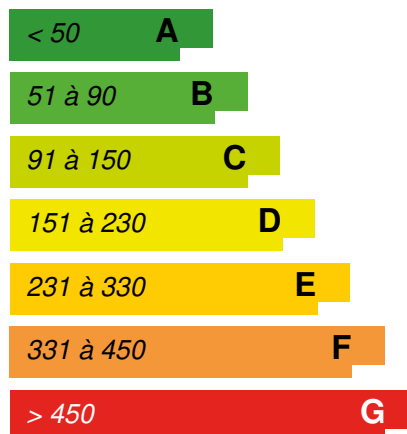


## Post-Disaster Reconstruction of Conservation and Research Center for Giant Panda of China in Wolong Nature Reserve

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**Building Type :** Other building  
**Construction Year :** 2011  
**Delivery year :** 2014  
**Address 1 - street :** 623000

**Climate zone :** [Cfa] Humid Subtropical - Mild with no dry season, hot summer.

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**Net Floor Area :** 19 800 m<sup>2</sup>  
**Construction/refurbishment cost :** 201 291 800 ¥  
**Number of none :** 170 none  
**Cost/m2 :** 10166.25 ¥/ m<sup>2</sup>

### General information

Located in the Wolong National Natural Reserve in southwest Wenchuan County, Sichuan Province, China, this project is a Post-Disaster Reconstruction Project aided by Hong Kong Government. The building structure includes steel structure (tourist center, science education center and scientific research office building) and reinforced concrete structure (veterinary hospital, energy center and auxiliary houses).

Green technology strategies that are environment-friendly and of low impact are adopted in the project. For example: surface soil recycling, multiple ecological compensation measures, native vegetation enclosure protection, artificial transplanting of local seedlings and other methods to restore vegetation of the damaged habitat, protect river morphology in the reserve and recover vegetation revetment; making full use of local rubbles and bamboos as materials for facades, outdoor flooring and railings of the buildings; reform and make use of the original residential houses; on the basis of original gullies, scarps, depressions, water systems and drainage channels, plan site catchment paths that collect rainwater; shallow gullies of vegetation, ecological water systems, rainwater gardens and constructed wetlands are built to take the place of storm sewers and concrete tanks, maximizing the site ecological benefits.

Besides, this project makes full use of local climate and resource advantages. Given the not high outdoor temperature and high humidity in summer, the heat pump type solution humidity regulating unit is used to dehumidify fresh air only before sending it indoors so as to remove indoor cold load and save air conditioning energy consumption; with waterpower in the reserve, electric boiler with heat accumulating system is adopted to accumulate heat in the night load trough so as to reduce the impact of air conditioning system had on the power grid during the daytime and balance peak to valley difference of power grid. Energy-saving measures like preparing methane with panda shit are taken; steel structure, high-strength steel and high-strength reinforcement are used to save steel and manufacturing cost. During the construction, construction solid wastes and operation wastes are recycled in classification. By preparing methane with panda shit and other organic wastes to realize the zero emission target of organic wastes that is harmless and pollution-

free.

As the three-star green public building complex in the National Natural Reserve, this project selects a series of green, environment-friendly measures that are technically mature and economically reasonable in the nature-friendly aspects of reducing damages and disturbance exerted on the native environment, planning and using rainwater, low impact development and energy system selection. The project integrates all the measures by implementing integrated design and construction. It is a successful green building practice case, making a typical reference example for the design of green public buildings in nature environment and providing experience to drawn upon for the development of green public buildings in other areas.

## Data reliability

3rd part certified

## Stakeholders

### Stakeholders

Function : Thermal consultancy agency

010-64517267

<http://www.cabr-design.com/>

Responsible for green building planning, making green architectural technology schemes, instructing the design of schemes, preliminary design, construction drawings, refined decoration and landscape design, auditing the drawings, carrying out green constr

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Function : Others

18048553075

<http://chinawolong.gov.cn>

Responsible for the management of the whole project, participating in the making of the green architectural schemes while coordinating and pushing forward the service units to adopt the green technology measures.

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Function : Designer

13980055961

<http://www.scsj.com.cn/>

Responsible for the design of project schemes, construction drawings, refined decoration and landscape design, designing and implementing the green construction measures of the project.

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Function : Thermal consultancy agency

13811509483

Responsible for the planning and researching of site rainwater and making technical schemes of rainwater resource utilization.

## Contracting method

Other methods

## Owner approach of sustainability

As a post-disaster reconstruction project, it is located in National Natural Reserve. In front of the beautiful but fragile natural ecological environment of the project, the project puts forward the green design principle of “environment-friendly and low impact development” at the beginning of the design innovatively and makes green building planning and technical schemes on that base. All the green technical measures adopted by the project embody the attitude that is natural-friendly and exerting as little destroy and disturbance on the original environment as possible. The project carries out active explorations and practices in the aspects like disaster control of primary site, ecological restoration and protection of soil and animal and plant, rainwater planning and ecological utilization, site and building pollutant control, residential building reform and utilization, steel structure system and material utilization, selection of building energy system and methane and other renewable energies utilization.

## Architectural description

On the basis of “environment-friendly development of minimum influence” and green design principle, the most significant innovative measures include:

1. Maintain the original scenic view and take original roads and vertical fields with ecological compensation measures like reducing earth volume excavated and filled on the site and surface soil recycling; restore vegetation of the damaged habitat, protect river morphology in the reserve and recover vegetation revetment through enclosure protection and artificial transplanting of local seedlings.
2. Local bamboos and rubbles are used in the architectural design which adopts steel structure and environment-friendly or waste materials that are recyclable. Skylights and unpowered funnel cap and other measures are taken to promote natural lighting and ventilation of the building, bamboo blinds are used to adjust exterior shading.
3. In order to realize development that is of low field influence, the special rainwater system planning is carried out by taking advantage of topographic features to place shallow gullies of vegetation and ecological ponds that replace pipeline collection and concrete tanks; together with measures such as roof greening and sunken

green spaces, ecological, energy-saving treatment of rainfall runoff is implemented. The natural circulation process of rainwater is recreated as possible by using a rainwater collecting, storing and reclaimed water reusing system that is of low impact development; the reclaimed water produced is used in toilet flushing in the scientific research office building and science education center.

## If you had to do it again?

The construction units shall follow the green construction special program strictly by making records and fulfilling targets. During the construction, dust reduction measures shall be adopted in all the construction operations that tend to produce dust, including earthwork, vehicles entering and leaving, earthwork stacking and transporting and storing materials easy to fly.

Solid rocks and abandoned residential houses are torn down by mechanical removal; no blasting demolition is used so as to lower noise pollution. During the construction, treated waste water that is up to standard is reused to avoid discharging as much as possible; domestic sewage is treated in septic tanks before being used to fertilize and irrigate fields and woods around the project area.

## Building users opinion

Users and visitors are satisfied.

## Energy

### Energy consumption

Primary energy need : 226,15 kWhpe/m<sup>2</sup>.

Primary energy need for standard building : 249,02 kWhpe/m<sup>2</sup>.

Calculation method : Primary energy needs

### Envelope performance

Envelope U-Value : 0,57 W.m<sup>-2</sup>.K<sup>-1</sup>

More information :

External wall heat transfer coefficient is 0.57 and that of external window is 2.5w/m<sup>2</sup>.k. Aerated concrete blocks are adopted in building the external walls; the external thermal insulation system of the external wall adopts polystyrene boards as the external thermal insulation material. Aluminum alloy thermal cracking coating insulating glass (6+12A+6) is used on the external windows.

Building Compactness Coefficient : 0,26

Indicator : GB/T 7106-2008

## Renewables & systems

### Systems

Heating system :

- Individual electric boiler

Hot water system :

- Other hot water system

Cooling system :

- Reversible heat pump
- Fan coil

Ventilation system :

- Double flow heat exchanger

Renewable systems :

- Energy recovery from waste

Renewable energy production : 39,60

### Smart Building

BMS :

The intelligent lighting control system is adopted in the multifunctional hall and science education exhibition hall. Carbon dioxide and air pollutant concentration sensors are set in places where indoor population density changes greatly or with high indoor population density. When concentration exceeds the standard, the system alarms, inspecting working state of the air intake and exhaust equipment, connecting to indoor air pollution monitoring system and coordinating with the automatic ventilation equipment; the automatic monitoring system network platform is set to effectively survey air conditioning and water pumps in the building; Itemized energy metering device for the air conditioning and ventilation system, lighting system and other power energy systems in the building is set. Itemized energy metering device for cold/heat source of the air conditioning system and pump/fan transmission and distribution system is set and runs normally.

## Environment

### Urban environment

Tourists arrive by means of public transportation mainly. A dedicated road for shuttle buses will be built between Gengda passenger station and the special bus stop outside of the Research Center for Giant Panda project scenic spot. Tourists can



take a bus to the Gengda passenger station and transfer to the shuttle bus especially set for them; then can take the shuttle bus set for tourists and local people on their way back. The bus stop is near the tourist center, a no more than 500m's walk from the scenic spot.

The staff mainly take a commuter bus: commuter buses will be provided as the staff's means of transportation.

## Land plot area

Land plot area : 268 200,00 m<sup>2</sup>

## Green space

Green space : 203 100,00

## Parking spaces

Parking location: outdoor, park entrance, near the tourist center at the total number of parking spaces: 65

## Products

### Product

Liquor humidity control unit

317 3 2019

<http://www.gearea.com/>

Product category :



The heat pump type solution humidity regulating fresh air units (GHRD) is fresh air treatment equipment integrating cold/hear source, full heat recovery section, air humidifying/dehumidifying treatment section, filter section, fan section and automatic control system. Its independent operation is able to meet the requirement of fresh air treatment all year round. In summer, outdoor fresh air of high temperature and humidity exchanges heat with indoor return air and is cooled down and dehumidified initially in the full heat recovery section. Next, it is further cooled down and dehumidified to the ventilation state in the dehumidifying unit. Diluted solution in the dehumidifying unit is concentrated in the recovery unit. Refrigerating capacity of the heat pump cycle is used to lower solution temperature for higher dehumidifying capability, heat discharge capacity of the condenser is used to concentrate the regenerated solution. The energy utilization efficiency is rather high. In winter, the four-way valve is switched to change the refrigerant cycle direction so as to realize air heating and humidifying. The operation is convenient.

To meet the needs of air humidification dehumidification

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<http://www.huandu.com.cn/>

Product category : HLK / Belüftung, Kühlung

The ceiling mounted regenerative fresh air ventilator. Outdoor fresh air is sent into the room through conduit after being filtered. The ceiling mounted regenerative fresh air ventilator coordinates with the air sensor set at the return air grille by turning on/off the ventilator automatically according to the return air condition to ensure indoor air quality. The heat pump type solution humidity regulating whole air units (total heat recovery type) adopted in the exhibition hall and multi-functional hall send fresh air into the rooms and regulate indoor humidity. Rated heat recovery ratio of all regenerative units is no lower than 60%.

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Heat storage boilers

<https://www.construction21.org/china/data/sources/users/35/zzzzzzzzzz.docx>

A3-1348

<http://syx755.b2bvip.com/>

Product category : HLK / Heizung, Warmwasser

Heat storage central heating system for electric boiler that accumulates heat in the night and supplies heat in the day meets the heating requirements and strict environmental protection requirements while making use of the advanced heat storage technology to distribute electricity power. It complies with local energy structure characteristics and energy policies with the minimum effect on the overall ecological environment of the Wolong Natural Reserve, enhancing the overall efficiency of hydropower stations and regional power grids. The water heat accumulation section consists of the regenerative circuit and the exothermic circuit. The regenerative circuit embodies a regenerative system made up of electric boiler, heat-storage tank and regenerative pump; the exothermic circuit has a exothermic system consisted of heat-storage tank, plate heat exchanger and heating water pump (circulating hot water pump). They can be adjusted due to climate characteristics or on the actual demands of air conditioning.

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## Costs

Construction and exploitation costs



Total cost of the building :201 291 800 ¥

## Energy bill

Forecasted energy bill/year : 1 077 100,00 ¥

Real energy cost/m<sup>2</sup> : 54.4

Real energy cost/none : 6335.88

## Building Environnemental Quality

### Building Environmental Quality

- biodiversity
- comfort (visual, olfactive, thermal)
- waste management (related to activity)
- energy efficiency
- renewable energies
- products and materials

## Health and comfort

### Water management

Consumption from water network :2 169,00 m<sup>3</sup>

Consumption of harvested rainwater :1 620,00 m<sup>3</sup>

Water Self Sufficiency Index : 0.43

Water Consumption/m<sup>2</sup> : 0.11

Water Consumption/none : 12.76

## Contest

Building candidate in the category



