

Nordic home with high export potential --Market study for Nordic home in China

General Report

Air0 Ltd.
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1 Project Introduction

Background

- Air0 has conducted this market study for Nordic Built Project in order to establish an overview on China's green building market based on Nordic Home concept and application. The aim is to identify the market areas with the greatest potential for business cooperation between China and Nordic countries in conjunction with Germany, focusing on villa, townhouse, and apartment.
- Ten Nordic Companies: Rockwool insulation products, Velux roof windows, Wingreen Windows and doors, Visility home automation, Ecovent ventilation solution, NIBE heat pump, Rehau floor heating, HTH Kitchen and bathroom, Vola Armatur for kitchen and bathroom, Air0 for air purifier have participated in the study as the representatives of Nordic advanced expertise/equipment manufacturers in the field.

Objectives and Scope of Work

- Objective: The market study provides an overall introduction to the current economy trend in China, legislation and policy framework, technical parameter requirements, decision making structures, generic technology background, major suppliers and competitors, customers, barriers and opportunities, and so on.
- Scope of Work: A general report has been prepared to give an overview of different aspects of China's green building market. The report is made for participating company to outline the market indications for relevant field of interest. A market strategy for Nordic Home on how to enter a specific market will be discussed in the study.

2 Overview of Green Buildings Market in China

2.1 PEST Analysis

In this global world, where companies are constantly relocating themselves, managers must understand certain important aspects of the new regions or countries where their companies are planning to expand the business. This understanding can be reached with the use of PEST Analysis.

The PEST analysis provides a guideline for analyzing how attractive a certain region might be, and it also helps companies to evaluate different environmental factors within that particular region.

PEST is an acronym for the Political, Economic, Socio-Cultural and Technological.

2.1 PEST Analysis

2.1.1 Political

China has become an industrial powerhouse, lifted hundreds of millions of citizens out of poverty, and created a growing middle class with rising levels of prosperity (Beebe et al., 2013). World Bank predicts that if the trend continues, China will have attained the largest economy in the world by 2030.

The progress, however, comes to a high sacrifice of environment, e.g. hazard weather (PM2.5), the polluted water resources, high carbon emission, climate change, etc. China is facing the energy production transformation stage. Especially in the '*United Nations Climate Change Conference 2015*', the president Mr. Xi Jinping has addressed the importance of green building development in China.

A shift in government policy towards green building and a (still) huge construction market are creating tremendous opportunities for companies with the know-how and technology to provide the solutions China needs

2.1 PEST Analysis

2.1.2 Economic



Milestones of the Economic Development of China (Source: EU SME center)

2.1 PEST Analysis

2.1.3 Socio-Cultural

- As the improvement of Chinese economy and people's income level, Chinese people gradually have higher payment capability for houses.
- Population: 1.5 Billion people will cause significant impacts on business. China has a huge population, which could form huge demand for houses.
- Positive attitude towards foreign products, especially Nordic design and high quality products
- Because of the serious air pollution, people has huge demand for the indoor clean air.
- The trend for young people: more awareness for the environment protection and energy saving for the world, which encourages for the green houses.

2.1 PEST Analysis

2.1.4 Technological

- Green buildings definition: Environmentally sustainable buildings, designed, constructed and operated to minimize the total environmental impacts

- As is seen in current society in China, internet and technologies has been witnessed rapid development and had been massively applied to housing industry in the society

- Unique selling point for Nordic Home:
 - Modular industrialized steel and wood construction
 - Scandinavian design
 - Green concept
 - Healthy indoor climate also taking care of pm 2.5
 - High quality (material and construction)
 - Construction time short on site
 - Flexible housing solution (tailer – made end user (configurator))
 - Low ownership costs (utility and maintenance cost)

2.1 PEST Analysis

Conclusion:

Positive drivers	Negative drivers
<ul style="list-style-type: none">• Environmental pollution• Energy efficiency drive• Changing energy economics• Transformation of real estate industry• Rising public awareness and disposable incomes• Policies and subsidies	<ul style="list-style-type: none">• Higher upfront costs• Non-guaranteed quality of green building materials• Lack of experienced designers, engineers, and architects• Government targets• Conflicts of interest between builders and owners

2.2 Legal Framework

2.2.1 Laws

Law	Effective Date	Note
Energy Conservation Law of the People's Republic of China	1-Apr-2008	
Law of the People's Republic of China on Prevention and Control of Water Pollution	1-Nov-1984	Revised on May 15 th , 1996 and June 1 st , 2008
Law of the People's Republic of China on the Prevention and Control of Atmospheric Pollution	1-Jun-1988	Revised on August 29 th , 1995 and September 1 st , 2000
Water Law of the People's Republic of China	1-Jul-1988	Revised on October 1 st , 2002
Environmental Protection Law of the People's Republic of China	26-Dec-1989	Revised on January 1 st , 2015
Law of the People's Republic of China on the Prevention and Control of Environmental Pollution by Solid Waste	1-Apr-1996	Revised on April 1 st , 2005
Cleaner Production Promotion Law of the People's Republic of China	29-Jun-2002	
Law of the People's Republic of China on Environmental Impact Assessment	1-Sep-2003	

2.2 Legal Framework

2.2.2 Regulations

Regulations	Effective Date
Residential Building Energy Saving Regulation	1-Oct-2008
Public Building Energy Saving Regulation	1-Oct-2008
Construction Project Safety Production Management Regulation	1-Feb-2004
City Real Estate Development Management Regulation	20-July-1998

2.2 Legal Framework

2.2.3 Standards For Green Buildings

Standards	No.
Pubic Building Energy Saving Design Standards	GB50189-2015
Residential Building Green Design Standards	JGJ/T 229-2010
Summer Hot Winter Cold Region Building Energy Saving Design Standards	JGJ 134-2010
Indoor Air Quality Standard	GB/T 18883-2002
Measurement and Evaluation for Efficiency of Building Ventilation Standard	JGJ/T 309-2013

2.2 Legal Framework

2.2.3 Standards For Green Buildings

Building Research Establishment Environmental Assessment Method (BREEAM) was the first standard, set up by Building Research Establishment (BRE), a British government research foundation. BREEAM has found an important market in the UK, but it is not a leading standard in China.

LEED in China

The LEED standard was established by the USGBC, a non-profit organization whose membership includes major construction and construction materials companies in the United States. Formed in 1993, USGBC to date has issued three versions of its LEED standard (1998, 2002, and 2009). The standard encompasses a broad range of construction areas.

Chinese 3-Star rating system (The Ministry of Housing and Urban-Rural Development) The 3-Star system incorporates two categories (residential and public buildings) and takes into account a different set of criteria. Local governments have made adaptations to the standard, depending on the local environmental and climatic circumstances.

2.2 Legal Framework

Chinese 3-Star rating system is presented:

Building types

Whereas residential buildings are made of apartments, public buildings consist of offices, shopping centres, hotels, schools, and hospitals.

Rated items

- Land savings and outdoor environment;
- Energy savings and utilisation;
- Water savings and utilisation;
- Material savings and utilisation;
- Indoor environment;
- Operation and management.

Rating checklist

Criteria and weighting differ for public and residential buildings. In public buildings, more weight is given to energy and material savings, while the standard for residential buildings places greater importance on urban land saving and outdoor environments.

History	MOHURD (Ministry of Housing and Urban-Rural Development), 2006
Organization type	Governmental
Evaluation target	Public (including commercial, hotel and government-owned buildings) and residential
Application	China
Level of certification	1 star 2 stars 3 stars
Credit categories	<ul style="list-style-type: none"> • Land savings and outdoor environment • Energy savings • Water savings • Materials savings • Indoor environmental quality • Operations and management

3 Market Analysis

3.1 Market Definition

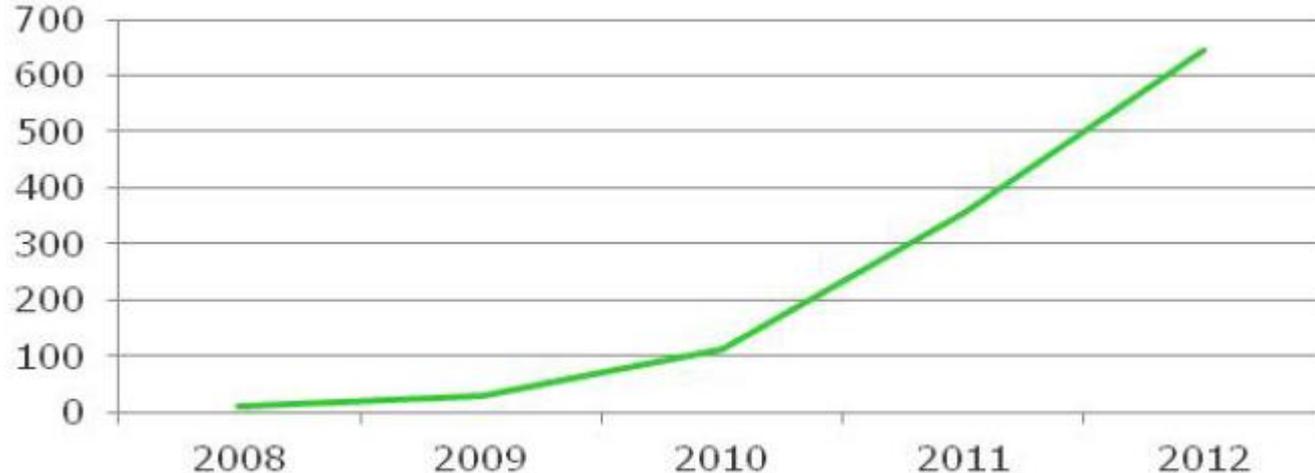
Green Buildings: Environmentally sustainable buildings, designed, constructed and operated to minimize the total environmental impacts

Green building / construction component: Designed to reduce the energy load of a building and/or uses less energy to make than other products in its class – should be compliant with energy efficiency protocols.

- Products: 1) A wide range of products are used in construction; 2) Systems bring functionality to the building; 3) Measurement, control, and management systems.
- Services: 1) Design; 2) Consultancy; 3) Renovation; 4) Recycling.
- Energy: 1) Energy generation; 2) Energy storage

Market Trends

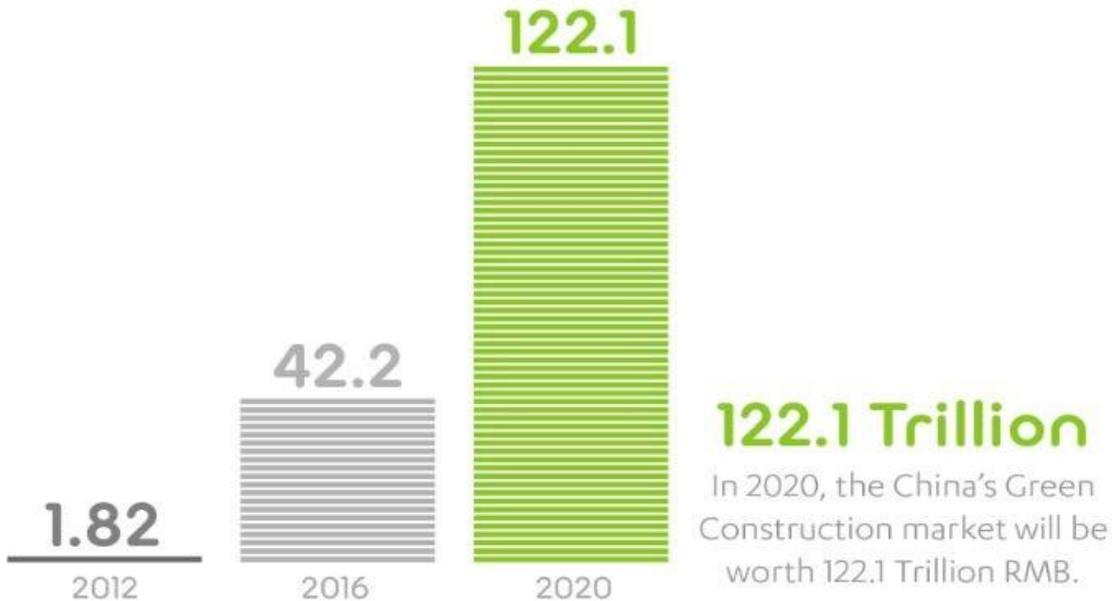
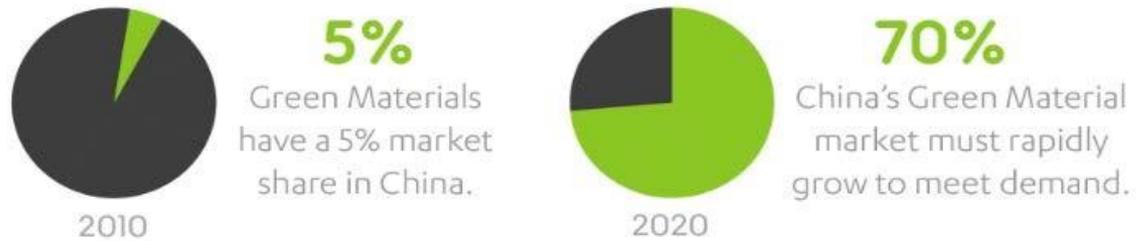
- Since the introduction of the Chinese Green Building Standard in 2006 and the government's consequent pressure to build according to these norms over the past 5-10 years. This has led to significantly higher growth rates for project developers applying for green building certification.



Accumulated No. of China Green Buildings Evaluation Standard Certified projects

Source: Source: China Bureau of Statistics

Market Trends



Source: blog.gigabase.org

3.3 Financial Impact on Green Buildings

3.3.1 Cost of green buildings

The cost of green building, though declining in proportion to lifecycle costs, is still significant. A study showed the extra cost per square meter, based on the Chinese 3-Star standard:

	1-Star (CNY/m²)	2-Star (CNY/m²)	3-Star (CNY/m²)
Public green building	45	176	320
Residential green building	63	131	219

Source: Tsinghua University, 2012

3.3 Financial Impact on Green Buildings

3.3.2 Subsidies and policies

- The Chinese national government intends to subsidise an estimated 40–50% of the additional building costs through a series of regulations and policies that are rapidly changing and upgraded, as a result of lobbying in the capital. Subsidies go straight to public buildings and buyers of residential units.
- Several local authorities (mostly first- and second-tier cities) will also contribute subsidies or adjust building regulations, further bringing down the extra cost of the green building certification.
- Apart from the welcome financial subsidies, the government is luring real estate developers involved in residential projects with a range of other measures, in which green targets are presented as a bonus or even an absolute condition, e.g. access to land; access to bank loans; and reduced building restrictions.

(Source: EU SME Center)

3.4 SWOT Analysis of Nordic Home

One of the most effective ways of identifying and planning the business in the green building market is in-depth analysis of the following factors by SWOT Analysis:

S	Strengths <ul style="list-style-type: none">• Innovative technology and products• Unique and comprehensive solution• Nordic brand and good reputation• Taking care of the air pollution PM2.5• Rich green building experience, knowledge and experts pool	W	Weaknesses <ul style="list-style-type: none">• Gap in experience, knowledge of the Chinese local business & market• Geographical factors, long distance & time zone for fast response and action• Higher upfront costs
O	Opportunities <ul style="list-style-type: none">• Chinese huge potential GB market• Increasing business sector• Wealthy people, buying power• Government support, policy and funding	T	Threats <ul style="list-style-type: none">• The economy grows pace decreasing• Strong competition• Competitors' new products• Products quality varies in the market• Conflicts between owners and builders• IPR risks

4 Industrialization Houses in China

4.1 Development history of housing industrialization in China

1970s

Prefabricated concrete component application and research was more common, the research and development of concrete large slab building system and light frame plate building system was conducted, and the steel structure gird began to be used in the large span space structure.

After 2000

Prefabricated housing obtained the development opportunity again, with China Vanke (2003) as the representative, a group of companies began using prefabricated housing for real estate development, and the governments at all levels energetically advocated green building construction, vigorously promoted prefabricated construction, and China's housing industrialization has stepped into the development period.

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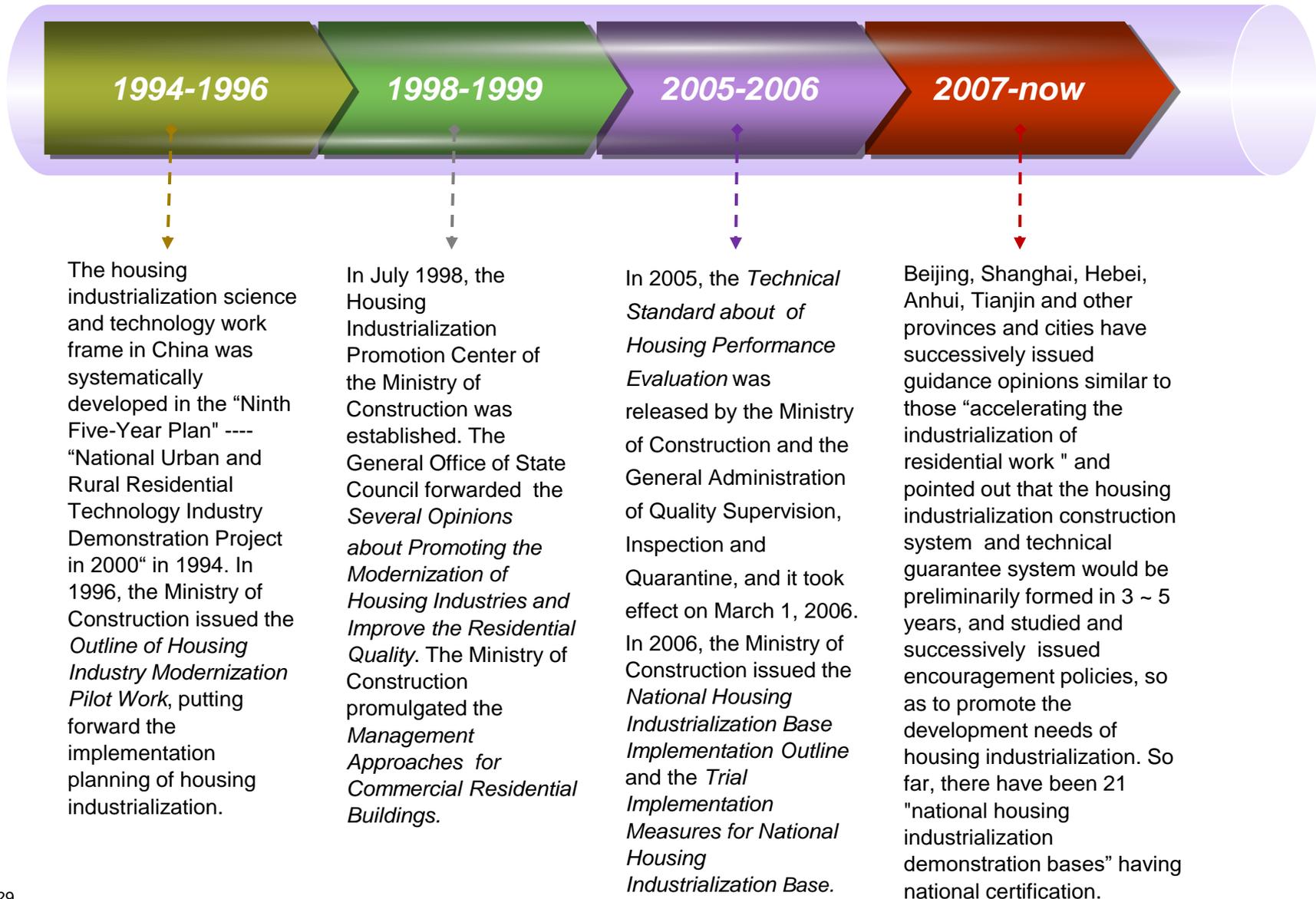
02

1980s-1990s

Because the integrity, shock resistance, and wall body watertightness problems are not solved, as well as the large stacking area, economy problems and etc, the prefabricated concrete components were still used in some northern regions at the end of the 1980s. In this period, it was mainly cast-in-situ concrete building.

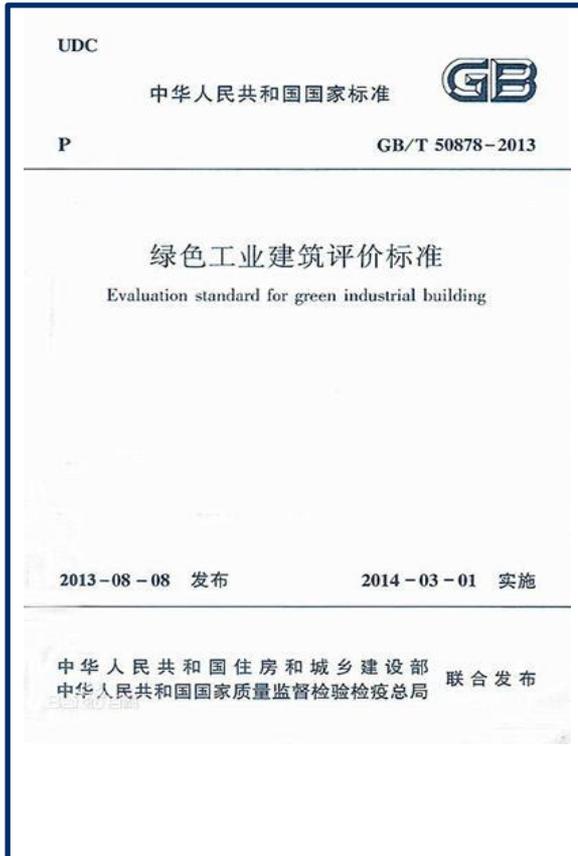
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4.2 National policy and industrial standard of housing industrialization



4.2 National policy and industrial standard of housing industrialization

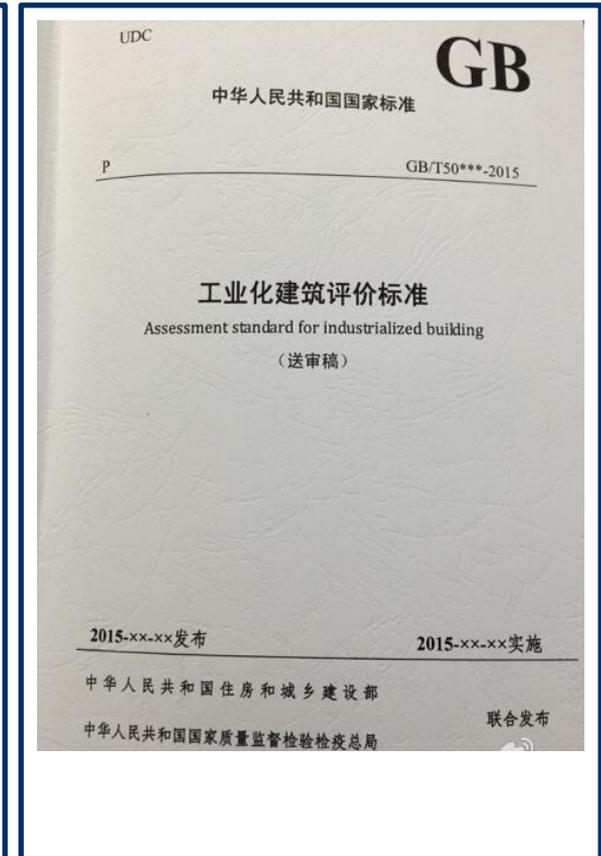
4.2.1 Main national/industrial standards



Evaluation standard for green industrial building



Technical specification for precast concrete structures



Assessment standard for industrialized building

4.2 National policy and industrial standard of housing industrialization

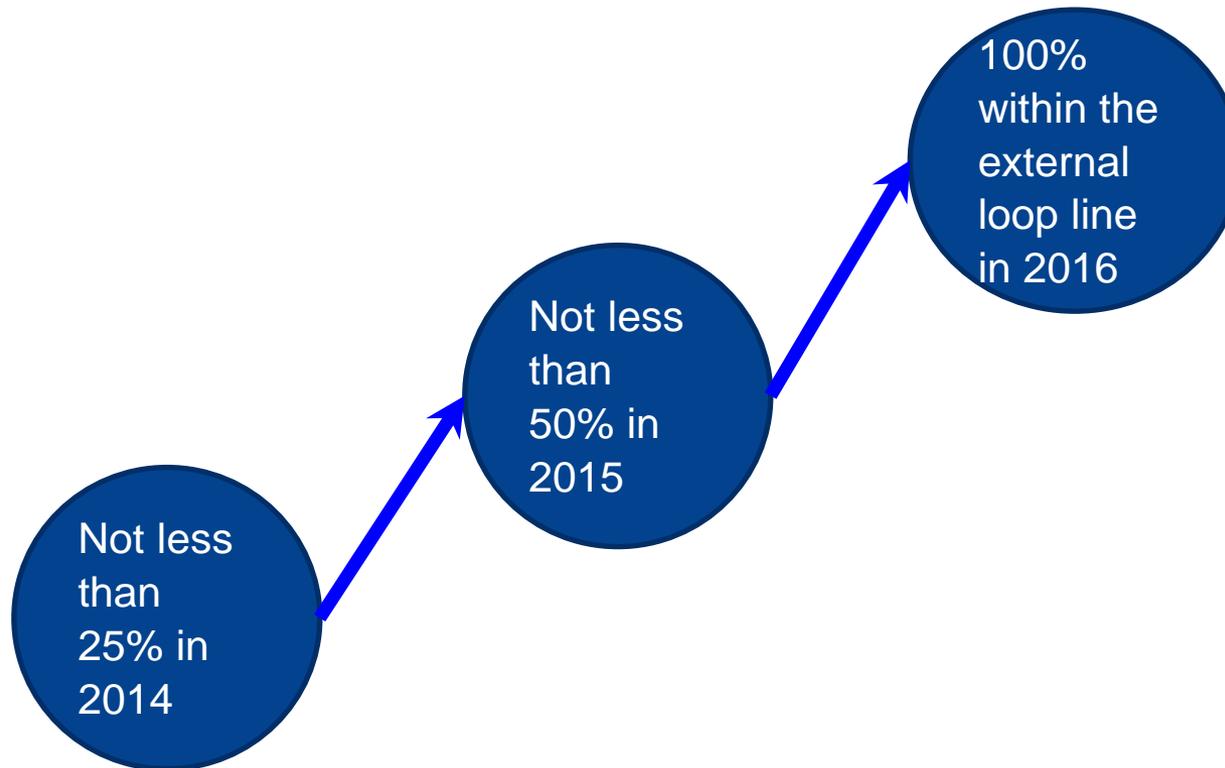
4.2.1 Main local standards

- Beijing: Design Discipline for Fabricated Shear Wall Residential Building DB11/T 970-2013
- Anhui: Technical Specification for Composite Slab Concrete Shear Wall Structure DB34/T 810-2008
- Shenzhen: Technical Specification for Precast Monolithic Reinforced Concrete Structures SJG18-2009
- Jiangsu: Technical Specification for Precast Monolithic Shear Wall Structure System DGJ32/TJ125-2010
- Shanghai: Design Discipline for Assembled Monolithic Concrete Housing System DG/TJ08-2071-2010
- Shanghai: Assembled Monolithic Residential Concrete Component Production, Construction and Quality Acceptance Procedures DG /TJ08-2069-2010
- Shanghai: Assembled Monolithic Concrete Structure Construction and Quality Acceptance Specification DG/TJ08-2117-2012

4.3 Regional government housing industrialization development plan

4.3.1 Shanghai

According to the *Three-Year Action Plan (2014-2016)* of Green Building Development in Shanghai , the total land area of each district and county in this region, the building floor area ratio planning of prefabricated building is carried out as follows:



Regional government housing industrialization development plan

Zhejaing Province

According to the *Three-Year Action Plan (2015-2017) of Green Building Development in Zhejiang Province*, the new prefabricated building plan is:



4.3 Regional government housing industrialization development plan

4.3.3 Part of other regions

Region	Construction	Time span	Project scale	Information basis
Nationwide	Indemnificatory housing	2015	The government-subsidized housing project in this year will arrange 7.4 million sets, including 5.8 million sets, of shantytowns transformation, with an increase of 1.1 million sets, and include urban dilapidated house transformation into shantytowns transformation policy range. There are 3.66 million rural dangerous house renovation, with an increase of 1 million households, comprehensively pushing forward the farmhouse seismic resistance transformation.	Chinese Government's Annual Work Report in 2015
Shanghai	Indemnificatory housing	2015	115,000 sets of new indemnificatory houses and old houses modification, with 100,000 sets basically completed. Remove 550,000 square meters of dilapidated houses in the urban villages.	Shanghai Municipal Government's Annual Work Report in 2015
Jiangsu	Indemnificatory housing	2015	Basically completed 280,000 sets of all kinds of indemnificatory houses	Jiangsu Provincial Government's Annual Work Report in 2015
Ningbo	Shantytowns transformation	2014-2017	The city plans to implement 100,000 houses of urban shantytowns transformation, covering an area of 10 million square meters, including 3 million square meters of dangerous old residence districts remodeling. For all counties (city) area, in principle, the upgrade area each year shall be not less than 100,000 square meters.	On November 1, 2014, the formally approved <i>Implementation Opinion about Promoting the Urban Shantytowns Transformation Focusing on Dangerous and Old Uptowns in Ningbo (Trial)</i> was implemented.

Introduction to main industry and enterprise

No.	Company name	Features
1	China Vanke Co., Ltd.	PC structure direction, prefabricated assembled monolithic reinforced concrete structure
2	Jiangsu Zhongnan Construction Group Co., Ltd.	Precast monolithic shear wall structure
3	Tianjin Housing Group	Industry-university-research cooperation, industrialization group.
4	Japan Daiwa House Industry	Foregoer of industrialized housing in Japan, entering into China in 2010
5	Broad Homes Industrial International Co., Ltd.	Low-price integrated residential (integrating real estate development, housing parts and building materials, forming a trinity)
6	Nanjing Dadi Construction Group	Sino-French joint-stock "Scope system"
7	BNBM HOUSE Co., Ltd.	Lightweight steel construction integration (Sino-Japanese joint venture)
8	Tianjin Secondary Construction Company	Steel-concrete composite structure
9	Heilongjiang Yuhui Construction Group	Shear wall structure system
10	Anhui Baoye Housing Industrialization Co., Ltd.	Lightweight steel construction
11	HXSS	Steel structure house
12	BBMG Corporation	Prefabricated part production
13	Haier Group	Integrated kitchen, toilet
14	CHINT GROUP	Residential electrical components
15	Shanghai Urban Construction Group	Prefabricated shear wall system (main wall body is full prefabricated shear wall structure, floor is SP composite board)

4.4 Introduction to main enterprises

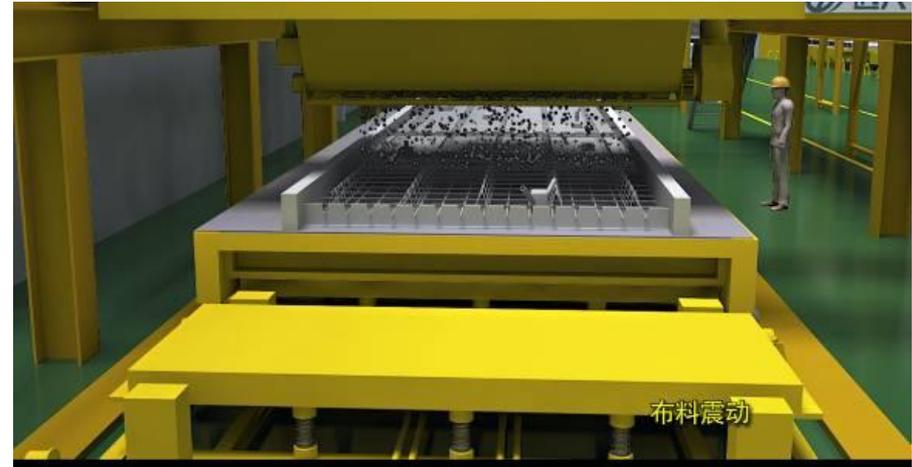
4.4.1 Broad Homes Industrial International Co., Ltd.

- Apply PC (precast concrete components) integration technology, use factorization, large equipment, assembly line production mode to build houses, structure system conforms to the requirements of current design code, and provided with standardized production, short construction cycle, reasonable cost, safety, environmental protection and energy saving and other technical advantages.
- Provider of “Green building overall solutions”, using advanced technology platform and strong manufacturing capacity, so as to provide technical support service, building and key construction parts for the research and development, design, material, manufacturing, construction and other links of building.
- In July, 2007, the Ministry of Housing and Urban-Rural Development awarded it the title of comprehensive “ national housing industrialization base”.
- Currently, the already established eight plants can achieve annual capacity of 10 million square meters

4.4 Introduction to main enterprises

4.4.1 Broad Homes Industrial International Co., Ltd.

Visual Simulation Design

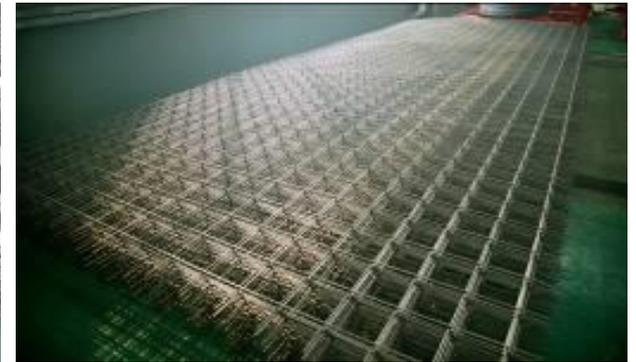


Bhome takes informatization simulation technology as its sustainable, scientific design tool.

4.4 Introduction to main enterprises

4.4.1 Broad Homes Industrial International Co., Ltd.

Production line



4.4 Introduction to main enterprises

4.4.1 Broad Homes Industrial International Co., Ltd.

Prefabricated housing construction site (left) and traditional construction site (right)



4.4 Introduction to main enterprises

4.4.1 Broad Homes Industrial International Co., Ltd.

References



4.4 Introduction to main enterprises

4.4.2 Vanke

China Vanke housing industrialization practice

Industrialization of Vanke = standardization + factorization + industrial chain integration

Standardization: product standardization + component standardization

Factorization: Structural system spin-off, retaining system upgrade, equipment system optimization, built-in standardization and integration.

Industrial chain integration: achieve complete decoration, form comprehensive home furnishing solutions, and build energy-saving green buildings

4.4 Introduction to main enterprises

4.4.2 Vanke

China Vanke housing industrialization practice



Shenzhen Vanke City Project

- Amount of electricity saving: 1.63 million KWH/year (equivalent to approximately 200 tec/year);
- CO₂ emission reduction: 532 tons/year; SO₂ emission reduction: 1.22 tons/year.
- Water saving per year: 180,000 tons; sewage emission reduction per year: 130,000 tons.

4.4 Introduction to main enterprises

4.4.2 Vanke

China Vanke housing industrialization practice



4.4 Introduction to main enterprises

4.4.3 Shanghai Urban Construction

Housing industrialization history

- In 2010, Shanghai Prefabricated Building R&D Center was established, introducing the digestion residential industrialization technology
- In 2011, No.1 experiment building (security housing) ,with the precast rate 50%, and No.2 experiment building (commercial residential building), with the prefabricated rate of 70% were built respectively, which obtained the affirmation of “national housing industrialization base”.
- In 2012, 05-02 plot in Pujiang large-scale living community was built, covering an area of 220 square meters, with the prefabricated rate exceeding 50%, reaching the domestic leading level
- In August 2014, Shanghai's largest and most advanced two prefabricated building component automatic production lines ——Shanghai Urban Construction Lingang and Wujing prefabricated production bases started building; after completed in 2015, they could increase more than 3 million square meters of annual average component production capacity for Shanghai

4.4 Introduction to main enterprises

4.4.3 Shanghai Urban Construction

Housing industrialization strategy

- Develop prefabricated house from security housing
- Integrate and form the whole industry chain, form the one-stop housing industrialization group model integrating investment and financing, development and management, housing design, prefabricated production, assembly construction, decoration, quality inspection, property services and etc.
- Combination involving production, teaching and research, high starting point
- Develop high prefabricated-rate houses (prefabrication rate of 50%-70%)
- Start from the pilot project, and create the first national housing industrialization base in Shanghai step by step.

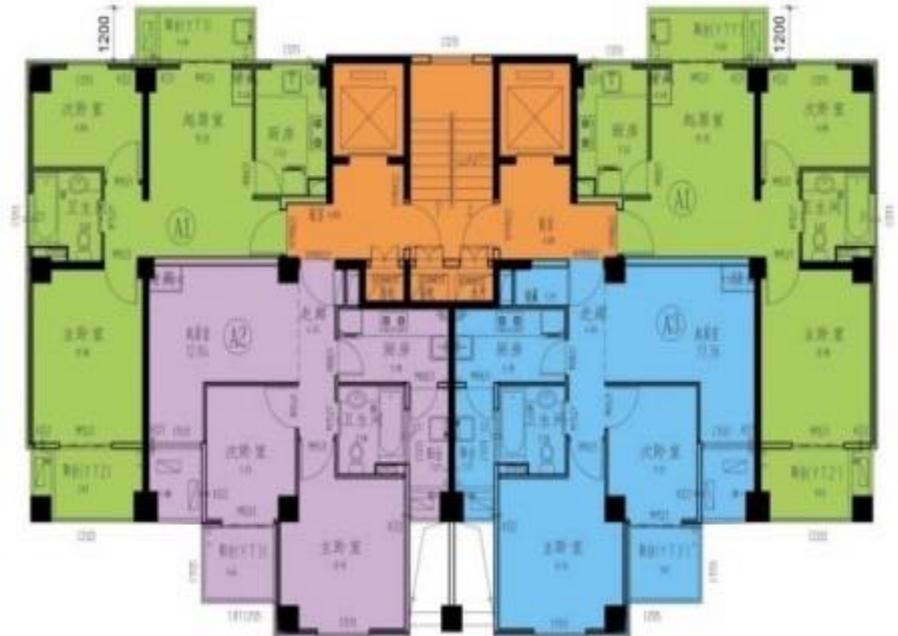
4.4 Introduction to main enterprises

4.4.3 Shanghai Urban Construction

Phase I of Pujiang large-scale residential community: 51,500 m²
prefabricated assembled houses, with the prefabrication rate of 50%-70%



Pujiang PC Phase I Design Sketch



Pujiang PC Phase I House Type Image

5 How to Enter Chinese Market

5.1 For Products

- The biggest hurdle for products is often to have them (or their standards) introduced by architects and design institutes. This requires building an extensive network of contacts within these circles, which can take time and – especially for SMEs – be a costly exercise.
- It makes sense to find and approach partners who already have contacts and are looking for green technology products to enhance their product portfolio. Both Chinese and western companies may be open to such partnerships.
- The most willing partners will be found in Eco-city projects, which are constantly looking to showcase the latest technologies.

5.2 For Services

- The search for know-how in Chinese companies is intense. Market growth in ordinary construction is lacking, and companies need to look for new markets, preferably with new technologies. Software licences, IP licences, and so forth are sought after by many Chinese builders, real estate developers, and design institutes.
- The key to these markets will be to find a sustainable business model: which services to offer to which party and for what price. Eco-cities are a welcome environment for first project experience and showcases.
- The easiest route to these companies is building relationships with western service providers that are already active in the market and are often quite happy to recommend and introduce noncompeting service providers to their customers, as a cluster and integrated solution.

5.3 For Energy

- Energy saving is an easy-to-sell concept, as it translates directly into financial savings (or generation). Approaching the market directly is therefore easier than in other sectors, provided that companies have a track record at home and can overcome the hurdle of showcasing their installations in China.
- China is witnessing an explosion of ESCOs (Energy Service Companies), EPC (Energy Performance Contracting) at the moment: companies, mostly subdivisions of large corporations, are introducing energy-saving installations in exchange for (part of) the savings realized. These ESCOs, both western and Chinese, are natural partners for companies with energy-saving or generating technologies and products.
- The most commonly used market approach is to focus on Eco-cities, smart cities, cooperating with local companies to develop references, and further to promote for large scale use.

6 Conclusions and Recommendations

6.1 Conclusions

- Although green building represents a collection of mature, developed technologies in Europe, it is only at the beginning of its development in China. A shift in government policy towards green building and a still massive construction industry are creating tremendous opportunities for companies with know-how and technology to provide the solutions that China needs.
- The US-based LEED standard has been introduced in the country, while China has also launched its own 3-Star standard; both standards are now competing in China. As green building solutions are only successful as far as they can help building owners achieve certification, these standards will, to a great extent, define the green building market in combination with government subsidies, regulations, and policies.
- The standard strategy is an entry into one city, mostly first-tier, by developing a business model, brand name, partnerships, and know-how before moving to other (second-tier) markets. This can be achieved using your own strength or through partnerships with Chinese companies with market access.

Recommendations

- Step 1: NordicHome prototype and demonstration completion
- Step 2: Chinese partner for localization of Nordic Home
- Step 3: Reference project, e.g. cooperation with Eco-city, real estate companies
- Step 4: Promotion to mass production of Nordichome
- Step 5: Business model, e.g. BOT, PPP, EPC, ESCOs, etc.
- Step 6: Follow the market change