

## Retrofit Project of Shanghai Chongming Chenjiazhen Energy Management Center

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**Year of commitment** : 2011

**CO2 Impact** : Through the green design, annual energy consumption saves 99.8MWh, standard coal saves 29.94t, green house gas CO2 reduces 104.87t



**50 050 000**

**Builder**

Huadong Architectural Design Research Co., Ltd

## GENERAL INFORMATION

The project is located in Chongming Island Chenjiachen International Ecological Community No. 4 Park, is a new project. As a supporting service center for the whole ecological park, the project is responsible for the function of the ecological community and the function of public activities. The project won the national green building "three-star green building design logo certificate" and the 2015 Shanghai Architecture Society sixth architectural award award.

The project is located on the main visual axis of No. 4 Park of Chenjiachen international ecological community. As the Service Center of the Ecological Park, it takes ecological community display function and public activities function. The architectural design adopts the minimalist "one" font and simple frame structure. The frame structure is of about 20m width and 100m length. The second floor extends 3m length and the natural grass pile is arranged at both sides of the extended layer making the building body seems floating in the green park.

This green building design project fully considers the geographical suitability, putting the passive building design in the first place and adopting the climate suitable envelops, natural lighting, natural ventilation, shading and other green measures. The architectural form, general layout, facade design, components and other aspects has been optimized and computer simulation technology is used to determine the optimum design parameters. All these measures saves resources and improves indoor comfort, achieving the China 3 Stars Green Building Evaluation Standard.

Because of the project's special location, the optimization design takes account of the building shape, the outdoor wind field, site runoff control and building insulation performance and other factors.

## Progress Status

Delivered

## Data Reliability

Self-declared

## Website Enterprise / Infrastructure

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

## Sustainable Development

### Attractiveness :

- 1.Overall layout and wind environment optimizationArrange the building along the axis of landscape layout. The natural slope is arranged at the top of the multi-purpose halls on the east and west sides, the calligraphy room and the machine room on the west side, which can decrease the effect of building on the environment, play a guiding role to tourists, resist the winter wind as well as lead the summer wind into the interior.
- 2.Large greening and permeable ground setting for rainwater storage and regulationSet large complex layers of green, and set the pervious concrete, porous asphalt and permeable adhesive stone pavement, so that rainwater can be fully infiltrated and stored. The total proportion of outdoor permeable ground area is 95.6%
3. Utilize the roof greening of the site slopesThe roof greening slope area is 1230.8m<sup>2</sup>, accounting for 30.4% of the roof greening area, integrating the building and the surrounding park together. It is conducive to adjusting micro climate and enhancing the insulation performance of the roof.
4. Utilize building body for shadingFirst use the 8.1m high side slope on the east and west side and the overhang on the 2nd floor and the glass concave design to realize self-shading of the curtain walls , which can reduce 43.73% of the radiation on the west side.Set perforated aluminum curtains on the east and west walls on the 2nd floor for shading of the facade, which reduces cooling load significantly.
5. Optimization of the integrated skylights, windows and lighting tubesIn order to prevent glare , only short windows and narrow window bars with perforated aluminum blocks are set up in the exhibition.In order to improve the lighting effect, a skylight is added at the top of the exhibition hall and the middle ramp, and the lighting factor can be increased from 1.15% to 4.41%.
- 6.Natural ventilation designs of open curtain walls, transit skylights and ventilation towers Organize ventilation using the short windows and narrow window bars .Set the curtains open.Set open-close French windows on the south and north sides.Set ventilation towers on the top of the axis. Set slope for connection in the middle of the building so as to ventilate the hall.The building passive energy saving technology can provide enough indoor ventilation rate through several strength method of natural ventilation although the management center is east-south orientated and has 100m depth.The ventilation rates for 90% of the rooms are more than 5times/hour

### Well Being :

### Social Cohesion :

- 1.The optimization and coupling of the energy system with full use of the site resources provide experience for the design of other similar projects, which has good social and economic benefits
- 2.On the basis of the research results of green technology, 5 papers have been published in domestic

core journals, playing a very good promotion effect.3.Saving 99.8MWh energy through the green design of this project. Saving 29.94 tons of standard coal. Reducing 104.8 tons of CO2 emissions.4.Realizing real-time energy monitoring, intelligent management and intelligent micro grid system in this building. green technology promotion and display play a very good role in promoting effect.5.Green technology such as park landscape features, flexible application of sloping roof greening, rainwater treatment, ecological pond, sprinkler irrigation system play a good green technical propaganda role to the visitors.6.The technical application of this project can provide guidance and demonstration for the green design of exhibition buildings, parks, supporting buildings and waterfront buildings

**Preservation / Environmental Improvement :** “Rain-River-Landscape-Greening” Integrated Unconventional Water Utilization Scheme According to the water source and field characteristics of the building location, the scheme reuses the rain from the roof and greening area and utilize the landscape, river, and water storage tank for achieving integrated utilization.1.River and landscape provide water storage and the greening provides penetration space for avoiding flooding.2.Landscape and greening provide rain water treatment for avoiding pollution.3.Rain water and river work as the irrigation source of the landscape and greening enhancing utilization for unconventional water source.4.Landscape and irrigation water usage is huge in this project. The unconventional water usage can reach 16441.45 m<sup>3</sup>/a , totally saving about RMB50900 per year.

**Resilience :**

**Responsible use of resources :**

GSHP combining the ground pipe and surface water1.Propose ground pipe and surface water integrated GSHP system to meet the cooling and heating demand according to the around sources and building load characteristics. 2.The project adopts the measure for reducing the peak demand that utilize lake as heat tank based on the soil thermal balance in a year: the buried pipe heat exchanger takes 80% of the cooling load and the lake water heat exchanger takes 20% of the cooling load. The whole system saves 21.33% of total energy consumption annually.3.According to that there is requirement of living hot water, the ground source heat pump unit adopts the condensation heat recovery function. Part of condensing heat is recovered in summer for producing hot water which saves about 10,000 yuan.Building Integrated PV (BIPV) system1.The photovoltaic power generation system is arranged on the roof of which the total installed power is 178.56KWp. It uses 48 ECF-20A type 20% transmittancy film silicon solar panels with and 584 TSM-300 type polysilicon battery plate which is grid-connected on the user side.2.Optimize the arrangement of the solar photovoltaic system to ensure the efficiency of the photovoltaic system and prevent the occurrence of the hot spot effect and damage. Based on the influence of the roof component bulge in the middle part of the roof, the photovoltaic array is connected in series with the north and south.3.20% transparent silicon based thin film battery board. 4.Providing 35.8% of the annual electricity load.Energy and water saving efficiencyTotal energy consumption rate: 80.12kWh/(m<sup>2</sup>year) without PV ,Total energy consumption rate: 51.4kWh/(m<sup>2</sup>year) with PV ,PV providing 35.8% of the annual electricity load.Unconventional water source usage rate: 70.91%

## Testimony / Feedback



## Governance

Chenjia Town Construction and Development Co., Ltd

**Holder Type :** Public Local Firm

Huadong Architectural Design Research Co., Ltd

**Builder Type :** Other

The work includes the consulting work on the structure, water supply and drainage, strong and weak, HVAC design and green building aspects of the overall building and single building. In addition, some creative points such as the passive design, non-conventional water utilization project, the use of renewable energy, HGSH operation optimization and so on according to the characteristics of projects have been researched.

## Sustainable Solutions

Photovoltaic integrated power generation system

**Description :** The photovoltaic power generation system is arranged on the roof of which the total installed power is 178.56KWp. It uses 48 ECF-20A type 20% transmittancy film silicon solar panels with and 584 TSM-300 type polysilicon battery plate which is grid-connected on the user side. Photovoltaic power generation system can provide more than 35% of the building's electricity demand, with significant energy-saving benefits.

**Company (es) Website :**

**Company (es) Website :**

**Company (es) Website :**



Wind power generation system

**Description :** In the process of designing, due to the shape of the building, after the consultation with the Shanghai Chenjiazhen construction and development Co. Ltd and architectural design units and park design units, the final design is that vertical axis wind power generation system cluster is arranged near the energy management center as the low-carbon theme park landscape and coordination layout of the energy management center. The fan total installed power changes from the original 4 x 0.3kW to 6 x 1kW. The annual average wind speed of Chenjiazhen area is 5m/s. The probability of extreme wind speed is small and the annual effective time is more than 2000 hours. As a result it is a good area for wind power generation. The vertical axis wind power generation system cluster on the northeast corner of the layout will play an exemplary role.



Company (es) Website :  
Company (es) Website :

Pipeline Daylighting System

**Description :** Tubular daylight devices This is the tubular daylight devices installation project for Chongming energy management center. The system is arranged for lounge lighting. There are 10 sets of the Solatube 290DS tubular daylight devices system. Specific rules: 1.The light pipe connection overlap size should be more than 25mm. The pipes by should be connected by screws. 2.The light pipes should be connected smoothly, with special aluminum foil tapes on the connection gaps. The pipe has no breakage and deformation. 3.Waterproof roof is firmly connected without loose. 4.The sealing strip is sealed between the light tube and the diffuser. 5.The top wool between the light tube and the light collecting cover is adopted for ventilation, dust prevention, insect control and sealing treatment. 6.The level and verticality of the light pipe should meet the application requirements 7.The waterproof cap insulation sleeve is adhered firmly, and the center of the heat insulation sleeve is consistent with the center of the light tube.



Company (es) Website :  
Company (es) Website :

Contest

Reasons for participating in the competition(s)

Building candidate in the category

