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## INDUSTRY OVERVIEW

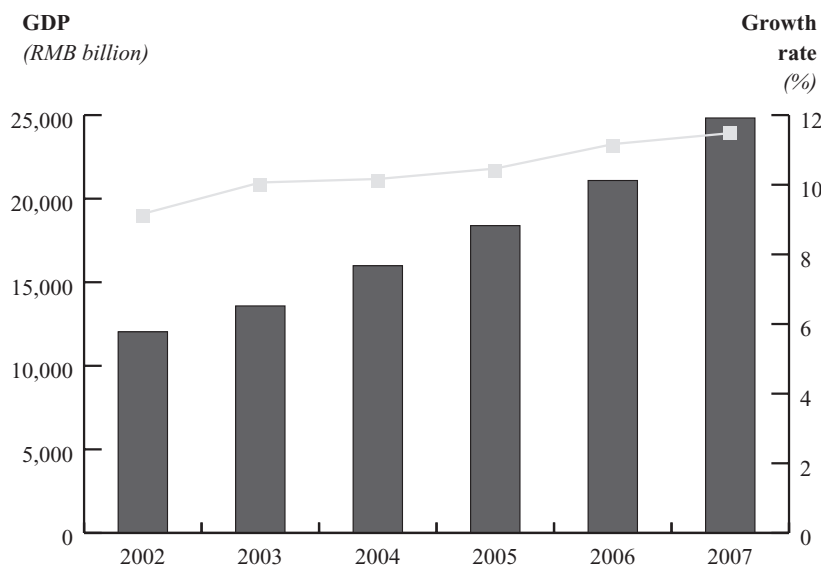
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### OVERVIEW OF THE ECONOMY OF THE PRC

The high-speed economic growth of the PRC has become a major focus of the world in recent years and as a result of which it has attracted investors both locally and internationally. According to China Statistics Yearbook 2007, China's GDP increased from approximately RMB12.03 trillion in 2002 to approximately RMB24.95 trillion in 2007, representing a CAGR of approximately 15.7% and showing a double-digit annual growth for five consecutive years.

It is set out in the Eleventh Five-Year plan for National Economic and Social Development of the PRC (2006-2010) (中華人民共和國國民經濟和社會發展十一五規劃綱要) that, by 2010, the average real GDP growth rate would be approximately 7.5% per year and GDP per capita would increase to approximately RMB19,200. Moreover, the reduction of energy consumption per unit GDP would be 20% annually.



Source: <China Statistics Yearbook 2007> and National Bureau of Statistics of the PRC

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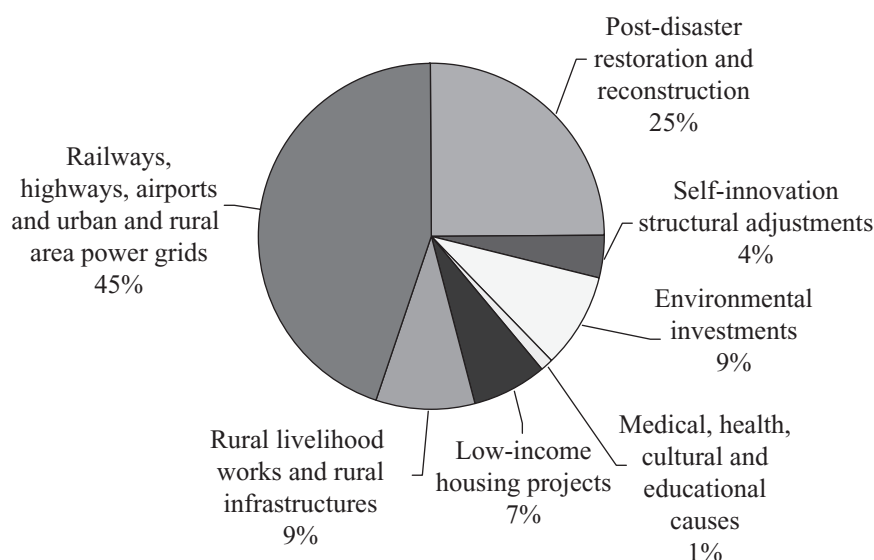
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### The RMB4 trillion economic stimulation plan

In order to cope with global financial crisis and maintain the economic growth momentum in the PRC, the PRC State Council convened a regular meeting on 5 November 2008 to formulate ten measures aiming to boost domestic demand and stimulate steady and faster growth of the economy and announced a stimulation package on 9 November 2008 with a budget of RMB4 trillion. The stimulation plan aims to boost domestic demand by increasing fixed asset investment in the coming two years.

Areas covered under the stimulation plan include infrastructure, rural development and post-disaster reconstruction. Under the plan, infrastructure projects, including railway facilities and airports, would contribute approximately 45% of the total investment amount. The budget allocation for the stimulation package is set forth below.

### Allocation of the budget of RMB4 trillion of the economic stimulation package



Source: PRC government website

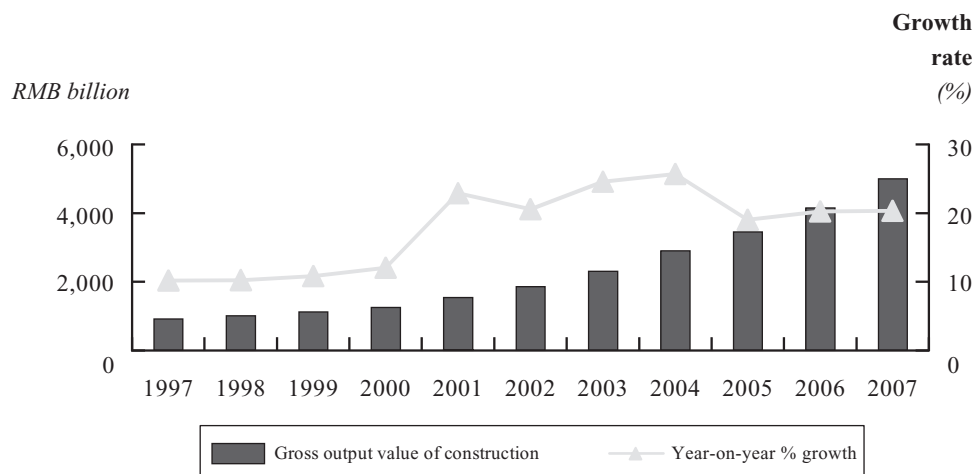
### CONSTRUCTION INDUSTRY AND PROPERTY INDUSTRY IN THE PRC

The economic growth of the PRC has stimulated the development of construction industry and property industry. Over the years, the PRC government had dramatically increased its expenditure on infrastructure construction, which is one of the main drives contributing to the strong GDP growth of the PRC, and is also a major factor propelling the construction industry and property industry. The demand for curtain walls, to a certain extent, depends on the development of the construction and property industries.

For the PRC construction industry, according to the CEIC, the total output value of the construction industry in the PRC has demonstrated a strong growth from approximately RMB912.6 billion in 1997 to approximately RMB5,001.9 billion in 2007 representing a CAGR of approximately 18.5% from 1997 to 2007.

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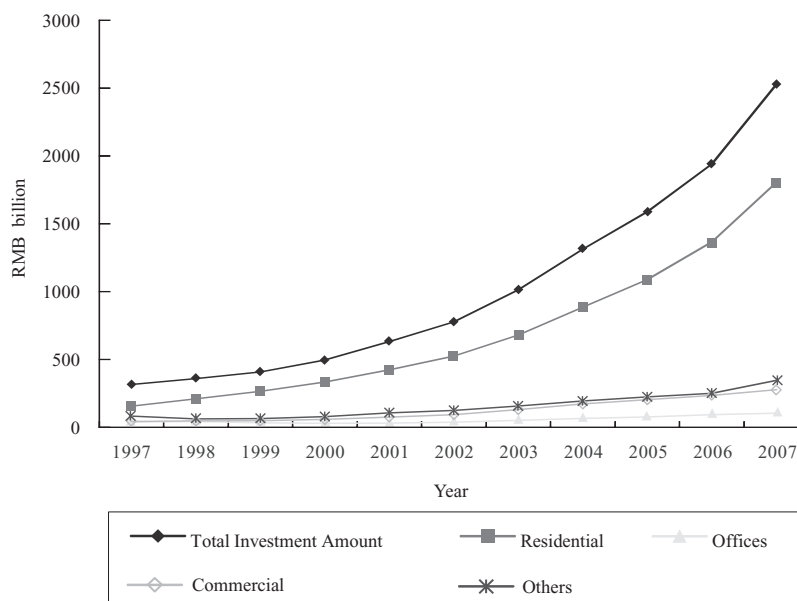
### China Gross Output Value of Construction



Source: CEIC

In addition to the strong growth as seen in the construction industry for the past decade, the property market of the PRC is also thriving. According to the National Bureau of Statistics, the total investment in real estates has shown a CAGR of approximately 23.0% from 1997 to 2007. Although the contributions of the investments in office buildings and commercial buildings to the total real estate investment are not among the highest, they have still demonstrated a CAGR of approximately 10.3% and 20.6% over the period from 1997 to 2007 respectively.

### Real Estate Investment in the PRC



Source: <China Statistics Yearbook 2007>, CEIC

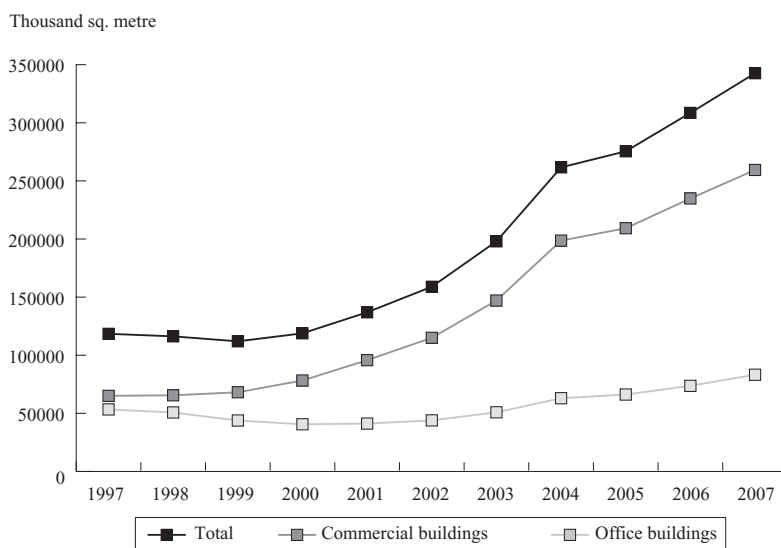
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The strong growth of real estate can also be demonstrated by the increase in the total floor area under construction. During the period from 1997 to 2006, the total floor area under construction for the categories of office buildings and commercial buildings has shown a CAGR of approximately 4.5% and approximately 14.8% for the period from 1997 to 2007 respectively.

### Floor area under construction of commercial buildings and office buildings in the PRC



Source: CEIC

### CURTAIN WALL INDUSTRY IN THE PRC

Curtain wall is mainly used in high-rise buildings, public works such as airport, railway station, cultural centre and convention and exhibition centre. Apart from serving as an exterior facade offering protection to the building interior, the current development in the design of curtain wall also entails a decorative function in improving the aesthetic outlook of the building and the energy-saving function by using energy-saving curtain wall and BIPV curtain wall.

The government plans to strengthen the development of the north eastern, western and central parts of the PRC by an increase of government spending in infrastructure construction, including airports, which is expected to support the growth of curtain wall industry in the PRC.

According to the CCMSA Report, the PRC has emerged as the world's largest producer and consumer in the curtain wall industry in the 21st century. The total output value of curtain walls from 1997 to 2007 is set out as follows:

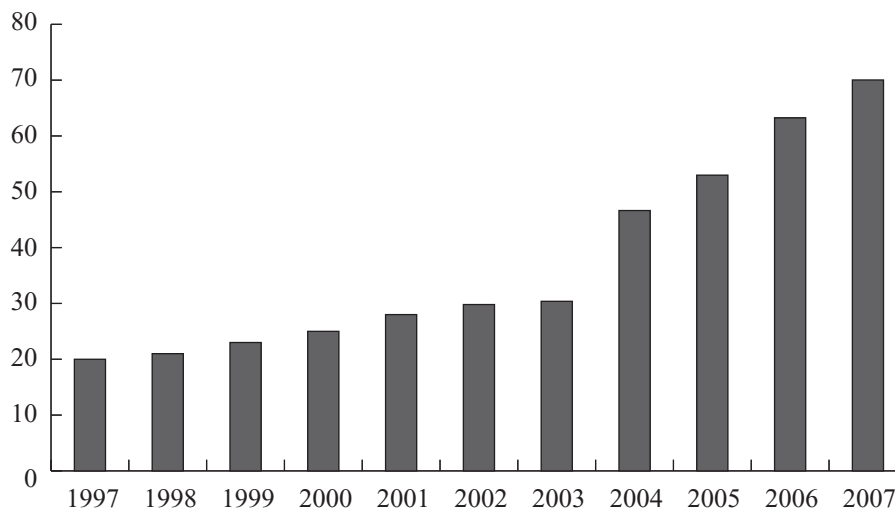
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### Total output value of curtain wall

Annual output value  
(million sq. m.)



Source: CCMSA Report

### Technical Features of Energy-Saving Curtain Wall

According to the CCMSA Report, energy-saving curtain wall has the following technical features.

Low-emission (“Low-E”) glass is an important component for energy-saving curtain walls which has a radiation level of only about 10% of ordinary glass. In winter, the coating of Low-E glass works to reduce the amount of heat loss transmitted through the glass to the colder exterior. In summer, Low-E glass effectively reduces undesirable heat gain from the outside by reflecting a significant portion of long-wave radiation back to the surroundings, helping to reduce the costs of air-conditioning. In order to enhance the energy-saving function, double-paned Low-E glass is used. As such, insulated glass facilitates heat insulation and reduces the level of energy loss. Its heat transmission level only represents 1/27 of that of the ordinary single-paned glass.

#### Heat transmission level of different types of glass

Glass type	Ordinary single paned glass	9mm thick ordinary insulated glass	12mm thick ordinary insulated glass	12 mm thick insulated Low-E glass
Heat transmission w/(m <sup>2</sup> .K)	5.8–6.4	3.2–3.5	2.8–3.2	1.6–1.8
Heat insulation	0.3–0.9	0.2–0.8	0.2–0.8	0.25–0.6

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The above table shows that the heat transmission level of ordinary single paned glass is  $5.8\text{W}/(\text{m}^2\cdot\text{K})$ , which means there will be energy loss of  $5.8\text{W}/(\text{m}^2\cdot\text{K})$  per sq.m. for each unit temperature difference of  $1^\circ\text{C}$  between the building interior and exterior. For a building that uses ordinary single paned glass of an area of 10,000 sq.m. and with an indoor temperature of  $25^\circ\text{C}$  and outdoor temperature of  $15^\circ\text{C}$ , in order to maintain the indoor temperature at the level of  $25^\circ\text{C}$ , the heating system of the building will at least have to supply energy of 580,000W to make up for the heat loss through the ordinary glass. If insulated low-E glass is used, it can achieve an energy saving level of 420,000W and therefore its energy saving effect is 2.6 times of that of the ordinary single paned glass.

In addition to the use of the above energy-saving material to achieve the purpose of saving energy, there should also be corresponding energy-saving features in the structure and design of curtain wall, such as ventilation system and architectural sunshading system.

Ventilation curtain wall system is a double-layer curtain wall that consists of a space in between two panes of glass that allows air circulation. Such system could save 50% more energy than that of the single paned glass. Normally low radiation glass will be used for the external layer of the ventilation curtain wall which can help to reduce the level of light pollution as a result of glass reflection. Architectural sunshading system can achieve energy-saving by preventing excessive heating and direct heating by the sun.

The latest development in energy-saving curtain wall is the increasing use of intelligent curtain wall (智能幕牆) which comprises various component parts of a curtain wall system including glass panes, ventilation system, air-conditioning system, environmental control system and automatic control system. It offers an efficient control of ventilation, humidity and lighting level of the building interior and most important of all, its energy consumption level represents only approximately 30% of that of the conventional curtain wall.

### THE ENERGY TREND

According to the “Report on the Development of the Photovoltaic Industry in China (2006-2007)” issued by the China Renewable Energy Development Project in June 2008, global energy structure may undergo substantial changes during the first half of the 21st century such that conventional fossil fuel energy will be gradually replaced by renewable energy. The same report stated that the replacement rate of renewable energy would increase from approximately 5% in 2000 to approximately 10% in 2010, and further increase to approximately 40% by 2040. Among all the choices of renewable energy, solar energy is a major focus of development for many countries. The International Energy Association has indicated that photovoltaic power generation currently account for less than 1% of the world’s total electricity output and such proportion is expected to increase to approximately 20% by 2040.

The PRC is rich in solar energy resources, which is the most important primary energy source with the emission of huge amount of energy through chains of nuclear fusion. According to “2007 China Solar PV Report (《2007中國光伏發展報告》)” issued by Chinese Renewable Energy Industries Association (中國資源綜合利用協會可再生能源專業委員會), Greenpeace European Photovoltaic Industry Association and World Wide Fund for Nature, the radiation received by the surface of the globe is 10,000 times of the energy demand of

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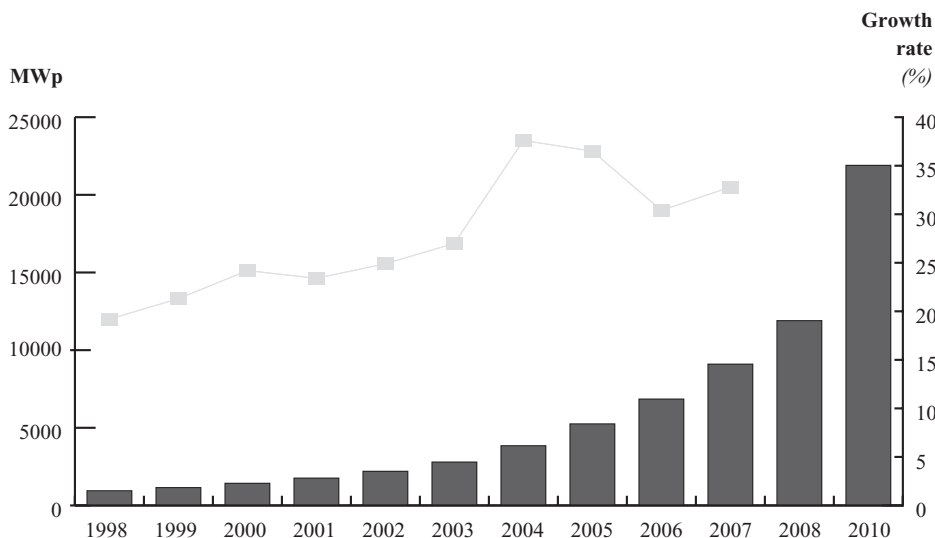
the world, and the radiation could generate power of 1,700 kWh per square meter per year. In the PRC, the average solar radiation level is about 1,050 – 2,450 kWh/m<sup>2</sup> each year. Areas with the most abundant solar radiation include Tibet, the southern part of Xinjiang, Qinghai, Gansu and the western part of Inner Mongolia. Compared with countries at the same latitude, the daytime radiation in the PRC is similar to that in the US and much higher than that in Europe and Japan.

### GLOBAL USE OF SOLAR ENERGY

According to the statistics from Renewables in Global Energy Supply issued by the International Energy Agency in 2007, solar energy only contributed to about 0.039% of the total energy supply in 2004, while the annual growth of solar energy supply reached approximately 28.1% from 1971 to 2004.

Statistics from “Global Market Outlook for Photovoltaics until 2012” and “Brighter Future with Solar Photovoltaic Electricity” issued by European Photovoltaic Industry Association indicated that global photovoltaic capacity was projected to be approximately 9.1GWp in 2007 and further increase to approximately 21.9GWp by 2010 in an advanced scenario which can be achieved with adequate political commitment at a global level. The historic development of global cumulative installed PV capacity from 1998 to 2007 and the projection from 2008 to 2010 under the aforesaid advanced scenario is set forth below:

**Global cumulative installed PV capacity**



Source: European Photovoltaic Industry Association

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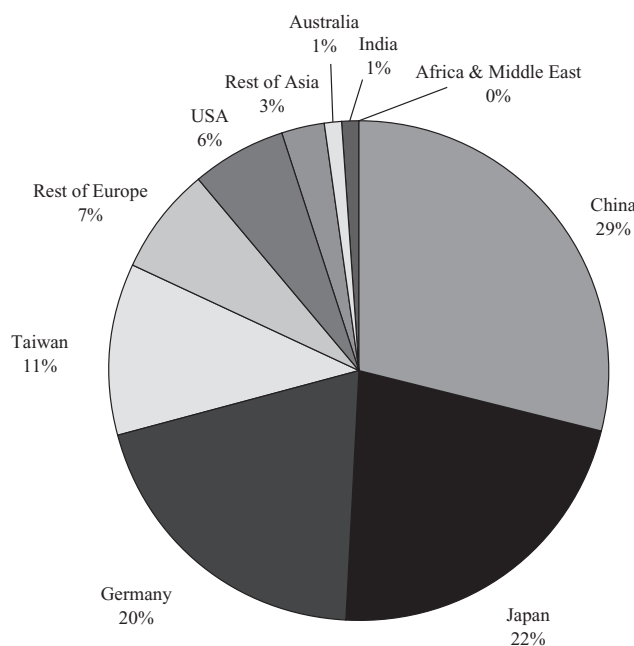
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### PV CELL INDUSTRY

The conversion of solar energy to electricity is also known as photovoltaic. PV cells are generally made either from crystalline silicon, sliced from ingot or castings or from grown ribbons, or thin film, deposited in thin layers on a low-cost backing such as glass, stainless steel or plastic. As there are no movable parts, it could be operated for a very long period of time without wearing. PV cells can be made into different shapes and are connectable in groups to generate more electricity. PV cells can be used in small articles like watches and can be sealed within double-sided steel glass to be installed on curtain wall or roof of buildings.

The global photovoltaic industry develops with great speed, and the PRC is one of the major producers of photovoltaic cells in the world. According to the European Photovoltaic Industry Association (“EPIA”), the PRC is the largest PV cell producer in the world for the year 2007.

#### Regional and national shares of global PV cell production in 2007



Source: *European Photovoltaic Industry Association*

At present, most PV cell production involves the crystalline silicon technologies, whilst future plans for PV cell production have a strong focus on the thin film technologies, which offer several advantages such as lower production costs compared to the more material-intensive crystalline technologies and such price advantage is currently counterbalanced by lower efficiency rates.

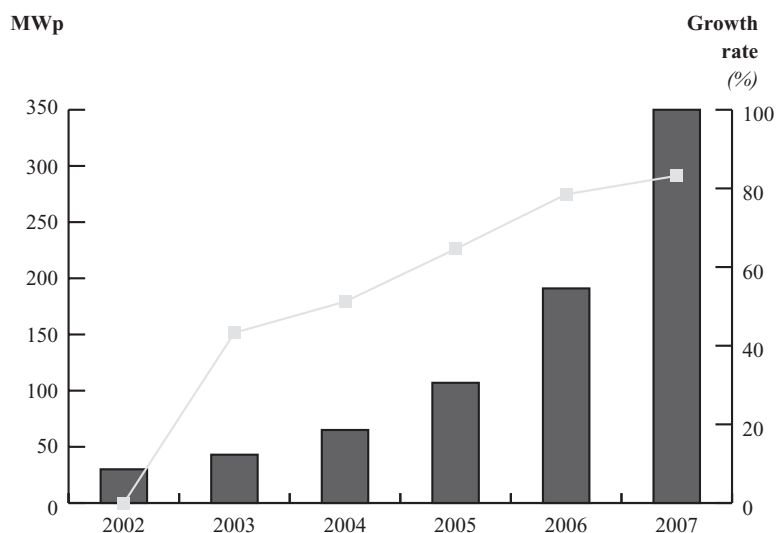


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Statistics from the “Report on the Development of the Photovoltaic Industry in China (2006-2007)” showed that the global production volume of thin-film PV cells has grown exponentially from 2002 to 2007, as set forth below:



### Thin-film PV cells

Three types of thin film PV cells or panels are commercially available at the moment which are manufactured from amorphous silicon (a-Si), copper indium gallium diselenide (CIG or CIGS) and cadmium telluride (CdTe). All of these have active layers with thickness in the range of less than a few microns, thus allowing higher automation once a certain production volume is reached. The process is less labour-intensive compared to the assembly of crystalline PV cells. Among the three commercially available thin film technologies, a-Si is the most important in terms of production and installation, with approximately 5.2% of the total market in 2007.

#### (a) *a-Si PV cells*

Amorphous silicon is the most well-developed thin film technology to-date and has an avenue of further development through the use of “microcrystalline” silicon which seeks to combine the stable high efficiencies of crystalline silicon technology with the simpler and cheaper large area deposition technology of amorphous silicon.

a-si PV cells are made by depositing a layer of N type amorphous silicon mixed with phosphorus on the substrate, and then deposit an unmixed i layer, and then deposit a layer of Type P amorphous silicon mixed with boron. Finally, the electronic beam evaporates an anti-reflection film to form a-Si film (with a film thickness of 0.5 microns), followed by laser cutting and evaporating silver electrode plating. a-Si PV cells can be used with glass (or other materials) as substrates. The use of glass as substrate for conventional glass walls with plated membrane is used for making PV curtain walls.

#### (b) *CIGS PV cells*

It is made by depositing several layers of metal compounds on the semi-conductive films (with a thickness of about 2-3 microns). This type of PV cell is characterized by its high conversion rates, stable performance, non-pollution, high anti-radiation capacity and long service life.

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### *(c) CdTe PV cells*

Cadmium telluride is an efficient light-absorbing material for thin-film solar cells. Compared to other thin-film materials, CdTe is easier to deposit and more suitable for large-scale production. Despite much discussion of the toxicity of CdTe-based solar cells due to the cumulative poisoness of elemental cadmium, this is the only technology (apart from amorphous silicon) that can be delivered on a large scale.

A temporary shortage of silicon has also offered the opportunity for increasing the market share of thin film technologies. European Photovoltaic Industry Association expects a growth in the thin film market share to reach about 20% of the total production of PV cells by 2010.

### **Building Integrated Photovoltaic (BIPV)**

According to the CCMSA Report, during the past 30 years, there has been tremendous technological improvement in the photovoltaic industry thereby reducing significantly the installation cost of solar power generation system. Nowadays photovoltaic technology is widely applied in some of the more remote and sparsely populated regions or countries in respect of, for instance, communication facilities, railway information system, agriculture and irrigation, etc. In some of the less developed areas where there is a limited supply of electricity or where the grid line network is not readily accessible, solar power serves as an alternative source of electricity supply.

Photovoltaic converts light into electricity directly, without emissions and when it is needed. PV systems can be deployed in close proximity to the user avoiding energy losses by long transportation. PV that is integrated into the fabric of a building, known as Building Integrated Photovoltaic (BIPV), has become very popular in Europe. The use of PV in the building envelop provides weather protection, heat insulation, sun protection, noise insulation, modulation of daylight and security. BIPV can be used in both new and existing buildings in different parts such as roofs, external building walls, semi-transparent facades, skylights, shading systems, etc. Such a wide range of applications opens up many opportunities for building designers and architects. Great potential is expected to be seen in respect of the development and application of BIPV in the coming years for reasons as follows:

- BIPV systems are highly reliable in the long term and the average guarantee for BIPV building products is 20-25 years.
- PV panels are almost maintenance-free.
- Unlike conventional building materials, BIPV produces electricity from costless solar energy and therefore allow a building owner to recover the initial investment cost in system installation.
- No extra space is taken up which constitutes a particular advantage in the urban area where there is a limited supply of land.
- No extra supporting structure is necessary in its installation.
- The burden on electricity supply can be reduced as electricity can be generated either on its own or as an alternative supply.

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- The deterioration level of grid-line network can be reduced.
- Conventional building material can be replaced by BIPV which offers a pleasing and aesthetic outlook and design to the buildings.
- It can be integrated with the other systems of the building including protection, control and operation.

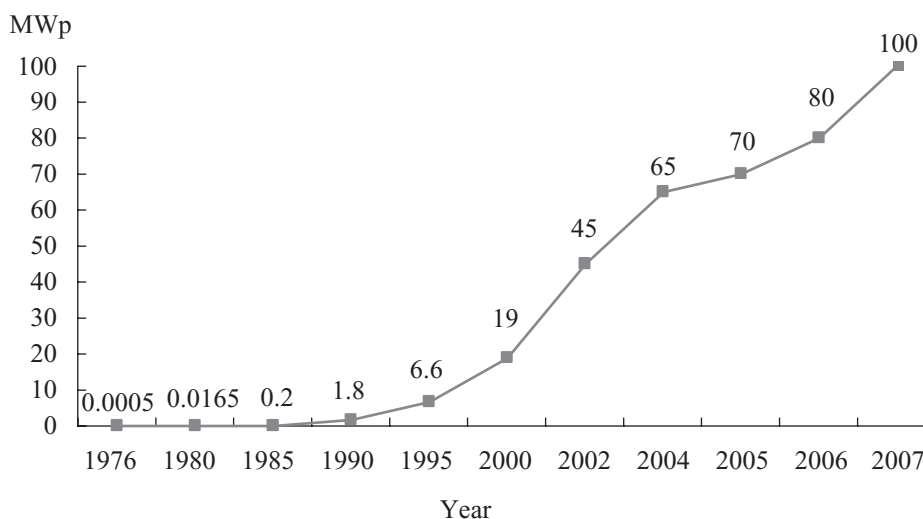
### SOLAR POWER UTILIZATION IN THE PRC

The shortage of electricity supply has all along been a problem in the PRC. In particular, the cost of electricity supply is very high in the sparsely populated and remote areas of the western part of the PRC due to the cost involved in the laying of gridlines.

Rural villages without electricity supply in the PRC are mainly located in Tibet, Xinjiang, Tsinghai, Gansu, Inner Mongolia, Ningxia, Sichuan and Yunnan, where a large portion of households without electricity supply are located. It is difficult to establish power grid coverage in these extensive and sparsely populated areas. Meanwhile, these areas have rich solar energy resources.

The application of solar power generation is considered to be the most effective and efficient solution to relieve the problem of the shortage of electricity supply in villages and remote areas. The PRC government launched the “Plan to Supply Electricity to Provinces in the Western Part of the Country where there is no Electricity Supply” (“西部省區無電鄉通電計劃”) by using solar PV and smart scale wind power for electricity generation in locations like Tibet, Xinjiang, Qinghai, Gansu, and Inner Mongolia in 2002. This project has highly stimulated the development of the solar PV power generation in the PRC. Moreover, the development of solar power generation system for independent supply of electricity to households fits well with the constraints of remote rural areas. Such project was further reinforced by the Article 15 of Renewable Energy Law which was promulgated in 2005.

### Cumulative PV Power Generation System Installed Capacity in the PRC



Source: Report on the Development of the Photovoltaic Industry in China (2006-2007)

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According to the statistics from “Report on the Development of the Photovoltaic Industry in China (2006-2007)”, the annual installed capacity of PV power generation systems of approximately 20 MWp during 2007 accounted for only 1.8% of the production volume of PV cells in the PRC of approximately 1,088 MWp in the same year, indicating that approximately 98% of the PV cells produced in the PRC in 2007 was exported and the installation of PV power generation systems inside the PRC was very limited.

PV power stations are more widely used in rural areas or the North-West part of the PRC. For example, according to the statistics from “State Power Information Network (中國國家電力信息網)”, more than 100 rural areas in Qinghai have been covered with PV Power Stations, which cover a population of one-seventh out of the total population of 5.5 million in Qinghai.

However, statistics from CEIC also showed that the cumulative power output from January to October 2008 for some North-western areas including, Tibet, Gansu and Xinjiang were of approximately 1.4%, 62.3% and 42.5% of the average level of the PRC (67.3 billion kWh). Based on the population data of 2007 from CEIC, the average electricity supply per capita for these three areas were also lower than the country average. This implies that the problem of electricity shortage still exists, and there are opportunities for more PV stations and wider use of in-house solar power generators in such areas.

According to the Mid-and-Long Term Development Plan of Renewable Energy promulgated by the National Development and Reform Commission in September 2007, the PV power generation capacities in the PRC is planned to reach 300MW by 2010 and 1,800MW by 2020 supporting by an estimated investment of approximately RMB130 billion for the period from 2006 to 2020, and the planned usage is set forth below:

- (1) Enhance rural electrification by promoting the use of solar-power home systems and setting up small-scale PV power stations in, among others, Tibet, Inner Mongolia, Xinjiang, Gansu and Yunnan such that the PV power generation capacities in rural villages could reach 150MW by 2010 and 300MW by 2020;
- (2) Establish on-grid building-integrated power generation facilities on the roof top of public buildings and facilities in modern cities of medium to large size such as Beijing, Shanghai and Guangdong such that 1,000 roof-top PV projects would be completed by 2010 with total power generation capacities of 50MW and 20,000 projects would be completed by 2020 with total capacities of 1,000MW;
- (3) Set up large-scale on-grid PV power stations in Gansu and Tibet as demonstrative projects and set up solar heat power generation projects in desert areas of Inner Mongolia, Gansu and Xinjiang such that the power generation capacities of large-scale on-grid PV power stations would reach 20MW by 2010 and 200MW by 2020 and that for solar heat power stations would reach 50MW by 2010 and 200MW by 2020; and
- (4) Apply PV power generation in, among others, telecommunications, railways and highways such that the commercial applications of PV power generation could reach the capacities of 30MW by 2010 and 100MW by 2020.

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In July 2008, the National Development and Reform Commission announced that (i) two companies are approved to sell the electricity generated at their respective PV power stations at RMB4 per kWh (inclusive of tax), effective on the date that such power stations commence commercial operations; (ii) the premium costs of such solar electricity over the domestic price of electricity generated from desulphurized coal shall be shared within the entire nation; and (iii) if the operating costs of such projects exceed the level of the aforesaid approved electricity costs, the local government may subsidize those projects by appropriate means or embed the excessive costs into the overall domestic electricity costs. This announcement serves as strong evidence to the PRC government's implementation of the relevant laws and regulations in respect of solar power generation, and is expected to encourage the industry players to enhance their commitment and/or investment in solar power generation.

### **PV power generation encouraged by the Renewable Energy Law in the PRC**

According to the Articles 17 and 24 of Renewable Energy Law promulgated in February 2005, the PRC government encourages corporate and residential application of solar energy for purposes of water-heating, air-conditioning and photovoltaic power generation systems. Property developers are encouraged to facilitate the use of solar energy in the design and construction of buildings; whilst residents are also encouraged to install solar-power systems which fulfill the required technical standards. Moreover, various renewable energy projects including the establishment of independent power systems using renewable energy in remote areas and islands are supported by national funds designated for renewable energy development. Financial assistance would be granted to fund the solar energy development projects.

Article 14 of the Renewable Energy Law requires power grid-network enterprises to acquire the full amount of electricity generated by authorized enterprises from renewable energy and to establish grid connection in relation thereto.

Article 19 stipulated that the acquisition cost of renewable energy electricity will be determined by the State Council, and the premium between such acquisition cost and the cost of electricity generated from conventional energy sources, as well as the set-up cost for grid connection, can be embedded into the selling price of output electricity. This measure is generally known as "feed-in tariff" which was first introduced by the United States and refined by Germany in 1990, then adopted in Spain, Australia, etc. In 2007, Germany ranked first in the world both in terms of total installed PV capacity and new capacity, which had been estimated by European Photovoltaic Industry Association to be approximately 3,800 MWp and 1,000 MWp respectively, accounting for approximately 42% and 46% of the world's total respectively.

The future growth of PV power generation in the PRC is supported by:

- Government's supportive attitude to develop renewable energy is evidenced in various government policies, including the Renewable Energy Law of the PRC and Mid-and-Long Term Development Plan of Renewable Energy.

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- Worldwide concerns as regards the emission of pollutants and environmental protection
- Improvement of technology and more widespread use of solar energy
- Increasing demand of electricity from the western part of the PRC and the rural areas, which cannot be fully supported by thermal, hydroelectric and other sources of energy.

### **Background of research report**

#### *CCMSA Report*

Our Directors confirm that the CCMSA Report is commissioned by our Group for a fee of RMB30,000. Our Directors confirm that CCMSA is an Independent Third Party.

CCMSA is governed by the Ministry of Civil Affairs and Ministry of Construction. It is a nationwide confederation that represents companies, organisations and individuals in the metal structure industry.

It has been agreed by CCMSA that the information contained in the CCMSA Report can be disclosed in this prospectus. The information contained in the CCMSA Report is based upon its own database and published government data that are not commissioned by our Group.

This prospectus contains some extracted information contained in the CCMSA Report in sections such as “Summary”, “Industry Overview” and “Business”.