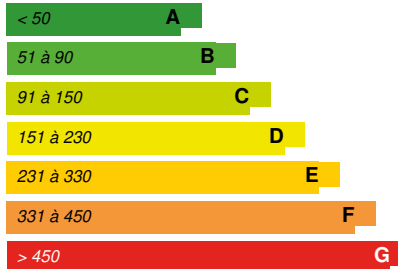


China Academy of Building Research NZEBuilding

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2



Building Type : Office building < 28m
Construction Year : 2012
Delivery year : 2014
Address 1 - street : 30# Beisanhuandonglu, Beijing, China 100013 BEIJING, China
Climate zone : [Cwa] Mild, dry winter, hot and wet summer.

Net Floor Area : 4 025 m²
Construction/refurbishment cost : 2 600 000 €
Number of Work station : 2 Work station
Cost/m2 : 645.96 €/m²

General information

The nearly zero energy building (NZEB) at the China Academy of Building Research (CABR) adhered to the design principle of "passive building, proactive optimization, economic and pragmatic". An ambitious annual energy consumption goal of 25 kWh/(m².a) (including heating, cooling and lighting energy) was set during the design phase without compromise of building function and indoor environment quality. The demonstration project integrated best available building energy conservation technologies, striving to build a signature NZEB project and establishing foundation for development of China's NZEB standard.

<https://www.construction21.org/data/sources/users/19348/24-china-academy-of-building-research-nearly-zero-energy-building-introduction.doc>

Stakeholders

Stakeholders

Function : Others
CHINA ACADEMY OF BUILDING RESERACH
86-10-84270181

Contracting method

General Contractor

Type of market

Table 'c21_algeria.rex_market_type' doesn't exist

If you had to do it again?

The HVAC system could be simpler to achieve the same result

Building users opinion

An indoor environment satisfaction and quality oriented survey is carried out, about 60 questionnaire is distributed to the users. 55 feedback regarding to air environment of the office are received, and 71.4% people feel satisfied and normal satisfied about the air quality, 28.5% people feel very unsatisfied. 45 questionnaires is received regarding to indoor environment to work efficiency. 100% people found the current indoor environment promote work efficiency, and 28.58% people feel very satisfied.

Energy

Energy consumption

Primary energy need : 75,00 kWhpe/m².year

Primary energy need for standard building : 300,00 kWhpe/m².year

Calculation method :

CEEB : 0.0001

Breakdown for energy consumption : HVAC = 45% (Fan = 13%; Pump = 35 % ; HP = 52%)

Plug = 31%

Lighting = 18%

Other= 6%

Envelope performance

Envelope U-Value : 1,20 W.m⁻².K⁻¹

Air Tightness Value : 0,60

More information

Are shown in the attached files

Real final energy consumption

Final Energy : 22,00 kWhfe/m².year

Real final energy consumption/m² : 23,00 kWhfe/m².year

Year of the real energy consumption : 2 015

Renewables & systems

Systems

Heating system :

- Geothermal heat pump
- Low temperature floor heating
- Others
- Solar thermal

Hot water system :

- Heat pump
- Solar Thermal
- Other hot water system

Cooling system :

- Reversible heat pump
- Gas absorption chiller
- Geothermal heat pump
- Others
- Floor cooling

Ventilation system :

- Double flow heat exchanger

Renewable systems :

- Solar photovoltaic
- Solar Thermal
- Heat pump (geothermal)

Renewable energy production : 40,00 %

Other information on HVAC :

7 heating source:

Medium temp solar collector, high temp solar collector, GSHP, water loop heat pump, water cooled VRV, thermal storage for heating, external hot-water

9 cooling source:

Hot-water driven absorption, GSHP, water cooled VRV, water loop heat pump, thermal storage for cooling, evaporative cooling, liquid desiccant air-conditioning, magnetic suspension chiller

6 HVAC terminal

Radiation ceiling, radiation floor, FCU, VRV, water loop heat pump, radiator

Smart Building

BMS :

A complete and precise building energy management system is constructed to monitor energy consumption and more importantly to guide optimize operation of the building. Building Automation system (BAS[2])(Figure 18-20) is constructed and integrated with BE

Environment

Urban environment

The building is located nearby Beisanhuan Road in Beijing and is surrounded by high office buildings.

Products

Product

Ground source heat pump unit

CLIMAVENETA

AQS

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

Product category : Génie climatique, électricité / Chauffage, eau chaude

Cooling capacity is about 99.5kW, Power input is set at 18.6kW EER is about 5.3, Heating capacity is set about 103.7kW, power input is about 25.3kW, COP is 4.10

Operation performance of the equipment is better than the marked value, and noise is small, operation is very stable.



Costs

Health and comfort

Water management

Permeable floor is arranged in blank area of facial side of the building, constructed in with water permeable materials. It is very good for groundwater conservation and provides a very good rode environment in raining days especially in rainstorm weather.

Comfort

Health & comfort : A roof garden was constructed on top of western side(Figure2-7), flowers and grass were planted inside, to provides good sight view and relax for employees, more importantly, it could decreases cooling load in summer season in some extent.

Contest

Reasons for participating in the competition(s)

This project adopted high performance building envelope system to reduce its energy demand. Underground borehole and solar collectors serves the geothermal heat pumps and absorption chiller as the primary cooling and heating sources. Through smart use of renewable and traditional energy, building heating demand in winter is to be met with zero use of fossil fuel and cooling energy consumption in summer to be reduced by 50%.

Various building sensors and metering devices were installed to collect real-time operational data, providing data monitoring, analysis, and control improvement, with aid of EMS and BMS, to realize optimized operation and maximized energy conservation.

Building candidate in the category



Smart building



Users' Choice Award



**Green Building
Solutions Awards 2016**

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