

SOLAR DECATHLON 2012

Deliverable#5



Press Release

TONGJI UNIVERSITY

SHANGHAI, CHINA

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Vice-President

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LIST OF MEMBERS

Faculty advisor: Tanhongwei(Mechanical)
Qianfeng(Architecture)
Liqiang(Electrical)
Yuanfeng(Architecture)
Marenle(Structure)

Student team leader: Yuzhongqi

Project manager: Jindong

Communications: Jiadongfang

Construction manager: Caoke

Contest captain: Jinlinhui

Electrical engineer: Sunhao

HS Team coordinator: Caohanxiao

Instrumentation contact: Zhushengwei

Project architect: Zhaoshijia

Project engineer: Leiyong

Safety officer: Luoguofu

Site operations coordinator: Qianlie

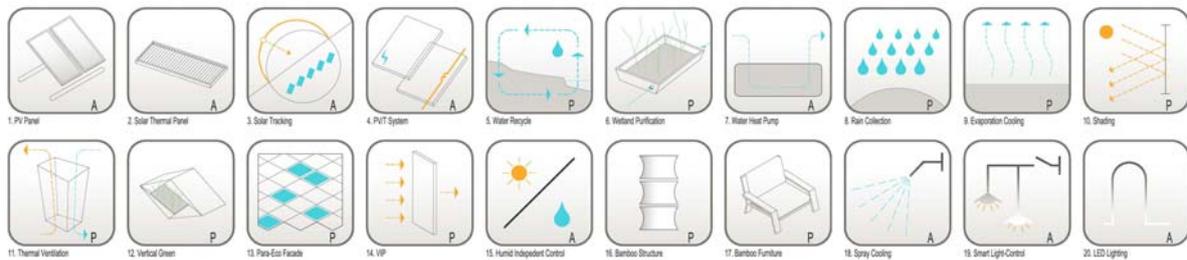
Structural engineer: Liukang

And we have 17 other members, form a team of a total number of 35 members

PROJECT DESCRIPTION

The Para Eco-House Concept

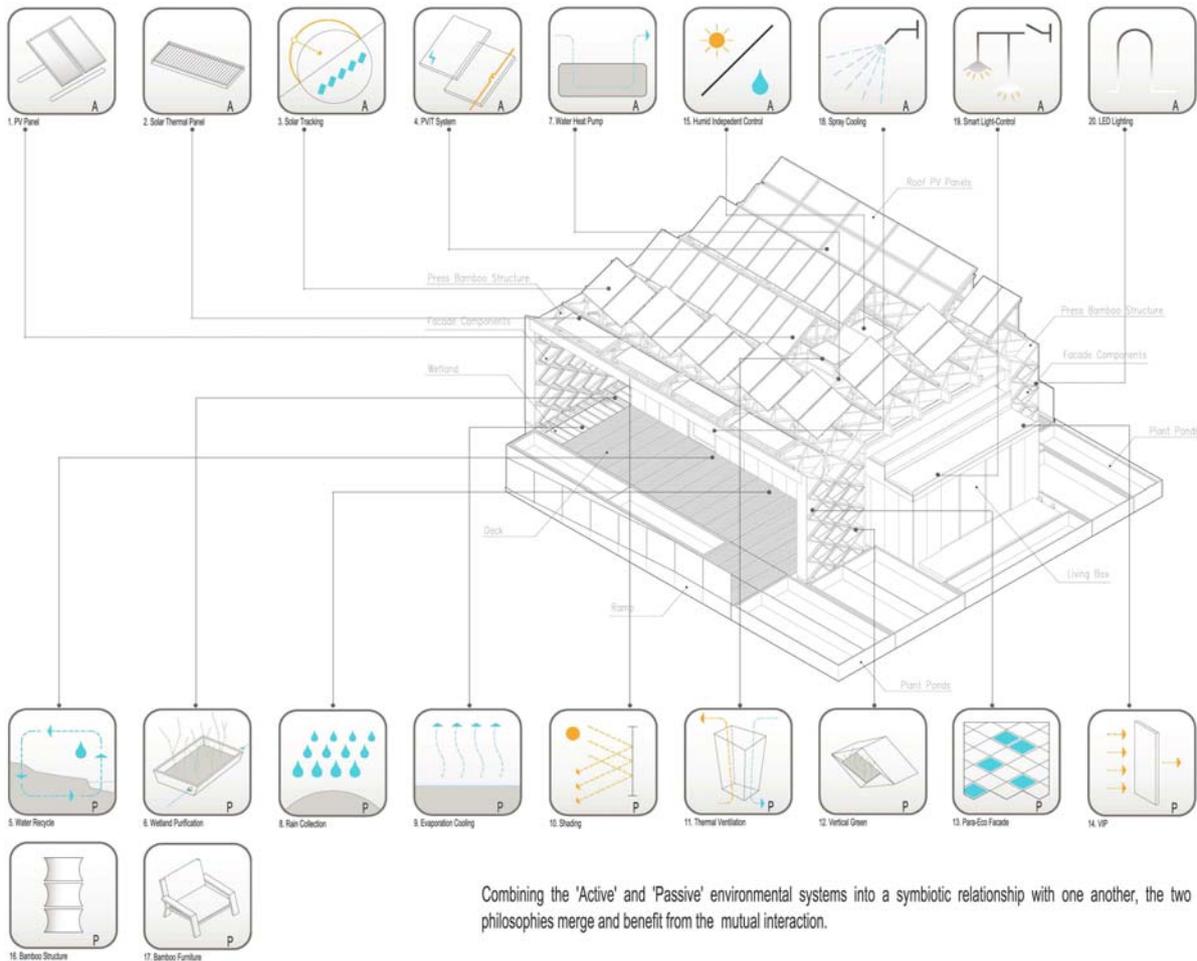
The “**Para Eco-House**” combines both parametric and ecological strategies into the logic of the architectural language used in the house design. Both ‘Passive’ and ‘Active’ energy systems are utilized in this project. Going beyond the functional and environmental requirements, we create a paradigm for a low carbon future.



The concept of creating a multi-layer skin emerges from a combination of Dao theory in eastern philosophy and the theories of *Michel Foucault* in western thought, especially the ideas of autonomy in architecture.

In Dao theory, the emphasis is upon the continece and the conversion among the world. While *Michel Foucault* discusses about the importance of independence and autonomy, along with it, the concept that quasi-autonomy which best presents the infiltration and conversion between the natural environment and our artificial environment.

Combining the ‘Active’ and ‘Passive’ environmental systems into a symbiotic relationship with one another, the two philosophies merge and benefit from the mutual interaction.



Active eco-systems:

High efficiency Integrated solar energy, gray water treatment, and ventilation systems.

Passive, eco-systems:

Multi-layer insulated skin, triple glazed windows, Green roof ecological system, reed bed water recycling system and an environmentally responsive patio that uses the gray water treatment as an aid to the ventilation of the building.

20 Ecological Points Towards An Autonomous Architecture

1. Photovoltaic Panels

Photovoltaics are best known as a method for generating electric power by using solar cells to convert energy from the sun into a flow of electrons. Our house has 48 panels placed on the roof; we have also generated an algorithm and mechanical base that will keep them orientated towards the optimum solar angle throughout the day and year.

2. Solar Collector system

A solar thermal collector is a solar collector designed to collect heat by absorbing sunlight. In our system we have connected the solar heat array into the home's heating supply, providing a high ambient temperature in the for the family to use.

3. Sun Tracking Solar Panels

A motorized axis system have been developed to position the solar panels directly in the suns raise throughout the day, making them 25% more efficient.

4. Solar PVT (Photovoltaic with thermal)

A dual use system for cooling the Solar panels making them run more efficiently. This water is then pumped into the house and is a low grade temperature heat resource used both for heating water and air conditioning.

5. Gray Water Treatment, and Ventilation aid

Gray water is reused by being filtered and is pumped back into the system to aid in backwater systems.

6. Wetland Filter System

The waste gray water, flows through the plants and microbes, which purifies the water through different kinds of filtration, by settling and the vegetation cleans the water by absorbing it, this water is used to flush black water and for outdoor use.

7. Water South Heat Pump with heat recovery unit

Pre-heating and Pre-cooling water tanks are place under the base of the building, and utilize water source heat pump to regulate the temperature of the building. This mechanism works at electrical peaks, and uses only excess energy that is produced by the solar panels, and acts as a thermal battery. Meanwhile, In the summer time the water source heat pump collect condensed heat and makes use of it by heating the hot water supply.

8. Rain water harvesting

The rainwater is collected and filtered and is used in the building for cooling.

9. Evaporating water cooling

In the transition season the outdoor fresh air, flows into the building through the shafts under the building, which make the air condition system more efficient and increases the thermal comfort of the house.

10. Architectural Shading

The exterior timber energy skin protrudes out over the inner skin so shield it from direct sunlight. This shading will protect the inhabitable house from temperature fluxes.

11. Inner Courtyard Ventilation

A chimney effect is created by heating the top, this ventilates the building by creating the a funnel or air through the building.

12. Vertical Green

Pockets of greenery are interspersed through the roof structure; these are used to slow rainwater runoff, and to help cool the solar panels.

13. Composite Skin System

A parametric skin, which unifies three elements, firstly the orientation and aspect of the solar panels, secondly the vertical vegetation, and the third is the airflow ventilation system.

14. VIP Thermal proof wall

A vacuum insulated panel (VIP) consists of a nearly gas-tight enclosure surrounding a rigid core, from which the air has been evacuated, we have used this to maximize the thermal efficiency of the enclosure.

15. Temperature Humidity Independent Control System

Make use of the Desiccant heat pump regulating the interior latent load where a fan cooled unit will manage the interior sensible load, keeping a separate control of the latent heat load, enhancing the efficiency of its heat and cooling ability.

16. Press bamboo structure

The structure is made of press bamboo panels, with very low carbon production.

17. Bamboo furniture

Our furniture is made of bamboo which is also have very low carbon production.

18. Mist Propagation Systems

In the semi open space, a humidifier system uses mist to cool the visitors that will be queuing to see the house.

19. Patio passive system

Rthe patio passive system can react to different environment requirement in each season, and reduce the energy consumption.

20. LED Lighting System

Light emitting diodes are used on the facade to enhance the visual appearance of the building in the evenings, highlighting various elements of the architectural design.

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PROJECT IMAGE

(Please find the attachments.)

SUMMARY OF Q & A

- How many persons have you got in your team ?

35.

- Your average age ?

About 25 (not include the teachers).

- What is the distribution of your gender ?

Only 3 girls among 30 students.

- What are your original subjects : architecture , electronics , computer science , ?

Architecture, civil engineer, electronics, mechanical.

- The house you construct has been designed for the climate in Madrid (Spain) , but would its adaptation be simply possible to other climatic characteristics (resistance to strong winds , hours of light , temperatures of environment , antiseismic preparation) ?

Yes, our house is consist of 3 layers of skins, and the first skin named energy skin can adapt to different climatic by change the modules of the skin.

- What sales price would this prototype have for the public ?

About 250, 000€

- Is this house presenting itself as a kit , being able to be set up or removable , or does it need a special human team to build it up in its final location ?

It can be easily set up by each team, like it can be set up by our students.

- What kind of total amount of energetic consumption / production (and referring to m3 as well) has the house got you're presenting ?

It's still being calculated.

- Number and typology of supported electrical household appliances , f.e. how can someone dry his laundry ?

The house equipped with oven, dish dryer, laundry machine, air-condition, clothes dryer machine and some small electrical machine as well, the clothes dryer machine can be used if you want to dry your laundry.

- Concerning the construction and installation of the house , what is the amount of emission of CO2 to the atmosphere ?

It's still being calculated.

- What kind of user profile is your creation aiming at ?

We aiming at the normal family consist of wife and husband, or them with a small children, and we recognize it as a single-family residence, and can adapt to different site.

- Have criteria been considered for the accessibility for the communities of disabled persons there ?

Yes, disabled persons can use this house very convenient, we comply with the disabled code of architecture, mechanical and electrical engineer.

- What type of materials does your construction prevail and contain : construction material (brick and cement) , wood , ceramics , natural stone ,thin walls of cardboard and plaster ?

We use pressed bamboo as our main material, it's a most sustainable material, and produce least carbon, even less than concrete, wood, and iron. We use it to fabricate the structure, decoration as well as the furniture.

- Do you use some sort of process of the recuperation and portable water purification of rain water ?

We collect the rain water and use the mini wet land in the west of our house to purify the water.

- Is your solar house 100% self-sufficient ?

Yes.