TOP TENS

TOP TEN 2018

ENERGY EFFICIENCY PRACTICES FOR THE CHINA BUILDINGS SECTOR

The National Development and Reform Commission of China (NDRC) guided the China Quality Certification Center (CQC) to develop a China TOP TENs Best Energy Efficient Practices list to highlight energy savings practices for the China's buildings sector. The list covers a broad range of building practices including commercial and residential.

Each practices have been weighted using a structured methodology to determine its energy saving and cost achievement, sustainability, originality and innovation, replicability, as well as co-benefits.

How to use the list

Energy consumers, program administrators, developers, designers, and policy makers can use this list to consider the benefits of these practices, while producers of these practitioners can use this list and underlying research to promote their cases in the globally.

China will partner with other countries that also investigated industry practices, including Japan. Getting exposure to the Chinese audiences, for example, can be beneficial for Chinese producers to implement the practices in general, as China is one of the largest industrial markets in the world.

Top Tens Task Group

The Top Tens Task Group was established in 2013 and is managed through the International Partnership for Energy Efficiency Cooperation (IPEEC). China, co-leading with Australia, is together with members including Canada, France, Japan, South Korea, and the United States.

The objective of the task group is to improve energy efficiency globally through better exchange of information about technologies and practices. Members of the task group are developing domestic and international Top Tens lists, with related case studies, to provide practical information for technology users.
These will have broad international relevance and provide a range of comparative case studies in different national contexts.

TOP TEN 2018

ENERGY EFFICIENCY PRACTICES FOR THE CHINA BUILDINGS SECTOR

These are the practices that have demonstrated leading energy efficiencies across the China Industry sector and are innovative or provide other sustainability benefits. The score given is out of 100 possible points.

1
Score: 91.2

The Energy Efficiency Retrofit Case of Guangzhou White Swan Hotel

Guangzhou White Swan Hotel, opened in 1983, is the first five-star hotel in China that designed…read more.

2
Score: 90.7

Near Zero Energy Consumption Demonstration Building Case of China Academy of Building Research

The near zero energy consumption demonstration building of the Chinese Academy of Building Research is...read more.

3
Score: 90.3

The Case of Passive Housing Technology Center of Sino-German Ecological Garden

Passive Housing Technology Center of Sino-German Ecological Garden located in Qingdao City, Shandong Province is…read more.

4
Score:89.7

The Demonstration Case of Chengdu Joy City

Chengdu Joy City is the first pilot project that selected by the planning and design department of…read more.

5
Score: 87.3

The Case of Ultra-low Energy Consumption Public Building of R&D Building in Zhuhai Xingye New Energy Industrial Park

The R&D building of Zhuhai Xingye New Energy Industrial Park located in Zhuhai City, Guangdong province is...read more.

6
Score: 86.0

The Case of Whole Process Management Practice of Near Zero Carbon Emission in Shanghai Hongqiao State Guest Hotel No.9 Building

As demonstration project of Near Zero Carbon Emission of World Bank Shanghai Low Carbon City in 2015...read more.

7
Score: 80.5

China Energy-saving Green Building Science and Technology Museum Case

China Energy-saving Green Building Science and Technology Museum does a comprehensive practice on energy-saving technologies…read more.

8
Score: 80.2

LIHU Park Energy Saving case of CETC China Key System & Integrated Circuit Co., Ltd (58 Institute)

LIHU Park of CETC China Key System & Integrated Circuit Co., Ltd (58) has a building area of 72,000 square meters...read more.

9
Score: 77.3

Energy Saving Lean Management Case of Shun He International Hotel in Shandong

Shun He International Hotel locates in Jinan, Shandong, with the floor area of 40575㎡… read more.

10
Score: 75.8

Intelligent Energy Conservation Retrofit Case of Headquarters Building of State Power Investment Corporation Limited

The case is to install solar cell components on the roof and curtain walls of...read more.

TOP TENS

1 SCORE 91.2

The Energy Efficiency Retrofit Case of Guangzhou White Swan Hotel

Guangzhou White Swan Hotel, opened in 1983, is the first five-star hotel in China that designed, constructed and managed by Chinese own, and has been a special historic building. After the overall retrofit, the energy consumption of the hotel reduced sharply, and the annual energy saving is about 17 million yuan(RMB), and the whole project gained the green building label (2-star). Among them, the average energy efficiency of the air-conditioned refrigeration equipment room is up to 5.91, and energy saving reaches 65.2% compared to the benchmarking before retrofit; the average annual thermal efficiency of the steam boiler system is 92.3%; the heat recovery water heat pump system can utilize the waste heat of air-conditioning processes to meet over 80% of the total annual demand of hot water. Its annual EUI is 121kWh/m2, which is much lower than the constraint value and guidance value under the Standards of China Civil Building Energy Consumption.

Implementation entity Guangzhou Design Institute, White Swan Hotels Co., Ltd

Score and weighting

Indicator	Score
1. Energy saving and cost achievement	
1.1 Energy savings	**13.8/15**
1.2 Cost effectiveness	**9.3/10**
1.3 Prospect	**9.3/10**
2. Sustainability	
2.1 Management factor	**9.5/10**
2.2 PDCA	**9.0/10**
3. Originality and innovation	
3.1 Originality	**8.8/25**
3.2 Innovation	**9.0/10**
4. 4. Transferability/Replicability	
4.1 General applicability	**4.5/5**
4.2 Ease of implementation	**4.5/5**
4.3 Ability to integrate external resources	**4.3/5**
5. Co-benefits	
5.1 Environmental	**6.3/7**
5.2 Social awareness	**2.7/3**
TOTAL	**91.2/100**

Back to China's TOP TENs Best Practices list

2 SCORE 90.7

Near Zero Energy Consumption Demonstration Building Case of China Academy of Building Research

The near zero energy consumption demonstration building of the Chinese Academy of Building Research is the research achievement of the Sino-US Joint Energy Research Center for Clean Energy (CERC-BEE) which was jointly researched, designed and constructed by more than 30 experts from China and the United States, and completed and put into service in July 2014. With total of four floors and building area of 4,025 m2, facing the core issues for the development of building energy-saving technologies in China and upholding the principle of 'passive priority, active optimization, economical and practical', the demonstration building integrated shows 28 world-leading technologies on building energy efficiency and environmental control, and meets the energy consumption targets of "heating supply without traditional energy in winter, cooling energy consumption reduced by 50% in summer and energy consumption of building lighting reduced by 75%, as well as the control indicators reach a 'domestic and international advanced level.

Implementation entity: China Academy of Building Research

Score and weighting

Indicator	Score
1. Energy saving and cost achievement	
1.1 Energy savings	**14/15**
1.2 Cost effectiveness	**8.3/10**
1.3 Prospect	**9.3/10**
2. Sustainability	
2.1 Management factor	**9.7/10**
2.2 PDCA	**9.2/10**
3. Originality and innovation	
3.1 Originality	**9.2/25**
3.2 Innovation	**9.0/10**
4. 4. Transferability/Replicability	
4.1 General applicability	**4.3/5**
4.2 Ease of implementation	**3.8/5**
4.3 Ability to integrate external resources	**4.3/5**
5. Co-benefits	
5.1 Environmental	**6.7/7**
5.2 Social awareness	**2.8/3**
TOTAL	**90.7/100**

Back to China's TOP TENs Best Practices list

3 SCORE 90.3

The Case of Passive Housing Technology Center of Sino-German Ecological Garden

Passive Housing Technology Center of Sino-German Ecological Garden located in Qingdao City, Shandong Province is a public building of passive ultra-low energy consumption. The project has adopted high-performance peripheral protection system, such as heat preservation, door and window and sunshade etc. and high efficiency fresh air heat recovery unit, and reasonably utilizes renewable technologies, such as geothermal and solar energy. The total annual electricity consumption per unit area in 2017 is 29.71kWh/m2. The project respectively gained the Sino-German passive room certification and the China green certification (3-star) and was included in the Demonstration Project of Technologies Plan proposed by the Ministry of Housing and Urban-Rural Development. Besides, it plays an exemplary role on deployment of the passive housing technology in cold regions, and brings good social, economic and environmental benefits.

Implementation entity: Qingdao Passive House Engineering Technology Co., Ltd

Score and weighting

Indicator	Score
1. Energy saving and cost achievement	
1.1 Energy savings	**13.7/15**
1.2 Cost effectiveness	**9.0/10**
1.3 Prospect	**9.2/10**
2. Sustainability	
2.1 Management factor	**9.0/10**
2.2 PDCA	**9.0/10**
3. Originality and innovation	
3.1 Originality	**9.0/25**
3.2 Innovation	**9.2/10**
4. Transferability/Replicability	
4.1 General applicability	**4.3/5**
4.2 Ease of implementation	**4.3/5**
4.3 Ability to integrate external resources	**4.7/5**
5. Co-benefits	
5.1 Environmental	**6.2/7**
5.2 Social awareness	**2.8/3**
TOTAL	**90.3/100**

Back to China's TOP TENs Best Practices list

4 SCORE 90.3

The Demonstration Case of Chengdu Joy City

Chengdu Joy City is the first pilot project that selected by the planning and design department of COFCO Land Holding Limited after it introduced the green development concept of "energy efficiency target management in the whole process". At the beginning of the project, the COFCO land planning and design department and the COFCO project design department jointly defined the energy efficiency targets for the first three-year. Thereafter, the design team continued to co-ordinate the team comprehensive efforts of designing, constructing and operating to ensure effective transmission of energy-efficient control targets among different links. Since its opening in December 2015 to present, the project has achieved the energy-efficient targets for the first three-year -'annual energy efficiency reaches the top 10% ranking in its industry' and 'the rate of power saving ran up to 30%'-ahead of a year, with annual energy cost saving of 5 million yuan (RMB) compared to the projects of the same size. It provides a new operational mode for green construction and operation of China's commercial complex.

Implementation entity: COFCO Land Holdings Limited

Score and weighting

Indicator	Score
1. Energy saving and cost achievement	
1.1 Energy savings	**13.3/15**
1.2 Cost effectiveness	**9.2/10**
1.3 Prospect	**9.3/10**
2. Sustainability	
2.1 Management factor	**9.3/10**
2.2 PDCA	**9.2/10**
3. Originality and innovation	
3.1 Originality	**7.8/10**
3.2 Innovation	**8.2/10**
4. Transferability/Replicability	
4.1 General applicability	**4.8/5**
4.2 Ease of implementation	**5/5**
4.3 Ability to integrate external resources	**4.8/5**
5. Co-benefits	
5.1 Environmental	**6/7**
5.2 Social awareness	**2.7/3**
TOTAL	**89.7/100**

Back to China's TOP TENs Best Practices list

5 SCORE 87.3

The Case of Ultra-low Energy Consumption Public Building of R&D Building in Zhuhai Xingye New Energy Industrial Park

The R&D building of Zhuhai Xingye New Energy Industrial Park located in Zhuhai City, Guangdong province is a multiuse office building with various functions such as office working, meeting and demonstrating. Relying on the research and demonstration of the building key technologies on near zero energy consumption of building energy saving of U.S.-China Clean Energy Research Center, and focusing on energy saving, land saving, water saving, material saving and indoor environment, it makes efforts to build ultra-low energy consumption buildings for hot-summer and warm-winter zone. Its building design energy consumption is 50kWh/（m2·year), which is about 1/3 of the average energy consumption of office buildings in Guangdong Province. According to the testing in 2017, the actual energy consumption is 39.8kWh/(m2·year). At present, this project gained the National Green Building Label(3-star) and platinum-level certification of Leadership in Energy and Environmental Design (LEED).

Implementation entity: Zhuhai Xingye Green Building Technology Co., Ltd

Score and weighting

Indicator	Score
1. Energy saving and cost achievement	
1.1 Energy savings	**13.2/15**
1.2 Cost effectiveness	**8.3/10**
1.3 Prospect	**8.8/10**
2. Sustainability	
2.1 Management factor	**8.8/10**
2.2 PDCA	**8.7/10**
3. Originality and innovation	
3.1 Originality	**8.8/10**
3.2 Innovation	**8.7/10**
4. Transferability/Replicability	
4.1 General applicability	**4.5/5**
4.2 Ease of implementation	**4.3/5**
4.3 Ability to integrate external resources	**4.2/5**
5. Co-benefits	
5.1 Environmental	**6.2/7**
5.2 Social awareness	**2.8/3**
TOTAL	**87.3/100**

Back to China's TOP TENs Best Practices list

6 SCORE 86.0

The Case of Whole Process Management Practice of Near Zero Carbon Emission in Shanghai Hongqiao State Guest Hotel No.9 Building

As demonstration project of Near Zero Carbon Emission of World Bank Shanghai Low Carbon City in 2015, Shanghai Hongqiao State Guest Hotel No.9 Building was entrusted to Shanghai Jianke Building Energy Service Co., Ltd for project setting-up, designing, constructing, final acceptance, operating and other phases of the whole processes of energy-saving management, achieved the objective of the operating power consumption no more than 34.7kWh/m2·a (without plug power consumption) , is equivalent to annual carbon emissions no more than 25kgCO2/m2·a.

Implementation entity: Shanghai Changning District Urban Renewal and Low Carbon Project Management Center; Shanghai Hongqiao State Guest Hotel; Shanghai Jianke Building Energy Service Co., Ltd

Score and weighting

Indicator	Score
1. Energy saving and cost achievement	
1.1 Energy savings	**12.5/15**
1.2 Cost effectiveness	**8.5/10**
1.3 Prospect	**9.0/10**
2. Sustainability	
2.1 Management factor	**9.0/10**
2.2 PDCA	**8.8/10**
3. Originality and innovation	
3.1 Originality	**8.2/10**
3.2 Innovation	**8.2/10**
4. Transferability/Replicability	
4.1 General applicability	**4.3/5**
4.2 Ease of implementation	**4.7/5**
4.3 Ability to integrate external resources	**4.5/5**
5. Co-benefits	
5.1 Environmental	**5.8/7**
5.2 Social awareness	**2.5/3**
TOTAL	**86.0/100**

Back to China's TOP TENs Best Practices list

7 SCORE 80.5

China Energy-saving Green Building Science and Technology Museum Case

China Energy-saving Green Building Science and Technology Museum does a comprehensive practices on energy-saving technologies according to China's cold winter and hot summer regions, has utilized ten domestic and international leading energy saving technologies, such as independent control system of building integrated temperature and humidity, passive ventilation system, renewable energy system etc., which effectively reduces building energy consumption, creates a healthy and comfortable environment and saves building energy up to 72%. China Energy-saving Green Building Science and Technology Museum has been listed as a demonstration project of building energy efficiency and renewable energy utilization by the Ministry of Housing and Urban-Rural Development, which is the first project that has won the LEED-NC platinum-level of America Green Leading, three-star of Green Building Design and three-star of Green Building Operation and other the highest-grade certifications. This museum will be built as the demonstration platform for integrated energy-saving technologies, the demonstration window of advanced green technologies and the education base of development direction of energy saving building, to promote energy conservation and environmental protection.

Implementation entity: CECEP Industry Development Co., Ltd; CECEP (Hangzhou) Environmental Investment Co., Ltd

Score and weighting

Indicator	Score
1. Energy saving and cost achievement	
1.1 Energy savings	**10.5/15**
1.2 Cost effectiveness	**7.2/10**
1.3 Prospect	**8.3/10**
2. Sustainability	
2.1 Management factor	**8.5/10**
2.2 PDCA	**8.3/10**
3. Originality and innovation	
3.1 Originality	**8.0/10**
3.2 Innovation	**8.2/10**
4. Transferability/Replicability	
4.1 General applicability	**4.2/5**
4.2 Ease of implementation	**4.0/5**
4.3 Ability to integrate external resources	**4.5/5**
5. Co-benefits	
5.1 Environmental	**6.0/7**
5.2 Social awareness	**2.8/3**
TOTAL	**85.5/100**

8 SCORE 80.2

LIHU Park Energy Saving case of CETC China Key System & Integrated Circuit Co., Ltd (58 Institute)

LIHU Park of CETC China Key System & Integrated Circuit Co., Ltd (58) has building area of 72,000 square meters, about 1100 employees by the end of 2017. In order to reduce the energy consumption and reduce the cost of operation and management, LIHU Park successively has built rooftop distributed photovoltaic power station and power demand-side management platform, implemented variable frequency transformation of central air conditioning water pump, and built a cloud platform of comprehensive management. By utilizing own technical resources of IoT, has realized the integration and integrated energy management of the above projects through the mobile phone. The project has been completed and put into operation smoothly with annual power saving about 1.1 million kWh, the comprehensive energy saving rate up to 20%, plays an exemplary role and have promotion value. In 2017, the power consumption of unit floor area is 65kwh/m2, and the comprehensive energy consumption of unit floor area is 11.4kgce/m2, both are lower than the average value in the same area.

Implementation entity: CETC China Key System & Integrated Circuit Co., Ltd (58 Institute)

Score and weighting

Indicator	Score
1. Energy saving and cost achievement	
1.1 Energy savings	**11.8/15**
1.2 Cost effectiveness	**8.5/10**
1.3 Prospect	**8.2/10**
2. Sustainability	
2.1 Management factor	**8.3/10**
2.2 PDCA	**8.0/10**
3. Originality and innovation	
3.1 Originality	**7.3/10**
3.2 Innovation	**7.2/10**
4. Transferability/Replicability	
4.1 General applicability	**4.2/5**
4.2 Ease of implementation	**4.0/5**
4.3 Ability to integrate external resources	**4.0/5**
5. Co-benefits	
5.1 Environmental	**6.0/7**
5.2 Social awareness	**2.7/3**
TOTAL	**80.2/100**

Back to China's TOP TENs Best Practices list

9 SCORE 77.3

Energy Saving Lean Management Case of Shun He International Hotel in Shandong

Shun He International Hotel locates in Jinan, Shandong, with the floor area of 40575㎡. This hotel adopts the advanced concepts of energy saving, consumption reduction and emission reduction in design, decoration, equipment procurement and operation management mode, etc. By lean management, the annual rate of energy consumption/10,000RMB of the hotel is reduced from 6.29% to 5.30%, saves 1811 tons of standard coal annually. Shun He International Hotel in Shandong meets the standard of advanced domestic energy saving hotel.

Implementation entity: Shun He International Hotel in Shandong

Score and weighting

Indicator	Score
1. Energy saving and cost achievement	
1.1 Energy savings	**12.2/15**
1.2 Cost effectiveness	**8.5/10**
1.3 Prospect	**8.5/10**
2. Sustainability	
2.1 Management factor	**8.2/10**
2.2 PDCA	**7.3/10**
3. Originality and innovation	
3.1 Originality	**6.2/10**
3.2 Innovation	**6.5/10**
4. Transferability/Replicability	
4.1 General applicability	**4.3/5**
4.2 Ease of implementation	**4.3/5**
4.3 Ability to integrate external resources	**3.8/5**
5. Co-benefits	
5.1 Environmental	**5.2/7**
5.2 Social awareness	**2.3/3**
TOTAL	**77.3/100**

Back to China's TOP TENs Best Practices list

10 SCORE 75.8

Intelligent Energy Conservation Retrofit Case of Headquarters Building of State Power Investment Corporation Limited

The case is to install solar cell components on the roof and curtain walls of the headquarters building of State Power Investment Corporation Limited, adopts energy saving technology of photovoltaic curtain wall. It saves annual energy consumption of 709,000 kWh, is equivalent to standard coal of 233.97t/year, and the comprehensive energy efficiency rate is 15.1%. It is a demonstration project of energy saving and consumption reduction in Xicheng District, Beijing and has widely applicability and promotion value.

Implementation entity: State Nuclear Electric Power Planning Design & Research Institute Co., Ltd

Score and weighting

Indicator	Score
1. Energy saving and cost achievement	
1.1 Energy savings	**11.2/15**
1.2 Cost effectiveness	**7.5/10**
1.3 Prospect	**8.2/10**
2. Sustainability	
2.1 Management factor	**8.0/10**
2.2 PDCA	**8.0/10**
3. Originality and innovation	
3.1 Originality	**7.2/10**
3.2 Innovation	**7.0/10**
4. Transferability/Replicability	
4.1 General applicability	**3.5/5**
4.2 Ease of implementation	**3.8/5**
4.3 Ability to integrate external resources	**3.8/5**
5. Co-benefits	
5.1 Environmental	**5.5/7**
5.2 Social awareness	**2.2/3**
TOTAL	**75.8/100**

Back to China's TOP TENs Best Practices list