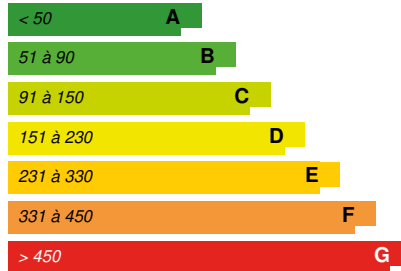


Shanghai Landsea Green Center

Last modified by the author on 24/03/2023 - 11:42



2



Building Type : Office building < 28m
Construction Year : 2018
Delivery year : 2018
Address 1 - street : 280 5 200335 ,
Climate zone : [BWh] Subtropical dry arid

Net Floor Area : 5 724 m² Other
Construction/refurbishment cost : 67 010 000 ¥
Number of Work station : 200 Work station
Cost/m2 : 11706.85 ¥/ m²

General information

Shanghai Lansea Green Centre is an office building with 4 floors above ground and 1 floor below ground, located in Shanghai Hongqiao International Business District, the project site is bounded by Linxin Road to the north, Xiehe Road to the east, Linhong Road to the south and Guangshun North Road to the west, with a site area of 3391m² and a total construction area of 5724.36m², of which 3969.22m² is above ground and 1755.14m² is below ground. The building structure is a frame structure.

The project is designed on the basis of the old building structure for the building facade, indoor functional space, electromechanical and water supply and drainage renovation, and the underground space is reasonably designed to set up an underground garage without crowding the road space. The project started on March 7, 2018 and was completed on October 28, 2018.

The project combines Shanghai's local climate with the building's own characteristics and selects green ecological and energy-saving technologies to match it, such as: using passive house building technology, selecting air-tight exterior windows to improve the performance of the building envelope, and using movable external sun-shading systems to enhance the building's energy-saving performance; adopting energy-saving air-conditioning technologies, such as adopting high-performance inverter-type air-conditioning units and four-effect fresh air systems, as well as setting up exhaust air heat recovery systems and The solar photovoltaic power generation system is mainly used for lighting in the underground garage; the rainwater reuse scheme is adopted, and the treated rainwater is used for greening and irrigation, garage pavement washing and indoor toilet flushing to save water resources, while Class I water-saving sanitary ware is used; high standard sound insulation design is adopted, and three-glass, two-cavity The design of the building is based on a high standard of sound insulation, using three-glass, two-cavity hollow glass to reduce the gap between doors and windows and improve the sound insulation performance, as well as adopting vibration damping measures for equipment to create a quiet office environment.

As a benchmark project in the urban regeneration category, Lanson Green Centre Shanghai is the first office building in the world to be renovated in accordance with the four authoritative certifications of LEED+WELL Double Platinum+Green Building Samsung+BREEAM, and has become a pioneering model in the green office sector. The project has developed a set of integrated technology based on temperature and humidity separation and control of high comfort, low noise and high energy efficiency healthy indoor environment system, including comfort radiation end, healthy replacement fresh air system and high efficiency energy system, the comfort radiation end adopts cold/hot water closer to the ambient temperature to bear the indoor air conditioning sensible heat load, the healthy replacement fresh air system bears the latent heat load, and combined with the high efficiency energy system to achieve indoor environment temperature and humidity independent regulation. This is combined with a high efficiency energy system to achieve independent regulation of indoor ambient temperature and humidity. The indoor vertical temperature difference is only less than 1.5°C, the wind speed at the lower air supply outlet is less than 0.3m/s, the end noise is less than 35dB, and the COP of the cooling and heat source can be increased by more than 15%. In addition, the integrated system technology creates the above-mentioned healthy and comfortable environment while being switchable, adjustable and meterable, avoiding energy waste and encouraging behavioural energy conservation.

The project innovatively adopts a whole process pollutant control model in terms of decoration pollutant control, adopting environmentally friendly decoration materials in the scheme design and realising source control through a professional database, combined with project-specific control, including means such as factory inspection of materials, on-site sampling, node information records and on-site monitoring. The construction process is supervised by a dedicated person who uses international standard certified materials. Indoor air quality testing was carried out after completion and operation, and the results showed that the concentration of formaldehyde, TVOC and other pollutants was more than 20% lower than the national standard "Indoor Air Quality Labeling" GB/T18883, which is comparable to the international most stringent Finnish S1 standard.

Data reliability

3rd part certified

BIM approach

In the construction drawing design stage, the project creates a comprehensive professional BIM model, and uses BIM technology to conduct drawing review, interdisciplinary clash detection, net clearance analysis, and comprehensive analysis of MEP pipelines. BIM technology effectively improves the feasibility of the design and effectively controls the design cost, thereby improving the overall quality of the building and improving the overall level of architectural design.

Photo credit

Shanghai Landleaf Construction Technology Co., Ltd.

Stakeholders

Contractor

Name :

Construction Manager

Name :

Stakeholders

Function : Thermal consultancy agency

<http://www.landleaf-tech.com/>

Landleaf group mainly provided green building technology consultation, overall planning and application for green building certification in projects, and full-process consulting services for indoor decoration pollution control. We also provided and instal

Allocation of works contracts

Macro packages

If you had to do it again?

In terms of green construction: the structures and materials demolished from old buildings were piled up on site, taking up a significant amount of space, and there are dust problems and health and safety issues. Solution: Cooperate with construction waste recycling companies, and optimize construction schedule to minimize the time that building space is occupied by on-sites wastes.

In terms of energy system operation: the lighting control area is too large, resulting in energy waste when only a few people are present after work. Solution: Designate certain areas as "overtime zones" for building users off work. Implement property inspection and management during off-hours.

Building users opinion

The indoor temperature is maintained in the range of 20~24 degrees throughout the year, ensuring a comfortable environment for people. There is no phenomenon of "overheating in winter and overcooling in summer" in typical office buildings due to the "over-design" of air conditioning system. All spaces are free of draft, with even temperature distribution.

After the project was completed, air quality testing was carried out, and all indicators met the most stringent international standards. The indoor air is fresh and clean. There is no feeling of suffocation in a closed meeting room for a long time.

All workstation areas in the project make full use of daylighting. In case of insufficient daylight, individual artificial lighting fixtures can also automatically adjust the brightness to provide comfortable desktop illumination and relieve visual fatigue.

The project is located on the east side of the Shanghai Outer Ring Road, approximately 50m away. The Outer Ring Road experiences heavy traffic, resulting in significant background traffic noise at the project site. Under such conditions, inside the building, the highest noise level of

the offices and meeting rooms adjacent to the traffic line of the outer ring is less than 35dB This ensures that normal work can proceed without any disturbance. Noises generated by air-conditioning equipment inside the room is also unnoticeable.

Energy

Energy consumption

Primary energy need : 75,20 kWhpe/m².

Calculation method : Experimental calculation method (China)

Final Energy : 32,38 kWhfe/m².

Breakdown for energy consumption :

Heating and air conditioning: 19.62 KWh /m² /year

Lighting: 9.40 KWh /m² / year

Elevator: 0.54 KW h /m² / year

Domestic hot water: 2.81 KWh /m²/year

More information :

- Energy-saving retrofit measures

The project adopts a set of comfortable, quite, energy efficient and healthy indoor environment system integration technology based on temperature and humidity independent control, including comfortable radiant terminals, healthy replacement fresh air system, and a high-efficiency energy system. The radiation terminals use chilled/hot water that is closer to the ambient temperature to handle the sensible heat load of indoor air conditioning and adopt an efficient circulating water system.

High-efficiency heating and cooling source unit: The high-efficiency energy system can increase or decrease the cooling/heating capacity of the main unit according to the indoor cooling and heating load requirements, achieving the purpose of energy saving. The cooling and heating sources both adopt energy-saving, efficient, and variable-frequency modular air-cooled heat pump units, with an energy efficiency of 3.2, which is 10.34% higher than the specified energy-saving standard value of 2.9; 3 units are installed from the basement to the first floor, and 3 units are installed from the second floor to the fourth floor. The cooling capacity of each unit is 65kw, and the heating capacity is 66kw.

Partial load energy saving: the air conditioning system on the B1 floor adopts the form of full heat exchanger + fan coil unit, and three total heat exchangers with an air volume of 1000m³/h are installed. The first floor adopts an all air supply and air conditioning system. The second to fourth floors adopt a four-effect fresh air unit + floor-standing fan coil + ceiling capillary, divided into four zones, with four four-effect fresh air units to handle the fresh air. During the transition season, only the fresh air system can be turned on to improve indoor thermal comfort and reduce the energy consumption of air conditioning. At the same time, the fresh air dehumidification unit adopts two-stage evaporation settings, which can be adjusted according to different outdoor environments to avoid energy waste caused by excessive input in capacity.

Exhaust air heat recovery: The four-effect fresh air fan used in the project uses exhaust air condensation to recycle indoor exhaust air, which can effectively recover exhaust air energy and improve the energy efficiency of the unit.

Condensation heat recovery: The four-effect fresh air fan used in the project adopts condensation heat recovery technology. It can reheat the supply air to achieve a comfortable supply air temperature without reducing humidity. At the same time, the fresh air is deeply dehumidified and sent into the room through the fresh air duct, and the indoor side adopts the form of floor air supply to ensure the thermal comfort of the air in the office and improve the indoor air quality.

High-efficiency lighting fixtures: the project adopts high-efficiency energy-saving fixtures, and the lighting of all areas is designed with target values. Various control measures are adopted: timing control measures are adopted in the lobby and basement; induction self-extinguishing control is adopted in aisles and stairwells, and on-site control is adopted in the electric rooms.

Energy-saving elevators: Barrier-free elevators are installed inside the building, and KONE elevators are selected, and the energy-saving efficiency reaches the A-level label.

Initial consumption : 120,00 kWhpe/m².

Envelope performance

Envelope U-Value : 0,38 W.m⁻².K⁻¹

More information :

- External walls and roof

The construction method of the exterior wall of this project is: base cleaning + waterproof membrane + steam anti-condensation layer + bonding layer + 100mm graphite EPS board + FC board grooved auxiliary keel + FC board + glass fiber board + plastering mortar + concrete veneer, insulation layer 100mm graphite polystyrene board is used . The average heat transfer coefficient of the external wall is 0.38W/(m² . K)

The roofing method is (from top to bottom): 50 thick C30 fine stone concrete + dry paving 150g non-woven fabric isolation layer 1 layer + 3.0 thick polyester tire self-adhesive modified bitumen waterproof membrane (SBS) + 20 thick 1:3 Cement mortar leveling + the thinnest 50 thick foam concrete slope leveling + 120 thick B1 grade extruded polystyrene board insulation layer + 3.0 thick polyester tire self-adhesive modified bitumen waterproofing membrane (SBS) + 2.0 thick non-curing rubber asphalt waterproofing Paint + reinforced concrete roof panels. Roof heat transfer coefficient 0.26W/(m² . K)

- High Performance Exterior Windows and Doors

The doors and windows of this project are made of 72 series heat-insulating aluminum alloy window frames, and the east-west glass is made of 5 light-transmitting Low -E+9 argon +5 transparent +9 argon +5 transparent, with a heat transfer coefficient of 1.5 W /(m² .K) ; The north-south glass adopts 6 light-transmitting Low-E+12 argon+6 transparent+12 argon+6 transparent , with a heat transfer coefficient of 1.5 W / (m² .K) .

The door and window settings meet the requirements of GB/T7106-2008 "Graduations and methods of air permeability, watertightness, wind load resistance performance for building external windows and doors", and the airtightness performance is not lower than level 7 (the unit seam length classification index value $1.0 \geq q_1 > 0.5$; Unit area grading index value $3.0 \geq q_2 > 1.5$); wind pressure resistance performance is not less than 8 ($4.5 \leq P_3 < 5.0$); watertight performance is not less than 5 ($500 \leq \Delta P < 70$).

- External window shading

The project is equipped with a fixed external shading structure on the exterior window of the building. The material is 3mm fluorocarbon sprayed aluminum veneer, which is installed along the window edge to form a horizontal and vertical shading effect. The depth of the shading components is (measured from the outer surface of the glass) 700mm . On 2F, 3F, and 4F, all east-west and partly south-facing offices, conference rooms, and negotiation areas are equipped with hollow interlayer roller shutters for intelligent shading. Vertical blinds are used for shading on the north and south sides of the building. The area of intelligent shading with insulating glass interlayer is 372.75 , accounting for 25.64% of the total area of light-transmitting glass. The project is equipped with adjustable shading facilities to reduce harmful solar radiation entering the room, minimize glare, reduce indoor cooling energy consumption, and improve comfort.

Building Compactness Coefficient : 0,20

Indicator : n50

Air Tightness Value : 0,90

Real final energy consumption

Real final energy consumption/m² : 73,30 kWhfe/m².

Year of the real energy consumption : 2 022

Renewables & systems

Systems

Heating system :

- Heat pump

Hot water system :

- Heat pump

Cooling system :

- Reversible heat pump

Ventilation system :

- Natural ventilation
- Double flow heat exchanger

Renewable systems :

- Solar photovoltaic

Renewable energy production : 5,00

Solutions enhancing nature free gains :

- architectural shape

The building is facing south, with a shape coefficient of 0.2 . The overall shape is regular, and it has good energy-saving conditions for the building itself. The window-to-wall ratios of each orientation are below 0.5 .

- natural ventilation

The main window types used in the project are equipped with openable windows on the upper part. The project carried out natural ventilation simulation analysis. The average air change times of main functional rooms on floors 1-4 of the building were 14.2 times/h , 15.2 times/h, 29.5 times/h, and 25.1 times/h. The proportion of areas in the main functional rooms with air exchange rates greater than 2 times/h is 100%, 96.7%, 100%, and 100% respectively. The overall indoor ventilation effect of each floor of the building is good. The project can make full use of natural ventilation during the transition season and reduce the energy consumption of HVAC units.

- Daylight

Each facade of the project has sufficient exterior window design. The project has conducted natural lighting simulation analysis, with a target illuminance coefficient of 3.3%, and the overall compliance rate of the main functional rooms has reached 83.5%.

Smart Building

BMS :

The project integrates eight top-level office intelligence systems, including indoor environment monitoring system, intelligent temperature and humidity management system, intelligent pipeline management, mini-office booth, visitor management, cloud platform data processing, intelligent conference, and energy measurement control. Through the BA building automatic control system and IBMS intelligent management system adopted in the operation stage, the level of buildings intelligent management can be improved, meetings, office coordination and other functions can be better realized. A comfortable, safe, economical, efficient and convenient working environment is created , which improve the intelligence level of the project.

The project installs sensors in key indoor areas to detect important parameters such as indoor temperature, humidity, and air quality, and displays them in real time on the terminal. Air quality monitoring includes PM2.5, PM10, CO2, formaldehyde, TVOC, etc. Thermal and humid environment parameters include indoor temperature, wind speed, and humidity, and the parameters are displayed on the screen for on-site personnel to check and understand at any time. At the same time, it can realize the linkage with the fresh air equipment, and control the air supply volume of the room according to the indoor CO2 concentration. When the CO2 concentration is higher than 800 ppm, the fresh air supply volume is increased to achieve linkage control and ensure indoor air quality.

The project conducts sub-item measurement of various terminal energy consumption and subdivides it into each floor. The statistical data of the smart meter can be remotely transmitted to the IBMS system in real time, and the background operation and maintenance personnel can view the data on the PC or mobile phone.

According to different water uses, the project measures residential water, rainwater (for landscape and outdoor miscellaneous water) and other sub-items, and sets up three-level metering for municipal main management, individual households, and households, and monitors various water use and water quality data.

Users' opinion on the Smart Building functions :

The system is able to collect building energy consumption and various terminal energy consumption operation data in real time, monitor system operation status, realize deviation alarm, fault diagnosis and prediction. It can analyze and calculate real-time operating efficiency, energy efficiency and other indicators. Monthly and annual charts and analysis reports can be generated, supporting data export. The backend can store 2 years of records, making it easy to find historical records. While the indoor environment sensor automatically controls the fresh air system and window drives, it will also transmit the operation log to the backend for recording.

The BMS system greatly facilitates the daily work of the operation and maintenance personnel. It does not need to manually control the equipment system. The system can realize the on-demand allocation of services, achieve optimal energy efficiency, and achieve maximum energy-saving control while meeting normal needs . The automatic data recording in the background also facilitates the management of energy consumption, eliminating the need for manual meter reading, which improves work efficiency and accuracy. The air conditioner and fresh air can be controlled by zones, and the operation and maintenance personnel can control them according to the actual usage of the office building to realize personalized management.

Environment

Biodiversity approach

This project adopts roof greening and three-dimensional greening technology. The area of the green roof is 441.72 , and the main plants are: golden-leaf calamus, Chinese evergreen, spider plant, orchid Panax notoginseng, ivy, tortoiseshell holly, osmanthus, lawn, etc.

The project has set up vertical greening on the facade of the first floor from the south entrance to the east entrance. Climbing plants with strong vitality are selected. As the plants climb, a green wall will be formed in the future, which can enrich the landscape, enhance the biological environment and provide shade.

Mitigation actions on soil and biodiversity :

This project is a renovation of existing buildings, and the development is carried out on the already developed land, which avoids new land development and reduces the adverse impact of building site selection on the environment. The project protects the green space planned in the original site, and protects large trees during the reconstruction process. The main plants planted in the project: golden leaf calamus, Chinese evergreen, Chlorophytum, orchid Panax notoginseng, ivy, tortoiseshell holly, osmanthus, etc. are all local adaptive plants, which help to reshape the suitable ecology of local species and reduce the invasion of exotic species. The project determines the irrigation scheme according to the habits of species to maximize the plant growth. The landscape lighting of the site does not have scattered light beyond the project boundary, and the building facade lighting and lawn lighting are set to be automatically turned off at night, reducing the intrusion of nocturnal creatures. The project incorporates non-toxic maintenance measures to the property operation and maintenance regulations, reducing the use of chemical fertilizers and pesticides, and helping to maintain ecological balance.

Urban environment

Public transit

The project is located in Building 5 of International Business Park, Lane 280 Linhong Road, Changning District, Shanghai, adjacent to Hongqiao Airport, close to the Outer Ring Expressway, with convenient transportation, and the direct distance from the nearest subway station Songhong Road Station (Line 2) is about 1.8 km . The project is equipped with a dedicated shuttle bus that run between the subway station and the project. The shuttle buses are electric minibuses with the signage "Landsea Green Center". The shuttle bus departs at three times during the morning rush hour on weekdays, at noon on weekdays, and at night on weekdays. There are 5 departures in each time period, and the time interval is half an hour. Within 500 meters walking distance from the project, there are two bus stops serving two bus routes: Xinjing 1 and 74. Xinjing 1 has an average of 127 trips on weekdays, and 74 has an average of 120 trips on weekdays.

Facilities

Within 1 kilometer of the project, there are various living service facilities as follows:

Hotels: Shanghai Hongqiao World Trade Ruixuan Hotel, Shanghai Anandi Hotel, Atour Hotel, Shanghai Kingboard Novotel Hotel and other business hotels;

Catering: Fuquanhui, Anadi Restaurant, KFC, Wagas and many other mid-to-high-end business banquet restaurants and light dining restaurants;

Convenience of life: Family Mart, Starbucks, Luckin Coffee and other community supporting businesses;

Leisure and entertainment: Leke 24h gym, dance classroom and other fitness and leisure facilities;

Conference Center: 6 professional multifunctional conference halls, which can accommodate up to 400 people for meetings.

Activities:

The park regularly organizes fire drills, special flower viewing, movie theaters, parent-child activities.

Green area

The IBP Hongqiao International Business Park where the project is located is a comprehensive economic park that features a garden-style and high-tech environment, attracting headquarters of domestic and international companies. It is a rare garden-style economic park in the downtown area of Shanghai. The greening rate of the park reaches 40%, and the plot ratio is 1.3. It was meticulously designed and planned by RIA International Urban Design Research Institute of Japan, with a strong emphasis on incorporating green, environmentally friendly, and energy-saving concepts into the park's landscape design.

Land plot area

Land plot area : 3 391,00 m²

Green space

Green space : 3 372,92

Products

Product

Variable frequency air-cooled heat pump unit

https://www.johnsoncontrols.com/zh_cn

Product category :

The IPLV of partial load energy efficiency significantly surpasses the first level of the national standard. The high-efficiency DC frequency conversion dual-rotor compressor utilizes advanced frequency conversion drive technology to ensure stable operation. Ultra-silence. The stable operating ambient temperature ranges from -27°C to 48°C . Great heating capacity in ultra-low temperature ambiance, high heating efficiency. Pre-defrosting technology ensures reliable operation of heating in winter and provides a steady supply of hot water for the room.



York's air-cooled heat pump system with variable frequency conversion boasts high energy efficiency and maintains exceptional heating performance even in low temperature environments. With a prolonged service life and evident energy-saving advantages, it is an economically sound choice.

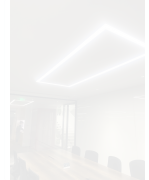
Variable frequency air-cooled heat pump unit

Berlind

<https://www.berlind-tech.com/>

Product category :

low noise, no moving parts, quiet and comfortable. Avoid running in wet conditions, prevent the growth of bacteria, improve sanitary conditions, and provide a high-quality indoor environment. Provide constant indoor temperature and humidity in winter and summer, simple operation management and maintenance, energy-saving operation, energy consumption and cost. Low noise, no moving parts, and quiet operation ensure a comfortable environment. Avoiding use in wet conditions prevents bacterial growth and improves sanitation, providing high-quality indoor air. Consistent temperature and humidity control year-round, along with simple management and maintenance operations, result in energy-efficient performance that reduces consumption and costs.



"The meeting room is equipped with a radiant air conditioning system that operates without visible outlets, providing an imperceptible presence and even temperature distribution. This noiseless and comfortable environment facilitates prolonged concentration during meetings."
--Employees

Four-effect fresh air fan

<http://www.landleaf-tech.com/>

Product category :

Control indoor humidity through direct expansion refrigeration and dehumidification. Automatically regulate the humidity content of fresh air supply, with a summer mode set below 8g/kg and winter mode for humidification when indoor humidity falls below 30%. The system will automatically activate humidification when levels drop too low, but also turn off once they exceed 50%. The humidification function is automatically deactivated upon timer expiration; equipped with high-efficiency mist removal, dual filter settings for primary PM10 filtration and secondary high-efficiency PM2.5 filtration, boasting a filtration efficiency of over 99%.

Variable frequency control technology automatically adjusts the operating frequency of the unit based on the fresh air load, thereby meeting indoor demand and improving energy efficiency ratio. By recovering condensation heat, dehumidifying fresh air, re-heating it through condensation heat recovery, and utilizing exhaust air condensers to recover heat from indoor discharge, the unit's energy efficiency ratio can reach 4.0 or higher.



"The four-effect fresh air unit and multi-indicator sensor are proprietary products that have been developed based on our extensive experience in green building projects. These innovative solutions integrate four technologies to provide customers with efficient, energy-saving, healthy, and comfortable green building solutions. We are thrilled to see our new office utilizing these exceptional products."

--- R&D of Landleaf Technology

Physiological Equivalent Luminaire

<https://www.zumtobel.com/cn-cn/index.html>

Product category : HVAC /

Embedded LED luminaire with a power of 32 W and a high color rendering index (CRI) of 90, boasting an impressive lifespan of up to 50,000 hours. In this project, variable color temperature lamps are utilized to create an environment that caters to the physiological rhythm of the human body while meeting illumination requirements and achieving equivalent physiological illumination levels exceeding 150 EML.

The project focuses on the quality of indoor lighting, creating an office light environment that conforms to employees' physiological laws, enhancing office efficiency and promoting employees' rest and health.



"I prefer working in the communal area on the first floor due to its utilization of equivalent physiological lighting fixtures. This type of illumination automatically adjusts brightness and color temperature based on outdoor light changes throughout the day, emulating natural light and effectively preventing disruption to one's biological clock caused by prolonged indoor exposure. As a result, it enhances sleep quality during nighttime hours."

--Employees

Energy-saving elevators

<https://www.kone.cn/zh/>

Product category :

The elevator achieves Class A energy efficiency rating, with a speed of 3m/s and utilizes traction technology. Additionally, lighting and standby solutions are implemented to ensure the elevator operates in an energy-efficient manner.



Interface renewable Nylon Carpet Module

Interface

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

Product category :

Interface's carpet tiles utilize innovative technology that effectively separates the surface fibers from the backing of nearly any type of carpet. The separated nylon is then transformed into new nylon yarn, while the backing is recycled and repurposed as new recycled backing material. Additionally, the nylon yarn utilized in the Interface carpet is sourced from recycled fishing nets and consists of 100% post-consumer recycled content. Interface's carpet tiles also calculate the greenhouse gas emissions of the product's full life cycle (including extraction and processing of raw materials, manufacturing, installation and maintenance, transportation, and returns and recycling) and offset these emissions through the purchase carbon emission credits.



" The modular carpet from Interface does not require adhesives. It only needs film splicing to be firmly connected together, and it can be attached to the ground without upturning. This installation method is highly convenient and low in loss. Moreover, there are no harmful volatilizations of adhesives or pungent smells of chemicals during installation. The entire construction process is easy."

--carpet installer

Landleaf technology multi-indicator sensor

<http://www.landleaf-tech.com/>

Product category :

High-precision and multi-indicator indoor air quality sensor capable of monitoring CO₂, PM_{2.5}, temperature, and humidity with a CO₂ measurement range of 400-5000 ppm (accuracy: 3%), PM_{2.5} measurement range of 0-500 µg/m³ (accuracy: <15%), temperature measurement range of -20-60 °C (accuracy: ±0.8 °C), and humidity measurement range of 0-99% RH (accuracy: ±4.5% RH). Real-time online monitoring of indoor air quality for 24 hours is available, with the option to upload monitoring data through RS 486 or cloud. The data can be viewed in real time on PC and mobile terminals. This product has acquired CE and RESET certification as well as green building certification approval. It is suitable for both ceiling and wall installation, featuring a three-color halo design that provides real-time indication of different levels of indoor air quality. Additionally, it can be connected with fresh air equipment or purification equipment to automatically process indoor air.



Motorized Mid-mounted louvers

<http://www.shyata.com>

Product category :

High energy efficiency can be achieved by adjusting the louvers to a closed state during summer, effectively blocking direct sunlight and reducing heat radiation. This results in reduced energy consumption of indoor air conditioning systems. During winter, lifting the louvers allows for direct sunlight absorption and increased indoor temperature. In the vertical shading state of the louvers, the overall heat transfer coefficient of the insulating glass is less than 2.2W/m²-K, and the shading coefficient is less than 0.2; when the louvers are retracted, the heat transfer coefficient is less than 3.0 W/m²-K, and the shading coefficient is less than 0.96. This product also features dust-proofing, pollution-proofing, and fire resistance. The louvers require no cleaning and will not ignite or emit dense smoke in a fire.

Costs

Construction and exploitation costs

Renewable energy systems cost : 559 000,00 ¥

Cost of studies : 5 908 000 ¥

Total cost of the building : 67 010 000 ¥

Subsidies : 1 982 950 ¥

Energy bill

Forecasted energy bill/year : 378 000,00 ¥

Real energy cost/m² : 66.04

Real energy cost/Work station : 1890

Circular Economy

Circular economy strategy

Quantified targets for reuse? :

Project preserves the main structure, beams and columns of the old building.

Reuse : same function or different function

Batches concerned by reuse :

- Structural works

For each batch : Reused Materials / Products / Equipments :

- Renewable modular carpet

Supplier: Interface.

Used in office areas and conference room floors. Interface 's modular carpet adopts innovative technology, which can completely separate the surface fibers from the backing of almost any type of carpet. The separated nylon will be converted into a new nylon yarn, and the separated backing will also be recycled into a new one. In addition, the nylon yarn used in the Interface carpet comes from recycled nylon materials from discarded fishing nets, and the proportion of recycled nylon is 100 % . Interface's carpet tiles also calculate the greenhouse gas emissions of the product's full life cycle (including extraction and processing of raw materials, manufacturing, installation and maintenance, transportation, and returns and recycling) and offset these emissions through the purchase certified carbon offset credits .

- Wood

Supplier: Tubaobao

Used in flooring substrates, framing and wood veneers. The Tubaobao wood used in this project is FSC forest certified. The process by which the forest management unit from which the wood comes is audited by an independent third-party FSC forest certification body to demonstrate that it meets the requirements for sustainable management, in accordance with recognized principles and standards, based on the forest management standards established . All production stages of a wood processing enterprises, including the entire chain from transportation, processing to distribution , are certified to ensure that the final products originated from a certified and well-managed forest . The wood is selected from large cross-section and long-dimension lumber, which is dried, toothed and hot pressed in 27 processes for superior stability, durability and recycling.

- Glass partition

Supplier: Maars.

Used in the conference room partition. The Maars partition system used in this project was awarded cradle -to-cradle silver rating . The glass partition system is re-installable, the raw materials can be completely recycled and reused without loss of quality, and the product does not use adhesives or hazardous substances.

Reused materials rate :

Steel: 46.08 t, accounting for 1.9 %

Timber: 51.36 t, accounting for 2.1 %

Gypsum: 80.65 t, accounting for 3.3 %

Glass: 114.68 t, accounting for 4.7 %

Carpet: 0.78 t , accounting for 0.03%

Total percentage of all recycled materials used in the project is 12.03%

Logistics

Storage of materials for reuse in situ (if project concerned by a cleaning/demolition stage) :

- On site, on a dedicated area in a covered location

Environmental assessment

More details on the avoided impacts :

During the project research stage, the overall evaluation of the original building was carried out in order to preserve the original structure and materials of the building and reduce the use of new materials. After evaluation, since the thermal insulation performance of the original building was far from meeting the requirements, and the original functional space did not meet the project goals, the project retained the basic structure of the original building and demolished the original decoration. During the demolition process, in order to improve the subsequent utilization rate of construction waste, the project consciously preserved the integrity of reusable materials during the dismantling process, and classified the demolished construction waste into concrete blocks, glass, steel, wood, etc., so that A lot of cost and time are saved in subsequent material disposal, and construction waste recycling also brings some economic benefits.

The storage of construction waste after demolition occupies a significant amount of space. To ensure efficient use of the area, the project estimated the production of various types of construction waste before demolition and collaborated with recycling manufacturers to arrange the construction period reasonably, thereby minimizing material stacking time

The project also reused the waste in situ, remade the abandoned wood into wooden formwork, and reused the discarded steel to build scaffolding and temporary enclosures.

Economic assessment

Total cost of reuse :6 370 000 ¥

Reuse quantified in the companies' offers? : Yes

Purchasing process for reused materials :

The following 5 types of reusable materials were used in this project:

Steel: locally sourced. Used in structural beams, slabs and columns

Wood: locally sourced. Used in plywood, blockboard

Carpet: locally sourced. Used in flooring in the office area and conference room

Gypsum: locally sourced. Used in ceiling decoration

Glass: locally sourced. Used in curtain wall and interior partition

Circular design

Eco-design :

The first to fourth floors of this project is the main office space. The east and west part of the building spaces are designed as small offices, partitioned by demountable light steel keel plasterboards. The south part of the building is designed as an open office area , partitioned by

decorative landscape cabinets, which facilitate the flexible adjustment of the office area.

Sustainable supply :

Steel: locally sourced. Used in structural beams, slabs and columns

Wood: locally sourced. Used in plywood, blockboard

Carpet: locally sourced. Used in flooring in the office area and conference room

Gypsum: locally sourced. Used in ceiling decoration

Glass: locally sourced. Used in curtain wall and interior partition

Health and comfort

Water management

Consumption from water network : 2 324,00 m³

Consumption of harvested rainwater : 1 001,95 m³

Water Self Sufficiency Index : 0.3

Water Consumption/m² : 0.41

Water Consumption/Work station : 11.62

Indoor Air quality

The project is equipped with a direct drinking water system that meets the hygienic requirements for both direct consumption and domestic use. In order to ensure healthy water quality, the operation team is required not to open the water tank inlet cover at will to prevent secondary pollution of the water quality, clean it once every six months and disinfect once every quarter. During the project delivery, it was verified that the drinking water quality met the requirements in Tables 1, 2, and 3 of the Sanitary Standards for Drinking Water (GB -5749-2006).

The rainwater reuse in this project is mainly used for irrigation, landscape, road washing, basement flushing and toilet flushing, considering the water quality of rainwater and the requirements for water quality. The rainwater of this project must flow through rainwater collection pipe network, pass through the waste flow to reach the rainwater storage pipe and then undergo filtration to remove most impurities. Afterward, it will be subjected to ultraviolet disinfection and monitored for water quality before its destination. The rainwater collected in this project after the whole set of rainwater filtration system, the water quality is: COD cr<20mg / L ; SS <5mg/L , in line with the water quality requirements for various purposes.

Comfort

Health & comfort :

- Average indoor temperature and humidity in typical seasons

Summer :temperature 24°C-28°C; humidity 50%-70%

Winter: temperature 18°C-22°C; humidity 30%-50%

- Hot and humid environment control measures

This project employs a **high-comfort, low-noise, and energy-efficient indoor environment system** based on temperature and humidity division control to promote healthy living conditions., using floor type dry air tray and ceiling radiation system to regulate indoor temperature. The radiation ceiling uses cold/hotwater closer to ambient temperature to bear the sensible heat load. This technology enables precise control of indoor temperature and humidity, maintaining indoor humidity levels between 30% and 60%, while controlling horizontal and vertical temperature difference within a narrow range to prevent uneven heating or cooling, thereby enhancing comfort.

In addition, the radiation terminal and **the healthy replacement fresh air system** can be directly installed on the main structural floor of the building or integrated with interior decoration modules, achieving a high level of integration of green, healthy and environmentally friendly living environment. The fresh air is continuously supplied into the room through an air outlet located on the ground of the main functional area. It first spreads along the floor, and then gradually envelops human bodies as it is heated by working electrical appliances and body heat. In this indoor positive pressure environment , hot exhaust gas exhaled by people is carried away by the fresh air and expelled through upper exhaust port. This method of downward and upward air circulation guarantees that every breath taken by office workers is purified and refreshed, creating an atmosphere akin to a "fresh air lake"

The four-effect fresh air fan utilized in the project employs **condensation heat recovery technology to recover energy from exhaust air, while simultaneously** reheating supply air temperature. This results in a comfortable supply air temperature for dehumidification without cooling. At the same time, the fresh air is deeply dehumidified and delivered into the room through a dedicated pipe, while floor-level air supply ensure thermal comfort and enhances indoor air quality in the office spaces.

- Building user comfort evaluation

Landsea Green Center provides a perpetual spring-like atmosphere, with consistently comfortable temperature and humidity levels throughout the year. The meeting rooms and office areas are free from any unpleasant drafts caused by air conditioning. The room equipped with radiant air conditioning system ensures uniform cooling and heating, minimal temperature gradient from head to toe, negligible noise level, and inconspicuous presence of the air conditioner. During transitional seasons such as spring and autumn, simply activating the fresh air mode can create an optimal indoor environment with high air quality that prevents stuffiness even during prolonged meetings in conference rooms.

Acoustic comfort :

The sound insulation performance of the components meets the high limit standard specified in GB 50118 "Code for Design of Sound Insulation of Civil Buildings", while the indoor noise level conforms to the average value between low and high limits as stipulated in GB 50118 "Code for Design of Sound Insulation of Civil Buildings".

Rubber sealing strips are installed on the top and both sides of the door of the project, with a maximum gap height at the bottom of 6mm. We utilize 120 series thermal break aluminum alloy double-layer composite windows, featuring a three-glass two-cavity hollow glass structure with

Low-E coating and argon gas filling on the exterior side, while adopting 5mm single pane glass for the interior side. The design optimizes the external enclosure structure and improves the sound insulation performance, making the insulation against air-borne sound of the external windows up to 42dB, the door insulation performance of the office unit up to 45 dB and the floor insulation performance of the conference room up to 58 dB.

The interior is equipped with a sound-absorbing ceiling, carpeted floors, and walls in the meeting room covered with sound-absorbing fabric. Office seats are upholstered in cloth and suede materials. Background noise levels in both the meeting room and open office area measure less than 40 dBA, the reverberation time is tested to reach 0.58 s and speech transmission coefficient is > 0.5.

At the same time, vibration damping measures are adopted for the air-conditioning equipment on the basement floor, and rubber vibration damping mats are installed on the unit. Spring vibration isolation is used for the equipment installed on roof. The air duct muffler meets the requirements of the national standard, and the floor-standing fan is equipped with damped spring vibration isolation in the form of mixed steel and concrete hybrid vibration-isolation inertial pedestal.

To create a quiet office environment, a phone booth has been installed in the project to provide a private space for making calls and prevent any disturbance to the surrounding staff.

Visual comfort :

- Daylight

Maximize the utilization of natural daylight by incorporating an atrium and expanding the building envelope's lighting surface area. Employ glass partitions indoors to minimize energy consumption from artificial lighting, creating a more comfortable and organic office environment that aligns with human health and circadian rhythms. Alleviate discomfort caused by artificial light sources.

- Equivalent physiological illuminance lighting fixtures

Energy-efficient lighting that automatically adjusts both illuminance and color temperature, while being linked with the shading system to control the illuminance of different indoor areas, all while ensuring energy savings and comfortable illumination in workspaces.

- Zone lighting

The lighting fixtures in the project utilize zone control, with individual desk lamps installed at workstations to adjust local illuminance and atmosphere according to employees' individual working habits.

-Glare control

In this project, all east, west, and some south-facing offices, conference rooms, and reception areas on the 2nd to 4th floors are equipped with mid-mounted louvers. Additionally, the southern and northern directions of the building are internally shaded by louvers. The intelligent sunshade area with insulating glass interlayer measures 372.75 square meters, accounting for 25.64% of the total light-transmitting glass area. The project is equipped with adjustable sunshade facilities, which effectively reduce the penetration of harmful solar radiation into the room, mitigate glare, lower indoor cooling energy consumption and enhance occupant comfort.

Ergonomic design :

- Barrier-free design

This project adheres to the "Barrier-Free Design Code" GB50763-2012 and relevant regulations set by local authorities. The building is equipped with barrier-free elevators that provide direct access to all floors from the basement level, while barrier-free ramps are available at the entrance. Special accessible parking spaces are designated in the underground garage, and priority parking spots are located at the nearest building entrance. The building is equipped with barrier-free restroom facilities.

- Adjustable desk

The project is equipped with intelligent lift desks that can be adjusted in height between 605 mm and 1235 mm through smart buttons. This feature enables employees to easily switch to standing postures, thereby avoiding prolonged sitting and promoting healthy office habits. Additionally, the desks help prevent lumbar spondylosis and improve blood circulation among employees.

- Ergonomic Office Chair

The project provides all employees with ergonomic office chairs that feature an S-shaped design to support the natural curvature of the human cervical spine. The headrest, seat depth, cushion, armrests, and height are adjustable to accommodate various sitting postures and body types.

- Anti-slip floor

In this project, anti-slip layers have been installed in building entrances and exits, public corridors, elevator halls, bathrooms and toilets. The anti-slip level has reached Bw standard. The outdoor activity area is designed with an anti-slip ground that meets Aw standards. Stair steps are equipped with an anti-slip surface layer that reaches Aw grade.

- Staff Sleeping Cabin

A dedicated sleeping area has been established on the basement level, complete with a specialized sleeping cabin for employee use. This facilitates a comfortable and healthy environment during lunch breaks, thereby enhancing sleep quality.

Quality of life and services

- fitness space

This project establishes a fitness center in the basement, complete with exercise equipment such as treadmills, and includes changing rooms and shower facilities to provide employees with a convenient workout space.

- Staff Sleeping Cabin

A dedicated sleeping area has been established on the basement level, complete with a specialized sleeping cabin for employee use. This facilitates a comfortable and healthy environment during lunch breaks, thereby enhancing sleep quality.

- Public facilities

The project incorporates a restaurant, book bar, leisure space and exhibition area to provide employees with an environment conducive to communication.

- Flexible office

In addition to fixed workstations, the project also features a proportion of flexible office positions. These stations are primarily situated adjacent to the circular corridors on the second and third floors. Combined with the indoor green landscape, these spaces also serve as areas for leisure, negotiations, and small meetings. Employees can select these flexible office positions according to their individual needs in order to adjust their personal working environment and enhance work efficiency.

- Green roof space

This project incorporates a green roof system, with a total area of 441.72 after deducting the functional rooms and equipment. The green coverage is 253.11, accounting for 57.3% of the roof area. The main plant species include Acorus gramineus 'Ogon', Aglaonema commutatum, Chlorophytum comosum, Panax notoginseng orchid, Hedera helix L., Ilex crenata Thunb., Osmanthus fragrans Lour., and lawn grasses. This provides employees with an opportunity to relax in a natural environment.

- Anti-slip floor

In this project, anti-slip layers have been installed in building entrances and exits, public corridors, elevator halls, bathrooms and toilets. The anti-slip level has reached Bw standard. The outdoor activity area is designed with an anti-slip ground that meets Aw standards. Stair steps are equipped with an anti-slip surface layer that reaches Aw grade.

- Barrier-free design

This project adheres to the "Barrier-Free Design Code" GB50763-2012 and relevant regulations set by local authorities. The building is equipped with barrier-free elevators that provide direct access to all floors from the basement level, while barrier-free ramps are available at the entrance. Special accessible parking spaces are designated in the underground garage, and priority parking spots are located at the nearest building entrance. The building is equipped with barrier-free restroom facilities.

- Flexible space partition

The proportion of spaces with flexible partitions in this project is more than 90%.

- Design for all ages

Mother and baby facilities have been established within the project to facilitate breastfeeding for employees.

Carbon

General infos

Building material production and transportation stage: In the design process, this project employs integrated technology to optimize building structure and decoration construction, thereby reducing the use of decorative building materials and minimizing carbon emissions during both the production and transportation stages as well as the construction stage.

Construction and demolition phase: opt for high-efficiency engineering vehicles and equipment, strictly adhere to the "Green Construction Regulations", and minimize energy consumption.

Run phase:

- External shading

The project is located in a hot summer and cold winter area. Considering energy-saving measures in an all-round way, the hollow interlayer roller shutter movable intelligent sunshade is installed on the east and west curtain walls of 2F-4F of the office building. The shading effect can also reduce the air conditioning load and improve comfort. The project is situated in a region with hot summers and cold winters. In order to comprehensively consider energy-saving measures, the east and west curtain walls of floors 2-4 in the office building are equipped with hollow interlayer roller shutter. This shading solution not only reduces air conditioning loads but also enhances comfort levels.

- Envelope Optimization

The enclosure structure of this project is as follows:

External wall: 100mm graphite polystyrene board is used for the insulation layer. The average heat transfer coefficient of the outer wall is 0.38W/(m².K)

External windows: triple-glazed, two-cavity high-performance glass with a heat transfer coefficient of 1.5W/(m².K) and a self-shading coefficient of 0.620.

Through the simulation calculation of comprehensive building energy consumption, the average energy saving rate of the project has reached more than 75.32%.

- Energy Saving Technology in Air Conditioning System

The air conditioner of this project is divided into two sets of systems, the upper and lower systems, and the cooling and heating sources are all modular air-cooled heat pump units, which are placed on the rooftop. There are 3 units equipped for the basement to the ground floor, and 3 units equipped for the second floor to the fourth floor. The cooling capacity of each unit is 65kw, and the heating capacity is 66kw.

The air-conditioning system on the basement adopts the form of total heat exchanger + fan coil unit, three total heat exchangers with an air flow of 1000m³/h are installed. The fresh air ventilator is equipped with initial filtration, carbon, and high-efficiency triple filters. It is of the compressed type and employs top-supply and top-return air supply mode. The first floor utilizes a full-air air-conditioning system with primary return air, featuring a return air concentrated in the aisle and supplemented by fan coil units in some functional rooms during heavy load. The air handling unit is equipped with an initial effect + electrostatic + medium-efficiency filter section, and adopts the air distribution of bottom supply and upper return.

The second to fourth floors are equipped with four-effect fresh air fans, floor fan coil units, and top capillary tubes. These components are divided into four areas and work together to provide a steady flow of fresh air. The four-effect fresh air unit adopts condensation heat recovery technology to send the fresh air deeply dehumidified to the room through the fresh air pipe, when the load is large, the "wet fan coil" mode is used, and when the cooling load and humidity load are low, the "dry fan coil" mode is adopted.

The four-effect fresh air unit utilizes condensation heat recovery technology to deliver deeply dehumidified fresh air into the room through a dedicated pipe. When there is a high load, the "wet fan coil" mode is employed; whereas when both cooling and humidity loads are low, the "dry fan coil" mode is adopted.

- Solar power system

This project employs a solar photovoltaic power generation system featuring a total capacity of 16.5KWp in photovoltaic modules and two 9KW inverters, with an annual photovoltaic power generation capacity of up to 19.8 MWh.

Carbon sink

Local building materials: The cement and steel purchased by the project are all local building materials, and the distance from the factory gate to the project site does not exceed 50 kilometers.

Modular carpet: The Interface tile carpets used in the project are all zero-carbon products, and the product manufacturers offset the carbon emissions of the products in their entire life cycle by purchasing certified carbon credits. (Including extraction and processing of raw materials, manufacturing, installation and maintenance, transportation, and returns and recycling)

Plant carbon sink: The project incorporates roof and facade greening, utilizing species with high carbon sequestration potential to absorb a significant amount of carbon dioxide during the plant growth phase.

Initiatives promoting low-carbon mobility

- Public transport lines

The project is situated in Building 5 of the IBP International Business Garden, located on Lane 280 of Linhong Road in Changning District, Shanghai. It is conveniently positioned adjacent to Hongqiao Airport and close to the Outer Ring Expressway, providing easy access for transportation. The nearest subway station, Songhong Road Station (Line 2), is approximately 1.8 kilometers away. There are two bus stations located within a 500-meter walking distance from the project, which serve two bus lines: Xinjing No.1 and No.74. Among them, Xinjing No.1 operates an average of 127 trips on working days while No.74 runs an average of 120 trips.

- Dedicated shuttle bus

The project is equipped with a dedicated shuttle bus to and from the subway station and the project. The shuttle bus is a new energy minibus, and the vehicle logo is "Landsea Green Center". The shuttle bus departs at three times during the morning rush hour on weekdays, at noon on weekdays, and at night on weekdays. There are 5 departures in each time period, and the time interval is half an hour. The project is equipped with a dedicated shuttle bus, which runs on electricity and provides transportation to and from the subway station and the project site. During weekdays, there are five departures at three different times in the morning rush hour, noon, and night with half-hour intervals.

- Electric Vehicle Facilities

The basement level is equipped with a certain number of charging stations for electric and hybrid vehicles, promoting eco-friendly transportation.

- Bicycle parking lot

The basement level features a bicycle parking garage that can accommodate 20-40 bicycles and is equipped with corresponding maintenance tools. Adjacent to the changing rooms and showers, this bike garage provides convenient facilities for employees to use after their ride.

GHG emissions

GHG in use :50,92 KgCO₂/m²/

Methodology used :

The project owner has provided the necessary information for carbon emission calculation, and a third-party organization, China Quality Certification Center (CQC), has prepared and evaluated the document. The calculation standard adheres to "Building Carbon Emission Calculation and Measurement Standard" CECS 374:2014, as well as references from "IPCC National Greenhouse Gas Inventory Guidelines" (2006) and China's "2005 National Greenhouse Gas Inventory".

GHG before use :715,00 KgCO₂ /m²

Building lifetime : 50,00

, ie xx in use years : 14.04

GHG Cradle to Grave :3 261,00 KgCO₂ /m²

Contest

Reasons for participating in the competition(s)

User wellbeing

The project has been designed in accordance with the national green building three-star, LEED platinum level, WELL platinum level and BREEAM certification. It is a typical demonstration of a green office building. Since its completion and operation, it has received over 100 batches of visitors.

It has established a dedicated green publicity mechanism and engaged professionals to deliver green lectures. Concurrently, it conducted a satisfaction survey among the building's office staff and visitors, with results indicating over 95% satisfaction. This project holds significant potential for promoting green buildings.

This project centers on user needs throughout the design process, creating a healthy, comfortable, and humane office environment. The inclusion of haze-free air quality, zero-formaldehyde materials, direct drinking water access, optimal lighting conditions, and noise control measures all contribute to crafting a "healthy" workspace tailored to users' well-being.

In addition, creating a "comfortable" office environment for users involves providing adequate ventilation and maintaining suitable temperature and humidity levels indoors. Furthermore, this project aims to establish work coffee bars, gyms, ergonomic home furnishings, and employee sleeping cabins in public areas to create a "humanistic" office environment that integrates work and rest for users.

Economic benefits

By establishing a "healthy, comfortable, and humane" office environment, the productivity of users can be effectively enhanced while mitigating physical discomfort caused by external weather conditions and thermal discomfort. Additionally, it can alleviate mental stress induced by noise pollution and surrounding light disturbances during work.

The office environment, which prioritizes the health, comfort, and well-being of employees, has a positive impact on their physical and mental health, work efficiency, business performance, and collaboration. Although difficult to quantify precisely, this impact yields significant economic benefits for enterprises that adopt such an office environment.

Environmental impact

In the design process of this project, comprehensive consideration is given to building energy efficiency, water conservation, material conservation and land conservation. It maximizes the utilization of rainwater resources, adopts recyclable materials in construction, and reduces energy consumption through excellent envelope systems and high-efficiency facilities and equipment.

The overall energy consumption is more than 30% lower than the average value of office buildings in Shanghai, and it fully utilizes renewable energy, thus playing a significant role in promoting energy conservation and emission reduction.

Operability and Demonstration

As a benchmark project for urban renewal, Shanghai Landsea Green Center is the world's first renovated office building to receive four authoritative certifications: LEED+WELL Double Platinum +Green Building Three Stars +BREEAM. It has also become a pioneer in the field of green offices and an exemplary work. The temperature and humidity control-based healthy indoor environment system integration technology utilized in this project exhibits high reproducibility, rendering it widely applicable to both office and residential buildings. By utilizing fresh air to regulate indoor humidity, dry and wet fan coils and localized radiation to adjust temperature, a comfortable, healthy and high-quality indoor environment can be created for users. This not only enhances indoor comfort but also promotes users' work efficiency as well as physical and mental health. At the same time, extending this integrated technology to residential buildings can mitigate the drawbacks of strong air currents, noticeable noise levels, and suboptimal thermal comfort associated with conventional split air conditioning systems. When combined with centralized energy stations (such as ground source heat pumps), energy utilization can be significantly enhanced. While striving to create a people-centric, high-quality, green, healthy and environmentally-friendly living environment that meets the aspirations of the populace for a better life, we must also continue to reduce energy consumption in order to promote sustainable development and alleviate pressure on carbon emissions.

Building candidate in the category



Users' Choice

