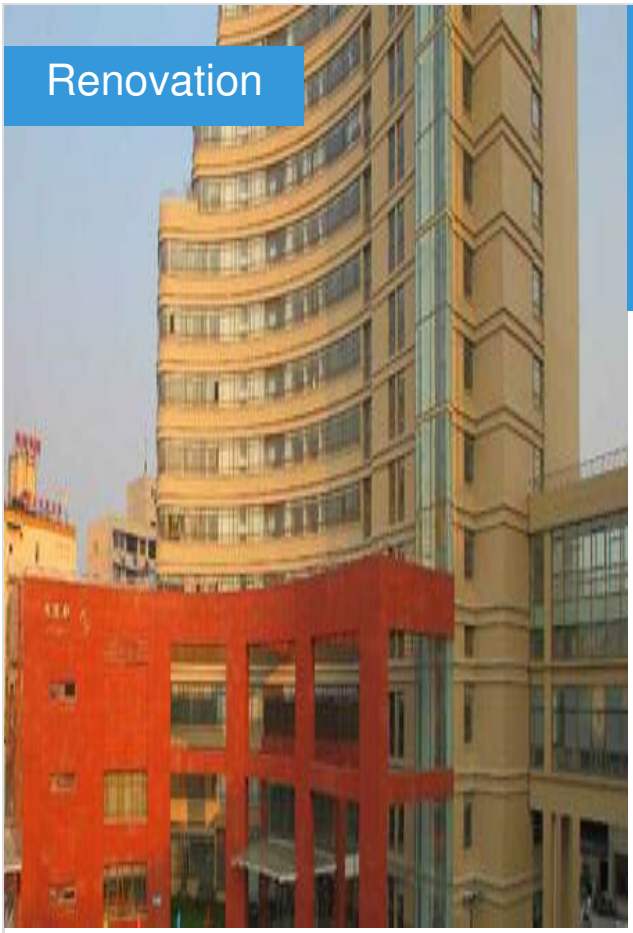
Shanghai Chest Hospital Outpatient Building

by CBTGC CBTGC / 2017-06-15 03:47:25 / Chine / 8713 / CN



Primary energy need :

203.41 kWhpe/m².

(Calculation method : Experimental calculation method (China))

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 : Public or private hospital
Construction Year : 2015
Delivery year : 2016
Address 1 - street : 200000 ,
Climate zone : [Cfa] Humid Subtropical - Mild with no dry season, hot summer.

Net Floor Area : 10 428 m^2 Autre type de surface nette
Construction/refurbishment cost : 52 840 000 ¥
Number of Bed : 2 800 Bed
Cost/m2 : 5067.13 ¥/ m^2

Proposed by :

General information

It is a renovation project, which considers social benefits, economic benefits, and environmental benefits comprehensively to improve users' performance, of an existing hospital building. In order to combine patient's requirements and social requirements, indicator system of this hospital was improved during the renovation project to make patient feel convenient, comfortable and the concept of people oriented.

During the renovation program, focuses were made on the aspects of envelop renovation, water conservation and drainage, energy supply and intelligent management system. Single glazed windows of inpatient building were replaced by hollow double glazing windows. Heating load for air conditioners of the renovation building was decreased by 35.94% as a result of the new envelope. Domestic water needed by the hospital area was supplied by solar water heating system. By analyzing the report of energy consumption simulation, energy consumed by HVAC system was decreased by 20.89%. In addition, water-saving implements were entirely applied in this renovation hospital. In order to ensure safety, high efficiency, energy saving of the equipment in the hospital, improve the management performance, and achieve the sustainable development, intelligent management system were applied in the main functional buildings in the hospital.

Considering the performance recovery system of boilers, solar heating water system and lighting system, 199.3t coal was saved every year and 492.3t/year CO_2, 3.99t/year SO_2 and 1.99t/year smoke dust were reduced every year.

Data reliability

3rd part certified

Stakeholders

Stakeholders

Function : Thermal consultancy agency

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http://www.cbtgc.com/

China Building Technology Group Co., Ltd made detailed schemes and technological analysis for this project and provided relative index, technology solutions and implement solutions based on the cost control of key techniques.

Owner approach of sustainability

As a specific type of public building, hospitals have the characteristic of complex functional layout, complex people, owing many large-scale applications, complex energy consumption systems and continuing to work throughout the year. As a result, hospital buildings require more energy than other public buildings and have a large potential of energy conservation. Hence, it is of great significance for hospital buildings to improve energy management and energy efficiency.

Energy performance contracting method was introduced into the renovation of recovery system of boiler smoke, solar heating water system and intelligent management system to improve enhance the performance of energy management.

As a result of the comprehensive renovation of the hospital, space is reasonable used, waiting areas for visitors are more comfortable, energy consumption was reduced, visual environment of patients was improved.

Architectural description

The intelligent management system realizes digital centralized monitoring and data acquisition of energy consumption.

Energy conservation of external was realized by controlling the window-wall ratio, reducing heat transfer rate of widows, improving shading coefficient and strengthening air tightness.

The hospital has revisited its wastewater treatment system and expanded its capacity to supply water for green area irrigation, garbage flush and so on. Outlet pipes were connected to the pipes of outdoor green areas to ensure the quality of water during supplying.

Under the circumstance of existing underground space, the hospital realized reasonable land using by considering the harmony of environment and hospital area. Two roof greening were applied to form a composite green area in harmony with other grassland in the hospital area.

If you had to do it again?

Oil boiler was replaced by oil & gas boiler in this project. During the process of purchase,

storage, energy conversion, distribution and terminal consumption, normal rate of energy loss is 3~5% 8~12% 3~7%, respectively. In other word, by using gas boiler, the rate of energy consumption is expected to be 13.44%~22.25% and the cost of heating supply is expected to be 0.2403~0.2675yuan/MJ. As a result, cost of heating supply was decreased by 10% after the renovation of valves.

Energy

Energy consumption

Primary energy need : 203,41 kWhpe/m^2.

Primary energy need for standard building : 317,53 kWhpe/m^2.

Calculation method : Experimental calculation method (China)

Initial consumption : 96,22 kWhpe/m^2.

Envelope performance

Envelope U-Value : 0,50 $W.m^{-2}.K^{-1}$

More information :

Energy conservation of external was realized by controlling the window-wall ratio, reducing heat transfer rate of widows, improving shading coefficient and strengthening air tightness. In this project, single glazed windows of inpatient building were replaced by hollow double glazing windows to reduce heat transfer through the external window. According to the design and calculation description, heat transfer of the external wall and external window is 0.50W/(m2•K), and 2.9W/(m2•K),, respectively.

Building Compactness Coefficient : 0,24

Indicator : GB/T 7106-2008

Renewables & systems

Systems

Heating system :

- Others

Hot water system :

- Solar Thermal

Cooling system :

- Fan coil
- VRV Syst. (Variable refrigerant Volume)

Ventilation system :

- Double flow

Renewable systems :

- Solar Thermal

Renewable energy production : 31,58

Energy conservation of 2nd building was realized by applying solar heating water system and reducing the heat requirements of heat transfer machine room. Based on the automation control of water flow, measurement of temperature and flow mass, applying temperature sensor in heating water storage tank and heat collector, the total area of solar hot water system collector is calculated to be about 383.4 m2.

Solutions enhancing nature free gains :
Single glazed windows of inpatient building were replaced by hollow double glazing windows.

Smart Building

BMS :
Intelligent management system was introduced into this project covering major functional buildings in this hospital, having an area of 64,521 m2. The management system is composed of air conditioning system, electro-metering, public lighting, boiler system, monitor of water-collecting well, domestic water system, monitor of elevator. The system can not only realize real-time monitoring but also can realize failure warning.

Users' opinion on the Smart Building functions : Entirely management system is applied in this project to make hospital's service system convenient and effective.

Environment

Urban environment

The area of green space is increased by using composite green floor. Grass brick, water drainage brick and other materials are applied to the parking space to satisfy the road requirement of strength and duration. Also, in this way, rain water can permeate to the underground soil directly.

Land plot area

Land plot area : 1 615,00 m^2

Green space

Green space : 8 317,90

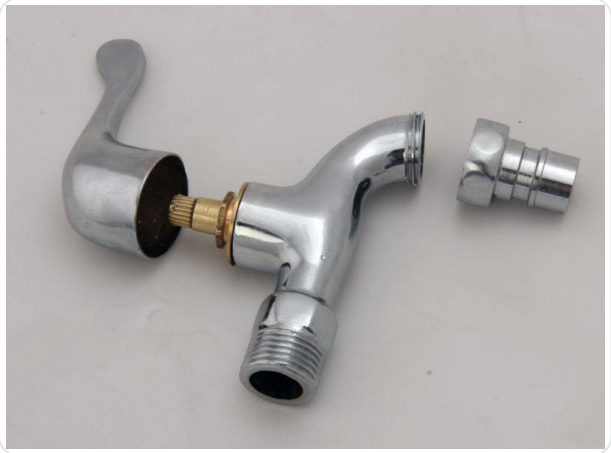
Parking spaces

The hospital has 38 parking spaces, including 5 barrier-free spaces. There are 184 double-layer mechanical parking spaces located on the 1st underground.

Products

Product

Ceramic seal piece faucet



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http://09s4586920.atobo.com.cn

Product category :

The sanitary implements were installed according to the sanitary standards (09S304). Floor drain is made from PVC-U with seal and the height of water seal must more than 50mm. The product performs well under testing pressure and testing conditions.

The product performs conveniently, flexibly and perfect water-saving ability.

Costs

Construction and exploitation costs

Total cost of the building : 52 840 000 ¥

Energy bill

Forecasted energy bill/year : 64,98 ¥

Real energy cost/m2 : 0.01

Real energy cost/Bed : 0.02

Building Environnemental Quality

Building Environmental Quality

- acoustics
- waste management (related to activity)
- water management
- maintenance
- building end of life management
- integration in the land

Health and comfort

Water management

Consumption from water network : 40 442,30 m^3

Water Consumption/m2 : 3.88

Water Consumption/Bed : 14.44

Waste water treatment system was moved and expanded, which is moved from east area of the hospital to the underground of the green area. As a result, handling capacity of the system increased from 800t/d to 2000t/d and automation medicines add application was also applied. Recycled water is reused for green area irrigation, garbage flush and so on. Outlet pipes were connected to the pipes of outdoor green areas to ensure the quality of water during supplying.

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%

As a result of perfect layout design, performance of air ventilation in transition season is great and daylight factor of major functional rooms is 73.62%, which meets the requirement of current national standards GB 50033.

Acoustic comfort : The surrounding sound environment of the hospital meets the 2nd Grade requirement of Sound Environmental Quality Evaluation Standard GB3096-2008. The sound insulation performance of all kinds of doors and windows is 3rd Grade, ranging from 30dB to 35dB. Sound insulation is good.

Carbon

GHG emissions

GHG in use : 47,17 $KgCO_2/m^2/$

Methodology used :
CECS374: 2014

Building lifetime : 50,00

GHG Cradle to Grave : 85,76 $KgCO_2 /m^2$

CECS374: 2014

Contest

Building candidate in the category

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