



Dow Building Solutions

Dow Building Solutions Leading the Way in Energy Efficiency



Styrofoam™ Case Study and Project Reference

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About Energy Efficiency in China

In a context of growing concern over energy shortage, Chinese government has set goals to foster energy efficiency within the booming construction sector. The target is by 2010 all new buildings in China have to cut their energy consumption by 50%, with large cities by 65%.

- By achieving the energy saving goal, China can save 110 million tons of coal from 2006-2010
- The cost for energy efficiency will not raise house price

China's key priorities on Energy Efficiency are: ensuring energy supply reliability, managing the environmental impact mainly by coal, reducing environmental damage and increasing the efficiency of energy use.

Efficient use of energy is critical to fulfill the projected economic growth in China!

Since traditional building practices often overlook the interrelations between a building, its components, its surroundings and its occupants, buildings consume a lot more resources than necessary and negatively impact the environment locally and globally. Compared to conventional buildings, energy efficient buildings can achieve a customized reduction in energy consumption and create a healthy and comfortable environment for residents.



Sketch map of energy loss ratio in a building

How to reduce the energy loss in a building? The "Tried and True" approaches are:

- **Increase the insulation for the building envelop.** The potential components for insulation upgrade include walls, roofs, basement foundations, basements floors and frame floors. DO IT RIGHT THE FIRST TIME!
- **Reduce air infiltration.** Air infiltration is very costly. Continuous insulation, housewrap, polyurethane sealants and adhesives are products you can use to minimize the costly air infiltrations.
- **Increase the thermal resistance of windows and doors.** Do not let these "open" areas to compromise the total thermal performance.
- **Increase the efficiency of your heating and cooling equipment.** High efficiency equipment will bring energy savings given the above three points are well managed.

In the way of exploring sustainable solutions for energy efficiency construction, Dow Building Solutions plays the leading and exploring role in the industry, combined with global experience and local knowledge, we create the positive changes for today, and make great efforts for future forever avail!



About Dow Building Solutions

Dow Chemical is committed to contributing to China's construction market success. On May 12, 2007, Dow, Berkeley National Laboratory and Chinese Energy Research Institute (ERI) partner to improve energy efficiency and reduce energy intensity in China, to reduce energy consumption per unit of gross domestic product (GDP) by 20% by 2010 upon 2005.

For more than 60 years, Dow Building Solutions has been the recognized global leader in extruded polystyrene insulation. Since developing STYROFOAM™, the original extruded polystyrene insulation, we have continued to build on our foam expertise and technical strengths to provide products and solutions that meet our customer's needs in the building industry.

Today, leveraging the strengths of The Dow Chemical Company as a leading global supplier of chemical and plastic products, Dow Building Solutions offers an extensive line of science-based building envelope solutions. Dow Building Solutions, through these efforts, intends to help you improve the comfort and energy efficiency of your buildings.

Worldwide, STYROFOAM™ extruded polystyrene insulation from Dow Building Solutions, with its distinctive Blue™ color, is the most widely used extruded polystyrene foam insulation in residential, commercial and industrial buildings - for both new construction and retrofit applications! Built on a commitment to its principles of sustainability, Dow continues development in China!





Energy Efficiency Case Study Summary by Dow Building Solutions (DBS)

Here we introduced some insulation case studies in China projects, intend to help you improve the comfort and energy efficiency of your buildings!

Customer Category	Insulation Case Study	Customers' Needs	DBS' Solution - Styrofoam™ Strength
Developer	Prosperous Qiantang, Hangzhou	<ul style="list-style-type: none"> • Good quality EIFS system • Environmental protection • Advanced Installation technology 	<ul style="list-style-type: none"> • Excellent flexibility • High compressive strength • Good dimension stability • Planed surface with good bonding performance
System Provider	Zhongxin the 5th Block, Shanghai	<ul style="list-style-type: none"> • Quality products and solutions delivering energy saving • Meeting high-standard in quality control • Reliable well-tested system with proven application in China and globally • Full compliance with national codes and local regulations • Bringing technology expertise • Promotion of energy management 	<ul style="list-style-type: none"> • Good construction insulation performance • Reduce crack and damage in exterior wall caused by huge temperature change, extend the usage life of the building • Eliminate cold bridge, reduce condensation in the wall, decrease humidity to avoid mould
Owner	China Film Production Base, Beijing	<ul style="list-style-type: none"> • Create a healthy and comfortable environment for residents • Superior quality of wall insulation material, and assure the quality after completion of the project • Like to know more comparative data such as compressive strength and test methods • Products supply in time • Lower operational and maintenance costs in the long run 	Styrofoam™ shows its Superior quality in technical tests. The owner paid close attention to quality, as China Group Film Production Base represents the international image. Finally the owner chose Styrofoam XPS
Architect	China Export/Import Commodity Fair Pazhou Hall Phase II, Guangzhou	<ul style="list-style-type: none"> • Superior quality • Water resistance • Material meets building codes and energy efficiency requirements • Drawing details and technical reference 	<ul style="list-style-type: none"> • Excellent moisture resistance and stable long-term R-value • Protects membrane against weathering, physical abuse and damage • Maintains membrane at a constant temperature, minimizing effects of freeze-thaw cycling • High compressive strength, allowing access of high loads, such as traffic and vehicles
MOC MOC: Ministry of Construction, here we refer to Shenyang Wall Insulation Office	New Riverside Garden Phase I, Shenyang	<ul style="list-style-type: none"> • Set up standard codes of XPS to regulate the market • Safety of the system, especially for the tall buildings • Project reference • System technology training to developers and design institutes to enhance energy efficiency 	<ul style="list-style-type: none"> • Styrofoam was invented by Dow 60 years ago • Superior product quality and service • Advanced technology, innovative solutions • Testimonial projects in China and global • Full compliance with worldwide codes and local regulations • Strength in R&D, training and problem solving, backed by technology expertise



Developers' Concern

Developers increasingly understand and appreciate the fact that energy-efficient buildings are highly competitive with regard to the rising number of residents demanding high-quality buildings and a growing environmental awareness of consumers.





Prosperous Qiantang, Hangzhou

Customer Needs on Wall Insulation

(from the view of developer):

- Good quality EIFS system
- Environmental protection
- Advanced Installation technology

"Since this is the model project of energy efficiency in Hangzhou. Our target is to achieve 60% energy saving, though national standard in Hangzhou is 50%. We adopted the worldwide first class and quality products, Styrofoam™ from Dow Building Solutions (DBS) meets our wall insulation requirements." said the developer.



Styrofoam™ Strength

- Excellent flexibility
- High compressive strength
- Good dimension stability
- Planed surface with good bonding performance

"Styrofoam™ from Dow Building Solutions is CFC free, environmental friendly. This is also one of the reasons why we used Styrofoam XPS. To our satisfied after on-site test, we got the test report of national center for quality supervision and test of building engineering certified that our buildings achieved national standard on building energy efficiency!" said the developer.

Project Background

Project Name	: Prosperous Qiantang, Hangzhou
Developer	: Yitian Real Estate
System Provider	: Hangzhou Green Home Engineering Co., Ltd.
DBS Product	: Styrofoam™ LB 25mm, around 90,000 sqm

Project Profile

- The project consists of 7 buildings, 33 floors
- The tallest residential building with brick surface and EIFS in Zhejiang province
- China MOC Residential Energy Efficiency model project







Zhongxin the 5th Block, Shanghai

Customer Needs on Reliable Partner

- Quality products and solutions delivering energy saving
- Meeting high-standard in quality control
- Reliable well-tested system with proven application in China and globally
- Full compliance with national codes and local regulations
- Bringing technology expertise
- Promotion of energy management



Styrofoam™ Strength

- Good construction insulation performance
- Reduce crack and damage in exterior wall caused by huge temperature change, extend the usage life of the building
- Eliminate cold bridge, reduce condensation in the wall, decrease humidity to avoid mould

"We are proud to cooperate with one of the global Fortune 500 companies – Dow Chemical on XPS to construct energy efficiency buildings. Due to use Styrofoam™, our XPS test report on Heat – Cold cycle meet national standard. Dow Building Solutions assures the product quality and advanced technology." said G.M. Wang of Full Color.

Project Background

Project Name	: Zhongxin the 5th Block, Shanghai
Developer	: Zhongxin Group
System Provider	: Shanghai Full Color Construction Material Co., Ltd.
DBS Product	: Styrofoam™ LB 25mm, around 40,000 sqm
Project Profile	: The project consists of 10 buildings, 18 floors, brick surface

System Providers' Concern

In the field of energy-efficient construction, professional handling of materials and professional application is essential. Badly applied insulation on outer walls, for example, can lead to cold bridges. As these areas will be colder than the rest there is a big risk of condensation and mould, leading to health problems and premature decay of building components. The replacement of damaged components and structures of buildings of buildings of course results in very high costs.







China Film Production Base, Beijing

Customer Needs on Wall Insulation

- Create a healthy and comfortable environment for residents
- Superior quality of wall insulation material, and assure the quality after completion of the project
- Like to know more comparative data such as compressive strength and test methods
- Products supply in time
- Lower operational and maintenance costs in the long run



Why choose Styrofoam™ as wall insulation material?

"Styrofoam™ shows its Superior quality in technical tests. We pay close attention to quality, because the China Group Film Production Base represents the international image. Finally we chose Styrofoam XPS." said Mr. Yu of China Film Group.

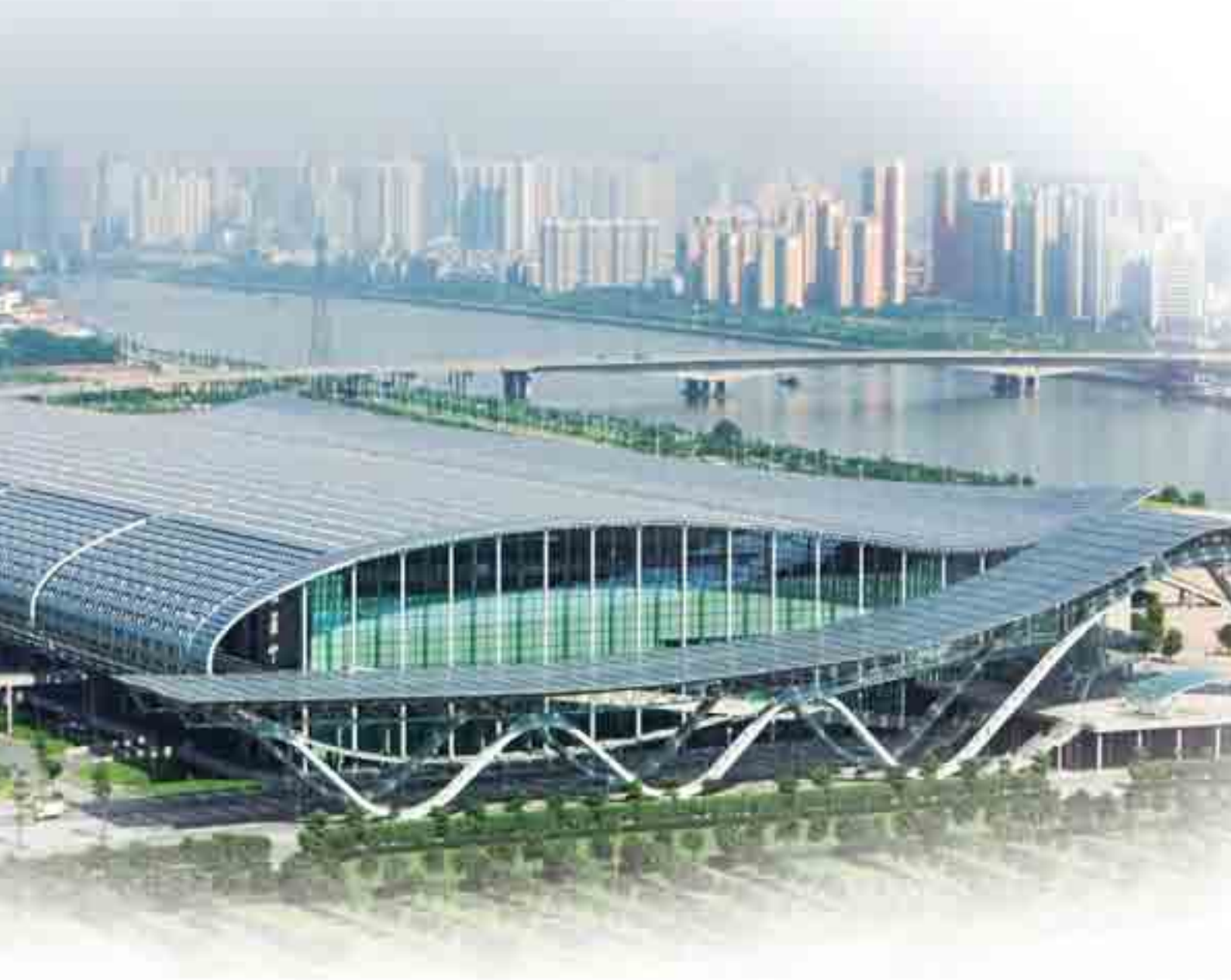
Project Background:

- The project is the largest and most advanced film production base in the country. The total construction area is 1,190 thousand square meters, covering 34 hectares.
- There are altogether 34 buildings, including 16 studios.
- Adopted Styrofoam™ 70mm XPS, about 80,000 sqm.
- Supposed to be completed in June, 2008 and is one of the most important visiting sights during Olympics.
- Location: Yangsong town, Huairou District, Beijing.

Owners' Concern:

With the insulation making up about small percentage of the overall cost of a standard wall, improving the K-values (thermal transmission) only results in minor additional costs. Better insulation pays off in 3-6 years with a guaranteed durability of 25-30 years, during which further maintenance is not required.





Architect' Concern

Architects care about owners' requirements, they'd like to introduce high quality and technology products in the projects, but sometimes, have to leverage with the limited budget, the products with high performance vs price ratio are important to them.





China Export/Import Commodity Fair Pazhou Hall Phase II, Guangzhou

Customer Needs on Roofing

(from the view of architect):

- Superior quality
- Water resistance
- Material meets building codes and energy efficiency requirements
- Drawing details and technical reference

Styrofoam™ for USD Strength

(up-side-down roofing)

- Excellent moisture resistance and stable long-term R-value
- Protects membrane against weathering, physical abuse and damage
- Maintains membrane at a constant temperature, minimizing effects of freeze-thaw cycling
- High compressive strength, allowing access of high loads, such as traffic and vehicles

“Since the project is the 1st class convention center in Guangzhou, the owner required all the material will be the best brand and quality, and to meet energy efficiency requirements, also we’d like to introduce the advanced technology during construction. We consider Styrofoam from Dow as it is the big brand in the world and the quality is guaranteed.” said Ms. Lin, the architect.



Project Background

Project Name	: China Export/Import Commodity Fair Pazhou Hall Phase II, Guangzhou
Developer	: China Foreign Trade Center
Architect	: Design Institute of South China Science and Technology University
General Contractor	: No. 1 Municipal Construction Company, Guangzhou
DBS Product	: DM-Plus 600x2500x25mm, around 60,000 sqm

Project Profile

- The 1st class convention center in Guangzhou
- Adopted advanced technology of Upside Down Roofing





MOC's Concern:

Effective implementation of the policies in daily production and construction is crucial in China. A number of policies and standards concerning energy efficiency are in place, but their application is lagging, efforts should be put on to achieve the energy efficiency target by 2010.





New Riverside Garden Phase I, Shenyang

Customer Needs on XPS

(from the view of MOC):

- Set up standard codes of XPS to regulate the market
- Safety of the system, especially for the tall buildings
- Project reference
- System technology training to developers and design institutes to enhance energy efficiency

Styrofoam™ Strength:

- Styrofoam was invented by Dow 60 years ago
- Superior product quality and service
- Advanced technology, innovative solutions
- Testimonial projects in China and global
- Full compliance with worldwide codes and local regulations
- Strength in R&D, training and problem solving, backed by technology expertise

"The index of energy efficiency standard used in Shenyang area was set up based on comparisons of walls, built of bricks in 1981 and 1982. The heat consumption at that time was 31 kilograms of coal per square meter. The energy-saving target of 65% currently implemented is thus constituted in line with the heat consumption rate. Effective implementation of the policies in daily production and construction is crucial. A number of policies and standards concerning energy efficiency are in place, but their application is lagging, we shall put efforts on this and also we'd like to cooperate with the world Fortune 500 companies like Dow to promote the energy efficiency solutions in the industry." said Mr. Wang, officer of Shenyang MOC.



Project Background

Project Name	: New Riverside Garden Phase I, Shenyang
Developer	: Shenyang Huaxin International and HK Lianmei Properties Co., Ltd
System Provider	: DMT Building Material Co., Ltd.
DBS Product	: Styrofoam™ LB 50mm and 60mm, around 80,000 sqm

Project Profile

The project consists of 4 phases, all adopted Styrofoam EIFS. Phase I had 31 buildings, 5-9 floors, brick surface, finished in July, 2004. It won "Silver" award of model project in Northeast 3 provinces and 4 cities.



Glorious Times, Shanghai



Pudong Century Garden, Shanghai



Jinxu River South, Shanghai



Sheshan Gubei Villa, Shanghai



Yitian Plaza, Hangzhou



Dow Building Solutions



Pujiang Garden, Shanghai



Jinlou Villa, Shanghai



San Hua Tian Yun, Hangzhou



Kunshan Green Land Villa, Jiangsu



Ningbo Bobo City, Zhejiang



Olympics Athletes' Apartment, Beijing



Oriental Plaza, Beijing



Continental Hotel, Shenzhen



Bai Shida Red Trees West, Shenzhen



Dow Building Solutions



Rancho Santa Fe Villa, Shenyang



Yunhen International Plaza, Shenyang



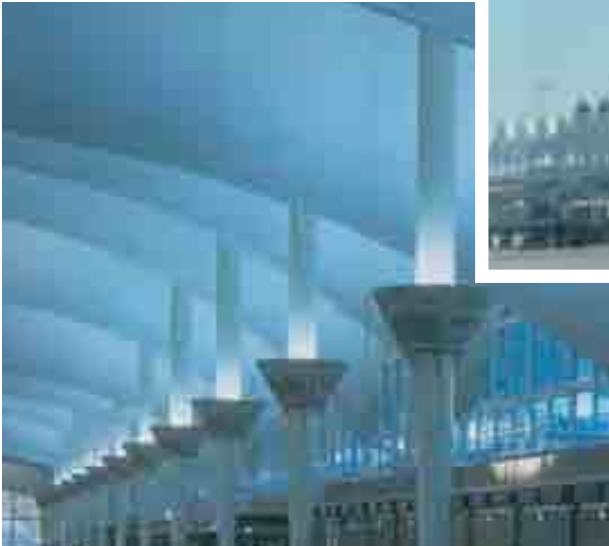
Madarin Garden, Shenyang



New World Garden, Shenyang



Pujiang Garden, Shenyang



Denver Int'l Airport, USA



Smithsonian Institute Washington DC, USA



Sears Tower, Chicago



Staple Center Stadium Los Angeles, USA



Dow Building Solutions



Louvre Museum Paris, France



La Defense Paris, France



Guggenheim Museum, Spain



Daimler Chrysler Berlin, Germany

DBS Project Reference List (Part)

No.	Project Name	Location	Insulation Product	Area (m ²) or (m ³)	Surface or Application	Installation time
1	Hurskey Plant	Shanghai	FM200SL	3,500m ³		
2	Shanghai Glorious Times	Shanghai	Styrofoam LB 25mm	160,000m ²	Brick	2003.12~2005.1
3	Shanghai Rich Gate Building	Shanghai	Ethafoam+FM200BE			
4	Shanghai Changli District No. 17 Building	Shanghai	Styrofoam	20,000m ²	Brick	
5	Pudong Qingyu Plaza	Shanghai	Styrofoam	3,000m ²	Coating	2002.5~2002.12
6	Shanghai Fuhao Garden	Shanghai	Styrofoam	15,000m ²		2002.3~2002.12
7	Raffles Plaza	Shanghai	Styrofoam	10,000m ²		2002.10~2003.5
8	Jinxiu River South Phase II, IV	Shanghai	Styrofoam	90,000m ²	Brick	2003.6~2004.9
9	Shanghai Zhongkai City Light	Shanghai	Styrofoam	20,000m ²	Coating	2004.8~2005.1
10	Yangpu Construction New Garden	Shanghai	Styrofoam	16,000m ²	Coating	2004.6~2004.10
11	Sheshan Gubei Villa	Shanghai	Styrofoam	30,000m ²	Coating	2004.3~2004.12
12	Chuansha Jinlou Villa	Shanghai	Styrofoam	32,000m ²	Coating, Brick	2004.11~2005.9
13	Jin'an New City R6 Area	Shanghai	Styrofoam	32,000m ²	Brick	2005.4~2005.7
14	Jin'an Yige	Shanghai	Styrofoam	10,000m ²	Brick	2005.4~2005.8
15	Pudong Century Garden Phase II	Shanghai	Styrofoam	9,000m ²	Stone	2005.7~2005.9
16	Hai Shang Garden	Shanghai	Styrofoam	70,000m ²	Brick	2005.7~2005.12
17	Jin'nan Block II	Shanghai	Styrofoam	12,000m ²	Coating, Brick	2005.6~2005.9
18	New Time Fujia Garden	Shanghai	Styrofoam	70,000m ²	Brick	2005.8~2006.2
19	Shanghai Yuanhua City	Shanghai	Styrofoam	50,000m ²	Coating	2005.4~2006.10
20	Shanghai Songjiang Hui Xian Ge	Shanghai	Styrofoam	53,000m ³	Stone	2005.12~
21	Shanghai Pudong Jin'nan Block 7	Shanghai	Styrofoam	40,000m ²	Brick	2006.1~2006.9
22	Shanghai Minhang Xindu City Hangtian Garden, Phase I	Shanghai	Styrofoam	12,000m ²	Brick	2006.2~2006.6
23	Shanghai Yongxin Garden	Shanghai	Styrofoam	54,000m ²	Brick, Stone	2006.2~2007.1
24	Shanghai Pudong Software District	Shanghai	Styrofoam	10,000m ²	Brick	2006.6~2006.10
25	Shanghai Wanshun District	Shanghai	Styrofoam	3,000m ²	Brick	2006.8
26	Shanghai Pudong Wai'gao'qiao Xia Bi Road Public House	Shanghai	Styrofoam	6,000m ²		2006.12~2007.1
27	Shanghai Jia'ding An'ting Club Street	Shanghai	Styrofoam	6,000m ²	Brick	2006.12~2007.1
28	Shanghai Minhang Xindu City Hangtian Garden, Phase II	Shanghai	Styrofoam	120,000m ²	Brick	2006.12~2007.4
29	Beijing Oriental Plaza	Beijing	FM500	4,500m ³		1991~2001
30	Beijing Olympic Apartment for Athlete	Beijing	Styrofoam	1,200m ³		2005
31	China Export/Import Commodity Fair Pazhou Hall Phase II	Guangzhou	DM-Plus/25mm	60,000m ²	USD Roofing	2007.1~2007.10
32	Shenzhen Continental Hotel	Shenzhen	SF-B2/25mm	3,000m ²		2006.9~2006.11
33	Shenzhen Xihu Villa	Shenzhen	SF-B2/25mm	4,000m ²		2006.7~2006.12
34	Hong Kong Government Housing Dept.	Hong Kong	Roofmate SL-A/40mm	1,000m ³		
35	Hong Kong Government Construction Dept.	Hong Kong	Roofmate /40mm	2,000m ³		



No.	Project Name	Location	Insulation Product	Area (m ²) or (m ³)	Surface or Application	Installation time
36	Hong Kong Bank Data Centre, Tseung Kwan O	Hong Kong	Roofmate BS/90mm	10,000m ²		2006.10~2006.12
37	Mega Box, Kowloon Bay	Hong Kong	Roofmate BS/75mm	7,000m ²		2006.10~2007.1
38	Hong Kong International Trade & Exhibition Centre, Kowloon Bay	Hong Kong	Floormate 700	700m ³		2007.4
39	HK Disneyland - It's a small world	Hong Kong	Floormate 500	630m ³		2007.4
40	Hangzhou Wangjiang Re-building Area	Hangzhou	Styrofoam	76,000m ²	Brick	2006.7~2007.1
41	Hangzhou Prosperous Qiantang	Hangzhou	Styrofoam	90,000m ²	Brick	2007.5
42	Hangzhou Oriental Ren Garden	Hangzhou	Styrofoam	10,000m ²	Brick	
43	Hangzhou Yitian Plaza	Hangzhou	Styrofoam	10,000m ²	Brick	2006.11
44	Hangzhou Lantin International Garden	Hangzhou	Styrofoam	35,000m ²	Brick	
45	Hangzhou Wutong Apartment	Hangzhou	Styrofoam	30,000m ²	Brick	
46	Ningbo Bindwood City Phase I, II	Ningbo	Styrofoam	25,000m ²	Coating, Brick	2003.8~2005.1
47	Ningbo Bobo City	Ningbo	Styrofoam	50,000m ²	Brick	2006.3~2006.11
48	Ningbo Weike Watershore Garden	Ningbo	Styrofoam	50,000m ²	Brick	2006.11~2007.1
49	Quzhou Jindu West River Moon	Quzhou	Styrofoam	43,000m ²	Brick	2006.9~2007.1
50	Suzhou Jia' duo' li Garden	SuZhou	Styrofoam	8,000m ²	Brick	2004.12~2005.03
51	Kunshan Greenland International Garden	Kunshan	Styrofoam	20,000m ²	Brick	2006.4~2007.1
52	Nanjing Fenya Garden	Nanjing	Styrofoam	2,000m ²	Brick	2003.2~2003.12
53	Nanjing Xianglong Apartment	Nanjing	Styrofoam	4,600m ²	Coating	2004.3~2004.12
54	Qingdao Navy Marine Officer Apartment	Qingdao	Styrofoam	3,000m ²	Coating	2003.3~2003.10
55	Xi'an Spaceflight Technology No. 11 Institute	Xi'an	Styrofoam	20,000m ²	Brick	2004.3~2005.1
56	Lanzhou Railway Group General Building	Lanzhou	Styrofoam	30,000m ²	Coating, Brick	2003.7~2003.12
57	Shenyang New World Garden Block D, E	Shenyang	Styrofoam 60mm	Block D EIFS-93,000m ² USD Roofing-96,000m ²	Coating, Brick USD Roofing	Block D- 2003 Block E-2007.7-2007.9
58	Shenyang Shanghai Garden Pujiang District	Shenyang	Styrofoam 40mm, 50mm	93,000m ²	Brick	2004.8~2005.1
59	New Riverside Garden Phase I-IV	Shenyang	Styrofoam 50mm, 60mm	260,000m ²	Brick	2004.7, 2005.12, 2006. 7
60	Wenlai Zun Di	Shenyang	Styrofoam	11,000m ²	Coating	2003.12
61	Madarin Garden	Shenyang	Styrofoam 30mm, 50mm	54,000m ²	Coating, USD Roofing	
62	Yunhen International Plaza	Shenyang	Styrofoam 50mm		Coating	2005.10
63	Shenyang Rancho Santa Fe Villa	Shenyang	Styrofoam 100mm	21,000m ²	Stone	2006.12
64	Sunshine Fashion City	Shenyang	Styrofoam 50mm, 60mm	5,000m ²	Brick	2006.10
65	Crystal City Club	Shenyang	Styrofoam 60mm	3,000m ²		2007.7-2007.8
66	MGM Macau Casino	Macau	Roofmate BS/50mm	32,000m ²		

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