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Building Energy Conservation Project of Sino-US Joint Clean Energy Research Center: Phase II

Research and Construction of Building's Ultra-low Energy Consumption Demonstration Project in Cold Region

Contracting company: Jilin Kelong Building Energy-Saving Technology Co., Ltd.

Key Partners: China Academy of Building Research



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- 2. Schedule**
- 3. Obstacles**





1. Overview of Demonstration Project





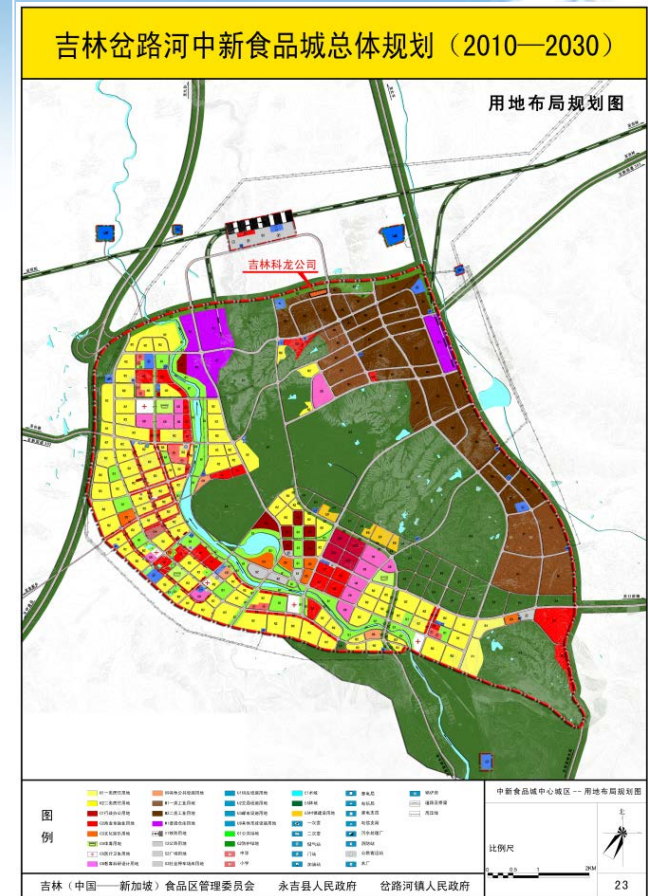
Overview of Demonstration Project

**Complex Model Building of JilinKelong
Building Energy-Saving Technology Co., Ltd.**

**1 It is located in Industrial Development Zone
Chaluhe, Jilin City, Jilin Province which is
China's cold area.**

**2 Destination ①Cold region three-star level
green building; ②Ultra-low energy
consumption building; ③Demonstration of
new technology and product**

**3 The total construction area of the model
building is 6000m². It is a multi-stores public
building with multi-purpose of office, research,
display and training.**



**The overall planning of Sino-Singapore Food Industry Zone ,
Jilin City.**



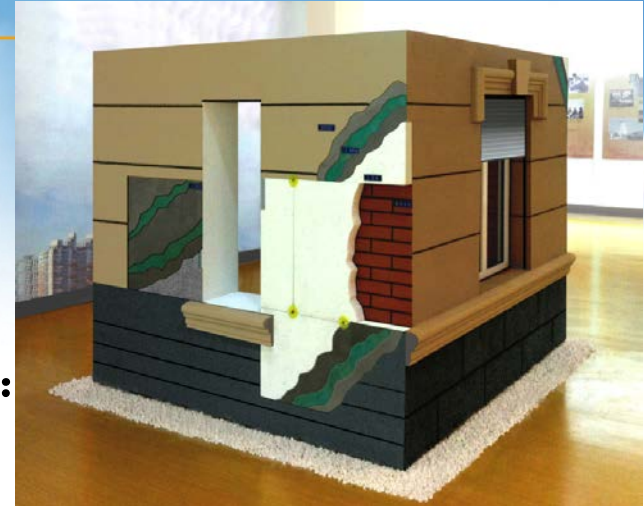
4. Target value of demonstration project.

- (1) 80-85% energy saving can be attained**
- (2) Other goals: 3 star level green building**

5. The main technical points of the model building :

(1) Building shape coefficient: 0.25.

(2) Envelop enclosure: The envelop enclosure thermal insulation technology system for the ultra-low energy consumption building in cold area in North China is composed of factors as followed: Structure and form of retaining structure thermal insulation technology system for the ultra-low energy consumption building, energy-saving windows and doors ($k = 0.8-1.1$), insulation curtains, air tightness processing of doors and windows, air tightness layer set, Joint structure of building's energy-extensive consumption part (thermal bridge treatment).





- (3) Renewable energy technologies: Solar energy+ ground source heat pump (GSHP) coupling**
- (4) Ventilation system: Ventilation system with heat recovery is adopted during the winter heating, and natural ventilation with windows open can be realized in summer.**
- (5) Operations management: We should strengthen the management of demonstration projects for the public through reduce the energy consumption by means of behavior.**
- (6) Integration of civil work and decoration: reduce cost increment, which should be within the limit of 10% - 15%.**





Bird's eye view of buildings





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Architectural style





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Architectural style





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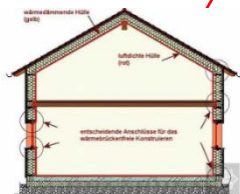
Rooftop garden



Energy management platform



Intelligent LightSystem



Design without thermal bridge



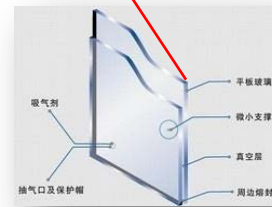
Rainwater collection system



Floor radiant



GSHP



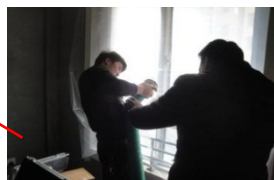
Low-e vacuum glass,system insulation curtains



Solar water heating system



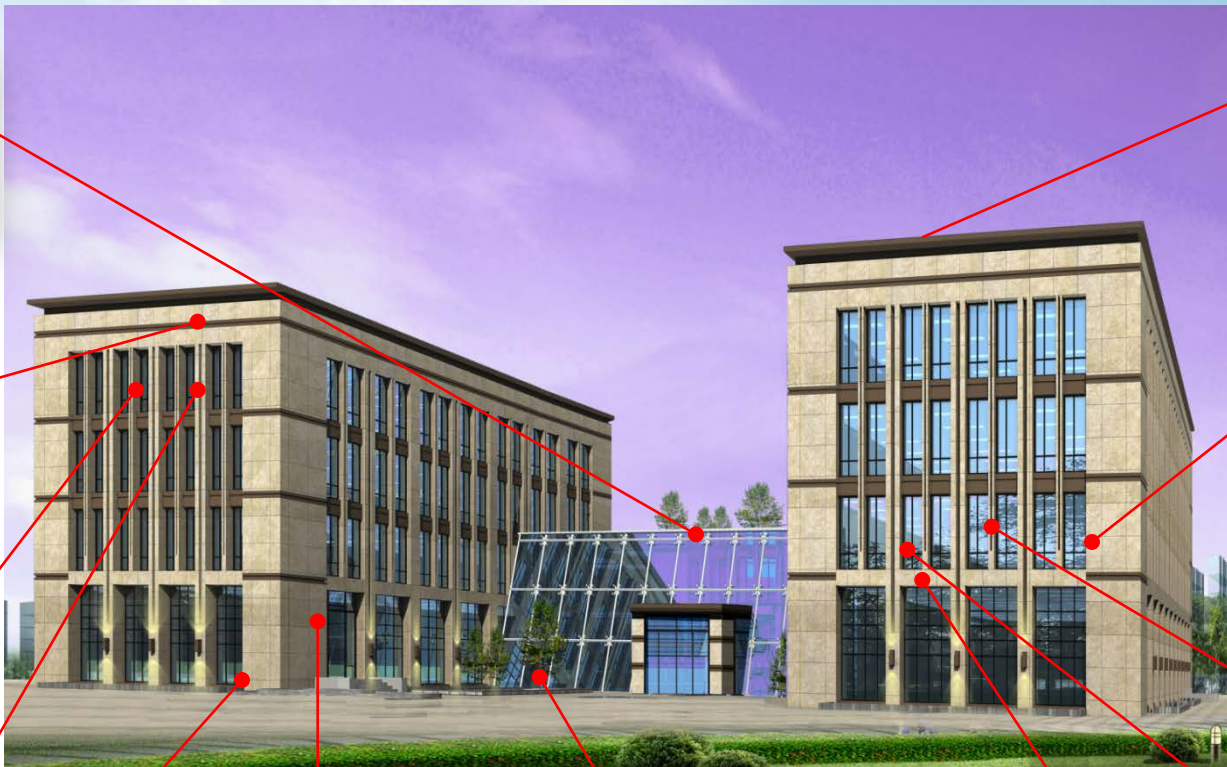
Light pipe system



Air tightness security



Central ventilation system





Key application technology

Research on technology and product of envelop enclosure external thermal insulation system

Application of external thermal insulation accessories

Structural measure of joint structure of building's energy-extensive consumption part and building air tightness

Energy-saving external window, insulation curtains

Building shape coefficient

Utilization of geothermal energy

Photo-thermal utilization of solar energy

Technology display

New building structure

Solar photovoltaic (pv)

Green lighting technology



Envelop enclosure

External wall: 260mm graphite
expanded polystyrene board, Roof
covering: 270mm graphite
expanded polystyrene
board External wall, roof covering
 $K=0.15$, Door and windows $K=0.8$ -
1.0 (Senying Brand), Design without
thermal bridge is adopted.





•Door and windows $K=0.8-1.0$,Gross area: 1161.27 m²

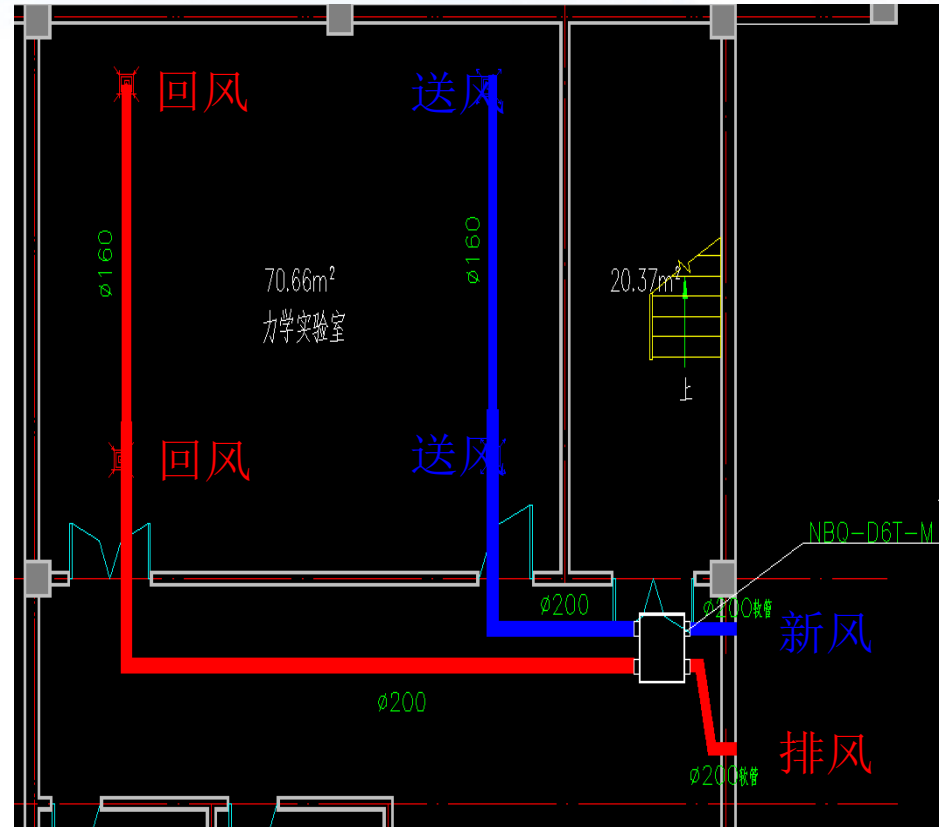
Heattransfer coefficient W/(m ² ·K)	Price(Yuan/m ²)	Configuration	Total price(10 thousand yuan)
1.0	4500	三玻两腔单Low-E充氩气木框	522.5
0.8	6000	三玻两腔双Low-E双暖边充氩气木框	696.6
0.6	8000	三玻两腔双Low-E双暖边充氩气复合框	928.8





Central ventilation system

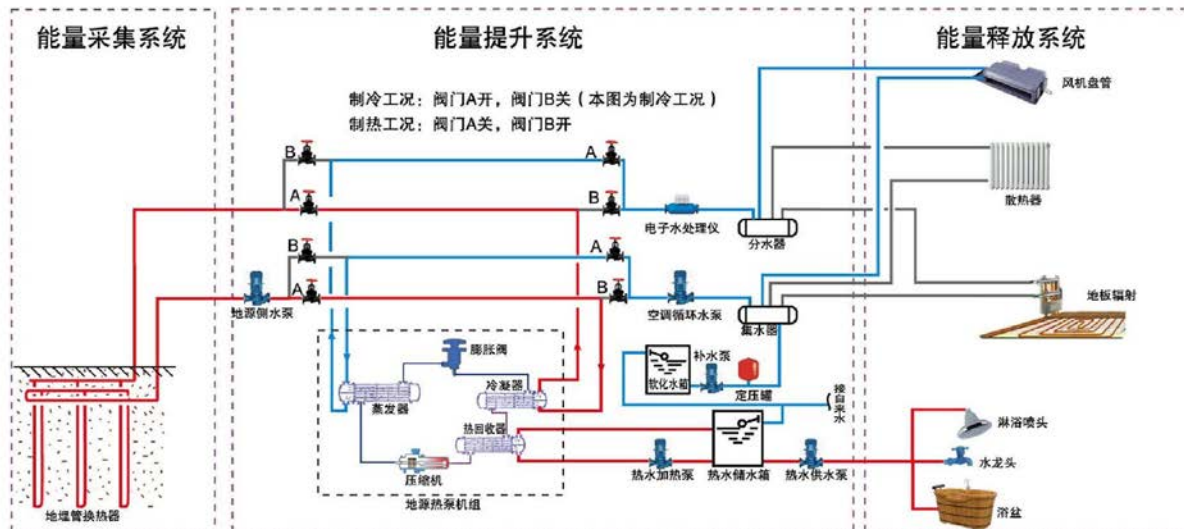
The location of central ventilation system is determined by the architectural design scheme. The main engine of the end of the corridor is mute type heat exchange host with heat recovery efficiency of more than 75%(See attachment 1). Air volume is calculated according to the building area and story height in this project. Ventilation rate designed: ≥ 0.8 times/h.





GSHP and air conditioning system

- The designed unit area cooling load index of Jilin Kelong's research office building is 65w/m^2 , and the unit area heat load index is 20w/m^2 (according to unit power plant).
- The heat exchange amount of buried pipe single well double U is 70W/m (Summer) and 40W/m (Winter). The heat transfer distance of single standpipe is 3-5m generally. If the single well is 100m, the number of the wells is 72 (summer) and 36 (winter). The maximum is 72 at least with the distance of 5 meters.





Solar water heating system

For there are 200 people in the model building, a solar water heating system with 2 tons of water is needed. Building roof lighting is adequate, angle of installation is 35°, hot water temperature is 55°C, the flat plate collector area is 43 m², and 20 collectors are needed.





Green lighting

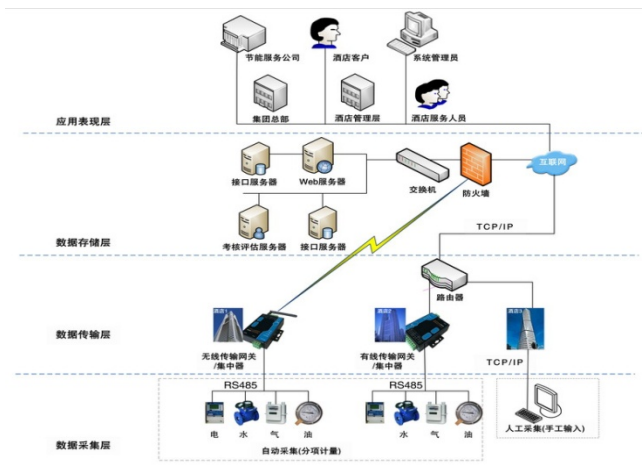
The design and analysis is carried out according to EEL. The subject of this program is a new office building complex which should install the LED energy-saving lighting system according to the requirement of green EEL. Illumination unit is 3/m² and one T5 LED(15w) is needed. The overall building need 2000 T5 LED(15w). Apart from that, 100 LED BULBs(10w) are to be installed in the corridor.





Monitoring platform

Distributed real-time monitoring of energy consumption of the low energy comprehensive office building are carried out by the online management operating platform in the office building of Jilin Kelong Building Energy-Saving Technology Co., Ltd. The main task is to perform the real-time collection, transmission and storage of the data of electricity, water, gas and oil consumption in the office building. And statistical analysis report about key office building's energy consumption is formed based on the job.





2.Schedule





1. The design and adjustment of demonstration project
2. Sensitivity analysis of building energy efficiency technology integration application and the adjustment advices on energy conservation design (US partner should attend)
3. Assessment of other green building indicators
4. The whole process of lean management of the demonstration project construction
5. Design and construction of energy consumption monitoring system
6. Post evaluation of demonstration project (US partner should attend)
7. Refinement of integrated technology system and other achievement



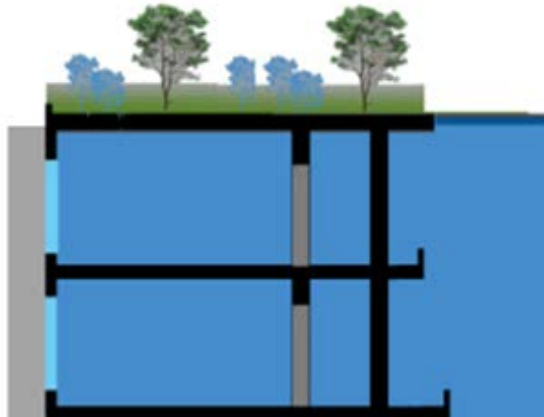


Work Schedule

design cycle: 9 months (Apr 2014- Dec 2014)

Construction period 15 months (Jan 2015- Oct 2015)

Come into service: the end of 2015





3. Next plan





1. Scheme optimization by means of simulation
2. To strengthen the cooperation with U.S.
3. Perfect technical solution



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Thank you for your attention!

Jilin Kelong Building Energy-saving Technology Co., Lt.

