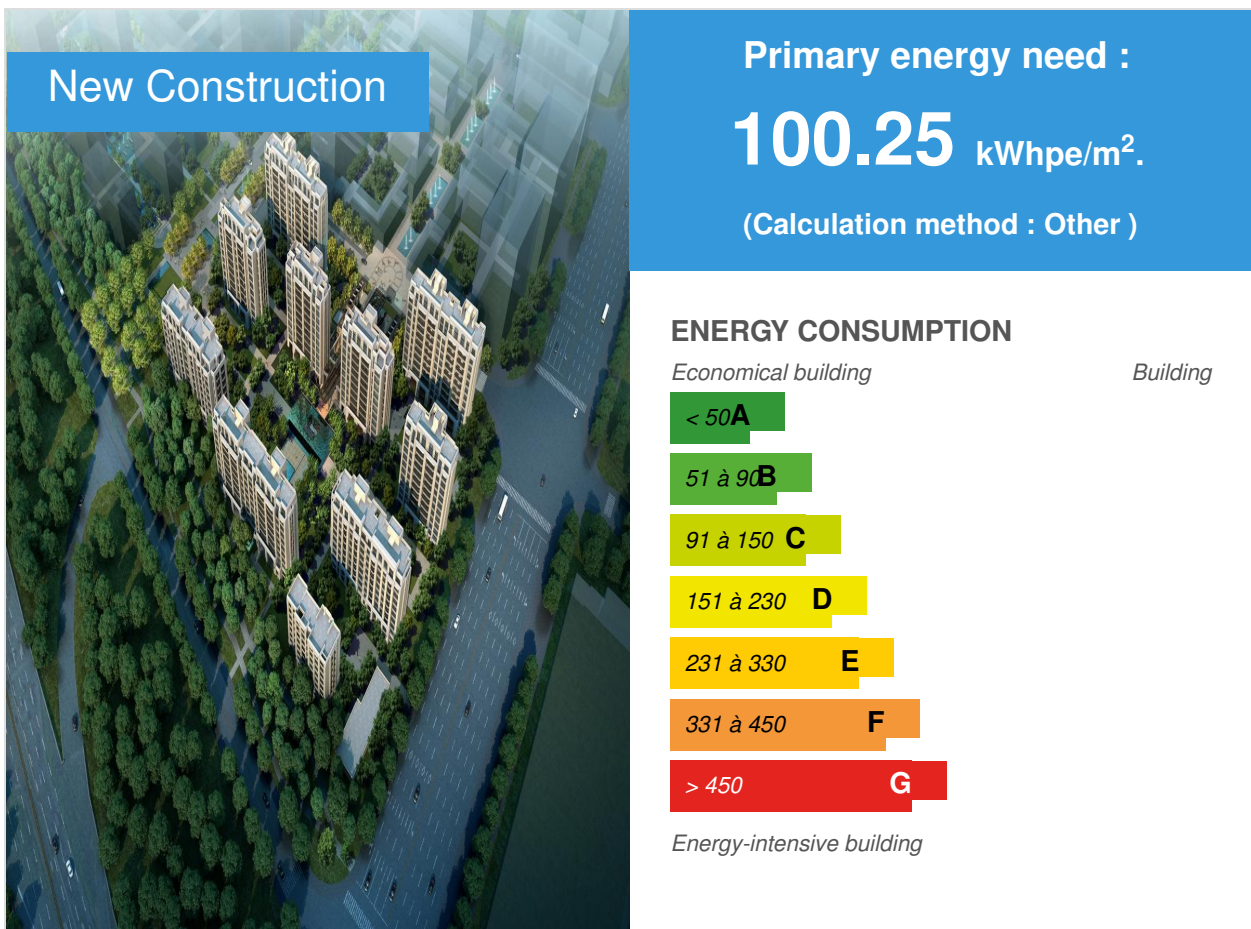


## Gezhouba Purple County Residence

by Cindy Chen / ⌚ 2019-06-23 12:00:58 / Chine / © 6716 / 🇨🇳 CN



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

**Construction Year** : 2016

**Delivery year** : 2019

**Address 1 - street** : 201799 ,

**Climate zone** :

**Net Floor Area** : 62 306 m<sup>2</sup> SHON

**Construction/refurbishment cost** : 2 147 483 647 ¥

**Number of Dwelling** : 286 Dwelling

Cost/m<sup>2</sup> : 34466.72 ¥/ m<sup>2</sup>

#### Certifications :



## General information

Gezhouba Purple County Residence is located in Qingpu District, Shanghai, from east to Zhuguang Road, West to planned green space, south to Xunan Road and north to Fangjiatang Road. The land area of the project is 25266.60 m<sup>2</sup>, the total building area is 62306.08 m<sup>2</sup>, the total ground building area is 42461.33 m<sup>2</sup>, the total underground building area is 19637.64 m<sup>2</sup>, the guaranteed building area is 2021.85 m<sup>2</sup>, the building density is 21.60%, the volume ratio is 1.60, the green space ratio is 35.07%, and the total green space area is 8860.00 m<sup>2</sup>.

Building 1, 2, 3, 5, 6, 7, 8, 9, 10 and 11 are shear wall structures, while building 4 and 12 are frame structures.

The project is designed to be three-star level of the new national standard of green building. It is designed and constructed according to the concept of green building. The green ecological technology suitable for this residential building is reasonably selected. The three-star level requirements of green building are achieved from six aspects: land saving, energy saving, water saving, material saving, indoor environment quality, improvement and innovation. At present, the project has achieved three-star design logo of green building, and three-star operation logo evaluation will be carried out in the follow-up. At the same time, the project has obtained German DGNB gold-grade pre-certification, and is undergoing full certification. The project is the first joint certification project of green building between China and Germany.

**Land saving:** The site of this project does not exist the threat of geological phenomena such as flood and debris flow, and has no adverse geological effects. The land area is 25266.60, the green space rate is 35.07%, the underground building area is 18190.4, and the ratio of the underground building area to the ground building area is 46.44%. It realizes the diversion of people and vehicles in the site.

**Energy-saving:** using renewable energy-ground source heat pump as the cold and heat source of the project system; using temperature and humidity independent regulation air-conditioning system at the end of the air-conditioning system, assuming indoor sensible heat

and cooling load in summer, indoor heat load in winter, controlling indoor temperature; independent fresh air system assuming indoor latent heat and fresh air cooling load in winter, bearing indoor sensible heat and cooling load in winter. Bear fresh air heat load, control indoor humidity. Lighting system lamps and lanterns selection general place is fluorescent lamp or other energy-saving lamps and lanterns. The lighting of corridor and underground garage is controlled centrally. The heat recovery efficiency of fresh air dehumidification unit is not less than 65%.

Water saving: The maximum daily water consumption is 153.48 m<sup>3</sup>/d, and sprinkler irrigation is used for greening irrigation. Sanitary appliances and fittings are water-saving products with grade 1 water use efficiency. The project collects rainwater in the site, and after physical and chemical treatment, it is used for road sprinkling, greening irrigation, water supplement and so on.

Save material: PC prefabricated structure is adopted in this project, and the prefabrication rate of building monomer is over 30%. Pre-mixed concrete is used in all cast-in-place concrete. All mortars are ready-mixed mortar. Recyclable materials include steel, copper, wood, aluminium alloy profiles, gypsum products and glass. The total weight of building materials is 97 683.94 t, and the weight of recyclable materials is 14 945.43 t. The weight of HRB400 steel bar is 1542.18t, and the total amount of steel bar is 211.9t.

Indoor environment: The project operates independent fresh air system 365 days a year and filters PM<sub>2.5</sub> efficiently to provide continuous, clean and healthy indoor air. The indoor noise level of the project meets the standard average requirement, and the floor impact sound insulation meets the standard high requirement. Good lighting, the main function of the room window-to-floor ratio are more than 20%. Balcony, convex window, interior decoration using light-colored materials, effective control of indoor uncomfortable glare, glare index of the main functional space are controlled below 27. A 300 mm fixed sunshade is designed above all the outer windows; three-layer hollow glass LOW-E aluminum alloy broken bridge doors and windows are used for the outer windows; curtains are installed indoors; the combination of the three can provide better sunshade adjustment. The ratio of ventilation opening area to floor area of each main functional room is more than 8%. CO concentration monitoring system is set up in underground garage, and PID self-adaptive adjustment is made between 5 and 25 PPM.

## Data reliability

3rd part certified

Stakeholders

Contractor

Name :

Contact : 18612181582 978405993@qq.com

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

## Construction Manager

Name :

Contact : 13564704923 541346547@qq.com

<http://www.2bur.cscec.com/>

## Stakeholders

Function : Designer

17717526535 wuxiangjun@uachina.com.cn

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

It undertakes the overall design responsibility of the project.

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Function : Thermal consultancy agency

13764563345

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

It is the green building consultant of this project, undertaking consultation, and assisting in the application for the three star green building certification.

## Owner approach of sustainability

In the aspect of green building design, design and build according to the green building concept, reasonably choose the green ecological technology suitable for the residential building, and reach the three star green building standard from the aspects of land saving, energy saving, water saving, material saving, indoor environmental quality, improvement and innovation.

The main aspect of Germany's DGNB certification is the inclusion of the ecological, economic and socio-cultural impacts of green buildings. It is the importance of promoting the sustainability of the three pillars of society to the same level of second-generation green buildings. (sustainable building) certification system; including the cost calculation of the whole life cycle of the building, can effectively assess the control of construction costs and investment risks; the building performance evaluation as the core rather than the presence or absence of measures as the standard, and for the owners and designers In the initial stage of building positioning and design, it provides a wide range of operational approaches for

achieving specific objectives; it is a dynamic assessment of the participating buildings, showing the pros and cons of different technical systems and indicator requirements, and providing comprehensive application performance evaluation for participating buildings. Established a standard system based on the high level of quality of the German construction industry system; according to the principles of the EU standard system, it can be applied to different countries' climate and economic environment, and has strong flexibility.

In addition, the project uses rainwater recovery system and landscape water body to reduce the rainwater runoff of the site, using high-performance enclosure structure to create a comfortable indoor environment; using ground source heat pump system and capillary end and displacement fresh air to achieve temperature and humidity independence. At the same time of regulation, the indoor constant temperature and humidity constant oxygen is maintained; the indoor air quality is improved; the energy-saving appliances such as energy-saving appliances, energy-saving lamps and energy-saving elevators are adopted, and the energy conservation is achieved by adopting these measures.

## Architectural description

This project is the first project of 5G technology system independently researched and developed by Gezhouba Real Estate of China. The 5G technology system consists of five subsystems: Green Health, Global National Craftsman, Gather Industrial Integration, Grasp Smart Connect, and Gain Service. Green Health aims to create a green, comfortable and healthy ecological living environment for the owners, so that the owners have the most pleasant living and life experience; the National Craftsman aims to adopt internationally leading building standards, craftsmanship and high-quality building parts. Comprehensively enhance the quality connotation of development projects and reflect the corporate culture and humanistic feelings of the company's great craftsman spirit; industrial integration aims to improve building quality, efficiency and longevity, reduce construction costs and energy consumption through the application of building industrialization and BIM technology; Through the modern electronic technology, the Internet aims to optimize the lifestyle for the owners, solve the inherent needs of the owners and the convenience of life, and comprehensively improve the quality of life. The value-added service aims to provide convenient and convenient access to the community through the comprehensive integration of high-quality urban service resources. Supporting services to add value to the owners. 5G Technology integrates the most comprehensive, in-depth and finest real estate technology system in the industry.

In the design process, building energy conservation, water conservation, material saving, land saving, operation management, and indoor environment are considered comprehensively, which meets the relevant requirements of green buildings. The application of PC structure, high-performance enclosure structure, high-performance unit, replacement fresh air system, BIM and other suitable and effective technologies has reached the relevant requirements of green buildings. Moreover, using advanced computer simulation technology, the indoor lighting, ventilation environment, and outdoor wind environment are simulated to achieve the goal of improving people's living comfort, energy saving, and beautiful environment, truly reflecting the practical significance of green building.

## If you had to do it again?

The environmental protection contents of the whole process of construction of the project include construction wastewater management, rainwater pipe network management, waste management, noise management, and dust management.

The project fully considers resource conservation during the construction process, and has formulated a construction energy plan, a construction water saving plan, and a waste recycling plan.

The construction units have passed ISO9001, ISO14001 and ISO18001 management system certification. During the construction process, the construction quality control and construction implementation work are carried out in strict accordance with the requirements of the three management systems.

## Building users opinion

For thermal comfort: the temperature distribution of radiation cooling and heating system is uniform, because there is no mechanical rotating parts in the room, the radiation temperature has little different from air temperature, there is no sense of blowing and the air is clean, quiet and noiseless, the system does not occupy indoor space, the comfort is good.

For air quality: replacement fresh air system has the functions of heat exchange, humidification, dehumidification and purification. Solve haze problem, effectively reduce indoor carbon dioxide concentration, control indoor temperature and humidity, so that indoor living environment achieve high health standards;

Light environment: all windows with floor height above 2.1 meters adopt indoor or outdoor shading measures to control glare. The illumination source is from natural light, which is soft and uniform, full spectrum, no flicker, no glare and no pollution.

Acoustic environment: Using the same floor drainage, noise is controlled at a low level. Through the control measures of external wall enclosure, door and window system and indoor decoration, indoor noise of residential buildings is lower than the national standard.

## Energy

### Energy consumption

Primary energy need : 100,25 kWhpe/m<sup>2</sup>.

Primary energy need for standard building : 176,59 kWhpe/m<sup>2</sup>.

Calculation method : Other

Final Energy : 133,21 kWhfe/m<sup>2</sup>.

Breakdown for energy consumption :

General lighting socket equipment 8.25 Kwh/m<sup>2</sup>/year Building No.1



Refrigeration 79.88 Kwh/m<sup>2</sup>/year Building No.1

Ventilation 3.61 Kwh/m<sup>2</sup>/year Building No.1

Heating Heating and Hot water 41.47Kwh/m<sup>2</sup>/year Building No.1

## Envelope performance

Envelope U-Value : 0,60 W.m<sup>-2</sup>.K<sup>-1</sup>

### More information :

1. Material Non-load bearing wall

1.1 Basement section The underground outdoor wall is self-waterproof reinforced concrete wall (Level P6) The basement interior wall is made of 100/200 thick MU5.0 concrete hollow block (the firewall is MU5.0 concrete solid block).

1.2 Aboveground The outer wall is made of 200 thick B07, A5.0 sand aerated block, and the inner wall (except as indicated) is made of 200 or 100 thick B06, A3.5 gray aerated block. The residential wall is made of 200 thick B07 autoclaved aerated concrete block. The air sound metering sound volume evaluation amount and correction amount (Rw+C) of the household wall is greater than 45dB. The strength and density level of the wall material used are Masonry mortar, sound insulation performance and other requirements meet the national standards, and the manufacturer holds the "wall material production qualification certificate" issued by the local management department.

2. The wall fascias are all 100, and the dimensions and positions of the reinforced concrete structural columns are detailed. The structural column setting requirements and positions of the infill wall exceeding the length or height are set according to the national standard.

3. The elevator shaft is not in close proximity to the bedroom, and when it is adjacent to other living spaces, sound insulation and shock absorption construction measures are placed on the inner wall of the indoor side.

4. The reserved holes are required to be positioned accurately. It is strictly forbidden to cut and break the ribs. The holes should be buried and sealed with C20 fine stone concrete (plus waterproof expansion agent). The bathroom, kitchen, etc. must be tested for water shutoff, requiring no leakage for 24 hours. The party is qualified.

5. The root of the kitchen and bathroom wall should be pre-cast with a C20 plain concrete wall base higher than the building elevation of 300, and the width is the same as the upper wall.

6. Equipment and wells with waterproof requirements, such as strong electricity and weak electricity, are made of 100 wide and 100 high-pass concrete plain sills behind the door, except for strong and weak electric tube wells in residential stairwells.

7. The outer walls of all indoor shafts are built after the pipeline is installed. Ventilation and exhaust shafts must be constructed in strict accordance with the drawings. The hoistway is cleaned with 1:3 cement mortar and the inner wall is smooth, dense and airtight, and the flue gas is discharged smoothly.

8. If all indoor wall retaining holes are opened, take the following measures: cover the second layer of Ø4 steel mesh on the back of the box and then block the gear. The top of the box needs to be added with beams.

9. The post-laying infill wall shall be set along the frame column or shear wall with a height of 2Ø6 (3Ø6 when the wall thickness is greater than 240mm) every 500mm, and the tie bars shall be set along the entire length of the wall. The intersection of the wall and the column,

beam and plate shall be strictly implemented in accordance with the “Code for Acceptance of Construction of Masonry Engineering”. At the intersection of different material walls, the intersection of the wall and the column beam and the buried pipeline, a metal mesh is added to the leveling layer, which is 400 wide and fixed by nails.

10. The lower part of the outer wall of the indoor and the roof is filled with C20 fine stone concrete with a height of 400. The block wall is then built with 2Ø6 horizontal bars.

11. The pipe well door is made of C20 concrete sill, 100 high, and the side wall is made of concrete soil sill 200 high when the pipe well passes through the floor. The width is the same as the wall thickness. It is equipped with 2\_6 horizontal bars.

12. Wall masonry, door and window installation, hole retention, buried pipelines, plastering, decoration, etc. should be carried out in accordance with the relevant national and local standards of waterproof agent moisture-proof layer.

13. The C20 concrete blocks embedded on both sides of the doors and windows are anchored with the doors and windows frame, or 100x100 holes are reserved for masonry, which are filled with C20 concrete after the doors and windows are installed.

14. When the wall sill at the edge of the door and window is less than 200, the same type of concrete is used together with the main structure.

15. Reinforced concrete walls, beams, columns and slabs can be painted only after they are coated with interface treatment agent.

16. Where there are more holes left on the masonry wall, the wall will be built after the pipeline has been installed.

17. The final selection of partition materials, door positioning, electrical switch and socket design, equipment through the wall to leave holes and other decoration design and construction. The retained holes on the wall are strengthened according to the structural description. After the opening is to be installed, the surrounding area is blocked and dense, and the label is not lower than the requirements of the surrounding structure.

18. Pipelines and bridges passing through the firewall are filled with fire-proof materials. Pipeline insulation materials through the firewall are made of non-combustible materials.

19. The wall is built with 60 high C20 fine stone concrete damp-proof layer at the elevation of -0.06 under the indoor floor, (2 lengths of steel bars with a diameter of 6). If it is reinforced concrete structure in this elevation, it can not be done. When one side of the wall is covered with soil, a P6 waterproof reinforced concrete retaining wall is installed on the water face, and the top of the reinforced concrete retaining wall is 500 heights higher than the overlying soil surface.

20. When the height of the indoor floor changes, the moisture barrier should overlap. And on the side wall of the high and low burial soil, 20 thick 1:2 cement mortar, 5% waterproof agent moisture-proof layer. If the buried side is outdoor, it should be made of 20 thick 1:2 cement mortar plus 2 thick 911 polyurethane waterproof coating.

21. Masonry wall bulk density, structure, masonry methods, structural columns, cast-in-place belts, tunnel entrance reinforcement measures, beams and so on are described in accordance with the structural drawings. The masonry above the ceiling height is to be installed after the equipment pipeline is completed.

22. The bottom of basement wall is made of C20 concrete guide wall with 200 heights and wall thickness, and the outer wall is made of C20 concrete guide wall with 200 heights and wall thickness except PC part.



Building Compactness Coefficient : 0,38

Indicator : n50

Air Tightness Value : 0,93

## Renewables & systems

### Systems

Heating system :

- Geothermal heat pump

Hot water system :

- Gas boiler
- Heat pump

Cooling system :

- Geothermal heat pump

Ventilation system :

- Single flow

Renewable systems :

- Heat pump (geothermal)

### Smart Building

BMS :

Intelligent Operation System of Science and Technology System (Intelligent Integrated Control of Geothermal Heat Pump)

## Environment

### Urban environment

The project is located in the Xujing plate, Xihongqiao business district, Qingpu District, and near the Hongqiao CBD, which can benefit from the radiation Hongqiao business district.

The project is close to metro line 2, line 10, line 17 and line 9, which can reach major business districts and airports through rail interchange, and the rail transit network is convenient. Close to Jianning expressway, Huqingping highway, Huyu expressway and other major highways, it can be directly access to the outer ring road, so as to reach the urban area and the business circle. The traffic around the plot is very convenient.

The surrounding education, medical, commercial and other living facilities are relatively complete. There are many large shopping malls and shopping centers and more than 10 educational institutions in the surrounding area, which are close to Hongqiao medical center.

Qingpu District, in which the project site is located, is one of the five key new towns in Shanghai 2040 general regulations. Supported by innovative research, business trade and tourism, the district has a national-level west Xihongqiao business district, Zhujiajiao tourist resort, and a node city on the Huhu axis.

## Land plot area

Land plot area : 25 266,60 m<sup>2</sup>

## Green space

Green space : 9 122,83

## Parking spaces

Underground parking lot, 373 total parking spaces, 0.42 parking spaces per capita, license plate recognition parking management system.

## Products

### Product

PDS protection siphon drainage rainwater collection system

601 1923 huwa@shhuwa.com

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

Product category :

The PDS protection siphon drainage rainwater collection system consists of polymer protective drainage profiled piece, siphon drainage channel, water collection cage, observation well and breathable dust cover.

- 1) It is difficult to find slopes on large roofs to achieve zero-gradient organized drainage.
- 2) Cancel looking for slope layer, protective layer, isolation layer and replace traditional drainage filter layer.
- 3) Collect the infiltrated water as water for garden irrigation to save water resources.
- 4) Convenient construction, saving 3/4 of the construction cycle.
- 5) Compared with the traditional construction technology, the total cost can be saved at least 1/3-1/2.
- 6) Easy to maintain and reduce congestion.
- 7) Make the pressure on the polymer protective drainage profiles consistent with the external pressure, breathe through and accelerate drainage.

## Costs

### Energy bill

Forecasted energy bill/year : 1 350 000,00 ¥

Real energy cost/m<sup>2</sup> : 21.67

Real energy cost/Dwelling : 4720.28

## Building Environmental Quality

### Building Environmental Quality

- indoor air quality and health
- renewable energies
- products and materials

## Health and comfort

### Life Cycle Analysis

Material impact on energy consumption : 51,25 kWhEP

### Water management

Consumption from water network : 99 769,10 m<sup>3</sup>

Water Consumption/m<sup>2</sup> : 1.6

Water Consumption/Dwelling : 348.84

The water consumption of this project is domestic water, green sprinkling, road square flushing, basement flushing, etc. The maximum daily water consumption of this project is 153.48 m<sup>3</sup>/d, and the maximum hourly water consumption is 6.4 m<sup>3</sup>/h. Sprinkler irrigation is adopted for greening irrigation. The sanitary appliances and fittings of this project adopt water-saving products of grade 1 water use efficiency. The toilet flushes with 2.9L/4.2L two-stage flushing water tank; the nozzle flow rate is 0.07L/s, and the shower flow rate is 0.078L/s. Appropriate material and pipeline connection mode are adopted to effectively reduce leakage of pipeline network. Set up grading water meter. The project collects rainwater in the site, and after physical and chemical treatment, it is used for road sprinkling, greening irrigation, water supplement and so on. The project collects rainwater in the site, and after physical and chemical treatment, it is used for road sprinkling, greening irrigation, water supplement and so on.

This project uses high-end drinking water treatment system and household water purification equipment to effectively remove suspended solids and particulate matter in water, so that families can drink healthy water sources.

## Indoor Air quality

Measured indoor CO<sub>2</sub> concentration (mg/m<sup>3</sup>): 1071

Indoor formaldehyde concentration (mg / m<sup>3</sup>): 0.031

Indoor TVOC test concentration (mg/m<sup>3</sup>): 0.25

Indoor benzene concentration (mg / m<sup>3</sup>): 0.013

Indoor PM<sub>2.5</sub> test concentration (ug/m<sup>3</sup>): 10

This project uses replacement fresh air system, the air purification mode is primary filtration, intermediate effect filter (G4), two-stage static electricity and bag medium efficiency filter (F9), PM<sub>2.5</sub> purification efficiency > 90%, to ensure indoor air cleaning. Replacement fresh air system: fresh air is fed from the lower part of the room, filling the whole room with very low speed (no sense of blowing) and temperature slightly below the indoor temperature. Residents and other indoor thermal loads heat the fresh air and produce rising air. The warm air generated in this way flows into the room with fresh air, and takes away the sweat and exhaust gas and other turbid gases from the human body. Finally, it reaches the top of the room and discharges from the exhaust holes, and forms a fresh air lake in the room.

In the application of indoor environmental protection coatings, the suppliers of decoration materials should be strictly screened and the VOC content of core building materials (such as sheets, coatings, adhesives, etc.) should be controlled according to "zero formaldehyde".

# Comfort

## Health & comfort :

Average indoor temperature in January: 21 degrees Average indoor humidity: 45%

Average indoor temperature in July 26 degrees Average indoor humidity: 60%

The project adopts ground source heat pump system, capillary radiation air conditioning system and displacement fresh air system.

Ground source heat pump system: Through a closed pipeline (called loop) buried 80-100 metres underground, Soil is used as an energy reservoir for heat extraction and heat dissipation of ground source heat pump units, and heating/refrigerating circulating water generates heat and cooling energy. By importing a small amount of high-quality energy (electricity, etc.), energy conversion can be realized, and the optimal effect of refrigeration and heating can be achieved.

Capillary network radiation air conditioning system: With water as the medium, heat (cold) is gently transmitted to the room through radiation. It can realize household control, save about 30% - 50% energy than conventional air conditioning combined with ground source heat pump, and ensure the balance and comfort of room temperature in the home. The temperature is maintained at 20 - 26 °C for the whole year. The indoor temperature is almost the same, and the deviation is less than 2 °C.

Replacement fresh air system: It has functions of humidification, dehumidification and haze removal (multi-stage filtering, filtering hair, mosquitoes, etc., and filtering efficiency of PM2.5 up to 90%). The air with the most suitable temperature is exported through the fresh air outlet, and the fresh air is sent down and back to form an orderly air circulation. Without opening windows, pure air can be input uninterruptedly, and the indoor humidity effect of about 30-70% can be achieved.

## Acoustic comfort :

The weight sound insulation of the air acoustics meter for the outer windows of residential space is more than 30dB. Facing the entrance of the aisle, the weight of the air acoustic meter is more than 25dB. The elevator shaft is not adjacent to the bedroom and living room. Sound insulation measures should be adopted when adjacent to other living spaces.

Through the comprehensive upgrading of the exterior wall enclosure, door and window system and indoor decoration, controlling sound insulation performance of floor, partition wall and doors and windows, and select low noise equipment, do a good job of air duct sealing, so that the indoor noise of residential buildings is lower than the national standard.

Using the same layer drainage system, water seal pipe fittings sharing the same layer drainage system of high-density polyethylene HDPE is used instead of many P-bends and S-bends. The overall structure is reasonable. So it is not easy to jam, and easy to clean up, dredge, with international first-line brand pipes, the noise may be controlled at a lower level, to create a quiet living environment.

## Carbon

### GHG emissions

GHG in use : 38,31 KgCO<sub>2</sub>/m<sup>2</sup>/

Methodology used :

German DGNB Housing Scoring Standard 2015 Edition

GHG before use : 14,10 KgCO<sub>2</sub> /m<sup>2</sup>

Building lifetime : 50,00

, ie xx in use years : 0.37

GHG Cradle to Grave : 52,41 KgCO<sub>2</sub> /m<sup>2</sup>

German DGNB Housing Scoring Standard 2015 Edition

## Contest

### Reasons for participating in the competition(s)

The Gezhouba Purple County Residence project was designed according to the green building, which was complied with the world trend. It can effectively reduce building energy consumption and the impact of buildings on the environment, and it was in line with China's construction policy. High performance envelope, high performance unit and equipment were used to reduce building energy consumption. The use of water-saving technologies such as water-saving appliances, water-saving sprinklers, high-pressure water guns, cooling towers, and water collecting trays and material-saving technologies such as integration of civil engineering and decoration, ready-mixed concrete, ready-mixed mortar, and PC structure have greatly saved energy and resources. Capillary network radiation air conditioning and replacement fresh air system were used in this project, which greatly improve indoor comfort.

The application of PC and BIM technologies in this project has played a good demonstration role in the promotion of new building technology.

### Building candidate in the category

