurité de verrouillage **(flèche noire)** tout en enfonçant la partie avant jusqu'à ce qu'elle s'ouvre vers l'intérieur (sens de la flèche).
- Laissez s'ouvrir les deux parties du verrouillage de tambour en les accompagnant avec les mains.

Bonne utilisation de votre lave-linge

Veillez à ce qu'aucune pièce de linge ne reste bloquée dans le verrouillage de tambour.





- Fermez le couvercle de cuve avec une légère pression sur le verrouillage de manière à ce qu'il s'enclenche nettement.

Si le couvercle de cuve n'est pas correctement fermé, le programme ne démarre pas et la diode *Surdosage lessive* clignote rapidement.

Bonne utilisation de votre lave-linge

❹ Chargez le linge

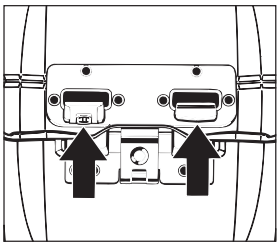
- Chargez le linge déplié dans le tambour sans tasser. Mélanger les pièces de différentes tailles permet de renforcer l'efficacité du lavage et de mieux répartir le linge à l'essorage.

Les textiles à plusieurs épaisseurs présentant une surface particulièrement fine et lisse peuvent se glisser dans la fente latérale entre les battants du couvercle et l'extérieur du tambour. Lavez donc toujours ce type de textiles dans un sac de lavage.

Utilisez la capacité de charge maximale du programme de lavage. La consommation d'eau et d'énergie est alors au niveau le plus faible par rapport à la quantité totale.
Une surcharge donne de mauvais résultats de lavage et augmente la formation de faux plis.

Bonne utilisation de votre lave-linge

❺ Fermez le tambour et le couvercle de cuve



- Enfoncez d'abord la partie avant puis la partie arrière jusqu'à ce que les **deux** crochets s'enclenchent de façon bien visible.

⚠ Si la fermeture n'est pas correcte, il y a risque de détérioration de la machine et du linge.

- Nettoyez régulièrement la roulette dans le crochet de gauche afin que celle-ci tourne toujours correctement.

Bonne utilisation de votre lave-linge

❻ Ajoutez la lessive

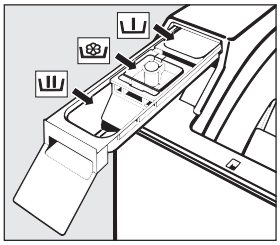
Importance d'un dosage correct . . .

<u>. . . et conséquences d'un dosage insuffisant :</u>

- Le linge n'est pas propre, il devient à la longue gris et rèche
- Formation de petites boules de graisse sur le linge
- Dépôt de calcaire sur la résistance

<u>. . . et conséquences d'un surdosage de lessive :</u>

- Une forte formation de mousse entravant le lavage et donnant un résultat de nettoyage, de rinçage et d'essorage imparfait,
- Une surconsommation d'eau (un rinçage supplémentaire est automatiquement déclenché),
- La pollution de l'environnement.



- Tirez la boîte à produits et versez la lessive dans les compartiments.

= Lessive pour le prélavage (si le prélavage est sélectionné, prendre $^1/_3$ de la quantité de lessive recommandée)

= Lessive pour le lavage trempage inclus

= Assouplissant, produit de tenue, ou amidon.

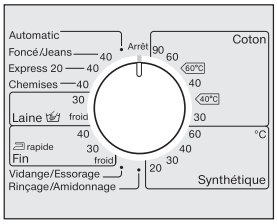
Consultez le chapitre "Lessives" pour davantage d'informations sur les lessives et leur dosage.

- Repoussez la boîte à produit.

❼ Fermez le couvercle de machine

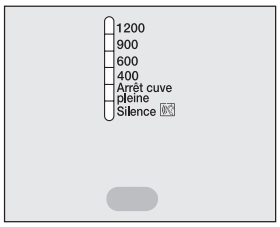
Bonne utilisation de votre lave-linge

❽ Sélectionnez le programme



■ Tournez le sélecteur de programme sur le programme souhaité.

❾ Sélectionnez la vitesse d'essorage

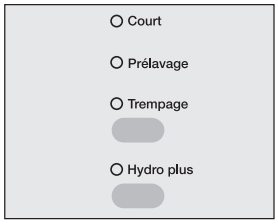


■ Pressez la touche "Essorage" jusqu'à ce que la diode de la vitesse d'essorage sélectionnée s'allume.

❿ Sélectionnez les options

La touche supérieure permet de sélectionner les options dans l'ordre suivant : *Trempage* ou *Prélavage* ou *Court* ou pas de sélection.

Avec la touche inférieure, vous pouvez sélectionner l'option *Hydro plus*.



■ Sélectionnez l'option souhaitée.

Toutes les options ne peuvent pas être sélectionnées avec tous les programmes.

> Si la sélection d'une option est impossible, c'est que celle-ci n'est pas compatible avec le programme de lavage.

Bonne utilisation de votre lave-linge

⓫ Démarrer le programme

■ Appuyez sur la touche *Start* qui clignote.

Au début du programme, l'arrêt automatique du tambour est débloqué avec un bruit caractéristique suivi d'un déclic.

⓬ Décharger le linge

A la fin du programme, la diode *Infroissable/Arrêt* s'allume.

A l'issue du programme, le tambour s'arrête automatiquement sur la position la plus appropriée pour l'ouverture (positionnement et arrêt automatiques du tambour - idéal stop).

■ Appuyez sur la touche *Couvercle*.

> 15 minutes après la fin de la rotation Infroissable, le lave-linge s'arrête automatiquement. Le lave-linge doit être réenclenché en pressant la touche ⏻.

■ Ouvrez complètement le couvercle de machine.

■ Ouvrez le couvercle intérieur

■ Ouvrez le tambour et enlevez le linge.

> N'oubliez pas de linge dans le tambour ! Il pourrait rétrécir ou déteindre à la lessive suivante.

⓭ Arrêtez le lave-linge

■ Fermez le tambour et le couvercle intérieur afin d'éviter que des objets ne tombent dans le linge par inadvertance et n'abîment le linge.

■ Fermez le couvercle de machine.

■ Arrêtez le lave-linge avec la touche ⏻ et positionnez le sélecteur sur *Arrêt*.

Symboles d'entretien

Lavage	
Les degrés indiqués dans la cuve indiquent la température maximale à laquelle vous pouvez laver les articles.	
95	rythme de lavage normal
60	rythme de lavage plus doux
30	rythme de lavage très doux
	lavage main
	non lavable

Exemples de sélection de programme

Programme	Symbole d'entretien
Coton	95 70 60 50 40 30
Synthétique	95 60 50 40 30
Fin	40 30
Laine	
Express 20	40 30
Automatic	40 30 40 30

Séchage	
Les points indiquent la température	
⊡	température normale
⊡	température réduite
⊠	ne doit pas être séché au sèche-linge.

Fer à repasser & repasseuse	
Les points indiquent les gammes de température.	
	env. 200°C
	env. 150°C
	env. 110°C
	ne pas repasser (fer/repasseuse)

Nettoyage professionnel	
Ⓕ	nettoyage avec des solvants chimiques. Les lettres correspondent aux détergents.
Ⓟ	
Ⓦ	Nettoyage à l'eau
⊗	pas de nettoyage chimique

Blanchiment	
△	produit de blanchiment par oxydation admis
◬	blanchiment à l'oxygène uniquement
▲	ne pas blanchir

Essorage

Vitesse d'essorage final

Programme	tr/min
Coton	1200
Synthétique	1200
Automatic	900
Foncé/Jeans	1200
Express 20	1200
Chemises	600
Laine	1200
Fin	600
Vidange/Essorage	1200
Rinçage/Amidonnage	1200

Vous pouvez réduire la vitesse d'essorage finale. Il est en revanche impossible de sélectionner une vitesse d'essorage supérieure à celle indiquée plus haut.

Essorage intermédiaire

Le linge est essoré après le lavage et entre les différents rinçages. En cas de réduction de la vitesse d'essorage finale, la vitesse d'essorage intermédiaire est également réduite.
En programme *Coton*, un rinçage supplémentaire est ajouté lorsque la vitesse d'essorage est inférieure à 700 tr/mn.

Désactiver l'essorage final (Arrêt cuve pleine)

■ Pressez la touche "Essorage" jusqu'à ce que la diode *Arrêt cuve pleine* s'allume. Le linge reste à tremper dans l'eau du dernier rinçage. Ceci permet de réduire la formation de plis lorsque les textiles ne sont pas enlevés immédiatement du lave-linge après le programme.

– Démarrer l'essorage final :

Sélectionnez la vitesse d'essorage avec la touche "Essorage". Le lave-linge lance l'essorage final.

– Terminer le programme:

Appuyez sur la touche *Couvercle*. L'eau est vidangée. Le couvercle s'ouvre.

Désactiver l'essorage intermédiaire et l'essorage final

■ Pressez la touche "Essorage" jusqu'à ce que la diode *Silence* s'allume. Après le dernier rinçage, l'eau est vidangée et Infroissable est activé. Avec ce réglage un rinçage supplémentaire est ajouté dans certains programmes.

Tableau des programmes

Coton	**90°C - 30°C**	**6,0 kg maximum**
Type de linge	T-shirts, sous-vêtements, nappes, etc, textiles en coton, lin ou mélangés.	
Conseil	Les réglages 60°C/40°C se distinguent de 60°C/40°C par : – des temps de programmes plus courts – des temps de maintien en température plus longs – davantage de consommation d'énergie si vous avez besoin d'un lavage particulièrement hygiénique, sélectionner une température de 60°C ou plus.	
Coton	60°C/40°C	**6,0 kg maximum**
Type de linge	Linge en coton normalement sale	
Conseil	– Ces réglages sont les plus efficaces pour le lavage de coton en termes de consommation d'énergie et d'eau. – Pour 60°C, la température de lavage atteinte est inférieure à 60°C mais l'efficacité de lavage correspond au programme Coton 60°C.	
Remarque pour les instituts de test : Programmes de test suivant EN 60456 et étiquette énergie conforme à la directive UE 1061/2010		
Synthétique	**60°C - 20°C**	**2,5 kg maximum**
Type de linge	Textiles en fibres synthétiques, textiles mélangés ou coton/polyester mélangé.	
Conseil	Réduire la vitesse d'essorage si le linge se froisse facilement.	
Automatic	**40°C**	**3,0 kg maximum**
Type de linge	Charge de linge triée par couleurs, adaptée aux programmes *Coton* et *Synthétique*.	
Conseil	A chaque charge de linge, les paramètres de lavage sont automatiquement adaptés pour un soin optimal du linge et un résultat de lavage parfait (par ex. niveau d'eau, rythme de lavage et profil d'essorage).	

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Tableau des programmes

Foncé/Jeans	**40°C**	**3,0 kg maximum**
Type de linge	Pièces de linge noires ou foncées en coton, textile mélangé ou toile de jean	
Conseil	– Retourner le linge pour le laver. – Les vêtements en jean déteignent souvent un peu au premier lavage. Lavez les vêtements foncés et clairs séparément.	
Express 20	**40°C**	**2,5 kg maximum**
Type de linge	Textiles en coton peu portés ou très peu sales.	
Conseil	L'option *Court* est automatiquement activée.	
Chemises	**40°C**	**1,5 kg maximum**
Conseil	– Vous pouvez préparer les cols et les manchettes s'ils sont très sales. – Utilisez le programme *Fin* pour les chemises en soie.	
Laine	**30°C - froid**	**2,0 kg maximum**
Type de linge	Textiles en laine, laine mélangée ou textiles lavables main, soie	
Conseil	Réduire la vitesse d'essorage si le linge se froisse facilement.	
Fin	**40°C - froid**	**1,0 kg maximum**
Type de linge	Pour les textiles délicats en fibres synthétiques, textiles mélangés, rayonne Voilages déclarés lavables en machine par le fabricant.	
Conseil	– Effectuer de préférence un programme avec Prélavage pour éliminer la poussière des rideaux. – Sélectionner *Silence* si le linge se froisse facilement.	

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Tableau des programmes

Vidange/Essorage	**5,0 kg maximum**
Conseil	– Vidange uniquement : régler la vitesse d'essorage sur *Silence* – Vérifiez que la vitesse d'essorage réglée est appropriée.
Rinçage/Amidonnage	**5,0 kg maximum**
Type de linge	– Pour rincer les textiles lavés à la main – Nappes, serviettes, tenues de travail à amidonner
Conseil	– Réduire la vitesse d'essorage finale si le linge se froisse facilement. – Le linge à amidonner doit être récemment lavé mais non traité à l'assouplissant. – Vous obtiendrez un résultat de rinçage particulièrement performant avec deux rinçages en activant l'option *Hydro plus* Pour la fonction additionnelle *Hydro plus*, l'option programmée doit être *rinçage supplémentaire*

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Options

Vous pouvez compléter les programmes standard avec les options.

Court

Pour les textiles avec des salissures légères sans taches apparentes.

La durée du programme est raccourcie.

Prélavage

Pour les textiles avec des salissures importantes (p. ex. poussière, sable).

Trempage

Pour les textiles particulièrement sales et tachés, (p. ex. sang, graisse, chocolat).

– Le temps de trempage peut être programmé entre 30 minutes et deux heures, par pas de 30 minutes.

– Le réglage d'usine est de deux heures.

Pour programmer un autre temps, voir le chapitre "Fonctions additionnelles", "Trempage".

Hydro plus

Le niveau d'eau est augmenté au lavage et au rinçage.

Vous pouvez programmer d'autres options pour la touche *Hydro plus*, comme décrit au chapitre "Fonctions programmables".

Les options suivantes peuvent être sélectionnées avec les programmes

Vous ne pouvez sélectionner qu'une option à la fois parmi les options *Court*, *Prélavage* et *Trempage* .

	Court	Prélavage	Trempage	Hydro plus
Coton	X	X	X	X
Synthétique	X	X	X	X
Automatic	-	-	-	-
Foncé/Jeans	X	X	X	-
Express 20	X[1)]	-	-	X
Chemises	X	X	X	-
Laine	-	-	-	-
Fin	X	X	X	-
Vidange/ Essorage	-	-	-	-
Rinçage/ Amidonnage	-	-	-	X

[1)] option sélectionnée automatiquement par le programme

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Déroulement de programme

	Lavage		Rinçage		Essorage	
	Niveau d'eau	Rythme de lavage	Niveau d'eau	Rinçages	Essorage intermédiaire	Essorage final
Coton	🛁	Ⓐ	🛁	2-4[1)2)]	✓	✓
Synthétique	🛁	Ⓒ	🛁	2-3[3)]	✓	✓
Automatic	🛁	ⒶⒷⒸ	🛁	2-3[3)]	✓	✓
Foncé/Jeans	🛁	Ⓑ	🛁	3	–	✓
Express 20	🛁	Ⓑ	🛁	1-3[3)]	✓	✓
Chemises	🛁	Ⓒ	🛁	2	–	✓
Laine	🛁	Ⓔ	🛁	2	✓	✓
Fin	🛁	Ⓓ	🛁	3	–	✓
Vidange/ Essorage	–	–	–	–	–	✓
Rinçage/ Amidonnage	–	–	🛁	1	–	✓

🛁 = niveau d'eau faible
🛁 = niveau d'eau intermédiaire
🛁 = niveau d'eau élevé

Ⓐ = Rythme intensif
Ⓑ = Rythme normal
Ⓒ = Rythme doux
Ⓓ = Rythme délicat
Ⓔ = Rythme lavage main

Particularités sur le déroulement du programme, voir page suivante.

Déroulement de programme

Ce lave-linge dispose d'une commande entièrement électronique avec capacité variable automatique. Le lave-linge calcule lui-même la consommation d'eau nécessaire, en fonction de la quantité et de la capacité d'absorption du linge chargé. C'est pourquoi les programmes présentent des déroulements et des durées différentes.

Les déroulements de programme mentionnés ici sont toujours basés sur le programme standard pour une charge maximale. Les options ne sont pas prises en compte.

L'affichage de déroulement de votre lave-linge vous indique à tout moment du programme de lavage quelle est la phase en cours.

Particularités du déroulement :

Infroissable :

Le tambour tourne encore jusqu'à 30 minutes après la fin du programme afin d'éviter la formation de plis (exception : programme Laine). Le lave-linge peut être ouvert à tout instant. Exception : La fonction Infroissable n'est pas proposée en programme *Laine*.

1) Si la température sélectionnée est comprise entre 90°C et 60°C 2 rinçages sont effectués. En cas de sélection de température inférieure à 60°C, 3 rinçages sont effectués.

2) un troisième ou quatrième rinçage est effectué en cas de :

- formation excessive de mousse dans le tambour
- vitesse d'essorage final inférieure à 700 tr/mn
- Sélection de *Silence*

3) un troisième rinçage est effectué en cas de:

Sélection de *Silence*

Modification du déroulement de programme

Annuler

Vous pouvez interrompre votre programme de lavage à tout instant après le démarrage.

- Tournez le sélecteur de programme sur *Arrêt*.

Le lave-linge vidange le bain lessiviel, le programme est interrompu et le couvercle s'ouvre.

Si vous souhaitez enlever le linge :

- Ouvrez complètement le couvercle de machine.
- Ouvrez le couvercle de cuve.
- Ouvrez le tambour.

Si vous souhaitez sélectionner un autre programme :

- Vérifiez si la boîte à produits contient encore de la lessive. Sinon, ajoutez de la lessive.
- Fermez le couvercle de machine et sélectionnez un nouveau programme.

Interruption

- Mettez le lave-linge hors tension avec la touche ⏻.

Pour poursuivre :

- Mettez le lave-linge en marche avec la touche ⏻.

Pour modifier le programme

Une fois le programme démarré, il est impossible d'en changer. La diode *Infroissable/Arrêt* clignote lorsque le sélecteur de programme est déplacé sur une autre position. Cela n'a pas d'influence sur le déroulement du programme.

Modification de la température

Jusqu'à 6 minutes après le départ, il est possible de modifier la température.

Modification de la vitesse d'essorage

Il est possible de modifier la vitesse d'essorage à tout moment.

Options

Il est possible d'activer ou de désactiver l'option *Hydro plus* jusqu'à 6 mn après le départ.

Modification du déroulement de programme

Ajout/Déchargement de linge

Vous pouvez ajouter/décharger du linge après le démarrage de l'appareil dans tous les programmes.

- Appuyez sur la touche *Couvercle*.

A présent, le tambour s'arrête automatiquement sur la position la plus appropriée pour l'ouverture et est immobilisé (positionnement et arrêt automatiques du tambour - idéal stop). Le couvercle de machine s'ouvre.

- Ouvrez complètement le couvercle de machine.
- Ouvrez le couvercle de cuve.
- Ouvrez le tambour.
- Ajoutez ou déchargez du linge.
- Fermez le tambour.
- Fermez bien le couvercle de cuve.
- Fermez le couvercle de machine.

Le programme reprend automatiquement.

Le couvercle ne s'ouvre pas lorsque :

- la température du bain est supérieure à **55°C**.
- la phase *Essorage final* est atteinte.

Lessive

Quelle lessive choisir ?

Vous pouvez utiliser toutes les lessives pour lave-linge. Les conseils d'utilisation et de dosage figurent sur l'emballage de la lessive.

	universelle	couleurs	textiles délicats	spéciale	adoucissant
	lessive				
Coton	X	X	–	–	X
Synthétique	X	X	–	–	X
Automatic	X	X	–	–	X
Foncé/Jeans[1)]	X	X	X	–	X
Express 20[1)]	X	X	–	–	X
Chemises	X	X	–	–	X
Laine	–	–	–	X	X
Fin	X	X	X	–	X
Rinçage/ Amidonnage	–	–	–	X	–

[1)] Utiliser de la lessive liquide. Lorsque le prélavage est sélectionné, il est conseillé d'utiliser un récipient spécial pour la lessive liquide dans le compartiment. Ce récipient spécial est disponible auprès du SAV Miele ou des revendeurs agréés.

Lessives spéciales :
Lessives développées spécialement pour ces programmes de lavage ou des textiles spécifiques (par ex. Miele CareCollection, chapitre "Accessoires en option")

Lessive

Le dosage dépend :

- du degré de salissure du linge

  Linge peu sale
  Ne comporte pas de salissures ni de taches visibles. Les vêtements portent seulement l'odeur du corps.

  Linge normalement sale
  Les salissures sont visibles et/ou quelques petites taches sont reconnaissables.

  Linge très sale
  Traces de salissures et/ou de taches nettement reconnaissables.

- de la dureté de l'eau
  Interrogez la Compagnie Distributrice d'eau si vous ne connaissez pas la zone de dureté de l'eau courante à votre lieu d'habitation.

- de la quantité de linge

Duretés d'eau

Zone de dureté	Dureté totale en mmol/l	Dureté française °f
douce (I)	0 - 1,5	0 - 15
intermédiaire (II)	1,5 - 2,5	15 - 25
dure à très dure (III)	plus de 2,5	plus de 25

Anticalcaire

Si votre eau appartient aux zones de dureté II-III, vous pouvez ajouter un anticalcaire pour économiser de la lessive. Le dosage exact est indiqué sur l'emballage. Versez tout d'abord la lessive, puis l'anticalcaire.

Dans ce cas versez la même dose de lessive qu'en zone de dureté I.

Utilisation de plusieurs produits de lavage

Si vous utilisez plusieurs produits, versez-les dans le compartiment dans l'ordre suivant :

1. Lessive
2. Anticalcaire
3. Détachant

Cela assure un meilleur entraînement des produits.

Lessive

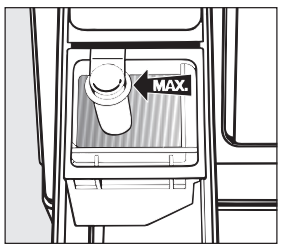
Produits de finition

L'assouplissant
rend au linge toute sa souplesse et diminue l'électricité statique en cas de séchage en machine.

Les produits de tenue
sont des amidons synthétiques qui donnent une meilleure tenue au linge.

L'amidon
donne au linge une belle tenue et un beau fini.

Adjonction automatique d'assouplissant, de produit de tenue ou d'amidon liquide



- Remplissez le produit correspondant dans le compartiment ❀. **Ne dépassez pas le repère maximum.**

Le produit est entraîné au dernier rinçage. Il reste un peu d'eau dans le compartiment assouplissant ❀ en fin de programme.

Après plusieurs amidonnages automatiques, nettoyez la boîte à produits, en particulier le tuyau d'aspiration.

Utilisation d'un assouplissant, de produits de tenue ou d'amidon séparée

- Dosez et préparez l'amidon comme indiqué sur l'emballage.
- Remplissez le produit correspondant dans le compartiment ❀.
- Versez le produit poudre ou semi-liquide correspondant dans le compartiment .
- Tournez le sélecteur de programme sur la position *Rinçage/Amidonnage*.
- Sélectionnez une vitesse d'essorage.
- Appuyez sur la touche *Départ*.

Décolorer/Teinter

- N'utilisez pas de décolorants dans le lave-linge.
- La fréquence des teintures effectuées doit correspondre à une utilisation domestique moyenne. En effet, le sel utilisé pour la teinture peut attaquer l'acier inoxydable en cas d'utilisation intensive. Veuillez strictement vous conformer aux instructions du fabricant de la teinture.

Nettoyage et entretien

Nettoyage du tambour (Info hygiène)

Si vous lavez principalement à basse température et/ou avec de la lessive liquide, du moisi et une odeur désagréable peuvent apparaître dans le lave-linge. Pour laver le tambour et éviter la formation d'odeurs, il est conseillé d'effectuer une fois par mois ou lorsque la diode *Info hygiène* s'allume un programme de lavage à 60°C ou davantage avec de la lessive en poudre.

Nettoyer la carrosserie et le bandeau

⚠ Débrancher le lave-linge avant tout nettoyage ou entretien.

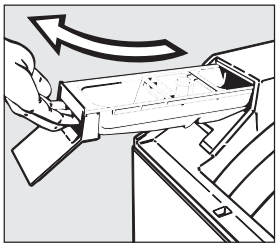
⚠ Ne pas asperger le lave-linge avec un jet d'eau.

- Nettoyez la carrosserie et le bandeau avec un détergent doux ou de l'eau savonneuse et séchez avec un chiffon.
- Nettoyez le tambour avec un produit spécial inox.

⚠ N'utilisez pas de détergents contenant des solvants, de produits abrasif, pour vitres ou multi-usages. Ils pourraient endommager les surfaces en plastique et d'autres pièces de l'appareil.

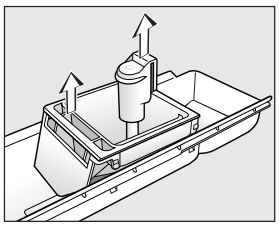
Nettoyage de la boîte à produits

Enlevez régulièrement les éventuels résidus de détergent.



- Sortez la boîte à produits.

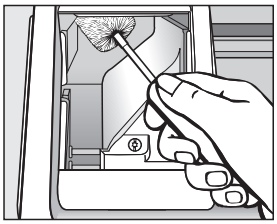
Nettoyage et entretien



- Sortez le compartiment à assouplissant et le tube d'aspiration (flèches).
- Nettoyez la boîte à produits, le compartiment à assouplissant et le tube d'aspiration à l'eau chaude.
- Nettoyez également le tuyau sur lequel le tube d'aspiration s'emmanche.

Nettoyez le canal d'aspiration particulièrement soigneusement après plusieurs amidonnages. L'amidon liquide peut s'agglutiner.

Nettoyage du logement de la boîte à produits



- Avec un goupillon, enlevez les restes de produit lessiviel et le dépôt de tartre des buses d'arrivée d'eau de la boîte à produits.

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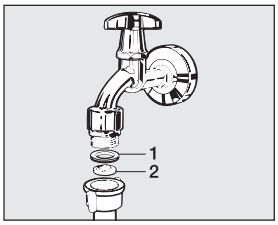
Nettoyage et entretien

Nettoyage du filtre dans la conduite d'arrivée d'eau

Le lave-linge est équipé d'un filtre destiné à protéger la valve d'arrivée d'eau.

Contrôlez le filtre logé à l'extrémité du tuyau d'arrivée d'eau tous les 6 mois. Il y a lieu de rapprocher les contrôles en cas de coupures fréquentes sur le réseau d'alimentation.

- Fermez le robinet.
- Dévissez le tuyau d'arrivée d'eau du robinet.



- Extrayez le joint caoutchouc **1**.
- Saisissez la languette du filtre plastique **2** à l'aide d'une pince à bec fin et sortez-le.
- Nettoyez-le.
- Remontez les éléments.

Vissez le flexible solidement au robinet et ouvrez ce dernier. Resserrez l'écrou en cas de fuite.

Remontez **impérativement** le filtre après le nettoyage.

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Recherche des anomalies

Que faire si . . .

Vous pouvez remédier vous-même à la plupart des anomalies qui peuvent se produire en utilisation quotidienne. Vous économiserez du temps et des frais en n'appelant pas immédiatement le Service après-vente.

Les tableaux suivants vous aideront à déceler les causes de la panne et à trouver la solution. Néanmoins il faut savoir que :

⚠ Les interventions techniques doivent être exécutées exclusivement par des professionnels. Les réparations incorrectes peuvent entraîner de graves dangers pour l'utilisateur.

Le programme ne démarre pas.

Message d'erreur	Cause possible	Solution
La diode *Infroissable/ Arrêt* ne s'allume pas ou la touche *Départ* ne clignote pas.	L'appareil n'est pas alimenté.	Vérifiez si – la fiche est branchée – le fusible est en bon état.
Le programme *Vidange/ Essorage* ne démarre pas lorsque vous le sélectionnez.	La "Première mise en service" n'a pas été effectuée.	Reportez vous au chapitre "Première mise en service" et suivez les instructions.
La diode *Surdosage lessive* clignote rapidement et le programme ne démarre pas.	Le couvercle de cuve n'est pas fermé.	Ouvrez le couvercle de machine et fermez bien le couvercle de cuve.

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Recherche des anomalies

Le programme de lavage a été interrompu et un message d'erreur s'affiche.

Message d'erreur	Cause possible	Solution ❶
La diode de contrôle *Vidange* clignote.	La vidange est bloquée.	Nettoyez le filtre et la pompe de vidange comme dans le chapitre "Recherche des anomalies" paragraphe "Déverrouillage de couvercle manuel en cas de vidange obstruée et/ou de panne de courant".
	Le tuyau de vidange est trop haut.	Hauteur de refoulement max. : 1 m
La diode de contrôle *Arrivée d'eau* clignote.	L'arrivée d'eau est fermée.	Ouvrez le robinet.
	Le filtre dans le tuyau d'arrivée d'eau est bouché.	Nettoyez-le.
Les diodes de contrôle *Arrivée d'eau* et *Vidange* clignotent.	Le système anti-fuites Watercontrol s'est déclenché.	Contactez le service après-vente.
La diode *Trempage/ Prélavage* ou *Rinçage* clignote.	Anomalie.	Relancez le programme. Si le message d'erreur apparaît de nouveau, appelez le S.A.V.

❶ Pour éliminer le message d'erreur : arrêtez l'appareil avec la touche ⏻ et positionnez le sélecteur sur *Arrêt*.

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Recherche des anomalies

Le programme de lavage se déroule comme d'habitude, mais une diode de contrôle s'allume		
Problème	**Cause**	**Solution ❶**
La diode de contrôle *Info hygiène* est allumée.	Aucun programme de lavage à plus de 60°C n'a été effectué depuis longtemps.	Pour éviter la formation de moisissures et d'odeurs dans votre lave-linge, démarrez le programme *Coton 90°C* avec une lessive universelle.
La diode de contrôle *Surdosage lessive* est allumée.	Pendant le lavage, une mousse excessive s'est formée.	A la prochaine lessive, mettez moins de produit et suivez les indications de dosage du fabricant sur le paquet.
La diode *Lavage* ou *Rinçage* clignote dans l'afficheur de déroulement.	Le lave-linge a détecté un défaut pendant le cycle de lavage.	Relancez le programme. Si le message d'erreur apparaît de nouveau, appelez le S.A.V.
La diode *Infroissable/ Arrêt* clignote dans l'afficheur de déroulement.	La position du sélecteur de programme a été modifiée après le lancement du programme. Tournez le sélecteur de programme sur la position d'origine.	

❶ Pour éliminer le message d'erreur : arrêtez le lave-linge avec la touche ⏻ et positionnez le sélecteur sur *Arrêt*.

Les diodes SAV s'allument à la fin du programme et à la mise en marche du lave-linge.

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Recherche des anomalies

Anomalies générales ou résultat de lavage insatisfaisant.		
Anomalie	**Cause possible**	**Solution**
L'appareil vibre pendant l'essorage.	Le lave-linge n'est pas bien d'aplomb.	Redressez le lave-linge en dévissant les pieds.
Le linge n'est pas essoré comme d'habitude.	La vitesse d'essorage sélectionnée était trop faible.	Sélectionnez une vitesse d'essorage plus rapide lors du prochain lavage.
On entend des bruits de pompe inhabituels.	Ce n'est pas un défaut. Les bruits d'aspiration en début et en fin de vidange sont normaux.	
Des résidus de lessive relativement gros restent dans la boîte à produits.	La pression d'eau n'est pas suffisante.	– Nettoyez le filtre dans le tuyau d'arrivée d'eau. – Enfoncez éventuellement la touche *Hydro plus*.
	Les lessives en poudre utilisées avec un anticalcaire ont tendance à coller.	Versez à l'avenir la lessive puis le produit anticalcaire dans la boîte à produits.
L'assouplissant n'est pas entraîné complètement ou il reste encore trop d'eau dans le compartiment ❀.	Le tube d'aspiration n'est pas posé correctement ou est obstrué.	Nettoyez le tube d'aspiration, cf. chapitre "Nettoyage et Entretien", Paragraphe "Nettoyage de la boîte à produits".

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Recherche des anomalies

Défaut	Cause possible	Solution
Le linge n'est pas propre avec la lessive liquide.	Les lessives liquides ne contiennent pas d'agent de blanchiment. Les taches de fruit, café ou thé ne sont pas éliminées.	– Utilisez de la lessive en poudre contenant des agents de blanchiment. – Versez du détachant dans le compartiment ⅢI et la lessive liquide dans une boule-doseuse. – Ne mélangez jamais lessive liquide et détachant dans la boîte à produits.
Des résidus élastiques gris adhèrent au linge lavé.	Vous avez versé trop peu de lessive ; le linge était fortement taché de graisse (huiles, crèmes).	– Versez davantage de lessive ou utilisez des lessives liquides pour le linge portant ce type de taches. – Faites fonctionner le programme *Blanc/Couleurs 60°C* à vide avec de la lessive liquide avant le prochain lavage.
Des résidus blanchâtres ressemblant à de la lessive apparaissent sur le linge foncé.	La lessive contient des composants anticalcaires insolubles (zéolithes) qui se sont fixés sur le linge.	– Essayez d'enlever les résidus de produit avec une brosse sur le linge sec. – Lavez le linge à l'avenir avec de la lessive liquide. Celle-ci ne contient pas de zéolithes.
De la mousse s'échappe par l'avant du lave-linge.	Pendant le lavage, une mousse excessive s'est formée.	Mettez moins de lessive au prochain lavage. Veuillez respecter les indications de dosage sur l'emballage de la lessive.

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Recherche des anomalies

Problème d'ouverture ou de fermeture.		
Anomalie	**Cause possible**	**Solution**
L'ouverture de tambour n'est pas en haut.	Un déséquilibre a empêché que le positionnement automatique du tambour s'effectue normalement.	Tournez le tambour sur la bonne position (jusqu'à ce que l'arrêt de tambour s'enclenche). Veillez dorénavant à mettre de grandes et de petites pièces de linge dans le tambour. Mélanger les pièces de différentes tailles permet de renforcer l'efficacité du lavage et de mieux répartir le linge à l'essorage.
Le couvercle de machine ne s'ouvre pas.	Le lave-linge n'est pas raccordé électriquement.	Branchez la fiche de l'appareil dans la prise.
	Le lave-linge n'est pas enclenché.	Enclenchez le lave-linge avec la touche ⏻.
	Panne de courant.	Ouvrez le couvercle, comme décrit à la fin de ce chapitre.
	Le couvercle est bloqué dès que le bain dépasse 55°C afin d'éviter toute brûlure.	

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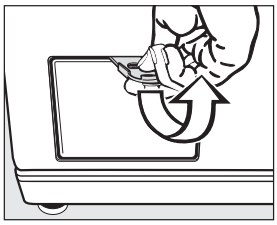
Recherche des anomalies

Déverrouillage de couvercle manuel en cas de vidange obstruée et/ou de panne de courant



- Arrêtez le lave-linge.
- Ouvrez la trappe de vidange avec le déverrouilleur jaune.

Vidange obstruée

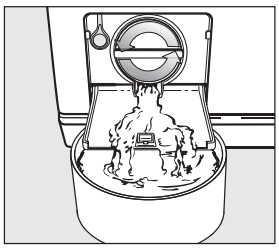
Si la vidange est obstruée, le lave-linge peut contenir une quantité d'eau assez importante **(max. 25 l)**.

⚠ Attention : risque de brûlure si un programme haute température était en cours !

Vidange

- Placez une bassine sous la trappe.

Ne dévissez pas complètement le filtre.

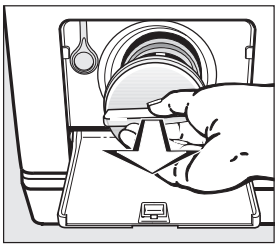


- Dévissez le filtre jusqu'à ce que de l'eau s'écoule.

Pour interrompre la vidange :

- refermez le filtre.

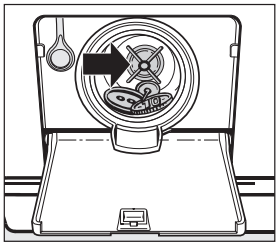
Dès que l'écoulement d'eau est fini :



- Dévissez complètement le filtre.

Recherche des anomalies

- Nettoyez bien le filtre.



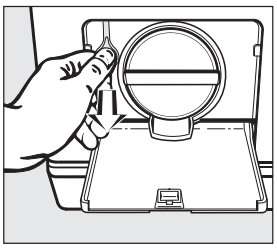
- Vérifiez si la turbine tourne facilement. Sinon, enlevez les corps étrangers (boutons, pièces etc.) et nettoyez l'intérieur.
- Remontez le filtre et verrouillez-le bien.

⚠ De l'eau s'écoule du lave-linge si le filtre n'est pas remonté et vissé à fond.

Pour éviter de perdre la lessive, versez environ 2 l d'eau par la boîte à produits après avoir nettoyé le filtre. L'eau superflue sera automatiquement vidangée avant le prochain lavage.

Ouverture du couvercle de machine

⚠ Assurez-vous que le tambour est à l'arrêt avant de décharger le linge. Ne mettez jamais les mains dans un tambour qui tourne encore, vous risquez de vous blesser.



- Tirez le déverrouillage de secours jusqu'à ce que le couvercle de machine s'ouvre.
- Ouvrez le couvercle de cuve.

Service Après Vente

Réparations

En cas de pannes auxquelles vous ne pouvez remédier vous-même, contactez :

– votre revendeur Miele ou

– le ligne Consommateurs Miele.

Veuillez indiquer le modèle et la référence de votre lave-linge. Vous trouverez la référence du modèle sur la plaque signalétique sur la paroi arrière de l'appareil.

Actualisation de la programmation (diode PC)

La diode PC est prévue pour l'actualisation par un technicien des programmes de lavage en fonction des évolutions techniques prévisibles.

La programmation de votre lave-linge pourra ainsi être adaptée aux progrès en matière de lessive, textiles et procédés de lavage.

Miele vous signalera les possibilités d'actualiser votre lave-linge.

Conditions et période de garantie

Ce lave-linge bénéficie d'une garantie de 2 ans.

Afin d'enregistrer la garantie de votre produit, veuillez remplir notre formulaire d'enregistrement produit en ligne sur le site www.miele.fr dans la rubrique "Les services" ou nous renvoyer la carte constructeur jointe.

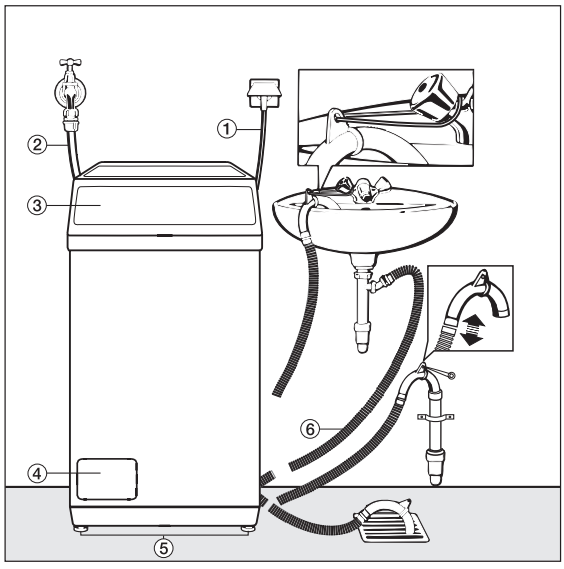
Vous trouverez de plus amples informations sur les conditions de garantie dans le livret de garantie.

Accessoires en option

Les accessoires de ce lave-linge sont disponibles chez les revendeurs Miele ou au SAV Miele.

Installation et raccordement

Vue de face



① Branchement électrique

② Tuyau d'arrivée

③ Couvercle avec bandeau de commande

④ Trappe d'accès au filtre, à la pompe et au déverrouillage manuel

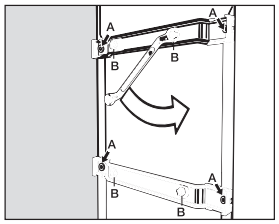
⑤ Pieds

⑥ Tuyau de vidange souple (avec crosse pivotante et amovible) et les différentes évacuations possibles

Installation et raccordement

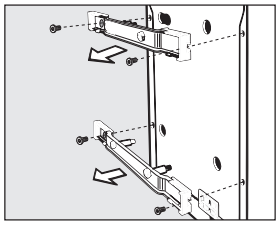
Démontage des sécurités de transport

■ Transportez le lave-linge jusqu'à son emplacement.



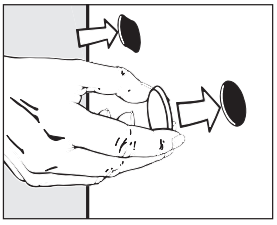
■ Dévissez les quatre vis extérieures **A** et retirez-les.

■ Dévissez complètement les quatre vis **B**. Ces vis doivent rester sur les sécurités de transport.



■ Enlevez les sécurités de transport.

⚠ Après avoir enlevé les tiges de transport, refermez les orifices. S'ils ne sont pas obturés, ils peuvent présenter un risque de blessure.



■ Fermez les quatre grands trous avec des caches.

Conservez les sécurités de transport et les vis. Les sécurités de transport doivent être montées avant tout transport du lave-linge (par ex. lors d'un déménagement) !

Remontage des sécurités de transport

■ Le remontage se fait en sens inverse du démontage.

Installation et raccordement

Ajustage

■ Installez toujours l'appareil d'aplomb et de façon stable.

Lieu d'installation

Un plancher en béton est le mieux adapté. Il ne transmet pas de vibrations, contrairement à un plancher en bois ou un sol "mou".

⚠ Les pieds de l'appareil et le sol doivent être secs sinon le lave-linge risque de déraper lors de l'essorage.

Evitez d'installer la machine sur des revêtements de sol mous, car elle peut vibrer pendant l'essorage.

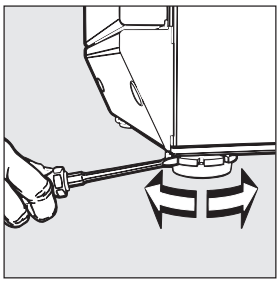
Sur un plancher en bois :

– placez l'appareil sur une planche en bois (min. 60 x 45 x 3 cm). Cette planche devra recouvrir le plus de solives possible ; vissez-la sur elles et non pas uniquement sur les lattes de plancher.

– installez la machine dans la mesure du possible dans un angle de la pièce. La stabilité du plancher y est meilleure.

Dévissage et blocage des pieds

Compensez les inégalités du sol avec les pieds à vis.



■ Dévissez le pied (éventuellement les deux pieds) jusqu'à ce que le lave-linge soit droit.

■ Maintenez le pied avec une pince multiprises.

■ Vissez le contre-écrou à fond contre la carrosserie avec un tournevis.

Installation et raccordement

Le système Watercontrol Miele

Le système anti-fuites Watercontrol Miele vous protège contre les risques de dégâts des eaux liés au lave-linge.

Ce système comporte trois éléments :

1) le tuyau d'arrivée d'eau

2) l'électronique et le boîtier

3) le tuyau de vidange

1) Le tuyau d'arrivée d'eau

– protection contre l'éclatement du tuyau

Le tuyau d'arrivée d'eau présente une pression d'éclatement supérieure à 7 000 kPa.

2) L'électronique et le boîtier

– tôle de fond

Les fuites d'eau liées à une mauvaise étanchéité du lave-linge sont recueillies dans la tôle de fond. Un interrupteur à flotteur coupe les vannes d'arrivée d'eau. L'arrivée d'eau est interrompue et l'eau se trouvant dans la cuve est vidangée.

– La sécurité anti-débordement

Ceci évite que le lave-linge déborde suite à une arrivée d'eau incontrôlée. Si le niveau d'eau dépasse d'un certain niveau, la pompe de vidange est réactivée et l'eau est vidangée de façon contrôlée.

3) Le tuyau de vidange

Le tuyau de vidange est protégé par un système d'aération. Ceci permet d'éviter que le lave-linge soit vidé par l'aspiration.

Installation et raccordement

Arrivée d'eau

Le raccordement du lave-linge à la conduite d'arrivée d'eau peut s'effectuer sans antiretour car il est construit suivant les normes DIN.

La pression doit impérativement être comprise entre 100 kPa et 1 000 kPa. En cas de pression supérieure à 1 000 kPa, l'installation d'un réducteur de pression est indispensable.

Pour le raccordement, l'utilisateur doit prévoir des robinets d'arrêt avec raccord fileté 3/4" (20/27). Si vous ne disposez pas d'un robinet de ce type, faites-le monter par un installateur agréé.

⚠ Le raccord fileté est sous pression. Contrôlez par conséquent si le raccordement est étanche en ouvrant lentement le robinet d'eau. Modifiez éventuellement la position du joint et du raccord fileté.

Ce flexible n'est **pas** conçu pour l'eau chaude.

Entretien

En cas de remplacement, n'utilisez que le flexible d'origine Miele avec une pression d'éclatement supérieure à 7 000 kPa.

Le filtre situé dans l'écrou fileté à l'extrémité libre du flexible d'arrivée d'eau ne doit pas être enlevé.

Installation et raccordement

Vidange de l'eau

Le bain est vidangé par une pompe de vidange d'une hauteur de refoulement de 1 m. Posez le tuyau sans coude, afin de ne pas gêner la vidange. La crosse à l'extrémité du tuyau est pivotante et amovible.

La taille de tuyau disponible va jusqu'à 5 mètres. Il est disponible auprès du SAV Miele ou des revendeurs spécialisés.

Possibilités de vidange :

1. Suspension dans un lavabo ou un évier :

Attention :

– bloquez le flexible pour éviter qu'il ne dérape.

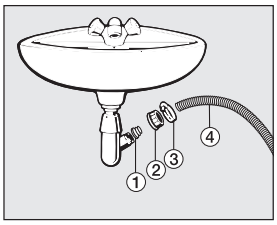
– Si le bain est vidangé dans un lavabo, il faut qu'il s'écoule suffisamment vite. Sinon l'eau risque de déborder ou une partie de l'eau vidangée risque d'être réaspirée dans le lave-linge.

2. Raccordement à un tuyau d'évacuation plastique avec manchon caoutchouc (siphon non indispensable).

3. Evacuation dans une vidange au sol (puits d'écoulement).

4. Raccordement à un lavabo avec raccord plastique.

Attention :



① Embout

② Ecrou moleté pour évier

③ Collier de serrage

④ Extrémité du tuyau

■ Fixez l'embout ① avec l'écrou moleté ② sur le siphon du lavabo.

■ Enfoncez l'extrémité du tuyau ④ sur l'embout ①.

■ Fixez le collier de serrage ③ juste derrière l'écrou moleté avec un tournevis.

Installation et raccordement

Branchement électrique

Ce lave-linge est livré avec un cordon d'alimentation équipé d'une prise, prêt à être branché en monophasé ~ 230 V 50 Hz.
Ne raccordez cet appareil qu'à une prise avec mise à la terre.

La prise avec mise à la terre doit toujours être accessible pour pouvoir débrancher le lave-linge de l'alimentation électrique.

Le branchement doit être conforme aux normes EDF.

Il est interdit de brancher l'appareil en utilisant des rallonges, boîtiers multiprises, etc. pour éviter tout risque d'incendie potentiel.

Il est recommandé de monter en amont de l'appareil un disjoncteur différentiel avec courant de déclenchement à 30 mA.

Dans ce cas utiliser uniquement un disjoncteur de type A ⏦.

La plaque signalétique vous indique la puissance de raccordement et le fusible. Comparez ces indications avec celles de votre réseau électrique.

Données de consommation

		Charge	Données de consommation			Humidité résiduelle
			Energie en kWh	Eau en l	Durée :	en %
Coton	90°C	6,0 kg	1,75	50	2 h 09 min	–
	60°C	6,0 kg	1,02	50	1 h 49 min	–
	60°C	3,0 kg	0,73	35	1 h 49 min	–
	60°C*	6,0 kg	0,85	50	2 h 39 min	53
	60°C*	3,0 kg	0,62	35	2 h 39 min	53
	40°C	6,0 kg	0,72	64	2 h 09 min	–
	40°C	3,0 kg	0,53	35	2 h 09 min	–
	40°C*	3,0 kg	0,46	35	2 h 39 min	53
Synthétique	40°C	2,5 kg	0,45	45	1 h 52 min	30
Automatic	40°C	3,0 kg	0,45	35 - 50	1 h 24 min	–
Foncé/Jeans	40°C	3,0 kg	0,55	43	1 h 12 min	–
Express 20	40°C	2,5 kg	0,30	26	20 min	–
Chemises	40°C	1,5 kg	0,48	43	54 min	–
Laine	30°C	2,0 kg	0,23	39	39 min	–
Fin	30°C	1,0 kg	0,30	63	59 min	–

Indications pour tests comparatifs :

* Programmes de test suivant EN 60456 et étiquette énergie conforme à la directive UE 1061/2010

Les consommations peuvent différer des valeurs annoncées en fonction de la pression, dureté et température d'entrée d'eau, de la température ambiante, du type et de la quantité du linge, des variations de tension sur le réseau et des options sélectionnées.

Caractéristiques techniques

Hauteur	900 mm
Hauteur, couvercle relevé	1390 mm
Largeur	454 mm
Profondeur	600 mm
Poids à vide	91,0 kg
Capacité	6,0 kg de linge sec
Tension	voir plaque signalétique
Puissance de raccordement	voir plaque signalétique
Fusible	voir plaque signalétique
Données de consommation	cf. chapitre consommations
Pression min. au robinet	100 kPa (1 bar)
Pression d'eau max.	1 000 kPa (10 bar)
Longueur du tuyau d'arrivée d'eau	1,70 m
Longueur du tuyau de vidange	1,50 m
Longueur du cordon d'alimentation	2,40 m
Hauteur de refoulement max.	1,00 m
Longueur de refoulement max.	5,00 m
Labels de conformité	voir plaque signalétique
Consommation à l'arrêt	0,25 W
Consommation en état de fonctionnement	2,0 W

Fonctions programmables

Avec les fonctions programmables, vous pouvez adapter l'électronique du lave-linge à différents besoins. Vous pouvez modifier les fonctions programmables à tout moment.

Système Hydro plus

Avec la fonction programmable Hydro plus, vous pouvez personnaliser les options de la touche *Hydro plus*.

Option 1 :

(Etat à la livraison)
Le niveau d'eau est augmenté (plus d'eau) au lavage et au rinçage.

Option 2 :

Un rinçage supplémentaire est effectué.

Option 3 :

L'augmentation du niveau d'eau au lavage et au rinçage et un rinçage supplémentaire.

Pour programmer et enregistrer, effectuez les opérations ❶ à ❼.

Les fonctions programmables sont activées à l'aide de la touche *Départ* et du sélecteur de programme. La touche *Départ* et le sélecteur de programme possèdent en effet une seconde fonction qui n'apparaît pas sur le bandeau de commande.

Condition :

- Le lave-linge a été arrêté avec la touche Marche/Arrêt.
- Le lave-linge est fermé.
- Le sélecteur de programme est positionné sur *Arrêt*.

❶ Pressez la touche *Départ* et maintenez-la enfoncée pendant les opérations ❷ à ❸.

❷ Mettez le lave-linge en marche avec la touche ⏻.

❸ Attendez que la diode de la touche *Départ* reste allumée sans clignoter. . .

❹ . . . puis relâchez la touche *Départ*.

❺ Positionnez le sélecteur de programme sur *Coton 60°C*:

La diode *Trempage/Prélavage* clignote 2 fois toutes les deux secondes et indique ainsi que le réglage d'usine est sur l'option 1.

❻ En appuyant sur la touche *Départ* vous pouvez sélectionner différentes options.

La diode *Trempage/Prélavage*

- **clignote 2 fois** = réglage 1
- **clignote 3 fois** = réglage 2
- **clignote 4 fois** = réglage 3

❼ Arrêter le lave-linge avec la touche ⏻.

La touche *Hydro plus* est maintenant affectée au réglage que vous avez choisi. Celui-ci reste enregistré jusqu'à ce qu'un autre réglage soit programmé.

Fonctions programmables

Rythme délicat

Lorsque la fonction rythme délicat est activée, le rythme du tambour est plus lent, pour laver les textiles peu sales avec plus de douceur.

Vous pouvez activer le rythme délicat en programmes *Coton* et *Synthétique*.

Rythme délicat est désactivé en sortie usine.

Pour programmer et enregistrer, effectuez les opérations ❶ à ❼.

Les fonctions programmables sont activées à l'aide de la touche *Départ* et du sélecteur de programme. La touche *Départ* et le sélecteur de programme possèdent en effet une seconde fonction qui n'apparaît pas sur le bandeau de commande.

Condition :

- Le lave-linge a été arrêté avec la touche Marche/Arrêt.
- Le lave-linge est fermé.
- Le sélecteur de programme est positionné sur *Arrêt*.

❶ Pressez la touche *Départ* et maintenez-la enfoncée pendant les opérations ❷ à ❸.

❷ Mettez le lave-linge en marche avec la touche ⏻.

❸ Attendez que la diode de la touche *Départ* reste allumée sans clignoter. . .

❹ . . . puis relâchez la touche *Départ*.

❺ Positionnez le sélecteur de programme sur la position *Coton* 60°C:

La diode *Trempage/Prélavage*

ne clignote pas = rythme délicat est **désactivé**.

clignote = rythme délicat est **activé**.

❻ Pour activer ou désactiver la fonction Délicat, il suffit d'appuyer sur la touche *Départ*.

❼ Arrêter le lave-linge avec la touche ⏻.

Le réglage choisi est maintenant enregistré jusqu'à ce qu'un autre réglage soit programmé.

Fonctions programmables

Refroidissement du bain

Une entrée d'eau supplémentaire intervient en fin de lavage pour refroidir le bain.

Le refroidissement du bain lessiviel est effectué en cas de sélection du programme *Coton 90°C*.

Il est conseillé d'activer le refroidissement du bain dans les cas suivants :

- pour éviter tout risque d'ébouillantage si le tuyau d'évacuation est fixé dans un lavabo ou un évier.
- dans les bâtiments non pourvus d'un tuyau d'évacuation conforme à DIN 1986.

Le refroidissement du bain lessiviel est désactivé en sortie usine.

Pour programmer et enregistrer, effectuez les opérations ❶ à ❼.

Les fonctions programmables sont activées à l'aide de la touche *Départ* et du sélecteur de programme. La touche *Départ* et le sélecteur de programme possèdent en effet une seconde fonction qui n'apparaît pas sur le bandeau de commande.

Condition :

- Le lave-linge a été arrêté avec la touche Marche/Arrêt.
- Le lave-linge est fermé.
- Le sélecteur de programme est positionné sur *Arrêt*.

❶ Pressez la touche *Départ* et maintenez-la enfoncée pendant les opérations ❷ à ❸.

❷ Mettez le lave-linge en marche avec la touche ⏻.

❸ Attendez que la diode de la touche *Départ* reste allumée sans clignoter. . .

❹ . . . puis relâchez la touche *Départ*.

❺ Positionnez le sélecteur de programme sur *Coton 40°C* :

La diode *Trempage/Prélavage*

ne clignote pas = le refroidissement du bain lessiviel est **désactivé**.

clignote = le refroidissement du bain lessiviel est **activé**.

❻ Pour activer ou désactiver le refroidissement du bain lessiviel, appuyer sur la touche *Départ*.

❼ Arrêter le lave-linge avec la touche ⏻.

Le réglage choisi est maintenant enregistré jusqu'à ce qu'un autre réglage soit programmé.

Fonctions programmables

Fonction mémoire

Au lancement du programme, l'appareil mémorise les paramètres sélectionnés : option et/ou vitesse d'essorage modifiée.

Lorsque le programme est de nouveau sélectionné, le lave-linge affiche l'option et/ou vitesse d'essorage enregistrées.

La fonction mémoire est désactivée au départ usine.

Pour programmer et enregistrer, effectuez les opérations ❶ à ❼.

Les fonctions programmables sont activées à l'aide de la touche *Départ* et du sélecteur de programme. La touche *Départ* et le sélecteur de programme possèdent en effet une seconde fonction qui n'apparaît pas sur le bandeau de commande.

Condition :

- Le lave-linge a été arrêté avec la touche Marche/Arrêt.
- Le lave-linge est fermé.
- Le sélecteur de programme est positionné sur *Arrêt*.

❶ Pressez la touche *Départ* et maintenez-la enfoncée pendant les opérations ❷ à ❸.

❷ Mettez le lave-linge en marche avec la touche ⏻.

❸ Attendez que la diode de la touche *Départ* reste allumée sans clignoter. . .

❹ . . . puis relâchez la touche *Départ*.

❺ Positionnez le sélecteur de programme sur la position *Coton* 40°C:

La diode *Trempage/Prélavage*

ne clignote pas = la fonction mémoire est **désactivée**.

clignote = la fonction mémoire est **activée**.

❻ Vous pouvez activer ou désactiver la fonction mémoire en pressant la touche *Départ*.

❼ Arrêter le lave-linge avec la touche ⏻.

Le réglage choisi est maintenant enregistré jusqu'à ce qu'un autre réglage soit programmé.

Fonctions programmables

Temps de trempage

Vous pouvez affectuer un temps de trempage au choix entre 30 minutes et deux heures (par pas de 30 minutes) à la touche *Trempage*.

Si vous sélectionnez l'option *Trempage*, le temps du trempage sera ajouté au programme de lavage.

La touche *Trempage* est réglée sur un temps de trempage de deux heures en usine.

Pour programmer et enregistrer, effectuez les opérations ❶ à ❼.

Les fonctions programmables sont activées à l'aide de la touche *Départ* et du sélecteur de programme. La touche *Départ* et le sélecteur de programme possèdent en effet une seconde fonction qui n'apparaît pas sur le bandeau de commande.

Condition :

- Le lave-linge a été arrêté avec la touche Marche/Arrêt.
- Le lave-linge est fermé.
- Le sélecteur de programme est positionné sur *Arrêt*.

❶ Pressez la touche *Départ* et maintenez-la enfoncée pendant les opérations ❷ à ❸.

❷ Mettez le lave-linge en marche avec la touche ⏻.

❸ Attendez que la diode de la touche *Départ* reste allumée sans clignoter. . . .

❹ . . . puis relâchez la touche *Départ*.

❺ Positionnez le sélecteur de programme sur *Coton 30°C*.

La diode de contrôle *Trempage/Prélavage* clignote 1 fois toutes les deux secondes, pour indiquer que le temps de trempage réglé en usine est de deux heures.

❻ En appuyant sur la touche *Départ* vous pouvez sélectionner différentes options.

La diode *Trempage/Prélavage*

- **clignote 1 fois** = 2 h de temps de trempage
- **clignote 2 fois** = 1 h 30 de temps de trempage
- **clignote 3 fois** = 1 h de temps de trempage
- **clignote 4 fois** = 30 min de temps de trempage

❼ Arrêter le lave-linge avec la touche ⏻.

La durée choisie est maintenant affectée à la touche *Trempage*. Celle-ci reste enregistrée jusqu'à ce qu'une autre durée soit programmée.

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Accessoires en option

La marque Miele est une référence en matière de soin du linge. Les lave-linge Miele vous offrent de nombreux programmes spéciaux dont le déroulement est spécialement mis au point pour des textiles spécifiques. Avec le développement de sa propre série de produits de lavage et de soin du linge (CareCollection), Miele vous propose un système unique pour le lavage et l'entretien de votre linge.

Voici une présentation des produits de la CareCollection Miele pour le linge. Vous pouvez commander ces articles et bien d'autres encore sur Internet :

Vous pouvez également commander ces produits au service après-vente.

CareCollection

Lessives spéciales Miele

Textile moderne

La lessive "Textile moderne" permet de laver et d'entretenir efficacement les vestes d'extérieur imperméables et respirantes.

Textile sport

La lessive spéciale Textile sport Miele nettoie les vêtements de sport et les tissus en microfibre avec beaucoup de douceur. Votre linge est rafraîchi rapidement, les mauvaises odeurs sont éliminées.

Duvets

Cette lessive spéciale contient des tensio-actifs doux et des agents actifs naturels pour conserver la souplesse des plumes et ainsi le volume des duvets, couettes, oreillers.

Liquide imperméabilisant

Le liquide imperméabilisant Miele enveloppe les fibres textiles et leur donne un effet hydrofuge, coupe-vent et antisalissant sans rendre la surface des vêtements collante. Le textile conserve entièrement ses propriétés respirantes et son élasticité.

Accessoires en option

Lessive UltraWhite

La lessive universelle Miele en poudre convient particulièrement au lavage du linge blanc et clair et du linge très sale.

Lessive UltraColor

La lessive couleurs UltraColor Miele convient particulièrement au lavage de linge de couleur ou noir. Sa composition chimique permet d'éliminer les taches dès les basses températures. Vos tenues favorites gardent leur éclat et ne déteignent pas.

Lessive pour textiles délicats

Pour laver particulièrement délicatement votre linge précieux, comme la laine et la soie, utilisez la lessive "Textiles délicats". Sa formule spéciale lave parfaitement dès 20°C et préserve les couleurs de votre linge fin.

Adoucissant

L'adoucissant Miele donne à votre linge une bonne odeur de propreté, particulièrement fraîche et naturelle. Il empêche que le linge se charge en électricité statique au séchage et rend le linge extrêmement doux et agréable au toucher.

63 64

Miele

MIELE France
Siège social
9 avenue Albert Einstein - Z. I. du Coudray
93151 - Le Blanc-Mesnil CEDEX
R.C.S. Bobigny B 708 203 088

Miele Center Paris
55 Boulevard Malesherbes
75008 Paris

Miele Center Nice
285 avenue de Verdun
06700 Saint-Laurent du Var

Internet
www.miele.fr

La ligne Consommateurs
Conseils, SAV, accessoires et pièces détachées
09 74 50 1000
Appel non surtaxé

Siège en Allemagne
Miele & Cie. KG
Carl-Miele-Straße 29, 33332 Gütersloh

www.miele-shop.com

67

Appliance **12.5.3**

Dryer

Basic		
Brand	BOSCH	
Model	WTW84363NL	
Dimension (mm)	842 x 598 x 636	
Weight (kg)	48	
Load Capacity	7 kg	
Energy		
Energy Efficiency Class	A++	
Condensation efficiency class (2010/30/EC)	B	
Energy Consumption	Weighted annual energy consumption (2010/30/EC)	212.0 kWh / year
	Energy electric dryer, maximum load (2010/30/EC)	1.65 kWh
	Energy electric dryer, partial load (2010/30/EC)	0.97 kWh
	Power consumption in sleep mode (2010/30/EC)	1.00 W
	Power consumption in off mode (2010/30/EC)	0.10 W
Sound emissions	65 dB	
Feature		
Program length cotton, maximum load	178 min	
Program length cotton, partial load	110 min	
Weighted program time	139 min	
Supply frequency min-max (Hz)	50 Hz	
Approvals	CE, VDE	
Weighted condensation efficiency	86 %	
Exhaust water	No	
Type of heating	electric	
humidity Sensor	Moisture Measurement, Heat	

Uw nieuwe droogautomaat

Gefeliciteerd - U hebt gekozen voor een modern, kwalitatief hoogwaardig huishoudelijk apparaat van Bosch.
De condensdroogautomaat met warmtepomp en automatische reiniging van de warmtewisselaar kenmerkt zich door een zuinig energieverbruik en minder onderhoud ⟶ *blz. 6.*
Elke droogautomaat die de fabriek verlaat, wordt zorgvuldig gecontroleerd op functioneren en een onberispelijke staat.
Bij vragen staat onze Servicedienst graag tot uw beschikking.

Volgens de milieuvoorschriften afvoeren.
De verpakking volgens de milieuvoorschriften afvoeren.
Dit apparaat is conform de Europese richtlijn 2002/96/EG voor elektrische en elektronische oude apparaten (waste electrical and electronic equipment - WEEE) gemarkeerd.
Deze richtlijn vormt het kader voor een in de hele EU geldende terugname en verwerking van oude apparaten.

Zie voor meer informatie over onze producten, toebehoren, reservedelen en diensten: www.bosch-home.com

De aanwijzingen op bladzijde 13 in acht nemen!

Droogautomaat pas na het lezen van deze gebruiksaanwijzing en afzonderlijke **handleiding voor de energiezuinige modus** in gebruik nemen.

Inhoud

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Gebruik overeenkomstig het bedoelde gebruik

- alleen voor huishoudelijk gebruik,
- alleen voor het drogen van textiel dat in water werd gewassen.

Kinderen niet zonder toezicht bij de droogautomaat laten! Huisdieren op afstand van de droogautomaat houden!
De droogautomaat kan door kinderen vanaf 8 jaar, door personen met beperkte fysieke-, sensorische- of geestelijke vaardigheden en door personen met beperkte ervaring of kennis bediend worden, wanneer ze onder toezicht staan of door een verantwoordelijke persoon worden geïnstrueerd.

Voorbereiden *Installatie zie blz. 8*

Een beschadigde droger nooit in bedrijf nemen! Neem contact op met uw Servicedienst! — **Droogautomaat controleren**

Alleen met droge handen! Alleen bij de stekker vastpakken! — **Stekker in het stopcontact steken**

Wasgoed sorteren + in de trommel doen

Alle voorwerpen uit de zakken verwijderen.
Let op aanstekers!
De trommel moet vóór het vullen leeg zijn!

Zie Programma-overzicht op blz. 7.
Zie ook de afzonderlijke handleiding "Wolkorf" (afhankelijk van model).

Programma kiezen + instellen

Droogprogramma selecteren ...

... en individueel aanpassen

Extra functies	Status-/ Service indicaties	Display/ Resterende tijd	Programmakiezer

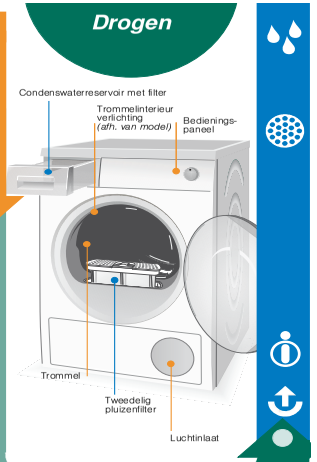
Alle toetsen zijn aanraakgevoelig, aantippen is voldoende!

Start/Pauze - toets kiezen

Droogautomaat uitsluitend met geplaatst pluizenfilter gebruiken!

	Reservoir	Reservoir met condenswater legen. Eventueel filter in condenswaterreservoir reinigen ⟶ *blz. 9.*
	Filter	Pluizenfilter onder stromend water reinigen ⟶ *blz. 4.*
	h:min	Programma-einde na 1-24 uur (toets eventueel meerdere malen indrukken) altijd op het eerstvolgende hele uur instelbaar.
	C/n	Automatische reiniging van de warmtewisselaar.
	Fijninstelling van de droogresultaten	Het droogresultaat (bijv. kastdroog) kan in drie stappen (1 - max. 3) voor de programma's **Katoen**, **Kreukherstellend, Mix** en **Extra Snel 40'** aangepast worden ⟶ Voorinstelling = 0. De instelling blijft na fijninstelling van één van deze programma's voor de anderen bewaard. Zie voor meer informatie ⟶ *blz. 6.* — **0, 1, 2, 3**
Selectie Aan/Uit voor akoestisch signaal bij programma-einde.	**Signaal**	
Gereduceerde temperatuur voor gevoelig textiel ☐, bij langere droogtijd, bijvoorbeeld polyacryl, elastaan of acetaat.	**Voorzichtig**	
Reduceert kreukels en verlengt de kreukbescherming na het einde van het programma.	**Licht strijken**	

Drogen



Drogen

Tijdens het drogen het condenswaterreservoir niet eruit nemen / legen!

1 2 3

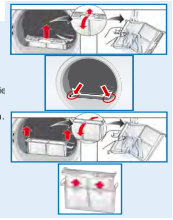
Condenswaterreservoir legen

Reservoir **na elke** droogcyclus legen, niet tijdens het drogen!
1. Condenswaterreservoir er uit trekken en horizontaal houden.
2. Condenswater eruit gieten.
3. Reservoir altijd volledig tot het inklikken in de droger schuiven.

Wanneer het indicatielampje **Reservoir** ondanks legen knippert ⟶ *Filter in condenswaterreservoir pag. 9.*

Pluizenfilter reinigen

Een schoon pluizenfilter reduceert het stroomverbruik en de droogtijd.



Het pluizenfilter bestaat uit twee delen. Reinigen van binnenste en buitenste buitenste zeef **na elke keer** drogen:
1. Deur openen, pluizen bij/rond deur verwijderen.
2. Beide delen van het pluizenfilter er uit trekken.
3. Pluizen van de rand van de schacht verwijderen. Deze mogen nie de open schacht vallen.
4. Filter openklappen en alle pluizen verwijderen.
5. Beide delen onder stromend water afspoelen en goed afdrogen.
6. Binnen en buitenfilter dichtklappen, in elkaar steken en weer in de droogautomaat plaatsen.

Droogautomaat uitschakelen

Programmakiezer op **Uit** zetten.
Was niet in de droger laten zitten!

Was uitnemen

Uw droger beschikt over een automatische antikreukfunctie. De trommel wordt na het einde van het programma 60 minuten met bepaalde tussenpozen kort gedraaid. Het wasgoed blijft losjes en zacht (bij gekozen extra functie **Licht strijken** 120 min).

Einde programma *zodra het indicatielampje* **losmaken/klaar** *gaat branden.*

Programma onderbreken *wasgoed bijvullen of uitnemen.*

Het droogproces kan voor het bijvullen of uitnemen van wasgoed kort worden onderbroken, maar moet echter daarna aansluitend worden voortgezet en beëindigd!

1. Deur openen, het droogproces wordt onderbroken.
2. Wasgoed bijvullen of uit de trommel halen en vuldeur sluiten.
3. Indien nodig programma en programmaverfijningen opnieuw kiezen.
4. Toets **Start**/Pauze kiezen. De resterende tijd wordt na enkele minuten bijgewerkt.

Aanwijzingen omtrent wasgoed ...

Identificatie van textiel

De onderhoudsinstructies van de producent aanhouden!
☑ Drogen met normale temperatuur.
☐ Drogen met lage temperatuur ⟶ extra **Voorzichtig** kiezen.
☒ Niet machinaal drogen.

Absoluut veiligheidsinstructies blz. 13 aanhouden!
Het volgende textiel bijvoorbeeld niet in de droogautomaat drogen:
- Niet luchtdoorlatend textiel (bijv. met rubberlaag).
- Gevoelige stoffen (zijde, synthetische vitrages) ⟶ Kreukvorming!
- Met olie verontreinigd wasgoed.

Tips voor het drogen

- Voor een gelijkmatig droogresultaat: wasgoed sorteren op weefsel en droogprogramma.
- Zeer klein wasgoed (bijv. babysokjes) altijd samen met groter wasgoed (bijv. handdoek) drogen.
- Ritssluitingen dichtdoen, haken en ogen sluiten, overtrekken dichtknopen, ceintuurs van stof, schorthanden enz. samenbinden.
- Kreukherstellend wasgoed niet te droog laten worden ⟶ kans op kreuken!
- Wasgoed in de frisse lucht laten nadrogen.
- Wol niet in de droger drogen, alleen optrissen ⟶ *blz. 7 Programma* ***Wol finish*** *(afh. van model).*
- Wasgoed na het drogen niet direct strijken, enige tijd op elkaar laten liggen ⟶ Restvocht verdeelt zich dan gelijkmatig.
- Het droogresultaat hangt af van het soort water dat tijdens het wassen wordt gebruikt. ⟶ *Fijninstelling van de droogresultaten, blz. 6.*
- Geweven textiel (bijv. T-shirts, tricot) krimpt vaak bij de eerste keer drogen. ⟶ Niet het programma **kastdroog extra** gebruiken.
- Gesteven wasgoed is slechts in beperkte mate geschikt voor de droger. ⟶ Stijfsel laat een laagje achter dat invloed heeft op het drogen.
- Wasverzachter bij het wassen van de te drogen voorwerpen opgave van de fabrikant doseren.
- Voor voorgedroogd, meerlaags textiel of afzonderlijke kleine stukken wasgoed het tijdprogramma gebruiken. Ook geschikt voor nadrogen.

Milieubescherming / Besparingstips

- Voorafgaande aan het drogen het wasgoed in de wasmachine grondig centrifugeren. ⟶ Hoge centrifugeertoerental-verschillen de droogtijd en verlagen het energieverbruik, ook kreukherstellend wasgoed centrifugeren.
- Maximaal aanbevolen vulgewicht benutten, maar niet overschrijden ⟶ Programma-overzicht *blz. 7.*
- Tijdens het drogen de ruimte goed ventileren.
- Luchtinlaat niet afsluiten of dichtplakken.

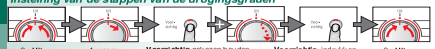
Toetssignalen

Innstilling av volumet for tastesignaler

Beschikbare waarden: 0 (uit), 1 (zacht), 2 (normaal), 3 (luid).

Fijninstelling van de droogresultaten

Instelling van de stappen van de drogingsgraden



L:00, L:01, L:02, L:03 worden achter elkaar weergegeven
Kort signaal bij wijziging van L:03 in L:00, lang signaal - andere gevallen.

L:01

Wat u absoluut moet aanhouden ...

Uw droger is bijzonder energiezuing en kenmerkt zich in technisch opzicht door een koudekringloop, die net als bij een koelkast, energie doelmatige gebruikt.
De warmtewisselaar van de droger wordt bij het drogen automatisch gereinigd.
Pluizenfilter en filter in het condenswaterreservoir moeten regelmatig gereinigd worden.

De droger nooit gebruiken zonder de pluizenfilters en zonder filter in het condenswaterreservoir!

Pluizenfilter

Bij het drogen worden pluizen en haren uit het wasgoed in het pluizenfilter opgevangen. Verstopt pluizenfilters kunnen de warmtewisselaar hinderen in het goed functioneren. Daarom moet het pluizenfilter absoluut na elke droogcyclus worden gereinigd. Regelmatig afspoelen onder stromend water ⟶ *blz. 4.*

Filter in condenswaterreservoir

Filter in condenswaterreservoir reinigt het condenswater. Dit condenswater is nodig voor de automatische reiniging. Het filter moet regelmatig onder stromend water worden gereinigd. Leeg het condenswaterreservoir is nodig voor de reiniging van het filter ⟶ *blz. 4/9.*

Textiel

Geen textiel drogen dat in aanraking is geweest met oplosmiddelen, olie, was, vet of verf: bijv. haarlak, nagellak-remover, vlekkenverwijderaar, wasbenzine, etc.
Zakken van het textiel legen.
Geen textiel drogen dat geen lucht doorlaat.
Sterk pluizend wasgoed vermijden.
Wol alleen optrissen in wolprogramma.

Installeren

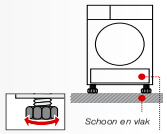
- Omvang levering: Droogautomaat, gebruiksaanwijzing en installatievoorschrift, wolkorf *(afhankelijk van model)*.
- Droogautomaat op transportschade controleren!
- De droogautomaat heeft een groot gewicht. Niet alleen optillen!
- Voorzichtig met scherpe kanten!
- Niet in een ruimte plaatsen waar vorst kan optreden! Water dat bevriest kan tot schade leiden!
- In geval van twijfel door een vakkundig monteur laten aansluiten!
- Droogautomaat niet aan uitstekende delen (bij. vuldeur) optillen - kans op afbreken!

1. *Plaatsen van de droogautomaat*

- De stekker moet te allen tijde bereikbaar zijn.
- Op een schoon, vlak en stevig oppervlak zetten!
- Luchtinlaat aan de voorkant van de droger vrijhouden.
- Omgeving van de droger schoonhouden.
- Droogautomaat met behulp van de schroefvoetjes stellen.
  Een waterpas gebruiken.
- Schroefvoetjes in geen geval verwijderen!

Alle toebehoren uit de trommel halen.
De trommel moet leeg zijn!

Droogautomaat niet opstellen achter een deur of een schuifdeur waardoor het openen van de deur van de droogautomaat wordt geblokkeerd of gehinderd! Kinderen kunnen zich zo niet insluiten en in levensgevaar geraken.



2. *Netaansluiting* *zie veiligheidsinstructies ⟶ blz. 13.*

- Volgens de voorschriften via een randgeaard stopcontact op wisselstroom aansluiten.
  In geval van twijfel het stopcontact door een vakkundige monteur laten controleren!
- Netspanning en de aangegeven spanning op het typeplaatje (⟶ *blz. 10*) moeten overeenkomen!
- Aansluitwaarde en vereiste zekering zijn op het typeplaatje aangegeven.

Vorstbeveiliging

Droogautomaat bij kans op vorst niet gebruiken!

Voorbereiding

1. Reservoir voor condenswater legen ⟶ *blz. 4.*
2. Programmakiezer op een willekeurig programma zetten.
3. Toets **Start**/Pauze kiezen ⟶ Condenswater wordt in het reservoir gepompt.
4. 5 min. wachten, reservoir voor condenswater nogmaals legen.
5. Programmakiezer op **Uit** zetten.

Transport

- Voorbereiding van de droger ⟶ zie vorstbeveiliging.
- Droogautomaat rechtopstaand transporteren.
- Na transport de droger twee uur laten rusten.

In de droogautomaat bevindt zich restwater.
Dit kan bij een scheve stand uit de droogautomaat lopen.

Schoonmaken en onderhoud

Alleen in uitgeschakelde toestand!

Warmtewisselaar

De warmtewisselaar van de droger wordt bij het drogen automatisch gereinigd, op het display verschijnt **Cln**. Het condenswaterreservoir tijdens het reinigingsproces niet uit de automaat trekken.

Droogautomaatbehuizing, bedieningspaneel, luchtinlaat

Met een zachte, vochtige doek afnemen.
Geen agressieve schoonmaak- en oplosmiddelen gebruiken.
Wasmiddel- en reinigingsmiddelresten direct verwijderen.

Filter in condenswaterreservoir

Bij het legen van het condenswaterreservoir, wordt het filter automatisch gereinigd.
Filter desondanks regelmatig onder stromend water reinigen ⟶ Vermijden van hardnekkige afzettingen/verontreinigingen.

1. Condenswaterreservoir eruit nemen.
2. Filter uit de borging trekken.
3. Filter onder stromend water of in vaatwasser reinigen.
4. Filter plaatsen.
5. Condenswaterreservoir in de droogautomaat schuiven totdat deze borgt.

Droogautomaat alleen met geplaatst filter gebruiken!

Vochtigheidssensor

De droogautomaat is uitgerust met vochtigheidssensoren van roestvaststaal. Vochtigheidssensoren meten de vochtigheidsgraad van het wasgoed. Na langere bedrijfstijd kan zich op de vochtigheidssensor een fijne kalklaag afzetten.

1. Deur openen.
2. Vochtigheidssensoren met een vochtig gemaakte spons met ruw oppervlak reinigen.

Geen staalwol of schuurmiddel gebruiken!

Technische gegevens

Afmetingen (DxBxH)	60 x 60 x 85 cm (in hoogte verstelbaar)
Gewicht	ca. 51 kg
Max. vulgewicht	7 kg
Reservoir voor condenswater	4,0 l
Aansluitspanning	220-240 V
Aansluitwaarde	max. 800 W
Zekering	10 A
Omgevingstemperatuur	5 - 35°C
Typenummer **Fabricagenummer**	onder de vuldeur

Het typeplaatje vindt u op de achterkant van de droogautomaat.

Trommelbinnenverlichting *(afhankelijk van model)*: De trommel wordt na het openen of sluiten van de deur, alsmede na programmastart verlicht en dooft automatisch.

Verbruikswaarden

Textiel/Programma	*Restvochtgehalte van het textiel na het centrifugeren*		*Droogtijd***	*Energie-verbruik**
Katoen 7 kg				
kastdroog*	1400 tpm	(50%)	151 min	1,33 kWh
	1000 tpm	(60%)	178 min	1,65 kWh
	800 tpm	(70%)	205 min	1,92 kWh
strijkdroog*	1400 tpm	(50%)	110 min	0,94 kWh
	1000 tpm	(60%)	137 min	1,24 kWh
	800 tpm	(70%)	166 min	1,55 kWh
Kreukherstellend 3,5 kg				
kastdroog*	800 tpm	(40%)	64 min	0,54 kWh
	600 tpm	(50%)	81 min	0,68 kWh

* Programma-instelling voor controle volgens de geldende EN61121.
** De waarden kunnen afhankelijk van de textielsoort, samenstelling van de te drogen was, restvochtgehalte van het textiel alsmede de beladingshoeveelheid afwijken van de vermelde waarden.

Textiel/Programma	*Droogtijd*	*Jaarlijks energieverbruik*
Katoen 7 kg / 3,5 kg*		
kastdroog***	139 min / cyclus	212 kWh / jaar

***Programma-instelling voor testen en energielabel conform de richtlijn 2010/30/EU.

Optionele accessoires *(via Servicedienst bestelnummer, afhankelijk van model)*

WTZ 11410 ***Verbindingsset was-droogzuil***
De droogautomaat kan ruimtebesparend op een wasmachine van dezelfde diepte en breedte worden geplaatst. Droogautomaat **absoluut** met deze aansluitset op de wasautomaat bevestigen. WTZ 11400: net als de WTZ 11410, maar dan met uittrekbaar werkblad.

WTZ 10290 ***Onderbouw***
In plaats van de apparaat-afdekplaat **absoluut** een plaatafdekking laten monteren door de vakman.

WAK 20500 ***Ergolade***
Voor het beter be- en ontladen. De mand in het uitschuifbare deel kan worden gebruikt voor transport van het wasgoed.

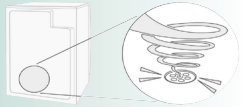
Normale geluiden

Bij het drogen ontstaan door de compressor en pomp heel normale geluiden.

De compressor in de droogautomaat veroorzaakt van tijd tot tijd een bromgeluid. Het volume en de toonhoogte kan daarbij wijzigen, afhankelijk van het gekozen programma en drooglase.

De compressor van de droger wordt af en toe belucht, daarbij ontstaat een zoemend geluid.

De automatische reiniging van de droger veroorzaakt klikgeluiden.



Het condenswater wordt met een pomp in het condenswaterreservoir gepompt, daarbij ontstaan pompgeluiden.

Wat te doen als...

Neem contact op met onze klantenservice wanneer een storing niet zelf kan worden verholpen. Wij vinden altijd een passende oplossing, ook om onnodige bezoeken van monteurs te vermijden. Vertrouw op de competentie van de producent en waarborg zo dat de, reparatie door getrainde servicetechnici wordt uitgevoerd, die met originele reserveedelen zijn uitgerust. De contactgegevens voor de dichtstbijzijnde **Servicedienst** vindt u hier, resp. in de Servicedienstindex:
– **NL** 088 424 4010
– **B** 070 222 141
Geef a.u.b. aan de Servicedienst het typenummer (E-Nr.) en het fabricagenummer (FD) van het apparaat door (zie binnenzijde van de deur).
Programmakiezer op **Uit** zetten en stekker uit het stopcontact halen.

Indicatielampje **Start**/Pauze brandt niet.	Stekker in het stopcontact? Programma gekozen? Zekering van de contactdoos controleren.
Display en displaylampen *(afh. van model)* gaan uit en de toets **Start**/Pauze knippert.	Energiezuinige modus geactiveerd ⟶ afzonderlijke *handleiding voor energiezuinige modus.*
Indicatielampje **Reservoir** en toets **Start**/Pauze knipperen.	Reservoir voor condenswater legen ⟶ *blz. 4.* Eventueel filter in condenswaterreservoir reinigen ⟶ *blz. 9.* Droger getransporteerd? ⟶ 2 uur wachten en opnieuw starten.
Indicatielampje **Filter** en toets **Start**/Pauze knipperen.	Pluizenfilter onder stromend water reinigen ⟶ *blz. 4.*
Op het display verschijnt **Cln**.	Geen storing! Automatische reiniging van de warmtewisselaar. Condenswaterreservoir niet legen.
Droogautomaat start niet.	Toets **Start**/Pauze gekozen? Vuldeur gesloten? Programma ingesteld? Omgevingstemperatuur hoger dan 5 °C?
Er komt water vrij.	Droogautomaat horizontaal plaatsen.
Deur gaat vanzelf open.	Deur dichtdrukken totdat deze hoorbaar vastklikt.
Kreukvorming.	Beladingshoeveelheid overschreden? Kledingstukken na afloop van het programma direct uit de droger halen, ophangen en in vorm brengen, niet aangepast programma gekozen⟶ *blz. 7.*
Droogresultaat is niet bevredigend (wasgoed gevoeld, te vochtig).	Warm wasgoed voelt vochtiger aan dan het daadwerkelijk is! Gekozen programma pas niet bij belading. Ander droogprogramma gebruiken of daarnaast het tijdprogramma kiezen⟶ *blz. 7.* Fijnregeling van de droogresultaten gebruiken ⟶ *blz.1/2 en 6.* Fijne kalklaag op de vochtigheidssensoren ⟶ vochtigheidssensoren reinigen ⟶*blz. 9.* Programma afgebroken, bijv. reservoir vol, stroomstoring, deur open of maximale droogtijd bereikt.
Droogtijd te lang.	Pluizenfilter onder stromend water reinigen ⟶ *blz. 4.* Omvallende luchttoevoer ⟶ zorg voor luchtcirculatie. Eventueel luchtinlaat geblokkeerd ⟶ Vrijhouden ⟶ *blz. 8.* Omgevingstemperatuur hoger dan 35 °C ⟶ Ventileren.
Vochtigheid in de ruimte stijgt sterk.	Ruimte afdoende ventileren.
Netspanningsstoring.	Was direct uit de droogautomaat halen en uitspreiden. Er kan warmte vrijkomen. Voorzichtig: deur, trommel en wasgoed kunnen heet zijn.
Af en toe extra geluiden en trillingen.	Geen storing! Normale geluiden ⟶ *blz. 11.*
Luid bromgeluid gedurende enige seconden.	Condenswaterreservoir volledig ingeschoven? ⟶ Condenswaterreservoir geheel in het apparaat schuiven. Geen storing! Normale geluiden ⟶ *blz. 11.*

Veiligheidsinformatie

Noodsituatie
- Stekker onmiddellijk uit stopcontact trekken of zekering losdraaien resp. uitschakelen.

Droogautomaat ALLEEN...
- binnenshuis gebruiken.
- voor het drogen van textiel gebruiken.

Droogautomaat NOOIT...
- voor andere doeleinden gebruiken dan hierboven beschreven.
- qua techniek of eigenschappen wijzigen.

Gevaren
- Kinderen en niet geïnstrueerde personen mogen de droogautomaat niet gebruiken.
- Kinderen nooit zonder toezicht bij het apparaat laten.
- Huisdieren uit de buurt van het apparaat houden.
- Alle voorwerpen uit de zakken van het textiel verwijderen.
  Let met name op aanstekers ⟶ **Explosiegevaar!**
- Niet op de deur leunen of gaan zitten ⟶ **Het apparaat kan omvallen!**

Installatie
- Losse snoeren vastmaken ⟶ **Valgevaar!**
- Droogautomaat bij kans op vorst niet gebruiken!

Elektrische aansluiting
- De droogautomaat volgens de voorschriften via een randgeaard stopcontact op de wisselstroom aansluiten. Anders is de veiligheid niet gegarandeerd.
- Diameter van de kabel moet voldoende zijn.
- Alleen een aardlekschakelaar met dit symbool gebruiken: ⏦
- Stekker en stopcontact moeten in elkaar passen.
- Geen meervoudige stekkers/contactdozen en/of verlengkabels gebruiken.
- Netstekker niet met vochtige handen beetpakken ⟶ **Elektrocutiegevaar!**
- Stekker nooit aan de kabel uit het stopcontact trekken.
- Aansluitkabel niet beschadigen ⟶ **Elektrocutiegevaar!**

Gebruik
- Alleen wasgoed in de trommel doen.
  Controleer de inhoud voordat u de droogautomaat inschakelt.
- Droogautomaat niet gebruiken wanneer het wasgoed met oplosmiddelen, olie, was, vet of verf in contact is geweest (bijv. haarversteviger, nagellak-remover, vlekkenmiddel, wasbenzine, etc) ⟶ **Kans op brand/explosie!**
- Gevaar door stof (bijv. stof van kolen, meel): Droger niet gebruiken ⟶ **Explosiegevaar!**
- Droogautomaat niet gebruiken als het wasgoed schuimstof of schuimrubber bevat ⟶ Elastisch materiaal kan vernietigd worden en het apparaat kan door eventuele verwarming van de schuimstof beschadigd worden.
- De droger nooit voor het einde van de droogcyclus uitschakelen, behalve wanneer al het wasgoed direct wordt uitgenomen en uitgespreid, zodat de warmte kan worden afgegeven.
- Let er bij het schoonmaken van de pluizenzeef op, dat er geen vreemde voorwerpen (dons, vulstoffen) in de opening van het luchtkanaal terechtkomen. Eventueel eerst de trommel met een stofzuiger schoonmaken. Mochten er dan toch nog vreemde voorwerpen in het luchtkanaal terechtkomen ⟶ waarschuw dan de Servicedienst. **Kans op brand/explosie!**
- Lichte objecten, zoals lange haren, kunnen in de luchtinlaat van de droogautomaat worden gezogen ⟶**Letselgevaar!**
- Droogautomaat na afloop van het programma uitschakelen.
- Condenswater is geen drinkwater en kan met pluizen zijn verontreinigd!

Defect
- Droogautomaat bij defect of een vermoedelijk defect niet gebruiken. Reparatie uitsluitend door de Servicedienst.
- Droogautomaat met defecte aansluitkabel niet gebruiken. Defecte netkabel alleen door de Servicedienst laten vervangen om gevaren te voorkomen.

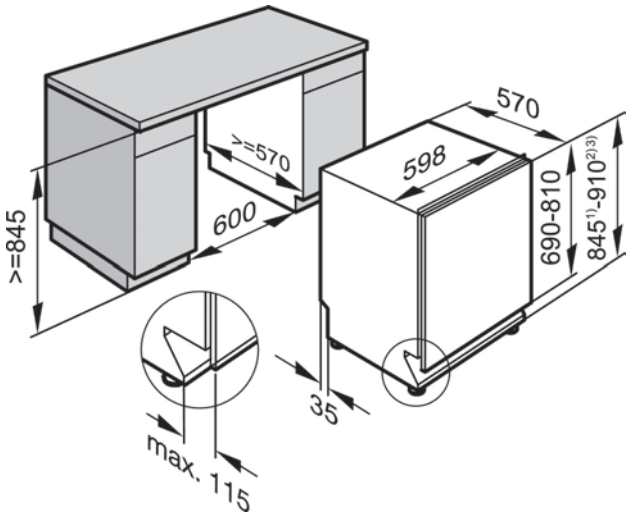
Vervangende onderdelen
- Om veiligheidsredenen alleen originele onderdelen en accessoires ter vervanging gebruiken.

Afvoeren
- Stekker uit het stopcontact trekken. **Hierna** de elektrische kabel van het apparaat afsnijden.
  Bij uw gemeente informeren hoe u het apparaat kunt (laten) afvoeren.
- De warmtewisselaar bevat het onder het Kyoto protocol vastgelegde gefluoriseerde broeikasgas R134a ⟶ Deskundig afvoeren. Vulgewicht: 0,22 kg.
- Verpakking: Kinderen niet met het verpakkingsmateriaal laten spelen ⟶ **Verstikkingsgevaar!**
- Al het materiaal is milieuvriendelijk en kan opnieuw gebruikt worden. Volgens de milieuvoorschriften afvoeren.

12.5 Appliances

Appliance 12.5.4

Dishwasher



Basic		
Brand	Miele	
Model	G6995 SCVi XXL K2O	
Dimension (mm)	845-910x598x570	
Weight (kg)	51	
Energy		
Energy Efficiency Class	A+++	
Energy Consumption	238 (kWh/a)	
Water Consumption	per year (liter)	2716
	per use (liter)	6.5 (Automatic)
Sound emissions	41dB(A)	
Feature		
Total connected loadin kW	2.3	
Voltage in V	230	
Fuse rating in A	10	
Optical and acoustic function control	Yes	
EcoFeedback	Yes	
Recirculation Turbothermic drying	Yes	
Heater rating	2110 W	
Sensor wash	Yes	
Quick wash	Yes	
Short wash cycle	Yes	
Very economical wash cycle	Yes	
Extra quiet	Yes	
SolarSave	Yes	
FlexiTimer	Yes	
Child safety lock	Yes	

Miele

Operating instructions for dishwashers

To avoid the risk of accidents or damage to the appliance, it is **essential** to read these instructions as well as the installation plan before it is installed and used for the first time.

en-GB HG05 M.-Nr. 09 645 540

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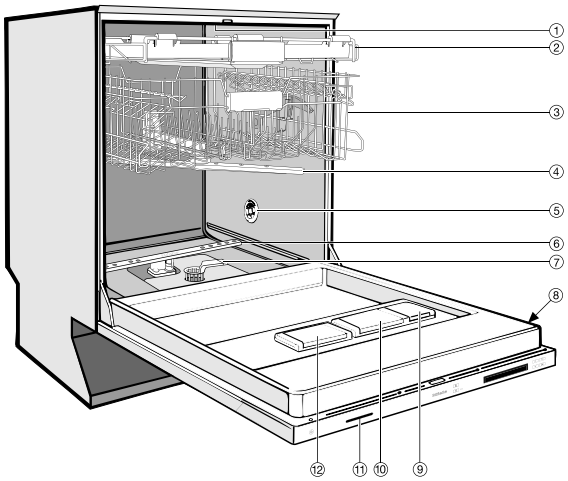
Guide to the appliance

Appliance overview



① Upper spray arm (not visible)
② Cutlery tray (depending on model)
③ Upper basket
④ Middle spray arm
⑤ Air inlet for drying (depending on model)
⑥ Lower spray arm
⑦ Filter combination
⑧ Data plate
⑨ Rinse aid reservoir
⑩ Dual compartment detergent dispenser
⑪ TimeControl in-operation indicator lights
⑫ Salt reservoir

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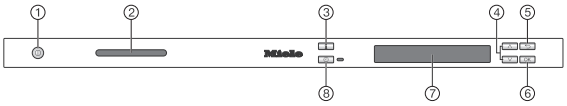
Guide to the appliance

Control panel



① **On/Off sensor** ⏻
For switching the dishwasher on and off.

② **TimeControl in-operation indicator lights**
For displaying programme time remaining with the door shut.

③ **Information button** ℹ
For displaying additional information about the option in the display.

④ **Arrow sensors** ∨∧
For altering values shown in the display.
For navigating between different menus.

⑤ **Back sensor** ⮌
For navigating back to the previous menu or deleting values which have been set previously.

⑥ ***OK* sensor**
For selecting the option shown in the display.
For confirming messages.

⑦ **Display**
See next page for more information.

⑧ **Delay start sensor** ◴ **with indicator light**
For selecting the "Delay start" function.

This instruction book applies to several different dishwasher models.
The specific dishwasher models are referred to as follows:
Standard = 80.5 cm high dishwashers (integrated)
and 84.5 cm high dishwashers (freestanding)
XXL = 84.5 cm high dishwashers (integrated).

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Guide to the appliance

Display

General

The display is used to select or set the following:

- the programme
- any extras
- the delay start function
- the Settings ⚑ menu
- information

The display can show the following:

- the programme name
- the stage the programme is at
- the current time of day
- the estimated time left for the programme to run
- the energy and water consumption (EcoFeedback)
- any relevant fault messages and information

To save energy, the dishwasher switches off after a few minutes if you do not press any sensors during this time.
To switch the dishwasher back on again, press the ⏻ sensor.

The scroll bar ⁞ on the right of the display indicates that more options or more text are available which can be displayed by touching the relevant arrow sensor ∨∧.

A dotted line will appear under the last option available in a list.

The *OK* sensor is used to confirm a message or setting and also to move to the next menu or another level.

A tick ✓ will appear beside the option which is currently selected.

To exit a sub-menu, touch the ⮌ sensor.
If you do not press any of the sensors for several seconds, the display will return to the previous level. You may need to enter your settings again.

The touch on metal sensor buttons react to pressure and not simply to touch.

The Settings ⚑ menu is used to alter the dishwasher's electronics to suit different requirements (see "Settings").

7

Warning and Safety instructions

This dishwasher complies with current safety requirements. Inappropriate use can, however, lead to personal injury and damage to property.

To avoid the risk of accidents and damage to the dishwasher, please read the installation plan and the operating instructions carefully before it is installed and used for the first time. They contain important information on its installation, safety, use and maintenance.

Keep the installation plan and the operating instructions in a safe place and pass them on to any future owner.

Miele cannot be held liable for damage caused by non-compliance with this information.

8

Warning and Safety instructions

Correct application

▶ This dishwasher is intended for use in domestic households and similar working and residential environments.

▶ The dishwasher is not intended for outdoor use.

▶ It must only be used as a domestic appliance as specified in these operating instructions, for cleaning domestic crockery and cutlery. Any other usage is not supported by the manufacturer and could be dangerous.

▶ The appliance can only be used by people with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, if they are supervised whilst using it, or have been shown how to use it in a safe way and recognise and understand the consequences of incorrect operation.

9

Warning and Safety instructions

Safety with children

▶ Children under 8 years of age must be kept away from the appliance unless they are constantly supervised.

▶ Children 8 years and older may only use the dishwasher unsupervised if they have been shown how to use it safely and recognise and understand the consequences of incorrect operation.

▶ Children must not be allowed to clean or maintain the appliance unsupervised.

▶ Please supervise children in the vicinity of the dishwasher and do not let them play with it, or play in or around it. They will not understand the potential dangers posed by it. There is a danger that children playing might shut themselves in the dishwasher.

▶ Danger of suffocation. Packaging, e.g. plastic wrappings, must be kept out of the reach of babies and children. Whilst playing, children could become entangled in packaging or pull it over their head and suffocate.

▶ Keep children away from detergents. Dishwasher detergents contain irritant and corrosive ingredients which can cause burning in the mouth, nose and throat if swallowed, or inhibit breathing. Keep children away from the dishwasher when the door is open. There could still be detergent residues in the cabinet. Seek medical attention immediately if your child has swallowed or inhaled detergent.

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Warning and Safety instructions

Technical safety

▶ Unauthorised installation, maintenance and repairs can cause considerable danger for the user. Installation, maintenance and repairs must only be carried out by a Miele authorised technician.

▶ A damaged dishwasher is dangerous. Check it for any visible damage. Never install or attempt to use a damaged appliance.

▶ The electrical safety of this appliance can only be guaranteed when correctly earthed. It is essential that this standard safety requirement is met. If in any doubt, please have the electrical installation tested by a qualified electrician.
Miele cannot be held liable for the consequences of an inadequate earthing system (e.g. electric shock).

▶ The dishwasher must only be plugged into the electricity supply via a suitable switched socket. The electrical socket must be easily accessible after the dishwasher is installed so that it can be disconnected from the electricity supply at any time.

▶ There must be no electrical sockets behind the dishwasher. Danger of overheating and fire risk if the dishwasher were to be pushed up against a plug.

▶ The dishwasher must not be installed under a hob. The high radiant temperatures which are sometimes generated by a hob could damage the dishwasher. For the same reason it should not be installed next to open fires or other appliances which give off heat, such as heaters etc.

▶ To avoid the risk of damage to the dishwasher, make sure that the connection data on the data plate (fuse rating, voltage and frequency) match the mains electricity supply before connecting the dishwasher to the mains. Consult a qualified electrician if in doubt.

▶ Do not connect the dishwasher to the mains supply until it has been fully installed and any adjustment has been made to the door springs.

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Warning and Safety instructions

▶ Do not connect the appliance to the mains electricity supply by a multi-socket adapter or an extension lead. These do not guarantee the required safety of the appliance (fire hazard).

▶ The appliance must not be used in a non-stationary location (e.g. on a ship).

▶ Do not install the dishwasher in a room where there is a risk of frost. Frozen hoses may burst or split. The reliability of the electronic control unit may be impaired at temperatures below freezing point.

▶ The plastic housing of the water connection contains an electrical component. It must not be dipped in water.

▶ There are electrical wires in the water inlet hose. Do not cut the water inlet hose, even if it is too long.

▶ The integrated Waterproof system offers protection from water damage, provided the following conditions are met:

– The dishwasher is correctly installed and plumbed in.
– The dishwasher is properly maintained and parts are replaced where it can be seen that this is necessary.
– The stopcock has been turned off when the appliance is not used for a longer period of time (e.g. during holidays).

The Waterproof system will work even if the appliance is switched off. However, the appliance must remain connected to the electricity supply.

▶ The water pressure (flow pressure at the take-off point) must be between 30 and 1000 kPa (0.3 and 10 bar).

▶ If the dishwasher gets damaged, switch it off at the mains immediately and call your Miele Dealer or the Miele Service Department.

▶ While the appliance is under guarantee, repairs should only be undertaken by a Miele authorised service technician. Otherwise the guarantee is invalidated.

12

Warning and Safety instructions

▶ Miele can only guarantee the safety of the appliance when genuine original Miele replacement parts are used. Faulty components must only be replaced by Miele spare parts.

▶ During installation, maintenance and repair work, the appliance must be disconnected from the mains electricity supply.

▶ If the connection cable is damaged it must be replaced with a special cable of the same type (available from Miele) by a Miele authorised service technician only.

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Warning and Safety instructions

Correct installation

▶ The dishwasher must be installed and connected in compliance with the installation diagram supplied.

▶ Take care, both before and during installation of the dishwasher, not to cut yourself on the metal parts. Danger of injury. Wear protective gloves.

▶ The dishwasher must be correctly aligned to ensure problem-free operation.

▶ In order to ensure stability, built-under and integrated dishwashers must only be installed under a continuous worktop which is secured to adjacent cabinetry.

▶ If you want to convert your freestanding dishwasher to a built-under ("U") model, you will need to order the appropriate conversion kit. If you remove the existing plinth, you must replace it with a U-model plinth. This is necessary to avoid the risk of injury caused by protruding metal parts.

▶ The door springs must be adjusted equally on both sides. They are correctly adjusted when the door remains stationary when left open at 45°. It is important that the door is held in place by the springs and cannot fall open.
The appliance may only be used with correctly adjusted door springs.

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Warning and Safety instructions

Correct use

▶ Do not use solvents in the dishwasher. Danger of explosion.

▶ Do not inhale or ingest dishwasher detergent. Dishwasher detergents contain irritant or corrosive ingredients which can cause burning in the nose, mouth and throat if swallowed, or inhibit breathing. Seek medical attention immediately if detergent has been swallowed or inhaled.

▶ You could injure yourself on the open dishwasher door or trip over it. Avoid leaving the door open unnecessarily.

▶ Do not sit or lean on the opened door. This could cause the dishwasher to tip and be damaged, and you could get injured.

▶ Dishes can be very hot at the end of the programme. Allow them to cool until they are comfortable enough to handle before unloading.

▶ Only use detergent and rinse aid formulated for domestic dishwashers. Do not use washing-up liquid.

▶ Do not use commercial or industrial detergents as these may cause damage, and there is a risk of a severe explosive chemical reaction (such as an explosive oxyhydrogen gas reaction).

▶ Do not fill the rinse aid reservoir with powder or liquid detergent. This will cause serious damage to the reservoir.

▶ Inadvertently filling the salt reservoir with powder or liquid dishwasher detergent will damage the water softener. Make sure you have picked up the correct packet of dishwasher salt before filling the salt reservoir!

▶ Only use special coarse grained dishwasher salt for reactivation. Do not use other salts such as cooking salt, agricultural grade or gritting salt. These may contain insoluble additives which can impair the functioning of the water softener.

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Warning and Safety instructions

▶ In an appliance with a cutlery basket (depending on model), cutlery is cleaned and dried more efficiently if placed in the basket with the handles downwards. However, to avoid the risk of injury, place knives and forks etc. with the handles upwards.

▶ Plastic items which cannot withstand being washed in hot water, such as disposable plastic containers, or plastic cutlery and crockery should not be cleaned in the dishwasher. The high temperatures in the dishwasher may cause them to melt or lose shape.

▶ If you use the "FlexiTimer/Delay start" option (depending on model), make sure that the dispenser is dry before adding detergent. Wipe dry if necessary. Detergent will clog if poured into a damp dispenser and may not be thoroughly dispersed.

▶ Please observe the information given in "Technical data" regarding the capacity of the dishwasher.

Accessories

▶ Only use genuine original Miele accessories and spare parts with this dishwasher. Using accessories or spare parts from other manufacturers will invalidate the guarantee, and Miele cannot accept liability.

Disposal of your old dishwasher

▶ Make the door lock inoperative so that children cannot accidentally shut themselves in. Make appropriate arrangements for the disposal of the appliance.

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Caring for the environment

Disposal of the packing material

The packaging is designed to protect the appliance from damage during transportation. The packaging materials used are selected from materials which are environmentally friendly for disposal and should be recycled.

The packaging consists of the following materials:

Outer packaging:

– Corrugated cardboard made from up to 100% recyclable material:
or: Polyethylene (PE) shrink wrap

– Polypropylene (PP) strapping

Inner packaging:

– Chlorine and fluorine free expanded polystyrene (EPS)

– Base, lid frame and support battens made from untreated natural wood from renewable forests

– Polyethylene (PE) protective wrap

Recycling the packaging reduces the use of raw materials in the manufacturing process and also reduces the amount of waste in landfill sites.

Disposing of your old appliance

Electrical and electronic appliances often contain valuable materials. They also contain materials which, if handled or disposed of incorrectly, could be potentially hazardous to human health and to the environment. They are, however, essential for the correct functioning of your appliance. Please do not therefore dispose of it with your household waste.

Please dispose of it at your local community waste collection / recycling centre or contact your dealer for advice.

Ensure that it presents no danger to children while being stored for disposal.

To enable sorting by type of plastic for recycling, all plastic parts of the appliance are labelled with international standard symbols.

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Caring for the environment

Energy saving washing

This dishwasher is exceptionally economical in its use of water and electricity.
You can make the most of your appliance by following these tips:

– For most economical dishwashing, make full use of the baskets without overloading the dishwasher.

– Choose the programme to suit the type of crockery being washed and the degree of soiling.

– Select the ECO programme for energy-saving dishwashing. This programme is the most efficient in terms of its combined energy and water consumption at cleaning normally soiled crockery.

– If your dishwasher is connected to a hot water supply select the SolarSave programme for washing a lightly to normally soiled load. Because the water is not be heated in this programme, crockery may still be slightly damper at the end of this programme than it would be with other programmes.

– Follow the detergent manufacturer's recommendations on detergent dosage.

– When using powder or liquid detergent you can use $^{1}/_{3}$ less detergent if baskets are only half full.

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Caring for the environment

EcoFeedback consumption indicator

The Consumption function is used for calling up information about the energy and water consumption of your dishwasher (see "Settings menu, Consumption").

Three different types of information can be displayed:

– an estimate of the consumption before the programme begins

– the actual consumption at the end of the programme

– the total consumption of the dishwasher

1. Consumption estimate:

The estimated energy and water consumption for a programme can be shown in the display.

■ Open the door.

■ Select the programme you want.

■ Select the Estimated consumption option.

The estimated energy and water consumption will appear in the display.

The estimated consumption levels will be displayed as a bar chart. The more bars (▮▮▮) in the display, the more energy or water will be used.

The values are influenced by the programme selected and any programme options selected.

The consumption indicator is switched on as standard. However, you can also switch the indicator off (see "Settings menu, Consumption").

2. Actual consumption

At the end of the programme you can call up the actual amount of energy and water used by the programme which has just been run.

■ Open the door at the end of the programme.

■ Press the ℹ sensor.

Switching the dishwasher off at the end of the programme will delete the actual consumption values for the programme which has just been run.

3. "Consumption" setting

The Consumption setting gives a total of the energy and water which has been used in all previous dishwasher programmes (see "Settings menu, Consumption").

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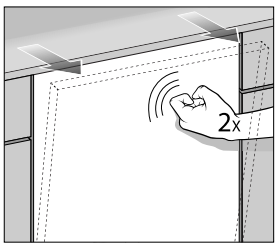
Before using for the first time

Opening the door

This dishwasher has a motorised door opener which is activated by knocking on the door front ("Knock2open function").



■ Knock twice in quick succession on the top third of the door front

The door will open a little.

■ There are two dark grips inside the door at the top.
Take hold of them and pull to release the door lock.

The door locking pin then retracts.

If the door is opened during operation all functions are automatically interrupted.

The number of knocks required for opening the door can be changed if wished (see "Settings, Knock2open").

⚠ Water in the dishwasher may be hot. Danger of scalding.
Only open the door during operation if absolutely necessary and exercise extreme caution when doing so.

⚠ Keep the area around the door free of obstructions.

At the end of programmes with a drying phase (see "Programme chart"), the door will open automatically a little in order to help the drying process.
This function can be deactivated, if preferred (see "Settings menu, AutoOpen").

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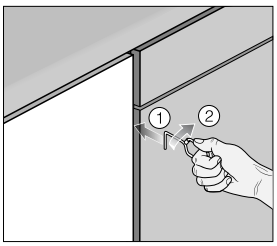
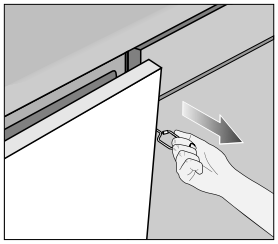
Before using for the first time

Emergency door opener

If the door will not open when knocked or if there is a power cut the door can be opened manually with the Knock2open mechanism supplied with the dishwasher.



- Push the device into the gap between the dishwasher front and the neighbouring unit door about 15 cm below the worktop.
- Turn the device clockwise ②, until it grips behind the dishwasher front.



- Then use it to pull the door open.

Closing the door

- Push the baskets right in.
- Raise the door upwards until the catch engages.

The door will then close automatically.

⚠ Danger of injury.
Do not put your hand inside the door as it is closing.

Before using for the first time

Basic settings

- Open the door.
- Switch the dishwasher on using the ⏻ sensor.

The welcome screen will appear when the dishwasher is switched on for the first time.

Language

The display will then change automatically to the screen for setting the language.

- Use the ∨∧ arrows to select the language you want and also the country, if appropriate, and confirm your selection with OK.

See "Display / Settings menu" for more information about the display and controls.

A tick ✓ will appear next to the language that has been set.

Time

The display will then change to the screen for setting the time.

The time of day needs to be set before the Delay start programme option can be used.
You can also show the current time of day in the display.

- Use the arrow sensors ∨∧ to set the hour and confirm with OK.
- Then set the minutes and confirm with OK.

Keeping the relevant sensor pressed in, will increase or decrease the time automatically.

Before using for the first time

Water hardness

The display will change to the screen for setting the water hardness.

- The dishwasher must be programmed to the correct water hardness for your area.
- Your local water authority will be able to advise you of the water hardness level in your area.
- Where the water hardness fluctuates e.g. between 1.8 and 2.7 mmol/l (10 - 15 °d - German scale) always programme the dishwasher to the higher value (2.7 mmol/l or 15 °d in this example).

In the event of a fault, it will help the service technician if you know the hardness of your local water supply.

Enter the water hardness below:

_____mmol/l or °d

The dishwasher is programmed at the factory for a water hardness level of 2.7 mmol/l (15 °d - German scale).

- Use the ∨∧ arrows to select the hardness you want and confirm with OK.

See "Settings menu, Water hardness" for more information.

Before using for the first time

The message Set-up successfully completed will then appear in the display.

After confirming this with OK, the prompts Insufficient salt and Insufficient rinse aid may appear.

- Add salt and rinse aid if necessary (see "Before using for the first time - "Dishwasher salt" and "Rinse aid").
- Confirm the messages with OK.

The display will change to show the main menu.

The prompt to set the dishwasher up for first use will not appear again after you have run the first complete programme.

Before using for the first time

Before using the appliance for the first time, you require:

- approx. 1 kg dishwasher salt,
- domestic dishwasher detergent,
- rinse aid formulated for domestic dishwashers.

Every dishwasher is tested at the factory. There will be residual water in the appliance from this test. It is not an indication that it has been used previously.

Dishwasher salt

In order to achieve good cleaning results, the dishwasher needs to operate with soft water. Hard water results in a build-up of calcium deposits on crockery and in the dishwasher. Mains water with a hardness level higher than 0.7 mmol/l (4 °d - German scale) needs to be softened. This takes place automatically in the integrated water softener. The water softener in the dishwasher is suitable for a water hardness level of up to 12.6 mmol/l (70 °d - German scale.

The water softener requires dishwasher salt.
Depending on the water hardness level (< 3.8 mmol/l, or 21 °d - German scale), dishwasher salt is not required if combination tablets are being used (see "Operation, Detergent").

If the water in your area is very soft and constantly **lower than 0.9 mmol/l (5 °d - German scale)** you do **not** have to add dishwasher salt. The prompt to add salt will be switched off automatically.

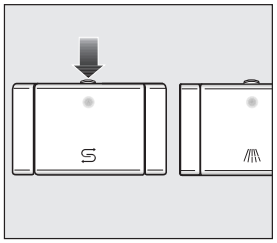
⚠ Dishwasher detergent will damage the water softener.
Do not fill the salt reservoir with powder or liquid detergent.

⚠ Only use special coarse grained dishwasher salt for reactivation, as other salts may contain insoluble additives which can impair the functioning of the water softener.

Before using for the first time

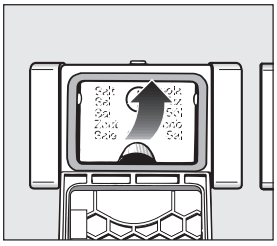
Adding salt

- When filling the salt reservoir **only open the door halfway** to ensure that all the salt gets into the reservoir.



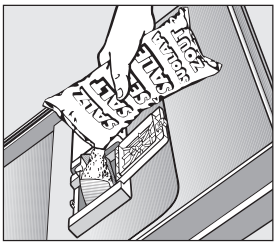
- Press the button on the top of the salt reservoir in the direction of the arrow.

The flap will spring open.



- Lift up the funnel.

Do **not** fill the reservoir with water.



- Add salt only until the reservoir is full or until water runs out of the opening. The salt reservoir holds approx. 1 kg of salt, depending on the brand used.

Do not add any more than 1 kg of salt.

As the salt reservoir is filled, displaced water may overflow.

- Clean any excess salt from around the reservoir opening, and then close the flap.
- Immediately after filling the salt reservoir, run the *Quick wash* programme with the *Short* programme option selected and without any crockery in the dishwasher, to remove any traces of salt from the cabinet.

Before using for the first time

Add salt reminder

- Fill the salt reservoir with dishwasher salt for reactivation when Insufficient salt appears. (If it appears during a programme, wait until the end of the programme).
- Confirm with *OK*.

The message will go out.

⚠ Risk of corrosion.
Immediately after filling the salt reservoir, run the Quick wash programme with the Short programme option selected and without any crockery in the dishwasher to remove any traces of salt from the cabinet.

After the salt reservoir has been filled, the refill reminder may still appear in the display if the salt concentration has not yet reached the correct level. If this is the case, confirm again with *OK*.

The refill reminder will be switched off if you have programmed the dishwasher for a water hardness below 0.9 mmol/l (5°d - German scale).

If you only ever use combination products containing salt and rinse aid in your dishwasher, you can switch the reminders off if you wish (see "Settings menu - Refill reminders").

If you switch to using detergent that does not contain salt or rinse aid, it is important to remember to add salt and rinse aid and to switch the reminders back on.

Before using for the first time

Rinse aid

Rinse aid is necessary to ensure water does not cling and leave marks on crockery during the drying phase and helps crockery dry faster after it has been washed.
Rinse aid is poured into the storage reservoir and the amount set is dispensed automatically.

⚠ Inadvertently filling the rinse aid reservoir with washing-up liquid or powder or liquid detergent will damage the reservoir. Only pour rinse aid formulated for domestic dishwashers into the reservoir.

Alternatively, it is possible to use

– Household vinegar with a max. 5% acid content

or

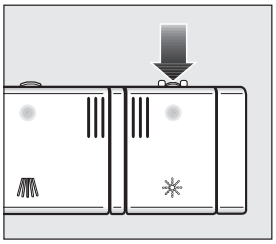
– Liquid citric acid up to 10% acid content

The resulting rinsing and drying quality will not, however, be as good as when rinse aid is used.

⚠ Do not use vinegar with a higher acid content (e.g. vinegar essence 25% acid).
This would damage the dishwasher.

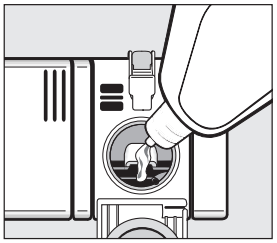
If you only ever use combination products containing rinse aid in your dishwasher, you do not need to add rinse aid.

Adding rinse aid



- Press the button on the lid of the rinse aid reservoir in the direction of the arrow until the flap springs open.

Before using for the first time



- Add rinse aid only until it is visible in the opening.

The rinse aid reservoir holds approx. 110 ml.

- Close the flap firmly so that it clicks into place. Otherwise water can enter the rinse aid reservoir during a programme.
- Wipe up any spilled rinse aid. This prevents over-foaming occurring during the next programme.

You can adjust the rinse aid dosage for best results (see "Settings menu, Rinse aid").

Add rinse aid reminder

When the ✳ Insufficient rinse aid message appears, the reservoir contains sufficient rinse aid for 2 - 3 programmes only.

- Add rinse aid in plenty of time.
- Confirm with *OK*.

The message will go out.

If you only ever use combination products containing salt and rinse aid in your dishwasher, you can switch both reminders off if you wish (see "Settings menu - Refill reminders").

If you switch to using detergent that does not contain salt or rinse aid, it is important to remember to add salt and rinse aid and to switch the reminders back on.

Loading the dishwasher

Notes

Remove coarse food residues from crockery.

There is no need to rinse items under running water.

⚠ Do not wash items soiled with ash, sand, wax, lubricating grease or paint in the dishwasher. Ash does not dissolve and is distributed in the wash cabinet. Wax, sand, grease and paint cause damage to the dishwasher.

Crockery can be loaded anywhere in the baskets, but the following notes should be observed:

- Do not place crockery and cutlery inside other pieces where they may be concealed.
- Load the crockery so that water can access all surfaces. This ensures that they get properly cleaned.
- Make sure that all items are securely positioned.
- Hollow items such as cups, glasses, pans, etc. must be inverted in the basket.
- Tall, narrow, hollow items, e.g. champagne glasses, should be placed in the centre of the basket to ensure better water coverage.
- Wide based items should be placed at an angle so that water can run off them freely.

Loading the dishwasher

- The spray arms must not be blocked by items which are too tall or hang through the baskets. If in doubt, test for free movement by manually rotating the spray arms.
- Make sure that small items cannot fall through the holders in the baskets.
  Small items, e.g. lids, should therefore be placed in the cutlery tray or cutlery basket (depending on model).

Some foodstuffs may contain natural dyes, e.g. carrots, tomatoes or ketchup. Plastic items in the dishwasher may discolour if large quantities of these foodstuffs find their way into the dishwasher on the crockery. The stability of plastic items is not affected by this discolouration.
Cleaning silver cutlery in the dishwasher may also cause plastic items to discolour.

Loading the dishwasher

Upper basket

See "Loading the dishwasher / Loading examples" for examples of how to load crockery and cutlery.

⚠ For safety reasons, do not operate the dishwasher without the upper and lower baskets in place (except when running the Tall items 65°C programme, if available).

- Use the upper basket for small, lightweight and delicate items such as cups, saucers, glasses, dessert bowls, etc.
  Shallow pans or casserole dishes can also be placed in the upper basket.
- Long items such as soup ladles, mixing spoons and long knives should be placed lying down across the front of the upper basket.

Cup rack

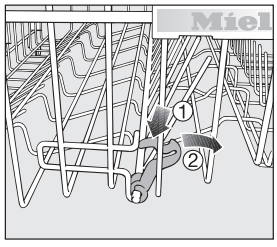
- Raise the rack upwards to make room for tall items.

Glasses can be arranged along the cup rack for support during the programme.

- Lower the cup rack and lean the glasses against it.

Hinged spikes

The rows of spikes can be lowered to make more room for larger items such as casserole dishes.

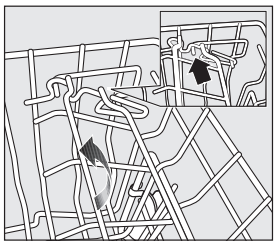


- Press the yellow lever downwards ① and then lower the spikes ②.

Loading the dishwasher

Jumbo cup rack (depending on model)

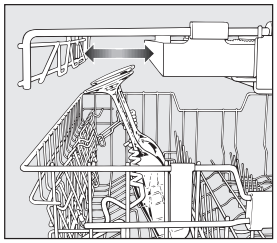
The cup rack can be set at two different widths so that it can also accommodate large cups.



- Pull the cup rack upwards and click it back into position at the required width.

Glass rail

This rail is designed to hold tall glasses and glasses with stems securely.

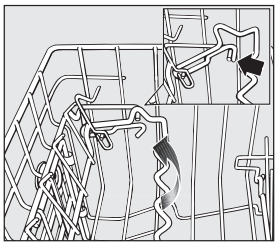


- Lower the rail and lean tall glasses against it.

- You can also move one of the side inserts of the cutlery tray to make more room for tall glasses.

Adjusting the height

You can set the glass rail at two different heights.



- Pull the rail upwards and click it back into position at the required height.

Use the low setting for small glasses and tumblers.

Use the high setting for tall glasses and glasses with stems.

Loading the dishwasher

Items not suitable for dishwashers:

- Wooden cutlery and crockery or items with wooden parts: these may discolour and fade. The glue used in these items is not dishwasher-proof and wooden handles may come loose after being washed in a dishwasher.
- Craft items, antiques, valuable vases and decorative glassware: such items are not suitable for dishwashers.
- Plastic items which are not heat resistant: the high temperatures in the dishwasher may cause them to melt or lose shape.
- Copper, brass, tin and aluminium items: these may discolour or become matt.
- Colours painted over a glaze: these may fade after a number of washes.
- Delicate glassware and glassware containing lead crystal: clouding may occur over time.

Please note

Silverware previously cleaned with a **silver polish** may still be damp or spotted at the end of a programme, where water has not run off smoothly. It may need to be rubbed dry with a soft cloth.

Silver which has been in contact with foods containing sulphur can discolour. These include egg yolk, onions, mayonnaise, mustard, pulses, fish, fish brine and marinades.

⚠ Aluminium components (e.g. cooker hood grease filters) must not be cleaned with caustic alkaline commercial or industrial cleaning agents.
These may damage the material, or in extreme cases, there is a risk of a severe explosive chemical reaction (such as an explosive oxyhydrogen gas reaction).

Tip: When purchasing new crockery and cutlery, make sure they are dishwasher-proof.

Glass care

- Clouding may occur on glasses after frequent washing. If delicate glassware is washed in the dishwasher ensure that only very low temperatures are used (see programme chart), or a special glass-care programme is used (depending on model). This will reduce the risk of clouding.
- Purchase glassware which is dishwasher safe (e.g. Riedel glassware).
- Use detergents with glass protective additives (e.g. Miele CareCollection tabs).
- Visit "http://www.mieleglasscare.com/international/en/glasscare/english" for more information on glass care.

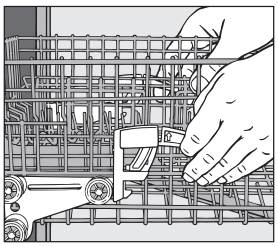
Loading the dishwasher

Adjusting the upper basket

In order to gain more space for taller pieces of crockery in the lower or upper basket, the upper basket can be adjusted on three levels with 2 cm between each level.

The upper basket can also be set at an angle with one side high and the other side low. This can be useful to help prevent water being left in deep dishes etc. Ensure, however, that the basket can be inserted smoothly into the cabinet. It is better to adjust the basket before loading it.

- Pull out the upper basket.



To raise the upper basket:

- Lift the basket up until it clicks into place.

To lower the upper basket:

- Pull upwards on the levers at either side of the upper basket.
- Adjust the basket to the desired height and then push the levers securely back down into position.

Depending on the setting of the upper basket, the following plate dimensions can be accommodated.

Dishwashers with cutlery basket
(see data plate for model number)

Upper basket level	Plate ∅ in cm		
	Upper basket		Lower basket
	Standard	XXL	
Top	20	24	31 (35*)
Middle	22	26	29
Bottom	24	28	27

Dishwashers with cutlery tray
(see data plate for model number)

Upper basket level	Plate ∅ in cm		
	Upper basket		Lower basket
	Standard	XXL	
Top	15	19	31 (35*)
Middle	17	21	29
Bottom	19	23	27

* When tilted, plates of up to 35 cm can be accommodated (see "Lower basket).

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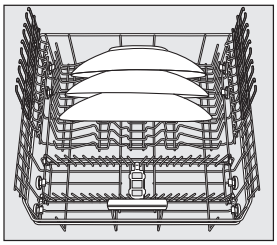
Loading the dishwasher

Lower basket

See "Loading the dishwasher / Loading examples" for examples of how to load crockery and cutlery.

- For larger and heavier items such as plates, serving platters, saucepans, bowls, etc.
  Glasses, cups and small items such as saucers can also be placed in the lower basket. Do not place thin, delicate glassware in the lower basket.



- Place very large plates in the centre of the lower basket.

When tilted, plates up to 35 cm in diameter can be accommodated.

Removable MultiComfort insert

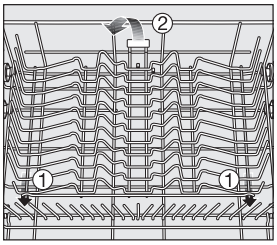
The rear section of the lower basket is used for washing cups, glasses, plates and pots.

You can remove the MultiComfort insert to make more room for larger items such as casserole dishes.

To remove the insert

- Pull the yellow handle forwards and remove the insert.

Replacing them



- Fit the insert into the lower basket with the hooks going under the long cross-piece ①.
- Press down on the insert until it clicks into position ②.

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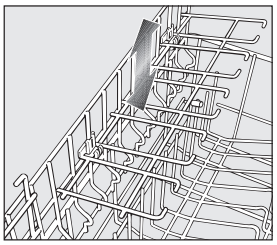
Loading the dishwasher

Glass rack

- The glass rack can be raised to make more room for tall items.
- Stem glassware, e.g. wine glasses or champagne flutes, can be leaned against the glass rack or suspended from it.

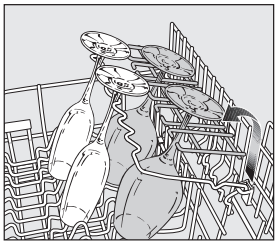
You can set the glass rack at two different heights.



- Slide the glass rack to the desired height until the catches click into place at the top and rest on the bottom.

Glass rail

This rail is designed to hold tall glasses and glasses with stems securely.



- Lower the rail and lean tall glasses against it.

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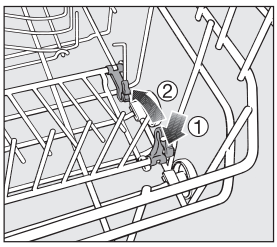
Loading the dishwasher

Hinged spikes

The spikes at the front are used for washing plates, soup bowls, platters, desert bowls, and saucers.

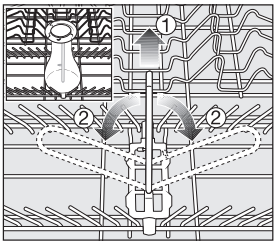
Both rows of spikes can be lowered to make more more room for large items, e.g. pots, pans and dishes.



- Press the yellow lever downwards ①, and then lower the spikes ②.

Bottle holder

The bottle holder can be used to wash narrow items, e.g. milk and baby bottles.



- If the bottle holder is not needed, lift it up ① and fold the sides down ②, as illustrated.

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Loading the dishwasher

Cutlery

3D cutlery tray (depending on model)

See "Loading the dishwasher / Loading examples" for examples of how to load crockery and cutlery.

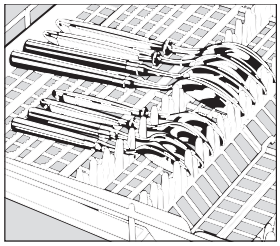
- Arrange the cutlery in the tray as shown.

To make unloading much easier, cutlery should be grouped in zones, one for knives, one for forks, one for spoons, etc.

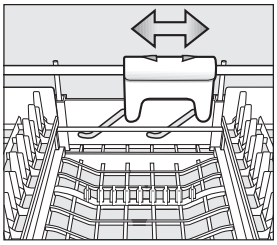
Spoon heads should be placed in contact with at least one of the serrated retainers on the base of the cutlery tray to ensure that water runs off them freely.

The upper spray arm must not be blocked by items which are too big (e.g. cake slices).

The side sections of the tray can be moved into the middle to accommodate tall items of crockery in the upper basket.



If spoon handles do not fit between the holders, then lay them the other way round.



You can use the yellow slide to adjust the height of the middle section of the cutlery tray to make more room for large items of cutlery, such as serving spoons and ladles.

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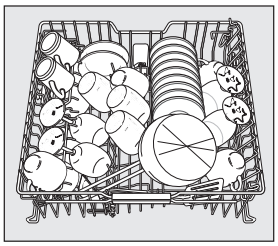
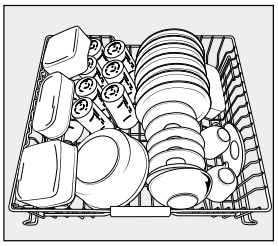
Loading the dishwasher

Loading examples

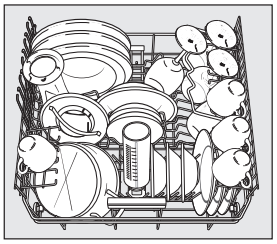
Dishwashers with cutlery tray

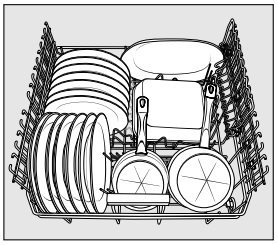
Upper basket





Lower basket





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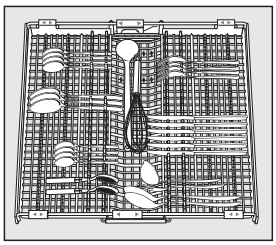
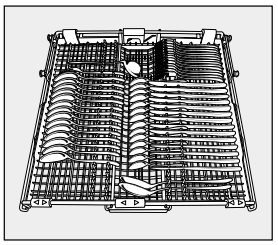
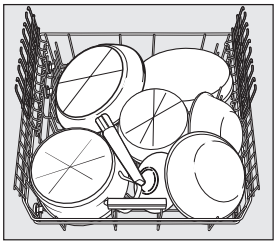
Loading the dishwasher

Cutlery tray





Heavily soiled items



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Operation

Detergent

⚠ Only use detergents formulated for domestic dishwashers. Do not use washing-up liquid.

Active ingredients

Modern detergents contain various active ingredients, the most important of which are:

- Complexing agents to prevent calcification.
- Alkalis to aid removal of dried on soiling.
- Enzymes to break down starch and loosen protein.
- Oxygen based bleaching agents to remove coloured stains (e.g. tea, coffee, tomato sauce).

Most dishwasher detergents are mildly alkaline and contain enzymes and oxygen based bleaching agents.

Types of detergent:

- Powder and liquid gel detergents. These detergents allow you to adjust the amount dispensed according to the amount of load and level of soiling.
- Tab detergents. These are suitable for most levels of soiling.

You can also buy combination products (see "Programme options, DetergentAgent", if applicable). In addition to detergent, these products contain rinse aid and salt substitutes. They are available as "3 in 1" or when they also contain other components such as glass and stainless steel protective additives and enhanced cleaning power, as "5 in 1", "7 in 1", "All in 1" etc.
Refer to the manufacturer's packaging as to whether combination products are suitable for the water hardness level in your area.
Please note that the cleaning and drying results of combination detergents can vary greatly.

For optimum cleaning and drying results, use Miele dishwasher detergent and add Miele salt and Miele rinse aid separately. See "Optional accessories".

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Operation

Detergent dosage

- Follow the dosage recommended by the manufacturer on the packaging.
- Unless directed otherwise, use one detergent tab or add 20 to 30 ml detergent to compartment II, depending on the level of soiling. With very heavy soiling you can also add a small amount of detergent to compartment I.
- Tabs may not dissolve completely when the Quick wash programme (if available) is used.

Failure to dispense the recommended amount of detergent may impair cleaning results.

⚠ Dishwasher detergents contain irritant or corrosive ingredients which can cause burning in the nose, mouth and throat if swallowed, or inhibit breathing.
Avoid inhalation of powder detergents and do not ingest dishwasher detergent. Seek medical attention immediately if detergent has been swallowed or inhaled. Keep detergent and other household agents out of the reach of children at all times. Keep children away from the dishwasher when the door is open. There could still be detergent residues in the cabinet. To avoid the danger of children coming into contact with the dishwasher detergent, only add detergent just before starting the programme and close the door, activating the safety lock (if your dishwasher is fitted with one).

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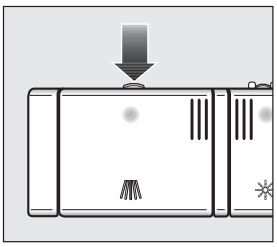
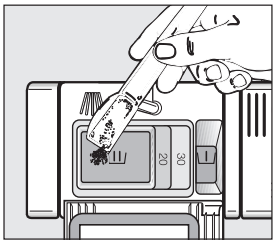
Operation

Adding detergent



- Press the opening catch on the detergent dispenser. The flap will spring open.

The flap is always open at the end of a programme.



- Add the required amount of detergent and close the flap.
- Make sure that the detergent packaging is properly closed after use to avoid it getting damp and clumping together.

For information

Compartment I holds max. 10 ml, Compartment II holds max. 50 ml of detergent.

There are marks in compartment II to assist with dispensing: 20, 30. The marks indicate a level of approx. 20 or 30 ml when the door is open in a horizontal position.

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Operation

Switching on

- Open the stopcock, if it is closed.
- Open the door.
- Make sure the spray arms can rotate freely.
- Switch the dishwasher on using the ⏻ sensor.

The main menu will appear in the display.

Switch the Memory function on (see "Settings menu, Memory") if you want the last programme selected to remain selected instead of the ECO programme.

Selecting a programme

Choose your programme according to the type of load and how dirty it is.

The different programmes and their uses are described in the **Programme chart** later on in this booklet.

- Use the ∨∧ arrows to select the programme required.

The display will change to show the programme menu.

Touch the ℹ sensor to call up more information about the programme currently selected.

You can now select extra options for your programme (see "Programme options").

To select a different programme, touch the ⮌ sensor to return to the main menu.

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Operation

Starting the programme

- Start the programme by closing the door.

The TimeControl indicator will light up to let you know the programme has started.

If you open the door the message Crockery can be added will show in the display.
As long as this message is showing, crockery can be added without compromising wash results.

⚠ Water in the dishwasher may be hot. Danger of scalding from water in the cabinet.
Make sure you open the door very carefully.

A programme should only be cancelled in the first few minutes, if at all. Otherwise important programme stages could be omitted.

Display

The estimated duration of the programme selected appears in hours and minutes in the display before the programme begins. During the programme, the time left until the end of the programme is displayed.

Symbols appear to indicate which stage the programme is at:

- Pre-wash / Soak
- Main wash
- Interim rinse
- Final rinse
- Drying
- Finish

The programme duration displayed may vary with the same programme. It is influenced by, among other things, the water temperature at each intake, the reactivation process, the type of detergent, the amount of crockery and how dirty it is.

When a programme is selected for the first time, the display shows an average duration for a cold water intake.

The durations shown in the Programme chart refer to standard test loads and temperatures.

Each time a programme is run, the electronic unit takes the new conditions into account, and calculates the programme duration required.

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TimeControl

The TimeControl indicator light lets you know how much longer the programme has to run with the door shut.

All four indicator lights under the worktop will come on when the programme starts. They will go out one after the other from left to right in 20 minute intervals an hour before the end of the programme to let you know how long the programme still has left to run.

– 4 indicator lights:
Programme start / Time remaining exceeds 60 minutes
– 3 indicator lights:
Time remaining 60-41 minutes
– 2 indicator lights:
Time remaining 40-21 minutes
– 1 indicator light:
Time remaining 20-1 minute
– All indicators off:
The programme has finished

Energy management

To save energy, the dishwasher will switch off automatically 10 minutes after the last time a sensor has been pressed or after the end of the programme (see "Settings, Optimise standby").

■ Press the ⏻ sensor to switch the dishwasher back on.

The dishwasher will not switch off whilst a programme is running, during the Delay start period or if there is a fault.

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At the end of a programme

At the end of a programme, the TimeControl indicator light will go out with the door shut. The buzzer might also be sounding.

The programme has finished when Finished appears in the display and the door has opened slightly (if applicable).

If the Consumption programmable function is switched on (see ""Settings, Consumption") you can now view the actual energy and water consumption of the programme which has just finished

The drying fan may continue to run for a few minutes at the end of the programme.

You can now empty the dishwasher.

⚠ If you have deactivated the automatic door opening function (see "Settings menu, AutoOpen"), but would still like to open the door at the end of the programme, then make sure that you open the door fully.
Otherwise steam from the dishwasher could damage the edge of the worktop because the fan is no longer running.

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Switching off

At the end of a programme:

■ Open the door.

■ The dishwasher can be switched off at any time using the ⏻ sensor.

Switching the dishwasher off during a programme stops the programme.

Switching the dishwasher off during the run-up to a delay start time will also stop the process.

If the dishwasher is not going to be used for a longer period of time, e.g. whilst on holiday, the stopcock should be closed.

Unloading the dishwasher

Dishes tend to break and chip more easily when they are hot. Allow the dishes to cool until they are comfortable enough to handle before unloading them.

If you open the door fully after switching off, the dishes will cool much faster.

First unload the lower basket, then the upper basket and finally the cutlery tray (depending on model).
This will prevent water drops from the upper basket and cutlery tray from falling onto the dishes in the lower basket.

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Interrupting a programme

A programme is interrupted as soon as the door is opened.
If the door is closed again, the programme will continue from the point it was at before the door was opened.

⚠ Water in the dishwasher may be hot. Danger of scalding.
Only open the door if absolutely necessary and exercise extreme caution when doing so. Before closing the door again, leave it ajar for approx. 20 seconds. This will enable the temperature in the wash cabinet to settle. Then raise the door up and push until the catch engages.

Changing a programme

If the detergent dispenser flap has already opened, do not change the programme.

If a programme has already started and you wish to change it, proceed as follows:

■ Open the door.

■ Press the Back sensor ⮌.

■ Confirm the message Cancel programme? with Yes.

The programme will be cancelled.

■ Select the Main menu option.

The display will revert to the main menu.

■ Select the programme you want, and then start it by shutting the door.

The in-operation indicator comes on to show that a programme has been started.

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Programme options

Extras

You can select Extras for the programme you have selected.

- Open the door.
- Switch the dishwasher on using the ⓘ sensor.
- Select a programme.
- Select the Extras option.

All available Extras will be shown in the display.

- Select the Extras you want using the *OK* sensor.

A tick ☑ will appear beside the Extra to show that it has been set.

Extras that cannot be combined will have a lock symbol 🔒 next to them.

- To deselect an option you have chosen simply use the *OK* sensor again.
- When you have finished selecting Extras, confirm with Accept OK.

The display will change back to the programme menu.
The number of Extras selected, e.g. 1 of 4, will appear in the programme menu.

You can save the selected Extras for the respective programme (see "Settings, Save extras").

Short

The Short Extra reduces the duration of the programmes in which this option is available by up to 30%.

In order to achieve optimum cleaning results consumption rates may increase slightly with this option.

Energy save

The Energy save Extra reduces the energy consumption of programmes in which this option is available by up to 20%.

In order to achieve optimum cleaning results the programme duration is extended with this option.

Intensive lower basket

The Intensive lower basket Extra intensifies cleaning performance in the lower basket in programmes in which this option is available.

Energy and water consumption are increased slightly due to the extended wash duration in the lower basket.

Extra dry

The Extra dry Extra improves the drying performance in programmes in which this option is available.

Energy consumption is increased due to an extended fan running time and an increased final rinse temperature.

Programme options

Soak

The Soak Extra is used for soaking crockery with dried on soiling.

Energy and water consumption will increase with this Extra.

If you are using powder dishwasher detergent, add approx. 5 g to compartment I.

Pre-wash

The Pre-wash Extra can be used for removing easily soluble soiling from crockery.

Adding a pre-wash will increase the programme duration and increase energy and water consumption levels.

DetergentAgent

For optimum cleaning results, the dishwasher automatically adjusts the programme sequence to the type of detergent being used. Depending on the programme, this can mean that the running time and energy consumption vary slightly.

If you only ever use combination products containing salt and rinse aid in your dishwasher, you can switch the reminders off if you wish (see "Settings menu - Refill reminders"). The DetergentAgent function will not be affected by this.

> Please make sure that if you start using dishwasher salt and rinse aid again, you switch the reminders back on.

Programme options

Delay start with EcoStart

There are three ways of starting the programme by means of delaying the start. You can set the start time or the finish time of a programme. You also have the option of taking advantage of time variable economy rates of electricity using the EcoStart function.

> When using the Delay start function, make sure that the detergent compartment is dry before adding detergent. Wipe dry with a cloth if necessary. If the compartment is wet, powder detergent can become lumpy and stick to the dispenser, with the result that it is not fully dispensed.
> Do not use liquid detergent when selecting Delay start, as it can run into the dishwasher before it is required.

- Open the door.
- Switch the dishwasher on using the ⓘ sensor.
- Select the programme you want from the main menu.
- Press the 🕘 button.

The 🕘 indicator will light up.

You then have a choice of Start at, Finish at and EcoStart.

- Select the one you want.

Now enter the time you want.

If, while you are setting the time, you do not press any sensors for several seconds, the display will revert to the previous menu. You will then have to enter your settings again.
If you keep the relevant arrow sensor ∨∧ pressed, the value shown will automatically increase or decrease.

Programme options

Start at

With the Start at function, you set the exact time you want the programme to start at.

- Use the arrow sensors ∨∧ to set the hour and confirm with OK.

The hours will be saved and the minute number block will be highlighted.

- Use the ∨∧ arrow buttons to set the minutes and confirm with OK.

The display will change to show the programme menu.

- Close the door.

The left hand in-operation indicator light will start flashing on and off.

When the set time is reached, the programme selected will begin automatically.

Finish at

With the Finish at function, you set the time you wish the programme to end at.

- Use the arrow sensors ∨∧ to set the hour and confirm with OK.

The hours will be saved and the minute number block will be highlighted.

- Use the ∨∧ arrow buttons to set the minutes and confirm with OK.

The display will revert to the programme menu and the estimated start time will appear.

- Close the door.

The left hand in-operation indicator light will start flashing on and off.

A message will appear in the display if the programme cannot be completed by the set finish time because it has too long a running time.

The selected programme will start automatically when the estimated start time is reached.

Programme options

EcoStart

The EcoStart function allows you to take advantage of time variable economy rates of electricity. Before you can use this option you must set up to three electricity tariff time zones (see "Settings menu, EcoStart").
You then set the latest time at which the programme selected should end.
The dishwasher will start automatically in the cheapest tariff zone within the time set.

- Use the arrow sensors ∨∧ to set the hour and confirm with OK.

The hours will be saved and the minute number block will be highlighted.

- Use the ∨∧ arrow buttons to set the minutes and confirm with OK.

The display will change to show the programme menu.

- Close the door.

The left hand in-operation indicator light will start flashing on and off.

The estimated start time for the programme selected will appear in the display.

The selected programme will start automatically during the most cost effective time zone. It will finish at the latest by the set finish time.

Changing or deleting set times

You can change the set times or the programme before the start time in the display is reached.

- Open the door.
- Select the Change option and confirm with OK.
- Press the ◴ button.
- Select the function that you want to change or delete the time for.

After confirming the Change option you can change the set time.

After confirming the Delete option the set time will be deleted and the ◴ indicator light will go out.

You can now select and start a programme.

Programme overview

Programme	Programme sequence				
	Pre-wash	Main wash °C	Interim rinse	Final rinse °C	Drying
ECO [1]		51	X	48	X
Sensor wash	Variable programme sequence, sensor-controlled adjustment according to the amount of crockery and level of food deposits				
	If required	47-65	If required	57	X
Normal 55 °C	X	55	X	60	X
Intensive 75 °C	2X	75	X	60	X
Sensor wash gentle ♀	X	44	X	57	X
Quick wash 40 °C		40	X	45	X
Hygiene		69	2X	70	X
Extra quiet		46	X	64	X
SolarSave	2X	X	X	X	X
Pasta/Paella	X	74	X	60	X
Tall items 65 °C	X	65	X	60	X
Glasses warm		34	X	54	X
Maintenance programme		75	2X	70	X

[1] This programme is the most efficient in terms of its combined energy and water consumption for cleaning normally soiled crockery.

Programme overview

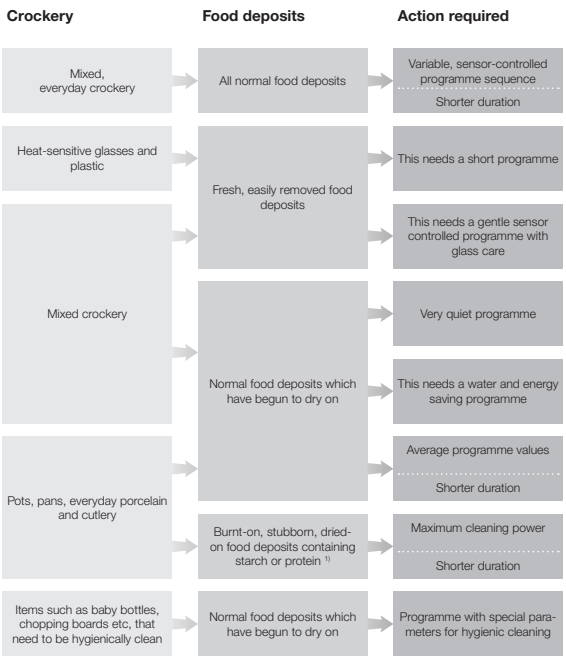
Consumption [2]			Duration [2]	
Energy		Water		
Cold water 15 °C kWh	Hot water 55 °C kWh	Litres	Cold water 15 °C h:min	Hot water 55 °C h:min
0.84	0.49	9.7	3:19	3:09
0.70 [3] -1.30 [4]	0.50 [3] -0.85 [4]	6.5 [3] -16.0 [4]	1:25-2:45	1:20-2:35
1.10	0.70	14.0	1:59	1:47
1.45	0.95	15.0	2:54	2:40
0.90	0.45	13.5	1:53	1:42
0.65	0.25	11.0	00:46	00:35
1.60	1.20	13.5	2:17	2:05
1.10	0.80	10.5	4:48	4:38
	0.05	27.5		1:29
1.45	0.95	13.5	2:24	2:10
1.15	0.65	14.5	1:52	1:39
0.75	0.40	10.5	00:52	00:42
2.10	1.35	21.5	1:56	1:34

[2] Values quoted are in accordance with EN 50242. In practice there may be variations to these figures due to variable conditions and data recorded by the sensors. Durations shown will reflect your household conditions.
Selecting programme options will also affect consumption levels and programme durations (see "Programme options").

[3] Part load with light soiling

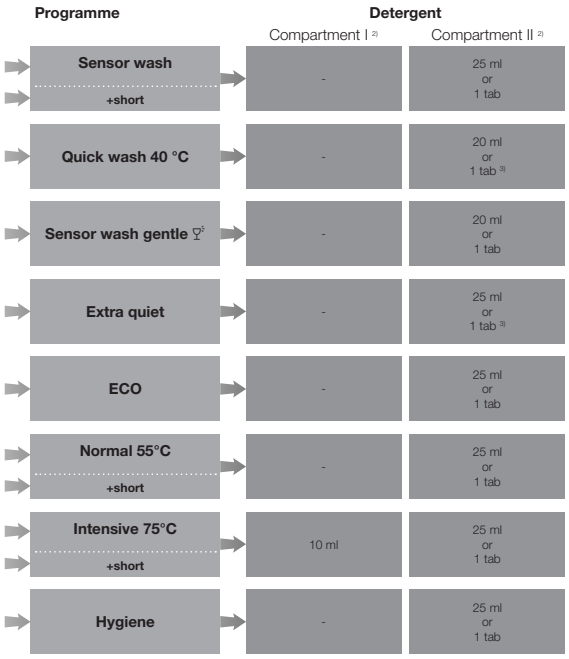
[4] Full load with heavy soiling

Programme overview



[1] Food such as potatoes, pasta, rice or stews can leave starchy deposits. Deposits containing protein can be left by food such as fried meat, fish or eggs and bakes.

Programme overview



2) see "Detergent"
3) In some cases, tabs may not dissolve completely.

Programme overview

Further programmes

SolarSave

This programme does not heat the water. To use it the water intake temperature must be at least 45 °C / 115 °F (see "Plumbing / Connection to the water supply"). This programme is suitable for mixed loads of crockery and glassware with normal, slightly dried on food residues.

Pasta/Paella

Programme with long soak phase incorporated for mixed loads of crockery, pots and pans and robust porcelain. This programme is particularly suitable for removing soiling containing starch left by pasta, rice and potatoes.

Tall items 65 °C

Programme for very large heat-resistant items, (e.g. very deep pans). In this programme the upper basket is removed to make space for large items in the lower basket. This programme has a medium action to remove normal, slightly dried on residues.

Glasses warm

This programme does not use rinse aid and omits the drying phase. It is particularly suitable for cleaning beer glasses where a good head of froth is needed.

Maintenance programme

The wash cabinet is largely self-cleaning. However, if residues or soiling build up in the cabinet, they can be removed by running the "Maintenance programme" without a load. This programme is designed for cleaning the wash cabinet using care products such as Miele's dishwasher cleaner or conditioner (see "Optional accessories / Dishwasher care products). Please follow usage instructions on the packaging.

Cleaning and care

Check your dishwasher regularly (approx. every 4 - 6 months). This way faults and problems can be avoided.

⚠ The external surfaces of the dishwasher are susceptible to scratching.
Contact with unsuitable cleaning agents can alter or discolour the external surfaces.

Cleaning the wash cabinet

The wash cabinet is largely self-cleaning, provided that the correct amount of detergent is always used.

If, however, there are limescale or grease deposits in the cabinet, these can be removed with a proprietary dishwasher cleaner or conditioner (available from Miele). Follow the instructions on the packaging.

Using mainly low temperature programmes (below 50 °C), could cause bacteria and unpleasant odours to build up in the wash cabinet. To avoid this, the dishwasher will increase the temperature in the final rinse of the selected programme automatically after several programmes using low temperatures have been run.

- Clean the filters in the wash cabinet regularly.

Cleaning the door and the door seal

Mould could build up on the door seal and the sides of the dishwasher door as these surfaces are outside the wash cabinet and so not accessed and cleaned by the spray arm jets.

- Wipe the door seal regularly with a damp cloth to remove food deposits.
- Wipe off any food or drink residues which may have dripped onto the sides of dishwasher door before closing it.

Cleaning the control panel

- The control panel should **only** be wiped with a damp cloth.

Cleaning the reflector panel

The reflector panel for the In-operation indicator light is situated in the coverplate underneath the worktop.

- The reflector panel should only be wiped with a damp cloth or a suitable cleaning agent designed for use on plastic.

Cleaning and care

Cleaning the door front

⚠ Soiling that is left too long might become impossible to remove and could cause the external surfaces to alter or discolour.
Remove any soiling immediately.

- Clean the front with a clean sponge and a solution of hot water and washing-up liquid. After cleaning dry with a soft cloth.
A clean, damp microfibre cloth without cleaning agent can also be used.

To avoid damaging the external surfaces, do not use:

- cleaning agents containing soda, ammonia, acids or chlorides,
- cleaning agents containing descaling agents,
- abrasive cleaning agents, e.g. powder cleaners and cream cleaners,
- solvent-based cleaning agents,
- stainless steel cleaning agents,
- dishwasher cleaner,
- oven sprays,
- glass cleaning agents,
- hard, abrasive brushes or sponges, e.g. pot scourers, brushes or sponges which have been previously used with abrasive cleaning agents,
- melamine eraser blocks,
- sharp metal scrapers.
- wire wool,
- steam cleaning appliances.

Cleaning and care

Checking the filters in the wash cabinet

The filter combination in the base of the wash cabinet retains coarse soil from the suds solution, preventing it accessing the circulation system and re-entering the cabinet through the spray arms.

⚠ This dishwasher must not be used without all the filters in place.

Collection of coarse soil may cause the filters to clog. The level of soiling and time it takes before the filters need cleaning will vary depending on use.

The message Check filters will appear in the display after every 50 programme cycles (factory default setting).

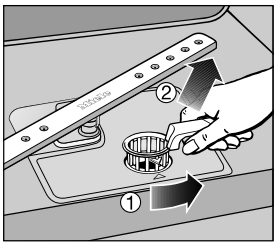
You can set the interval for this message to appear to between 30 and 60 programme cycles (see "Settings menu, Check filters").

- Check the filter combination.
- Clean it, if necessary.
- Then confirm the message with OK.

The message goes out.
The display will change to show the programme selection menu.

Cleaning the filters

- Switch the dishwasher off.



- Turn the handle anti-clockwise to release the filter combination ①.
- Lift the filter combination out of the dishwasher ②. Remove any coarse particles and rinse the filter well under running water.
  Use a nylon brush if necessary.

⚠ Make sure that when cleaning the filters, no coarse soil falls into the circulation system, causing a blockage.

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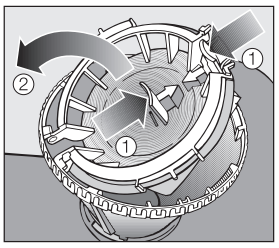
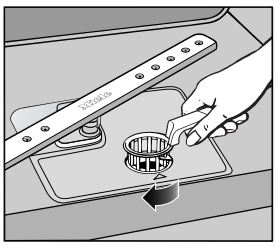
Cleaning and care





To clean the inside of the filter, the flap must be opened:

- Press catches ① together in the direction of the arrows as shown, and open the filter ②.
- Rinse all the filters under running water.
- Then close the flap so that the catch engages.
- Replace the filter combination so that it lies flat in the base of the wash cabinet.
- Then turn the handle clockwise to lock the filter combination in place.

⚠ Take care when you are fitting the filter combination that it is secured in position correctly. Otherwise coarse soil could get into the circulation system and cause a blockage.

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Cleaning and care

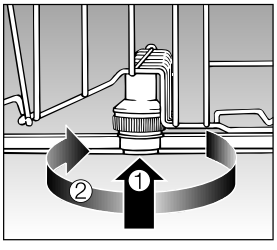
Cleaning the spray arms

Particles of food can get stuck in the spray arm jets and bearings. The spray arms should therefore be inspected and cleaned regularly (approx. every 4 - 6 months).

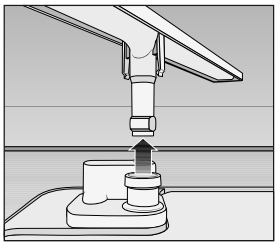
- Switch the dishwasher off.

Remove the spray arms as follows:

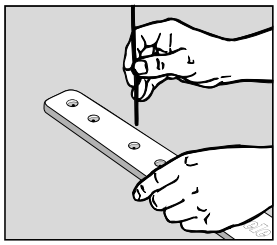
- Take out the cutlery tray (if your dishwasher is fitted with one).
- Push the **top** spray arm upwards to engage the inner ratchet. Then unscrew the spray arm.



- Push the **middle** spray arm upwards ① to engage the ratchet. Then unscrew the spray arm ②.
- Remove the lower basket.



- Pull the **lower** spray arm firmly upwards to remove it.



- Use a pointed object to push food particles into the spray arm jets.
- Rinse thoroughly under running water.
- Replace the spray arms and check that they rotate freely.

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Problem solving guide

Most minor faults in the performance of the appliance, some of which may result from incorrect operation, can be put right without contacting the Service Department.

The following guide may help you to find the reason for a fault, and to correct it. You should, however, note the following:

⚠ Unauthorised or incorrect repairs could cause personal injury or damage to the appliance.
Repair work to electrical appliances should only be carried out by a suitably qualified and trained person in strict accordance with current local and national safety regulations. The manufacturer cannot be held liable for unauthorised work.

Technical problems

Problem	Possible cause and remedy
The dishwasher will not start.	The door is not properly closed. ■ Raise the door upwards until the catch engages.
	The appliance is not plugged in. ■ Insert the plug and switch on at the socket.
	The mains fuse has tripped. ■ Reset the trip switch in the mains fuse box or replace the fuse in the plug (minimum fuse rating - see data plate).
	The dishwasher is not switched on. ■ Switch the dishwasher on with the ⏻ button.
The dishwasher stops during a programme.	The mains fuse has tripped. ■ Reset the trip switch in the mains fuse box or replace the fuse in the plug (minimum fuse rating - see data plate). ■ If the mains fuse trips again, call the Miele Service Department.
After the programme has started, the In-operation indicator light is not visible.	The reflector panel was not correctly fitted. ■ Re-fit the reflector panel correctly (see Installation diagram).

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Problem solving guide

Problem	Possible cause and remedy
All in-operation indicators are flashing quickly. The warning buzzer is sounding. One of the following faults is shown in the display:	Before rectifying the problem: ■ Switch the dishwasher off using the ⓘ sensor.
⚠ Technical fault FXX	There may be a technical fault. After a few seconds: ■ Switch the dishwasher back on. ■ Select the programme you want. ■ Close the door. If the fault message appears again, there is a technical fault. ■ Call the Miele Service Department.
Waterproof fault	The Waterproof system has reacted. ■ Close the stopcock. ■ Call the Miele Service Department.
⚠ Technical fault F78	A fault has occurred in the circulation pump. ■ Switch the dishwasher off for at least 30 seconds with the ⓘ sensor. ■ Switch the dishwasher back on. ■ Select the programme you want. ■ Close the door. If the fault message appears again, there is a technical fault. ■ Call the Miele Service Department.

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Problem solving guide

Problem	Possible cause and remedy
All in-operation indicators are flashing quickly. The warning buzzer is sounding. One of the following faults is shown in the display:	Before rectifying the problem: ■ Switch the dishwasher off with the ⓘ button.
Fault auto. door closing	The door is sometimes obstructed by an item inside the appliance. ■ If this is the case, remove the item causing an obstruction and switch the dishwasher on again. ■ If the same message appears again, call the Service Department.
Fault auto. door opening	There may be a technical fault. ■ Open the door manually. ■ If the same message appears again, call the Service Department.

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Problem solving guide

Water inlet fault

Problem	Possible cause and remedy
All in-operation indicators are flashing quickly. The warning buzzer is sounding. One of the following faults is shown in the display:	
Water inlet fault. Please open the stopcock	The stopcock is closed. ■ Open the stopcock fully.
Water inlet fault	Before rectifying the problem: ■ Switch the dishwasher off using the ⓘ sensor.
	The water intake is restricted. ■ Open the stopcock fully and start the programme again. ■ Clean the water inlet filter (see "Maintenance"). ■ The water pressure at the intake is lower than 30 kPa (0.3 bar). Seek professional advice.
The following message appears in the display during the SolarSave programme: ℹ Water in. temp. too low	The intake water has not reached the required temperature of 45°C (see "Plumbing, Connection to the water supply"). ■ Start the programme again. ■ If the fault message appears again, select a different programme.

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Problem solving guide

Water drainage fault

Problem	Possible cause and remedy
All in-operation indicators are flashing quickly. The warning buzzer is sounding. The following fault is shown in the display: Drain fault	Before rectifying the problem: ■ Switch the dishwasher off with the ⓘ button.
	The water outlet is restricted. There might be water in the wash cabinet. ■ Clean the filter combination (see "Cleaning and care, Cleaning the filters"). ■ Clean the drain pump (see "Maintenance"). ■ Clean the non-return valve (see "Maintenance"). ■ Remove any kink or loop in the drain hose.

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Problem solving guide

General problems

Problem	Possible cause and remedy
The door will not open when knocked.	The Knock2open function has been permanently disabled. ■ Switch the door opening mechanism on again (see "Settings, Knock2open"). If the door will still not open or if there is a power cut the door can still be opened with the door opening device supplied (see "Before using for the first time, Door opening mechanism").
The interior lighting does not come on when the door is opened.	The lighting has been switched off permanently. ■ Switch the lighting back on again (see "Settings menu, BrilliantLight").
The following fault is shown in the display: **Salt reservoir lid** **During the programme the warning buzzer is also sounding and the In operation indicator light is flashing.**	The salt reservoir lid has not been closed properly. ■ Close the salt reservoir lid.
	If the salt reservoir lid has opened during a programme: ■ Switch the dishwasher off and back on again with the ⏻ button. ■ Close the salt reservoir lid. ■ Start the programme again.
Detergent residue is left in the dispenser at the end of a programme.	The dispenser was still damp when detergent was added. ■ Make sure the dispenser is dry before adding detergent.
The detergent dispenser lid cannot be closed properly.	Clogged detergent residue is blocking the catch. ■ Clean the detergent from the catch.
At the end of a programme there is a film of moisture on the inside of the door and the interior walls.	This is caused by the drying system and does not indicate a fault. The moisture will dissipate after a while.

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Problem solving guide

Problem	Possible cause and remedy
Water remains in the wash cabinet at the end of a programme.	Before rectifying the problem: ■ Switch the dishwasher off using the ⏻ sensor.
	The filter combination in the wash cabinet is clogged. ■ Clean the filter combination (see "Cleaning and care, Cleaning the filters").
	The drain pump or non-return valve may be blocked. ■ Clean the drain pump or the non-return valve (see "Maintenance").
	The drain hose is kinked. ■ Remove any kink from the drain hose.

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Problem solving guide

Noises

Problem	Possible cause and remedy
Knocking noise in the wash cabinet.	A spray arm is knocking against an item in a basket. ■ Interrupt the programme, and rearrange the items which are obstructing the spray arm.
Rattling noise in the wash cabinet.	Items of crockery are insecure in the wash cabinet. ■ Interrupt the programme, and rearrange the items of crockery.
	A foreign object (e.g. a cherry stone) has become lodged in the drain pump. ■ Remove the foreign object from the drain pump (see "Maintenance, Cleaning the drain pump and non-return valve").
Knocking noise in the water pipes.	This may be caused by the on-site installation or the cross-section of the piping. ■ This has no influence on dishwasher function. If in doubt, contact a suitably qualified plumber.

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Problem solving guide

Unsatisfactory washing result

Problem	Possible cause and remedy
The dishes are not clean.	The dishes were not loaded correctly. ■ See notes in "Loading the dishwasher".
	The programme was not powerful enough. ■ Select a more powerful programme (see "Programme chart").
	There is some stubborn soiling although most of the crockery is only lightly soiled (e.g. with tea stains). ■ Use the Sensor wash programme option (see "Settings menu, Sensor wash").
	Not enough detergent was dispensed. ■ Use more detergent, or change your detergent.
	Items are blocking the path of the spray arms. ■ Rearrange the items so that the spray arms can rotate freely.
	The filter combination in the base of the wash cabinet is not clean or is not correctly fitted. This may cause the spray arm jets to get blocked. ■ Clean and/or fit the filter combination correctly. ■ Clean the spray arm jets, if necessary (see "Cleaning and care, Cleaning the spray arms").
	The non-return valve is open and blocked. Dirty water has flowed back into the wash cabinet. ■ Clean the drain pump and the non-return valve (see "Maintenance, Cleaning the drain pump and non-return valve").
Smearing appears on glassware and cutlery. There is a bluish sheen on the surface of glassware; film can be wiped off.	The rinse aid dosage is set too high. ■ Reduce the dosage (see "Settings menu, Rinse aid").

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Problem solving guide

Problem	Possible cause and remedy
Crockery is not dry or cutlery and glasses are flecked.	The rinse aid dosage is set too low or the rinse aid reservoir is empty. ■ Replenish the reservoir, increase the dosage or change the brand of rinse aid (see "Before using for the first time, Rinse aid").
	Crockery was taken out of the cabinet too soon. ■ Leave it in for longer (see "Operation").
	Combination products have been used which have impaired drying performance. ■ Change your detergent, or replenish the rinse aid (see "Before using for the first time, Rinse aid").
Glassware has a brown or blue tinge, and film cannot be wiped off.	This may be caused by the detergent. ■ Change your detergent.
Glassware is dull and discoloured; film cannot be wiped off.	The glassware is not dishwasher-proof. The surfaces are affected. ■ There is no remedy. Purchase glassware which is dishwasher-proof.
Tea or lipstick stains have not been completely removed.	The wash temperature of the selected programme was too low. ■ Select a programme with a higher wash temperature.
	The bleaching effect of the detergent used is too low. ■ Change your detergent.
Plastic items are discoloured.	Natural dyes e.g. from carrots, tomatoes or ketchup may be the cause. The amount of detergent used or its bleaching effect was not sufficient to deal with natural dyes. ■ Use more detergent (see "Operation, Detergent"). Discolouration is irreversible.

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Problem solving guide

Problem	Possible cause and remedy
White residue is visible on crockery and cutlery, clouding occurs on glassware; film can be wiped off.	The rinse aid dosage is set too low. ■ Increase the dosage (see "Settings menu, Rinse aid").
	There is no salt in the salt reservoir. ■ Fill the salt reservoir (see "Before using for the first time, Dishwasher salt").
	An unsuitable combination product has been used. ■ Change your detergent. Use a standard liquid, tablet or powder detergent, and fill the salt and rinse aid reservoirs in the dishwasher.
	The water softener is programmed to too low a water hardness level. ■ Programme the water softener to a higher water hardness level (see "Settings menu, Water hardness").
There are rust stains on cutlery.	The affected items are not corrosion resistant. ■ There is no remedy. Purchase cutlery which is dishwasher-proof.
	A programme was not run after dishwasher salt was added. Traces of salt have got into the wash cycle. ■ Always run the *Quick wash* programme with the *Short* programme option selected and without any crockery in the dishwasher after adding dishwasher salt.

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Maintenance

Cleaning the water inlet filter

A filter is incorporated in the screw connection of the valve on the water inlet hose. The filter must be cleaned when dirty, otherwise insufficient water flows into the wash cabinet.

⚠ The plastic housing of the water connection contains an electrical component.
The housing must not be dipped in water.

Recommendation

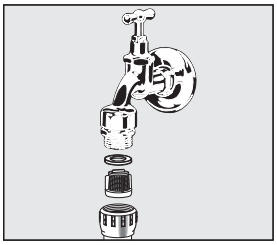
If the mains water contains a large number of insoluble substances, we recommend fitting a large-area filter in the connection between the stopcock and the water inlet hose threaded union.
This filter is available from Miele.

Cleaning the filter:

■ Disconnect the dishwasher from the mains supply.
Switch off at the mains socket and withdraw the plug.

■ Close the stopcock.

■ Unscrew the inlet hose.



■ Carefully remove the seal.

■ Withdraw the filter using pointed pliers and rinse clean under running water.

■ Replace the filter and seal, making sure they are sitting correctly.

■ Reconnect the inlet hose to the stopcock, making sure it goes on correctly and is not cross-threaded.

■ Open the stopcock.

If water leaks out, the inlet hose may not be connected securely or it may have been screwed on at an angle.

■ Unscrew and reconnect the water inlet valve correctly.

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Maintenance

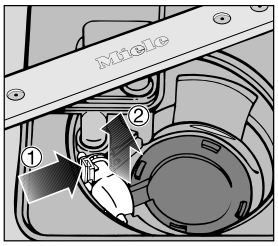
Cleaning the drain pump and non-return valve

If the water has not been pumped away at the end of a programme the drain pump or the non-return valve might be blocked. They are, however, easy to clean.

■ Disconnect the dishwasher from the mains supply. Switch off at the mains socket and withdraw the plug.

■ Take the filter combination out of the wash cabinet (see "Cleaning and care", "Cleaning the filters").

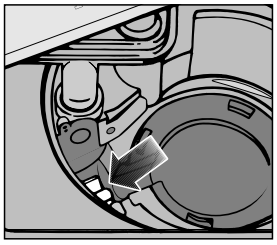
■ Scoop the water out of the cabinet using a suitable container or utensil.



■ Press the catch for the non-return valve inwards ①.

■ Lift out the non-return valve ② and rinse well under running water.

■ Remove all foreign objects from the non-return valve.



The drain pump is situated under the non-return valve (see arrow).

■ Remove all foreign objects from the drain pump carefully (watch out for glass or bone splinters which are particularly difficult to detect and could cause injury). Turn the drain pump impeller by hand to check that there are no more obstructions. You will feel a little resistance when you turn the impeller.

■ Carefully replace the non-return valve, and secure it with the catch.

⚠ Ensure that the catch engages correctly.

⚠ Be very careful not to damage sensitive components when cleaning the drain pump and the non-return valve.

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After sales service

Repairs

In the event of any faults which you cannot remedy yourself, please contact:

- your Miele dealer, or
- the Miele Service Department

Contact details for Miele are given at the back of this manual. N.B. A call-out charge will be applied to service visits where the problem could have been resolved as described in these instructions.

When contacting the Service Department or your Dealer, please quote the model and serial number of your dishwasher, both of which are shown on the data plate on the right hand side of the door.

Guarantee

The appliance is guaranteed for 2 years from the date of purchase. For further information on the appliance guarantee specific to your country please contact Miele.

In the UK, you must activate your cover by calling 0845 365 6640 or registering online at www.miele.co.uk.

Note for test institutes

All information required regarding comparison testing and measuring noise levels is given in the **"Comparison tests"**.
The latest version of this leaflet can be ordered by email from:

- testinfo@miele.de

Please quote your postal address, as well as the model and serial number of your dishwasher (see data plate).

Optional accessories

Dishwasher detergent and rinse aid as well as cleaning and care products are available as optional accessories.
All the products are designed for use with Miele dishwashers.

These and many other useful products can be ordered via the internet at www.miele-shop.com or from Miele (see end of this booklet for contact details).

Dishwasher detergent, rinse aid and salt

When you decided to buy a Miele dishwasher you chose excellent quality and performance. However, ensuring that your dishwasher always delivers the best possible results will also depend on your choice of dishwasher detergent, rinse aid and salt, as cleaning results can vary depending on the brand used.
With Miele CareCollection products, you can be sure of optimum results as these products have been specially designed for Miele dishwashers.

Detergent tabs

- sparkling results even with stubborn food deposits
- combination product with other components such as rinse aid, salt and glass protection additives
- phosphate free - helps protect the environment
- water-soluble wrapping - no need to unwrap

Powder detergent

- with active oxygen for thorough cleaning
- with enzymes which are effective even in low temperature programmes
- with glass protection against corrosion

Rinse aid

- for gleaming glasses
- helps crockery to dry
- with glass protection against corrosion
- specially designed cap for precise, easy dispensing

Dishwasher salt

- prevents limescale on crockery and in the appliance
- extra coarse-grained

Optional accessories

Dishwasher care products

Miele cleaning and care products provide optimum care for your dishwasher.

Dishwasher cleaner

- cleans the dishwasher effectively and thoroughly
- removes grease, bacteria and unpleasant odours
- ensures excellent dishwashing results

Dishwasher descaler

- removes heavy limescale deposits
- mild and gentle with natural citric acid

Dishwasher conditioner

- removes odours, limescale and light deposits
- maintains the elasticity and leak tightness of the seals

Dishwasher freshener

- neutralises unpleasant odours
- fresh, pleasant lime and green tea scent
- easy to attach to the dishwasher basket
- very economical, lasts for 60 wash cycles

Accessories

Some accessories may be supplied as standard, depending on model.

Cappuccinatore insert

The Cappuccinatore insert can be used for cleaning the individual parts of the Miele Cappuccinatore in the dishwasher.

Cutlery basket

The cutlery basket is placed in the lower basket and can be used to wash additional items of cutlery.

Glass rail

This rail is designed to hold glasses with stems securely in the lower basket.

Electrical connection

Electrical connection U.K.

⚠ All electrical work must be carried out by a suitably qualified and competent person, in accordance with current local and national safety regulations (BS 7671 in the UK).

Ensure power is not supplied to the appliance until after installation work has been carried out.

The appliance is supplied with a mains cable with moulded plug ready for connection to a 230-240V mains supply. Please ensure the connection data quoted on the data plate match the household mains supply.

Connection should be made via a suitable switched socket which is easily accessible after installation.

For extra safety it is advisable to protect the appliance with a suitable residual current device (RCD). Contact a qualified electrician for advice.

Do not connect via an extension lead. Extension leads do not guarantee the required safety of the appliance (e.g. danger of overheating).

This appliance must not be connected to the inverter of an autonomous power supply, e.g. a solar power system. When switching the appliance on, a surge in power could trigger the safety cut-out mechanism.

This appliance must not be used with so-called energy saving devices. These reduce the energy supply to the appliance which could then become too warm. Using such devices could alter the specification of the product

Non-rewireable plugs BS 1363

The fuse cover must be refitted when changing the fuse, and if the fuse cover is lost, the plug must not be used until a suitable replacement is obtained. The colour of the correct replacement cover is that of the coloured insert in the base of the plug, or the colour that is embossed in words on the base of the plug (as applicable to the design of plug fitted).

Replacement fuses should be ASTA approved to BS 1362 and have the correct rating. Replacement fuses and fuse covers may be purchased from your local electrical supplier.

⚠ THIS APPLIANCE MUST BE EARTHED

Plumbing

The Miele waterproof anti-leak system

As long as your dishwasher has been installed correctly, the Miele waterproof anti-leak system will protect you from water damage throughout its lifetime.

Connection to the water supply

⚠ Water in the dishwasher must not be used as drinking water.

– The dishwasher may be connected to a cold or hot water supply, max. 60 °C.
We would only recommend connection to a hot water supply if it is economical, e.g. a solar powered supply. When connected to a hot water supply all programme stages which would otherwise be carried out with cold water will be carried out with hot water.

– The SolarSave programme (if available) requires a hot water supply of between 45 °C (minimum) and 60 °C (maximum).
The higher the water intake temperature, the better the cleaning and drying results.

Plumbing

– The inlet hose is approx. 1.5 m long. A 1.5 m long flexible metal extension hose, pressure tested to 14000 kPa/140 bar) is available as an optional accessory, if required.

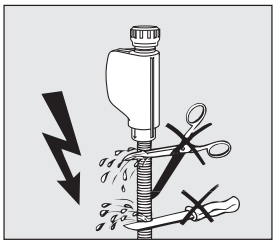
– A stopcock with a 3/4" male thread must be provided on site.

– This appliance is constructed to comply with IEC/EN/DIN 61770 // VDE 0700 Section 600, and may be connected to a suitable supply without an extra non-return valve if national regulations permit.

– The water pressure (flow pressure at the take-off point) must be between 30 and 1000 kPa (0.3 und 10 bar). If the water pressure is lower than this, the fault message Water intake will appear in the display (see "Problem solving guide"). If the water pressure is too high, a pressure reducer valve must be fitted.

After connecting the dishwasher to the water supply, check that all plumbing connections are watertight.

⚠ To avoid any damage to the appliance, the dishwasher must only be connected to a fully vented plumbing system.



⚠ The inlet hose must not be shortened or damaged in any way as it contains electrical components (see illustration).

Plumbing

Drainage

– The appliance drainage system is fitted with a non-return valve, which prevents dirty water from flowing back into the dishwasher via the drain hose.

– The dishwasher is supplied with approx. 1.5 m of flexible drain hose with an internal diameter of 22 mm.

– The drain hose can be extended using a connection piece to attach a further length of hose. The drainage length must not be longer than 4 m, and the delivery head must not exceed 1 m.

– If the hose is to be directly fitted to the drainage outlet on site, use the hose clip supplied (see installation plan).

– The hose can be directed to the left or the right of the appliance.

– The on-site connector for the drain hose can be adapted to different widths of hose. If the connector protrudes too far into the drain hose, it will need to be shortened. Otherwise the drain hose may become blocked.

– The drain hose must not be shortened.

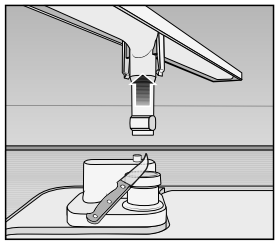
⚠ Make sure that there are no kinks in the hose, and that it is not squashed or stretched.

After connecting the dishwasher to the drainage system, check that all plumbing connections are watertight.

Venting the drainage system

If the on-site drain connection is situated lower than the guide path for the bottom basket rollers in the open door, the drainage system must be vented. Otherwise a siphoning effect during a programme can cause the appliance to empty itself of water.

■ To vent it: Open the dishwasher door fully.



■ Pull the lower spray arm firmly upwards to remove it.

■ Cut off the top of the vent valve in the wash cabinet.

Technical data

Dishwasher model	Standard	XXL
Height	80.5 cm (adjustable + 6.5 cm)	84.5 cm (adjustable + 6.5 cm)
Height of building-in recess	Min. 80.5 cm (+ 6.5 cm)	Min. 84.5 cm (+ 6.5 cm)
Width	59.8 cm	59.8 cm
Width of building-in recess	60 cm	60 cm
Depth	57 cm	57 cm
Weight	max. 53 kg	max. 59 kg
Voltage	See data plate	
Connected load	See data plate	
Fuse rating	See data plate	
Power consumption when switched off	0.30 W	0.30 W
Power consumption when not switched off	2.50 W	2.50 W
Test certificates awarded	See data plate	
Water pressure (flow rate)	30 - 1000 kPa (0.3 - 10 bar)	30 - 1000 kPa (0.3 - 10 bar)
Hot water connection	Up to max. 60 °C	Up to max. 60 °C
Delivery head	Max. 1 m	Max. 1 m
Drainage length	Max. 4 m	Max. 4 m
Mains cable	Approx. 1.7 m	Approx. 1.7 m
Capacity	13/14 place settings*	13/14 place settings*

* depending on model

Settings menu

Settings menu for changing standard settings

To open the Settings menu

- Switch the dishwasher on with the ⓘ sensor if it is switched off.

The main menu will appear in the display.
If the memory function is activated, the programme menu for the programme last selected will be displayed instead (see "Settings, Memory"). If this is the case use the ⮌ sensor to get to the main menu.

> See "Display / Settings menu" for more information about the display and controls.

- Select the Settings ⚑ option.

The display will change to show the Settings ⚑ menu.

- Select the option you want to change.

> Touch the ℹ sensor to call up more information about the programme currently selected.

> Sub-menu options which have already been selected will have a tick ✓ beside them.

- To exit a sub-menu again use the ⮌ sensor.

The display will revert to the menu above.

Settings menu

Language ⚑

The display can be set to appear in one of several different languages.

You can change the language in the display via the Language ⚑ sub-menu.

- Select the language you want and confirm this with OK.

Some languages also have a country option to select.

- If so, select the country you want and confirm your selection with OK.

> The flag after the word Language ⚑ acts as a guide if a language which you do not understand has already been set.
> If this the case, keep selecting the option which has a flag after it until you reach the Language ⚑ sub-menu.

Time

The current time of day must be set before you can use the Delay start option.

Setting the clock format

You can select either a 24 hour or 12 hour clock.

- Select the Clock format option.
- Select the setting you want and confirm with OK.

Setting the time of day

- Select the Set option.
- Set the hour with the ∨∧ arrow buttons and confirm with OK. Then set the minutes and confirm with OK.

The time of day has now been saved.

Settings menu

Water hardness

Your dishwasher is fitted with a water softener which you need to programme to the water hardness level in your area.

- The dishwasher must be programmed to the correct water hardness for your area.
- Your local water authority will be able to advise you of the water hardness level in your area.
- Where the water hardness fluctuates e.g. between 1.8 and 2.7 mmol/l (10 - 15 °d - German scale) always programme the dishwasher to the higher value (2.7 mmol/l or 15 °d in this example).

- Select the water hardness you want, and confirm your selection with *OK*.

> A tick ✓ will appear beside the water hardness which has been set.

°d	mmol/l	°f	Display
1	0.2	2	1
2	0.4	4	2
3	0.5	5	3
4	0.7	7	4
5	0.9	9	5
6	1.1	11	6
7	1.3	13	7
8	1.4	14	8
9	1.6	16	9
10	1.8	18	10

°d	mmol/l	°f	Display
11	2.0	20	11
12	2.2	22	12
13	2.3	23	13
14	2.5	25	14
15	2.7	27	15
16	2.9	29	16
17	3.1	31	17
18	3.2	32	18
19	3.4	34	19
20	3.6	36	20
21	3.8	38	21
22	4.0	40	22
23	4.1	41	23
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Settings menu

Rinse aid

You can adjust the rinse aid dosage for best results.
The rinse aid dosage can be set from approx. 0-6 ml.
The factory default setting is 3 ml.

If the function to adjust the Sensor wash programme has been activated, the amount of rinse aid dispensed in the Sensor wash programme can be higher than that set.

If spots appear on crockery and glassware:

– Increase the rinse aid dosage.

If clouding or smearing appears on crockery and glassware:

– Decrease the rinse aid dosage.

- Use the arrow sensors ∨∧ to set the rinse aid dosage and confirm with OK.

Consumption (EcoFeedback)

You can programme the dishwasher so that the energy and water consumption of the currently selected programme appears in the display. The estimated consumption can be displayed before the programme starts and the actual consumption can be displayed after the programme has finished.
In this menu you can also call up the total energy and water used in all previous dishwasher programmes (see "Caring for the environment, EcoFeedback consumption indicator").

Consumption indicator

- Select the Display consumption option.
- Select the setting you want and confirm with OK.

Total consumption

You can display the values for Energy and Water.

- Select the Total consumption option.

You can also reset the values for the total consumption to 0.

- Select the Reset option.
- Select the Yes option.
- Confirm the message with OK.

The values are now reset to 0.

Sensor wash

You can adjust the Sensor wash programme so that it will remove stubborn soiling in a lightly soiled load.

- Select the setting you want and confirm with OK.

AutoOpen

At the end of programmes with a drying phase (except ExtraQuiet) the door will open automatically a little in order to help the drying process (see "Programme chart").

This function can be deactivated if wished.

- Select the setting you want and confirm with OK.

⚠ If you have deactivated the automatic door opening function but would still like to open the door at the end of the programme, then make sure that you open the door fully. Otherwise steam from the dishwasher could damage the edge of the worktop because the fan is no longer running.

Knock2open

You can choose whether the door should open with 1 or 2 knocks.

- Select the setting you want and confirm with *OK*.

This function can also be disabled in which case the door has to be fitted with a handle to open it.

BrilliantLight

This dishwasher has interior lighting. When the door is open the lighting will switch off automatically after 15 minutes.

You can also switch off the interior lighting permanently.

- Select the setting you want and confirm with OK.

Optimise standby

The dishwasher is supplied with the Optimise standby function set as standard.

To save energy the dishwasher will switch off automatically a few minutes after the last time a button has been pressed or after the end of a programme.

The dishwasher will not switch off in the event of a fault.

Optimise standby can be switched off if you prefer. If you do this the duration before the dishwasher switches off increases to 6 hours. Doing this will increase energy consumption.

- Select the setting you want and confirm with *OK*.

Refill reminders

If you only ever use combination products containing salt and rinse aid in your dishwasher, you can switch the reminders for salt and rinse aid off if you wish (see "Settings menu - Refill reminders"). Switching off the reminders will not affect the DetergentAgent function (see "Programme options, DetergentAgent").

- Select the setting you want and confirm with OK.

If you switch to using detergent that does not contain salt or rinse aid, it is important to remember to add salt and rinse aid and to switch the reminders back on.

Check filters

You can adjust the interval at which the reminder to check the filters appears. You can set an interval of between 30 and 60 programme cycles.

The reminder to check the filters is set at the factory to appear after every 50 programme cycles.

- Select the interval you want and confirm with OK.

Change main menu

You can change the order of the programmes in the programme selection menu and also enter your favourite programmes into the first two programme places.

- Select the programmes you want to place in the first and second position of the programme selection menu.
- Confirm each position with OK.

The programmes you have selected will then appear together in the display.

- If you are happy with the order they are shown in confirm with OK.
- To change the order they are shown in select Change main menu.

Enter the settings again.

Save extras

Additional programme options can be added to some programmes, e.g. Short (see "Programme options, Extras").

You can use the Save extras option to save settings you have chosen for a particular programme so that they are automatically selected when you run the programme in the future.

The dishwasher is delivered with this function deactivated.

- Select the setting you want and confirm with OK.

Temperature

The temperature can be displayed in °C/Celsius or °F/Fahrenheit.

The factory default setting is °C.

- Select the option you want and confirm with OK.

Brightness

There are seven different display brightness settings.

- Select the brightness you want and confirm this with OK.

Volume

A sequence of audible tones will sound at the end of the programme or if there is a fault as long as the buzzer has been activated.

Buzzer in the event of a fault

The buzzer in the event of a fault will sound 4 times at intervals with a short pause between each set of tones.

The buzzer which sounds when there is fault cannot be deactivated.

Buzzer at the end of a programme

The buzzer at the end of a programme will sound 4 times at intervals with a short pause between each set of tones.

Buzzer tones

The volume of the tone at the end of the programme can be selected in seven stages or switched off.

- Select the volume you want using the Quieter and Louder sensors, or switch the buzzer off.
- Confirm with OK.

Night time buzzer tone

You can select a different volume for the buzzer at night, or switch it off.

- Select the volume you want for the night time buzzer using the Quieter and Louder sensors, or switch the night time buzzer off.
- Confirm with OK.

Night time

You can select the times for night time to begin and end.

- Select the Start at option.
- Use the arrow sensors ∨∧ to set the time in hours and minutes for the night time to begin and confirm both with OK.
- Select the Finish at option.
- Use the arrow sensors ∨∧ to set the time in hours and minutes for the night time to end and confirm both with OK.

Keypad tone

An audible tone sounds each time a sensor is pressed.

The volume for the keypad tone can be set in seven stages, or switched off.

- Select the volume you want using the Quieter and Louder sensors, or switch the keypad tone off.
- Confirm with OK.

Settings menu

Memory

With the Memory function activated, the dishwasher will save the last programme selected. When you switch the dishwasher off and back on again, the last programme selected will appear in the display instead of the ECO programme.

- Select the setting you want and confirm with OK.

Version info

You can call up the electronic software version of your dishwasher for technical support purposes.

- Confirm the display with *OK*.

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Settings menu

EcoStart

In order to run your dishwasher in the most economical way, you can use the EcoStart option to take advantage of your electricity supplier's time variable tariffs (see "Programme options, Delay start, EcoStart").
With this option selected, your dishwasher will start automatically at your electricity supplier's cheapest tariff times.

To use this option you must first set up to three electricity tariff time zones in which the dishwasher can start. You can allocate different priorities to these time zones. The time with the cheapest electricity tariff will be given Priority 1.

Contact your electricity supplier to find out the times of the cheapest electricity tariffs.

Once the electricity tariff times have been set, you can use the EcoStart option to set the latest finish time required for each programme.
The dishwasher will then start automatically in the cheapest electricity tariff time and the programme will end at the latest at the finish time set.

Setting the electricity tariff times

Before you can use the EcoStart option, you must set at least one electricity tariff time.

- Select an electricity tariff time from T1-T3 to set.

The start of the electricity tariff time selected will appear in the display and the hour number block will be highlighted.

- Use the ∨∧ arrow buttons to set the hours and minutes for the start time and confirm both with OK.

The end of the electricity tariff time selected will appear in the display and the hours number block will be highlighted.

- Use the ∨∧ arrow buttons to set the hours and minutes for the end time and confirm both with OK.

The electricity tariff time will be saved and its priority will appear in the display.

- Select the priority you want and confirm this with OK.
- Confirm the message with OK.

The electricity tariff time will be activated.

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Settings menu

Changing the electricity tariff times

You can change the start, finish or priority of a electricity tariff time.

- Select an electricity tariff time from T1-T3 to change.
- Select the setting you want to change.
- Use the ∨∧ arrow buttons to change the setting and confirm with OK.

The change will be saved.

Deleting the electricity tariff times

- You can delete the settings for an electricity tariff time and in doing so deactivate the EcoStart option for this time zone.
- Select an electricity tariff time from T1-T3 to delete.
- Select Delete.
- Confirm the query Delete tariff T1? with Delete.

The settings for the electricity tariff time selected will be reset.

- Confirm the message with OK.

The electricity tariff time will be deleted.

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Settings menu

Showroom programme

For demonstration purposes only.

The dishwasher is equipped with various demo programmes for showroom use.

– Demo mode
Programme for use in showrooms to demonstrate the TimeControl function.

– Demo with sound
This programme activates the circulation pump to demonstrate the sound of the dishwasher.

– Demo AutoOpen
The door will open automatically.

– BrilliantLight
The interior lighting is on constantly.

Factory default

You can reset all settings to the factory default settings.

You will be given the choice of Appliance settings reset or Main menu.

- Select the one you want to reset.
- Confirm the message Reset settings? or Reset main menu? with Yes.

To close the Settings menu

To close the Settings ⚑ menu use the ⮌ sensor. This will take you back to the main menu.

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Appliance **12.5.4**

Dishwasher

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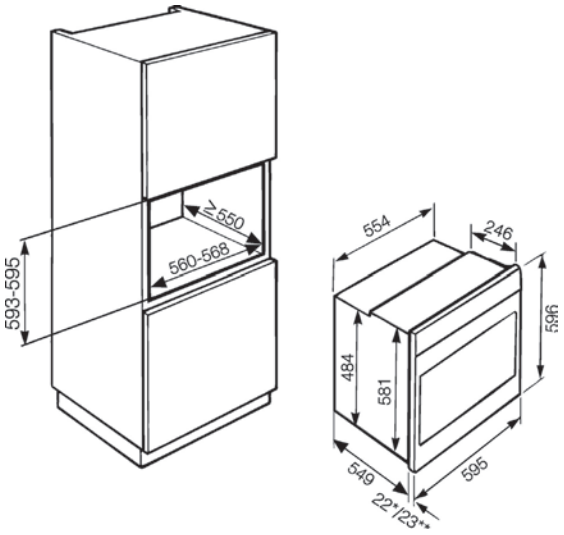
12.5 Appliances

Appliance **12.5.5**

Oven



Basic	
Brand	Miele
Model	H2161 B
Dimension (mm)	600x600x550
Weight (kg)	42
Load Capacity	56 litre
Energy	
Energy Efficiency Class	A
Energy Consumption	3.5 (kWh)
Feature	
Voltage in V	230
Fuse rating in A	20
Number of shelf levels	4
Rapid heat-up	Yes
Conventional heat	Yes
Fan grill	Yes
Number of functions	7
Minute minder	Yes
Start-stop programming	Yes
Programmable settings	Yes
System lock	Yes
Precise temperature regulation	50°C - 250°C

Miele

Operating and installation instructions
Ovens and cookers

To prevent the risk of accidents or damage to the appliance, it is **essential** to read these instructions before it is installed and used for the first time.

en - GB

M.-Nr. 09 610 161

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Warning and Safety instructions

These Warning and Safety instructions apply to Ovens **and** Cookers. They are referred to as ovens in the general text throughout this manual.

This appliance complies with statutory safety requirements. Inappropriate use can, however, lead to personal injury and damage to property.

To avoid the risk of accidents and damage to the appliance, please read these instructions carefully before using it for the first time. They contain important notes on installation, safety, use and maintenance.

Miele cannot be held liable for non-compliance with these instructions.

Keep these instructions in a safe place and ensure that new users are familiar with the contents. Pass them on to any future owner.

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Warning and Safety instructions

Correct application

▶ This oven is intended for use in domestic households and similar working and residential environments.

▶ The oven is not intended for outdoor use.

▶ It is intended for domestic use only to cook food, and in particular to bake, roast, grill, cook, defrost and dry food. Any other use is not supported by the manufacturer and could be dangerous.

▶ People with reduced physical, sensory or mental capabilities, or lack of experience or knowledge who are not able to use the appliance safely on their own must be supervised whilst using it. They may only use it unsupervised if they have been shown how to use it safely and recognise and understand the consequences of incorrect operation.

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Warning and Safety instructions

Safety with children

▶ Children under 8 years of age must be kept away from the appliance unless they are constantly supervised.

▶ Children 8 years and older may only use the oven unsupervised if they have been shown how to use it safely and recognise and understand the consequences of incorrect operation.

▶ Children must not be allowed to clean or maintain the appliance unsupervised.

▶ Please supervise children in the vicinity of the oven and do not let them play with it.

▶ Danger of suffocation. Packaging, e.g. plastic wrappings, must be kept out of the reach of babies and children. Whilst playing, children could become entangled in packaging or pull it over their head and suffocate.

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Warning and Safety instructions

▶ Danger of burning.
Children's skin is far more sensitive to high temperatures than that of adults. External parts of the oven such as the door glass, control panel and the vents become quite hot during use. Do not let children touch the oven whilst it is in use.
With cookers the cooking zones will also get hot. Place pots and pans on the hob in such a way that children cannot reach them and burn themselves.

▶ Danger of injury.
The oven door can support a maximum weight of 15 kg. Do not let children sit on the door, lean against it or swing on it.

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Warning and Safety instructions

Technical safety

▶ Unauthorised installation, maintenance and repairs can cause considerable danger for the user. Installation, maintenance and repairs must only be carried out by a Miele authorised technician.

▶ Never use a damaged oven. It could be dangerous. Check it for visible signs of damage before using it.

▶ The electrical safety of this appliance can only be guaranteed when correctly earthed. It is essential that this standard safety requirement is met. If in any doubt please have the electrical installation tested by a qualified electrician.

▶ To avoid the risk of damage to the oven, make sure that the connection data on the data plate (voltage and frequency) match the mains electricity supply before connecting the oven to the mains. Consult a qualified electrician if in doubt.

▶ Do not connect the appliance to the mains electricity supply by a multi-socket unit or an extension lead. These do not guarantee the required safety of the appliance (fire hazard).

▶ For safety reasons, this appliance may only be used after it has been built in.

▶ The oven must not be used in a non-stationary location (e.g. on a ship).

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Warning and Safety instructions

▶ Tampering with electrical connections or components and mechanical parts is highly dangerous to the user and can cause operational faults.
Never open the casing of the appliance.

▶ While the appliance is under guarantee, repairs should only be undertaken by a Miele authorised service technician. Otherwise the guarantee is invalidated.

▶ Miele can only guarantee the safety of the appliance when genuine original Miele replacement parts are used. Faulty components must only be replaced by Miele spare parts.

▶ If the connection cable is damaged or if the oven is supplied without a cable, it must be replaced or fitted with a suitable connection cable by a Miele authorised technician (see "Electrical connection").

▶ During installation, maintenance and repair work, the appliance must be disconnected from the mains electricity supply, e.g. if the oven lighting is faulty (see "Problem solving guide" and "Electrical connection").

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Warning and Safety instructions

▶ In order to function correctly, the oven requires an adequate supply of cool air. Ensure that the supply of cool air is not impaired (e.g. by heat insulation strips in the housing unit). Please also ensure that the cool air supply is not unduly heated by other heat sources such as a solid fuel stove.

▶ If the oven is installed behind a furniture panel (e.g. a door), ensure that the door is never closed whilst the oven is in use. Heat and moisture can build up behind a closed furniture panel and cause subsequent damage to the oven, the housing unit and the floor. Do not close the door until the oven has cooled down completely.

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Warning and Safety instructions

Correct use

⚠ Danger of burning.
The oven becomes hot when in use.
You could burn yourself on the heating elements, oven interior, cooked food or oven accessories.
Wear oven gloves when placing food in the oven, turning or removing it and when adjusting oven shelves etc. in a hot oven.

▶ Due to the high temperatures radiated, objects left near the oven when it is in use could catch fire.
Do not use the oven to heat up the room.

▶ Do not store items on the hob. Items could melt or catch fire from residual heat or if the appliance is turned on inadvertently.
With cookers never use the hob as a resting place for other objects.

▶ Oil and fat can ignite if overheated. Never leave the oven unattended when cooking with oil and fat.
If it does ignite do not put the flames out with water. Switch the oven off immediately and switch the hob off on cookers.
Then suffocate the flames in the oven by keeping the oven door closed.
With cookers suffocate the flames on the hob using a suitable lid or a fire blanket.

▶ Grilling food for an excessively long time can cause it to dry out with the risk of catching fire.
Do not exceed recommended grilling times.

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Warning and Safety instructions

▶ Some types of food dry out quickly and can self-ignite if high grill temperatures are used. Never use the grill to finish baking part-cooked rolls or bread or to dry flowers or herbs. Use Fan plus or Conventional heat for this type of procedure.

▶ If using alcohol in your recipes, please be aware that high temperatures can cause the alcohol to vaporise. The vapour can catch fire on hot heating elements.

▶ When using residual heat to keep food in the oven warm, the high moisture content and amount of condensation in the oven can cause corrosion damage. The control panel, the worktop or the housing unit can also suffer damage.
When using residual heat do not switch the oven off. Instead set the temperature to the lowest setting and leave the oven on the selected function. The fan will then remain on automatically and dissipate the moisture.

▶ Cover any food which is left in the oven to be kept hot, as moisture in the food could lead to corrosion damage in the oven. This also prevents the food from drying out.

▶ A build-up of heat can cause the enamel on the floor of the oven to crack or shatter.
Do not line the floor of the oven with anything, e.g. aluminium foil. Do not place roasting pans, pots or baking trays directly on the oven floor.

▶ The enamelling on the oven floor can become damaged by items being pushed around on it. If using the oven to store pots and pans, ensure that you avoid pushing them around on the oven floor.

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Warning and Safety instructions

▶ If cold liquid is poured onto a hot surface steam will occur, which can cause scalding. The sudden change in temperature can also damage enamel surfaces.
Do not pour cold liquid directly onto hot enamelled surfaces.

▶ It is important that the temperature in the food being cooked is evenly distributed and sufficiently high. Stir and / or turn it to ensure even heat distribution.

▶ Plastic containers which are not suitable for use in an oven can melt at high temperatures and can even damage the oven or catch fire.
Only use plastic containers which are declared by the manufacturer as being suitable for use in an oven. Follow the manufacturer's instructions on use.

▶ Do not heat up food in closed containers e.g. tins or sealed jars in the oven, as pressure can build up in the container, causing it to explode.

▶ You could injure yourself on the open oven door or trip over it. Avoid leaving the door open unnecessarily.

▶ The door can support a maximum weight of 15 kg.
Do not sit on or lean against an open door, and do not place heavy objects on it. Also make sure that nothing can get trapped between the door and the oven cavity. The oven could get damaged.

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Warning and Safety instructions

Cleaning and care

▶ Do not use a steam cleaning appliance to clean this appliance. The steam could reach electrical components and cause a short circuit.

▶ Scratches on the door glass can result in the glass breaking. Do not use abrasive cleaners, hard sponges, brushes or sharp metal tools to clean the door glass.

▶ The side runners can be removed for cleaning purposes (see "Cleaning and care"). Ensure that they are replaced correctly and do not use the oven without them fitted.

▶ The catalytic enamelled panels and liners can be removed for cleaning purposes (see "Cleaning and care").
Ensure that they are replaced correctly and do not use the oven without them fitted.

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Warning and Safety instructions

Accessories

▶ Miele cookers with integrated hob controls may only be combined with hobs specified by Miele as suitable for use with that appliance (see "Electrical connection").

▶ Only use genuine original Miele accessories and spare parts with this appliance. Using accessories or spare parts from other manufacturers will invalidate the guarantee, and Miele cannot accept liability.

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Caring for the environment

Disposal of the packing material

The packaging is designed to protect the appliance from damage during transportation. The packaging materials used are selected from materials which are environmentally friendly for disposal and should be recycled.

Recycling the packaging reduces the use of raw materials in the manufacturing process and also reduces the amount of waste in landfill sites.

Disposing of your old appliance

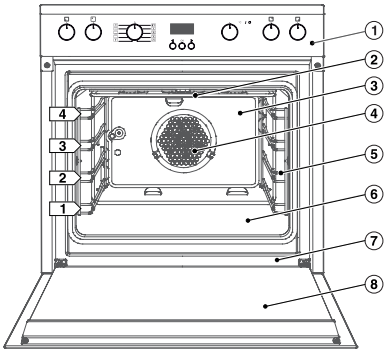
Electrical and electronic appliances often contain valuable materials. They also contain materials which, if handled or disposed of incorrectly, could be potentially hazardous to human health and to the environment. They are, however, essential for the correct functioning of your appliance. Please do not therefore dispose of it with your household waste.

Please dispose of it at your local community waste collection / recycling centre.

Ensure that it presents no danger to children while being stored for disposal.

17

Guide to the cooker



① Oven controls*, cooking zone dials
② Top heat/grill element
③ Catalytic enamelled back panel
④ Air inlet for the fan with ring heating element behind it
⑤ Side runners with 4 shelf levels
⑥ Oven floor with bottom heat element underneath it
⑦ Front frame with data plate
⑧ Door

* features will vary depending on model

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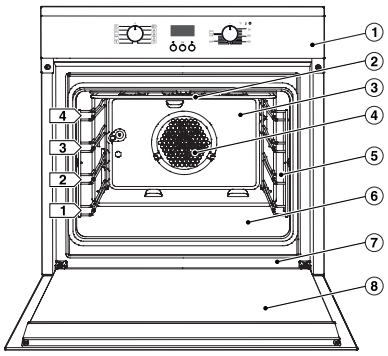
Oven overview



① Oven controls*
② Top heat/grill element
③ Catalytic enamelled back panel
④ Air inlet for the fan with ring heating element behind it
⑤ Side runners with 4 shelf levels
⑦ Oven floor with bottom heat element underneath it
⑦ Front frame with data plate
⑧ Door

* depending on model

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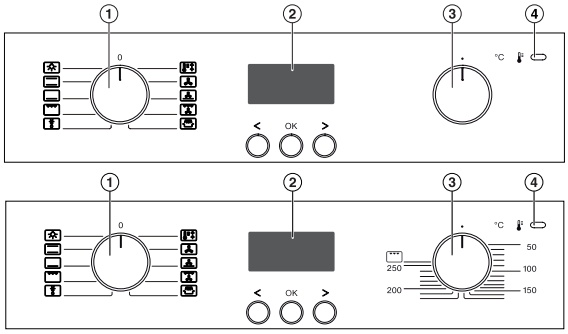
Oven controls



① Function selector
② Clock/timer
③ Temperature selector
④ Temperature indicator light

Function selector

Use the function selector to select the required function and switch on the oven lighting independently.

It can be turned clockwise or anti-clockwise.
In the **0** position it can be retracted by pressing it in.

Oven functions

- Lighting
- Conventional heat
- Bottom heat
- Grill
- Defrost
- Rapid heat-up
- Fan plus
- Intensive bake
- Fan grill
- Gentle bake

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Oven controls

Clock/timer

(features will vary depending on model)
The clock/timer is operated via the **display** and the <, OK and > **buttons**.

Display

The display shows the time of day or your settings.

It goes dark if settings are not being entered.

Please refer to "Clock/Timer" for more information.

Buttons

These ovens have push buttons.

Temperature selector

Use the temperature selector to select the temperature for the cooking processes.

It can be turned clockwise until a resistance is felt and then back again. The temperature selector can be retracted when it is in the ● position by pressing it in.

The temperature settings are marked on the temperature selector and on the control panel with ovens.

Temperature indicator light

The temperature indicator light lights up whenever the oven heating is switched on.

As soon as the set temperature is reached,

- the oven heating switches off
- and the temperature indicator light goes out.

The temperature control unit ensures that the oven heating and the temperature indicator light switch back on if the temperature in the oven temperature falls bellow the level set.

Features

Model numbers

A list of the ovens described in these operating instructions can be found on the back page.

H2x6xE	Cooker = Oven + integrated hob controls
H2x6xB	Oven

The descriptions of the oven functions apply to ovens and also cookers with integrated hob controls. However, both types of appliance are generally referred to as "oven" throughout.

Data plate

The data plate is located on the front frame, visible when the door is open.

The data plate states the model number of your oven, the serial number as well as connection data (voltage, frequency and maximum connected load).

Please have this information to hand, should you need to contact Miele regarding any questions or problems.

Items supplied

The oven is supplied with:

- the operating and installation instructions for using the oven,
- screws for securing your cooker or oven in the housing unit,
- various accessories.

With H2x6xE an additional operating and installation instruction booklet is supplied for the hob.

Accessories supplied and available to order

Accessories will vary depending on model.
Your oven will be supplied with side runners, a universal tray and a rack. Depending on model, your oven may also come supplied with some or several of the accessories listed here.

All the accessories listed as well as the cleaning and care products are designed for Miele appliances.

These can be ordered via the internet at www.miele-shop.com, from Miele (see back cover for contact details) or from your Miele dealer.

When ordering, please quote the model number of your oven and the reference number of the accessories required.

Features

Side runners

Side runners for trays, racks and accessory dishes are fitted on either side of the oven cavity for shelf levels 4 1.

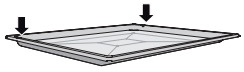
Each level consists of two rails, one above the other.

- The accessories (e.g. the rack) are pushed into the oven between the rails,
- FlexiClip telescopic runners (depending on model) are fitted on the top rail.

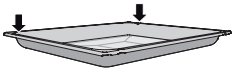
If necessary, the side runners can be removed for cleaning (see "Cleaning and care").

Baking tray, universal tray and rack with non-tip notches

Baking tray HBB51:



Universal tray HUBB51:



Rack HBBR50:

These accessories are inserted into the oven between the two rails of a side runner.

Always position the rack as illustrated above.

The accessories have non-tip safety notches half way along the short edges which prevent them from being pulled right out when they only need to be pulled partially out.

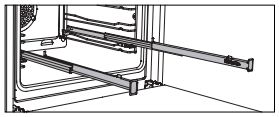
If you are using the universal tray with the rack on top, insert the tray between the rails of the side runners and the rack will automatically slide in above them.

The enamelled surfaces have been treated with PerfectClean.

Features

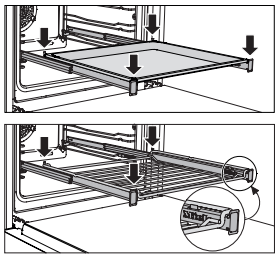
FlexiClip telescopic runners HFC50

(optional accessory)



The FlexiClip telescopic runners can be used on the three lower shelf levels. Each shelf level can be drawn right out of the oven individually to give a good overview of cooking in progress.

Push the FlexiClip telescopic runners right into the oven compartment before placing accessories on them.



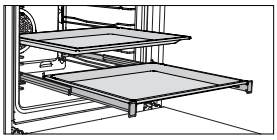
To prevent the risk of accessories sliding off the telescopic runners:

- make sure that they are sitting securely on their runners in between the stoppers at either end of each runner,
- always place the rack with the loading surface in the lower position on the FlexiClip telescopic runners.

The FlexiClip runners can support a maximum load of 15 kg.

Features

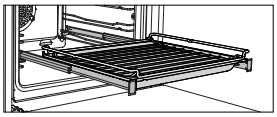
Because the FlexiClip runners sit on the top rail of the side runners the gap between the level the FlexiClip runners are on and the one above is smaller than if, for instance, racks were fitted on each level. Cooking results will be affected if the gap is too small.



If you need to cook using more than one baking tray, universal tray or rack:

- Place the baking tray, universal tray or rack on the FlexiClip runners.
- Leave at least one shelf level free between it and any baking tray, universal tray or rack above it.

If you are using the universal tray with a rack on top of it:



- Slide the universal tray together with the rack onto the FlexiClip runners. The rack will automatically slide between the rails of the shelf level above the FlexiClip runners.
- Leave at least one shelf level free between it and any baking tray, universal tray or rack above it.

Features

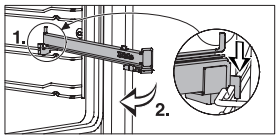
Fitting the FlexiClip runners

⚠ Danger of burning.
Make sure the oven heating elements are switched off and cool.

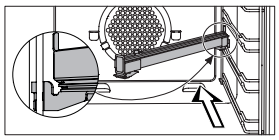
Each level is made up of two rails. The FlexiClip telescopic runners fit on the top rail of these two rails.

The FlexiClip runner with the Miele logo is fitted on the right.

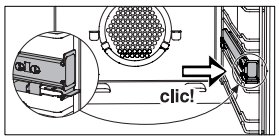
Do **not** extend the FlexiClip runners when fitting them or taking them out. If the FlexiClip runners are difficult to pull out after fitting, you may need to pull firmly on them once to release them.



- Hook the FlexiClip runner onto the front of the top rail of a side runner (1.) and then hold it at an angle in towards the middle of the oven compartment (2.).



- Slide the FlexiClip runner at an angle along the top rail as far as it will go.

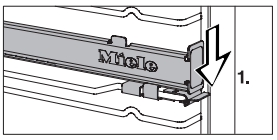


- Then swing it back to the side of the oven cavity and secure it to the top rail with an audible click.

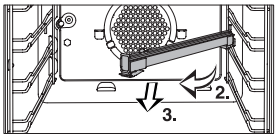
Features

Removing the FlexiClip runners

- Push the FlexiClip runner in all the way.

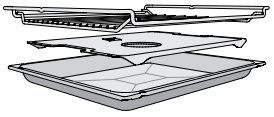


- Push down on the tab at the front of the FlexiClip runner (1.).



- Swing the FlexiClip runner towards the middle of the oven cavity (2.) and pull it forwards along the top rail (3.).
- Lift the FlexiClip runner off the rail and take it out of the oven.

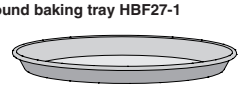
Anti-splash insert HGBB51



The anti-splash insert fits in the universal tray below the rack.
The juices from the food being grilled or roasted collect under the insert. This prevents them from spitting and making the oven dirty. The juices can then be used for making gravy and sauces.

The enamelled surface has been treated with PerfectClean.

Round baking tray HBF27-1

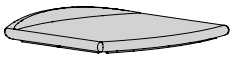


The round baking tray is suitable for cooking pizza, shallow cakes made with yeast or whisked mixtures, sweet and savoury tarts, baked desserts, flat bread, and can also be used for frozen cakes and pizzas.

The enamelled surface has been treated with PerfectClean.

Features

Baking stone HBS60



The baking stone is ideal for items which need a well baked base such as pizza, quiche, bread, bread rolls and savoury snacks.
The baking stone is made from heat retaining fire brick and is glazed.
Place it directly on the rack.
A paddle made of untreated wood is supplied with it for placing food on the baking stone and taking it off.

Handle HEG

The handle makes it easier to take the universal tray, baking tray and rack out of the oven, or to put them into it. The two prongs at the top go inside the tray or above the rack, and the U-shape supports underneath.

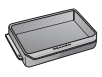
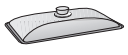
HUB oven dish and HBD oven dish lid

The Miele oven dish, unlike other oven dishes, slides into the oven on the side runners. It has non-tip safety notches like the universal tray to prevent it being pulled out too far.
It also has a non-stick coating.

The Miele oven dishes are either 22 cm or 35 cm deep. The width and height are the same.

Lids are also available. These are ordered separately.

Please quote the model number of your Miele oven dish when ordering.

Depth: 22 cm	Depth: 35 cm
HUB61-22 HUB62-22*	HUB61-35
	
HBD 60-22	HBD 60-35
	

* suitable for use on induction hobs

Features

Catalytic enamelled liners

– Side liners
These are fitted behind the side runners in the sides of the oven and help keep the oven walls clean.

– Roof liner
This is fitted above the top heat/grill element and helps keep the roof of the oven clean.

– Back panel
This should be replaced if the catalytic enamel has become ineffective due to incorrect use or very heavy soiling.

When ordering, please quote the model number of your oven.

Miele microfibre cloth

Light soiling and fingerprints can be easily removed with the microfibre cloth.

Miele oven cleaner

Miele oven cleaner is suitable for removing very stubborn soiling. It is not necessary to pre-heat the oven beforehand.

Features

Oven controls

(features will vary depending on model)

The oven controls are used to operate the various cooking functions for baking, roasting and grilling.

Ovens with a clock/timer also offer the following:

– a time of day display,

– a minute minder,

– a timer to automatically switch cooking programmes on and off,

– settings that can be customised.

Safety features

System lock for the oven

The system lock prevents the oven from being used unintentionally (see "Clock/timer - Changing settings – *P 3*"). When the system lock is engaged will appear in the display.

Cooling fan

The cooling fan will come on automatically when a cooking programme is started. The cooling fan mixes hot air from the oven cavity with cool room air before venting it out into the kitchen through vents located between the appliance door and the control panel.

The cooling fan will continue to run for a while after a programme to prevent moisture building up in the oven, on the control panel or in the oven housing unit.

When the temperature in the oven has fallen sufficiently, the cooling fan will switch off automatically.

Vented oven door

The oven door glass panes have a heat-reflecting coating.

The door can be removed and dismantled for cleaning (see "Cleaning and care").

Features

PerfectClean treated surfaces

PerfectClean surfaces have very good non-stick properties and are much easier to keep clean than conventional enamel surfaces, if cleaned regularly.

Food can be taken off these surfaces easily, and soiling from baking and roasting is simple to remove.

Food can be sliced or cut up on PerfectClean surfaces.

However, do not use ceramic knives as these will scratch the PerfectClean surface.

Surfaces treated with PerfectClean enamel can be cleaned as you would clean glass.

Read the instructions in "Cleaning and care" so that the benefits of the non-stick properties and easy cleaning are retained.

The following have all been treated with PerfectClean:

– Oven interior

– Universal tray

– Baking tray

– Anti-splash insert

– Round baking tray

Catalytic enamelled surfaces

The back panel is coated with catalytic enamel. Soiling from oil and fat is burnt off this surface when very high temperatures are used in the oven.

See "Cleaning and care" for more information.

Hob controls

(features will vary depending on model)

H2x6xE cookers also have cooking zone controls for operating the cooking zones on the linked hob.

All the hob cooking zone controls are retractable when they are at the ● position.

The range of settings is printed on the control.

Cooking zones:

Symbol	Cooking zone
	front left
	rear left
	rear right
	front right

The hob can still be operated when the system lock for the oven is switched on .

Please read the separate operating and installation manual provided with your hob. It contains additional information on how to install and use your hob.

Using for the first time

Before using for the first time

⚠ The oven must not be operated until it has been correctly installed in its housing unit.

■ Press and release the function and temperature selectors if they are retracted.

The time of day can only be changed when the function selector is at **0**.

■ On models with a clock/timer, enter the correct time of day.

Setting the time of day for the first time

The time of day is shown in 24 hour clock format.

After connecting the oven to the electricity supply, *12:00* will flash in the display.

The time of day is set in segments: first the hours, then the minutes.

■ Press OK.

12:00 will light up constantly and will flash.

■ Whilst is flashing, press OK.

The hours will flash.

■ Use < or > to set the hours.

■ Press OK.

The hours are saved and the minutes will flash.

■ Use < or > to set the minutes.

■ Press OK.

The time of day is now saved.

The time of day can be displayed in 12 hour format by setting *P 2* in the settings menu to status *12* (see "Clock/timer – Changing settings").

Using for the first time

Heating up the oven for the first time

New ovens can give off an unpleasant smell on first use. Heating up the oven for at least 1 hour with nothing in it will get rid of this smell.

Ensure that the kitchen is well ventilated during this operation. Close doors to other rooms to prevent the smell spreading throughout the house.

- Remove any stickers or protective foil from the oven and accessories.
- Take the accessories out of the oven and clean them (see "Cleaning and care").
- Before heating the oven up, wipe the interior with a damp cloth to remove any dust or bits of packaging that may have accumulated in the oven cavity during storage and unpacking.
- Select Fan plus.

The oven heating, lighting and cooling fan will switch on.

- Set the maximum temperature (250 °C).
- Heat the empty oven for at least an hour.
- After the heating up process has finished, turn the function selector to **0** and the temperature selector to ●.

⚠ Danger of burning.
Allow the oven to cool down before cleaning by hand.

- Clean the oven interior with a clean sponge and a solution of hot water and washing-up liquid or a clean damp microfibre cloth.
- Dry all surfaces with a soft cloth.

Leave the oven door open until the oven interior is completely dry.

Overview of functions

Your oven has a range of oven functions for preparing food.

Depending on the function selected, different heating elements are switched on and sometimes combined with the fan (see details in brackets).

Conventional heat

(Top heat/grill element + bottom heat element)

For baking and roasting traditional recipes, preparing soufflés and cooking at low temperatures.

If using an older recipe or cookbook, set the oven temperature for Conventional heat 10 °C lower than that recommended. This will not change cooking times.

Bottom heat

(Bottom heat element)

Use this setting towards the end of cooking to brown the base of a cake, quiche or pizza.

Grill

(Top heat/grill element)

For grilling larger quantities of thin cuts (e.g. steaks) and browning baked dishes.

Defrost

(Fan)

For the gentle defrosting of frozen food.

Overview of functions

Rapid heat-up

(Top heat/grill element + ring heat element + fan)

For pre-heating the oven quickly. The oven function required must then be selected.

Fan plus

(Ring heat element + fan)

This function is used for baking and roasting on different levels at the same time.
A lower temperature can be selected than when using Conventional heat, as the fan distributes the heat to the food straight away.

Intensive bake

(Ring heat element + fan + bottom heat element)

For baking cakes with moist toppings. Intensive bake is not suitable for baking thin biscuits or for roasting as the juices will become too dark.

Fan grill

(Top heat/grill element + fan)

For grilling thicker cuts of meat (e. g. roulades, chicken). Lower temperatures can be used than when using the Grill function, as the fan distributes the heat to the food straight away.

Gentle bake

(Top heat/grill element + ring heat element + fan)

Ideal for cooking bakes and gratins that need to be crispy on top.

Operation

Tips on saving energy

- Remove any accessories from the oven that you do not require for cooking.
- Pre-heat the oven only if instructed to do so in the recipe or the cooking chart.
- Avoid opening the door during cooking.
- In general, if a range of temperatures is given, it is best to select the lower temperature and to check the food after the shortest given time.
- Use Fan plus as you can cook at temperatures 10–30 °C lower than when using other functions.
- Fan grill can be used for a wide variety of food. With Fan grill you can use lower temperatures than with other grill functions which use the maximum temperature setting.

Residual heat use

When cooking using temperatures above 140 °C and cooking durations longer than 30 minutes you can turn the temperature selector down to ● about 5 minutes before the end of cooking. The heating elements will switch off and the residual heat in the oven will be sufficient to finish cooking the food.

Using the oven

- Place the food in the oven.
- Select the required oven function with the function selector.

The oven lighting and the fan will switch on.

- Use the temperature selector to set the temperature.

The oven heating will switch on.

After cooking:

- Turn the function selector to **0** and the temperature selector to ●.
- Take the food out of the oven.

Cooling fan

The cooling fan will continue to run for a while after a cooking process to prevent moisture building up in the oven, on the control panel or on the oven housing unit.

The cooling fan will switch off automatically when the temperature in the oven interior has fallen sufficiently.

Operation

Pre-heating

It is only necessary to pre-heat the oven in a few instances.

Most dishes can be placed in a cold oven. They will then make use of the heat produced during the heating-up phase.

Pre-heat the oven when cooking the following food with the following oven functions:

Fan plus

- dark bread dough,
- beef sirloin joints and fillet.

Conventional heat

- cakes and biscuits with a short baking time (up to 30 minutes)
- delicate mixtures (e.g. sponges)
- dark bread dough,
- beef sirloin joints and fillet.

Rapid heat-up

Do not use Rapid heat-up to pre-heat the oven when baking pizzas or biscuits and small cakes. They will brown too quickly on top.

- Select Rapid heat-up.
- Select a temperature.
- When the temperature indicator light goes out for the first time, set the oven function you require for continued cooking.
- Place the food in the oven.

Clock/timer

(features will vary depending on model)

The clock/timer can:

- display the time of day,
- be used as a minute minder,
- switch cooking processes on and off automatically,
- be used to alter various settings *P*.

The clock/timer is operated via the **display** and the <, OK and > **buttons** .

The functions available are indicated by symbols.

Display

Symbols in the display

Depending on the position of the function selector ○ and/or whether a button has been pressed, the following symbols appear:

Symbol/function	○
Minute minder	Any
Duration	Function
End of cooking duration	
Time of day	0
P Setting	
S Setting status	
System lock	

You can only set or change a function if the function selector is in the correct position.

Buttons

Button	Use
<	– To highlight a function – To reduce a duration – To call up settings *P* – To change the status *S* of a setting *P*
>	– To highlight a function – To increase a duration – To change the status *S* of a setting *P*
OK	– To confirm a function – To save set durations and altered settings – To confirm set durations

Hours, minutes or seconds are set with the < or > buttons in individual steps. Holding the button pressed will speed up the change in the display.

Clock/timer

How to set the time or a duration

Times are set in segments:

- For the time of day and cooking durations, first the hours, then the minutes.
- For the minute minder, first the minutes, then the seconds.

- Press OK.

Depending on the position of the function selector, the functions (, , or) will appear.

- Highlight the function required with < or >.

The appropriate symbol will flash for about 15 seconds.

- Press OK while the symbol is flashing.

This selects the function and the left numeric block will start to flash.

You can only set the time/duration while the numeric block is flashing. If you run out of time you will have to select the function again.

- Use < or > to enter the value required.
- Press OK.

The right numeric block will start to flash.

- Use < or > to enter the value required.
- Press OK.

The time/duration you have set is now saved.

Displaying times/durations

If times/durations have been entered, the and or symbols will appear to show that these have been set.

If you are using the minute minder , cooking duration and end of cooking time functions simultaneously, the last selected time will be displayed.

If you have selected a cooking duration, the time of day cannot be displayed.

When the time/duration has elapsed

- the relevant symbol will flash,
- a buzzer will sound, if this option is selected (see "Clock/timer - Altering settings").

- Press OK.

The buzzer will stop and the symbols in the display will go out.

Clock/timer

Using the minute minder

The minute minder can be used to time other activities in the kitchen, e.g. boiling eggs.

The minute minder can also be used at the same time as a cooking programme in which the start and finish times have been set, e.g. as a reminder to stir a dish or add seasoning etc.

A maximum minute minder time of 99 minutes and 59 seconds can be set.

To set the minute minder

Example: You want to boil some eggs and set a minute minder time of 6 minutes and 20 seconds.

- Press < repeatedly until starts flashing.
- Press OK.

00:00 will appear and the minutes block will flash.

If you then press < once, two lines will appear and, after pressing again, the maximum possible minute value *99* will appear.

- Use < or > to set the minutes.
- Press OK.

The minutes are saved and the seconds will flash.

- Use < or > to enter the seconds.
- Press OK.

The minute minder is saved and will count down in seconds.

The symbol indicates the minute minder has been set.

Clock/timer

At the end of the minute minder time

– 🔔 will flash,
– the display will show the time counting upwards.
– a buzzer will sound for approx. 7 minutes, if this option is selected (see "Clock timer - Altering settings").

■ Press OK.

The buzzer will stop and the symbols in the display will go out.

If cooking durations have not been set, the time of day will appear in the display.

To change the time set for the minute minder

■ Press < repeatedly until 🔔 starts flashing.

The minute minder time selected appears.

■ Press OK.

The minutes block will flash.

■ Use < or > to set the minutes.

■ Press OK.

The seconds block will flash.

■ Use < or > to enter the seconds.

■ Press OK.

The changed minute minder is saved and will count down in seconds.

To cancel the time set for the minute minder

■ Press < repeatedly until 🔔 starts flashing.

■ Press OK.

The minutes block will flash.

■ Decrease the minutes to *00* by pressing <, or increase them to *99* by pressing >.

The next time the relevant button is pressed, two lines will appear instead of the minutes:

■ Press OK.

Four lines will appear:

■ Press OK.

The minute minder is now cancelled.

If cooking durations have not been set, the time of day will appear in the display.

Clock/timer

Switching on and off automatically

Cooking programmes can be switched off, or on and off automatically.

To do this, set a duration or a duration and finish time after selecting an oven function and a temperature.

The maximum duration which can be set for a cooking programme is 11 hours and 59 minutes.

We recommend switching on and off automatically when roasting.
If using it for baking, do not delay the start for too long as the cake mixture or dough will dry out, and the raising agents will lose their effectiveness.

Setting a cooking duration

Example: To bake a cake for 1 hour 5 minutes

■ Place the food in the oven.

■ Select the required oven function and the temperature.

The oven heating, lighting and cooling fan will switch on.

■ Press > repeatedly until ⏲ starts flashing.

0:00 will appear.

■ Press OK.

00:00 will appear and the hour numeric block will start to flash.

If you then press < once, two lines will appear and, after pressing again, the maximum possible hour value *11* will appear.

Clock/timer

■ Use < or > to set the hours.

■ Press OK.

The hours are saved and the minutes will flash.

■ Use < or > to set the minutes.

■ Press OK.

The cooking duration is saved and then counts down in minutes, with the last minute counting down in seconds.

The ⏲ symbol indicates a cooking duration has been set.

At the end of the cooking duration

– *0:00* will appear,
– ⏲ will start to flash,
– the oven heating will switch off automatically,
– the cooling fan will continue to run for a while,
– a buzzer will sound for approx. 7 minutes, if this option is selected (see "Clock timer - Altering settings").

■ Press OK.

As soon as you press OK,

– the buzzer will stop and the symbols in the display will go out.
– the time of day will appear,
– and the oven heating will switch on again.

■ Turn the function selector to **0** and the temperature selector to ●.

■ Take the food out of the oven.

Clock/timer

Setting a cooking duration and finish time

A cooking duration and finish time can be set to switch a cooking programme on and off automatically.

Example:
The time is now 11:15 ;
you want a dish with a cooking duration of 90 minutes to be ready by 13:30 .

■ Place the food in the oven.

■ Select the required oven function and the temperature.

The oven heating, lighting and cooling fan will switch on.

Set the cooking duration first:

■ Press > repeatedly until ⏲ starts flashing.

■ Press OK.

00:00 will appear and the hour numeric block will start to flash.

■ Use < or > to set the hours.

■ Press OK.

The hours are saved and the minutes will flash.

■ Use < or > to set the minutes.

■ Press OK.

The cooking duration is now saved.

The ⏲ symbol indicates a cooking duration has been set.

Now set the finish time:

■ Press > repeatedly until 🔔 starts flashing.

12:45 will appear in the display (= current time of day + cooking duration = *11:15* + *1:30*).

■ Press OK.

The hours will flash.

■ Use < or > to set the hours.

■ Press OK.

The hours are saved and the minutes will flash.

Clock/timer

- Use < or > to set the minutes.
- Press OK.

The finish time is now saved.

The oven heating, lighting and cooling fan will switch off.

The selected finish time appears in the display.

As soon as the start time (*13:30 - 1:30 = 12:00*) is reached, the oven heating, lighting and cooling fan will switch on.

The set cooking duration appears and then counts down in minutes, with the last minute counting down in seconds.

Altering the cooking duration

- Press > repeatedly until starts flashing.

The cooking duration remaining will appear in the display.

- Press OK.

The hours will flash.

- Use < or > to set the hours.
- Press OK.

The minutes block will flash.

- Use < or > to set the minutes.
- Press OK.

The altered cooking duration is now saved.

Clock/timer

Deleting a cooking duration

- Press < or > repeatedly until starts to flash.
- Press OK.

The hours will flash.

- Press < or > repeatedly until two lines appear.

- Press OK.

Four lines will appear:

- Press OK.

The cooking duration and any finish time will be deleted.

The time of day will appear unless a minute minder time has been set.

The oven heating, lighting and cooling fan will switch on.

If you want to finish the cooking programme:

- Turn the function selector to **0** and the temperature selector to ●.
- Take the food out of the oven.

Deleting a finish time

- Press < or > repeatedly until starts to flash.
- Press OK.

The hours will flash.

- Press < or > repeatedly until two lines appear.
- Press OK.

Four lines will appear.

- Press OK.

The symbol will appear and the set cooking duration will count down in minutes, with the last minute counting down in seconds.

If you want to finish the cooking programme:

- Turn the function selector to **0** and the temperature selector to ●.
- Take the food out of the oven.

If you turn the function selector to **0**, the settings for the cooking duration and the finish time will be deleted.

Clock/timer

Altering the time of day

The time of day can only be changed when the function selector is at **0**.

- Turn the function selector to **0**.
- Press > repeatedly until starts to flash.
- Press OK.

The hours will flash.

- Use < or > to set the hours.
- Press OK.

The hours are saved and the minutes will flash.

- Use < or > to set the minutes.
- Press OK.

The time of day is now saved.

After a power cut, the time of day needs to re-entered.

Clock/timer

Altering settings

Your appliance is supplied with a number of standard default settings (see the "Settings overview" chart).

A setting *P* can be changed by altering its status *S*.

- Turn the function selector to **0**.
- Press and hold < until *P 1* appears.

- If you want to change another setting, press < or > repeatedly until the relevant number appears.
- Press OK.

The setting is selected and the current status *S* appears, e.g. *0*.

To alter the status:

- Press < or > repeatedly until the required status appears in the display.
- Press OK.

The selected status is saved and the setting *P* appears again.

If you wish to alter more settings, proceed as described previously.

If you do not want to alter any more settings:

- Wait for approx. 15 seconds until the time of day appears.

The settings remain in the memory even after a power cut.

Clock/timer

Settings overview

Setting	Status	
P 1		
Buzzer volume	S 0	The buzzer is **switched off**.
	S 1 to S 30*	The buzzer is **switched on**. The volume can be altered. When you select a status you will hear the corresponding buzzer.
P 2		
Clock format	24*	The time of day is shown in **24-hour** format.
	12	The time of day is shown in **12 hour** format. If you change the clock after 13:00 from a 12 hour clock to a 24 hour clock you will need to update the hour numerical block for the clock accordingly.
P 3		
System lock for the oven	S 0*	The system lock is **switched off**.
	S 1	The system lock is **switched on** and 🔒 appears in the display. The system lock prevents the oven from being used unintentionally. The system lock remains active even after a power cut.

* Factory default setting

Baking

Eating food which has been cooked correctly is important for good health.
Only bake cakes, pizza, chips etc. until they are golden. Do not overcook them.

Functions:

Depending on how the food is prepared, you can use Fan Plus, Intensive Bake or Conventional Heat.

Bakeware

The choice of bakeware depends on the oven function and preparation.

- Fan plus, Intensive bake: Baking tray, universal tray, bakeware of any ovenproof material.
- Conventional heat: Dark metal, enamel, tin or aluminium baking tins with a matt finish, heat-resistant glass or ceramic dishes. Avoid using bright, shiny metal tins as they give an uneven and poor browning result and in some cases cakes might not cook properly.
- Always place baking tins on the rack.

  Position rectangular tins with the longer side across the width of the rack for optimum heat distribution and even baking results.
- When baking cakes with fresh fruit toppings and deep sponge cakes place the tin in the universal tray to catch any spillages.

Baking parchment, greasing the tin

All Miele accessories (baking tray, universal tray, perforated gourmet baking tray and the round baking tray) are treated with PerfectClean enamel.

Surfaces treated with PerfectClean enamel generally do not need to be greased or covered with baking paper.

Baking paper is only needed with

- anything with a high salt content (e.g. pretzels, bread sticks), because sodium can damage the PerfectClean surface,
- meringues or sponges with a high egg-white content, because they are more likely to stick,
- frozen food cooked on the rack.

Baking

Notes on the baking chart

Temperature

As a general rule, select the lower temperature given in the chart.

Baking at temperatures higher than those recommended may reduce the cooking time, but will lead to uneven browning, and unsatisfactory cooking results.

Baking duration

Check if the food is cooked at the end of the shortest time quoted.
To check if a cake is ready, insert a wooden skewer into the centre. It is ready if the skewer comes out clean, without dough or crumbs sticking to it.

Shelf levels

The shelf level on which you place your food for baking depends on the oven function and number of trays being used.

- Fan plus
  1 tray: level 1
  2 trays: level 1+3
  3 trays: level 1+2+4

  When using the universal tray and baking tray to bake on two or more levels at the same time, place the universal tray underneath the baking tray.

  Bake moist biscuits and cakes on a maximum of two levels at the same time.
- Intensive bake
  1 tray: level 1
- Conventional
  1 tray: level 1 or 2

Baking

Baking chart

Cakes / biscuits			
	[°C]		[min]
Creamed mixture			
Sponge cake	**140–160**	**1**	**60–70**
Ring cake	**140–160**	**1**	**65–80**
Muffins (1 [2] tray(s))	**140–160**	**1 [1+3 4)]**	**30–50**
Small cakes (1 tray) 1) 2)	**150**	**1**	**25–40**
Small cakes (2 trays) 1) 2)	**150**	**1+3**	**25–40**
Foam cake (tray)	**140–160**	**1**	**25–40**
Marble, nut cake (tin)	**140–160**	**1**	**60–80**
Fresh fruit cake, with meringue topping (tray)	**140–160**	**1**	**45–50**
Fresh fruit cake (tray)	**140–160**	**1**	**35–45**
Fresh fruit cake (tin)	**140–160**	**1**	**55–65**
Flan base 1)	**140–160**	**1**	**25–30**
Small cakes/biscuits 1) (1 [2] tray(s))	**140–160**	**1 [1+3 4)]**	**20–25**
Rubbed in mixture			
Flan base	**140–160**	**1**	**20–25**
Streusel cake	**140–160**	**1**	**45–55**
Small cakes/biscuits 1) (1 [2] tray(s))	**140–160**	**1 [1+3 4)]**	**15–25**
Drop cookies 1) 2) (1 [2] tray/s)	**140**	**1 [1+3 4)]**	**25–40**
Cheese cake	140–160	1	70–90
Apple pie (tin Ø 20 cm) 1) 2)	**150**	**1**	**95–110**
Apple pie 1)	150–170	1	50–70
Apricot tart with topping (tin)	140–160	1	55–75
Swiss apple cake	–	–	–

The data for the recommended function is printed in bold.

Unless otherwise stated, the times given are for an oven which has not been pre-heated. With a pre-heated oven, shorten times by up to 10 minutes.

In general, if a range of temperatures is given, it is best to select the lower temperature and to check the food after the shortest time.

Baking

[°C]		[min]	[°C]		[min]
140–160	1	60–70	–	–	–
160–180	1	65–80	–	–	–
150–170	2	25–45	–	–	–
140 [3) 5)]	**3**	**25–35**	–	–	–
–	–	–	–	–	–
160–180	2	25–40	–	–	–
140–160	1	60–80	–	–	–
160–180	2	45–50	140–160	1	30–35
160–180	2	35–45	–	–	–
150–170	1	55–65	–	–	–
160–180	1	20–25	–	–	–
160–180 [3)]	2	12–20	–	–	–
160–180	2	15–20	–	–	–
160–180	2	45–55	–	–	–
160–180	2	10–20	–	–	–
160 [3)]	**2**	**15–30**	–	–	–
160–180	**1**	**70–90**	140–160	1	65–75
170	**1**	**80–100**	–	–	–
160–180	1	45–65	**140–160**	**1**	**50–60**
160–180	1	55–75	**140–160**	**1**	**50–60**
210–230 [3)]	**1**	**25–35**	**180–200** [3)]	**1**	**25–30**

Fan plus / Conventional heat / Intensive bake

Temperature / Shelf level / Duration

1) Do not use Rapid heat-up during the heating-up phase.

2) The settings also apply for testing in accordance with EN 60350.

3) Pre-heat the oven.

4) Take the baking trays out of the oven early if the food is sufficiently browned before the specified time has elapsed.

5) Do not use the FlexiClip telescopic runners.

Baking

Baking chart

Cakes / biscuits	[°C]		[min]
Sponge mix[1)]			
Tart / flan base (2 eggs) [1)]	150–170	1	20–25
Sponge cake (4 to 6 eggs) [1)]	150–170	1	25–35
Whisked sponge cake [1) 2)]	**160**	**1**	**25–35**
Swiss roll [1)]	150–170	1	20 –25
Yeast mixtures and quark dough			
Proving dough	**50**	[5)]	**15–30**
Gugelhupf	**140–160**	**1**	**50–60**
Stollen	**140–160**	**1**	**55–65**
Streusel cake	**140–160**	**1**	**35–45**
Fresh fruit cake (tray)	**150–170**	**1**	**40–50**
White bread	**150–170**	**1**	**40–50**
Wholegrain bread	**160–180** [3)]	**1**	**50–60**
Pizza (tray) [1)]	160–180	1	35–45
Onion tart	160–180	1	35–45
Apple turnovers (1 [2] tray(s))	**140–160**	**1 [1+3** [4)]**]**	**25–30**
Choux pasty [1)], Eclairs (1 [2] tray(s))	**150–170**	**1 [1+3** [4)]**]**	**30–40**
Puff pastry (1 [2] tray(s))	**160–180**	**1 [1+3** [4)]**]**	**20–25**
Meringues, Macaroons (1 [2] tray(s))	**120–140**	**1 [1+3** [4)]**]**	**25–50**

The data for the recommended function is printed in bold.

Unless otherwise stated, the times given are for an oven which has not been pre-heated. With a pre-heated oven, shorten times by up to 10 minutes.

In general, if a range of temperatures is given, it is best to select the lower temperature and to check the food after the shortest time.

Baking

[°C]		[min]	[°C]		[min]
160–180 [3)]	**1**	**15–20**	–	–	–
160–180 [3)]	**1**	**20–35**	–	–	–
140–170 [3)]	**1**	**20–45**	–	–	–
170–190 [3)]	**1**	**12–16**	–	–	–
50	[5)]	15–30	–	–	
150–170	1	50–60	–	–	
140–160	2	55–65	–	–	
170–190	2	35–45	–	–	
160–180 [1)]	2	40–50	–	–	–
170–190	1	40–50	–	–	–
180–200 [3)]	2	50–60	–	–	–
180–200	**1**	**30–40**	160–180	1	40–50
170–190	**1**	**25–35**	160–180	1	25–35
150–170	2	25–30	–	–	–
170–190 [3)]	2	25–35	–	–	–
180–200 [3)]	2	15–25	–	–	–
120–140 [3)]	2	25–50	–	–	–

Fan plus / Conventional heat / Intensive bake

Temperature / Shelf level / Duration

1) Do not use Rapid heat-up during the heating-up phase.

2) The settings also apply for testing in accordance with EN 60350.

3) Pre-heat the oven.

4) Take the baking trays out of the oven early if the food is sufficiently browned before the specified time has elapsed.

5) Place the rack on the floor of the oven, and stand the bowl containing the dough on the rack.

Roasting

Functions:

Depending on how the food is prepared, you can use Fan Plus or Conventional Heat.

Crockery

You can use any heat-resistant crockery:

Miele Gourmet oven dishes, roasting pans, ovenproof glass trays, roasting bags, dishes made from earthenware or cast iron, the universal tray, rack and/or anti-splash insert (if available) on top of the universal tray.

We recommend roasting in oven dishes as this ensures that sufficient stock remains for making gravy. The oven also stays cleaner than with open roasting.

Notes on the roasting chart

Temperature

As a general rule, select the lower temperature given in the chart. If higher temperatures are used, the meat will brown on the outside, but will not be properly cooked through.

When cooking with Fan Plus, select a temperature of 20 °C lower than for Conventional Heat.

For cuts which weigh more than 3 kg, select a temperature approx. 10 °C lower than that given in the roasting chart. Roasting will take longer at the lower temperature, but will be more even.

When roasting on the rack, set a temperature of approx. 10 °C lower than in an oven dish.

Pre-heating

Pre-heating is required when roasting beef sirloin joints and fillet.

Roasting

Roasting duration

The traditional British method for calculating the roasting time is to allow 15 to 20 minutes per lb/450 grammes, according to type of meat, plus approx. 20 minutes, adjusting the length of time as roasting proceeds to obtain the required result. The roasting time can also be determined by multiplying the thickness of the roast [cm] with the time per cm [min./cm], depending on the type of meat:

Beef/venison: . . . . . 15–18 min/cm

Pork/veal/lamb: . . . . . 12–15 min/cm

Sirloin/fillet: . . . . . 8–10 min/cm

Check if the meat is cooked after the shortest duration quoted.

Shelf levels

As a general rule, use shelf level 1.

Useful tips

Browning

Browning only occurs towards the end of the roasting time. Remove the lid about halfway through the roasting time if a more intensive browning result is desired.

Standing time

At the end of the programme, take the roast out of the oven, wrap in aluminium foil and leave to stand for about 10 minutes. This helps distribute the juices evenly before the meat is carved.

Roasting poultry

For a crisp finish, baste the poultry 10 minutes before the end of the cooking time with slightly salted water.

Roasting

Roasting chart

Meat/Fish
Topside of beef, approx. 1 kg [1]
Beef fillet or sirloin joint, approx. 1 kg [2]
Venison, approx. 1 kg [3]
Pork joint, approx. 2 kg [3]
Pork joint with crackling, approx. 2 kg [3]
Gammon joint, approx. 1 kg [3]
Meat loaf, approx. 1 kg [3]
Veal, approx. 1.5 kg [3]
Leg of lamb, approx. 1.5 kg [2]
Saddle of lamb, approx. 1.5 kg
Poultry, 0.8–1 kg
Poultry, approx. 2 kg
Poultry, stuffed, approx. 2 kg
Poultry, approx. 4 kg
Fish, whole, approx. 1.5 kg

The data for the recommended function is printed in bold.

The times given are for an oven which has not been pre-heated.

In general, if a range of temperatures is given, it is best to select the lower temperature and to check the food after the shortest time.

The temperatures quoted are for roasting in an open dish.
Lower the temperature by approx. 10 °C if roasting directly on the universal tray or on the rack with the universal tray underneath.

Roasting

Fan plus			Conventional heat		
Temperature [°C]	Shelf level	Duration [min]	Temperature [°C]	Shelf level	Duration [min]
160–180	1	100–120	**180–200**	**1**	**100–120**
180–200	**1**	**45–55**	190–210	1	45–55
170–190	**1**	**90–120**	180–200	1	90–120
140–160	1	100–120	**170–190**	**1**	**100–120**
150–170	1	160–180	**180–200**	**1**	**120–150**
160–180	**1**	**60–70**	190–210	1	60–70
150–170	1	70–80	**180–200**	**1**	**70–80**
170–190	**1**	**100–120**	180–200	1	100–120
160–180	**1**	**90–120**	190–210	1	90–120
160–180	1	50–60	**180–200**	**1**	**50–60**
180–200	**1**	**60–70**	180–200	2	60–70
160–180	**1**	**90–110**	180–200	2	90–110
160–180	**1**	**110–130**	180–200	2	110–130
150–170	**1**	**150–180**	170–190	1	150–180
150–170	**1**	**35–55**	180–200	1	35–55

Fan plus / Conventional heat

Temperature / Shelf level / Duration

1) Roast with the lid on first, then remove the lid halfway through roasting and add approx. ½ litre liquid.

2) Pre-heat the oven, but do not use Rapid heat-up.

3) Add approx. ½ litre liquid halfway through roasting.

Low temperature cooking

This method is ideal for cooking beef, pork, veal or lamb when a tender result is required.

First sear the meat all over at a high temperature on the hob in order to seal it.

Then place the meat in the pre-heated oven where the low temperature and long cooking time will cook it to perfection and ensure it is very tender.

The meat relaxes and the juices inside start to circulate evenly throughout the meat to reach the outer layers. This has very tender and succulent results.

Tips

– Use lean meat which has been correctly hung and trimmed. Bones should be removed before cooking.

– For searing, use a suitable cooking oil or fat that can withstand high temperatures (e.g. clarified butter, vegetable oil).

– Do not cover meat during cooking.

Cooking takes between 2-4 hours depending on the size and weight of the meat and on how well cooked you want it as well as the level of browning required.

Procedure

Use the universal tray with the rack placed on top of it.

Do not use the Rapid Heat-up function to pre-heat the oven.

- Place the rack together with the universal tray on shelf level 1.
- Select Conventional heat and a temperature of 130 °C.
- Pre-heat the oven together with the universal tray and rack for approx. 15 minutes.
- Whilst the oven is pre-heating, sear the meat thoroughly on the hob.

⚠ Danger of burning!
Use oven gloves when placing food in the oven, turning or removing it and when adjusting oven shelves etc. in a hot oven.

- Place the seared meat on the rack.
- Reduce the temperature to 100 °C.
- Continue cooking until the end of the cooking duration.

On models with a clock/timer, you can set this procedure to finish automatically, see the "Clock/timer - Entering a cooking duration").

Low temperature cooking

After cooking

Because the cooking and core temperatures are very low:

- Meat can be carved straight from the oven. It does not need to rest.
- The cooking result will not be affected if the meat is left in the oven after the programme has finished. It can be kept warm until you serve it.
- The meat is an ideal temperature to eat straight away. Serve on pre-heated plates with very hot sauce or gravy to prevent it cooling down too quickly.

Cooking duration/Core temperatures

Meat	Duration [min]	Core-tempe-rature** [°C]
Sirloin joint		
– Rare:	60–90	48
– Medium	120–150	57
– Well-done:	180–240	69
Pork fillet	120–150	63
Gammon*	150–210	68
Saddle of veal*	180–210	63
Saddle of lamb*	90–120	60

* Boned

** You can use a proprietary food probe if you have one to monitor the core temperature.

Grilling

⚠ Danger of burning.
Grill with the oven door closed. If you grill with the door open, hot air will escape from the oven instead of being cooled by the cooling fan. The controls will get hot.

Functions

Grill

For grilling larger quantities of thin cuts (e.g. steaks) and browning baked dishes.

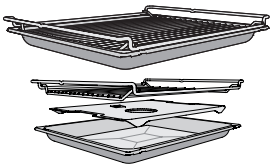
The whole of the top heating / grill element will get hot and glow red.

Fan grill

For grilling larger items, e.g. chicken.

The top heating / grill element and the fan switch on and off alternately.

Trays and racks



Use the universal tray with the rack or anti-splash insert (if available) on top. The juices from the food being cooked collect under the insert. This prevents them from spitting and making the oven dirty. The juices can then be used for making gravy and sauces.

Do not use the baking tray.

Grilling

Notes on the grilling chart

Temperature

As a general rule, select the lower temperature given in the chart. If higher temperatures are used, the meat will brown on the outside, but will not be properly cooked through.

The setting is recommended for thin cuts of meat. For thicker cuts of meat, the maximum temperature can be set to 240 °C.

Pre-heating

Always pre-heat the grill for approx. 5 minutes with the door closed.

Shelf levels

Select the shelf level according to the thickness of the food.

- Thin cuts: Shelf level 3/4
- Thicker cuts: Shelf level 2/3

Grilling duration

- Flat pieces of fish and meat usually take 6–8 minutes per side. Thicker pieces require more time for each side. It is best to grill food of a similar thickness at the same time so that the grilling time for each item does not vary too greatly.
- Turn the food halfway through cooking.

Testing to see if cooked

One way of finding out how well a piece of meat has been cooked is to press down on it with a spoon:

Rare:	If the meat gives easily to the pressure of the spoon, it will still be red on the inside.
Medium:	If there is some resistance, the inside will be pink.
Well-done:	If there is very little resistance, it is cooked through.

Check if the meat is cooked after the shortest time quoted.

Tip

If the surface of thicker cuts of meat is cooked but the centre is still raw, continue grilling at a lower temperature setting or use a lower shelf level to allow the food to cook through to the centre.

Grilling

Preparing food for grilling

Trim the meat. Do not season meat with salt before grilling as this draws the juices out.

Add a little oil to lean meat if necessary. Do not use other types of fat as they can burn and cause smoke.

Clean fish in the normal way. To enhance the flavour, add a little salt or squeeze a little lemon juice over the fish.

Grilling

- Select the required oven function and the temperature.
- Pre-heat the grill for approx. 5 minutes with the door closed.

⚠ Danger of burning!
Use oven gloves when placing food in the oven, turning or removing it and when adjusting oven shelves etc. in a hot oven.

- Place the food on the rack.
- Place the food on the appropriate shelf level (see Grilling chart).

  When grilling using **shelf level 1 to 3**, place the anti-splash tray (if you have one) and the rack in the universal tray and slide these all into the oven together.

  When grilling using **shelf level 4**, slide the rack into shelf level 4 and slide the universal tray together with the anti-splash insert (if you have one) into shelf level 1.
- Close the door.
- Turn the food halfway through cooking.

Grilling

Grilling chart

The data for the recommended function is printed in bold.
Pre-heat the grill for approx. 5 minutes with the door closed, unless advised otherwise.
Turn the food halfway through the cooking time.
Check the food after the shortest time quoted.

Food to be grilled	Level	Grill [°C]	Grill [min]	Fan grill [°C]	Fan grill [min]
Thin cuts					
Steak	4 3)		10–16	**220**	**20–25**
Beef burgers 1)	4 3)		**18–27**	–	–
Kebabs	4 3)	240	25–30	**220**	**16–20**
Chicken kebabs	4 3)	240	20–25	**200**	**23–27**
Pork chops	4 3)		**12–18**	220	23–27
Liver	4 3)		**8–12**	220	12–15
Burgers	4 3)		**14–20**	220	18–22
Sausages	3/4 3)		**10–15**	220	9–13
Fish fillet	3/4 3)		12–16	**220**	**13–18**
Trout	3/4 3)		**16–20**	220	20–25
Toast 1) 2)	3		**4–8**	–	–
Cheese toast	3		7–9	**220**	**5–8**
Tomatoes	3		6–8	**220**	**8–10**
Peaches	3		6–8	**220**	**15–20**
Thicker cuts					
Chicken, approx. 1.2 kg	1 4)	240	60–70	**200**	**60–70**
Pork, approx. 1 kg	1	–	–	**200**	**95–100**
Sirloin joint, fillet, approx. 1 kg	1	–	–	**250**	**25–35**

Grill / Fan grill / Level / Temperature / Duration

1) The settings also apply when using the Grill function for testing in accordance with EN 60350.

2) Do not pre-heat the grill.

3) When grilling using shelf level 4, slide the rack into shelf level 4 and slide the universal tray with the anti-splash insert (if you have one) into shelf level 1.

4) Use shelf level 2 for Fan grill.

Defrost

Use the Defrost function to gently defrost frozen food.

When this function is selected, only the fan switches on and circulates the air at room temperature.

⚠ Danger of salmonella poisoning. It is particularly important to observe food hygiene rules when defrosting poultry. Do not use the liquid from the defrosted poultry. Pour it away, and wash the tray, the sink and your hands.

Useful tips

- Where possible, remove the packaging and put the food to be defrosted on the universal tray or into a suitable dish.
- When defrosting poultry, put it on the rack over the universal tray to catch the defrosted liquid so that the meat is not lying in this liquid.
- Meat, poultry and fish do not need to be fully defrosted before cooking. Defrost so that the surface is sufficiently soft to take herbs and seasoning.

Defrosting times

The time needed for defrosting depends on the type and weight of the food, and at what temperature it was deep frozen. The following chart is for guidance only. It is important to check that food is thoroughly defrosted.

Frozen food	Weight [g]	Duration [min]
Chicken	800	90–120
Meat	500	60–90
	1000	90–120
Sausages	500	30–50
Fish	1000	60–90
Strawberries	300	30–40
Butter cake	500	20–30
Bread	500	30–50

Drying food

Drying is a traditional method of preserving fruit, certain vegetables and herbs.

It is important that fruit and vegetables are ripe and not bruised before they are dried.

■ Prepare the food for drying

- Peel and core apples, and cut into slices 0.5 cm thick.
- Stone plums, if necessary.
- Peel, core and cut pears into thick wedges.
- Peel and slice bananas.
- Clean mushrooms and cut them in half or slice them.
- Remove parsley and dill from the stem.

■ Distribute the food evenly over the universal tray.

■ Select Fan plus or Conventional heat.

■ Select a temperature of 80–100 °C.

■ Place the universal tray on shelf level 1.
With Fan plus you can dry produce on levels 1+3 at the same time.

Food	Drying time
Fruit	2–8 hours
Vegetables	3–8 hours
Herbs*	50–60 minutes

* Use Conventional heat for drying herbs.

■ Reduce the temperature if condensation begins to form in the oven.

⚠ Danger of burning. Wear oven gloves when removing the dried food from the oven.

■ Allow the dried fruit or vegetables to cool down after drying.

Dried fruit must be completely dry, but also soft and elastic.

■ Store in sealed glass jars or tins.

Frozen food/Ready meals

Tips

Cakes, pizza, baguettes

- Large frozen items such as cakes, pizzas or baguettes cover an extensive area of the baking tray or universal tray.
The temperature difference if large frozen items are cooked in these trays can cause the tray to distort in such a way that it cannot be removed from the oven when it is hot. Further use will make the distortion worse. Place this type of food on baking parchment on the rack to prevent the risk of this happening.
- Use the lowest temperature recommended on the manufacturer's packaging.

Oven chips, croquettes or similar items

- Small items of frozen food such as oven chips can be cooked on the baking tray or universal tray.
Place baking parchment on the tray so that they cook gently.
- Use the lowest temperature recommended on the manufacturer's packaging.
- Turn several times during cooking.

Method

Eating food which has been cooked correctly is important for good health.

Only bake cakes, pizza, chips etc. until they are golden. Do not overcook them.

■ Select the function and temperature recommended on the manufacturer's packaging.

■ Pre-heat the oven.

■ Place the food in the pre-heated oven on the shelf level recommended on the packaging.

■ Check the food at the end of the shortest time recommended on the packaging.

Gentle bake

The Gentle bake function is ideal for bakes and gratins which require a crisp top.

Food	[°C]		[min]
Lasagne	190	1	45–60
Potato gratin	180	1	55–65
Vegetable bake	180	1	55–65
Pasta bake	180	1	40–50

Temperature / Shelf level / Duration

The table contains just a few examples.

For other recipes, use the temperature and time settings given for Fan plus as a guide.

Note for test institutes

Test food acc. to EN 60350

Test food	Tray / tin	Function	[°C]		[min]	Pre-heat
Drop cookies (8.4.1)	1 tray		140 2)	2	30–50	No
	2 trays 1)		140 2)	1+3	30–55	No
	1 tray		160 2)	2	15–35	Yes
Small cakes (8.4.2)	1 tray		150 2)	1	25–40	No
	2 trays		150 2)	1+3	25–40	No
	1 tray		140 2) 6)	3	25–35	Yes
Whisked sponge cake (8.5.1)	Springform Ø 26 cm 3)		160 2)	1	30–40	No
	Springform Ø 26 cm 3)4)		140–170 2)	1	20–45	Yes
Apple pie (8.5.2)	Springform Ø 20 cm 3)		150 2)	1	95–110	No
	Springform Ø 20 cm 3)		170 2)	1	80–100	No
Toast (9.1)	Rack			3	4–8	No
Grill beef burgers (9.2)	Rack on top of universal tray			4 5)	1st side: 12–16 2nd side: 6–11	Yes, 5 minutes

Fan plus / Conventional heat / Grill

Temperature / Shelf level / Duration

1) Take the baking trays out of the oven early if the food is sufficiently browned before the specified time has elapsed.

2) Do not use Rapid heat-up during the heating-up phase.

3) Place baking tins on the rack.

4) In general, if a range of temperatures is given, it is best to select the lower temperature and to check the food after the shortest time.

5) Place the rack on shelf level 4 and the universal tray on shelf level 1.

6) Do not use the FlexiClip telescopic runners.

Energy efficiency class

The Energy efficiency class is determined according to EN 50304.

Energy efficiency class	**A**
Function used:	Fan plus
Please note:	Do not use the FlexiClip telescopic runners

Cleaning and care

⚠ Danger of burning. Make sure the oven heating elements are switched off and that the oven cavity is cool.

⚠ Danger of injury. Do not use a steam cleaning appliance to clean this appliance. The steam could reach electrical components and cause a short circuit.

All external surfaces are susceptible to discolouration or change in appearance if unsuitable cleaning agents are used.
Oven cleaners and descaling agents will damage the front of the oven, in particular.
Residues of cleaning agents must be removed immediately after use.
All surfaces are also susceptible to scratches. Scratches on glass surfaces could even cause a breakage in certain circumstances.

Unsuitable cleaning agents

To avoid damaging the surfaces, do not use:

- cleaning agents containing soda, ammonia, acids or chlorides,
- cleaning agents containing descaling agents on the oven front,
- abrasive cleaning agents, e.g. powder cleaners and cream cleaners,
- solvent-based cleaning agents,
- stainless steel cleaning agents,
- dishwasher cleaner,
- glass cleaning agents,
- cleaning agents for ceramic hobs,
- hard, abrasive brushes or sponges, e.g. pot scourers, brushes or sponges which have been previously used with abrasive cleaning agents,
- melamine eraser blocks,
- sharp metal scrapers or tools,
- wire wool or metal scourers,
- spot cleaning,
- oven cleaner*,
- stainless steel spiral pads*.

* these can, however, be used to remove very heavy soiling from PerfectClean treated surfaces.

Cleaning and care

Soiling might become impossible to remove if it is not dealt with. Continued use of the oven without regular cleaning will make it much harder to keep clean.
Soiling is, therefore, best removed after each use of the oven.

The accessories are not dishwasher-proof.

Useful tips

- Soiling caused by spilt juices and cake mixtures is best removed whilst the oven is still warm. Exercise caution and make sure the oven is not too hot - danger of burning.
- To make cleaning easier you can dismantle the oven door, remove the side runners and the FlexiClip runners (if present), remove the catalytic back panel and the side liners and lower the top heating/grill element to remove the roof liner.

Normal soiling

See "Cleaning catalytic panels and liners" for instructions on how to keep the catalytic enamel clean.

- It is best to remove normal soiling immediately using a clean sponge and a solution of hot water and washing-up liquid or with a clean, damp microfibre cloth.
- After cleaning make sure all residual cleaning agent is thoroughly removed with clean water. This is particularly important when cleaning PerfectClean surfaces as cleaning agent residues can impair the non-stick properties.
- After cleaning and rinsing, wipe the surfaces dry using a soft cloth.

Cleaning the seal

There is a seal around the oven interior which seals the oven interior and the inside of the door.

Grease deposits on the seal can cause it to become brittle and cracked.

- It is best to wipe the seal clean after each use.

Cleaning and care

Stubborn soiling (does not apply to the FlexiClip runners)

Spilt fruit and roasting juices may cause lasting discolouration or matt patches on enamelled surfaces. This discolouration is permanent but will not affect the efficiency of the finish. Do not try to remove this discolouration! Clean these following the instructions given here.

- Baked on deposits can be removed with a glass scraper or a non-abrasive stainless steel spiral pad.

Oven spray will damage catalytic enamel. Remove all catalytic enamelled panels from the oven interior before using oven spray.

- Very stubborn soiling on PerfectClean treated enamel can be cleaned using Miele oven cleaner. It must be applied to cold surfaces in accordance with instructions on the packaging.

Non-Miele oven spray must only be used in a cold oven and for no longer than a maximum of 10 minutes.

- Leave the oven cleaner to take effect for the prescribed time. You can then also use the scouring pad on the back of a washing-up sponge to remove the soiling.
- After cleaning, remove all oven cleaning agent residues thoroughly with clean water, and dry with a soft cloth.

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Cleaning and care

Stubborn soiling on the FlexiClip runners

Never attempt to clean FlexiClip telescopic runners in a dishwasher. This would remove the special grease which is essential for their smooth functioning.

For stubborn surface soiling or if the bearings become sticky with spilled fruit juices proceed as follows:

- Soak the FlexiClip runners for approx. 10 minutes in a solution of hot water and washing-up liquid. If necessary use the back of a washing-up sponge to remove the soiling. The bearings can be carefully cleaned with a soft brush.

Cleaning may cause some discolouration or fading in places, however this will not affect the functioning of the runners in any way.

Cleaning catalytic panels and liners

Soiling from oil and fat is burnt off catalytic enamel when very high temperatures are used in the oven.

The higher the temperature, the more effective the process.

Exposure to scouring agents, abrasive brushes or sponges and oven sprays can cause catalytic enamel to lose its self-cleaning properties.
Catalytic enamelled panels and liners should therefore be taken out of the oven before using oven spray in it.

Removing spice, sugar and similar deposits

- Remove the back panel and the side liners (see relevant sections later on in this chapter).
- Clean the back panel, roof liner and side liners by hand with a solution of hot water and washing-up liquid applied with a soft brush.
- Rinse thoroughly and then leave to dry before fitting back in the oven.

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Cleaning and care

Removing oil and grease splashes

- Remove any accessories from the oven including the side runners.
- Before starting the cleaning process, remove any large deposits of soiling from the inside of the door and the PerfectClean surfaces to avoid them burning on.
- Select the Fan plus function and a temperature of 250 °C.
- Then heat the empty oven for at least an hour.

The length of time required will depend on the level of soiling.

If the catalytic coating is very heavily soiled with oil and grease, a film can form on the oven surface during the cleaning process.

⚠ Danger of burning. Allow the oven to cool down before cleaning by hand.

- Clean the inside of the door and the oven interior with a clean sponge and a solution of hot water and washing-up liquid or a clean damp microfibre cloth.

Any remaining soiling will gradually disappear with each subsequent use of the oven at high temperatures.

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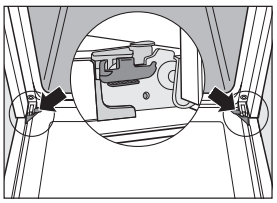
Cleaning and care

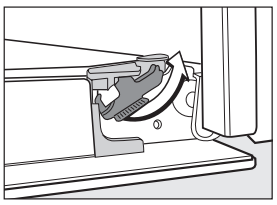
Removing the door



The oven door is connected to the hinges by retainers.

Before removing the door from the retainers, the locking clamps on both hinges have to be released.

- Open the door fully.

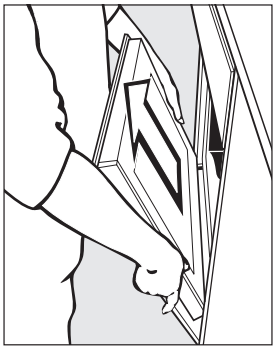


- Release the locking clamps by turning them as far as they will go.

Do not attempt to take the door off the retainers when it is in the horizontal position as the retainers will spring back against the oven.

Do not use the handle to pull the door off the retainers as the handle could break.

- Raise the door up till it rests open.



- Holding the door securely at both sides lift it upwards off the retainers. Make sure you take it off straight.

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Cleaning and care

Dismantling the door

The door is sealed all round to prevent air in the oven cavity from getting into it.

In the unlikely event that soiling has worked its way in between the glass panes, the door can be dismantled in order to clean in between the panes.

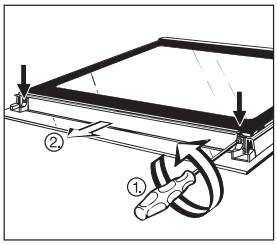
Take particular care as scratches can damage the glass.
When cleaning the glass panes do not use abrasive cleaning agents, hard sponges or brushes and do not use sharp metal tools or scrapers. Please also read the general notes on cleaning the oven front before cleaning the glass panes.

Oven spray will damage the aluminium trims inside the door. These should only be cleaned using hot water and washing-up liquid applied with a clean sponge or a clean, damp microfibre cloth.

Be especially vigilant after dismantling the door that the glass panes do not break.

⚠ Danger of injury.
Always remove the door before dismantling it.

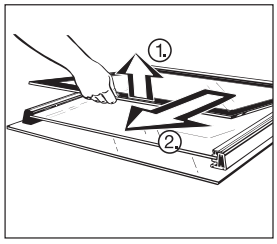
- Place the door on a protective surface (e.g. on a tea towel) to prevent it getting scratched. The door handle should line up with the edge of the table. Make sure the glass lies flat and does not get broken during cleaning.



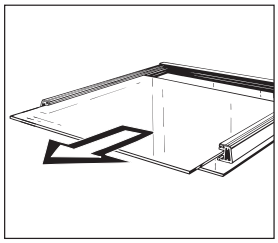
- Unscrew the Torx screws and then pull the guides and the trim together with the seal off.

You can now remove the inner and middle panes.

Cleaning and care



- **Gently** lift the inner pane up and out of the plastic strip.



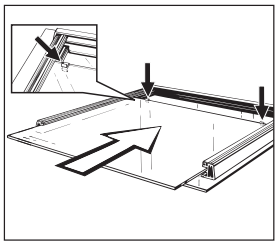
- Pull the middle pane out.

Take care not to dislodge the seals that are fitted to the right and left hand side of the pane next to the guides. These seals are designed to hold the glass pane securely in the frame.

- Clean the door panes and other individual parts with a clean sponge and a solution of hot water and washing-up liquid or a clean damp microfibre cloth.

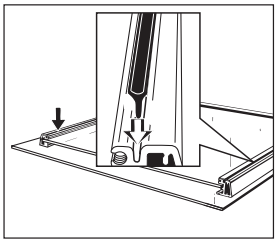
- Dry all parts with a soft cloth.

Then reassemble the door carefully:

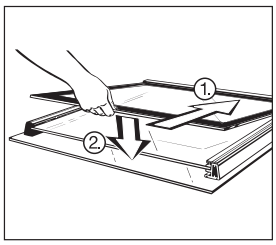


- Slide the middle pane in slightly and then refit the seal. Then push the pane right in.

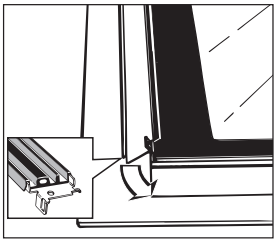
Cleaning and care



- Fit the side seals for the inner panel in the grooves provided.

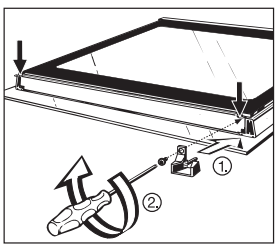


- Fit the middle pane with the matt printed surface facing downwards. Make sure that the side seals do not slip and push the pane in as far as it will go.



- Fit the trim together with its seal over the panes.

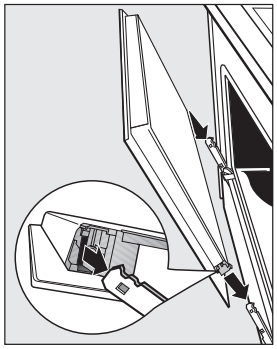
If the seal is fitted correctly hot air from the oven cavity will not be able to get into the door.



- Refit the guides and screw the trim firmly back in position.

Cleaning and care

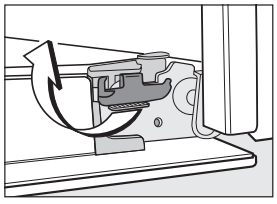
Refitting the door



- Hold the door securely at both sides and carefully fit it back onto the hinge retainers. Make sure it goes on straight.

- Open the door fully.

It is essential that the locking clamps lock securely when the door is refitted after cleaning. Otherwise the door could could work loose from the retainers and be damaged.



- Flip both locking clamps back up as far as they will go into a horizontal position.

Cleaning and care

Removing the side runners and side liners

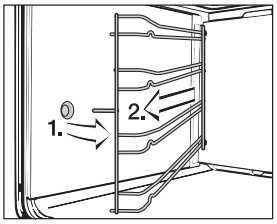
Remove the side runners and side liners from the runners for cleaning.

⚠ Danger of injury.
Do not use the oven without the side runners.

You can remove the side runners together with the FlexiClip runners (if present).

If you wish to remove the FlexiClip runners separately beforehand, please follow the instructions in "Features – Fitting and removing the FlexiClip runners".

⚠ Danger of burning.
Make sure the oven heating elements are switched off and cool.



- Pull the runners out of holder (1) at the front of the oven and then pull them out of the oven (2) together with the catalytic side liners (if fitted).

Refit in the reverse order.

- Take care and ensure that all parts are correctly fitted.

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Cleaning and care

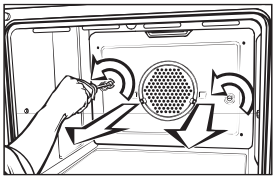
Removing the back panel

⚠ Danger of injury.
Do not use the oven without the back panel.

The back panel can be removed for cleaning purposes.

⚠ Danger of burning.
Make sure the oven heating elements are switched off and cool.

- Disconnect the appliance from the mains.
- Remove the side runners, together with the catalytic side liners (if fitted).
- Undo the screws and take the back panel out for cleaning.



Refit in the reverse order.

Take care and ensure that all parts are correctly fitted.

- Reconnect the oven to the electricity supply.

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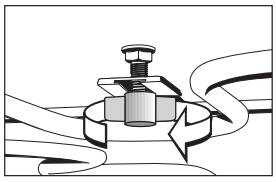
Cleaning and care

Removing the roof liner

⚠ Danger of burning.
Make sure the oven heating elements are switched off and cool.

- Remove the side runners together with the catalytic side liners (if fitted).



- Undo the wing nut.

Do not use force to lower the top heat/grill element as this can cause it to break.

- Carefully lower the top heat/grill element and remove the roof liner for cleaning.

You can now clean the roof of the oven.

Reassemble in the reverse order, carefully ensuring all parts are correctly in place.

- Raise the top heat/grill element and tighten the wing nut securely.
- Refit the side runners.

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Problem solving guide

With the aid of the following guide, minor problems can be easily corrected without contacting Miele. The following guide may help you to find the reason for a fault, and to correct it. If having followed the suggestions below, you still cannot resolve the problem, please contact Miele (see back cover for contact details).

⚠ Danger of injury.
Installation, maintenance and repairs may only be carried out by a suitably qualified and competent person. Repairs and other work by unqualified persons could be dangerous.
Miele cannot be held liable for unauthorised work.
Do not attempt to open the casing of the oven yourself.

Problem	Possible cause and remedy
The display is dark.	There is no power to the oven. ■ Check whether the mains fuse has tripped. If it has, contact a qualified electrician or Miele.
The oven does not heat up.	You have only selected an oven function or a temperature. ■ Select both a function **and** a temperature.
	The system lock has been switched on. ■ Switch off the system lock (see "Clock/timer - Altering settings").
	There is no power to the oven. ■ Check whether the mains fuse has tripped. If it has, contact a qualified electrician or Miele.

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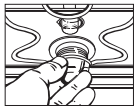
Problem solving guide

Problem	Possible cause and remedy
On ovens with a clock/ timer, *12:00* starts flashing in the display.	There has been a power cut. ■ Reset the time of day (see "Using for the first time"). Cooking durations will also need to be reset for any programme in use.
0:00 appears unexpectedly in the display and is flashing at the same time. The buzzer might also be sounding.	The oven has been operating for an unusually long time and this has activated the safety switch-off function. ■ Turn the function selector to **0**.The oven is now ready to use again immediately.
A noise can be heard after a cooking process.	The cooling fan is switched on. The cooling fan will switch off automatically when the temperature in the oven interior has fallen sufficiently.
Spots like rust appear on catalytic surfaces.	The catalytic cleaning process does not remove spices, sugar and similar deposits. ■ Take catalytic panels out of the oven and remove this type of deposit with a mild solution of hot water and washing-up liquid applied with a soft brush (see "Cleaning and care / Cleaning the catalytic back panel").

Problem solving guide

Problem	Possible cause and remedy
Cakes and biscuits are not cooked properly after following the times given in the chart.	A different temperature from the one given in the recipe was used. ■ Select the temperature required for the recipe.
	The ingredient quantities are different from those given in the recipe. ■ Double check the recipe. The addition of more liquid or more eggs makes a moister mix which would take longer to cook.
Browning is uneven.	The wrong temperature or shelf level was selected. ■ There will always be a slight unevenness. If the unevenness is pronounced, check that the correct temperature and shelf level have been selected.
	The material or colour of the baking tin is not suitable for the oven function. ■ With Conventional heat light coloured, shiny tins are less suitable. Use matt, dark coloured tins.
FlexiClip runners are not running smoothly.	The bearings in the FlexiClip runners are not sufficiently lubricated. ■ Lubricate the bearings with the special Miele lubricant. Only use this special lubricant, as it is designed to withstand high temperatures in the oven. Other lubricants can harden and stick to the telescopic runners when they are heated. The Miele lubricant is available to order from Miele or via the online Miele shop.

Problem solving guide

Problem	Possible cause and remedy
The oven lighting does not switch on.	The halogen lamp needs replacing. Danger of burning. Make sure the oven heating elements are switched off and cool. ■ Disconnect the appliance from the mains.  ■ Turn the lamp cover a quarter turn anti-clockwise to release it and then pull it together with its seal downwards to take it out. ■ Replace it with a new halogen lamp (Osram 66725 AM/A, 230 V, 25 W, G9). ■ Refit the lamp cover together with its seal and turn clockwise to secure. ■ Reconnect the oven to the electricity supply.

After Sales / Guarantee

Service

In the event of any faults which you cannot easily remedy, please contact

– your Miele Dealer

or

– Miele Service

See back of booklet for contact details.

When contacting your Dealer or Miele, please quote the model and serial number of your appliance.

This information is given on the data plate, visible on the front frame of the oven, with the door fully open.

For appliances with hob controls, please also quote the model and serial number of your hob (see the separate Operating and installation instructions for the hob)

Guarantee

The appliance is guaranteed for 2 years from the date of purchase.

In the UK, you must activate your cover by calling 0845 365 6640 or registering online at www.miele.co.uk.

Electrical connection

⚠ Danger of injury.
All electrical work should be undertaken by a suitably qualified and competent person. Installation, repairs and other work by unqualified persons could be dangerous. Miele cannot be held liable for unauthorised work. Ensure power is not supplied to the appliance until after installation or repair work has been carried out.

Connection of this appliance to the electricity supply must be made in accordance with current safety regulations (BS 7671 in the UK).

Connection of this appliance should be made via a fused connection unit or a suitable isolator and the on/off switch should be easily accessible after the appliance has been built in.

If the switch is not accessible after installation (depending on country) an additional means of disconnection must be provided for all poles.

When switched off there must be an all-pole contact gap of 3 mm in the isolator switch (including switch, fuses and relays according to EN 60335).

Connection data

The required connection data are given on the data plate located on the oven trim visible when the door is open.

Ensure that these match the mains supply.

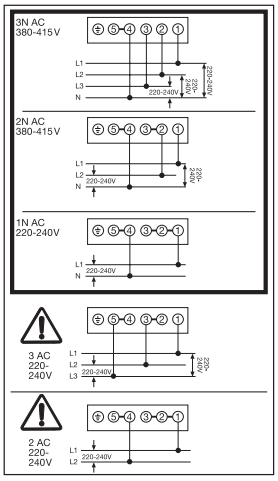
When contacting Miele, please quote the following:

– Model number
– Serial number
– Connection data (voltage/frequency/ maximum connected load)

When replacing the cable supplied with another cable or changing the connection, only cable type H05VV-F with a suitable cross-sectional area (CSA) may be used (available from Miele Spare Parts).

Electrical connection

Wiring diagram



Cooker

Cookers with integrated hob controls are not supplied with a connection cable.

The cooker must be connected to the mains supply using a type H 05 VV-F mains cable only, with a suitable cross-sectional area (CSA) according to the diagrams shown above.

Maximum connected load: see data plate.

Possible combination hobs

Miele cookers with integrated hob controls may only be combined with hobs as specified by Miele for use with that cooker.

Contact Miele or your Miele Dealer for further information on suitable combinations.

Oven

Ovens are supplied for connection with an approx. 1.7 m long 3-core cable for connection to a 230 V, 50 Hz supply. The wires in the mains lead are coloured as follows: Green/yellow = earth; Blue = neutral; Brown = live WARNING, THIS APPLIANCE MUST BE EARTHED

For extra safety it is advisable to protect the appliance with a suitable residual current device (RCD).

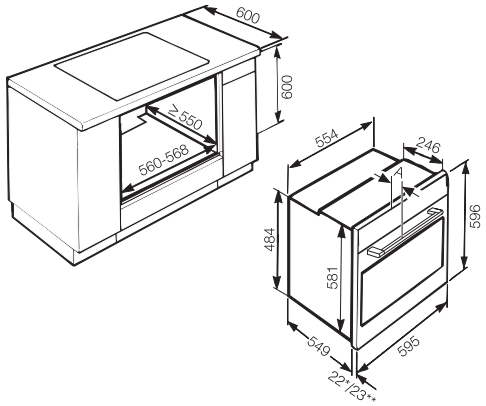
Maximum connected load: see data plate.

Building-in diagrams

Appliance and niche dimensions

Dimensions are given in mm.

Installation in a base unit

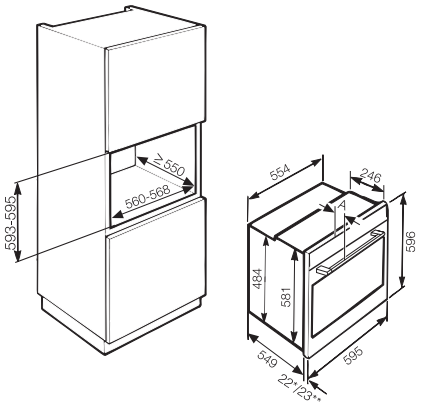


A H21xx: 45 mm
H22xx: 42 mm

* Ovens with glass front
** Ovens with metal front

Building-in diagrams

Installation in a tall unit



A H21xx: 45 mm
H22xx: 42 mm

* Ovens with glass front
** Ovens with metal front

Built-in cooker

⚠ The cooker must not be operated until it has been correctly installed in its housing unit.

In order to function correctly, the cooker requires an adequate supply of cool air.
Ensure that the supply of cool air is not impaired (e. g. by heat insulation strips in the housing unit).
Please also ensure that the cool air supply is not unduly heated by other heat sources such as a wood burning stove.

Before installation

- Before connecting the appliance to the mains, you must disconnect the power supply to the isolator switch.
- Follow the connection diagram supplied with the cooker.

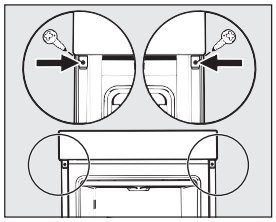
Installing the cooker

- Connect the mains cable from the cooker to the isolator.
- Align the cooker in front of the base unit.
- Connect the hob plugs to the socket on the cooker.

Lifting the oven by the door handle can damage the door. Use the handle recesses on the side of the casing.

It is advisable to dismantle the door before installing the appliance (see "Cleaning and Care - Dismantling the door") and remove accessories from the oven cavity. This will make it easier to install in its niche and you will not be tempted into using the handle to carry it.

- Push the cooker into the base unit and align it.
- Open the door (if you have not removed it previously).



- Use the screws supplied to secure the cooker to the side walls of the housing unit through the holes in the trim.
- Refit the door, if necessary (see "Cleaning and care - Refitting the door").

Installing the oven

⚠ The oven must not be operated until it has been correctly installed in its housing unit.

In order to function correctly, the oven requires an adequate supply of cool air. Ensure that the supply of cool air is not impaired (e.g. by heat insulation strips in the housing unit). Please also ensure that the cool air supply is not unduly heated by other heat sources such as a wood burning stove.

Before installation

- Before connecting the oven to the mains, you must disconnect the power supply to the oven isolator switch.

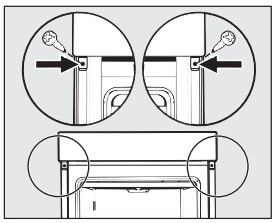
Building in

- Connect the mains cable from the oven to the isolator.

Lifting the oven by the door handle can damage the door. Use the handle recesses on the side of the casing.

It is advisable to dismantle the door before installing the appliance (see "Cleaning and Care - Dismantling the door") and remove accessories from the oven cavity. This will make it easier to install in its niche and you will not be tempted into using the handle to carry it.

- Push the oven into the housing unit and align it.
- Open the door (if you have not removed it previously).



- Use the screws supplied to secure the oven to the side walls of the housing unit through the holes in the oven trim.
- Refit the door, if necessary (see "Cleaning and care - Refitting the door").

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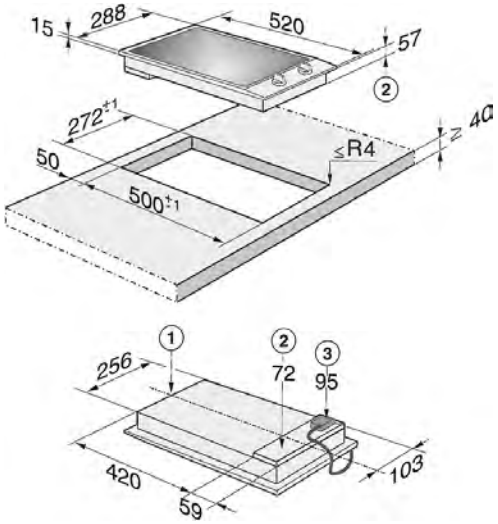
Miele

H2160E; H2260E;
H2160B; H2161B; H2261B

CE en - GB M.-Nr. 09 610 161 / 02

Appliance **12.5.6**

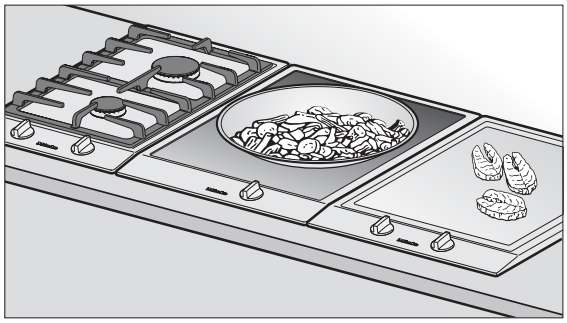
Cooktop



Basic		
Brand	Miele	
Model	Domino CS 1112 E	
Dimension (mm)	288x272x500	
Weight (kg)	7.7	
Energy		
Energy Efficiency Class		
Energy Consumption	Front ceramic radiant (145 mm)	1.20 kW
	Rear ceramic radiant (100-180 mm)	0.60-1.80 kW
	Max Power	3.00 kW
	Rated Current	16 A
Feature		
Control Type	mechanical	
Cooktop Features	residual heat indicator	
Safety Features	auto shut-off	

Miele

Operating and installation instructions



Ceramic hobs
CS 1112
CS 1122
CS 1134

To avoid the risk of accidents or damage to the appliance it is **essential** to read these instructions before it is installed and used for the first time.

en - GB

M.-Nr. 07 138 350

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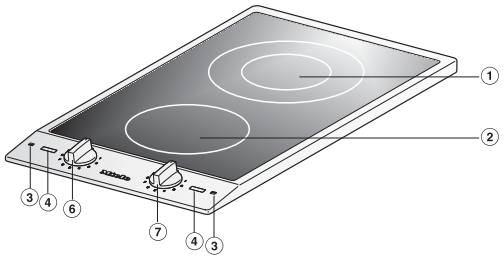
Guide to the appliance

CS 1112



① Double circle zone (Ø 100 mm / 180 mm, rating: 700/1800 W)

② Single circle zone (Ø 145 mm, rating: 1200 W)

③ Symbols to indicate which cooking zone the control is for

④ Displays

Controls:

⑥ front

⑦ rear

Displays

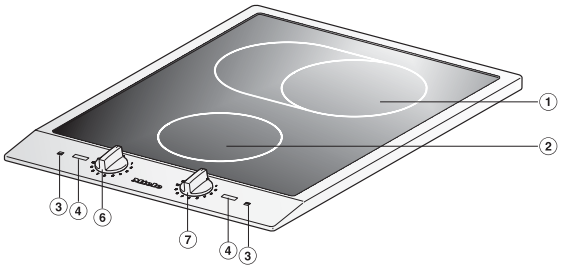
⑪ In-operation indicator

⑫ Symbol to indicate if the outer circle of the double zone is switched on

⑬ Residual heat indicator

Guide to the appliance

CS 1122



① Extended cooking zone (Ø 180 mm / 180 mm x 265 mm, rating: 1500/2400 W)
② Single circle zone (Ø 145 mm, rating: 1200 W)
③ Symbols to indicate which cooking zone the control is for
④ Displays

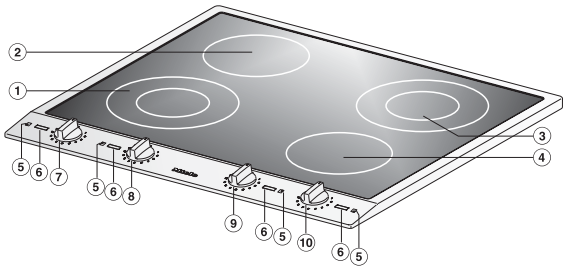
Controls:
⑥ front
⑦ rear

Displays

⑪ In-operation indicator
⑫ Symbol to indicate if the extended area of the rear zone is switched on
⑬ Residual heat indicator

Guide to the appliance

CS 1134



① Double circle zone (Ø 100 mm / 180 mm, rating: 700/1800 W)
② Single circle zone (Ø 145 mm, rating: 1200 W)
③ Double circle zone (Ø 100 mm / 180 mm, rating: 700/1800 W)
④ Single circle zone (Ø 145 mm, rating: 1200 W)
⑤ Symbols to indicate which cooking zone the control is for
⑥ Displays

Controls:
⑦ front left
⑧ rear left
⑨ rear right
⑩ front right

Displays

⑪ In-operation indicator
⑫ Symbol to indicate if the outer circle of a double zone is switched on
⑬ Residual heat indicator

Warning and Safety instructions

This appliance complies with all current local and national safety requirements. Improper use can, however, present a risk of both personal injury and material damage.

To avoid the risk of accidents and damage to the appliance, please read these instructions carefully before installation and before using it for the first time. They contain important notes on installation, safety, use and maintenance.

Keep these instructions in a safe place and ensure that new users are familiar with the content. Pass them on to any future owner.

Warning and Safety instructions

Correct application

▶ This hob is not designed for commercial use. It is intended for use in domestic households and in similar working and residential environments such as:

– Shops
– Offices and showrooms

and by residents in establishments such as:

– Hostels and guest houses.

▶ The hob is intended for domestic use only to cook food and keep it warm.
Any other use is not supported by the manufacturer and could be dangerous. Miele cannot be held liable for damage resulting from incorrect or improper use or operation.

▶ The hob is not intended for outdoor use.

▶ The hob can only be used by people with reduced physical, sensory or mental capabilities or lack of experience and knowledge if they are supervised whilst using it, or have been shown how to use it in a safe way and understand the hazards involved.

Warning and Safety instructions

Safety with children

▶ The hob is not a toy! To prevent the risk of injury, do not let children play with the appliance or its controls.

▶ Children under 8 years of age must be kept away from the hob unless they are constantly supervised.

▶ Children 8 years and older may use the hob only if they have been shown how to use it in a safe way and understand the hazards involved.

▶ The hob gets hot when in use and remains hot for quite a while after being switched off. Keep children well away from the appliance until it has cooled down and there is no danger of burning.

▶ Do not store anything which might arouse a child's interest in storage areas above or next to the hob. Otherwise they could be tempted into climbing onto the appliance with the risk of burning themselves.

▶ Keep all pans out of reach of children. Turn pan handles inwards away from the edge of the hob. Danger of burning or scalding. Special hob guards are available from good retail outlets.

▶ Packaging, e.g. cling film, polystyrene and plastic wrappings, must be kept out of the reach of babies and young children. Danger of suffocation. Dispose of or recycle all packaging safely as soon as possible.

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Warning and Safety instructions

Technical safety

▶ Before installation, check the hob for visible signs of damage. Do not install and use a damaged appliance. It could be dangerous.

▶ The electrical safety of the hob can only be guaranteed if correctly earthed. It is most important that this basic safety requirement is observed and regularly tested, and where there is any doubt, the household wiring system should be inspected by a qualified electrician.
Miele cannot be held liable for the consequences of an inadequate earthing system (e.g. electric shock).

▶ Before connecting the hob to the mains electricity supply, make sure that the data quoted on the data plate match the household mains supply, otherwise the appliance could be damaged. Consult a qualified electrician if in any doubt.

▶ For safety reasons, the hob may only be used after it has been built in.

▶ Do not open the casing of the hob.
Tampering with electrical connections or components and mechanical parts is highly dangerous to the user and can cause operational faults.

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Warning and Safety instructions

▶ Installation, maintenance and repairs may only be carried out by a suitably qualified and competent person in strict accordance with current national and local safety regulations.
Repairs and other work by unqualified persons could be dangerous. Miele cannot be held liable for unauthorised work.

▶ During installation, maintenance and repair work, the hob must be disconnected from the mains electricity supply.

▶ While the hob is under guarantee, repairs should only be undertaken by a service technician authorised by Miele. Otherwise the guarantee is invalidated.

▶ Faulty components must only be replaced by genuine Miele original spare parts. The manufacturer can only guarantee the safety of the appliance when Miele replacement parts are used.

▶ If the connection cable is damaged, it must be replaced by a suitably qualified electrician with a special connection cable of type H 05 V V-F (pvc insulated), available from Miele.

▶ The hob is not intended for use with an external timer switch or a remote control system.

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Warning and Safety instructions

▶ Do not connect the hob to the mains electricity supply by a multi-socket adapter or an extension lead. These do not guarantee the required safety of the appliance (e.g. danger of overheating).

▶ Do not use the hob if it is faulty, or if the ceramic surface is cracked, chipped or damaged in any way. Switch it off immediately, and disconnect it from the mains electricity supply. Danger of electric shock.

▶ The hob may be connected via a fused plug and switched socket. If you wish to connect it to a fused spur connection, or if the appliance is supplied without a plug, it must be installed and connected by a suitably qualified and competent person in strict accordance with current local and national safety regulations. Miele cannot be held liable for damage caused by incorrect installation or connection.

▶ In areas which may be subject to infestation by cockroaches or other vermin, pay particular attention to keeping the appliance and its surroundings clean at all times. Any damage caused by cockroaches or other vermin will not be covered by the guarantee.

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Warning and Safety instructions

Correct use

▶ The hob gets hot when in use and remains hot for quite a while after being switched off. There is a danger of burning until the residual heat indicators go out.

▶ Do not leave the hob unattended whilst it is in use. Pans that have boiled dry can cause damage to the ceramic surface for which Miele cannot be held liable. Boiling fat or oil could ignite and cause a fire.

▶ If oil or fat does catch fire, do not attempt to put out the flames with water. Use a suitable fire blanket, saucepan lid, damp towel or similar to smother the flames.

▶ Do not use the hob to heat up the room. Due to the high temperatures radiated, objects near the appliance could catch fire. The life of the appliance could also be reduced.

▶ Use heat-resistant pot holders or gloves when using the appliance. Do not let them get damp or wet, as this causes heat to transfer through the material more quickly with the risk of scalding or burning yourself.

▶ Do not flambé under a cooker hood. The flames could set the cooker hood on fire.

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Warning and Safety instructions

▶ Do not use the hob as a resting place for anything. When it is switched on either deliberately or by mistake, or when there is residual heat present, there is the risk of metal objects heating up, with a danger of burning. Depending on the material, other objects left on the hob could also melt or catch fire.
Damp pan lids might adhere to the ceramic surface and be difficult to dislodge.
Switch the cooking zones off after use.

▶ Where several appliances are installed side by side
Do not place hot pots or pans on the cover strip as this can damage the seal.

▶ Do not cover the hob, e. g. with a hob cover, a cloth or protective foil. The material could catch fire, shatter or melt if the appliance is switched on by mistake or if it is still warm.

▶ Do not use plastic or aluminium foil containers. These melt at high temperatures and could catch fire.

▶ Do not heat up unopened tins of food on the hob, as pressure will build up in the tin, causing it to explode. This could result in injury and scalding or damage.

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Warning and Safety instructions

▶ Do not use pots and pans on the hob with bases with pronounced edges or ridges, e.g. cast iron pans. These could scratch or scour the hob surface permanently.

▶ Aluminium pans or pans with an aluminium base can cause metallic, shiny marks to appear on the ceramic surface. These marks can be removed using a ceramic and stainless steel hob cleaner (see "Cleaning and care").

▶ Never heat an empty pan unless the manufacturer of the pan expressly states that you can do so. This could damage the appliance.

▶ Keep the hob clean. Grains of salt, sugar and sand (e.g. from cleaning vegetables) can cause scratches.

▶ Do not drop anything on the ceramic surface. Even a light object could cause damage in certain circumstances.

▶ To prevent the risk of spillages etc. burning on, remove any soiling as quickly as possible and ensure that pan bases are clean, dry and free of grease.

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Warning and Safety instructions

▶ Do not allow either solid or liquid sugar, or pieces of plastic or aluminium foil to get onto the cooking zones when they are hot. If this should occur, switch off the appliance, and carefully scrape off all the sugar, plastic or aluminium residues from the hob whilst they are still hot, using a shielded scraper blade.
Take care not to burn yourself.
If residues are allowed to cool before being removed, the ceramic surface would be susceptible to pitting or even cracking.
Clean the appliance once it has cooled down.

▶ When using an electrical appliance, e.g. a hand-held food blender, near the hob, ensure that the cable of the electrical appliance does not come into contact with the hot hob. The insulation on the cable could become damaged, giving rise to an electric shock hazard.

▶ Spray canisters, aerosols and other inflammable substances must not be stored in a drawer under the hob. Cutlery inserts must be heat-resistant.

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Warning and Safety instructions

▶ Always ensure that food is sufficiently cooked or reheated. Some foods may contain micro-organisms which are only destroyed by thorough cooking at a sufficiently high temperature for long enough. Therefore, when cooking or reheating food such as poultry, it is particularly important that the food is completely cooked through. If in doubt, select a longer cooking or reheating time.

▶ If the hob is installed behind a kitchen furniture door, it may only be used with the furniture door open. Only close the door when the appliance is switched off and the residual heat indicators have gone out.

Miele cannot be held liable for damage caused by non-compliance with these Warning and Safety instructions.

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Caring for the environment

Disposal of the packing material

The transport and protective packing has been selected from materials which are environmentally friendly for disposal, and should be recycled.

Ensure that any plastic wrappings, bags, etc. are disposed of safely and kept out of the reach of babies and young children. Danger of suffocation.

Disposal of your old appliance

Electrical and electronic appliances often contain materials which, if handled or disposed of incorrectly could be potentially hazardous to human health and to the environment. They are, however, essential for the correct functioning of your appliance. Please do not therefore dispose of it with your household waste.

Please dispose of it at your local community waste collection/recycling centre or contact your dealer for advice. Ensure that it presents no danger to children while being stored for disposal.

18

Before using for the first time

Please stick the extra data plate for the appliance supplied with this documentation in the space provided in the "After sales service, data plate, guarantee" section of this booklet.

Cleaning for the first time

- Remove any protective wrapping and sticky labels.
- Before using for the first time, clean the appliance with a damp cloth only and then wipe dry.

Do not use washing up liquid to clean the ceramic surface as it can leave a blue sheen which may be difficult to remove.

Metal components have a protective coating which may give off a slight smell when heated up for the first time.
The smell and any vapours will dissipate after a short time, and do not indicate a faulty connection or appliance.

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How the cooking zones work

Single circle cooking zones have one heating element, whilst double circle cooking zones and extended zones have two. Depending on the model, the heating elements may be separated by an insulating ring. See illustrations.

Each cooking zone has overheating protection (a temperature limiter), which stops the ceramic surface from becoming too hot (see "Overheating protection").

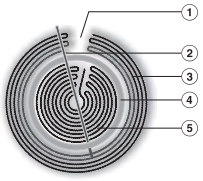
When a power level is selected, the heat switches on and the element can be seen through the ceramic surface.

The temperature of the cooking zones depends on the power level selected, and is electronically regulated. This controls the "timing" of a cooking zone, switching the element on and off.

Single circle zone

① Overheating protection
② Heating element

Double circle zone



① Gap
② Overheating protection
③ Outer heating element
④ Insulating ring
⑤ Inner heating element

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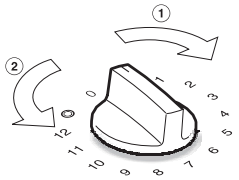
Switching on and off

A single circle zone is switched on and off by turning the control clockwise or anticlockwise.

A double circle zone or extended zone is switched **on** by turning the relevent control **clockwise** ①, and is switched **off** by turning the relevant control **anticlockwise** ② to "0".



Do not turn the control to "0" by turning it past ◎.

When using setting "12", ensure that the mark on the control is exactly positioned at the "12".

Switching on a double or extended area

Depending on the model of hob, the outer circle of a double circle zone or an extended cooking zone can be switched on to provide an extended cooking area when cooking with larger pans.

- Turn the control **clockwise** past "12" to the symbol ◎.
- Then turn the control **anticlockwise** to the required power level.

Switch the double or extended cooking zone off by turning the control back to the "0" position.

When the same cooking zone is switched on again, only the inner zone will switch on.

Residual heat indicator

When a cooking zone is switched on, the corresponding in-operation indicator lights up. Once the zone has reached a certain temperature, the **residual heat indicator** also lights up. The in-operation indicator goes out when the cooking zone is switched off. The residual heat indicator remains on until the cooking zone is cool enough to touch.

Do not touch or place any heat-sensitive objects on the cooking zones while the residual heat indicators are on. Danger of burning and fire.

Settings

Cooking process	Settings
Melting butter, chocolate etc. Dissolving gelatine Preparing yoghurt	1 - 2
Thickening sauces containing egg yolk and butter Warming small quantities of food/liquid Keeping warm food which sticks easily Cooking rice	1 - 3
Warming liquid and semi-solid foods Thickening sauces, e.g. Hollandaise Making porridge Preparing omelettes, lightly fried eggs Steaming fruit	3 - 5
Defrosting deep frozen food Steaming vegetables, fish Cooking dumplings, potatoes, pulses Cooking broths, pulse soups	4 - 6
Bringing to the boil and continued cooking of large quantities of food	7
Gentle braising (without overheating the fat) of meat, fish, vegetables, fried eggs etc.	8 - 9
Frying pancakes etc.	9 - 11
Boiling large quantities of water Bringing food to the boil	11 - 12
Symbol for switching on the outer zone of a double/extended cooking zone	◎

These settings, which are for approx. 4 servings, should only be taken as a guide. With deep pans, large quantities or when cooking without the lid on, a higher setting is needed. With smaller quantities select a lower setting.

Overheating protection

Each zone is equipped with overheating protection (internal temperature limiter). This switches off the heating elements in the cooking zone before the ceramic surface overheats. Once the ceramic surface has cooled down to a safe level, the heating will automatically switch back on again.

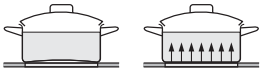
Overheating can be caused by:

- a cooking zone being switched on without a pan on it
- heating up an empty pan
- the base of a pan not sitting evenly on the cooking zone
- the pan not conducting heat properly.

You can tell that the overheating protection has activated because the heating switches on and off even when the highest setting is selected.

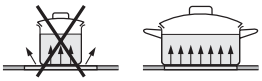
Pans

- Pans made from any material can be used on a ceramic hob.
- However, the best pans are those with a thick base which is very slightly concave when cold. When heated, the base flattens to rest evenly on the hob, optimising the conduction of the heat.



Cold Hot

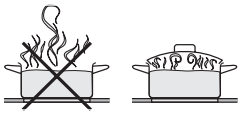
- Pans made of glass, ceramic or stoneware are less suitable, as they do not conduct the heat so well.
- Do not use pots and pans on the ceramic hob with bases with pronounced edges or or ridges, e.g. cast iron pans. These could scratch or scour the hob surface permanently.
- Lift pans into position on the hob. Sliding them into place will cause scuffs and scratches.
- Check that the diameter of the pan base is wide enough for the cooking zone so that heat is not lost unnecessarily. Please note that the maximum diameter quoted by manufacturers often refers to the diameter of the top rim of the pot or pan. The diameter of the base (generally smaller) is more important.



Too small Suitable

Tips on saving energy

- Use a lid whenever possible to minimise heat loss.



Uncovered Covered

- Select a smaller pan when cooking small quantities. A small pan on a small cooking zone uses less energy than a large, partially filled pan on a large cooking zone.
- Use as little water as possible to cook with.
- Reduce the power setting once the water has come to the boil or the oil is hot enough to fry in.
- When cooking for a long time, switch the cooking zone off about 5 to 10 minutes before the end of the cooking time. In this way, use is made of the residual heat.
- Cooking times are greatly reduced when using a pressure cooker.

Cleaning and care

Miele offer a range of branded cleaning and conditioning agents for your hob. See "Optional accessories".

⚠ Do not use a steam cleaning appliance to clean this appliance. The steam could reach electrical components and cause a short circuit.

The appliance should be cleaned after each use. Let it cool down to room temperature before cleaning.
To avoid water marks and limescale deposits, use a soft cloth to dry surfaces that have been cleaned with water.

To avoid damaging the surface of your appliance, do not use:

- washing-up liquid
- cleaning agents containing soda, alkalines, ammonia, acids or chlorides,
- cleaning agents containing descaling agents,
- stain or rust removers,
- abrasive cleaning agents, e.g. powder cleaners and cream cleaners,
- solvent-based cleaning agents,
- dishwasher cleaner,
- grill and oven cleaners,
- glass cleaning agents,
- hard, abrasive brushes or sponges, e.g. pot scourers, or sponges which have been previously used with abrasive cleaning agents,
- melamine eraser blocks,
- sharp pointed objects (these can damage the seal between the frame and the worktop).

Cleaning and care

Ceramic surface

Do not use washing-up liquid to clean the ceramic surface. Washing-up liquid will not remove all soiling and deposits. It will form an invisible coating which will cause permanent discolouration of the ceramic surface.
Clean the hob regularly with a suitable ceramic hob cleaning agent.

Wipe all coarse soiling off using a damp cloth. Stubborn soiling may need to be removed with a shielded scraper blade.

Then clean the hob with Miele ceramic and stainless steel hob cleaning agent (see "Optional accessories") applied with kitchen paper or a clean cloth. Do not apply cleaning agent whilst the appliance is still hot, as this could result in marking. Please follow the manufacturer's instructions.

Finally, wipe the hob with a damp cloth, then polish with a soft, dry cloth. Ensure that all cleaning agent residues are removed. Residues can burn onto the appliance the next time it is used, and cause damage to the ceramic surface.

Spots caused by limescale, water and aluminium residues (spots with a metallic appearance) can be removed using Miele's ceramic and stainless steel hob cleaning agent.

Should any **sugar, plastic or aluminium foil** spill or fall onto a hot cooking zone while it is in use, first switch off the appliance. Then carefully scrape off all the sugar, plastic or aluminium residues from the hob whilst they are still hot using a shielded scraper blade. Take care not to burn yourself.
Allow the appliance to cool down, and then clean as described above.

Stainless steel

The ceramic and stainless steel hob cleaning agent is suitable for cleaning stainless steel surfaces (see "Optional accessories").
To help prevent re-soiling, we recommend a stainless steel conditioner (see "Optional accessories").
Apply sparingly with a soft cloth.

Do not use the ceramic and stainless steel hob cleaning agent on **printed** surfaces. This would rub off the print. These areas should be only cleaned with an E-Cloth or with a solution of warm water and a little washing-up liquid applied with a soft sponge.

Problem solving guide

⚠ Installation work and repairs to electrical appliances must only be carried out by a suitably qualified and competent person in strict accordance with current local and national safety regulations. Repairs and other work by unqualified persons could be dangerous. The manufacturer cannot be held liable for unauthorised work.

What to do if...

... after switching on, the appliance does not heat up

Check whether the mains fuse has tripped. If it has, contact a qualified electrician or Miele.

... the heating switches on and off at the highest setting on one of the cooking zones

The overheating protection mechanism has been triggered (see "Overheating protection").

... it is taking too long for the contents of the pan to come to the boil

– Check that the mark on the control is exactly positioned at the "12". The appliance operates at a lower power level when the control is positioned between the "12" and the "0".

– You can test the power level of the cooking zone (see "To test the power level").

To test the power level

You can test the power level of a cooking zone by measuring how long it takes to bring a specific amount of water to the boil.

The pan (and lid) must be stainless steel or enamel. The diameter of the pan must match the cooking zone, and be flat-bottomed or slightly concave.

- Take a note of the diameter and wattage of the cooking zone to be tested (see "Guide to the appliance").
- Fill the pan with the quantity of water given in the table. The temperature of the water should be approx. 20°C.
- Place the pan with its lid on the cooking zone.
- Switch on the cooking zone at the highest setting.
- Note the time it takes for the water to boil.

The power level for the cooking zone is fine if the water boils within the time given in the table.

The time can vary if:
- there are fluctuations in the main electricity supply,
- very cold water is used,
- an unsuitable pan is used,
- the pan is not covered.

To test the power level

Cooking zone ∅ in cm	Rating in watts for 230 V	Quantity of water in litres	Duration* in minutes
10.0	600 / 700	0.5	11.0
12.0	700 / 750	1.0	13.0
14.5	1000 / 1100	1.0	9.0
14.5	1200	1.0	8.5
14.5	1350	1.0	8.0
17.0	1500	1.5	9.5
18.0	1250	1.5	11.0
18.0	1700 / 1800	1.5	9.0
21.0	2000	2.0	10.5
21.0	2200 / 2300	2.0	9.5
23.0	2500	2.0	9.0

* Max. duration under unfavourable conditions

Optional accessories

Miele offer a comprehensive range of useful accessories as well as cleaning and conditioning products for your Miele appliances.

These can be ordered online at:

or from Miele (see back cover for contact details)

Ceramic and stainless steel hob cleaner 250 ml

Removes heavy soiling, limescale deposits and light discolouration

Stainless steel conditioning agent 250 ml

Removes water marks, flecks and fingerprints. Helps prevent re-soiling.

E-cloth (microfibre cloth)

Removes fingerprints and light soiling.

Safety instructions for installation

General

To avoid the risk of damaging the hob fit the wall units and extractor hood before installing it.

▶ The veneer or laminate coatings of worktops (or adjacent kitchen units) must be treated with 100 °C heat-resistant adhesive which will not dissolve or distort.
Any backmoulds must be of heat-resistant material.

▶ This appliance must not be used in a non-stationary location (e.g. on a ship).

▶ The hob may only be installed above a Miele oven if the worktop is at least 40 mm thick.

▶ Observe carefully the safety distances given on the following pages.

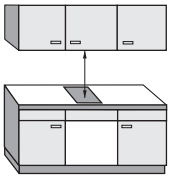
▶ After installation, ensure that the connection cable is without hindrance and that there is no mechanical obstruction which could damage it, such as a drawer.

▶ This appliance must not be installed over a dishwasher, washing machine, tumble dryer, refrigerator or freezer. The high temperatures radiated by the hob could damage the appliance below.

All dimensions in this instruction booklet are given in mm.

Safety instructions for installation

Safety distance above the appliance



A minimum safety distance must be maintained between the appliance and the cooker hood above it. See the cooker hood manufacturer's operating and installation instructions for details.

If the manufacturer's instructions are not available for the cooker hood, a minimum safety distance of at least 760 mm must be maintained. For any flammable objects, e.g. utensil rails, wall units etc. a minimum distance of at least 760 mm must be maintained between them and the appliance below.

When two or more appliances are installed together below a cooker hood, e.g. a gas wok and a ceramic hob, which have different safety distances given in the installation instructions, you should select the greater distance of the two.

Safety instructions for installation

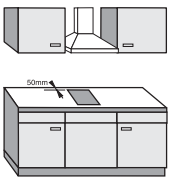
Safety distances to the sides of the hob

Ideally the hob should be installed with plenty of space on either side. There may be a wall at the rear and a tall unit or wall at one side. On the other side, however, no unit or divider should stand higher than the built-in appliance (see illustrations).

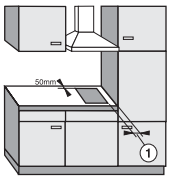
Due to the high temperatures radiated by the appliance, it is essential that a minimum distance of **50 mm** is maintained between the worktop cut-out and the back wall.

The following minimum distance ① between the worktop cut-out and a wall or tall unit to the right or left of it must be maintained:

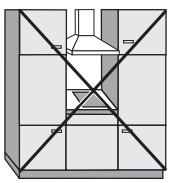
40 mm	for	CS 1212 / CS 1212-1 CS 1221 / CS 1221-1 CS 1222 CS 1223 CS 1234 / CS 1234-1
50 mm	for	CS 1112 CS 1122 CS 1134 CS 1326 CS 1327 CS 1411
100 mm	for	CS 1012 / CS 1012-1
150 mm	for	CS 1421 CS 1312 CS 1322
200 mm	for	CS 1034 / CS 1034-1
250 mm	for	CS 1011 CS 1021.



Recommended



Not recommended



Not allowed

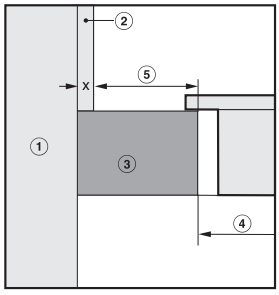
Safety instructions for installation

Safety distance when installing the appliance near a wall with additional niche cladding

A minimum safety distance must be maintained between the worktop cut-out and any niche cladding to protect it from heat damage.

If the niche cladding is made from a **combustible material** (e. g. wood) a minimum safety distance ⑤ of 50 mm must be maintained between the cut-out and the cladding.

If the niche cladding is made from a **non-combustible material** (e. g. metal, natural stone, ceramic tiles) a minimum safety distance ⑤ of 50 mm less the thickness of the cladding must be maintained between the cut-out and the cladding.
Example: 15 mm niche cladding
50 mm - 15 mm = minimum safety distance of 35 mm



① Masonry

② Niche cladding
Dimension x = thickness of niche cladding material

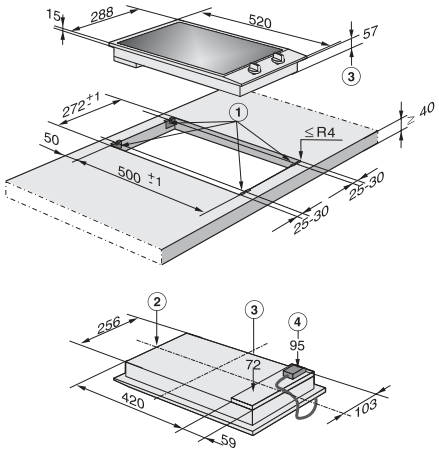
③ Worktop

④ Worktop cut-out

⑤ Minimum safety distance
for **combustible** materials is 50 mm
for **non-combustible** materials is 50 mm less dimension x

Appliance and building-in dimensions

CS 1112



① Spring clamps

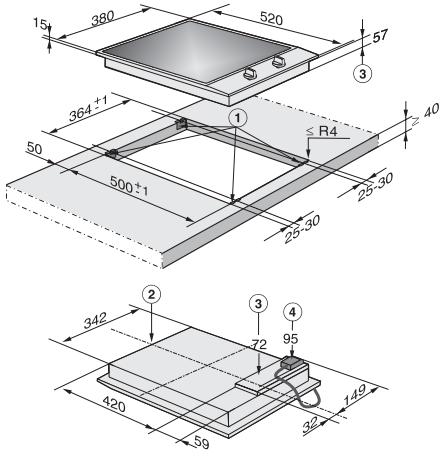
② Front

③ Casing depth

④ Casing depth including mains connection box with mains connection cable, L = 1440 mm

Appliance and building-in dimensions

CS 1122



① Spring clamps

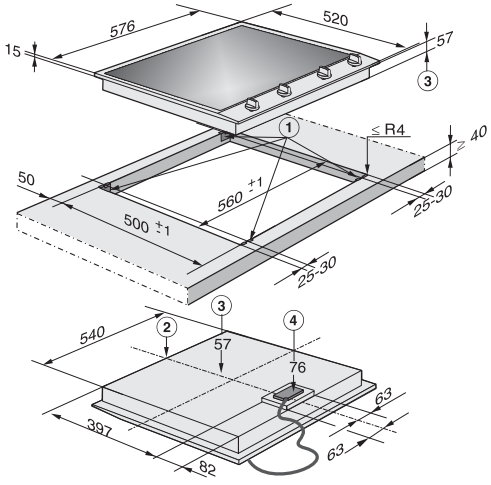
② Front

③ Casing depth

④ Casing depth including mains connection box with mains connection cable, L = 1440 mm

Appliance and building-in dimensions

CS 1134



① Spring clamps

② Front

③ Casing depth

④ Casing depth including mains connection box with mains connection cable, L = 2000 mm

Preparing the worktop

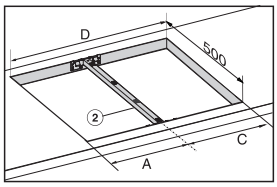
- Make the worktop cut-out for one or more appliances in accordance with the building-in diagrams.
  Remember to maintain a **minimum safety distance** from the **back wall**, as well as from any **tall unit or side wall** to the right or left of the appliance(s).
  See "Safety instructions for installation".
- Seal the cut surfaces with a suitable heat-resistant sealant to avoid swelling caused by moisture.

If, during installation, you find that the seals on the corners of the frame are not flush with the worktop surface, the corner radius (≤ R4) can be carefully scribed to fit.

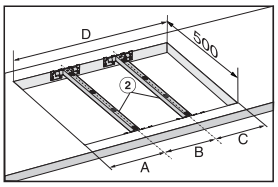
Installation of several appliances

When installing two or more appliances next to each other a spacer bar ② must be used between each one.
See "Fixing the spring clamps and spacer bars".

Worktop cut-out - two appliances



Worktop cut-out - three appliances



To calculate the cut-out width (D) required:

Add up the widths of each appliance (e.g. 288 mm, 380 mm) and subtract 16 mm from this figure

Number of appliances	Appliance width in mm	Worktop cut-out in mm
1	288	288 - 16 = **272**
2	288, 288	288 + 288 - 16 = **560**
2	288, 380	288 + 380 - 16 = **652**
3	288, 288, 288	288 + 288 + 288 - 16 = **848**
3	288, 288, 380	288 + 288 + 380 - 16 = **940**

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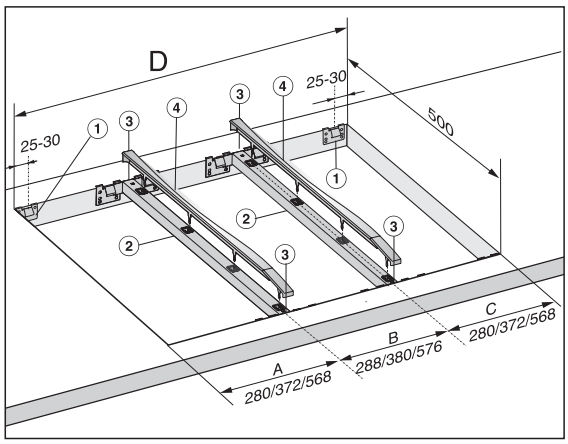
Installation of several appliances



① Spring clamps

② Spacer bars

③ Gaps between spacer bars and worktop

④ Cover strips

The illustration shows a worktop cut-out with spring clamps ① and spacer bars ② for 3 appliances.

An additional spacer bar is required for each additional appliance. The position for securing each additional spacer bar will depend on the width of appliance **B** (288 mm / 380 mm / 576 mm).

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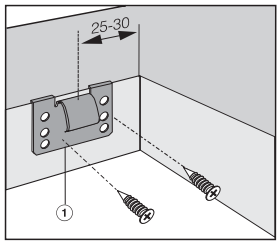
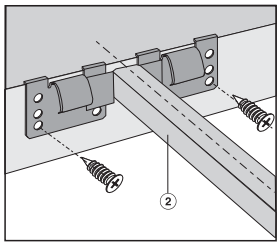
Fixing the spring clamps and spacer bars

Wooden worktops





- Position the spring clamps supplied ① and spacer bars ② on the top edge of the cut-out in the positions marked.
- Secure the spring clamps and spacer bars with the 3.5 x 25 mm screws supplied.

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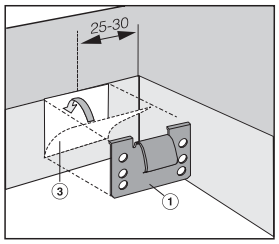
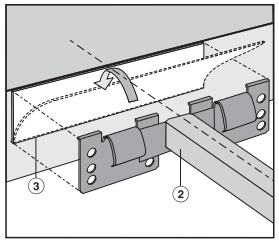
Fixing the spring clamps and spacer bars

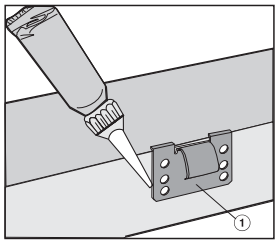
Granite and marble worktops

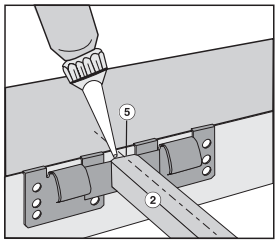
The screws are not required for granite or marble worktops.





- Position and secure the spring clamps ① and spacer bars ② using strong, double-sided adhesive tape ③.





- Apply silcone to the side edges and the lower edges of spring clamps ① and spacer bars ②.
- Then fill gap ⑤ between the spacer bars and the worktop with silicone.

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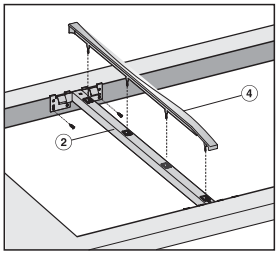
Appliance 12.5.6

Cooktop

Installing the appliance(s)

- Feed the connection cable down through the cut-out.
- Starting at the front, position the appliance in the worktop cut-out.
- Using both hands, press down evenly on the sides of the appliance until it clicks into position. When doing this make sure that the seal under the appliance sits flush with the worktop on all sides. This is important to ensure an effective seal all round. **Do not use sealant.**
- Push the appliance to the side until the holes in the spacer bar can be seen.



- Fit the cover strip ④ into the holes in the spacer bar ②.

- Starting at the front, position the next appliance in the worktop cut-out.
- Connect the appliance(s) to the mains (see "Electrical connection").
- Check that the appliance(s) work(s).

Once installed, the appliance can only be removed using a special tool. It can also be pushed up out of the cut-out from below. It must be pushed up from the back first.

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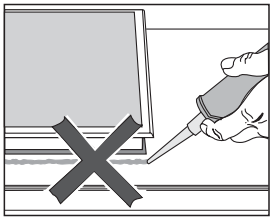
General installation tips

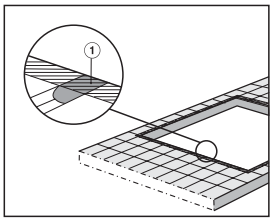
Seal between the appliance and the worktop



The sealing strip under the edge of the top part of the appliance provides a sufficient seal for the worktop.

The appliance must not be sealed with sealant (e.g. silicone).
This could result in damage to the appliance or the worktop if it ever needs to be removed for servicing.

Tiled worktop



Grout lines ① and the hatched area underneath the surface of the appliance must be smooth and even. If they are not, the appliance will not sit flush with the worktop and the sealing strip underneath the top part of the appliance will not provide a good seal between the appliance and the worktop.

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Electrical connection

All electrical work should be carried out by a suitably qualified and competent person in strict accordance with current local and national safety regulations (BS 7671 in the UK).

If the connection cable is damaged, it must be replaced by a suitably qualified electrician with a special connection cable of type H 05 V V-F (pvc insulated), available from Miele.

Installation, repairs and other work by unqualified persons could be dangerous. The manufacturer cannot be held liable for unauthorised work.

Ensure power is not supplied to the appliance until after installation or repair work has been carried out.

The appliance must only be operated when built-in. This is to ensure that all electrical parts are shielded. Live parts must not be exposed.

Do not connect the appliance to the mains electricity supply by an extension lead. These do not guarantee the required safety of the appliance.

Please make sure that the connection data quoted on the data plate match the household mains supply.

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Connection should be made via a fused plug and switched socket or a double pole fused spur connection unit, or a suitable isolator (as appropriate) which complies with national and local safety regulations and the on/off switch should be easily accessible after the appliance has been built in.

If the switch is not accessible after installation (depending on country) an additional means of disconnection must be provided for all poles.

For extra safety it is advisable to protect the appliance with a suitable residual current device (RCD).

When switched off there must be an all-pole contact gap of at least 3 mm in the isolator switch (including switch, fuses and relays).

Important U.K.

The appliance is supplied for connection to a 230-240 V, 50 Hz supply with a 3-core cable.

The wires in the mains lead are coloured in accordance with the following code:

Green/yellow	= earth
Blue	= neutral
Brown	= live

WARNING
THIS APPLIANCE MUST BE EARTHED

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Electrical connection

Important

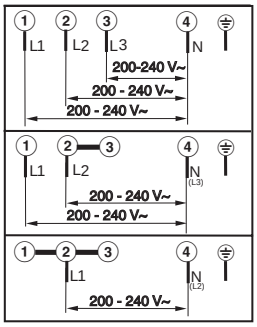
The electrical safety of this appliance can only be guaranteed when continuity is complete between the appliance and an effective earthing system, which complies with local and national regulations. It is most important that this basic safety requirement is present and tested regularly and if there is any doubt the electrical wiring in the home should be inspected by a qualified electrician. The manufacturer cannot be held liable for the consequences of an inadequate earthing system such as an electric shock.

The manufacturer cannot be held liable for damage which is the direct or indirect result of incorrect installation or connection.

Electrical connection

Wiring diagram

CS 1134



After sales service, data plate, guarantee

In the event of any faults which you cannot remedy yourself, or if the appliance is under guarantee, please contact:

– Your Miele dealer, or

– the Miele Service Department (see back cover for address).

Please note that telephone calls may be monitored and recorded to improve our service.

When contacting Miele, please quote the model and serial number of your appliance which are given on the data plate.

N.B. A call-out charge will be applied for service visits where the problem could have been resolved as described in these instructions.

Space in which to stick the extra data plate supplied with the appliance. Ensure that the model number is the same as the one on the front of these instructions.

Guarantee

For information on the appliance guarantee specific to your country please contact Miele. See back cover for contact details.

In the U.K. your appliance is guaranteed for 2 years from the date of purchase. However, you must activate your cover by calling 0845 365 6640 or registering online at www.miele.co.uk

United Kingdom
Miele Co. Ltd.
Fairacres, Marcham Road
Abingdon, Oxon, OX14 1TW
Tel: 0845 365 0555
Fax: 0845 365 0777
Customer Contact Centre Tel: 0845 365 6600
E-mail: info@miele.co.uk
Internet: www.miele.co.uk

Australia
Miele Australia Pty. Ltd.
ABN 96 005 635 398
1 Gilbert Park Drive, Knoxfield, VIC 3180
Tel: (03) 9764 7130, Fax: (03) 9764 7149
Internet: www.miele.com.au

China
Miele (Shanghai) Trading Ltd.
1-3 Floor, No. 82 Shi Men Yi Road
Jing' an District
200040 Shanghai, PRC
Tel: +86 21 6157 3500
Fax: +86 21 6157 3511
E-mail: mieleshanghai@cn.miele.com
Internet: www.miele.cn

Miele (Hong Kong) Limited
41/F - 4101, Manhattan Place
23 Wang Tai Road
Kowloon Bay
Hong Kong
Tel: (852) 2610 1331
Fax: (852) 2610 1013
Email: mielehk@miele.com.hk

India
Miele India Pvt. Ltd.
Ground Floor, Copia Corporate Suites
Plot No. 9, Jasola
New Delhi – 110025
Tel: 011-46 900 000, Fax: 011-46 900 001
E-mail: customercare@miele.in
Internet: www.miele.in

Manufacturer: Germany - Miele & Cie. KG
Carl-Miele-Straße 29, 33332 Gütersloh

Ireland
Miele Ireland Ltd.
2024 Bianconi Avenue
Citywest Business Campus, Dublin 24
Tel: (01) 461 07 10, Fax: (01) 461 07 97
E-Mail: info@miele.ie, Internet: www.miele.ie

New Zealand
Miele New Zealand Limited
Unit L, 10-20 Sylvia Park Road
Mt. Wellington, 1060, Auckland, NZ
Tel: 0800 264 353, Fax: 0800 463 453
Internet: www.miele.co.nz

Singapore
Miele Southeast Asia
Miele Pte. Ltd.
163 Penang Road
04 - 02/03 Winsland House II
Singapore 238463
Tel: +65 6735 1191, Fax: +65 6735 1161
E-Mail: infosea@miele.com.sg
Internet: www.miele.sg

South Africa
Miele (Pty) Ltd
63 Peter Place, Bryanston 2194
P.O. Box 69434, Bryanston 2021
Tel: +27 (0) 11 548-1900
Fax: +27 (0) 11 548-1935
E-mail: info@miele.co.za
Internet: www.miele.co.za

United Arab Emirates
Miele Appliances Ltd.
P.O. Box 11 47 82
Gold & Diamond Park
Sheikh Zayed Road
Building 6 / Offices Nos. 6-214 to 6-220
Dubai
Tel: +971-4-341 84 44
Fax: +971-4-341 88 52
E-Mail: info@miele.ae
Internet: www.miele.ae

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M.-Nr. 07 138 350 / 10

CE

Appliance **12.5.7**

TV

Basic		
Brand	Samsung	
Model	UE28F4000	
Dimension (mm)	645 x 435 x 49.5	
Weight (kg)	4.2	
Product Type	LCD Display	
Energy		
Energy Efficiency Class	A+	
Energy Consumption	per year (kWh)	37
	Energy-saving mode	16
	On-Mode / IEC 62087 Edition 2	25
Feature		
Power Supply	AC 220 - 240V 50 / 60Hz	
Size Inch (cm)	28 (70.06cm)	
Resolution	1366 x 768	
Panel Frequency	100	
Aspect Control	16:9	
HDTV Display Capability	720p	
Progressive Full HD	Yes	
NICAM stereo	Yes	
Receiving System	PAL / SECAM / NTSC	
DVB-T	DVB-T MPEG4	
DVB-C	DVB-C MPEG4	
Video Signal	480i / 480p / 576i / 576p / 720p / 1080i / 1080p	
PC Resolution	640x480 / 800x600 /1024x768 /1280x1024 /1360x768 1920x1080	
Multimedia	MP3 / WMA / MPEG4 / DivX / MKV / JPEG	
Sound Output (RMS)	10W x 2	
3D Sound Available	Yes	
Dolby	Dolby Digital Plus / Dolby Pulse	
Inputs	AV / Component / HDMI x2 / USB	
Outputs	Optic	
OSD Language	26 European Languages	

SAMSUNG ELECTRONICS

Declaration of Conformity

For the following

Product : LED TV

Model(s) : **UE28F40****

Where '*' can be any alphanumeric character.

Year of affixing CE marking : 2013

We hereby declare under our sole responsibility that the electrical product above is in compliance with the essential requirements of the Low Voltage Directive (2006/95/EC) and Electromagnetic Compatibility Directive (2004/108/EC) by application of

EN 60065: 2002+A1:2006+A11:2008+A2:2010+A12:2011	EN61000-3-3:2008
EN 55022:2010	EN55024:2010
EN61000-3-2:2006+A1:2009+A2:2009	EN55013:2001+A1:2003+A2 :2006
EN 62311:2008	EN55020:2007+A11:2011

and the Eco-Design Directive (2009/125/EC) implemented by Regulation (EC) No 642/2009 for televisions and the Directive (2011/65/EU) on the restriction of the use of certain hazardous substances in electrical and electronic equipment.

The Technical documentation is kept at the below Manufacturer's address.

Manufacturer

Samsung Electronics Co., Ltd.
129, Samsung-ro, Young-Tong-gu,
Suwon-si, Gyeonggi-do, Korea
443-742

11 Mar 2013 — (Place and date of issue)

Chang Seub Eum / Manager — (Name and signature of authorized person)

Representative in the EU:

Samsung Electronics Euro QA Lab.
Blackbushe Business Park
Saxony Way, Yateley, Hampshire
GU46 6GG, UK

12 Mar 2013 — (Place and date of issue)

Joong Hoon Choi / Lab. Manager — (Name and signature of authorized person)

Note : It is not the address of Samsung Service Centre. For the address or the phone number of Samsung Service Centre, see the warranty card or contact the retailer where you purchased your product.

SAMSUNG

Contact SAMSUNG WORLD WIDE

If you have any questions or comments relating to Samsung products, please contact the SAMSUNG customer care centre.

Country	Customer Care Centre ☎	Web Site
AUSTRIA	0810 - SAMSUNG (7267864, € 0.07/min)	www.samsung.com
BELGIUM	02-201-24-18	www.samsung.com/be (Dutch) www.samsung.com/be_fr (French)
BOSNIA	051 133 1999	www.samsung.com
BULGARIA	07001 33 11 , share cost tariff	www.samsung.com/bg
CROATIA	062 SAMSUNG (062 726 786)	www.samsung.com/hr
CZECH	800 - SAMSUNG (800-726786)	www.samsung.com
	Samsung Electronics Czech and Slovak, s.r.o. V Parku 2343/24, 148 00 - Praha 4	
DENMARK	70 70 19 70	www.samsung.com
FINLAND	030-6227 515	www.samsung.com
FRANCE	01 48 63 00 00	www.samsung.com/fr
GERMANY	0180 6 SAMSUNG bzw. 0180 6 7267864* (*0,20 €/Anruf aus dem dt. Festnetz, aus dem Mobilfunk max. 0,60 €/Anruf)	www.samsung.com
CYPRUS	8009 4000 only from landline	www.samsung.com/gr
GREECE	80111-SAMSUNG (80111 726 7864) only from land line (+30) 210 6897691 from mobile and land line	www.samsung.com/gr
HUNGARY	06-80-SAMSUNG (726-7864)	http://www.samsung.com/hu
ITALIA	800-SAMSUNG (726-7864)	www.samsung.com
LUXEMBURG	261 03 710	www.samsung.com
MONTENEGRO	020 405 888	www.samsung.com
NETHERLANDS	0900-SAMSUNG (0900-7267864) (€ 0,10/Min)	www.samsung.com
NORWAY	815 56480	www.samsung.com
POLAND	0 801-172-678* lub +48 22 607-93-33 ** *(całkowity koszt połączenia jak za 1 impuls według taryfy operatora) ** (koszt połączenia według taryfy operatora)	www.samsung.com/pl
PORTUGAL	808 20-SAMSUNG (808 20 7267)	www.samsung.com
ROMANIA	08008 SAMSUNG (08008 726 7864) TOLL FREE No.	www.samsung.com/ro
SERBIA	011 321 6899	www.samsung.com/rs
SLOVAKIA	0800 - SAMSUNG (0800-726 786)	www.samsung.com
SPAIN	902172678	www.samsung.com
SWEDEN	0771 726 7864 (SAMSUNG)	www.samsung.com
SWITZERLAND	0848 - SAMSUNG(7267864, CHF 0.08/min)	www.samsung.com/ch (German) www.samsung.com/ch_fr (French)
U.K	0330 SAMSUNG (7267864)	www.samsung.com
EIRE	0818 717100	www.samsung.com
LITHUANIA	8-800-77777	www.samsung.com/lt
LATVIA	8000-7267	www.samsung.com/lv
ESTONIA	800-7267	www.samsung.com/ee
TURKEY	444 77 11	www.samsung.com

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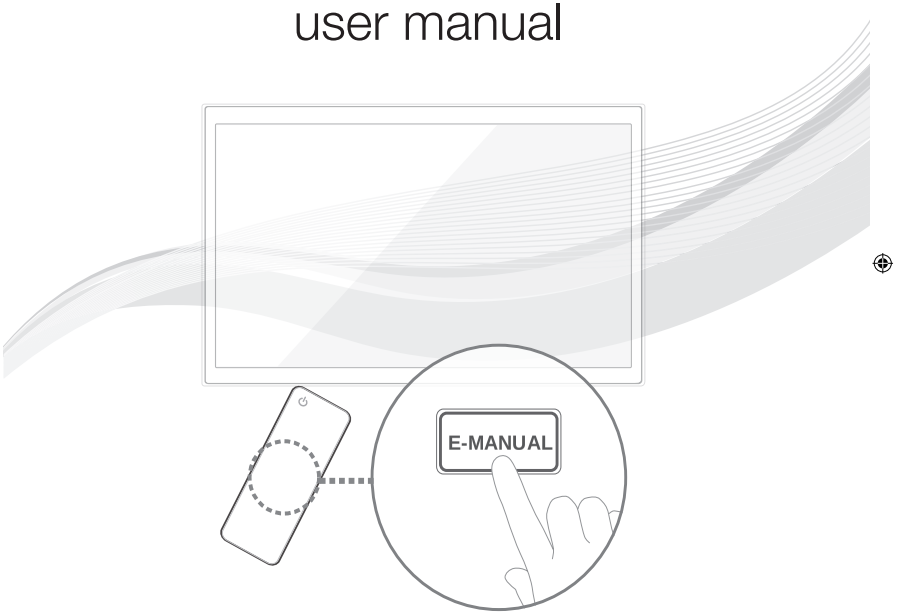
BN68-04904B-01

SAMSUNG

SERIES 4 5

LED TV

user manual



Thank you for purchasing this Samsung product.
To receive more complete service, please register your product at
www.samsung.com/register

Model _____ Serial No. _____

Warning! Important Safety Instructions

(Please read the safety instructions below before installing and using the product.)

CAUTION

RISK OF ELECTRIC SHOCK. DO NOT OPEN.

CAUTION: TO REDUCE THE RISK OF ELECTRIC SHOCK, DO NOT REMOVE COVER (OR BACK). THERE ARE NO USER SERVICEABLE PARTS INSIDE. REFER ALL SERVICING TO QUALIFIED PERSONNEL.

This symbol indicates that high voltage is present inside. It is dangerous to make any kind of contact with any internal part of this product.

This symbol indicates that important literature concerning operation and maintenance has been included with this product.

- The slots and openings in the cabinet and in the back or bottom are provided for necessary ventilation. To ensure reliable operation of this apparatus, and to protect it from overheating, these slots and openings must never be blocked or covered.
  - Do not cover the slots and openings with a cloth or other materials.
  - Do not block the slots and openings by placing this apparatus on a bed, sofa, rug or other similar surface.
  - Do not place this apparatus in a confined space, such as a bookcase or built-in cabinet, unless proper ventilation is provided.
- Do not place this apparatus near or over a radiator or heat register, or where it is exposed to direct sunlight.
- Do not place a vessel containing water (vases etc.) on this apparatus, as this can result in a risk of fire or electric shock.
- Do not expose this apparatus to rain or place it near water (near a bathtub, washbowl, kitchen sink, or laundry tub, in a wet basement, or near a swimming pool etc.). If this appratus accidentally gets wet, unplug it and contact an authorized dealer immediately.
- Make sure to pull out the power cord from the outlet before cleaning.
- This apparatus use batteries. In your community, there might be regulations that require you to dispose of these batteries properly to protect the environment. Please contact your local authorities for disposal or recycling information.
- Do not overload wall outlets, extension cords, or adaptors beyond their capacity, since this can result in fire or electric shock.
- Power-supply cords should be routed so that they are not likely to be walked on or pinched by items placed upon or against them. Pay particular attention to cords at the plug end, where connected to adaptors, and at the point where they exit from the apparatus.
- To protect this apparatus from a lightning storm, or when it is left unattended and unused for long periods of time, unplug it from the wall outlet and disconnect the antenna or cable system. This will prevent damage to the set due to lightning and power line surges.
- Before connecting the AC power cord to the DC adaptor outlet, make sure the voltage designation of the DC adaptor corresponds to the local electrical supply. (depending on the model)
- Never insert anything metallic into the open parts of this apparatus. Doing so may create a danger of electric shock.
- To avoid electric shock, never touch the inside of this apparatus. Only a qualified technician should open this apparatus.
- Make sure to plug the power cord in until it is firmly inserted. Pull on the plug, not the cord, when removing the power cord from the outlet. Do not touch the power cord with wet hands.
- If this appratus does not operate normally - in particular, if there are any unusual sounds or smells coming from it - unplug it immediately and contact an authorized dealer or service center.
- Be sure to pull the power plug out of the outlet if the TV is to remain unused or if you are to leave the house for an extended period of time (especially when children, elderly or disabled people will be left alone in the house).
  - Accumulated dust can cause an electric shock, an electric leakage, or a fire by causing the power cord to generate sparks and heat, or cause the insulation to deteriorate.
- Be sure to contact an authorized service center, when installing your set in a location with heavy dust, high or low temperatures, high humidity, chemical substances or where it will operate for 24 hours a day such as in an airport, a train station, etc. Failure to do so may cause serious damage to your set.
- Use only a properly grounded plug and receptacle.
  - An improper ground may cause electric shock or equipment damage. (Class I Equipment only.)
- To turn off the apparatus completely, you must pull the power plug out of the wall socket. Consequently, the power plug should be readily accessible at all times.
- Do not allow children to hang onto the product.
- Store the accessories (batteries, etc.) in a location safely out of the reach of children.
- Do not install the product in an unstable location such as a shaky self, a slanted floor, or a location exposed to vibration.
- Do not drop or impart a shock to the product. If the product is damaged, disconnect the power cord and contact a service center.
- To clean the product, unplug the power cord from the power outlet and wipe the product using a soft cloth dipped in a small amount of water. Do not use any chemicals such as wax, benzene, alcohol, thinners, insecticide, air freshener, lubricant or detergent. This may damage the appearance or erase the printing on the product.
- Do not expose the apparatus to dripping or splashing.
- Do not dispose of batteries in a fire.
- Do not short circuit, disassemble, or overheat the batteries.
- not short circuit, disassemble, or overheat the batteries.
- There is a danger of explosion if you replace the batteries with the wrong type of battery. Replace only with the same or equivalent type.
- WARNING - TO PREVENT THE SPREAD OF FIRE, KEEP CANDLES OR OTHER OPEN FLAMES AWAY FROM THIS PRODUCT AT ALL TIMES.

For more information on how to use e-Manual (P. 8)

Figures and illustrations in this User Manual are provided for reference only and may differ from actual product appearance. Product design and specifications may be changed without notice.

Important Warranty Information Regarding Television Format Viewing

1. Functionalities related to Digital TV (DVB) are only available in countries/areas where DVB-T (MPEG2 and MPEG4 AVC) digital terrestrial signals are broadcasted or where you are able to access to a compatible DVB-C (MPEG2 and MPEG4 AAC) cable-TV service. Please check with your local dealer the possibility to receive DVB-T or DVB-C signal.
2. DVB-T is the DVB European consortium standard for the broadcast transmission of digital terrestrial television and DVB-C is that for the broadcast transmission of digital TV over cable. However, some differentiated features like EPG (Electric Programme Guide), VOD (Video On Demand) and so on, are not included in this specification. So, they cannot be workable at this moment.
3. Although this TV set meets the latest DVB-T and DVB-C standards, as of [August, 2008], the compatibility with future DVB-T digital terrestrial and DVB-C digital cable broadcasts cannot be guaranteed.
4. Depending on the countries/areas where this TV set is used some cable-TV providers may charge an additional fee for such a service and you may be required to agree to terms and conditions of their business.
5. Some Digital TV functions might be unavailable in some countries or regions and DVB-C might not work correctly with some cable service providers.
6. For more information, please contact your local Samsung customer care centre.

   The reception quality of TV may be affected due to differences in broadcasting method between the countries. Please check the TV performance in the local SAMSUNG Authorized Dealer, or the Samsung Call Centre whether it can be improved by reconfiguring TV setting or not.

Still image warning

Avoid displaying still images (like jpeg picture files) or still image element (like TV programme logo, panorama or 4:3 image format, stock or news bar at screen bottom etc.) on the screen. Constant displaying of still picture can cause ghosting of LED screen, which will affect image quality. To reduce risk of this effect, please follow below recommendations:

- Avoid displaying the same TV channel for long periods.
- Always try to display any image on the whole screen, use the picture size menu for the best possible option to achieve this.
- Reduce brightness and contrast to minimum values required to achieve desired picture quality, excessively high values will increase the possibility of screen burnout.
- Frequently use all the TV's features designed to reduce image retention and screen burnout, please refer to the relevant section of the user manual for details.

Securing the Installation Space

Keep the required distances between the product and other objects (e.g. walls) to ensure proper ventilation.

Failing to do so may result in fire or a problem with the product due to an increase in the internal temperature of the product.

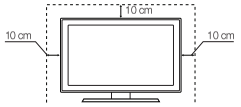
When using a stand or wall-mount, use parts provided by Samsung Electronics only.

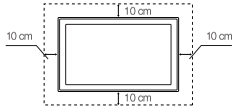
- If you use parts provided by another manufacturer, it may result in a problem with the product or an injury due to the product falling.

The appearance may differ depending on the product.

Be careful when you contact the TV because some parts can be somewhat hot.

Installation with a stand.	Installation with a wall-mount.





Correct Disposal of This Product (Waste Electrical & Electronic Equipment)
(Applicable in the European Union and other European countries with separate collection systems)
This marking on the product, accessories or literature indicates that the product and its electronic accessories (e.g. charger, headset, USB cable) should not be disposed of with other household waste at the end of their working life. To prevent possible harm to the environment or human health from uncontrolled waste disposal, please separate these items from other types of waste and recycle them responsibly to promote the sustainable reuse of material resources. Household users should contact either the retailer where they purchased this product, or their local government office, for details of where and how they can take these items for environmentally safe recycling. Business users should contact their supplier and check the terms and conditions of the purchase contract. This product and its electronic accessories should not be mixed with other commercial wastes for disposal.

Correct disposal of batteries in this product
(Applicable in the European Union and other European countries with separate battery return systems)
This marking on the battery, manual or packaging indicates that the batteries in this product should not be disposed of with other household waste at the end of their working life. Where marked, the chemical symbols Hg, Cd or Pb indicate that the battery contains mercury, cadmium or lead above the reference levels in EC Directive 2006/66. If batteries are not properly disposed of, these substances can cause harm to human health or the environment. To protect natural resources and to promote material reuse, please separate batteries from other types of waste and recycle them through your local, free battery return system.

CIS languages (Russian, Ukrainian, Kazakhs) are not available for this product, since this is manufactured for customers in EU region.

List of Features

Media Play

- Allows you to play music files, pictures, and movies saved on a USB device.

e-Manual

- Allows you to read on screen full manual. (p. 8)

Accessories

✎ Please make sure the following items are included with your TV. If any items are missing, contact your dealer.

✎ The items' colours and shapes may vary depending on the models.

✎ Cables not included in the package contents can be purchased separately.

- Remote Control & Batteries (AAA x 2)
- Warranty Card / Regulatory Guide
- Owner's Instructions
- Power Cord
- AC/DC Adapter (for 19", 22" models)

✎ An administration fee may be charged if either
(a) an engineer is called out at your request and there is no defect in the product
(i.e. where you have failed to read this user manual)
(b) you bring the unit to a repair centre and there is no defect in the product
(i.e. where you have failed to read this user manual)

✎ The amount of such administration charge will be advised to you before any work or home visit is carried out.

Using the TV's Controller (Panel Key)

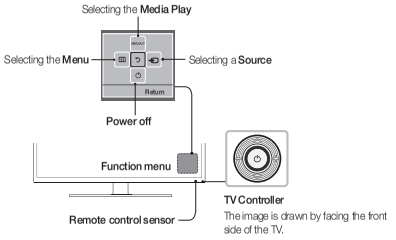
The TV's Controller, a small joy stick like button on the rear right side of the TV, lets you control the TV without the remote control.

✎ Some functions which require a PIN code may not be available.

✎ The product colour and shape may vary depending on the model.

✎ Exits the menu when pressing the controller more than 1 second.

✎ When using the controller in the up/down/left/right directions, make sure you do not push the controller in first. If you push the controller in first it will not move in the up/down/left right directions.



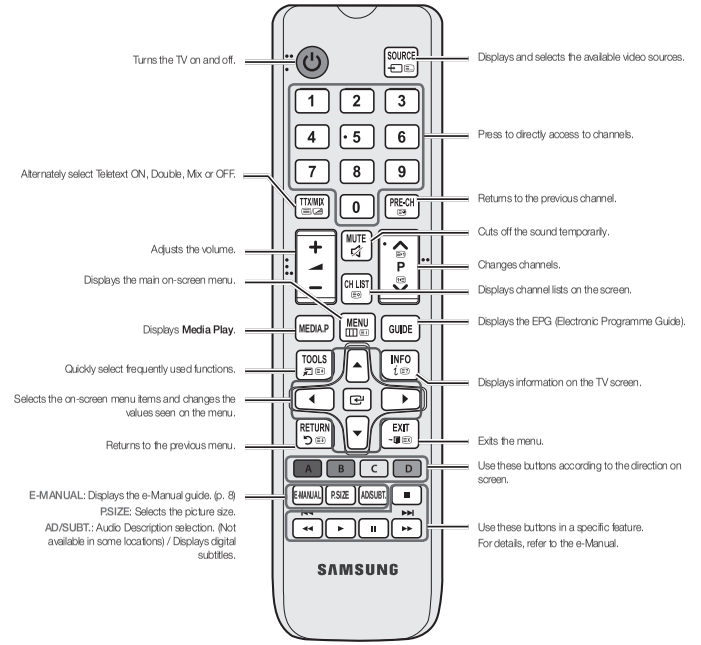
Standby mode

Do not leave your TV in standby mode for long periods of time (when you are away on a holiday, for example). A small amount of electric power is still consumed even when the power button is turned off. It is best to unplug the power cord.

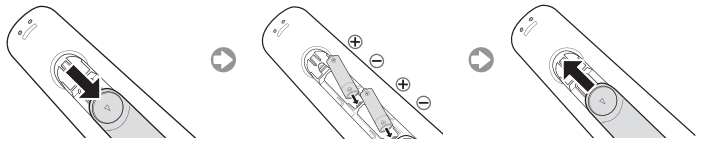
[UF40005000S-ZGZT]BN68-04904B-01L04.indb 4 2013-07-29 3:58:20

Viewing the Remote Control

✎ This is a special remote control for the visually impaired persons and has Braille points on the Power, Channel, and Volume buttons.



Installing batteries (Battery size: AAA)



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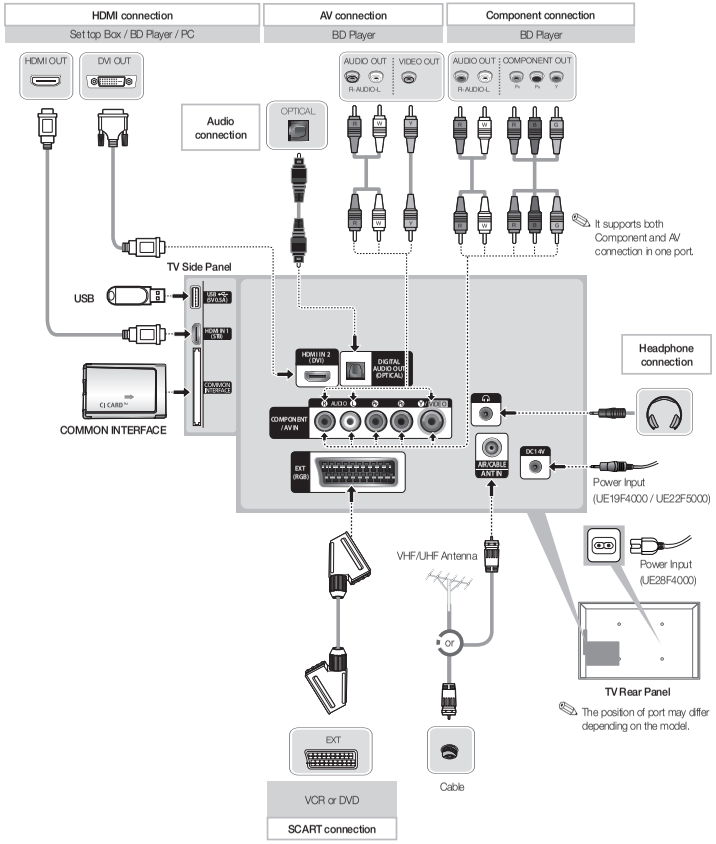
Connections



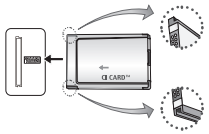
NOTE

- PC(D-Sub) and PC/DVI AUDIO IN input are not supported.
- Connecting through the HDMI cable may not be supported depending on the PC.
- If a DVI to HDMI cable is connected to HDMI IN 2(DVI) port, there will be no audio.
- For set-top box connection using HDMI cable, we highly recommend you to connect the HDMI IN 1(STB) port.
- The headphone jack supports only the 3 conductor tip-ring-sleeve (TRS) type.
- The HDD (Hard Disk Drive) connected to USB is not supported.

Connecting to a COMMON INTERFACE slot (Your TV viewing Card Slot)

To watch paid channels, the "CI or CI+ CARD" must be inserted.

- If you do not insert the "CI or CI+ CARD", some channels will display the message "Scrambled Signal".
- The pairing information containing a telephone number, the "CI or CI+ CARD" ID the Host ID and other information will be displayed in about 2~3 minutes. If an error message is displayed, please contact your service provider.
- When the configuration of channel information has finished, the message "Updating Completed" is displayed, indicating the channel list is updated.



- The image may differ depending on the model.

NOTE

- You must obtain a "CI or CI+ CARD" from a local cable service provider.
- When removing the "CI or CI+ CARD", carefully pull it out with your hands since dropping the "CI or CI+ CARD" may cause damage to it.
- Insert the "CI or CI+ CARD" in the direction marked on the card.
- The location of the COMMON INTERFACE slot may be different depending on the model.
- "CI or CI+ CARD" is not supported in some countries and regions; check with your authorized dealer.
- If you have any problems, please contact a service provider.
- Insert the "CI or CI+ CARD" that supports the current aerial settings. The screen will be distorted or will not be seen.

Initial Setup

When the TV is initially powered on, a sequence of on-screen prompts will assist in configuring basic settings. Press the POWER button. **Setup** is available only when the source is set to TV.

If you connect any device to HDMI IN 1(STB) before starting the installation, **Channel Source** will be changed to **Set-top box** automatically. If you do not want to select **Set-top box**, please select **Aerial**.

If You Want to Reset This Feature...

You should do **Setup** (MENU → **System**) again at home although you did in shop.

Select **System - Setup** (Initial Setup). Enter your 4 digit PIN number. The default PIN number is "0-0-0-0" (except Italy). If you want to change the PIN number, use the **Change PIN** function.

If you forget the PIN code, press the remote control buttons in the following sequence in Standby mode, which resets the PIN to "0-0-0-0" (Italy: "1-1-1-1"): POWER (off) → MUTE → 8 → 2 → 4 → POWER (on).

Changing the Input Source

Source

TV / Ext. / HDMI1 / HDMI2/DVI / AV / Component

Use to select TV or other external input sources such as DVD / Blu-ray players / cable box / STB satellite receiver connected to the TV.

Press the SOURCE button. In the displayed **Source** list, connected inputs will be highlighted.

PC(D-Sub) input is not supported. If you want to connect PC to the TV, you can connect the HDMI to DVI cable with the HDMI IN 2(DVI) port on the TV.

Ext. always stays activated.

Press the TOOLS button.

- **Edit Name**
  You can set an external input source name you want.
  - When connecting a PC to the HDMI IN 2(DVI) port with HDMI cable, you should set the TV to **PC** mode under **Edit Name**.
  - When connecting a PC to the HDMI IN 2(DVI) port with HDMI to DVI cable, you should set the TV to **DVI PC** mode under **Edit Name**.
  - When connecting an AV devices to the HDMI IN 2(DVI) port with HDMI to DVI cable, you should set the TV to **DVI Devices** mode under **Edit Name**.
- **Information**
  You can see detailed information about the connected external device.

[UF40005000S-ZGZT]BN68-04904B-01L04.indb 6 2013-07-29 3:58:21
[UF40005000S-ZGZT]BN68-04904B-01L04.indb 7 2013-07-29 3:58:21

Specifications

Environmental Considerations	
Operating Temperature	10°C to 40°C (50°F to 104°F)
Operating Humidity	10% to 80%, non-condensing
Storage Temperature	-20°C to 45°C (-4°F to 113°F)
Storage Humidity	5% to 95%, non-condensing

Model Name	UE19F4000	UE28F4000
Screen Size	19 inches	28 inches
Sound (Output)	3W X 2	5W X 2
Display Resolution	1366 X 768	
Dimensions (W x H x D)		
Body	453.7 x 285.8 x 49.5 (mm)	645.0 x 389.4 x 49.5 (mm)
With stand	453.7 x 314.2 x 151.4 (mm)	645.0 x 435.6 x 252.6 (mm)
Weight		
Without Stand	2.5 kg	4.2 kg
With Stand	2.6 kg	4.6 kg

Model Name	UE22F5000
Screen Size	22 inches
Sound (Output)	3W X 2
Display Resolution	1920 X 1080
Dimensions (W x H x D)	
Body	513.1 x 321.5 x 43.8 (mm)
With stand	513.1 x 366.5 x 169.6 (mm)
Weight	
Without Stand	2.6 kg
With Stand	2.9 kg

✎ Design and specifications are subject to change without prior notice.

✎ For information about power supply, and more about power consumption, refer to the label attached to the product.

✎ Typical power consumption is measured according to IEC 62087 Ed.2

English

[UF40005000S-ZGZT]BN68-04904B-01L04.indb 15 2013-07-29 3:58:24

Supported Video Formats

File Extention	Container	Video Codec	Resolution	Frame rate (fps)	Bit rate (Mbps)	Audio Codec
*.avi / *.mkv *.asf / *.wmv *.mp4 / *.3gp *.vro / *.mpg *.mpeg / *.ts *.tp / *.trp *.mov / *.flv *.vob / *.svi *.dlwx	AVI MKV ASF MP4 3GP MOV FLV VRO VOB PS TS	DivX 3.11/4.x/5.x/6.x	1920 x 1080	6~30	30	AC3 LPCM ADPCM (IMA, MS) AAC HE-AAC WMA DD+ MPEG (MP3) DTS (Core) G.711(A-Law, µ-Law)
		MPEG4 SP/ASP				
		H.264 BP/MP/HP			8	
		Motion JPEG	640 x 480			
		Window Media Video v9	1920 x 1080		30	
		MPEG2				
		MPEG1				
*.webm	WebM	VP8			20	Vorbis

✎ Other Restrictions

- Video content will not play, or not play correctly, if there is an error in the content or the container.
- Sound or video may not work if the contents have a standard bit rate/frame rate above the compatible Frame/sec listed in the table.
- If the Index Table is in error, the Seek (Jump) function is not supported.
- Some USB/digital camera devices may not be compatible with the player.
- The menu can be displayed late if the video is over 10Mbps(bit rate).

Video decoder	Audio decoder
• Supports up to H.264, Level 4.1 (FMO/ASO/RS are not supported.) • frame rate : - Below 1280 x 720: 60 frame max - Above 1280 x 720: 30 frame max • VC1 AP L4 is not supported. • GMC 2 or higher is not supported.	• WMA 10 Pro supports up to 5.1 channel and M2 profile. • WMA lossless audio is not supported. • Vorbis supports up to 2ch. • DD+ supports up to 5.1 channel.

Supported Subtitle Formats

- External

Name	File extension
MPEG-4 timed text	.ttxt
SAMI	.smi
SubRip	.srt
SubViewer	.sub
Micro DVD	.sub or .txt
SubStation Alpha	.ssa
Advanced SubStation Alpha	.ass
Powerdivx	.psb

- Internal

Name	Container	Format
Xsub	AVI	Picture Format
SubStation Alpha	MKV	Text Format
Advanced SubStation Alpha	MKV	Text Format
SubRip	MKV	Text Format
MPEG-4 Timed text	MP4	Text Format

Supported Photo Formats

File Extension	Type	Resolution
*.jpg *.jpeg	JPEG	15360 X 8640
*.bmp	BMP	4096 X 4096
*.mpo	MPO	15360 X 8640

✎ The MPO type file does not support Zoom, Rotate and Slide Show Effect functions.

Supported Music Formats

File Extension	Type	Codec	Remark
*.mp3	MPEG	MPEG1 Audio Layer 3	
*.m4a *.mpa *.aac	MPEG4	AAC	
*.flac	FLAC	FLAC	Supports up to 2ch.
*.ogg	OGG	Vorbis	Supports up to 2ch.
*.wma	WMA	WMA	WMA 10 Pro supports up to 5.1 channel and M2 profile. (WMA lossless audio is not supported.)
*.wav	wav	wav	
*.mid *.midi	midi	midi	type 0 and type 1

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English

Full available resolution

Optimal resolution is 4 series:1366 x 768@60Hz / 5 series: 1920 x 1080@60Hz. See specification page for full available resolution.

Mode	Resolution	Horizontal Frequency (KHz)	Vertical Frequency (Hz)	Pixel Clock Frequency (MHz)	Sync Polarity (H / V)	1366 x 768	1920 X 1080
IBM	720 x 400	31.469	70.087	28.322	-/+	✓	✓
MAC	640 x 480	35.000	66.667	30.240	-/-	✓	✓
	832 x 624	49.726	74.551	57.284	-/-	✓	✓
	1152 x 870	68.681	75.062	100.000	-/-		✓
VESA DMT	640 x 480	31.469	59.940	25.175	-/-	✓	✓
	640 x 480	37.861	72.809	31.500	-/-	✓	✓
	640 x 480	37.500	75.000	31.500	-/-	✓	✓
	800 x 600	37.879	60.317	40.000	+/+	✓	✓
	800 x 600	48.077	72.188	50.000	+/+	✓	✓
	800 x 600	46.875	75.000	49.500	+/+	✓	✓
	1024 x 768	48.363	60.004	65.000	-/-	✓	✓
	1024 x 768	56.476	70.069	75.000	-/-	✓	✓
	1024 x 768	60.023	75.029	78.750	+/+	✓	✓
	1152 x 864	67.500	75.000	108.000	+/+		✓
	1280 x 720	45.000	60.000	74.250	+/+	✓	✓
	1280 x 800	49.702	59.810	83.500	-/+		✓
	1280 x 1024	63.981	60.020	108.000	+/+		✓
	1280 x 1024	79.976	75.025	135.000	+/+		✓
	1366 x 768	47.712	59.790	85.500	+/+	✓	✓
	1440 x 900	55.935	59.887	106.500	-/+		✓
	1600 x 900RB	60.000	60.000	108.000	+/+		✓
	1680 x 1050	65.290	59.954	146.250	-/+		✓
	1920 x 1080	67.500	60.000	148.500	+/+		✓

NOTE

- The interlace mode is not supported.
- The set might operate abnormally if a non-standard video format is selected.

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dts Premium Sound | 5.1
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DivX Certified® to play DivX® video up to HD 1080p, including premium content.

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ABOUT DIVX VIDEO-ON-DEMAND: This DivX Certified® device must be registered in order to play purchased DivX Video-on-Demand (VOD) movies. To obtain your registration code, locate the DivX VOD section in your device setup menu. Go to vod.divx.com for more information on how to complete your registration.

Covered by one or more of the following U.S. patents : 7,295,673; 7,460,668; 7,515,710; 7,519,274

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Appliance **12.5.8**

PC

Basic		
Brand	ASUS	
Model	Transformer AiO P1801	
Dimension (mm)	Tablet	466 x 18 x 294 mm
	PC Station	466 x 162 x 267 mm
	Tablet + PC Station	466 x 162 x 376 mm
Weight (kg)	Tablet	2.4
	PC Station	4.1
Feature		
Operating System	PC Station	Windows 8
	Tablet	Android 4.1 (Jelly Bean)
Processor	PC Station	Intel Core™ i5 3350P Processor
	Tablet	NVIDIA Tegra 3 Quad-core CPU
Memory	PC Station	4 GB Up to 8 GB DDR3 at 1600MHz 2 x SO-DIMM
	Tablet	2 GB DDR3 at 1600MHz
Wireless Data Network	PC Station	802.11 a/b/g/n Bluetooth V4.0 Supports dual band frequency 2.4/5 GHz in selected areas
	Tablet	802.11 a/b/g/n Bluetooth V3.0 EDR
Power Supply	PC Station	180 W Power adaptor
	Tablet	33 W Power adaptor
Display	18.4"(46.7cm), 16:9, Wide Screen, Full HD 1920x1080, LED-backlight, IPS, 178° wide viewing angle	
Graphic	NVIDIA® GeForce GT730M 2GB	
LAN	10/100/1000 Mbps	
Battery	Tablet: 38 W	
Multimedia	Camera: 1.0 M Pixel Audio Feature: SonicMaster Speaker: Tablet: 2 x 1.5 W PC Station: 2 x 3 W Built-in Mic: Yes	

English

Declaration of Conformity (R&TTE directive 1999/5/EC)

The following items were completed and are considered relevant and sufficient:

- Essential requirements as in [Article 3]
- Protection requirements for health and safety as in [Article 3.1a]
- Testing for electric safety according to [EN 60950]
- Protection requirements for electromagnetic compatibility in [Article 3.1b]
- Testing for electromagnetic compatibility in [EN 301 489-1] & [EN 301 489-17]
- Effective use of the radio spectrum as in [Article 3.2]
- Radio test suites according to [EN 300 328-2]

CE Mark Warning

This is a Class B product, in a domestic environment, this product may cause radio interference, in which case the user may be required to take adequate measures.

CE

CE marking for devices without wireless LAN/Bluetooth

The shipped version of this device complies with the requirements of the EEC directives 2004/108/EC "Electromagnetic compatibility" and 2006/95/EC "Low voltage directive".

CE/CE

CE marking for devices with wireless LAN/ Bluetooth

This equipment complies with the requirements of Directive 1999/5/EC of the European Parliament and Commission from 9 March, 1999 governing Radio and Telecommunications Equipment and mutual recognition of conformity.

is for class II device.

The highest SAR value for this device is 0.163 W/kg.

Wireless Operation Channel for Different Domains

N. America	2.412-2.462 GHz	Ch01 through CH11
Japan	2.412-2.472 GHz	Ch01 through Ch13
Europe ETSI	2.412-2.472 GHz	Ch01 through Ch13

Appliance **12.5.9**

Extractor

Basic		
Brand	best	
Model	Gloss	
Dimension (mm)	455x435x830-1180	
Weight (kg)		
Energy		
Sound emissions	Max Noise Level	66 dB (A) re 1pW
	Min Noise Level	49 dB (A) re 1pW
Feature		
Airflow IEC EN 61591	630 m3/h	
Pressure	455 Pa	
Total Absorption	260 W	
Controls	Electronic Slim 4S	
Lighting	Led 3x3W	
Version	Duct-out	
Duct Size	ø 150 mm	
Grease Filter	Stainless Steel grid filter	
No. Motors	1	
Installation	Ceiling	

Gloss

Gloss

pg. 50 | 53

GLOSS plus	
Tecnologia LED	
Aspirazione Perimetrale	
Timer	

Caratteristiche	
Installazione	Soffitto
Finitura	Acciaio Inox Lucido
Comandi	Elettronica Slim 4V
N. Motori	1
Portata IEC EN 61591	630 m³/h
Pressione	455 Pa
Rumorosità Max	66 dB (A) re 1pW
Rumorosità Min	49 dB (A) re 1pW
Assorbimento totale	260 W
Misure	455x435 mm
Illuminazione	Led 3x3W
Versione	Aspirante
Uscita	ø 150 mm
Filtro Grassi	Griglia filtro inox

Accessori	
Filtro Carbone	In opzione | Cod. 08999114

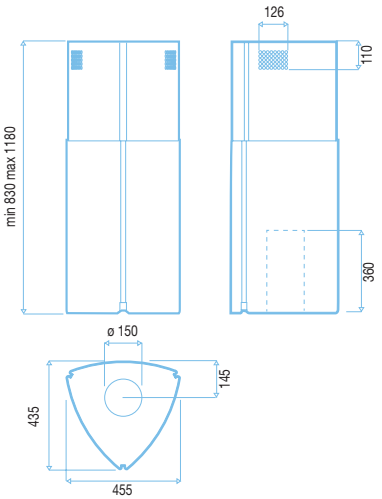
Descrizione	
Gloss Inox	Cod. 07F50000

GLOSS plus	
LED Technology	
Perimeter Aspiration	
Timer	

Features	
Installation	Ceiling
Finish	Shiny Stainless Steel
Controls	Electronic Slim 4S
No. Motors	1
Airflow IEC EN 61591	630 m³/h
Pressure	455 Pa
Max Noise Level	66 dB (A) re 1pW
Min Noise Level	49 dB (A) re 1pW
Total Absorption	260 W
Dimensions	455x435 mm
Lighting	Led 3x3W
Version	Duct-out
Duct Size	ø 150 mm
Grease Filter	Stainless Steel grid filter

Accessories	
Charcoal filter	Optional | Cod. 08999114

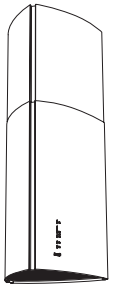
Description	
Gloss SS	Cod. 07F50000



Appliance **12.5.9**

Extractor

best
Style & Lifestyle



Gloss

IT	Italiano, 10	**Istruzioni per l'uso**
GB	English, 12	**Instructions for use**
DE	Deutsch, 14	**Betriebsanleitung**
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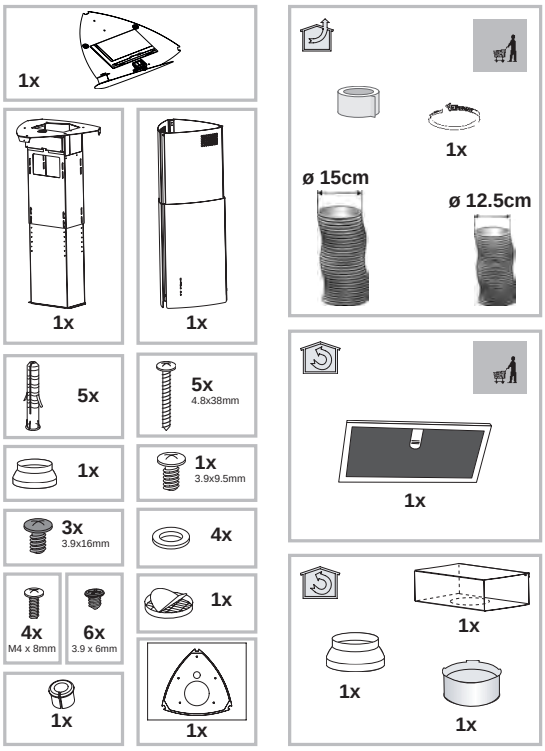
SK	Slovensky, 38	**Návod na používanie**



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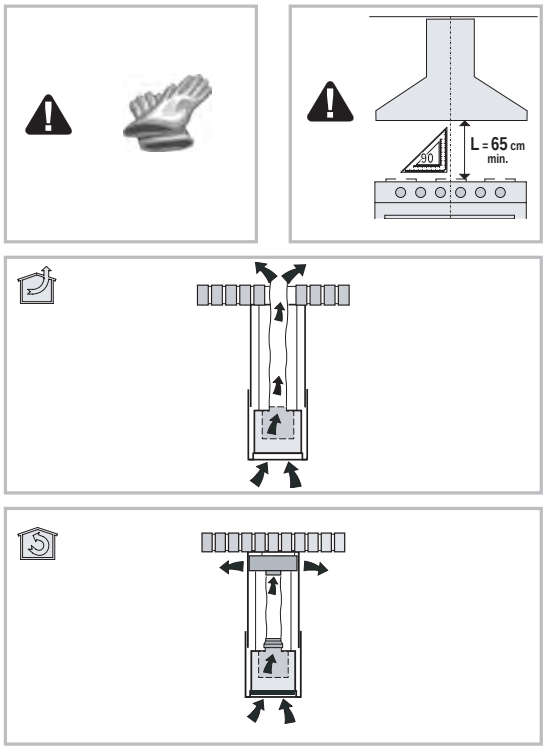

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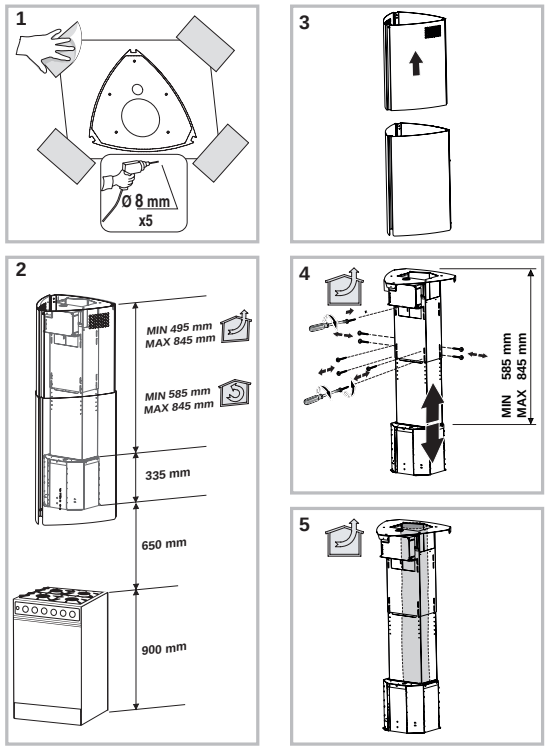
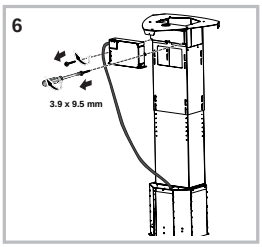
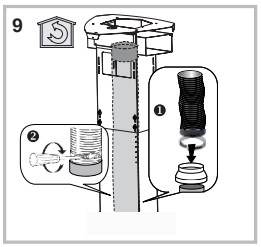
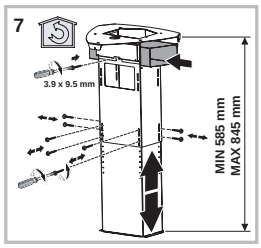
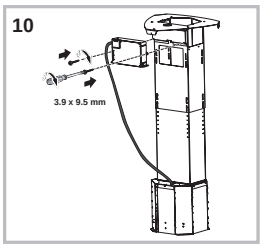


6


6
3.9 x 9.5 mm


9
❶
❷


7
3.9 x 9.5 mm
MIN 585 mm
MAX 845 mm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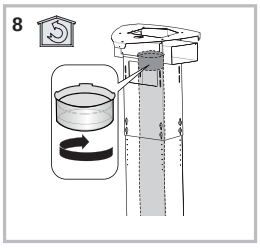
3.9 x 9.5 mm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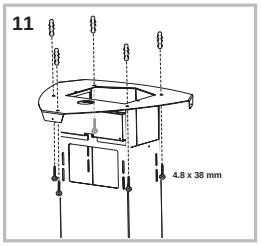
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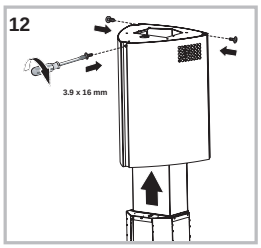
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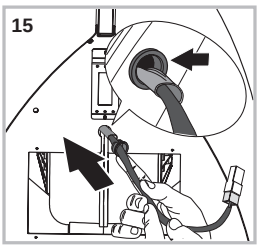
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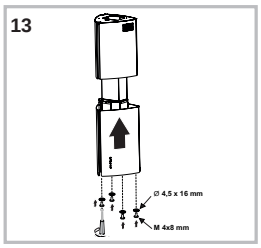
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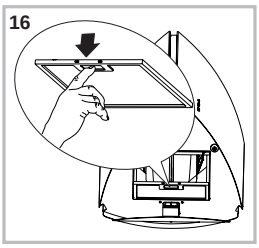
Ø 4,5 x 16 mm
M 4x8 mm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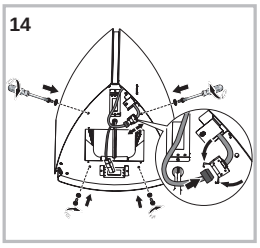
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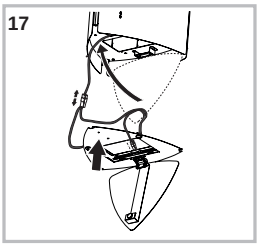
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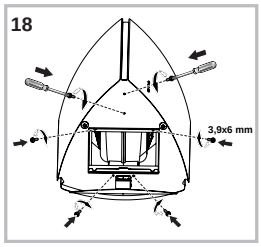
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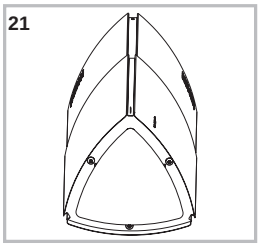
3,9x6 mm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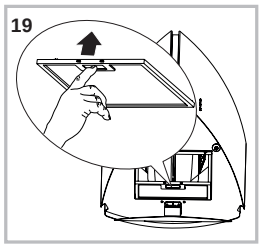
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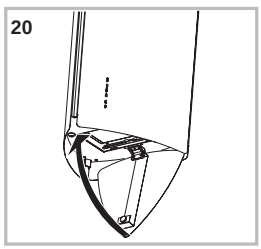
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9

Appliance **12.5.9**

Extractor

English

EN

! The appliance must be installed by a qualified person in compliance with the instructions provided.

⚠ Wear gloves when carrying out installation and maintenance operations.

AIR VENT
(for ducting versions)

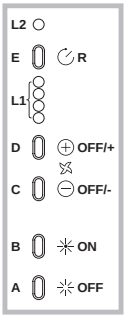
! Prepare the hole and the air vent duct (150 mm diameter).
! Use a duct of the minimum indispensible length.
! Use a duct with as few elbows as possible (maximum elbow angle: 90°).
! Avoid drastic changes in the duct cross-section.
! Use a duct with an as smooth as possible inside.
! The duct must be made of certified material.
! Do not connect the hood to smoke exhaust ducts for the products of combustion (boilers, fireplaces, stoves, etc).
! For the air vents comply with the provisions laid down by the competent authorities.
In addition, the air must not be evacuated through a hole in the wall unless specifically intended for this purpose.
! Fit air intakes in the room to prevent the hood from creating a negative pressure in the room (which must not exceed 0.04 mbar); if the hood is used at the same time as non-electrical equipment (gas-, oil- and charcoal-fired stoves, etc.) the exhaust gas may be sucked in by the heat source.

FILTERING OR DUCTING VERSION ?
The hood may be in filtering or in ducting version. Decide from the outset which type is to be installed.
For better efficiency, we recommend installing the hood in the ducting version (if possible).

Ducting version
The hood purifies the air and evacuates it to the outside through an exhaust duct (diameter 150 mm).

Filtering version
The hood purifies the air and recycles the clean air back into the room. For this version, the following are required: 1 air baffle, 1 reducer, 1 charcoal filter.
The upper flue air evacuation slots must be positioned at the top.

CONTROLS
A) Turns the LIGHTS off
B) Turns the LIGHTS on.
C) Decreases speed down to minimum speed. If pressed for 2" the motor is turned off.
D) Activates the motor (calling the last speed used) and increases the speed until reaching maximum.
E) FILTER ALARM/TIMER RESET: when pressing the key during display of the filter alarm (motor off) it resets the hour counter. When pressing the key when the motor is running, the TIMER is activated and the hood will automatically be switched off after 5 minutes.
L1) The 4 green LEDs indicate the running speed.
L2) When the LED is red (motor off) it indicates the FILTER ALARM. When the LED is green (flashing) it indicates that the TIMER has been activated with the key E.



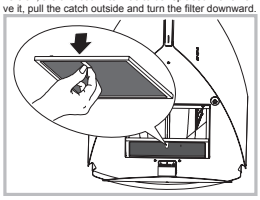
FILTER ALARM:
After 30h of operation, the LED L2 turns RED. It indicates that the grease filters need to be cleaned.
After 120h of operation, the LED L2 turns RED and flashes; It indicates that the grease filters need to be cleaned and the charcoal filters replaced.
After cleaning the grease filters (and/or replacing the charcoal filters), restart the hour counter (RESET) by pressing the key E during display of the filter alarm.

MAINTENANCE
! Before cleaning or maintenance cut the power.

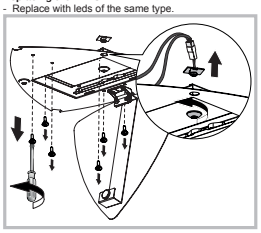
Cleaning the hood
WHEN TO CLEAN IT: clean it at least every 2 months to prevent the risk of fire.
EXTERNAL CLEANING: use a cloth moistened in luke-warm water and neutral detergent (for painted hoods); use specific products for steel, copper or brass hoods.
INTERNAL CLEANING: use a cloth (or brush) soaked in denatured ethyl alcohol.
WHAT NOT TO DO: do not use abrasive or corrosive products (e.g. metal sponges, brushes, too hard brushes, very aggressive detergents, etc.)

Cleaning the grease filters
WHEN TO CLEAN IT: clean it at least every 2 months to prevent the risk of fire.
HOW TO REMOVE THE FILTERS: push the catch near the handle towards the rear of the hood and pull the filter downwards
HOW TO CLEAN THE FILTERS: hand wash or in the dishwasher using a neutral detergent. If washing in the dishwasher, possible discoloration of the filters does not in any way compromise their functioning.

Replacing the charcoal filter (P)
(for filtering version only)
WHEN TO REPLACE IT: replace it at least every 6 months.
HOW TO REMOVE IT: if using the hood in the filtering version, the charcoal filter has to be replaced. To remove it, pull the catch outside and turn the filter downward.



Replacing the LEDS
- Replace with leds of the same type.



EN

MALFUNCTIONS
If something appears not to be working properly, do the following simple checks before calling Technical Service:

• If the hood is not working:
Check that:
- The power has not been disconnected.
- A speed has been selected.

• If the hood performs inefficiently:
Check that:
- The motor speed selected is sufficient for the amount of smoke and vapours released.
- The kitchen is sufficiently ventilated to allow air intake.
- The charcoal filter is not worn (hood in filtering version).

• If the hood has turned off during normal functioning:
Check that:
- The power has not been disconnected.
- the omnipolar disconnection device has not tripped.

Components not provided with the product

12.5 Appliances

Appliance **12.5.10**

AED

Basic		
Brand	PHILIP	
Model	HeartStart M5066A	
Dimension (mm)	71x210x210	
Weight (kg)	0.9 with batteries	
Feature		
Batteries	4 AA cells	
Temperature	Operating	0º - 50º C
	Standby	10º - 43º C
Humidity	Operating	0% to 95% relative, non-condensing
	Standby	0% to 75% relative, non-condensing
Altitude	Operating	0 to 4,500 m
	Standby	0 to 8,500 ft > 48 hours and 8,500 to 15,000 feet < 48 hours
Shock/Drop Abuse	Withstands 1 meter drop to any edge,corner or surface.	
EMI (Radiated/ Immunity)	Meets EN55011 Group 1 Level B Class B and EN61000-4-3.	
Battery (M5070A) Type	9 Volt DC, 4.2 Ah	
Install-By-Date	Battery is labeled with an install-by date of at least five years from date of manufacture.	
Standby Life	Four years typical when battery is installed by the install-by date.	
Adult SMART Pads Cartridge	M5071A defibrillation pads for patients 8 years of age and older or 25 kg and over.	
Infant/Child SMART Pads Cartridge	M5072A defibrillation pads for patients under 8 years of age or 25 kg Rx only.	
Energy Delivered	Adult: nominal 150 Joules into a 50 ohm load Infant/Child: nominal 50 Joules into a 50 ohm load	
How Supplied	Disposable cartridge	
Active Surface Area	85 cm^2 each	
Use-by Date	Cartridge is labeled with a use-by date of at least two years from date of manufacture.	

HeartStart OnSite Defibrillator specifications

Defibrillator	
Defibrillator family	HS1. Order M5066A
Standard configuration	Defibrillator, battery, adult SMART Pads cartridge (1 set), Setup and Maintenance Guides, Owners Manual, Quick Reference Guide, Date sticker
HeartStart OnSite Ready-Pack configuration	Order option R01. Defibrillator, battery, carry case, adult SMART Pads (1 pre-installed set, 1 spare set), Setup and Maintenance Guides, Owners Manual, Quick Reference Guide, Date Sticker
Waveform	Truncated Exponential Biphasic. Waveform parameters adjusted as a function of each patient's impedance
Therapy	Adult defibrillation: Peak current 32A (150 J nominal into a 50-ohm load). Pediatric defibrillation with optional Infant/Child pads cartridge installed: Peak current 19A (50 J nominal into 50-ohm load)
Shock-to-Shock cycle time	Typically less than 20 seconds between shocks in a series
Quick Shock	Able to deliver a shock after the end of a CPR interval, typically in 8 seconds
Voice instructions	Detailed voice messages guide responder through use of the defibrillator
CPR coaching	Instructions for adult or infant/child CPR available at user's option
Shock delivery	Via adhesive pads placed on patient's bare skin as illustrated on pads
Controls	Green SMART Pads cartridge handle, green On/Off button, blue i-button, orange Shock button
Indicators	Ready light; blue i-button; caution light, Shock button lights up when shock is advised
Physical	
Size	2.8″ x 7.4″ x 8.3″ (7 cm x 19 cm x 21 cm) D x H x W.
Weight	With battery and pads cartridge: 3.3 lbs. (1.5 kg) Without battery or pads cartridge: 2.4 lbs. (1 kg)
Environmental/Physical Requirements	
Sealing	Solid objects per EN60529 class IP2X Drip-proof per EN60529 class IPX1
Temperature	Operating: 32° - 122° F (0°- 50° C) Standby: 50° - 109° F (10°- 43° C).
Humidity	Operating: 0% to 95% relative, non condensing Standby: 0% to 75% relative, non-condensing
Altitude	Operating: 0 to 15,000 feet Standby: 0 to 8,500 feet > 48 hours and 8,500 to 15,000 feet < 48 hours
Shock/drop abuse	Withstands 1-meter drop to any edge, corner or surface
Vibration	Meets EN1789 random and swept sine, road ambulance specification in operating and standby states
EMI (radiated/immunity)	Meets EN55011 Group 1 Level B Class B and EN61000-4-3
Data Recording and Transmission	
Infrared	Wireless transmission of event data to a Smartphone or PC, using the IrDA protocol
Data stored	First 15 minutes of ECG and the entire incident's events and analysis decisions

Patient analysis system	
Patient analysis	Evaluates patient ECG to determine if a rhythm is shockable. Rhythms considered shockable are ventricular fibrillation (VF) and certain ventricular tachycardias (VT) associated with lack of circulation. For safety reasons, some VT rhythms associated with circulation will not be interpreted as shockable, and some very low-amplitude or low-frequency rhythms will not be interpreted as shockable VF
Quick Shock	Able to deliver a shock after the end of a CPR interval, typically in 8 seconds
Sensitivity/specificity	Meets AAMI DF80 guidelines and AHA recommendations for adult defibrillation (Circulation 1997;95:1677-1682)
Artifact detection	The effects of pacemaker artifact and electrical noise are minimized
Battery (M5070A)	
Type	9 Volt DC, 4.2 Ah, composed of disposable long-life lithium manganese dioxide primary cells
Capacity	Minimum 200 shocks or 4 hours of operating time (EN 60601-2-4:2003)
Install-by date	Battery is labeled with an install-by date of at least 5 years from date of manufacture
Standby life	Four years typical when battery is installed by the install-by date. (Will power the AED in standby state within the specified standby temperature range, assuming 1 battery insertion test and no defibrillation uses)
SMART Pads	
Adult SMART Pads cartridge	M5071A defibrillation pads for patients 8 years of age and older or 55 lbs. (25 kg) and over
Infant/child SMART Pads cartridge	M5072A defibrillation pads for patients under 8 years of age or 55 lbs. (25 kg). By prescription only
Active surface area	13.2″² (85 cm²) each
Cable length	Adult pads: 54″ (137.1 cm) Infant/Child pads: 40″ (101.6 cm)
Use-by date	Cartridge is labeled with a use-by date of at least 2 years from date of manufacture
Training Pads	
M5073A	Adult Training Pads cartridge
M5074A	Infant/Child Training Pads cartridge
Function	Training pads feature 8 real-world training scripts. Used with training mat (included) or with adapters on manikins
Automated and User-activated Self-tests	
Daily automatic self-tests	Tests internal circuitry, waveform delivery system, pads cartridge, and battery capacity
Pads integrity test	Specifically tests readiness-for-use of pads (gel moisture)
Battery insertion test	Upon battery insertion, extensive automatic self-tests and user-interactive test check device readiness
Status Indicators	Blinking green "Ready" light indicates ready for use. Audible "chirp" indicates need for maintenance

* Refer to the HeartStart OnSite Defibrillator Owner's Manual for detailed product instructions. All specifications based on 25° C unless otherwise noted. The defibrillator and its accessories are made of latex-free materials.

PHILIPS

HeartStart Trainer

INSTRUCTIONS FOR USE

M5085A
Edition 3

HEARTSTART
DEFIBRILLATORS

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Philips Medical Systems

HeartStart Trainer
M5085A

INSTRUCTIONS FOR USE
Edition 3

Philips Medical Systems

About this edition

The information in this guide applies to the HeartStart Trainer M5085A. This information is subject to change.Please contact Philips at www.medical.philips.com/heartstart or contact your local Philips representative for information on revisions.

Edition history

Edition 3
Publication date: August 2006
Publication #: M5085A-91900
Assembly #: 012116-0003
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Device manufacturer

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PHILIPS

HEARTSTART TRAINER M5085A

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HeartStart Trainer M5085A

Intended Use of the HeartStart Trainer

The HeartStart Trainer M5085A is designed to prepare emergency responders to use the HeartStart HS1 Defibrillators. The HS1 Defibrillators include the HeartStart OnSite Defibrillator M5066A, the HeartStart Defibrillator M5067A, and HeartStart Home Defibrillator M5068A. **The HeartStart Trainer cannot be used to deliver defibrillation treatment.**

The HeartStart Trainer provides a variety of simulations, or training scenarios, to help responders acquire and demonstrate the basic skills necessary to use the HeartStart HS1 Defibrillator in an emergency.

Features of the HeartStart Trainer

- The HeartStart Trainer provides simulated shock delivery. It has no high-voltage capabilities, ensuring safety during training.
- The HeartStart Trainer is designed for use with training manikins in conjunction with Internal Manikin Adapter M5088A or External Manikin Adapter M5089A and with Adult Training Pads Cartridge M5073A or Infant/Child Training Pads Cartridge M5074A only.*
- The HeartStart Trainer and Training Pads cartridge can also be used with an Infant/Child Pads Placement Guide and an Infant/Child Key, available separately from Philips, for training in pediatric defibrillation.
- The HeartStart Trainer is pre-configured with 8 training scenarios that simulate realistic sudden cardiac arrest episodes. See pages 10 through 12 for scenario descriptions. These scenarios are compatible with training programs developed by nationally recognized responder programs.
- The HeartStart Trainer is powered by four standard AA alkaline batteries.

* Do not use the Trainer with any other defibrillation pads cartridges.

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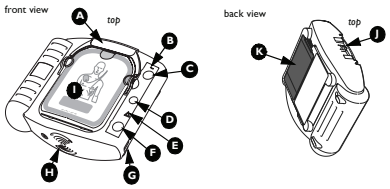
WARNING: Do not store the Trainer with your defibrillator, or where it could be confused with a defibrillator during an emergency.*

Overview of the HeartStart Trainer



The HeartStart Trainer M5085A is designed to look like the HeartStart HS1 Defibrillator. However, some of the defibrillator's physical features are either inactive in the Trainer or behave differently from their counterparts in the defibrillator, as noted below.

A TRAINING PADS CARTRIDGE HANDLE. Pull up on the handle to turn on the Trainer. Remove the cartridge's hard cover, peel off the resealable film cover, then lift out pads.

B ON LIGHT. The Trainer's green ON light is on solid when the Trainer is on, and off otherwise. *(In the HS1 Defibrillator, the green Ready light blinks when the defibrillator is in standby mode, is on solid when the defibrillator is in use, and is off when the defibrillator needs attention.)*

* A Warning is a condition, hazard, or unsafe practice that could result in serious personal injury or death.

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C ON/OFF BUTTON. You can also turn on the Trainer by pressing this green button. To turn off the Trainer, press the green button again and hold it down for one (1) second.

D INFORMATION-BUTTON. This blue "i-button" flashes when it has information you can access by pressing it. In the Trainer, the i-button flashes when scenario selection is available and at the beginning of a patient care pause when CPR coaching is available.

E CAUTION LIGHT. This triangular light flashes during rhythm analysis and is on solid when a shock is advised, as a reminder that no one should be touching the patient.

F SHOCK BUTTON. This orange button flashes when the Trainer advises you to deliver a shock; press the Shock button to deliver the simulated shock.

G INFRARED (IR) COMMUNICATIONS PORT. This feature is not active in the Trainer. *(In the HS1 Defibrillator, this feature is used to transfer data directly between the defibrillator and a computer running one of the HeartStart Event Review data management software products.)*

H SPEAKER. When the device is being used, its voice instructions come from this speaker.

I TRAINING PADS CARTRIDGE. This reusable cartridge contains self-adhesive training pads with attached cable. An Adult Training Pads Cartridge (M5073A) comes with the Trainer. Infant/Child Training Pads Cartridges (M5074A) are available separately.

J TRAINING PADS CARTRIDGE LATCH. Slide the latch to the side to release the pads cartridge for removal.

K BATTERY COMPARTMENT DOOR. Lift off the door to install or replace batteries. The Trainer is powered by four disposable AA alkaline cells inserted in the recess on the back of the unit.

The HeartStart Training Pads are provided in a yellow cartridge with a yellow-banded label to distinguish them from the white HeartStart SMART Pads cartridge.

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WARNING: Do not store your Training Pads cartridge with your HeartStart defibrillator, or where it could be confused with a HeartStart SMART Pads cartridge during an emergency. Do not put the training pads on a person.

HeartStart Trainer Kit Contents

The HeartStart Trainer M5085A comes with the following:

- Trainer
- Adult training pads cartridge
- Carry case (does not include scissors)
- Instructions for Use
- External Manikin Adapter strip (1)
- Quick Reference

Optional Accessories

- M5085-91900 HeartStart Trainer *Instructions for Use*
- M5087A Replacement Carry Case (Philips)
- M5073A Adult Training Pads Cartridge
- M5074A Infant/Child Training Pads Cartridge
- M5093A Replacement Adult Training Pads*
- M5094A Replacement Infant/Child Training Pads*
- M5088A Internal Manikin Adapter (1/pouch)
- M5089A External Manikin Adapters (10/box)
- M5090A Adult pads placement guide
- 989803139281 Infant/Child pads placement guide

To set up the HeartStart Trainer

To install or replace the batteries

The HeartStart Trainer is powered by four AA alkaline batteries (not included). To install or replace the batteries, follow the steps below:

* Includes pads and resealable film cover.

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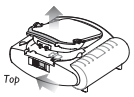
1. Press the latch on the battery compartment door on the back of the Trainer. Lift off the door and set it aside.
2. Remove the old batteries and recycle or dispose of in accordance with your local regulations.
3. Insert four new AA alkaline batteries into the recess, oriented according to the diagram provided on the inside of the recess.
4. Replace the battery compartment door and press down to ensure the latch holds it in place.

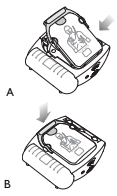
NOTE: It is recommended that you replace all four batteries at the same time.

To install or replace the training pads cartridge

To install the training pads cartridge, follow these steps:



1. If a cartridge is currently installed in the Trainer, locate the latch at the top edge of the Trainer, and slide it to the side. The pads cartridge will be released. Remove the cartridge.
2. Remove the new training pads cartridge from its resealable package.
3. Insert the M5073A or M5074A Training Pads cartridge into the compartment on the front of the HS1 Trainer (**A**). Press the cartridge down firmly until it clicks into place. Be sure the green handle is pressed all the way down (**B**). The Trainer will tell you what kind of training pads -- Adult or Infant/Child -- have been inserted, then it allows you to select a training scenario.



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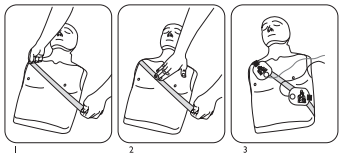
To use the HeartStart Trainer with training manikins

To simulate the patient, use the training pads on a CPR training manikin equipped with a disposable External Manikin Adapter M5089A or an Internal Manikin Adapter M5088A. Alternatively, you can use a Laerdal Resusci Anne training manikin equipped with Laerdal Link technology and an adapter available at most electronics stores. Contact Laerdal for information.

To install the external manikin adapter

The M5089A External Manikin Adapter is provided with the HeartStart Trainer. It can be applied to any training manikin as illustrated in steps 1 and 2 below. (When the manikin is used in training, training pads should be placed as shown in step 3 below.)



Applying the External Manikin Adapter M5089A to an adult manikin.

NOTE: The M5089A External Manikin Adapter has a limited service life. You can order replacement sets of five adapters.

To install the internal manikin adapter

The Internal Manikin Adapter M5088A, sold separately, works with Laerdal Little Anne CPR and Laerdal Resusci Anne CPR Manikins.

To install the Internal Manikin Adapter on a Laerdal Little Anne CPR or Laerdal Resusci Anne CPR Manikin, follow the steps below:

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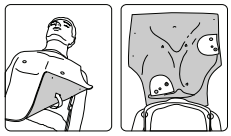
1. Remove the skin from the manikin.
2. Peel off the liner from the adhesive backing of the Internal Manikin Adapter.
3. Place the Internal Manikin Adapter sections in the appropriate locations on the underside of the manikin's skin. See the Instructions for Use provided with the Internal Manikin Adapter for detailed placement illustrations.



Installing the Internal Manikin Adapter M5088A with the Laerdal Resusci Anne.

4. Replace the manikin skin.
5. Using the Trainer in a practice trial, check that the Internal Manikin Adapter is located appropriately to teach proper pad placement.

To select a training scenario

1. Make sure the pads connector is plugged in and the HeartStart Trainer is turned off. (Press and hold the On/Off button if necessary to turn off the Trainer.)
2. Press the flashing i-button once. The Trainer will tell you how to select a scenario.
3. Press the i-button again to have the Trainer identify the current training scenario. If you want to use this scenario, briefly press the On/Off button to run the scenario immediately.

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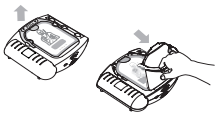
4. To select a different scenario, press the flashing blue i-button to scroll through each of the eight scenarios in sequence. When you reach the scenario number you want, briefly press the On/Off button to run the scenario immediately. Or, to simply select the scenario without running it, press and hold the On/Off button until the Trainer turns off, or wait for 10 seconds and it will automatically turn off.

The HeartStart Trainer will run the selected scenario every time until the batteries are replaced or until a different scenario is selected. The Trainer defaults to Scenario 1 each time the batteries are installed.

To run a training scenario

To run the selected training scenario, treat the Trainer exactly as you would the HS1 Defibrillator.

1. Pull the handle or press the green On/Off button to turn on the Trainer.
2. Remove the clear protective lid from the training pads cartridge and set it aside. Follow the HeartStart Trainer's voice instructions.



3. If using a clothed manikin, remove the clothing as instructed.
4. Pull the tab at the top of the training pads cartridge to peel off the resealable film cover. Inside are two adhesive pads on a yellow plastic liner. Lift the pads out of the cartridge and unwind the wires from the well. Peel one pad off the liner.

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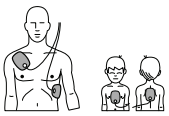
NOTE: Avoid touching the pad's adhesive gel, because this may cause the Trainer to begin analysis prematurely.

5. Place the pad on the manikin. Press the pad down firmly. Then peel and place the other pad.



6. Continue to follow Trainer instructions for remainder of scenario.
7. When the scenario has been completed, or to stop a scenario in process, press and hold the On/Off button until the Trainer turns off.
8. To repeat the same scenario, repack the pads as described below, then begin again by pulling the green handle or pressing the green On/Off button. To select a different scenario, press the i-button.

NOTE: If battery power is depleted, the Trainer will say REPLACE BATTERY when the Trainer is turned on, at the completion of a training scenario, and when the Trainer is turned off. The Trainer will continue to operate for a short time. Replace the batteries as soon as possible to ensure correct Trainer behavior.

PRECAUTION: Do not place the training pads on a person.*

Standard Scenarios

The Trainer provides eight training scenarios when using the training pads cartridges, as described in the following table. When the Trainer directs you to press the Shock button, the scenario will not advance unless the button is pressed. When the Trainer detects a non-shockable rhythm, it instructs you to provide CPR.

* A Precaution is a condition, hazard, or unsafe practice that could result in minor personal injury.

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In the Trainer scenarios, "conversion" means a change from a shockable to a non-shockable rhythm.

The legend below identifies the symbols used on the rear label of the Trainer and in the following scenario descriptions.

NOTE: The Trainer provides a two-minute CPR/patient care interval after each shock delivery and each No Shock decision.

symbol	meaning
	(Simulated) shockable rhythm detected by Trainer.
	(Simulated) non-shockable rhythm detected by Trainer.
	(Simulated) pads problem detected by Trainer.

scenario number	scenario description
Scenario 1	Shockable rhythm detected, one shock needed for conversion Details: • Trainer detects a shockable rhythm, instructs user to deliver a shock. • Trainer detects a non-shockable rhythm.
Scenario 2	Shockable rhythm detected, two shocks needed for conversion Details: • Trainer detects a shockable rhythm, instructs user to deliver a shock. • Trainer still detects a shockable rhythm, instructs user to deliver another shock. • Trainer detects a non-shockable rhythm.

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scenario number	scenario description
Scenario 3	Troubleshooting pads, one shock needed for conversion Details: • Trainer detects poor pad contact, repeats pads placement instructions. • After one pad is removed and reapplied, Trainer detects a shockable rhythm, instructs user to deliver a shock. • Trainer detects a non-shockable rhythm.
Scenario 4	Shockable rhythm detected, conversion, return to shockable rhythm, conversion Details: • Trainer detects a shockable rhythm, instructs user to deliver a shock. • Trainer detects a non-shockable rhythm. • Trainer detects refibrillation (return to a shockable rhythm), instructs user to deliver a shock. • Trainer detects a non-shockable rhythm.
Scenario 5	Non-shockable rhythm detected Details: • Trainer detects a non-shockable rhythm throughout.
Scenario 6	Shockable rhythm detected, two shocks needed for conversion Details: • Trainer detects a shockable rhythm, instructs user to deliver a shock. • Trainer still detects a shockable rhythm, instructs user to deliver another shock. • Trainer detects a non-shockable rhythm.

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scenario number	scenario description
Scenario 7	Shockable rhythm detected, two shocks needed for conversion, return to shockable rhythm detected, one shock needed for conversion Details: • Trainer detects a shockable rhythm, instructs user to deliver a shock. • Trainer still detects a shockable rhythm, instructs user to deliver another shock. • Trainer detects a non-shockable rhythm. • Trainer detects refibrillation (return to a shockable rhythm), instructs user to deliver a shock. • Trainer detects a non-shockable rhythm.
Scenario 8	Troubleshooting pads, two shocks needed for conversion Details: • Trainer detects poor pad contact, repeats pads placement instructions. • After one pad is removed and reapplied, Trainer detects a shockable rhythm, instructs user to deliver a shock. • Trainer still detects a shockable rhythm, instructs user to deliver another shock. • Trainer detects a non-shockable rhythm.

NOTE: Scenarios 2 and 6 are identical in the Trainer. However, in the defibrillator, these scenarios could differ depending on the defibrillator configuration. Both scenarios are included in the Trainer to keep scenario number consistent between the Trainer and the defibrillator.

Not all scenarios are appropriate for all user training. Training scenario number 1 is the default scenario and is most commonly used when teaching how to use the defibrillator to treat a victim of sudden cardiac arrest.

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If the training scenarios are used as part of a formal training course, the instructor may wish to:

- select only the scenarios appropriate for the training level goals,
- create case histories and patient details for the selected scenarios,
- highlight certain features of the defibrillator's performance,
- assure that users conform to local protocols,
- check pad placement, and
- evaluate user knowledge on topics such as CPR and assessing the patient.

HeartStart Trainer performance during use

The Philips HeartStart Trainer is designed for use in an automated external defibrillator training class taught by a qualified instructor.

When a training scenario is running, the Trainer mimics the behavior of the HS1 Defibrillator during actual emergency use. It provides voice instructions, guides the user through one or more simulated shocks, provides pauses for CPR, offers CPR coaching, etc. If there is no user interaction (no buttons are pressed, or the cartridge handle is not pulled) for ten minutes, the Trainer turns off.

IMPORTANT: Certain features of the actual HeartStart HS1 Defibrillator are not reproduced by the HeartStart Trainer.

- The Trainer cannot be used with the (clinical) SMART Pads cartridges. If a SMART Pads cartridge is installed, the Trainer will repeatedly request the user to install a new cartridge.
- The Trainer does not perform the battery insertion and periodic self-tests.
- The Trainer's setup is configured to meet Guidelines 2005 standard protocols* and cannot be reconfigured.†
- The Trainer always uses a standard NSA (No Shock Advised) pause.

* 2005 American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. *Circulation* 2005;112:IV. European Resuscitation Council Guidelines for Resuscitation 2005. *Resuscitation* 2005;67S1:S7-S23. International Liaison Committee on Resuscitation. *Resuscitation* 2005;67:203-211.

† This symbol on the back of the Trainer indicates configuration to meet the Guidelines 2005.

2005 GUIDELINES

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To repack the training pads cartridge

After you have finished using the training pads cartridge, press and hold the green On/Off button to turn off the Trainer. If battery power is low after training, the Trainer will tell you to replace the batteries.

Prepare the training pads cartridge for its next use as follows:

1. Turn off the Trainer.

NOTE: The following steps can be performed as illustrated or with the training pads cartridge in the Trainer.

2. Reapply the pads to each side of the solid yellow liner, making sure that the red tabs are positioned at same end of the liner as the yellow tab (**A**) and that neither pad extends beyond the edge of the liner.

3. Press the pads firmly together on the yellow liner.
4. Untwist the wires, then wind the wires around the training cartridge recess, pressing them into the track (**B**). Then place the pads over the wound wires in the cartridge. The chest pad should be on top, and the tab ends of the pads at the curved end of the cartridge (**C**). Fold the tab down over the top pad (**D**).

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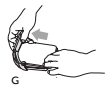
5. Press the resealable film cover over the cartridge, with the tab end at the top (**E**). Be sure to fold the tab back down under the cover (**F**).

6. Fit the hooks on the bottom of the clear hard protective lid into the holes at the bottom edge of the cartridge, and press the lid and handle down (**G**). Be sure the cartridge handle snaps into place. The training cartridge is now ready for its next use.



7. Reinstall the cartridge if necessary and press down the protective lid. The Trainer will announce the cartridge type and turn on for scenario selection. Press and hold the On/Off button or do nothing and the Trainer will automatically go to the training standby mode.

To maximize training pads cartridge service life

The M5073A and M5074A Training Pads are designed for up to 100 uses. To help ensure continued performance, avoid placing the resealable film cover or adhesive side of the pads in heat, direct sunlight, or against surfaces that might transfer fiber, dirt, or lint. Periodically check the metal contacts on the back of the cartridge and clean them with a soft, non-abrasive cloth if necessary. Do not use alcohol to clean these contacts. Do not clean the contacts in the Trainer's cartridge recess; they are self-cleaning.

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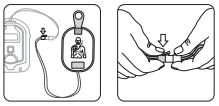
When the original training pads have reached the end of their service life, you can order M5093A Replacement Adult Training Pads or M5094A Replacement Infant/Child Training Pads for the cartridge. These include a set of pads and a resealable film cover. Change the pads as shown in the figure.



To troubleshoot the HeartStart Trainer

The following table provides troubleshooting tips.

behavior	possible cause	recommended action
Trainer says ANALYZING before pads are applied to manikin.	• User touched the adhesive gel on the pads and activated the sensing circuitry of the Trainer. • Liner is not properly separating pads. • Wires are twisted.	• Avoid touching the adhesive gel on the pads. • Be sure the pads are pressed firmly to the liner and only touching each other through the liner hole. • Untwist the wires.
Trainer does *not* say ANALYZING when pads are applied to the manikin adapter.	• Pads placement is incorrect. • Pads are old. Foil under adhesive gel is severely cracked. • Replaceable pads are not properly connected to cartridge cable. • Manikin adapter is broken. • User touched the adhesive gel on the pad, so Trainer circuitry did not sense that the pad had been removed from the liner. • Pads wires are twisted.	• Check for proper pad placement. Remove and reapply pads if indicated. • Replace training pads. • Check latch to be sure the replaceable pads are correctly attached to the cartridge cable. • Replace manikin adapter. • Avoid touching the adhesive gel on the pads. • Untwist the pads wires.

HEARTSTART TRAINER M5085A

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behavior	possible cause	recommended action
Trainer says ANALYZING while yellow liner is still attached to pad.	Trainer cannot sense yellow liner.	Remove yellow liner. *NOTE: This cannot happen when using the HS1 Defibrillator. The defibrillator will not analyze heart rhythm when the yellow liner is attached to the pads. It senses that the pads are not attached to a patient and advises the user to remove the yellow liner.*
The training pads cartridge is difficult to install in or release from the Trainer.	The resealable film cover may be improperly aligned on the cartridge.	Make sure the resealable film cover is lined up properly when repacking the cartridge.
Trainer's voice instructions high-pitched and too rapid.	One of the batteries is installed backwards.	Be sure to install batteries according to the diagram in the Trainer's battery compartment.

Environmental Considerations

By complying with your national regulations regarding disposal of electric, electronic, and battery waste, you can make a positive contribution to our shared environment. Such waste can introduce harmful elements into the environment as a whole and may also endanger human health.

The HeartStart Trainer contains electronic components. Do not dispose of it as unsorted municipal waste. As a reminder, the Trainer bears the following symbol as a reminder to collect such electronic waste separately and dispose of it at an appropriate recycling facility according to your country's regulations.

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012116-0003

13

Structural Calculations

Structural Calculation Report

(Rev. B)

1. Introduction

This report explain the structural calculations for the Orchid House. This building will be located at NCTU in Hsinchu city, Taiwan. The building size is 12.6m x 9m x 6.8m (Length x Width x Height) in approximation. Single footing is adopted in the foundation design. Ordinary Moment Resistant Framing System (OMRF) is chosen in the building. The load types considered in structural system design include DL(dead load)、LL(live load) and EL(earthquake load). The wind load in this project is not considered because it is smaller than LL for roof and EL for lateral load. The design and analysis of structural system are completed by software "CSI-SAP2000 v14.2".

2. Codes and Standards

The design codes used in this report include:

(a) Taiwan Building Technical Regulations, 2013
(b) Taiwanese Design and Technique Specifications of Steel Structures for Buildings (Allowable Stress Design), 2010
(c) Taiwanese Design and Construction Specifications of Wood Construction for Buildings(Allowable Stress Design), 2011
(d) Taiwan Seismic Design Specifications and Commentary of Buildings, 2011
(e) Chinese National Standards (CNS)

3. Materials

The structural system is intended to use two major material types: steel for structural member, wood for floor deck.

(a) Steel: SS400 or ASTM-A36
(b) Wood: CNS 14630 (TYPE IV)

4. Loads

(a) Dead Loads (DL)

The dead loads include the weight of the structural members and the other permanently loads (Such as ceiling, insulation and facilities, etc.) applied on the structure.

Structural Weight: calculated by structural analysis software (SAP2000) automatically.

Roof: 100kgf/m^2 (include Solar Glass Panel and Ceiling)

Top and Ground Floor: 100kgf/m^2 (include Wood Deck, Insulation Ceiling and Partition)

Exterior Wall: 100kgf/m(line load on exterior girders)

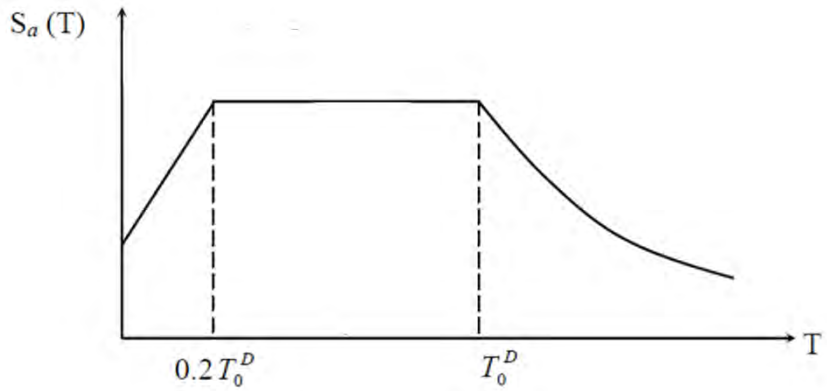
(b) Live Load (LL)

Roof: 100kgf/m^2 (as maintenance load)

Top and Ground Floor: 200kgf/m^2 (for residential usage)

(c) Earthquake Load (EL)

Owing to Taiwan located at Pacific seismic belt, seismic design for building should be considered. The typical response earthquake acerbation curve is as follows:



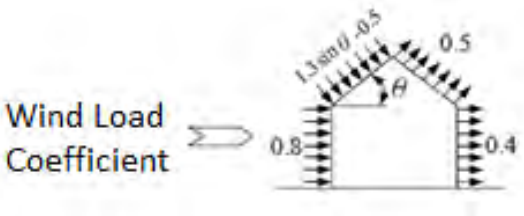
In this report, the structural period for the building located in Hsinchu is 0.358sec and the T_0^D is 0.7sec. Based on the Taiwan Seismic Design Specifications and Commentary of Buildings, the lateral load by earthquake will be

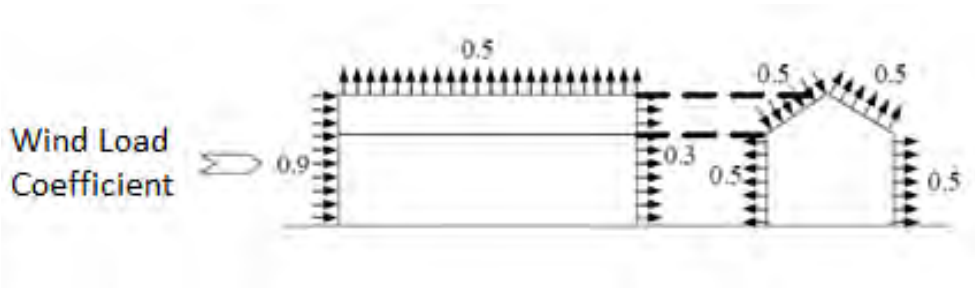
(EL)x = 0.247DL for X-dir

(EL)y = 0.247DL for Y-dir

(d) Wind Load (WL)

For this structure, the basic wind pressure is 110kgf/m^2 and the applied wind load coefficients are listed as follows:





The lateral wind load applied on the structural system is smaller than that caused by earthquake. For the roof, it is also less than the live load. Therefore, it is not the controlling load case in the structural design.

5. Comfort Criteria

Deflection:

(a) Vertical Deflection of steel girder/beam: L/240 (for DL+LL); L/360 (for LL)

(b) Vertical Deflection of wood beam: L/240 (for DL+LL); L/360 (for LL)

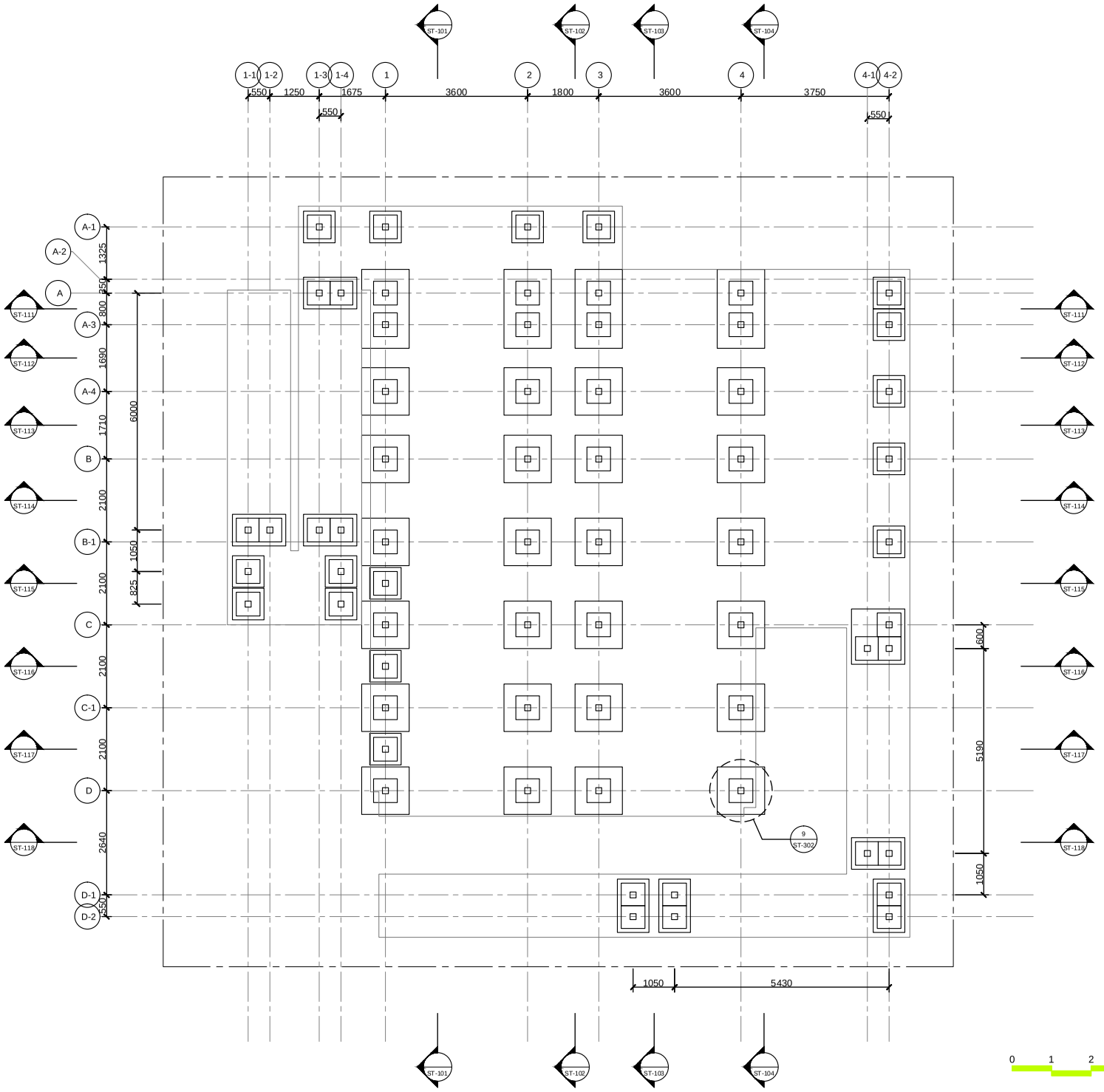
(c) Horizontal Drift of top of the structure: H/200 (for EL)

6. Load Combination

ID	Combination
101	DL+LL
201	DL+0.75(LL+0.8Ex)
202	DL+0.75(LL-0.8Ex)
203	0.7DL+0.8Ex
204	0.7DL-0.8Ex
301	DL+0.75(LL+0.8Ey)
302	DL+0.75(LL-0.8Ey)
303	0.7DL+0.8Ey
304	0.7DL-0.8Ey

7. Structural Layout

The Structural plan and elevation layout are listed as follows.



Solar Decathlon Europe

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Contact: www.sde.tw

Consultants: RUENTEX CONSTRUCTION GROUP

Note:

Mark	Date	Description
DN	2013/04/01	SD Submission
DN	2013/07/01	DD Submission
ST	2013/11/01	CD Submission
ST	2014/03/03	CD Submission

Drawn by	ST
Checked by	DN
Scale	1:100
Unit	mm

DWG. Title

FOUNDATION PLAN AND DETAILS

DWG. No. ST-001

PAGE

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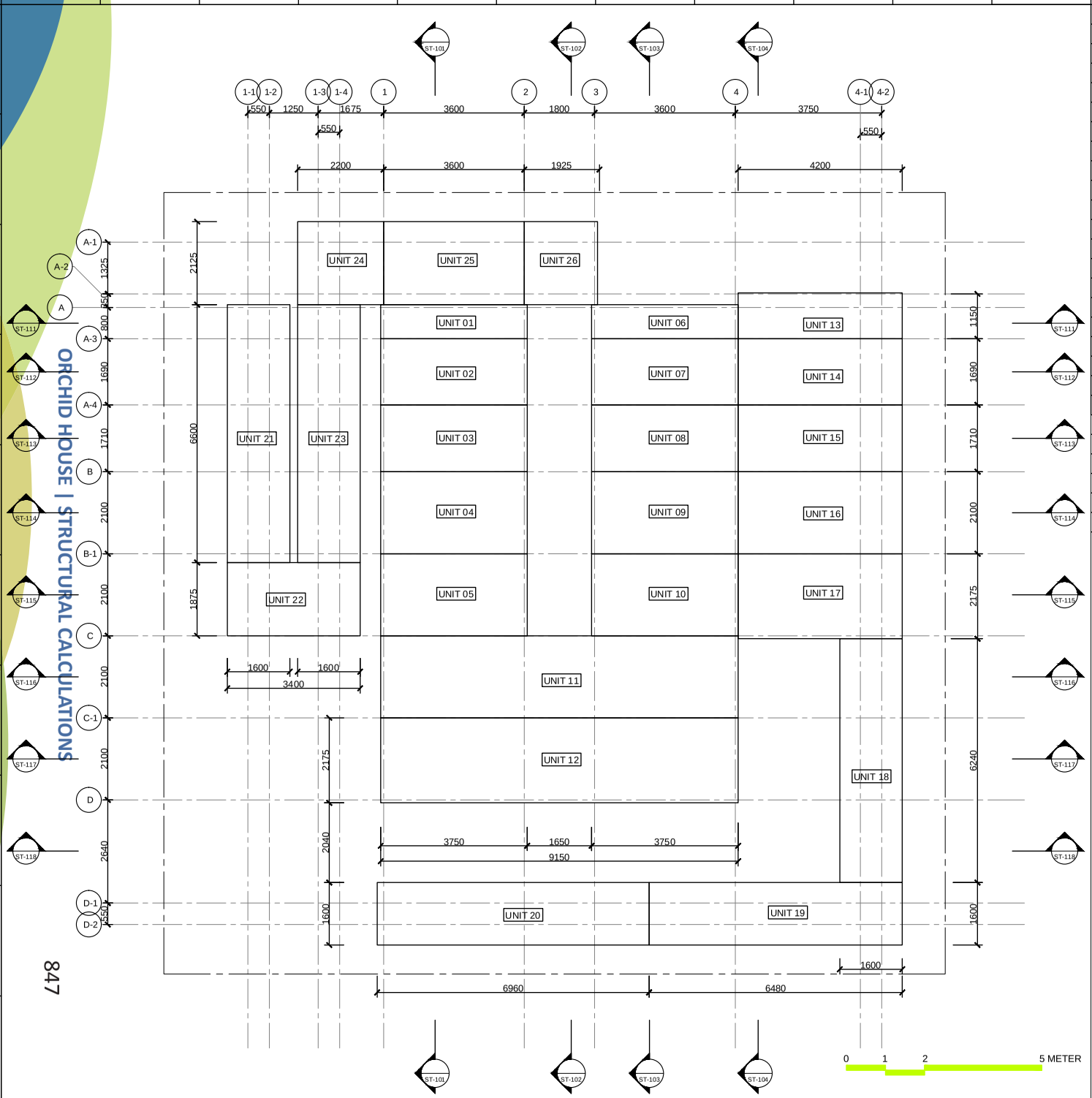

UNIT No.	Size (L x W x D)
UNIT 01	3750 x 875 x 150
UNIT 02	3750 x 1690 x 150
UNIT 03	3750 x 1710 x 150
UNIT 04	3750 x 2100 x 150
UNIT 05	3750 x 2100 x 150
UNIT 06	3750 x 875 x 150
UNIT 07	3750 x 1690 x150
UNIT 08	3750 x 1710 x 150
UNIT 09	3750 x 2100 x 150
UNIT 10	3750 x 2100 x 150
UNIT 11	9150 x 2100 x 150
UNIT 12	9150 x 2175 x 150
UNIT 13	4200 x 1150 x 150
UNIT 14	4200 x 1690 x 150
UNIT 15	4200 x 1710 x 150
UNIT 16	4200 x 2100 x 150
UNIT 17	4200 x 2175 x 150
UNIT 18	6240 x 1600 x 150
UNIT 19	6480 x 1600 x 150
UNIT 20	6960 x 1600 x 150
UNIT 21	6600 x 1600 x 150
UNIT 22	3400 x 1875 x 150
UNIT 23	6600 x 1600 x 150
UNIT 24	2200 x 2125 x 150
UNIT 25	3600 x 2125 x 150
UNIT 26	2125 x 1925 x 150

ORCHID HOUSE | STRUCTURAL CALCULATIONS

847

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Note:

Mark	Date	Description
DN	2013/04/01	SD Submission
DN	2013/07/01	DD Submission
ST	2013/11/01	DD Submission
ST	2014/03/03	CD Submission

Drawn by	ST
Checked by	DN
Scale	1:100
Unit	mm

DWG. Title: STRUCTURAL FLOOR UNITS

DWG. No.: ST-002

PAGE

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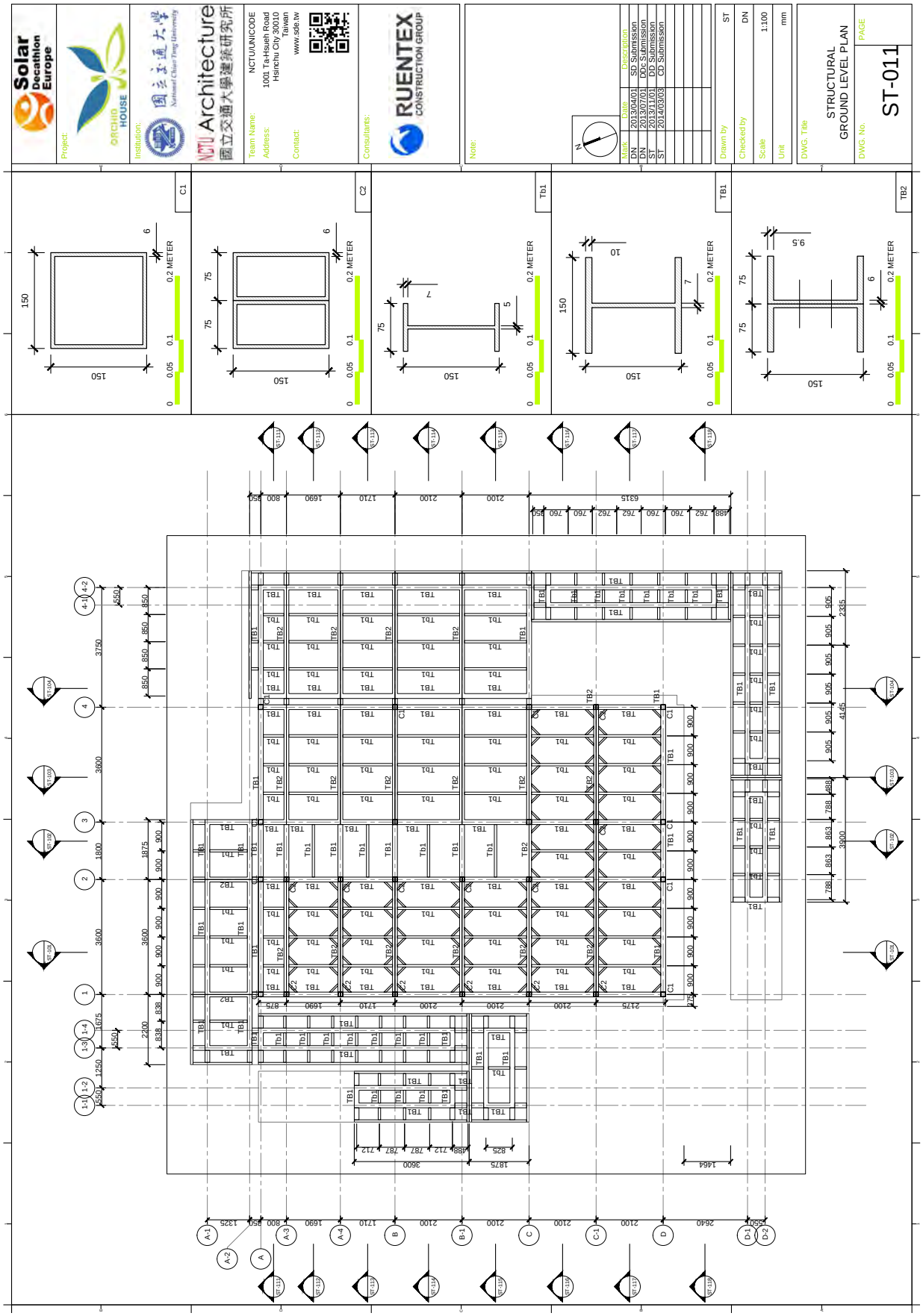
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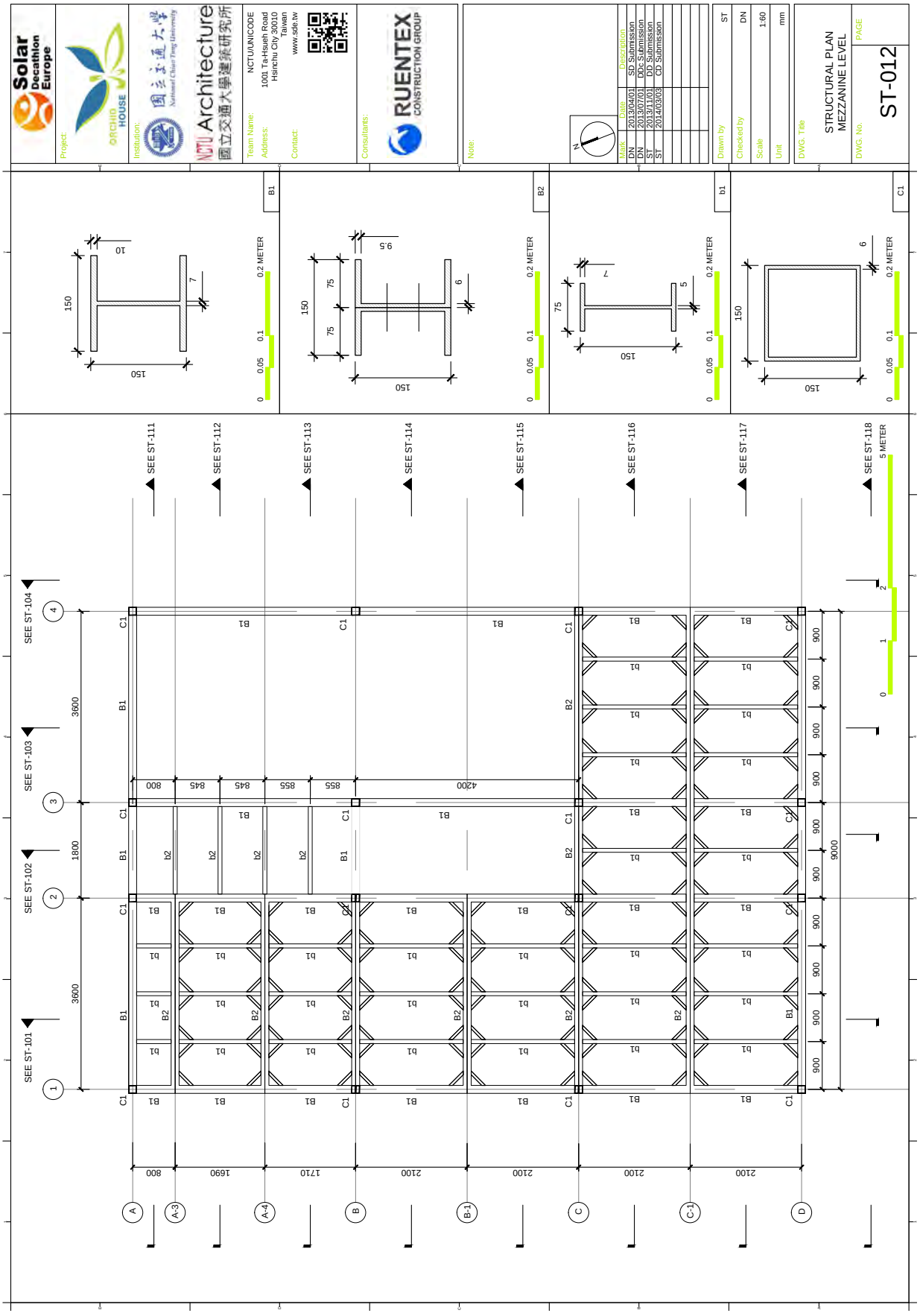
RUENTEX
CONSTRUCTION GROUP
Description
SD Submission
DC Submission
DD Submission
CD Submission
STRUCTURAL
GROUND LEVEL PLAN
ST-011
C1
C2
TB1
TB2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Mark Date Description
DN 2013/04/01 SD Submission
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ST 2013/11/01 DD Submission
ST 2014/03/03 CD Submission
Drawn by ST
Checked by DN
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Unit mm
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DWG. No. ST-012
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B2
b1
C1
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SEE ST-102
SEE ST-103
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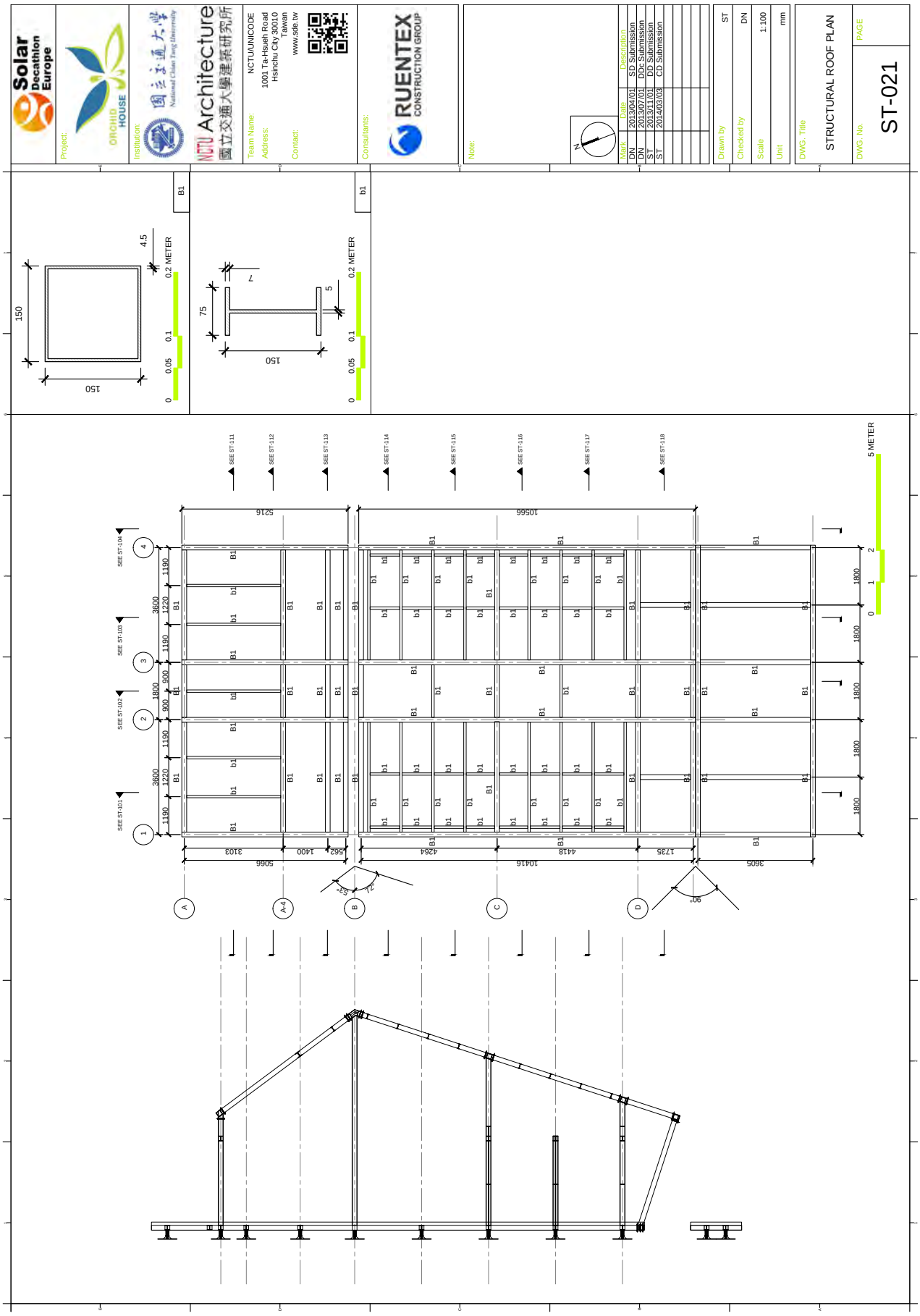
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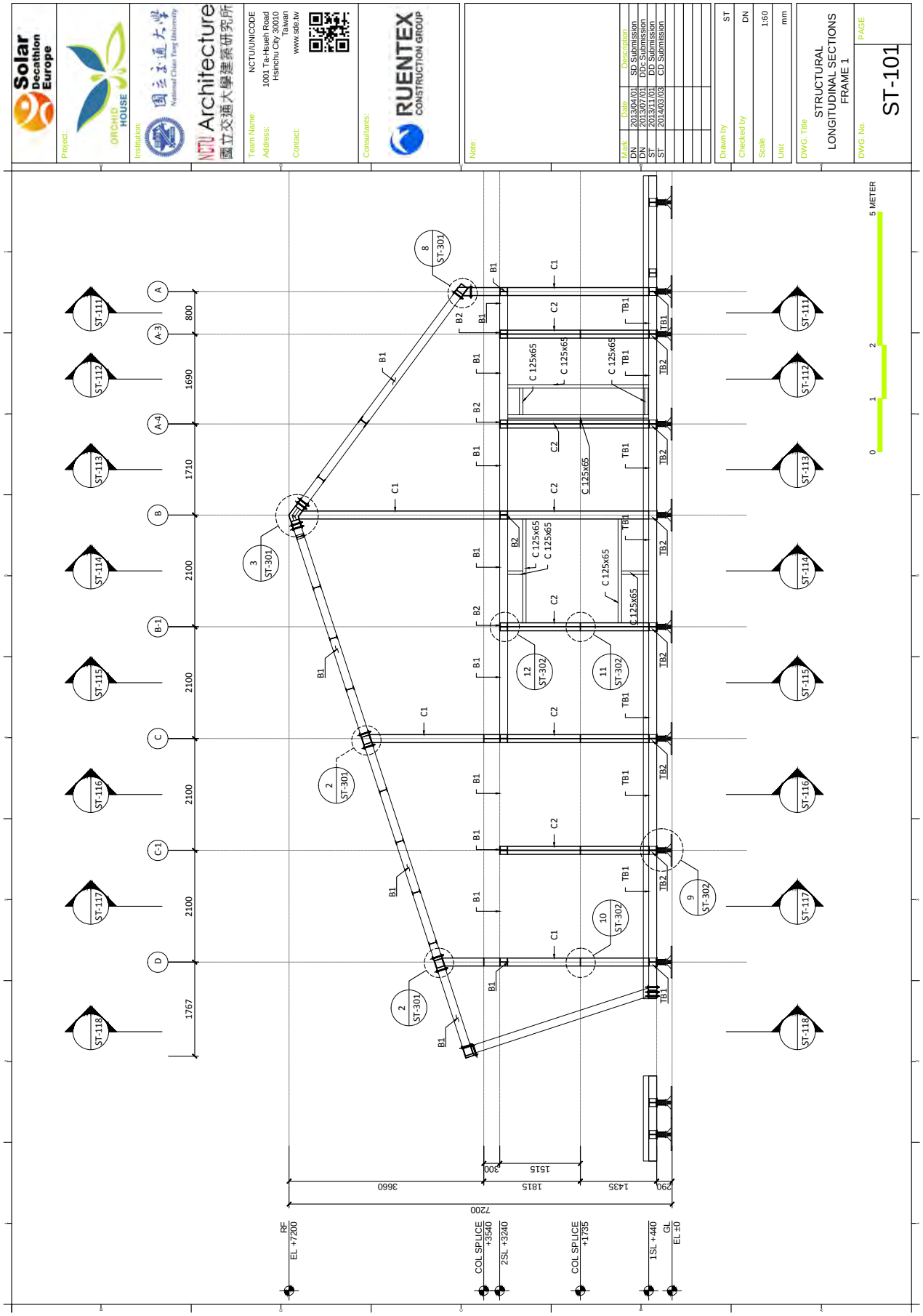
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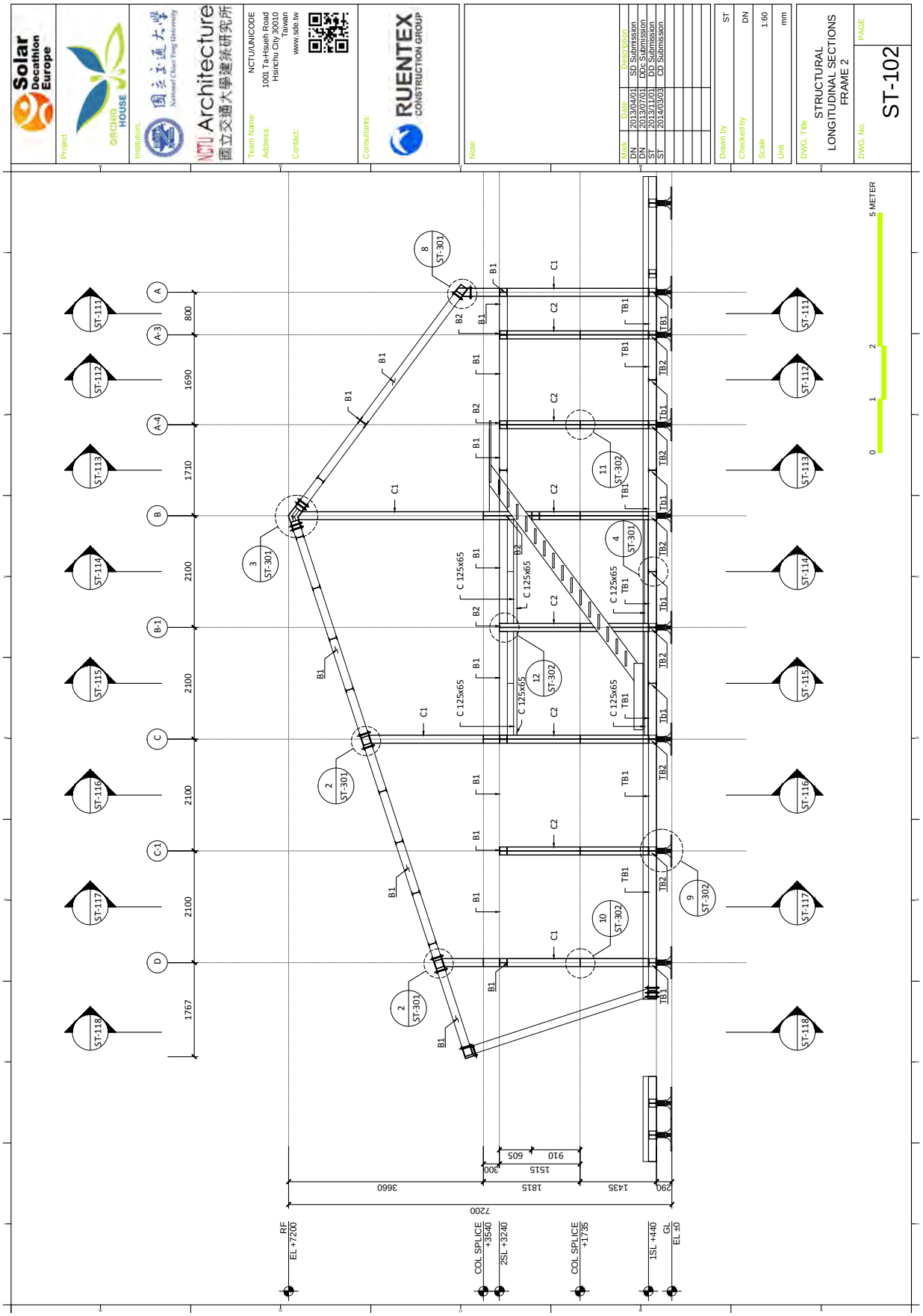
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1815
1435
290
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300
910
605
800
1690
1710
2100
2100
2100
2100
1767
A
A-3
A-4
B
B-1
C
C-1
D
ST-111
ST-112
ST-113
ST-114
ST-115
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TB2
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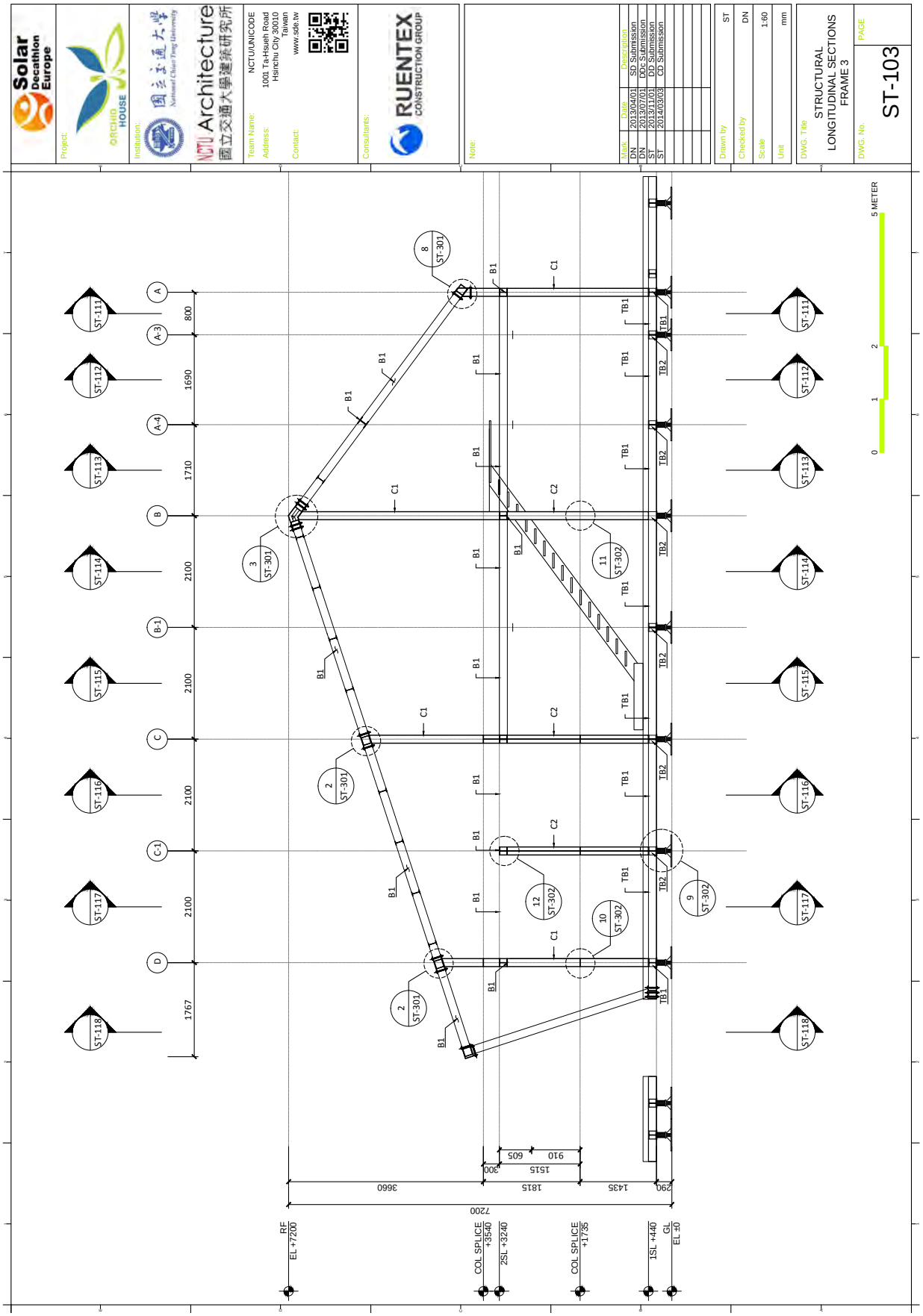
ST-302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1SL +440
GL EL ±0
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3660
1815
1435
290
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605
1515
300
800
1690
1710
2100
2100
2100
1767
A
A-3
A-4
B
B-1
C
C-1
D
ST-111
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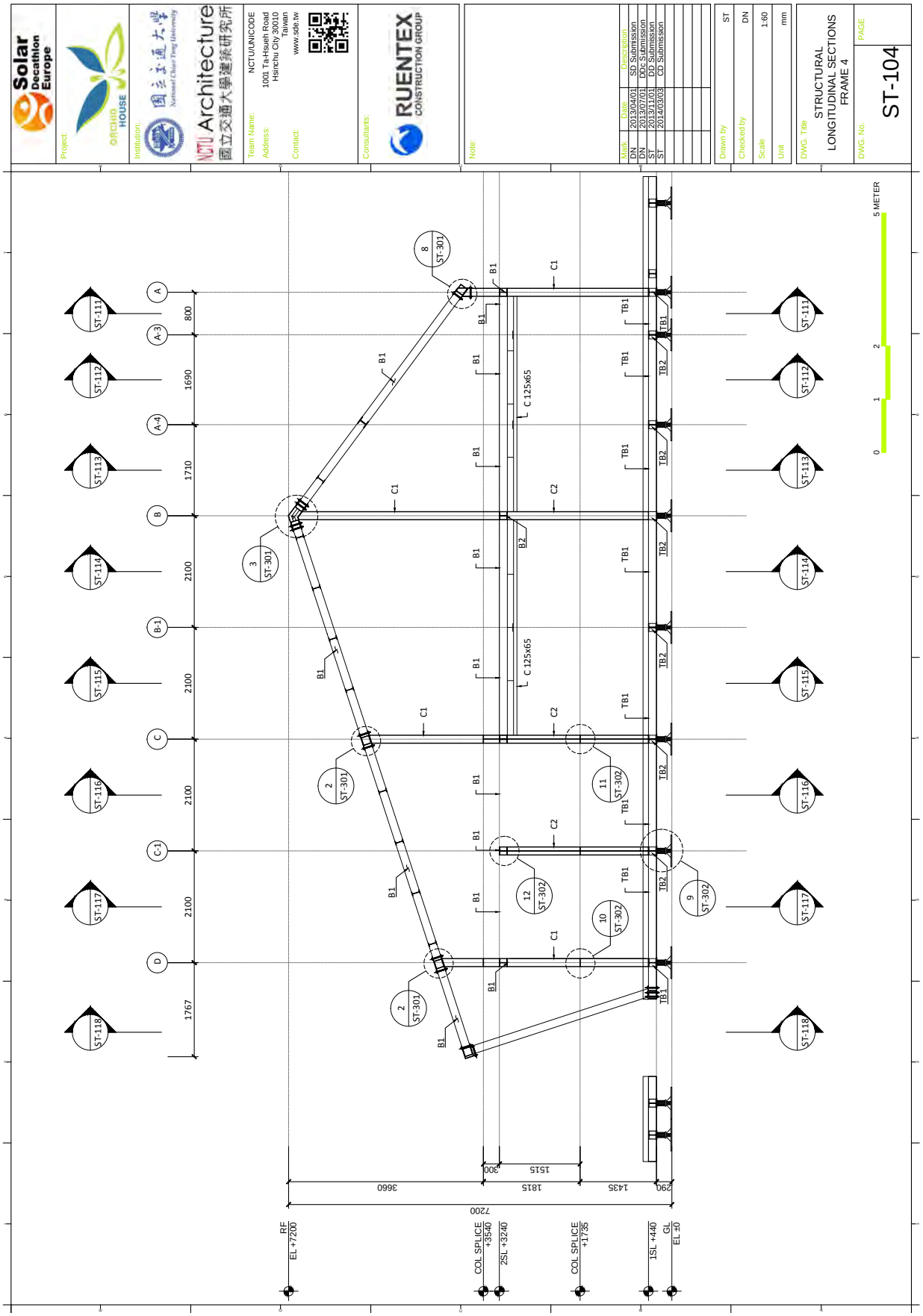
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ST-111 ST-112 ST-113 ST-114 ST-115 ST-116 ST-117 ST-118
B1 C1 C2 B2 TB1 TB2
C 125x65
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COL SPLICE +3540
2SL +3240
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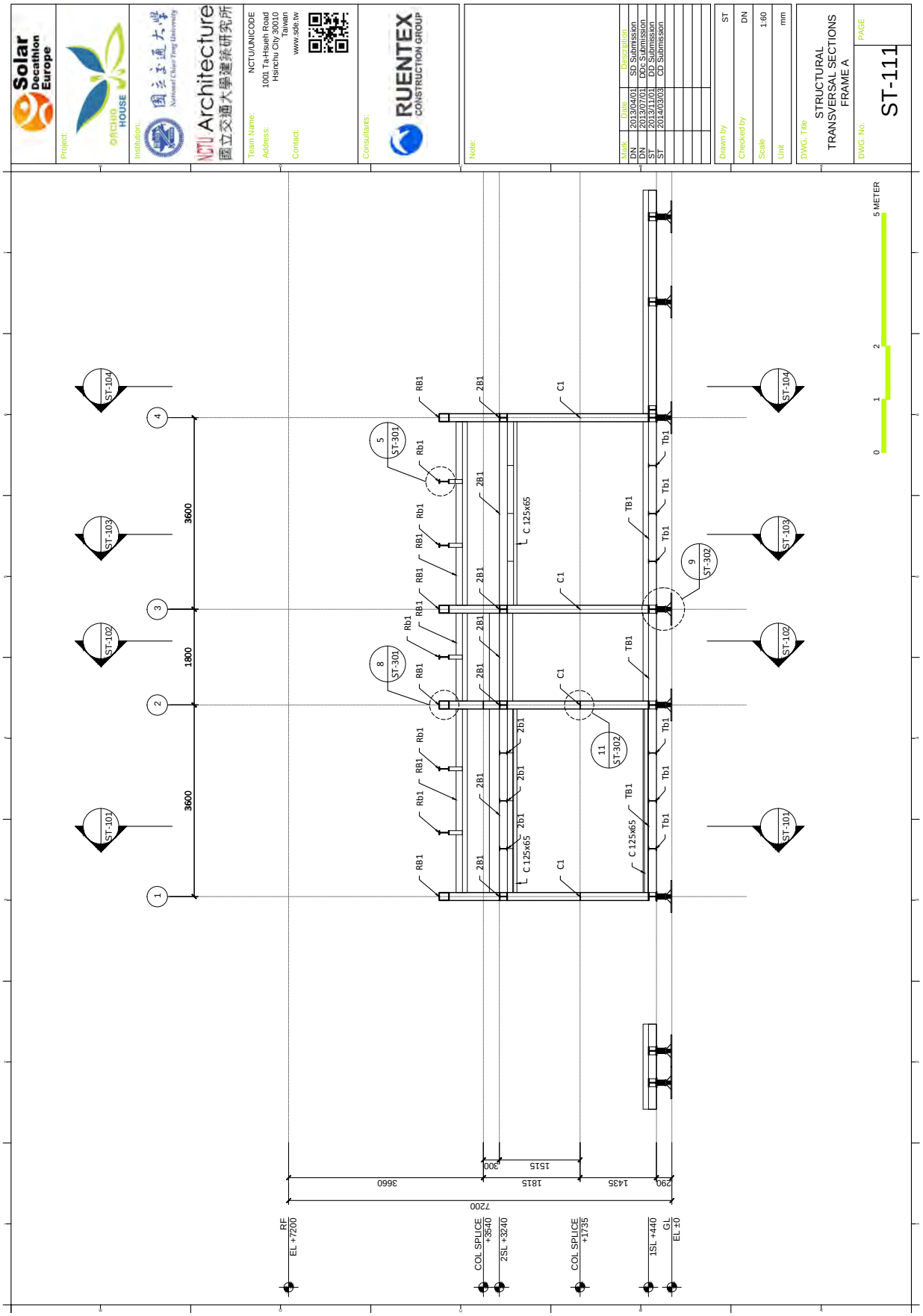
GL EL ±0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ST-102
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RB1
2B1
C1
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Tb1
TB1
C 125x65
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3660
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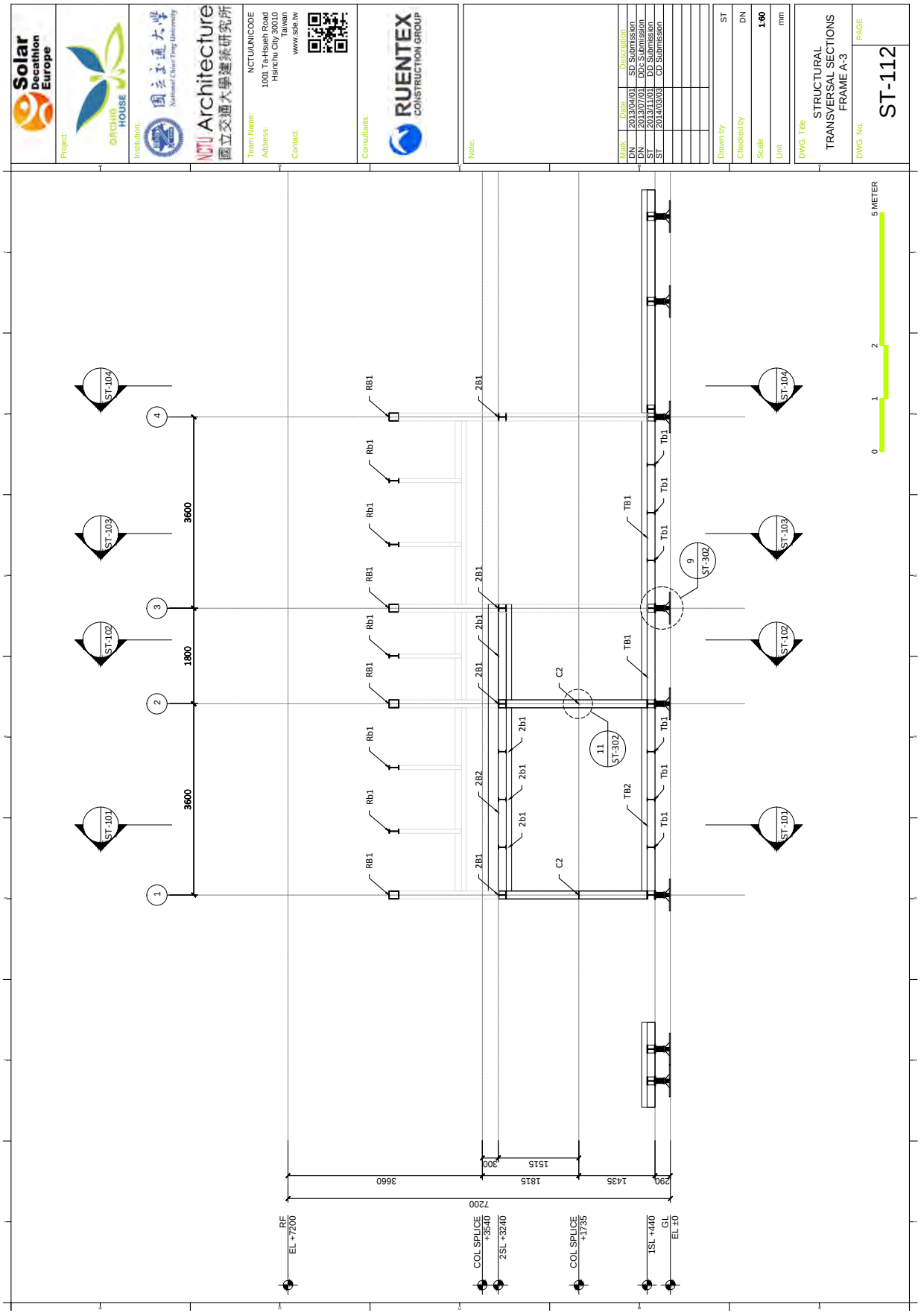
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1800
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2b1
2B2
TB1
Tb1
TB2
C2
9
ST-302
11
ST-302
3660
300
1515
1815
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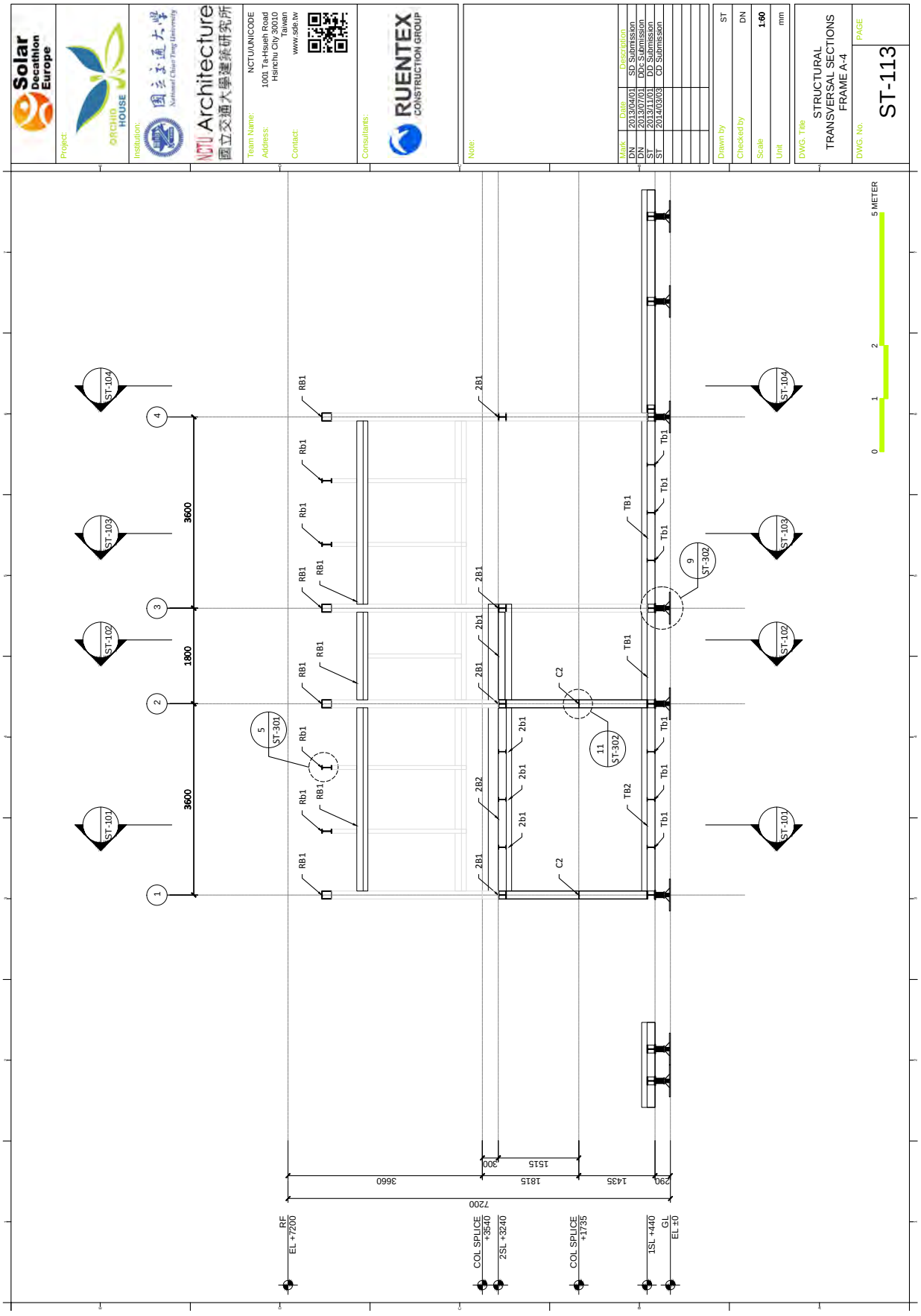
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ST-103
ST-102
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1
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1800
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2B2
TB1
Tb1
TB2
C2
5 ST-301
9 ST-302
11 ST-302
3660
300
1515
1815
1435
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7200
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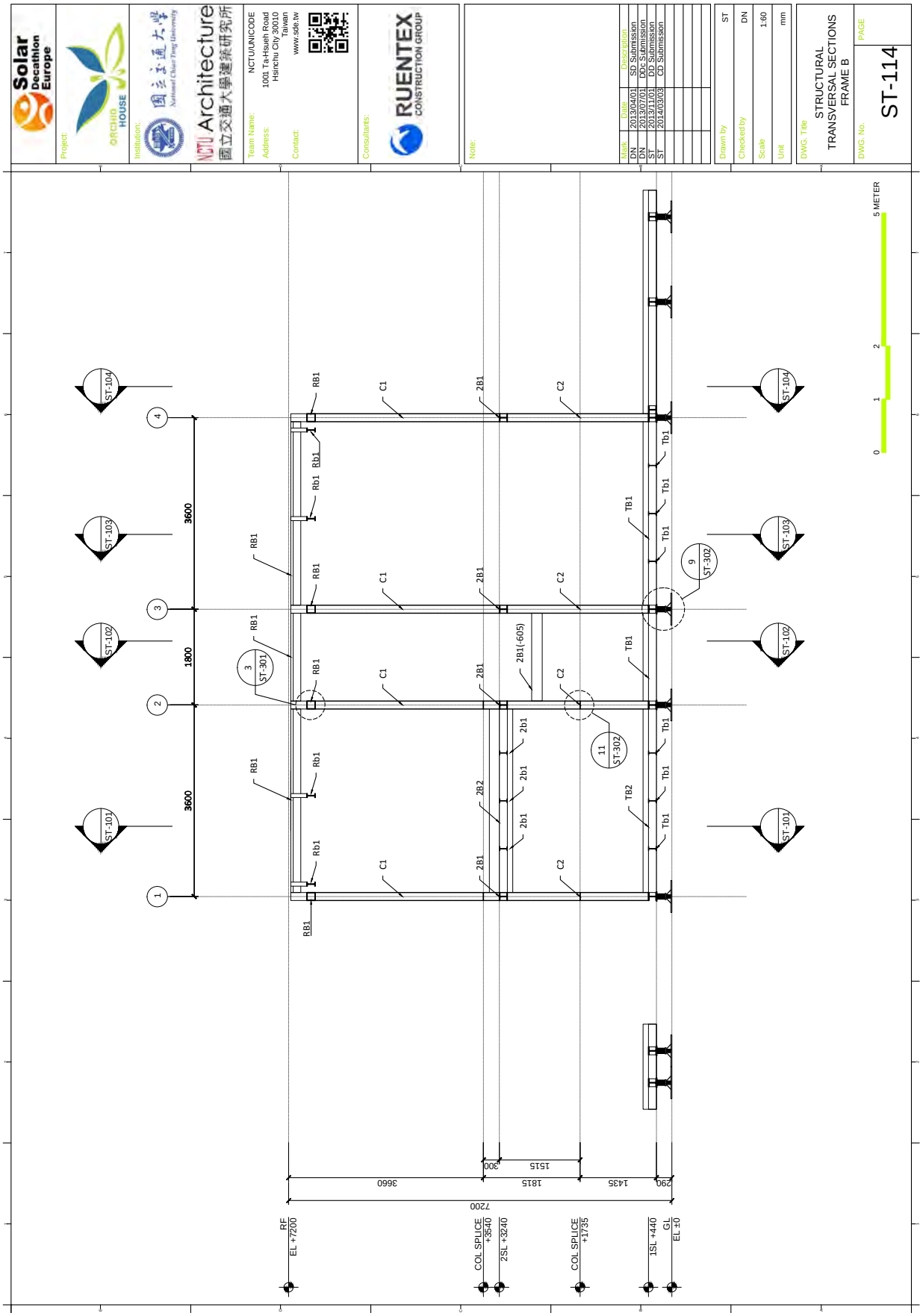
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3600 1800 3600
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2B1(-605)
9 ST-302
11 ST-302
3 ST-307
7200
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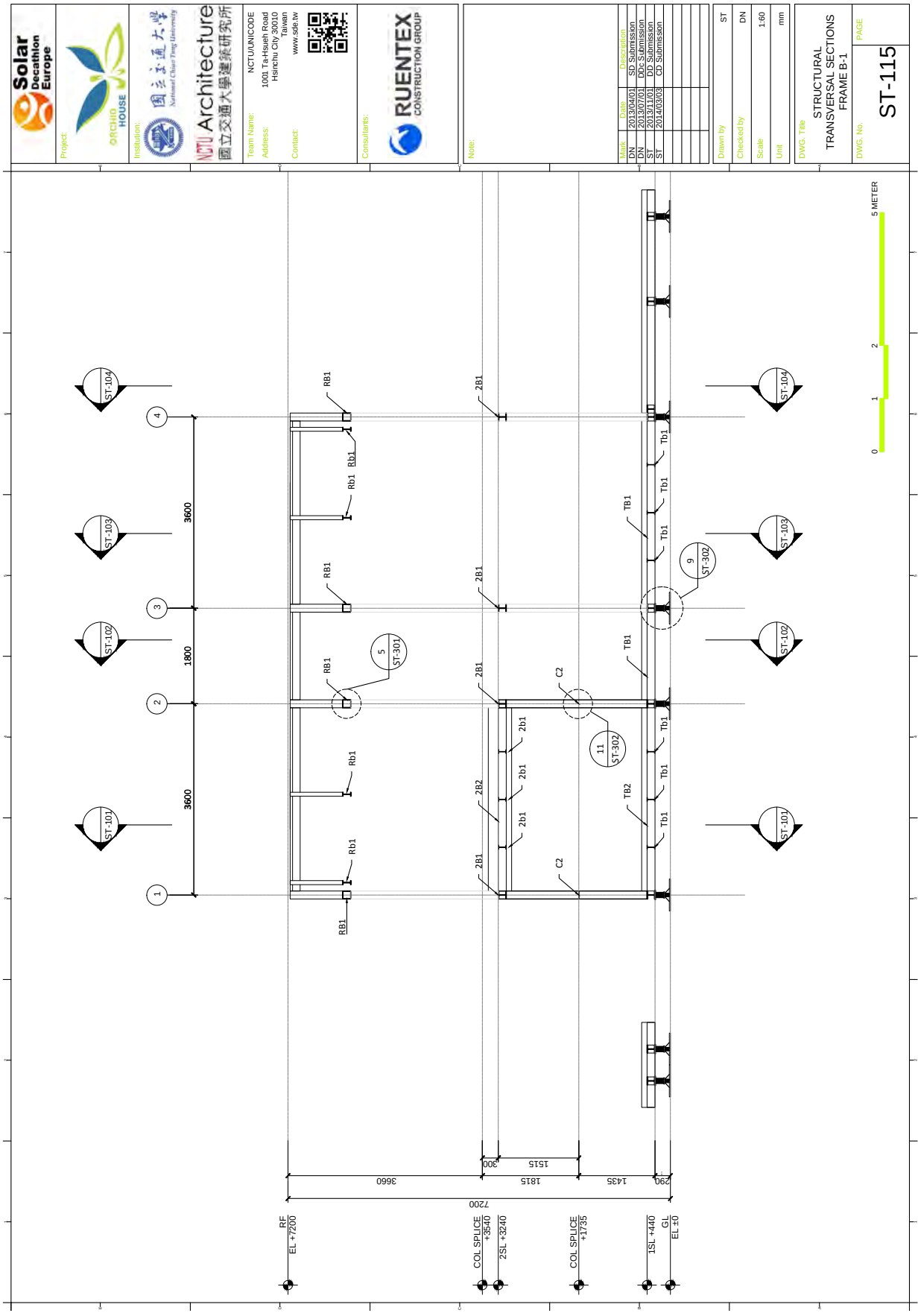
GL EL ±0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ST-102
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TB1
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2B2
TB2
C2
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9 ST-302
11 ST-302
3660
300
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ISL +440
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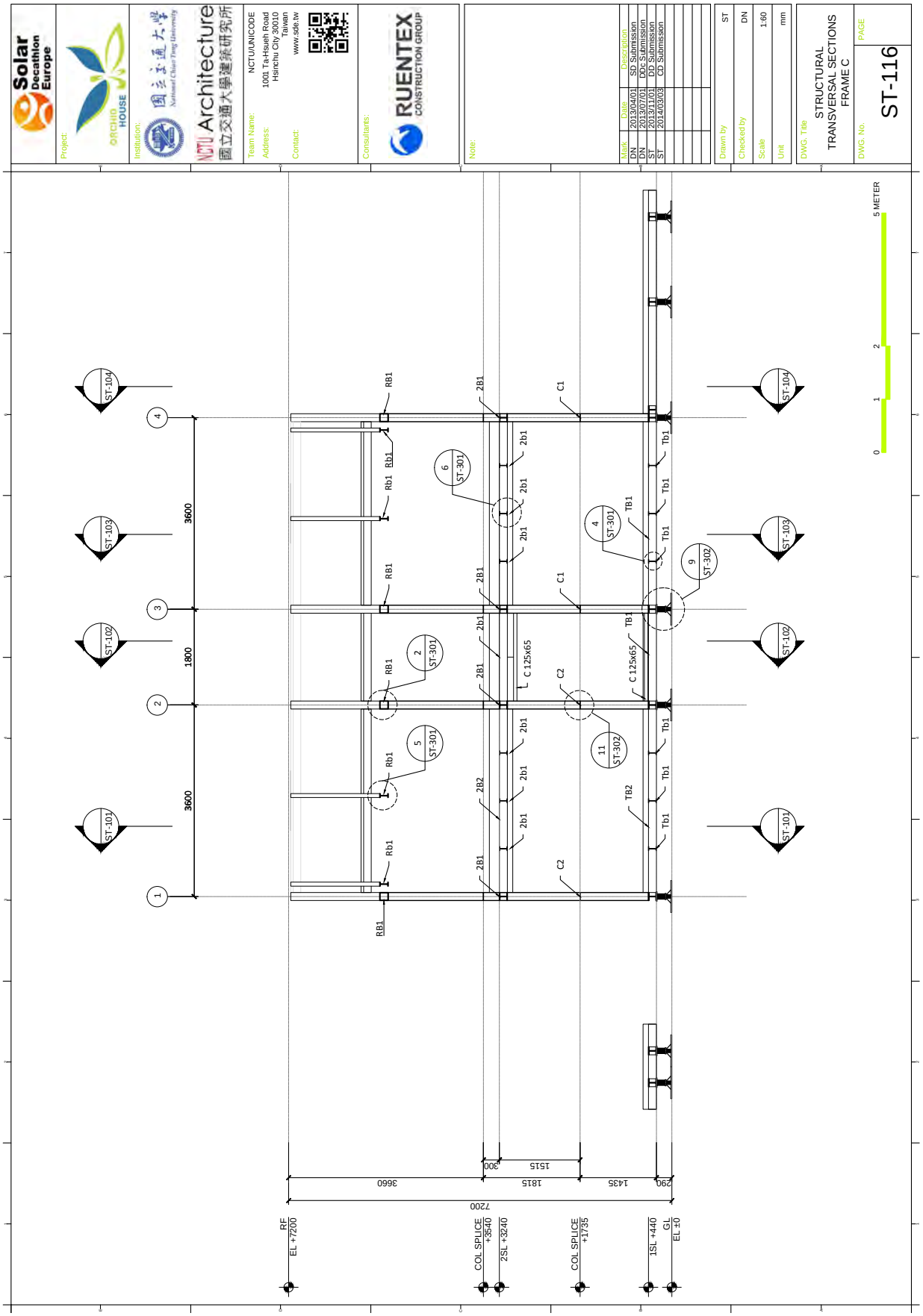
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4
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1800
3600
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Rb1
2B1
2b1
C1
C2
TB1
Tb1
2B2
TB2
C 125x65
6 ST-301
4 ST-301
2 ST-301
5 ST-301
9 ST-302
11 ST-302
3660
300
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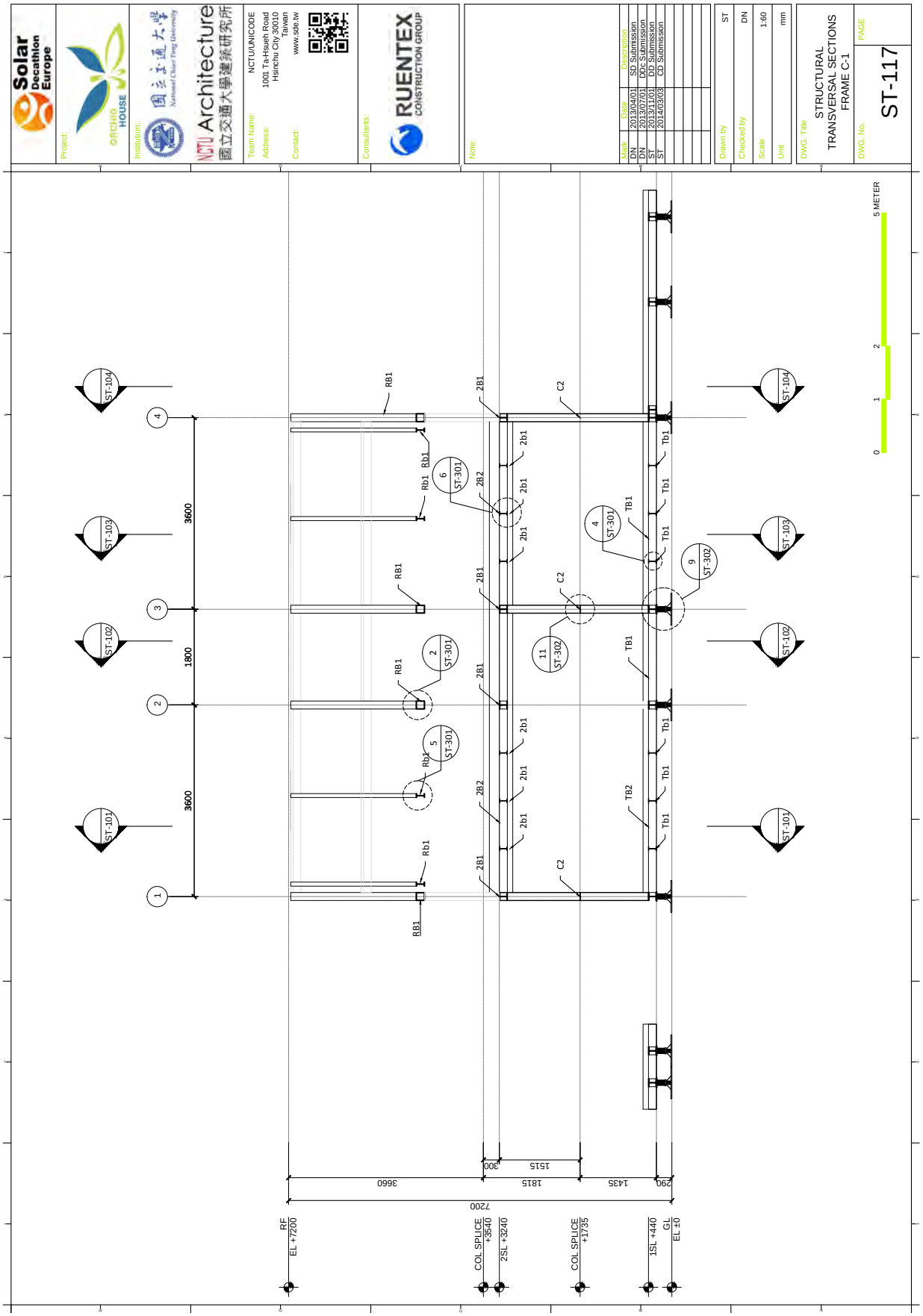
ISL +440
GL EL ±0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Rb1
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ST-302
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300
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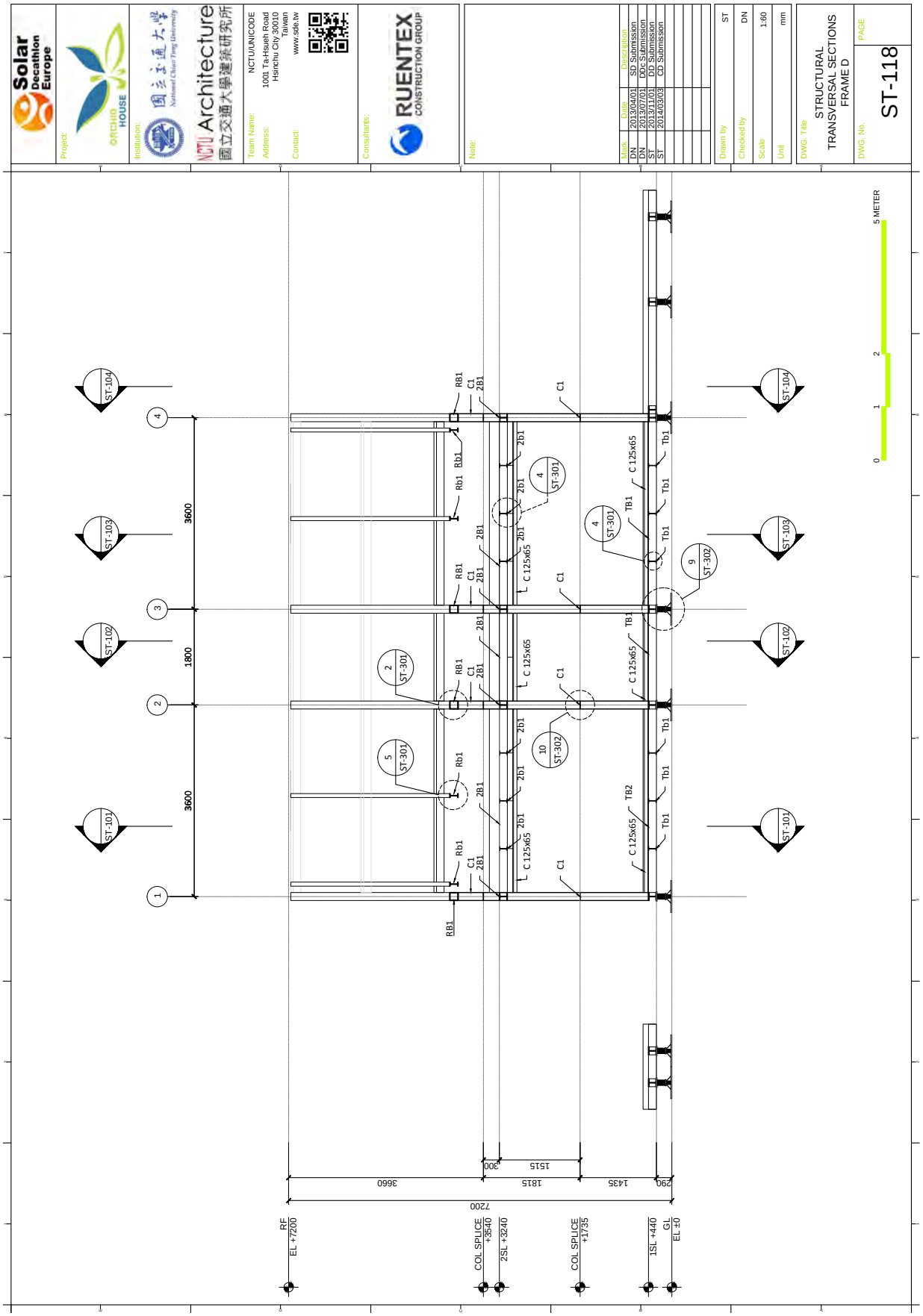
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ST-102
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1800
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2b1
C 125x65
TB1
Tb1
TB2
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2 ST-301
5 ST-301
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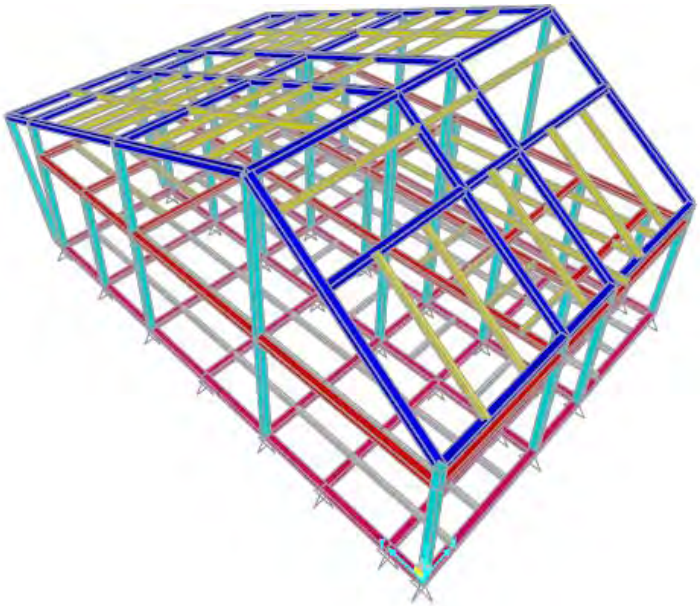
10 ST-302
3660
300
1515
1815
1435
290
7200
RF EL +7200
COL SPLICE +3540
ZSL +3240
COL SPLICE +1735
ISL +440
GL EL ±0

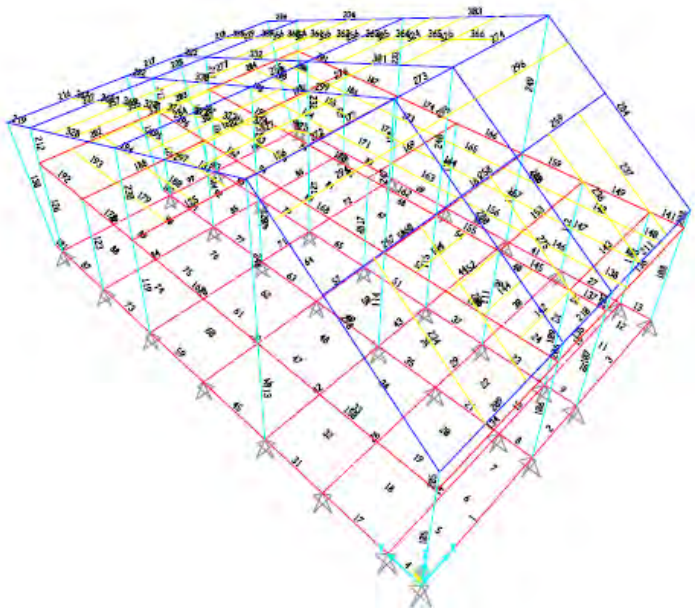
8. Structural Model

The structural model is shown as follows:

(a) 3D Model



(b) Member ID



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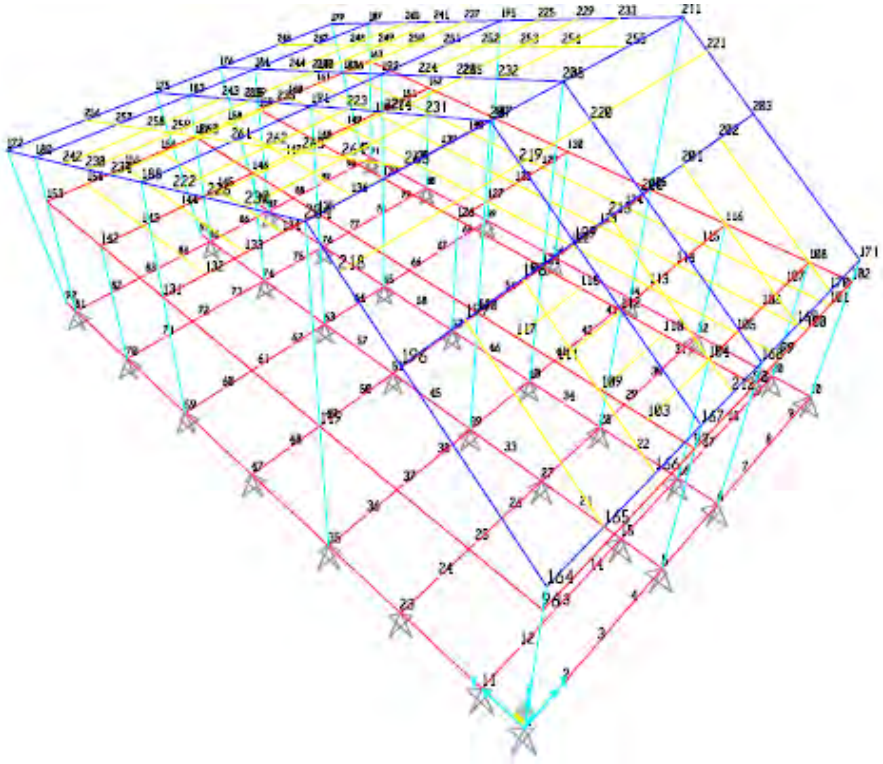
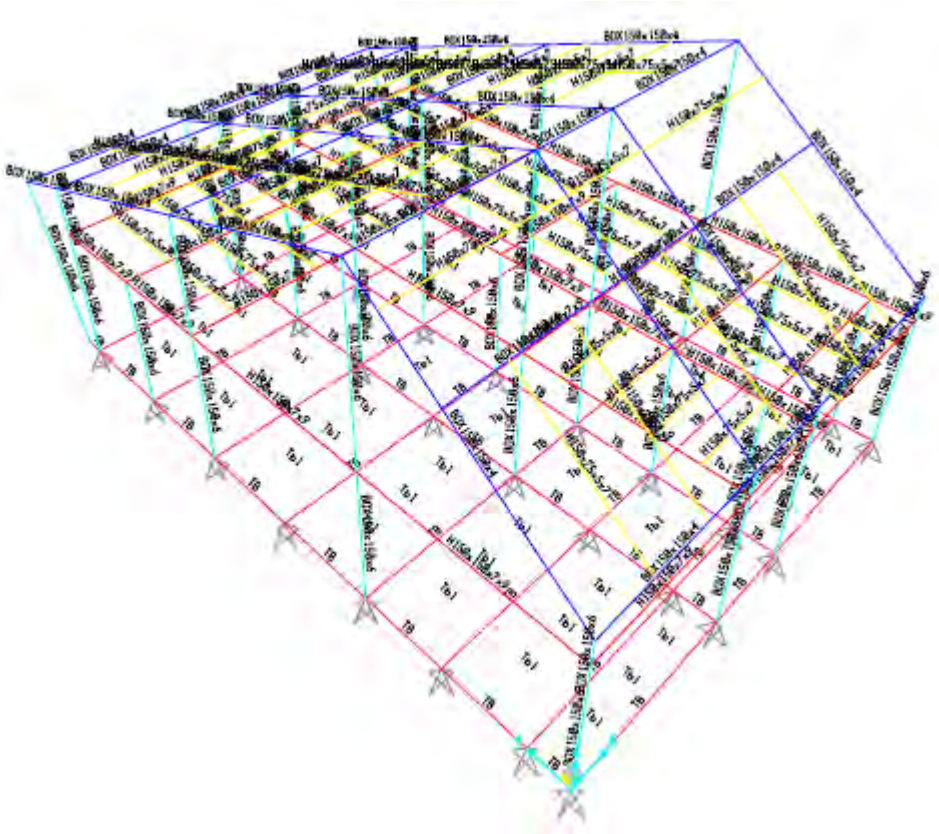
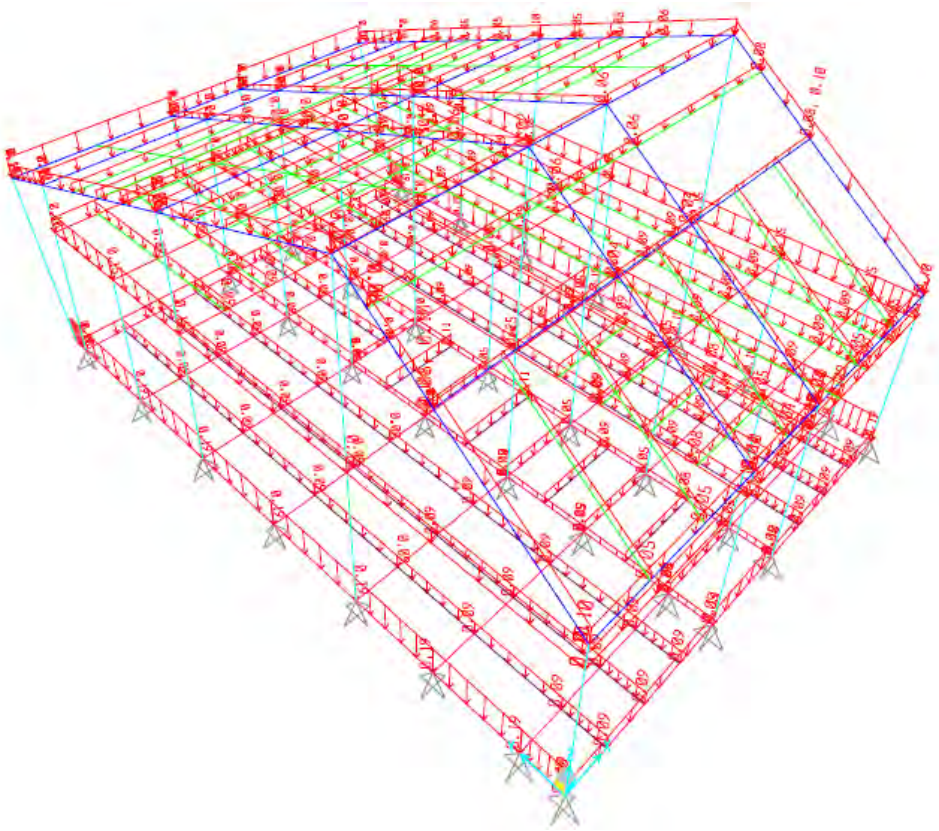


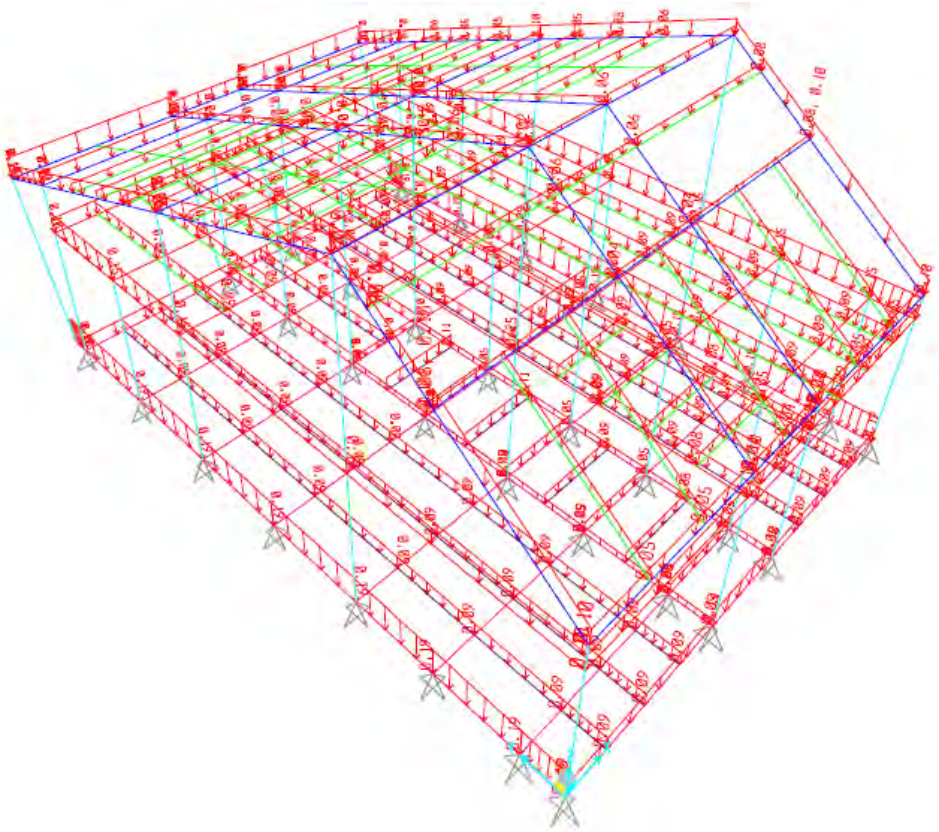
(d) Assigned Section



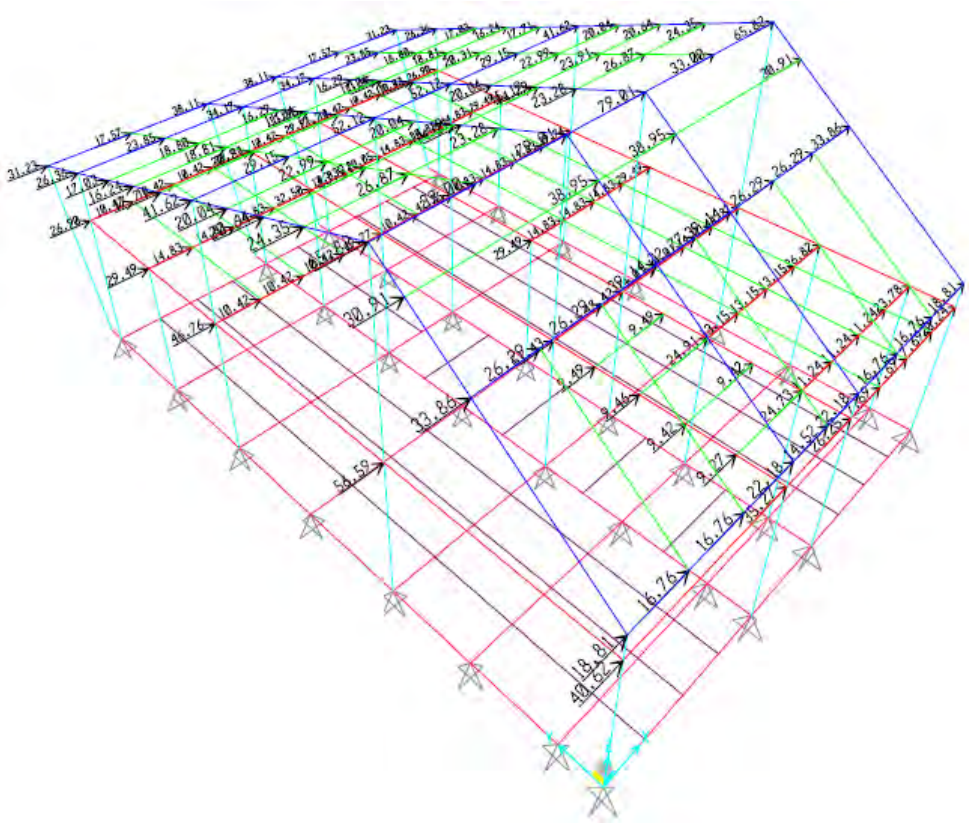
(e) Dead Load



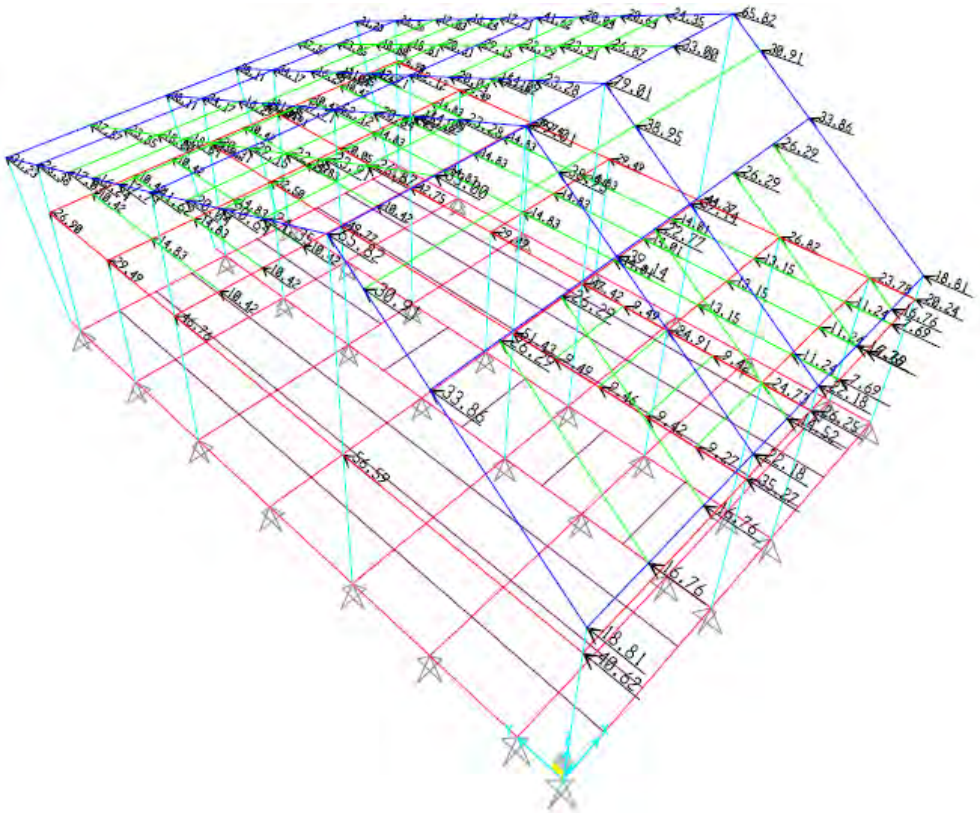
(f) Live Load



(g) Earthquake Load



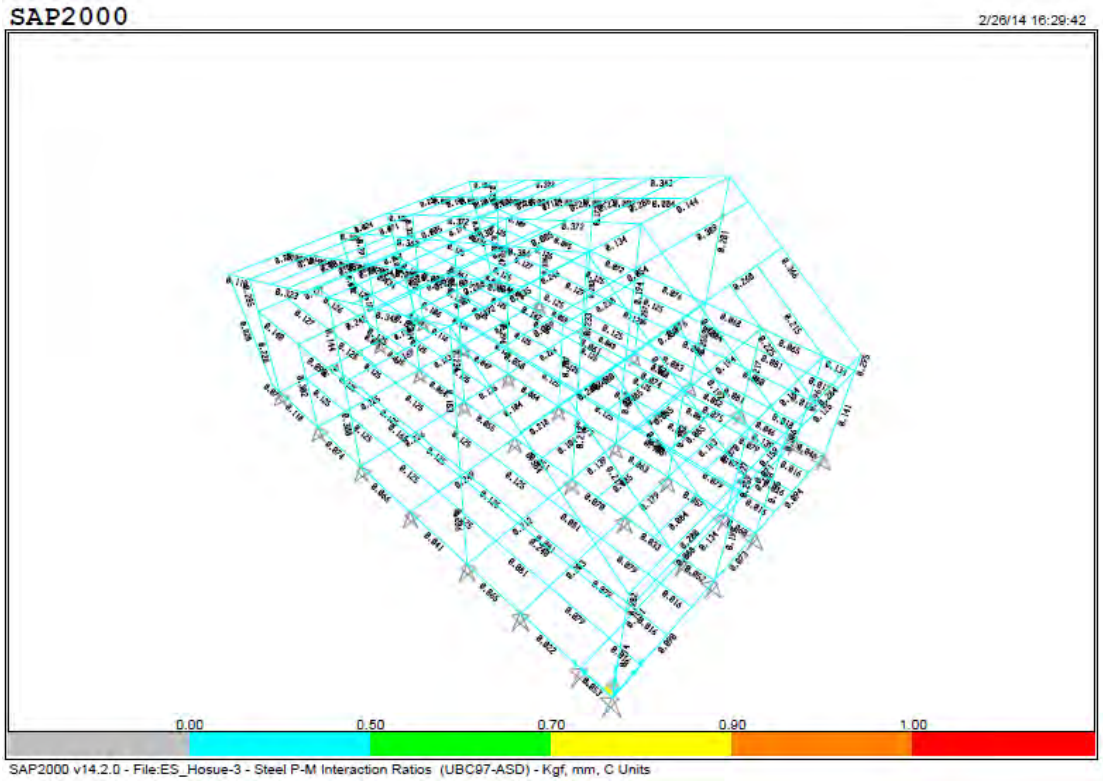
(X-dir)



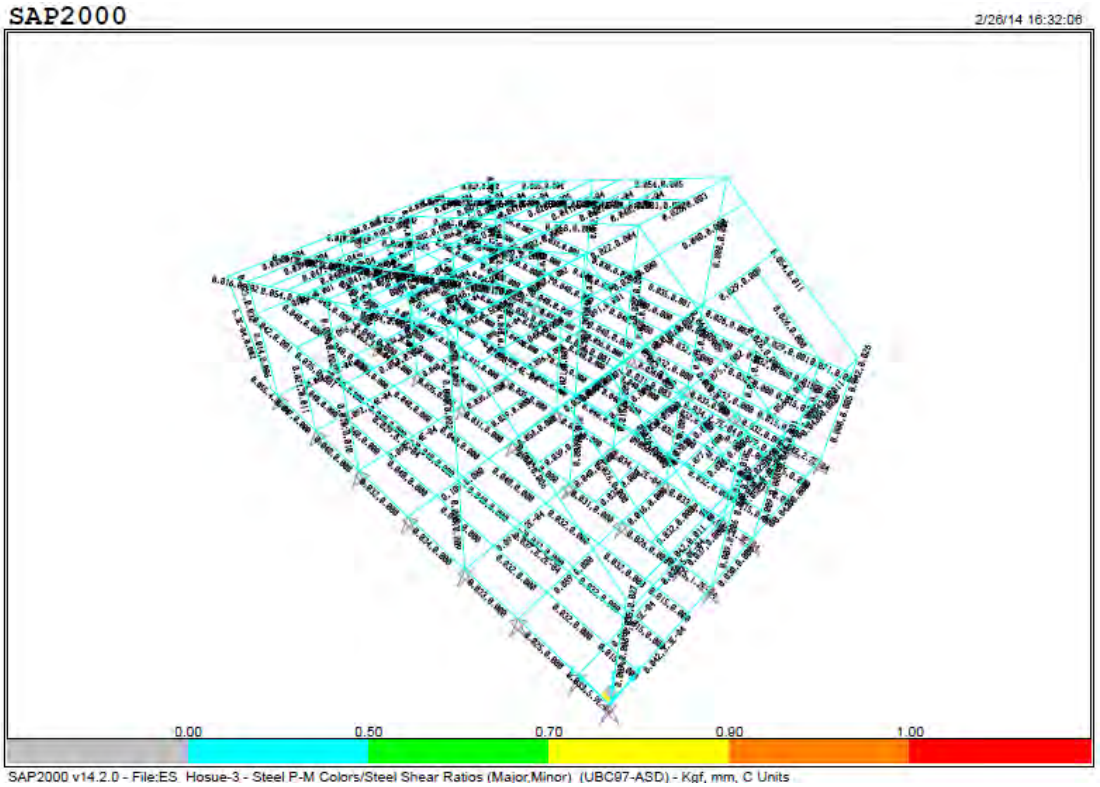
(Y-dir)

9. Structural Memebr Design

The structural member design and check are shown in the following figure. Dtail calculations for column, girder and beam are listed in 9.(1)~9.(5)。



(PMM ratio)



(Shear Ratio)

(1) Steel Column (Box-150x150x6)

TABLE: Steel Design 1 - Summary Data - UBC97-ASD						
Frame	DesignSect	DesignTyp	Status	Ratio	RatioTyp	Combo
105	BOX150x150x6	Column	No Messages	17.4%	PMM	202
106	BOX150x150x6	Column	No Messages	19.9%	PMM	201
107	BOX150x150x6	Column	No Messages	15.5%	PMM	202
108	BOX150x150x6	Column	No Messages	14.1%	PMM	201
113	BOX150x150x6	Column	No Messages	28.6%	PMM	301
114	BOX150x150x6	Column	No Messages	21.2%	PMM	301
115	BOX150x150x6	Column	No Messages	26.9%	PMM	301
116	BOX150x150x6	Column	No Messages	25.5%	PMM	301
119	BOX150x150x6	Column	No Messages	30.0%	PMM	301
120	BOX150x150x6	Column	No Messages	23.4%	PMM	201
121	BOX150x150x6	Column	No Messages	29.4%	PMM	202
122	BOX150x150x6	Column	No Messages	28.3%	PMM	201
126	BOX150x150x6	Column	No Messages	22.8%	PMM	202
127	BOX150x150x6	Column	No Messages	19.5%	PMM	201
128	BOX150x150x6	Column	No Messages	27.6%	PMM	202
129	BOX150x150x6	Column	No Messages	20.8%	PMM	201
205	BOX150x150x6	Column	No Messages	28.2%	PMM	101
206	BOX150x150x6	Column	No Messages	25.9%	PMM	101
207	BOX150x150x6	Column	No Messages	30.6%	PMM	101
208	BOX150x150x6	Column	No Messages	29.5%	PMM	101
246	BOX150x150x6	Column	No Messages	18.3%	PMM	202
247	BOX150x150x6	Column	No Messages	23.3%	PMM	202
248	BOX150x150x6	Column	No Messages	19.4%	PMM	202
249	BOX150x150x6	Column	No Messages	20.1%	PMM	201
212	BOX150x150x6	Column	No Messages	28.5%	PMM	101
213	BOX150x150x6	Column	No Messages	29.1%	PMM	101
214	BOX150x150x6	Column	No Messages	33.7%	PMM	101
215	BOX150x150x6	Column	No Messages	27.6%	PMM	101
230	BOX150x150x6	Column	No Messages	14.4%	PMM	202
231	BOX150x150x6	Column	No Messages	15.6%	PMM	201
232	BOX150x150x6	Column	No Messages	24.7%	PMM	202
233	BOX150x150x6	Column	No Messages	17.2%	PMM	201
109	BOX150x150x6	Column	No Messages	22.7%	PMM	301
110	BOX150x150x6	Column	No Messages	19.6%	PMM	301
111	BOX150x150x6	Column	No Messages	25.2%	PMM	301
112	BOX150x150x6	Column	No Messages	21.7%	PMM	301
117	BOX150x150x6	Column	No Messages	28.7%	PMM	301
118	BOX150x150x6	Column	No Messages	25.7%	PMM	201
123	BOX150x150x6	Column	No Messages	30.2%	PMM	301
124	BOX150x150x6	Column	No Messages	21.4%	PMM	301
125	BOX150x150x6	Column	No Messages	33.6%	PMM	101

Calculation Detail

UBC97-ASD STEEL SECTION CHECK
Combo : 101
Units : Kgf, mm, C

Frame : 125 Design Sect: BOX150x150x6
X Mid : 9000.000 Design Type: Column
Y Mid : 10500.000 Frame Type : Ordinary Moment Resisting Frame
Z Mid : 1475.000 Sect Class : Compact
Length : 2950.000 Major Axis : 0.000 degrees counterclockwise from local 3
Loc : 2950.000 RLLF : 1.000

Area : 3456.000 SMajor : 159528.960 rMajor : 58.839 AVMajor: 1800.000
IMajor : 11964672.000 SMinor : 159528.960 rMinor : 58.839 AVMinor: 1800.000
IMinor : 11964672.000 ZMajor : 186732.000 E : 20400.000
Ixy : 0.000 ZMinor : 186732.000 Fy : 25.000

STRESS CHECK FORCES & MOMENTS

Location	P	M33	M22	V2	V3	T
2950.000	-1689.211	-712482.406	-59393.384	424.875	39.342	-418.103

PMM DEMAND/CAPACITY RATIO

Governing Equation	Total Ratio		P Ratio		MMajor Ratio		MMinor Ratio	Ratio Limit	Status Check
(H1-3)	0.336	=	0.043	+	0.271	+	0.023	0.950	OK

AXIAL FORCE DESIGN

	P Force	fa Stress	Fa Allowable	Ft Allowable
Axial	-1689.211	0.489	11.491	15.000

MOMENT DESIGN

	M Moment	fb Stress	Fb Allowable	Fe Allowable	Cm Factor	K Factor	L Factor	Cb Factor
Major Moment	-712482.406	4.466	16.500	21.861	0.850	1.383	1.000	2.300
Minor Moment	-59393.384	0.372	16.500	34.825	0.850	1.095	1.000	

SHEAR DESIGN

	V Force	fv Stress	Fv Allowable	Stress Ratio	Status Check	T Torsion
Major Shear	424.875	0.236	10.000	0.024	OK	0.000
Minor Shear	39.342	0.022	10.000	0.002	OK	0.000

(2) Steel Girders & Beams

TABLE: Steel Design 1 - Summary Data - UBC97-ASD						
Frame	DesignSect	DesignTyp	Status	Ratio	RatioTyp	Combo
134	H150x150x7x9	Beam	No Messages	8.8%	PMM	201
135	H150x150x7x9	Beam	No Messages	7.1%	PMM	201
136	H150x150x7x9	Beam	No Messages	12.5%	PMM	202
160	H150x150x7x9	Beam	No Messages	18.0%	PMM	201
161	H150x150x7x9	Beam	No Messages	23.0%	PMM	202
175	H150x150x7x9	Beam	No Messages	16.9%	PMM	201
177	H150x150x7x9	Beam	No Messages	24.6%	PMM	202
202	H150x150x7x9	Beam	No Messages	17.7%	PMM	201
204	H150x150x7x9	Beam	No Messages	17.4%	PMM	201
150	H150x150x7x9	Beam	See WarnMsg	24.0%	PMM	301
167	H150x150x7x9	Beam	No Messages	16.5%	PMM	301
151	H150x150x7x9	Beam	No Messages	16.8%	PMM	301
168	H150x150x7x9	Beam	No Messages	5.8%	PMM	101
190	H150x150x7x9	Beam	No Messages	36.1%	PMM	101
143	H150x150x7x9	Beam	No Messages	14.4%	PMM	101
153	H150x150x7x9	Beam	No Messages	19.4%	PMM	101
169	H150x150x7x9	Beam	No Messages	23.8%	PMM	101
188	H150x150x7x9	Beam	No Messages	24.2%	PMM	201
191	H150x150x7x9	Beam	No Messages	25.8%	PMM	101
159	H150x150x7x9	Beam	No Messages	6.8%	PMM	301
166	H150x150x7x9	Beam	No Messages	7.6%	PMM	301
174	H150x150x7x9	Beam	No Messages	7.2%	PMM	201
187	H150x150x7x9	Beam	No Messages	9.5%	PMM	301
201	H150x150x7x9	Beam	No Messages	10.9%	PMM	301
141	H150x150x7x9	Beam	No Messages	13.4%	PMM	301
149	H150x150x7x9	Beam	No Messages	6.5%	PMM	301
178	H150x150x7x9	Beam	No Messages	9.0%	PMM	301
192	H150x150x7x9	Beam	No Messages	14.0%	PMM	301
182	H150x150x7x9	Beam	No Messages	10.6%	PMM	301
196	H150x150x7x9	Beam	No Messages	13.4%	PMM	301
137	H150x150x7x9	Beam	No Messages	13.9%	PMM	301
145	H150x150x7x9	Beam	No Messages	7.5%	PMM	301
155	H150x150x7x9	Beam	No Messages	7.4%	PMM	202
162	H150x150x7x9	Beam	No Messages	6.1%	PMM	301
170	H150x150x7x9	Beam	No Messages	14.7%	PMM	202

Calculation Detail

UBC97-ASD STEEL SECTION CHECK
Combo : 101
Units : Kgf, mm, C

Frame : 190 Design Sect: H150x150x7x9
X Mid : 5400.000 Design Type: Beam
Y Mid : 10500.000 Frame Type : Ordinary Moment Resisting Frame
Z Mid : 2950.000 Sect Class : Compact
Length : 4200.000 Major Axis : 0.000 degrees counterclockwise from local 3
Loc : 2100.000 RLLF : 1.000

Area : 3624.000 SMajor : 197060.640 rMajor : 63.861 AVMajor: 1050.000
IMajor : 14779548.000 SMinor : 67550.307 rMinor : 37.390 AVMinor: 2250.000
IMinor : 5066273.000 ZMajor : 220842.000 E : 20400.000
Ixy : 0.000 ZMinor : 102867.000 Fy : 25.000

STRESS CHECK FORCES & MOMENTS

Location	P	M33	M22	V2	V3	T
2100.000	810.312	936616.358	36940.072	-362.178	-32.755	481.673

PMM DEMAND/CAPACITY RATIO

Governing Equation	Total Ratio		P Ratio		MMajor Ratio		MMinor Ratio	Ratio Limit	Status Check
(H2-1)	0.361	=	0.015	+	0.317	+	0.029	0.950	OK

AXIAL FORCE DESIGN

	P Force	fa Stress	Fa Allowable	Ft Allowable
Axial	810.312	0.224	11.740	15.000

MOMENT DESIGN

	M Moment	fb Stress	Fb Allowable	Fe Allowable	Cm Factor	K Factor	L Factor	Cb Factor
Major Moment	936616.358	4.753	15.000	24.286	1.000	1.000	1.000	1.000
Minor Moment	36940.072	0.547	18.750	33.300	1.000	1.000	0.500	

SHEAR DESIGN

	V Force	fv Stress	Fv Allowable	Stress Ratio	Status Check	T Torsion
Major Shear	362.178	0.345	10.000	0.034	OK	0.000
Minor Shear	32.755	0.015	10.000	0.001	OK	0.000

Frame	DesignSect	DesignTyp	Status	Ratio	RatioTyp	Combo
176	H150x75x5x7	Beam	No Messages	19.2%	PMM	201
203	H150x75x5x7	Beam	No Messages	16.2%	PMM	202
152	H150x75x5x7	Beam	No Messages	8.5%	PMM	101
189	H150x75x5x7	Beam	No Messages	43.5%	PMM	101
138	H150x75x5x7	Beam	No Messages	1.8%	PMM	101
139	H150x75x5x7	Beam	No Messages	1.7%	PMM	101
140	H150x75x5x7	Beam	No Messages	1.7%	PMM	101
146	H150x75x5x7	Beam	No Messages	8.1%	PMM	101
147	H150x75x5x7	Beam	No Messages	8.0%	PMM	101
148	H150x75x5x7	Beam	No Messages	8.1%	PMM	101
156	H150x75x5x7	Beam	No Messages	8.3%	PMM	101
157	H150x75x5x7	Beam	No Messages	8.2%	PMM	101
158	H150x75x5x7	Beam	No Messages	8.4%	PMM	101
163	H150x75x5x7	Beam	No Messages	12.5%	PMM	101
164	H150x75x5x7	Beam	No Messages	12.7%	PMM	101
165	H150x75x5x7	Beam	No Messages	12.5%	PMM	101
171	H150x75x5x7	Beam	No Messages	12.5%	PMM	101
172	H150x75x5x7	Beam	No Messages	12.7%	PMM	101
173	H150x75x5x7	Beam	No Messages	12.5%	PMM	101
184	H150x75x5x7	Beam	No Messages	12.5%	PMM	101
185	H150x75x5x7	Beam	No Messages	12.7%	PMM	101
186	H150x75x5x7	Beam	No Messages	12.5%	PMM	101
198	H150x75x5x7	Beam	No Messages	12.5%	PMM	101
199	H150x75x5x7	Beam	No Messages	12.6%	PMM	101
200	H150x75x5x7	Beam	No Messages	12.5%	PMM	101
179	H150x75x5x7	Beam	No Messages	12.8%	PMM	101
180	H150x75x5x7	Beam	No Messages	12.5%	PMM	101
181	H150x75x5x7	Beam	No Messages	12.5%	PMM	101
193	H150x75x5x7	Beam	No Messages	12.7%	PMM	101
194	H150x75x5x7	Beam	No Messages	12.6%	PMM	101
195	H150x75x5x7	Beam	No Messages	12.5%	PMM	101
197	H150x75x5x7	Beam	No Messages	12.5%	PMM	101
183	H150x75x5x7	Beam	No Messages	12.5%	PMM	101
154	H150x75x5x7	Beam	No Messages	8.5%	PMM	101
144	H150x75x5x7	Beam	No Messages	8.5%	PMM	101
142	H150x75x5x7	Beam	No Messages	7.0%	PMM	101
234	H150x75x5x7	Brace	No Messages	21.7%	PMM	101
235	H150x75x5x7	Brace	No Messages	22.5%	PMM	101
236	H150x75x5x7	Brace	No Messages	22.5%	PMM	101
237	H150x75x5x7	Brace	No Messages	21.5%	PMM	101
275	H150x75x5x7	Brace	No Messages	19.2%	PMM	101
276	H150x75x5x7	Beam	No Messages	0.5%	PMM	201
277	H150x75x5x7	Beam	No Messages	0.5%	PMM	101
294	H150x75x5x7	Beam	See WarnMsg	38.9%	PMM	101
295	H150x75x5x7	Beam	No Messages	5.4%	PMM	101
296	H150x75x5x7	Beam	See WarnMsg	38.9%	PMM	101

TABLE: Steel Design 1 - Summary Data - UBC97-ASD						
Frame	DesignSect	DesignTyp	Status	Ratio	RatioTyp	Combo
305	H150x75x5x7	Beam	No Messages	24.7%	PMM	101
307	H150x75x5x7	Beam	No Messages	24.7%	PMM	101
324	H150x75x5x7	Beam	No Messages	23.7%	PMM	101
325	H150x75x5x7	Beam	No Messages	23.7%	PMM	101
326	H150x75x5x7	Beam	No Messages	28.8%	PMM	101
327	H150x75x5x7	Beam	No Messages	28.8%	PMM	101
336	H150x75x5x7	Beam	No Messages	24.5%	PMM	101
337	H150x75x5x7	Beam	No Messages	24.5%	PMM	101
354	H150x75x5x7	Beam	No Messages	23.6%	PMM	101
355	H150x75x5x7	Beam	No Messages	23.5%	PMM	101
356	H150x75x5x7	Beam	No Messages	28.1%	PMM	101
357	H150x75x5x7	Beam	No Messages	28.1%	PMM	101
358	H150x75x5x7	Brace	No Messages	0.7%	PMM	101
359	H150x75x5x7	Brace	No Messages	0.5%	PMM	201
360	H150x75x5x7	Brace	No Messages	0.4%	PMM	201
361	H150x75x5x7	Brace	No Messages	0.4%	PMM	201
362	H150x75x5x7	Brace	No Messages	0.4%	PMM	201
363	H150x75x5x7	Brace	No Messages	0.3%	PMM	301
364	H150x75x5x7	Brace	No Messages	0.2%	PMM	202
365	H150x75x5x7	Brace	No Messages	0.2%	PMM	301
366	H150x75x5x7	Brace	No Messages	0.4%	PMM	301
367	H150x75x5x7	Brace	No Messages	0.7%	PMM	101
368	H150x75x5x7	Brace	No Messages	0.4%	PMM	304
369	H150x75x5x7	Brace	No Messages	0.3%	PMM	202
370	H150x75x5x7	Brace	No Messages	0.4%	PMM	101
371	H150x75x5x7	Brace	No Messages	0.4%	PMM	101
372	H150x75x5x7	Brace	No Messages	0.3%	PMM	301
373	H150x75x5x7	Brace	No Messages	0.2%	PMM	301
374	H150x75x5x7	Brace	No Messages	0.1%	PMM	301
375	H150x75x5x7	Brace	No Messages	0.4%	PMM	301

Calculation Detail

UBC97-ASD STEEL SECTION CHECK

Combo : 101
Units : Kgf, mm, C

Frame : 190 Design Sect: H150x150x7x9
X Mid : 5400.000 Design Type: Beam
Y Mid : 10500.000 Frame Type : Ordinary Moment Resisting Frame
Z Mid : 2950.000 Sect Class : Compact
Length : 4200.000 Major Axis : 0.000 degrees counterclockwise from local 3
Loc : 2100.000 RLLF : 1.000

Area : 3624.000 SMajor : 197060.640 rMajor : 63.861 AVMajor: 1050.000
IMajor : 14779548.000 SMinor : 67550.307 rMinor : 37.390 AVMinor: 2250.000
IMinor : 5066273.000 ZMajor : 220842.000 E : 20400.000
Ixy : 0.000 ZMinor : 102867.000 Fy : 25.000

STRESS CHECK FORCES & MOMENTS

Location	P	M33	M22	V2	V3	T
2100.000	810.312	936616.358	36940.072	-362.178	-32.755	481.673

PMM DEMAND/CAPACITY RATIO

Governing Equation	Total Ratio		P Ratio		MMajor Ratio		MMinor Ratio	Ratio Limit	Status Check
(H2-1)	0.361	=	0.015	+	0.317	+	0.029	0.950	OK

AXIAL FORCE DESIGN

	P Force	fa Stress	Fa Allowable	Ft Allowable
Axial	810.312	0.224	11.740	15.000

MOMENT DESIGN

	M Moment	fb Stress	Fb Allowable	Fe Allowable	Cm Factor	K Factor	L Factor	Cb Factor
Major Moment	936616.358	4.753	15.000	24.286	1.000	1.000	1.000	1.000
Minor Moment	36940.072	0.547	18.750	33.300	1.000	1.000	0.500	

SHEAR DESIGN

	V Force	fv Stress	Fv Allowable	Stress Ratio	Status Check	T Torsion
Major Shear	362.178	0.345	10.000	0.034	OK	0.000
Minor Shear	32.755	0.015	10.000	0.001	OK	0.000

TABLE: Steel Design 1 - Summary Data - UBC97-ASD						
Frame	DesignSect	DesignTyp	Status	Ratio	RatioTyp	Combo
209	BOX150x150x4	Beam	No Messages	28.0%	PMM	201
210	BOX150x150x4	Beam	No Messages	15.9%	PMM	202
211	BOX150x150x4	Beam	No Messages	28.4%	PMM	202
272	BOX150x150x4	Beam	No Messages	13.5%	PMM	202
273	BOX150x150x4	Beam	No Messages	13.4%	PMM	202
274	BOX150x150x4	Beam	No Messages	14.4%	PMM	201
227	BOX150x150x4	Beam	No Messages	18.2%	PMM	201
228	BOX150x150x4	Beam	No Messages	7.1%	PMM	203
229	BOX150x150x4	Beam	No Messages	19.0%	PMM	202
254	BOX150x150x4	Beam	No Messages	16.4%	PMM	201
255	BOX150x150x4	Beam	No Messages	13.0%	PMM	203
256	BOX150x150x4	Beam	No Messages	17.4%	PMM	201
130	BOX150x150x6	Brace	No Messages	2.8%	PMM	202
219	BOX150x150x4	Brace	No Messages	11.0%	PMM	301
131	BOX150x150x6	Brace	No Messages	3.2%	PMM	304
222	BOX150x150x4	Brace	No Messages	10.9%	PMM	301
132	BOX150x150x6	Brace	No Messages	3.8%	PMM	202
223	BOX150x150x4	Brace	No Messages	10.5%	PMM	101
133	BOX150x150x6	Brace	No Messages	2.8%	PMM	201
226	BOX150x150x4	Brace	No Messages	10.6%	PMM	202
257	BOX150x150x4	Beam	No Messages	26.0%	PMM	101
258	BOX150x150x4	Beam	No Messages	7.6%	PMM	101
259	BOX150x150x4	Beam	No Messages	26.0%	PMM	101
216	BOX150x150x4	Beam	No Messages	23.5%	PMM	101
217	BOX150x150x4	Beam	No Messages	2.4%	PMM	101
218	BOX150x150x4	Beam	No Messages	23.6%	PMM	101
278	BOX150x150x4	Brace	No Messages	38.4%	PMM	101
280	BOX150x150x4	Brace	No Messages	43.3%	PMM	101
282	BOX150x150x4	Brace	No Messages	42.7%	PMM	101
284	BOX150x150x4	Brace	No Messages	36.6%	PMM	101
297	BOX150x150x4	Brace	No Messages	34.8%	PMM	101
299	BOX150x150x4	Brace	No Messages	38.6%	PMM	101
301	BOX150x150x4	Brace	No Messages	37.2%	PMM	101
303	BOX150x150x4	Brace	No Messages	34.3%	PMM	101
328	BOX150x150x4	Brace	No Messages	32.3%	PMM	101
330	BOX150x150x4	Brace	No Messages	36.2%	PMM	101
332	BOX150x150x4	Brace	No Messages	37.2%	PMM	101
334	BOX150x150x4	Brace	No Messages	32.2%	PMM	101

Calculation Detail

UBC97-ASD STEEL SECTION CHECK
Combo : 101
Units : Kgf, mm, C

Frame : 282 Design Sect: BOX150x150x4
X Mid : 5400.000 Design Type: Brace
Y Mid : 2100.000 Frame Type : Ordinary Moment Resisting Frame
Z Mid : 5105.000 Sect Class : Compact
Length : 5347.532 Major Axis : 0.000 degrees counterclockwise from local 3
Loc : 5347.532 RLLF : 1.000

Area : 2619.000 SMajor : 123328.710 rMajor : 59.429 AVMajor: 1350.000
IMajor : 9249653.250 SMinor : 123328.710 rMinor : 59.429 AVMinor: 1350.000
IMinor : 9249653.250 ZMajor : 142944.750 E : 20400.000
Ixy : 0.000 ZMinor : 142944.750 Fy : 25.000

STRESS CHECK FORCES & MOMENTS

Location	P	M33	M22	V2	V3	T
5347.532	-102.060	-778414.907	82918.384	818.709	-114.363	2143.519

PMM DEMAND/CAPACITY RATIO

Governing Equation	Total Ratio		P Ratio		MMajor Ratio		MMinor Ratio	Ratio Limit	Status Check
(H1-3)	0.427	=	0.004	+	0.383	+	0.041	0.950	OK

AXIAL FORCE DESIGN

	P Force	fa Stress	Fa Allowable	Ft Allowable
Axial	-102.060	0.039	9.913	15.000

MOMENT DESIGN

	M Moment	fb Stress	Fb Allowable	Fe Allowable	Cm Factor	K Factor	L Factor	Cb Factor
Major Moment	-778414.907	6.312	16.500	12.974	0.850	1.000	1.000	1.000
Minor Moment	82918.384	0.672	16.500	36.912	0.850	1.000	0.593	

SHEAR DESIGN

	V Force	fv Stress	Fv Allowable	Stress Ratio	Status Check	T Torsion
Major Shear	818.709	0.606	10.000	0.061	OK	0.000
Minor Shear	114.363	0.085	10.000	0.008	OK	0.000

TABLE: Steel Design 1 - Summary Data - UBC97-ASD						
Frame	DesignSect	DesignTyp	Status	Ratio	RatioTyp	Combo
101	TB	Beam	No Messages	7.1%	PMM	301
102	TB	Beam	No Messages	7.8%	PMM	301
103	TB	Beam	No Messages	6.4%	PMM	301
104	TB	Beam	No Messages	6.7%	PMM	301
1	TB	Beam	No Messages	9.0%	PMM	201
2	TB	Beam	No Messages	7.3%	PMM	202
3	TB	Beam	No Messages	9.4%	PMM	202
16	TB	Beam	No Messages	13.6%	PMM	101
14	TB	Beam	No Messages	15.1%	PMM	101
15	TB	Beam	No Messages	13.4%	PMM	101
28	TB	Beam	No Messages	20.3%	PMM	101
29	TB	Beam	No Messages	17.9%	PMM	101
30	TB	Beam	No Messages	18.3%	PMM	101
42	TB	Beam	No Messages	21.2%	PMM	101
43	TB	Beam	No Messages	13.9%	PMM	202
44	TB	Beam	No Messages	20.6%	PMM	101
56	TB	Beam	No Messages	24.9%	PMM	101
57	TB	Beam	No Messages	21.8%	PMM	101
58	TB	Beam	No Messages	22.5%	PMM	101
70	TB	Beam	No Messages	22.6%	PMM	101
71	TB	Beam	No Messages	13.6%	PMM	202
72	TB	Beam	No Messages	22.6%	PMM	101
84	TB	Beam	No Messages	22.5%	PMM	101
85	TB	Beam	No Messages	16.3%	PMM	101
86	TB	Beam	No Messages	22.7%	PMM	101
98	TB	Beam	No Messages	14.7%	PMM	201
99	TB	Beam	No Messages	11.0%	PMM	202
100	TB	Beam	No Messages	15.4%	PMM	202
4	TB	Beam	No Messages	5.3%	PMM	304
31	TB	Beam	No Messages	6.5%	PMM	301
45	TB	Beam	No Messages	4.1%	PMM	304
59	TB	Beam	No Messages	6.6%	PMM	301
73	TB	Beam	No Messages	7.4%	PMM	301
87	TB	Beam	No Messages	11.8%	PMM	301
8	TB	Beam	No Messages	5.2%	PMM	304
21	TB	Beam	No Messages	3.3%	PMM	101
35	TB	Beam	No Messages	7.0%	PMM	301
49	TB	Beam	No Messages	5.1%	PMM	101
63	TB	Beam	No Messages	5.5%	PMM	301
77	TB	Beam	No Messages	6.4%	PMM	301
91	TB	Beam	No Messages	11.5%	PMM	301
9	TB	Beam	No Messages	6.0%	PMM	303
23	TB	Beam	No Messages	5.7%	PMM	301
37	TB	Beam	No Messages	6.3%	PMM	301
51	TB	Beam	No Messages	7.3%	PMM	301
65	TB	Beam	No Messages	6.4%	PMM	301

TABLE: Steel Design 1 - Summary Data - UBC97-ASD						
Frame	DesignSect	DesignTyp	Status	Ratio	RatioTyp	Combo
79	TB	Beam	No Messages	4.9%	PMM	101
93	TB	Beam	No Messages	11.6%	PMM	301
13	TB	Beam	No Messages	4.6%	PMM	303
27	TB	Beam	No Messages	4.6%	PMM	301
41	TB	Beam	No Messages	5.2%	PMM	301
55	TB	Beam	No Messages	6.4%	PMM	301
69	TB	Beam	No Messages	6.3%	PMM	301
83	TB	Beam	No Messages	5.9%	PMM	301
97	TB	Beam	No Messages	9.6%	PMM	301

Calculation Detail

```
UBC97-ASD STEEL SECTION CHECK
Combo  : 101
Units  : Kgf, mm, C



Frame  : 72              Design Sect: TB
X Mid  : 7200.000        Design Type: Beam
Y Mid  : 8400.000        Frame Type : Ordinary Moment Resisting Frame
Z Mid  : 0.000           Sect Class : Compact
Length : 3600.000        Major Axis : 0.000 degrees counterclockwise from local 3
Loc    : 1800.000        RLLF       : 1.000

Area   : 3624.000        SMajor : 197060.640      rMajor : 63.861          AVMajor: 1050.000
IMajor : 14779548.000    SMinor : 67550.307       rMinor : 37.390          AVMinor: 2250.000
IMinor : 5066273.000     ZMajor : 220842.000      E      : 20400.000
Ixy    : 0.000           ZMinor : 102867.000      Fy     : 25.000


STRESS CHECK FORCES & MOMENTS
    Location          P         M33         M22         V2         V3          T
    1800.000      0.000  734095.161     -44.218    233.036     -0.427    -12.208

PMM DEMAND/CAPACITY RATIO
    Governing      Total           P      MMajor      MMinor       Ratio      Status
    Equation       Ratio       Ratio       Ratio       Ratio       Limit       Check
    (BENDING)      0.226   =   0.000   +   0.226   +   0.000       0.950          OK

AXIAL FORCE DESIGN
                       P          fa          Fa          Ft
                   Force      Stress   Allowable   Allowable
    Axial          0.000       0.000      12.366      15.000

MOMENT DESIGN
                       M          fb          Fb          Fe          Cm       K       L      Cb
                  Moment      Stress   Allowable   Allowable      Factor  Factor  Factor  Factor
    Major Moment  734095.161    3.725      16.500      33.056      1.000   1.000   1.000   1.000
    Minor Moment  -44.218   6.546E-04      18.750     181.300      1.000   1.000   0.250

SHEAR DESIGN
                       V          fv          Fv      Stress      Status           T
                   Force      Stress   Allowable       Ratio       Check     Torsion
    Major Shear  233.036       0.222      10.000       0.022          OK       0.000
    Minor Shear    0.427   1.899E-04      10.000   1.899E-05          OK       0.000
```

TABLE: Steel Design 1 - Summary Data - UBC97-ASD						
Frame	DesignSect	DesignTyp	Status	Ratio	RatioTyp	Combo
5	Tb1	Beam	No Messages	1.6%	PMM	101
6	Tb1	Beam	No Messages	1.6%	PMM	101
7	Tb1	Beam	No Messages	1.6%	PMM	101
18	Tb1	Beam	No Messages	7.9%	PMM	101
19	Tb1	Beam	No Messages	7.9%	PMM	101
20	Tb1	Beam	No Messages	7.9%	PMM	101
32	Tb1	Beam	No Messages	8.1%	PMM	101
33	Tb1	Beam	No Messages	8.1%	PMM	101
34	Tb1	Beam	No Messages	8.1%	PMM	101
46	Tb1	Beam	No Messages	12.5%	PMM	101
47	Tb1	Beam	No Messages	12.5%	PMM	101
48	Tb1	Beam	No Messages	12.5%	PMM	101
60	Tb1	Beam	No Messages	12.5%	PMM	101
61	Tb1	Beam	No Messages	12.5%	PMM	101
62	Tb1	Beam	No Messages	12.5%	PMM	101
74	Tb1	Beam	No Messages	12.5%	PMM	101
75	Tb1	Beam	No Messages	12.5%	PMM	101
76	Tb1	Beam	No Messages	12.5%	PMM	101
88	Tb1	Beam	No Messages	12.5%	PMM	101
89	Tb1	Beam	No Messages	12.5%	PMM	101
90	Tb1	Beam	No Messages	12.5%	PMM	101
10	Tb1	Beam	No Messages	1.6%	PMM	101
11	Tb1	Beam	No Messages	1.6%	PMM	101
12	Tb1	Beam	No Messages	1.6%	PMM	101
24	Tb1	Beam	No Messages	7.9%	PMM	101
25	Tb1	Beam	No Messages	7.9%	PMM	101
26	Tb1	Beam	No Messages	7.9%	PMM	101
38	Tb1	Beam	No Messages	8.1%	PMM	101
39	Tb1	Beam	No Messages	8.1%	PMM	101
40	Tb1	Beam	No Messages	8.1%	PMM	101
52	Tb1	Beam	No Messages	12.5%	PMM	101
53	Tb1	Beam	No Messages	12.5%	PMM	101
54	Tb1	Beam	No Messages	12.5%	PMM	101
66	Tb1	Beam	No Messages	12.5%	PMM	101
67	Tb1	Beam	No Messages	12.5%	PMM	101
68	Tb1	Beam	No Messages	12.5%	PMM	101
80	Tb1	Beam	No Messages	12.5%	PMM	101
81	Tb1	Beam	No Messages	12.5%	PMM	101
82	Tb1	Beam	No Messages	12.5%	PMM	101
94	Tb1	Beam	No Messages	12.5%	PMM	101
95	Tb1	Beam	No Messages	12.5%	PMM	101
96	Tb1	Beam	No Messages	12.5%	PMM	101
64	Tb1	Beam	No Messages	10.4%	PMM	101
50	Tb1	Beam	No Messages	10.4%	PMM	101
36	Tb1	Beam	No Messages	8.5%	PMM	101
22	Tb1	Beam	No Messages	8.4%	PMM	101
92	Tb1	Beam	No Messages	12.5%	PMM	101
78	Tb1	Beam	No Messages	12.5%	PMM	101

Calculation Detail

UBC97-ASD STEEL SECTION CHECK

Combo : 101
Units : Kgf, mm, C

Frame : 46 Design Sect: Tbl
X Mid : 900.000 Design Type: Beam
Y Mid : 5250.000 Frame Type : Ordinary Moment Resisting Frame
Z Mid : 0.000 Sect Class : Compact
Length : 2100.000 Major Axis : 0.000 degrees counterclockwise from local 3
Loc : 840.000 RLLF : 1.000

Area : 1730.000 SMajor : 85603.422 rMajor : 60.919 AVMajor: 750.000
IMajor : 6420256.667 SMinor : 13162.778 rMinor : 16.891 AVMinor: 875.000
IMinor : 493604.167 ZMajor : 98195.000 E : 20400.000
Ixy : 0.000 ZMinor : 20537.500 Fy : 25.000

STRESS CHECK FORCES & MOMENTS

Location	P	M33	M22	V2	V3	T
840.000	0.976	150069.929	0.000	-59.552	0.000	0.000

PMM DEMAND/CAPACITY RATIO

Governing Equation	Total Ratio		P Ratio		MMajor Ratio		MMinor Ratio	Ratio Limit	Status Check
(BENDING)	0.125	=	0.000	+	0.125	+	0.000	0.950	OK

AXIAL FORCE DESIGN

	P Force	fa Stress	Fa Allowable	Ft Allowable
Axial	0.976	5.643E-04	6.786	15.000

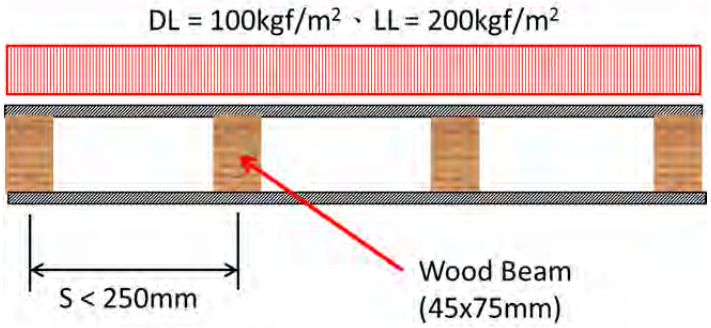
MOMENT DESIGN

	M Moment	fb Stress	Fb Allowable	Fe Allowable	Cm Factor	K Factor	L Factor	Cb Factor
Major Moment	150069.929	1.753	14.061	88.400	1.000	1.000	1.000	1.000
Minor Moment	0.000	0.000	18.750	6.796	1.000	1.000	1.000	

SHEAR DESIGN

	V Force	fv Stress	Fv Allowable	Stress Ratio	Status Check	T Torsion
Major Shear	59.552	0.079	10.000	0.008	OK	0.000
Minor Shear	0.000	0.000	10.000	0.000	OK	0.000

(3) Wood Deck Beam



Wood Deck Section

Calculation Detail

The maximum span is L_{max} = 105cm
and
uniform line load on wood beam is w = (DL+LL)xS= 75kgf/m

$\therefore M_{max} = wL^2_{max} / 8 = 10.34$ kgf-m = 1034 kgf-cm

Section Modulus, Sx, of Wood Beam is 42.1875cm³.
The compressive and tension stress of wood beam are

$fc = ft = Mmax/Sx = 24.51$ kgf/cm²

The allowable compressive and tension stress of wood beam are

$_Lfc = 60$kgf/cm² ; $_Lft = 45$kgf/cm².

Because both fc and ft are less than the allowable stresses, the design result is satisfactory.

Any type of wood deck which satify the minimum depth 75mm and maximum spacing 250mm in the above-mentioned calculation can be adopted in this building.

(4) Bolt Connection Check

The connection between Gider H150x150x7x9 and Column Box-150x150x6 is moment connection. The penetration weld is adopted in factory. So, the connection strength is enough.

The bolt connection completed in site for box column splice and girder connection is check as follow:

The maximum PMM ratio (shown in 9.(1)) for column is 0.337 Therefore, it the bolt connection force can be determined by capacity design concepet, that is

$$P_{t,col} = (0.6F_y) \times b_f \times t_f \times PMM_ratio = 0.6x2.5x15x0.6x0.337 = 4.55\ tf$$

As for Girder H150x150x7x9 & TB, its maximum PMM ratio (shown in 9.(2)) is 0.361. So, the bolt connection force can be obtained as follows:

$$P_{t,girder} = (0.6F_y) \times b_f \times t_f \times PMM_ratio = 0.6x2.5x15x0.9x0.361 = 7.31\ tf$$

As for Girder Box150x150x4 & Box150x150x6, its maximum PMM ratio (shown in 9.(2)) is 0.433. So, the bolt connection force can be obtained as follows:

$$P_{t,girder} = (0.6F_y) \times b_f \times t_f \times PMM_ratio = 0.6x2.5x15x0.6x0.433 = 5.85\ tf$$

F10T M16 bolt (bearing type) is used in the connection design, its allowable shear force is 3.8tf. Base on the above forces, Pt,col and Pt,Girder, two bolts are needed for each flange of box column/girder.

……

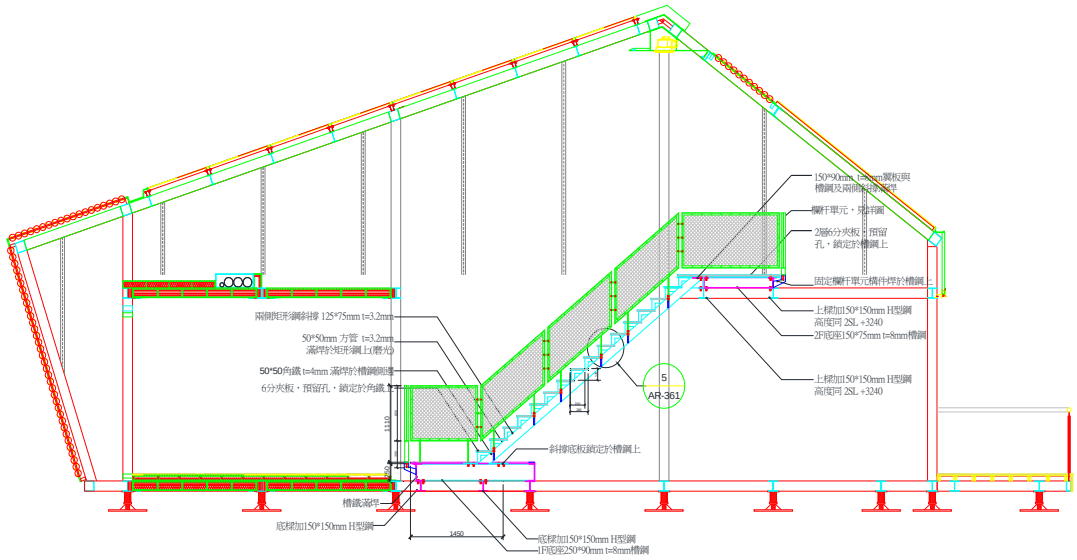
For beam H150x75x5x7 & Tb1, its connection to girder is shear connection. The shear ratio of beam is less than 0.25. Use capacity design concept, the connection force can be determined as

$$V_{BM} = (0.4F_y) \times (2 \times d_w \times t_w) \times Shear_ratio = 0.4x2.5x15x0.5x0.25 = 1.875\ tf$$

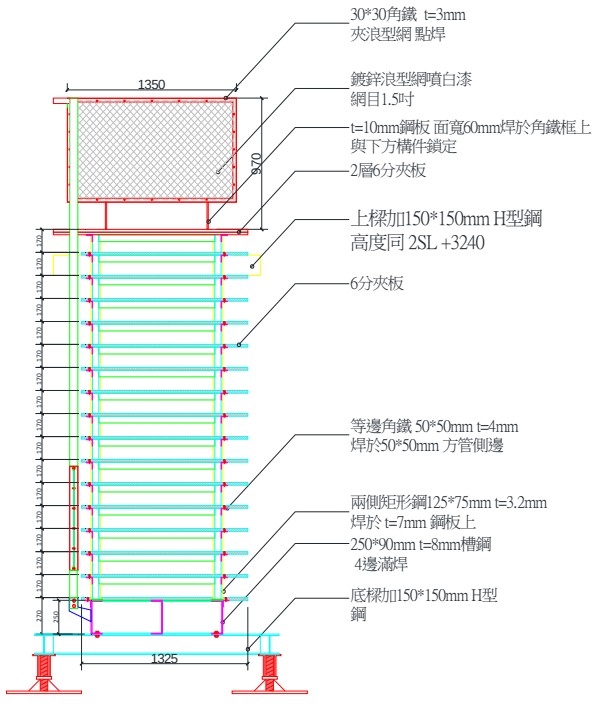
F10T M16 bolt (bearing type) is adopted in the shear connection design, its allowable shear force is 3.8tf. Base on the force, V_{BM}, one bolt is needed for web of box beam.

10. Stair Design

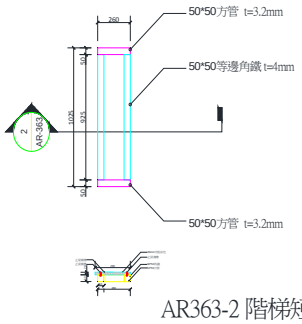
The stair-design in this building is completed in the following calculation. The stair drawing as follows:



Elev. View_1



AR363-1 樓梯短剖 1/30



AR363-2 階梯短剖 1/30

AR361-5 階梯鋼構平面 1/30

Elev. View_2

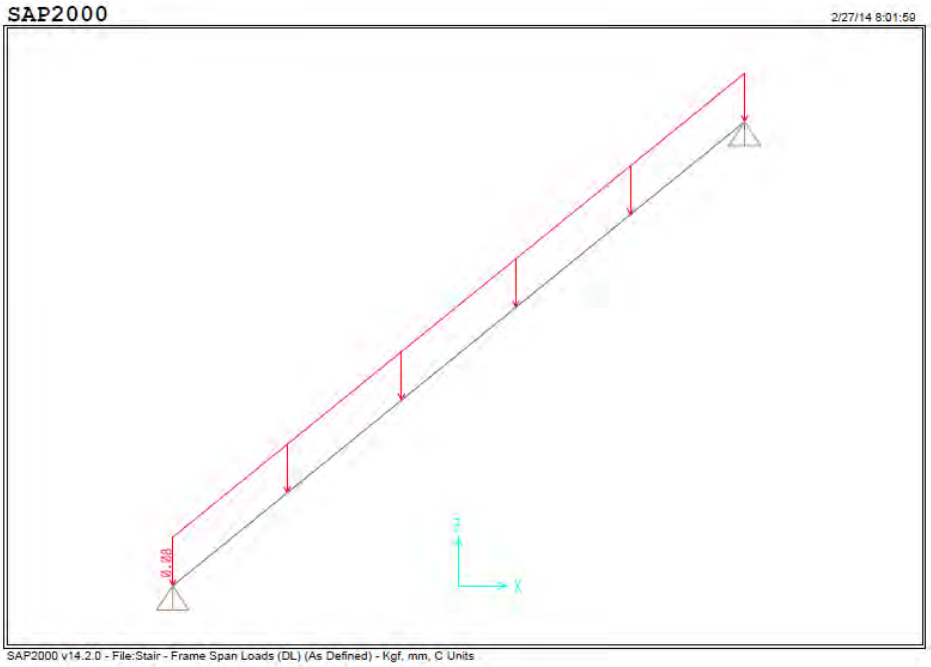
Design Loading

(1) DL: 150 kgf/m^2

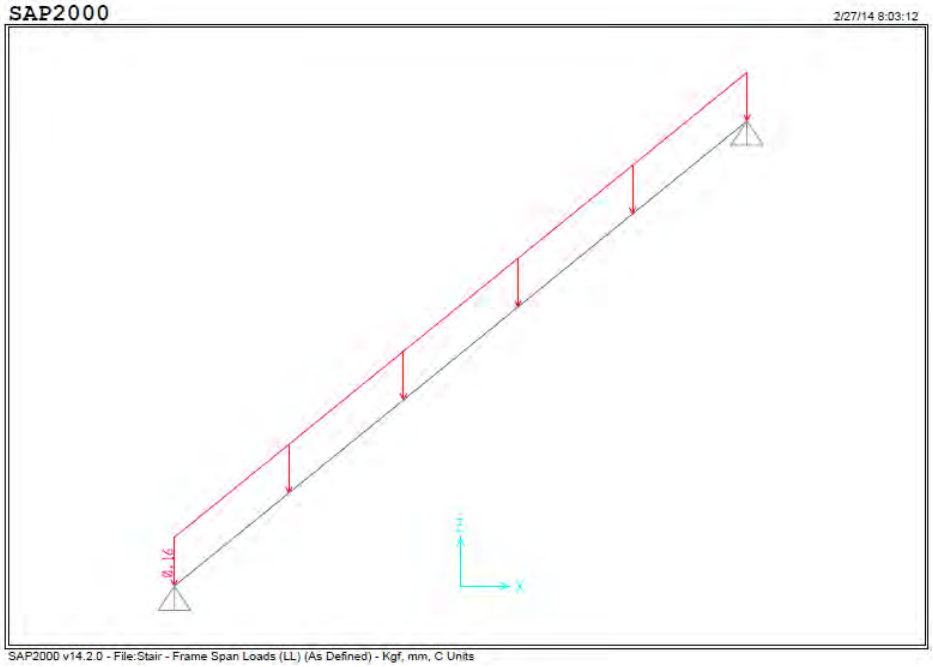
(2) LL: 300 kgf/m^2

Analysis Model

(DL Case)



(LL Case)



Design Result

AISC-ASD89 STEEL SECTION CHECK
Combo : COMB2
Units : Kgf, mm, C

Frame : 1 Design Sect: Box125x75x3
X Mid : 0.000 Design Type: Brace
Y Mid : 0.000 Frame Type : Braced Frame
Z Mid : 1347.500 Sect Class : Compact
Length : 4280.029 Major Axis : 0.000 degrees counterclockwise from local 3
Loc : 1902.235 RLLF : 1.000

Area : 1239.040 SMajor : 42725.716 rMajor : 46.424 AVMajor: 800.000
IMajor : 2670357.257 SMinor : 32104.162 rMinor : 31.171 AVMinor: 480.000
IMinor : 1203906.057 ZMajor : 51737.536 E : 20400.000
Ixy : 0.000 ZMinor : 36249.536 Fy : 25.000

STRESS CHECK FORCES & MOMENTS

Location	P	M33	M22	V2	V3	T
1902.235	-36.350	426554.193	0.000	-44.848	0.000	0.000

PMM DEMAND/CAPACITY RATIO

Governing Equation	Total Ratio		P Ratio		MMajor Ratio		MMinor Ratio	Ratio Limit	Status Check
(H1-3)	0.608	=	0.003	+	0.605	+	0.000	0.950	OK

AXIAL FORCE DESIGN

	P Force	fa Stress	Fa Allowable	Ft Allowable
Axial	-36.350	0.029	9.731	15.000

MOMENT DESIGN

	M Moment	fb Stress	Fb Allowable	Fe Allowable	Cm Factor	K Factor	L Factor	Cb Factor
Major Moment	426554.193	9.984	16.500	12.359	1.000	1.000	1.000	1.000
Minor Moment	0.000	0.000	16.500	1426.386	1.000	1.000	0.063	

SHEAR DESIGN

	V Force	fv Stress	Fv Allowable	Stress Ratio	Status Check	T Torsion
Major Shear	44.848	0.056	10.000	0.006	OK	0.000
Minor Shear	0.000	0.000	10.000	0.000	OK	0.000

11. Footing Design

The reactions of single footing are obtained by SAP2000 analysis results. The following list shows the reactions for footing design and soil bearing check.

TABLE: Joint Reactions

Joint	OutputCase	CaseType	F1	F2	F3	M1	M2	M3
Text	Text	Text	Kgf	Kgf	Kgf	Kgf-mm	Kgf-mm	Kgf-mm
1	101	Combination	105.87	37.87	2379.82	0	0	0
1	201	Combination	38.63	33.96	2122.53	0	0	0
1	202	Combination	156.54	39.82	2333.76	0	0	0
1	203	Combination	-27.71	19.85	1100.37	0	0	0
1	204	Combination	129.52	27.67	1382	0	0	0
1	301	Combination	100.52	-28.28	1850.53	0	0	0
1	302	Combination	156.54	39.82	2333.76	0	0	0
1	303	Combination	54.82	-63.13	737.69	0	0	0
1	304	Combination	46.99	110.65	1744.68	0	0	0
5	101	Combination	-34.46	93.99	3445.95	0	0	0
5	201	Combination	-132.97	78.4	2917.99	0	0	0
5	202	Combination	66.96	80	3262.45	0	0	0
5	203	Combination	-153.34	23.3	1186.5	0	0	0
5	204	Combination	113.24	25.45	1645.78	0	0	0
5	301	Combination	-26.14	15	2717.66	0	0	0
5	302	Combination	66.96	80	3262.45	0	0	0
5	303	Combination	-10.9	-61.23	919.39	0	0	0
5	304	Combination	-29.2	109.98	1912.88	0	0	0
6	101	Combination	63.36	-20.07	2653.56	0	0	0
6	201	Combination	-39.9	-20.69	2531	0	0	0
6	202	Combination	156.95	-18.03	2224.32	0	0	0
6	203	Combination	-100.41	-13.84	1289.43	0	0	0
6	204	Combination	162.06	-10.29	880.53	0	0	0
6	301	Combination	65.55	-96.36	1480.64	0	0	0
6	302	Combination	156.95	-18.03	2224.32	0	0	0
6	303	Combination	40.19	-114.73	-111.06	0	0	0
6	304	Combination	21.46	90.6	2281.02	0	0	0
10	101	Combination	-96.77	-2.97	1955	0	0	0
10	201	Combination	-151.07	-1.71	1910.27	0	0	0
10	202	Combination	-27.13	-4.33	1681.06	0	0	0
10	203	Combination	-128.9	-0.47	1075.15	0	0	0
10	204	Combination	36.37	-3.96	769.54	0	0	0
10	301	Combination	-80.9	-62.82	1083.24	0	0	0
10	302	Combination	-27.13	-4.33	1681.06	0	0	0
10	303	Combination	-35.33	-81.95	-27.55	0	0	0
10	304	Combination	-57.2	77.52	1872.25	0	0	0
11	101	Combination	-8.04	1.79	900.74	0	0	0
11	201	Combination	-13.73	3.33	802.77	0	0	0
11	202	Combination	0.27	-0.32	798.88	0	0	0
11	203	Combination	-11.29	2.89	353.35	0	0	0
11	204	Combination	7.37	-1.98	348.17	0	0	0
11	301	Combination	-6.02	1.35	1001.39	0	0	0
11	302	Combination	0.27	-0.32	798.88	0	0	0
11	303	Combination	-1.02	0.26	618.18	0	0	0
11	304	Combination	-2.9	0.66	83.34	0	0	0

TABLE: Joint Reactions								
Joint	OutputCase	CaseType	F1	F2	F3	M1	M2	M3
Text	Text	Text	Kgf	Kgf	Kgf	Kgf-mm	Kgf-mm	Kgf-mm
15	101	Combination	0.52	0.39	1405.98	0	0	0
15	201	Combination	0.67	0.005933	1172.09	0	0	0
15	202	Combination	-0.16	0.55	1246.43	0	0	0
15	203	Combination	0.18	-0.41	383.81	0	0	0
15	204	Combination	-0.94	0.31	482.93	0	0	0
15	301	Combination	-1.78	-0.4	1405.94	0	0	0
15	302	Combination	-0.16	0.55	1246.43	0	0	0
15	303	Combination	-3.1	-0.95	695.6	0	0	0
15	304	Combination	2.34	0.85	171.13	0	0	0
16	101	Combination	201.53	-36.89	2626.27	0	0	0
16	201	Combination	89.93	-36.63	2228.16	0	0	0
16	202	Combination	253.5	-34.33	2343.11	0	0	0
16	203	Combination	-51.44	-23.4	807.99	0	0	0
16	204	Combination	166.65	-20.35	961.25	0	0	0
16	301	Combination	172.29	-149.27	2791.92	0	0	0
16	302	Combination	253.5	-34.33	2343.11	0	0	0
16	303	Combination	58.37	-173.6	1559.67	0	0	0
16	304	Combination	56.83	129.85	209.57	0	0	0
20	101	Combination	-199.54	-27.73	2341.14	0	0	0
20	201	Combination	-238.62	-25.67	2188.41	0	0	0
20	202	Combination	-101.84	-26.03	1991.11	0	0	0
20	203	Combination	-148.81	-13.89	1066.47	0	0	0
20	204	Combination	33.56	-14.37	803.4	0	0	0
20	301	Combination	-172.11	-115.53	2480.91	0	0	0
20	302	Combination	-101.84	-26.03	1991.11	0	0	0
20	303	Combination	-60.13	-133.71	1456.46	0	0	0
20	304	Combination	-55.12	105.44	413.41	0	0	0
23	101	Combination	-0.09013	0.05922	1104.54	0	0	0
23	201	Combination	1.13	0.99	980.46	0	0	0
23	202	Combination	-1.26	-0.86	975.61	0	0	0
23	203	Combination	1.6	1.29	422.19	0	0	0
23	204	Combination	-1.58	-1.18	415.74	0	0	0
23	301	Combination	0.06356	0.13	886.95	0	0	0
23	302	Combination	-1.26	-0.86	975.61	0	0	0
23	303	Combination	0.18	0.14	297.52	0	0	0
23	304	Combination	-0.16	-0.02943	540.41	0	0	0
27	101	Combination	0.0636	0.4	1921.71	0	0	0
27	201	Combination	0.23	-0.5	1590.48	0	0	0
27	202	Combination	-0.11	1.11	1676.43	0	0	0
27	203	Combination	0.26	-1.06	480.78	0	0	0
27	204	Combination	-0.2	1.09	595.37	0	0	0
27	301	Combination	0.18	-0.17	1545.47	0	0	0
27	302	Combination	-0.11	1.11	1676.43	0	0	0
27	303	Combination	0.19	-0.63	420.76	0	0	0
27	304	Combination	-0.14	0.65	655.39	0	0	0
28	101	Combination	275.38	-38.24	3007.88	0	0	0
28	201	Combination	146.1	-36.17	2502.49	0	0	0
28	202	Combination	322.09	-35.64	2640.15	0	0	0
28	203	Combination	-40.15	-20.57	791.39	0	0	0
28	204	Combination	194.51	-19.86	974.93	0	0	0
28	301	Combination	235.52	-143.49	2562.05	0	0	0
28	302	Combination	322.09	-35.64	2640.15	0	0	0
28	303	Combination	79.08	-163.66	870.8	0	0	0
28	304	Combination	75.28	123.23	895.52	0	0	0

TABLE: Joint Reactions								
Joint	OutputCase	CaseType	F1	F2	F3	M1	M2	M3
Text	Text	Text	Kgf	Kgf	Kgf	Kgf-mm	Kgf-mm	Kgf-mm
32	101	Combination	-266.86	-28.79	2565.76	0	0	0
32	201	Combination	-299.16	-23.87	2382.4	0	0	0
32	202	Combination	-154.28	-29.48	2147.98	0	0	0
32	203	Combination	-171.01	-10.48	1110.72	0	0	0
32	204	Combination	22.17	-17.96	798.15	0	0	0
32	301	Combination	-225.64	-111.29	2256.16	0	0	0
32	302	Combination	-154.28	-29.48	2147.98	0	0	0
32	303	Combination	-72.98	-127.05	942.4	0	0	0
32	304	Combination	-75.86	98.61	966.47	0	0	0
35	101	Combination	77.54	-42.51	3633.14	0	0	0
35	201	Combination	24.62	-41.5	3180.11	0	0	0
35	202	Combination	107.27	-38.2	3432.82	0	0	0
35	203	Combination	-33.28	-24.5	1460.05	0	0	0
35	204	Combination	76.91	-20.1	1796.99	0	0	0
35	301	Combination	66.66	-144.58	3544.62	0	0	0
35	302	Combination	107.27	-38.2	3432.82	0	0	0
35	303	Combination	22.76	-161.95	1946.06	0	0	0
35	304	Combination	20.87	117.34	1310.98	0	0	0
39	101	Combination	-57.34	-88.18	4943.2	0	0	0
39	201	Combination	-147.17	-78.5	3782.14	0	0	0
39	202	Combination	49.2	-77.65	4735.15	0	0	0
39	203	Combination	-147.66	-34	908.15	0	0	0
39	204	Combination	114.18	-32.88	2178.82	0	0	0
39	301	Combination	-49.16	-179.56	4494.15	0	0	0
39	302	Combination	49.2	-77.65	4735.15	0	0	0
39	303	Combination	-16.97	-168.74	1857.49	0	0	0
39	304	Combination	-16.5	101.87	1229.48	0	0	0
40	101	Combination	188.72	-35.46	5722.95	0	0	0
40	201	Combination	39.83	-32.96	5279.25	0	0	0
40	202	Combination	280.88	-33.69	4549.35	0	0	0
40	203	Combination	-108.01	-18.36	2228.44	0	0	0
40	204	Combination	213.38	-19.33	1255.24	0	0	0
40	301	Combination	160.05	-137.34	5209.84	0	0	0
40	302	Combination	280.88	-33.69	4549.35	0	0	0
40	303	Combination	52.28	-157.53	2135.9	0	0	0
40	304	Combination	53.1	119.84	1347.78	0	0	0
44	101	Combination	-232.12	-18.2	4394.87	0	0	0
44	201	Combination	-255.43	-15.99	4139.59	0	0	0
44	202	Combination	-138.67	-18	3680.68	0	0	0
44	203	Combination	-142.13	-8.03	2025.09	0	0	0
44	204	Combination	13.56	-10.72	1413.21	0	0	0
44	301	Combination	-197.49	-98.79	4143.06	0	0	0
44	302	Combination	-138.67	-18	3680.68	0	0	0
44	303	Combination	-64.87	-118.43	2029.71	0	0	0
44	304	Combination	-63.7	99.68	1408.58	0	0	0

TABLE: Joint Reactions								
Joint	OutputCase	CaseType	F1	F2	F3	M1	M2	M3
Text	Text	Text	Kgf	Kgf	Kgf	Kgf-mm	Kgf-mm	Kgf-mm
47	101	Combination	-0.43	-0.36	1404.2	0	0	0
47	201	Combination	-1.5	0.31	1246.95	0	0	0
47	202	Combination	0.76	-0.89	1241.01	0	0	0
47	203	Combination	-1.65	0.76	538.27	0	0	0
47	204	Combination	1.37	-0.85	530.35	0	0	0
47	301	Combination	-0.55	-0.23	1248.32	0	0	0
47	302	Combination	0.76	-0.89	1241.01	0	0	0
47	303	Combination	-0.37	0.02832	540.1	0	0	0
47	304	Combination	0.09353	-0.11	528.51	0	0	0
51	101	Combination	-0.007587	-0.29	2433.06	0	0	0
51	201	Combination	-0.09396	-0.9	2019.52	0	0	0
51	202	Combination	0.07422	0.34	2114.88	0	0	0
51	203	Combination	-0.12	-1	615.15	0	0	0
51	204	Combination	0.1	0.65	742.3	0	0	0
51	301	Combination	-0.0874	-0.76	2071.08	0	0	0
51	302	Combination	0.07422	0.34	2114.88	0	0	0
51	303	Combination	-0.12	-0.81	683.9	0	0	0
51	304	Combination	0.09167	0.46	673.55	0	0	0
52	101	Combination	337.58	-59.05	2907	0	0	0
52	201	Combination	186.03	-54.57	2411.41	0	0	0
52	202	Combination	386.7	-52.68	2564.89	0	0	0
52	203	Combination	-40.87	-27.39	759.8	0	0	0
52	204	Combination	226.69	-24.88	964.44	0	0	0
52	301	Combination	285.9	-158.97	2470.39	0	0	0
52	302	Combination	386.7	-52.68	2564.89	0	0	0
52	303	Combination	92.3	-166.59	838.44	0	0	0
52	304	Combination	93.52	114.32	885.8	0	0	0
56	101	Combination	-326.45	-30.89	3179.28	0	0	0
56	201	Combination	-359.13	-27.43	2935.48	0	0	0
56	202	Combination	-194.73	-29.84	2671.26	0	0	0
56	203	Combination	-199.44	-13.71	1349.1	0	0	0
56	204	Combination	19.76	-16.92	996.81	0	0	0
56	301	Combination	-277.22	-110.75	2800.86	0	0	0
56	302	Combination	-194.73	-29.84	2671.26	0	0	0
56	303	Combination	-90.23	-124.8	1169.6	0	0	0
56	304	Combination	-89.45	94.17	1176.31	0	0	0
59	101	Combination	242.58	-54.98	4552.45	0	0	0
59	201	Combination	123.48	-50.08	3868.99	0	0	0
59	202	Combination	288.24	-55.31	4289.93	0	0	0
59	203	Combination	-42.84	-28.61	1581.72	0	0	0
59	204	Combination	176.84	-35.58	2142.97	0	0	0
59	301	Combination	205.57	-157.14	3917.96	0	0	0
59	302	Combination	288.24	-55.31	4289.93	0	0	0
59	303	Combination	66.61	-171.36	1647.01	0	0	0
59	304	Combination	67.4	107.16	2077.68	0	0	0
63	101	Combination	-125.32	-22.29	5007.19	0	0	0
63	201	Combination	-235.39	-24.61	4125.81	0	0	0
63	202	Combination	22.96	-21.63	4493.58	0	0	0
63	203	Combination	-206.47	-19.9	1306.86	0	0	0
63	204	Combination	138	-15.93	1797.22	0	0	0
63	301	Combination	-106.76	-125.39	4152.86	0	0	0
63	302	Combination	22.96	-21.63	4493.58	0	0	0
63	303	Combination	-34.95	-154.28	1342.92	0	0	0
63	304	Combination	-33.51	118.45	1761.15	0	0	0

TABLE: Joint Reactions								
Joint	OutputCase	CaseType	F1	F2	F3	M1	M2	M3
Text	Text	Text	Kgf	Kgf	Kgf	Kgf-mm	Kgf-mm	Kgf-mm
65	101	Combination	223.16	48.27	6475.09	0	0	0
65	201	Combination	59.75	38.1	5728.91	0	0	0
65	202	Combination	317.93	38	5376.29	0	0	0
65	203	Combination	-111.99	5.23	2184.68	0	0	0
65	204	Combination	232.25	5.1	1714.52	0	0	0
65	301	Combination	188.33	-56.09	5616.22	0	0	0
65	302	Combination	317.93	38	5376.29	0	0	0
65	303	Combination	59.44	-120.35	2034.42	0	0	0
65	304	Combination	60.82	130.68	1864.78	0	0	0
69	101	Combination	-253.66	-29.75	4981.48	0	0	0
69	201	Combination	-297.51	-26.81	4627.29	0	0	0
69	202	Combination	-132.43	-27.92	4208.42	0	0	0
69	203	Combination	-179.28	-13.41	2188.15	0	0	0
69	204	Combination	40.82	-14.89	1629.65	0	0	0
69	301	Combination	-215.52	-106.3	4387.16	0	0	0
69	302	Combination	-132.43	-27.92	4208.42	0	0	0
69	303	Combination	-69.96	-119.39	1867.97	0	0	0
69	304	Combination	-68.5	91.09	1949.83	0	0	0
70	101	Combination	347.02	-64.93	3015.93	0	0	0
70	201	Combination	211.14	-57.63	2519.6	0	0	0
70	202	Combination	377.44	-62.46	2782.33	0	0	0
70	203	Combination	-15.58	-28.53	914.1	0	0	0
70	204	Combination	206.15	-34.98	1264.41	0	0	0
70	301	Combination	293.71	-184.09	2582.19	0	0	0
70	302	Combination	377.44	-62.46	2782.33	0	0	0
70	303	Combination	94.5	-197.15	997.55	0	0	0
70	304	Combination	96.06	133.64	1180.96	0	0	0
74	101	Combination	-122.64	-52.95	4087.95	0	0	0
74	201	Combination	-218.29	-50.78	3557.64	0	0	0
74	202	Combination	10.06	-48.43	3396.46	0	0	0
74	203	Combination	-186.2	-29.25	1258.48	0	0	0
74	204	Combination	118.26	-26.12	1043.57	0	0	0
74	301	Combination	-107.44	-170.93	3402.49	0	0	0
74	302	Combination	10.06	-48.43	3396.46	0	0	0
74	303	Combination	-38.41	-189.45	1051.63	0	0	0
74	304	Combination	-29.53	134.08	1250.43	0	0	0
76	101	Combination	0.8	0.29	1851.64	0	0	0
76	201	Combination	1.81	0.98	1563.43	0	0	0
76	202	Combination	-0.4	-0.43	1569.95	0	0	0
76	203	Combination	1.77	1.1	493.92	0	0	0
76	204	Combination	-1.19	-0.78	502.62	0	0	0
76	301	Combination	0.97	0.68	1527.97	0	0	0
76	302	Combination	-0.4	-0.43	1569.95	0	0	0
76	303	Combination	0.65	0.7	446.65	0	0	0
76	304	Combination	-0.06695	-0.39	549.89	0	0	0
80	101	Combination	-423.26	-39.87	3328.46	0	0	0
80	201	Combination	-421.81	-39.08	2984.69	0	0	0
80	202	Combination	-296.43	-34.33	2861.97	0	0	0
80	203	Combination	-200.29	-22.21	1277.36	0	0	0
80	204	Combination	-33.12	-15.88	1113.74	0	0	0
80	301	Combination	-357.85	-123.23	2858.14	0	0	0
80	302	Combination	-296.43	-34.33	2861.97	0	0	0
80	303	Combination	-115	-134.41	1108.63	0	0	0
80	304	Combination	-118.41	96.32	1282.48	0	0	0

TABLE: Joint Reactions								
Joint	OutputCase	CaseType	F1	F2	F3	M1	M2	M3
Text	Text	Text	Kgf	Kgf	Kgf	Kgf-mm	Kgf-mm	Kgf-mm
81	101	Combination	188.28	118.26	4398.78	0	0	0
81	201	Combination	74.45	106.03	3835.41	0	0	0
81	202	Combination	257.96	117.92	4154.09	0	0	0
81	203	Combination	-52.35	57.26	1735.4	0	0	0
81	204	Combination	192.34	73.12	2160.3	0	0	0
81	301	Combination	162.2	19.82	4249.47	0	0	0
81	302	Combination	257.96	117.92	4154.09	0	0	0
81	303	Combination	64.65	-57.69	2287.47	0	0	0
81	304	Combination	75.34	188.07	1608.23	0	0	0
85	101	Combination	-82.86	178.89	5284.11	0	0	0
85	201	Combination	-205.95	164.29	4515.84	0	0	0
85	202	Combination	55.99	170.77	4830.78	0	0	0
85	203	Combination	-210.58	89.08	1778.69	0	0	0
85	204	Combination	138.67	97.73	2198.61	0	0	0
85	301	Combination	-80.63	78.11	4917.86	0	0	0
85	302	Combination	55.99	170.77	4830.78	0	0	0
85	303	Combination	-43.48	-25.82	2314.71	0	0	0
85	304	Combination	-28.43	212.63	1662.59	0	0	0
87	101	Combination	132.29	77.18	5946.94	0	0	0
87	201	Combination	-15.19	83.45	5383.88	0	0	0
87	202	Combination	247.57	80.39	5078.13	0	0	0
87	203	Combination	-127.65	69.33	2362.05	0	0	0
87	204	Combination	222.7	65.25	1954.39	0	0	0
87	301	Combination	110.8	13.14	5348.31	0	0	0
87	302	Combination	247.57	80.39	5078.13	0	0	0
87	303	Combination	40.33	-24.42	2314.64	0	0	0
87	304	Combination	54.71	159.01	2001.8	0	0	0
91	101	Combination	-154.83	137.02	4277.53	0	0	0
91	201	Combination	-230.34	136.22	4041.9	0	0	0
91	202	Combination	-46.45	121.59	3723.64	0	0	0
91	203	Combination	-184.97	82.94	2101.12	0	0	0
91	204	Combination	60.22	63.43	1676.76	0	0	0
91	301	Combination	-143.02	68.08	4071.1	0	0	0
91	302	Combination	-46.45	121.59	3723.64	0	0	0
91	303	Combination	-68.53	-7.91	2140.04	0	0	0
91	304	Combination	-56.21	154.28	1637.84	0	0	0

In the previous list, the maximum vertical force is 6475kgf and uplift force is 111kgf. The uplift force does not include the footing base. After considering the footing weight (near 70kgf), the uplift force is reduced to 41kgf. It is too small and can be ignored. Therefore, we only consider the maximum compressive force 6475kgf for footing design.

(A) Axial Capacity Check

The M40 screw bar is 300mm long and its both ends (100mm in length) are constrained in a series of stiffness plates. Therefore, its axial allowable compressive load is $0.6F_y \times A_b = 18.85tf$. It is quite enough to resist the

above-mentioned force, 6429kgf.

(B) Soil bearing check

The allowable soil bearing stress is 4tf/m^2 for short term loading in site. Therefore, the footing plate size 60x60cm is not enough, so sandbox in size of 120x120cm will adopted under the footing plate with 12cm THK. Then the soil bearing, 6.429/((1.2+0.12*2)x(1.2+0.12*2))= 3.1 tf/m^2, is less than the allowable soil bearing stress.