


## Haimen City Yunqi Court Project Phase 3, No. 4, Building 5

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New Construction



Primary energy need :  
**84.6** kWhpe/m<sup>2</sup>.  
(Calculation method : )

**ENERGY CONSUMPTION**

*Economical building* *Building*

- < 50 **A**
- 51 à 90 **B**
- 91 à 150 **C**
- 151 à 230 **D**
- 231 à 330 **E**
- 331 à 450 **F**
- > 450 **G**

*Energy-intensive building*

**Building Type** : Collective housing > 50m

**Construction Year** : 2014

**Delivery year** : 2016

**Address 1 - street** : 226199 ,

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

**Net Floor Area** : 75 610 m<sup>2</sup> Autre type de surface nette

**Construction/refurbishment cost** : 1 460 000 000 ¥

**Number of Dwelling** : 451 Dwelling

**Cost/m<sup>2</sup>** : 19309.62 ¥/ m<sup>2</sup>

**Certifications :**



**Proposed by :**



## General information

This project emphasizes on many significant factors comprehensively such as energy-saving, water-saving, material-saving, space-saving, operation management and indoor environment. The following key technology and products are applied in this project: energy recovery systems, ground-source heat pump systems, thermal insulation of exterior wall, thermal insulation aluminum alloy hollow glass and shutter outside window with external sunshade, rain-storing and recycling system, high-efficiency micro-sprinkler irrigation technology, pervious area floor, rainfall penetration technology, full decoration, intelligent building system and etc.

9670.3 m<sup>3</sup>water will be stored and recycled directly per year after the complete establishment of the rain-storing and recycling system. According to the local living water price for residents, 17,000 yuan will be saved a year. When considering the indirect benefits including the increase of national finance income, the decrease of social loss by eliminating pollution and the decrease of drainage operation costs of the city, 30,000 to 50,000 yuan will be gained every year.

100% residents in the housing estate use ground source heat pump system for heating/air conditioning and providing domestic hot water. Supposing that the system can be used for 15 years, 1.6×10<sup>7</sup>kWh conventional source of energy will be saved during the life cycle of the system. The investment recovery period for ground source heat pump system is calculated to be 5.4 years.

## Data reliability

3rd part certified

### Stakeholders

Function : Designer

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<http://cbtgc.iwingchina.com.cn/>

As a design and consulting company of green building, China Building Technology Group Co., Ltd is responsible for the design, comprehensive assessment and overall targets of the project; feasible research and analysis for the green building technical sche

### Owner approach of sustainability

In order to improve the social benefit, economic benefit and environmental benefit, and achieve the target of energy-saving and energy efficiency, this project focuses on the practice and promotion, researches practical green ecological technology to protect the ecological environment and achieve sustainable development.

### Architectural description

Key factors of this project:

- (1) The thermal insulation of the external wall is made of composite foam cement panel (IIttype) and cement base compound insulation mortar(L type). The external window is made of 5+19Ar+5 thermal insulation aluminum alloy hollow glass. The south window was shaded with external sunshade. Energy-saving materials are applied as envelope for roof and overhead floor. The total energy consumption of the building is up to 80% of the demand of the standard of DGJ32/J 71-2008.
- (2) By using source side ledger of ground source heat pump system, soil is applied as energy source to supply heating or cooling to the houses and provide domestic hot water.
- (3) Rain water was stored and recycled for irrigating, street flushing, car washing, landscape water filling and underground garage flushing.

### If you had to do it again?

This project is designed as high-level housing estate building with heating system in winter, cooling system in summer and domestic hot water system all over the year. The cooling and heating system take well use of shallow geothermal energy to implement changeable operation, energy saving optimization, separately regulation and system maintenance.  
Solution: Ground source water was supplied to each house by using ground source heat

pump. During the period of project design, analysis and research of ground source heat pump have been completed. By considering the advantages and benefits of each projects, centralized ground source heat pump system for high-rise buildings was selected as the application to supply heating for winter, supply cooling for summer and supply domestic hot water all over the year.

## Building users opinion

The residents in this housing estate feel satisfied to the living environment, lighting environment, ventilation effect and indoor air quality.

## Energy

### Energy consumption

Primary energy need : 84,60 kWhpe/m<sup>2</sup>.

Primary energy need for standard building : 87,19 kWhpe/m<sup>2</sup>.

Calculation method :

Breakdown for energy consumption :

HVAC:63.7%

lighting/plug:14.1%

power equipment: 12%

others:10.2%

### Envelope performance

Envelope U-Value : 1,01 W.m<sup>-2</sup>.K<sup>-1</sup>

More information :

The thermal insulation of the external wall is made of composite foam cement panel (II type) and cement base compound insulation mortar(L type). The external window is made of 5+19Ar+5 thermal insulation aluminum alloy hollow glass. The south window was shaded with external sunshade.

Building Compactness Coefficient : 0,33

## Renewables & systems

## Systems

### Heating system :

- Geothermal heat pump
- Low temperature floor heating

### Hot water system :

- Heat pump

### Cooling system :

- Geothermal heat pump
- Fan coil

### Ventilation system :

- Natural ventilation
- Double flow heat exchanger

### Renewable systems :

- Heat pump on geothermal pile

Renewable energy production : 88,00

### Other information on HVAC :

The amount of fresh air is calculated based on the air change rate. Every house applied a fresh air ventilator in the kitchen. According to the supply distance and fictional resistance, fresh air ventilator was equipped with total heat exchanger.

100% residents in the housing estate use ground source heat pump system for heating/air conditioning and providing domestic hot water.

### Solutions enhancing nature free gains :

The project nearly faces to the source and the nearest horizontal line of sight of the building is 38.39 m. Each unit has at least one room meets the sunshine standards of living space. For the houses which have more than four rooms, at least two rooms me

## Smart Building

### BMS :

Intercom system, emergency alarm and intrusion alarm system, vehicle access control system, building automation control system, access control and management system.

Users' opinion on the Smart Building functions : The management system of this project is set up comprehensive and made household convenient, efficient and safe.



## Environment

### Urban environment

The surroundings near the house estate are equipped with public facilities including: business area, schools, kindergarten, hospital, cultural plaza, bank, petrol station and so on.

### Land plot area

Land plot area : 18 909,00 m<sup>2</sup>

### Green space

Green space : 8 017,11

### Parking spaces

The building has 384 parking spaces, including 377 spaces underground and 7 spaces above ground with a total area of 13520.18 m<sup>2</sup>.

## Products

### Product

Shulian aluminum alloy shutter

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

Product category :

Adjustable sunshade was installed on the south side windows in the housing estate. Shulian aluminum alloy shutter was planned to be used to make the sunshade in harmony with the building external façade, reduce the radiant heat gain and avoid sunlight shining into the indoor space.

The product is functional in sunshade, safe proof, sound proof, against severe weather, moisturizing, thermal insulation and inhibition of water.

### Construction and exploitation costs

Renewable energy systems cost : 18 902 600,00 ¥

Total cost of the building : 1 460 000 000 ¥

### Energy bill

Forecasted energy bill/year : 479 500,00 ¥

Real energy cost/m<sup>2</sup> : 6.34

Real energy cost/Dwelling : 1063.19

## Building Environmental Quality

### Building Environmental Quality

- Building flexibility
- acoustics
- waste management (related to activity)
- water management
- energy efficiency
- maintenance
- building end of life management
- integration in the land
- building process

### Water management

Consumption from water network : 91 167,90 m<sup>3</sup>

Consumption of harvested rainwater : 9 670,30 m<sup>3</sup>

Water Self Sufficiency Index : 0.1

Water Consumption/m<sup>2</sup> : 1.21

Water Consumption/Dwelling : 202.15

In this project, rain water was stored and recycled to reuse in other systems. Meanwhile, a variety of measures were applied to increase rainwater infiltration and the surplus rain water will be transport to municipal rainwater pipe network to ensure the drainage of surplus water. Collective water flows into the reservoir and then flows into the folded plate after flocculation in the inclined plate sedimentation tank. Rain storage contains a variety of types such as rain on the roof, on the floor, on the grassland. This project will collect compound rain water from different place for irrigating, street flushing, car washing, landscape water filling and underground garage flushing.

### Comfort

Health & comfort : Average indoor air temperature in January: 19oC

Average humidity in January: 60%

Average indoor air temperature in July: 26 oC

Average humidity in July: 60%

Fan coil unit (FCU) and fresh air ventilation system is applied in houses and the FCU

Acoustic comfort : Noisy mechanical room such as heat pump room, water pump room and electricity generation room is arranged in the basement to reduce the operational influence to residents. Air conditioning machines, fresh air ventilators and all of the air hoses are equipped with complex muffler or bend muffler. Pipes directly connected to the operational pipeline are hosted with damping applications. Besides using low-noise ventilator, each machine is equipped with vibration pedestal and installed flexible pipe at the air inlet and outlet pipe.

## Carbon

### GHG emissions

GHG in use : 9,33 KgCO<sub>2</sub>/m<sup>2</sup>/

Methodology used :



Contest

Building candidate in the category

