**Summary**

# China's Wind-Power Generation Policy and Market Developments

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The Chinese government set its wind power generation capacity target at 5 million kW for 2010 and 30 million kW for 2020 in its Medium to Long-term Renewable Energy Development Plan released in September 2007. The 11th Five-Year Renewable Energy Development Plan, announced in March 2008, doubled the 2010 target to 10 million kW, attracting much attention from relevant parties.

This report considers the challenges and future course of the Chinese wind power generation market in analyzing recent Chinese wind power development policies and other background factors behind the government's upward revision to the wind power generation capacity target in the 11th Five-Year Renewable Energy Development Plan.

The analysis has found that the Chinese government has made the upward revision to the wind power generation capacity target in the 11th Five-Year Renewable Energy Development Plan because the following factors indicate China's total wind power generation capacity would reach or exceed 10 million kW by 2010:

1） Implementation of wind power concession projects since 2003
2） Implementation of the Renewable Energy Law and relevant regulations
3） Establishment of the target local content of wind power generation facilities (at 70%)
4） Revisions to tariffs on wind power generation equipment imports
5） Utilization of the Clean Development Mechanism (CDM)

While China's wind power generation market has achieved rapid growth, however, China has been required to normalize the market by resolving such challenges as the rationalization of wind power electricity prices, the security and maintenance of safe and stable grid operations amid an increase in large wind power plants, the improvement of wind power resources survey accuracy and the development of equipment inspection and certification systems.

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# China's Wind-Power Generation Policy and Market Developments

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## Introduction

The Chinese government has given priority to the expansion of renewable energy uses to adjust its energy consumption structure concentrated in coal and other fossil fuels. It established the Renewable Energy Law in February 2005 (for its implementation in January 2006) and cited the promotion of renewable energy as one of the objectives under the 11th five-year development plan (from 2006) prepared in March 2006, putting forward its basic policy on renewable energy.

In September 2007, the Chinese government announced the Medium to Long-term Renewable Energy Development Plan, specifying numerical targets for medium to long-term renewable energy development through 2020. It seeks to expand wind power generation to 5 GW by 2010 and to 30 GW by 2020. Only a half year later, however, the government released the 11th Five-Year Renewable Energy Development Plan (from 2006) in which it doubled the wind power generation capacity target for 2010 to 10 GW. The upward revision to the wind power generation capacity target has attracted attention.

This report deals with the development of the Chinese wind power generation market that led to the upward revision to the wind power generation capacity target in the 11th Five-Year Renewable Energy Development Plan. Particularly, the report addresses the future challenges and course of China's wind power generation market in analyzing policy factors regarding the wind power generation development over recent years. More specifically, Chapter 1 reviews China's wind power resources and their development, Chapter 2 discusses policies and measures that have promoted the introduction of wind power generation, Chapter 3 puts in order challenges in the wind power generation market toward the achievement of numerical targets, and Chapter 4 provides a conclusion.

## 1. Overview of China's Wind Power Resources and Generation

### 1.1 Distribution of Wind Power Resources

China is rich with wind power resources. According to the China Meteorological Administration, onshore wind power resources at an altitude of 10 meters total about 3,226 GW in terms of electricity, including 253 GW available for development and utilization. At an altitude of 50 meters, the resources available for development and utilization double to more than 500 GW. Offshore wind power resources in coastal waters aggregate 750 GW.

As indicated by Figure 1-1, regions rich with wind power resources in China are as follows:

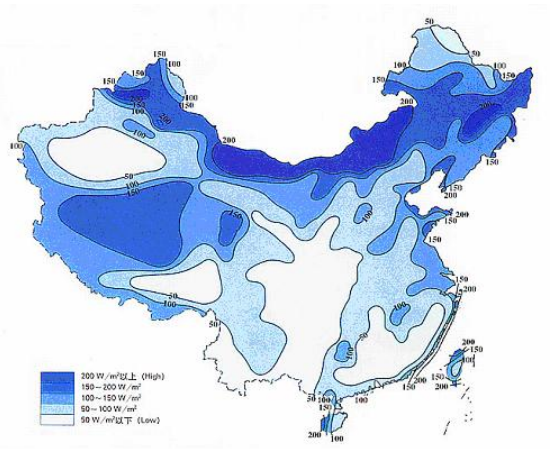
1) Three northern regions (Northeast, North and Northwest): Within a radius of 200 kilometers in three northeastern provinces (Jilin, Heilongjiang and Liaoning), Hebei Province, Inner Mongolia Autonomous Region, Gansu Province, Ningxia Autonomous Region, Xinjiang Uygur Autonomous Region, etc. The annual wind power energy density ranges from 200 to more than 300 watts per square meter.

2) Southeastern coastal waters and islands: Coastal waters within some 10 kilometers from the coast in Shandong Province, Jiangsu Province, Shanghai municipality, Zhejiang Province, Fujian Province, Guangdong Province, Guangxi Autonomous Region, Hainan Province, etc. The annual wind power energy density exceeds 200 watts per square meter.

3) Inland regions: Lake Poyang and its vicinity, Mt. Jiugong and Lichuan River in Hubei Province, etc[1].

4) Coastal waters: Eastern China coastal waters with depths from 5 to 20 meters. Wind power resources are estimated at about 700 GW.

**Figure 1-1 Distribution of Wind Power Resources in China**



Source: China Wind Energy Network.

### 1.2 History and Achievements of Wind Power Generation Introduction

1) History of Wind Power Generation Introduction

The history of China's introduction of wind power generation plants connected to the power grid can be divided into the following three phases:

① 1986-1993 Initial Pilot Program Phase

In this phase, China implemented pilot programs to build small wind power generation plants using official development assistance and loans from foreign governments. China's first wind power

[1] These regions including lakes and other special landscapes are rich with wind power resources.

generation plant connected to the power grid was the Rongcheng Wind Farm in Shandong Province, which launched operations in April 1986. The plant consisted of three 55kW wind turbines made in Denmark. In October 1986, four 200 kW wind turbines were granted by the Belgian government and installed in Pingtan, Fujian Province. As foreign government loans to China increased in and after 1998, such regions as Inner Mongolia, Xinjiang Uygur, Liaoning, Guangdong, Jilin and Zhejiang positively introduced wind power generation equipments from overseas to build power plants[2]. In the meantime, the Chinese government provided partial financial support for investments in wind power generation projects and for research and development of relevant equipments.

② 1994-2003 Wind Power Generation Industry Development Phase

In this phase, the then Ministry of Electricity developed a system for purchases of all electricity generated by wind power plants in 1994. Under this system, wind power electricity prices were calculated to cover production costs and reasonable profit. These prices' excess over the average electricity wholesale price for a regional power grid was shouldered by power companies for the region and the relevant province. This system prompted new wind power generation capacity to expand year by year between 1994 and 1997. Capacity for wind power plants built in 1997 alone exceeded that for all such plants constructed before the year, growing 194.3% from the previous year. Later, however, China introduced the principle of market mechanism into the electricity market and put an end to the wind power electricity pricing system developed by the Ministry of Electricity in 1994. The elimination of incentives for the introduction of wind power generation led China's wind power generation market to enter a phase for slower growth in 1998.

③ Phase for Larger-Scale Wind Power Resources Development and Domestic Production of Equipments from 2003

In 2003, the National Development and Reform Commission conducted its first ever assessment of wind power resources throughout China using meteorological data and selected wind power plant locations based on geological, transportation and power grid conditions. Based on the nationwide survey on wind power resources, the National Development and Reform Commission initiated wind power concession projects in the same year[3]. The projects are designed to select wind power project investors through competitive tenders regarding their power sales costs and the Chinese content of wind power generation facilities. The government aims to reduce wind power generation costs by taking advantage of such concession tenders to expand the scales of wind power development projects and improve domestic technologies for wind power generation facilities.

[2] Xinying (2006), "Present Situation and Outlook of China's Wind Power Development," *Overseas Electricity March 2006*, Japan Electric Power Information Center.
[3] Under the concession project that amounts to the Chinese version of the private finance initiative (PFI), special permits are given for development of state-owned resources and government-controlled infrastructure construction.

From the initiation in 2003 to June 2008, open tenders were implemented for wind power generation projects totaling 3.4 GW in five phases. As indicated by Table 1-1, the total capacity quintupled from 200 MW for Phase 1 wind power concession projects in 2003 to 950,000 kW for Phase 5 projects in 2007, signaling the great potential of China's wind power generation. Central government-led wind power concession projects that entered commercial operations by the end of December 2007 accounted for about 815 MW or 23.9% of the total capacity.

In February 2005, China adopted the Renewable Energy Law for implementation in January 2006, establishing a basic framework for the development, investment and promotion in renewable energy. Later, administrative instructions regarding the Renewable Energy Law were worked out as explained below, becoming a driving force for the promotion of renewable energy introduction.

**Table 1-1 1st-5th-Phase Wind Power Concession Projects and Progress (as of December 2007)**

| Phase | Year | Wind Power Concession Project | Capacity (MW) | Capacity in operation (MW) |
|---|---|---|---|---|
| Phase 1 | 2003 | Jiangsu Rudong Wind Power Station I | 100 | 100 |
| | | Guangdong Huilai Shibeishan Power Station | 100 | 100 |
| Phase 2 | 2004 | Jiangsu Rudong Wind Power Station II | 150 | 150 |
| | | Jilin Tongyu Tuanjie Wind Power Station | 400 | 200 |
| | | Inner Mongolia Huiteng Xile Wind Power Station | 200 | 200 |
| Phase 3 | 2005 | Jiangsu Dongtai Wind Power Station | 200 | Under construction |
| | | Jiangsu Dafeng Wind Power Station | 200 | 50 |
| | | Gansu Anxi Wind Power Station | 100 | 15 |
| Phase 4 | 2006 | Inner Mongolia Ximeng Huitengliang Wind Power Station | 600 | Under construction |
| | | Inner Mongolia Baotou Bayin Wind Power Station | 200 | Under construction |
| | | Hebei Zhangbei Danjinghe Wind Power Station | 200 | Under construction |
| Phase 5 | 2007 | Inner Mongolia Niaolan Yiligeng Wind Power Station | 300 | Under construction |
| | | Inner Mongolia Tongliao Beiqinghe Wind Power Station | 300 | Under construction |
| | | Hebei Shangde Yudaokou Wind Power Station | 150 | Under construction |
| | | Gansu Yumen Changma Wind Power Station | 200 | Under construction |
| Total | | | 3400 | 815 |

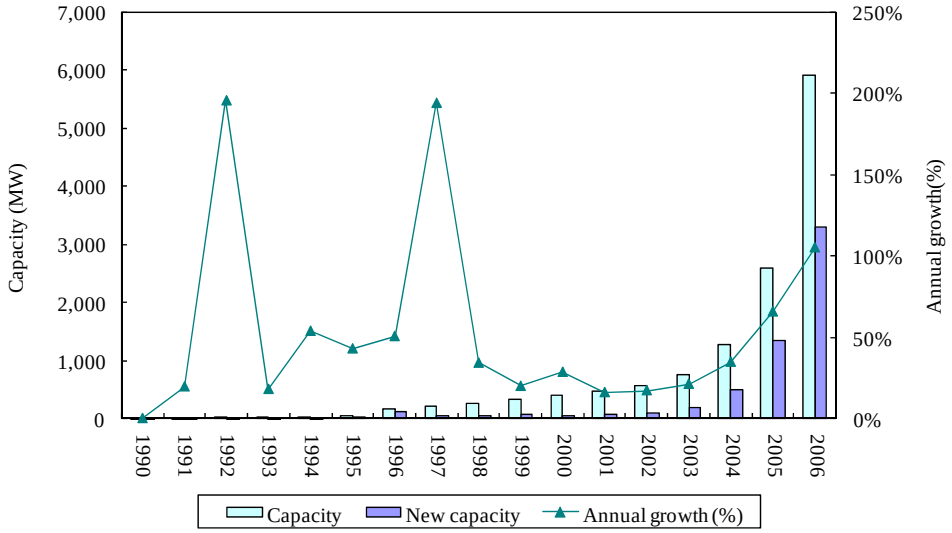
Sources: China Wind Power Generation Technology Information Network, media reports.

2) Present Situation of Wind Power Generation

Under the legal system development as described above, China's wind power generation capacity increased from 567 MW in 2003 to 5.906 GW in 2007. Annual growth averaged 79.7%. In 2006 and 2007, annual growth exceeded 100%. In 2007, particularly, annual growth reached 127.2%, the highest rise since 2000 (see Figure 1-2).

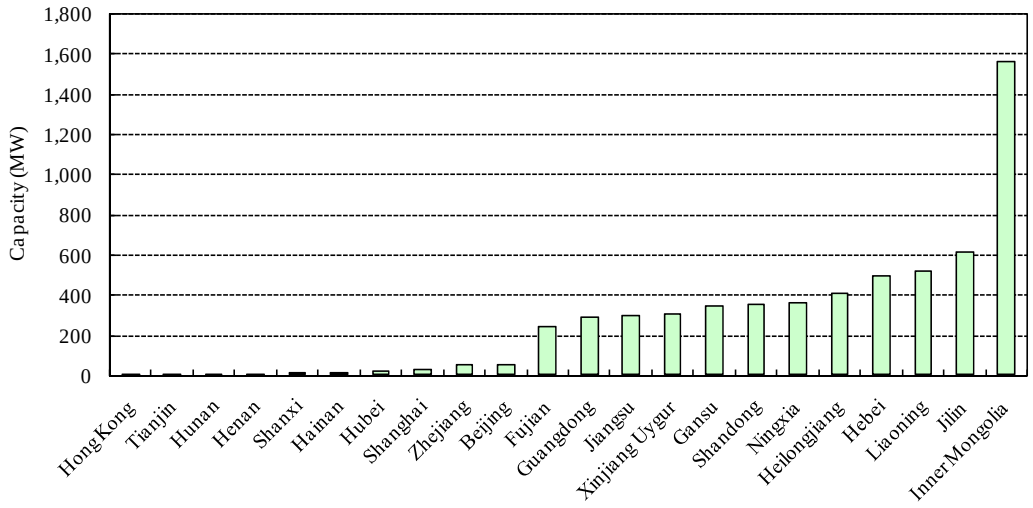
By the end of 2007, a total of 158 wind power plants were built in 21 provinces. Inner Mongolia features the largest wind power generation capacity among autonomous regions and provinces in China, followed by Jilin, Liaoning, Hebei and Heilongjiang. The five account for 60% of China's total wind power generation capacity, indicating that China's wind power resources development has been concentrated in the three northern regions (see Figure 1-3).

**Figure 1-2 Changes in Wind Power Generation Capacity (1990-2007)**




Sources: China New Energy Network, China Wind Energy Association.

**Figure 1-3 Province-by-Province Wind Power Generation Capacity (at end of 2007)**




Sources: “China’s Wind Power Installation Capacity Statistics 2007,” China Wind Energy Association.

## 2. China’s Institutional Development Regarding Wind Power Generation

This chapter analyzes the institutional development regarding wind power generation, the legal system development regarding the wind power generation equipment industry and other factors behind China's fast wind power generation capacity development from 2005 and behind the revision

of the wind power generation target for 2010 in the 11th Five-Year Renewable Energy Development Plan as released in March 2008.

### 2.1 Legal System Development Regarding Wind Energy

1) *Renewable Energy Law* (Implemented since January 2006)

The largest factor behind China's rapid wind power generation development since 2005 is the Renewable Energy Law that took effect in January 2006. The National People's Congress Standing Committee passed the law in February 2005 for effectuation in January 2006. The law gave energy policy priority to the development and utilization of renewable energy and required power utilities to purchase electricity generated with renewable energy. The law provides that the State Council's price regulatory department may approve renewable energy electricity purchase prices (wholesale prices), or grid connection tariffs of renewable energy power generation projects, in consideration of the promotion of renewable energy development and utilization. It also provides that extra costs for purchasing renewable energy-based electricity and grid connection for transmitting such electricity may be passed on to retail electricity charges. After the passage, a series of regulations for the enforcement of the Renewable Energy Law were established later.

2) *Administrative Provisions for Renewable Energy Power Generation* (Implemented in January 2006)

In January 2006, the National Development and Reform Commission promulgated the Administrative Provisions for Renewable Energy Power Generation. The provisions specify the standards for administration of renewable energy power generation and the roles of power generation and grid enterprises[4] in the development and utilization of renewable energy. Key points of the provisions follow.

**Table 2-1 Outline of Administrative Provisions for Renewable Energy Power Generation**

| Chapter | Key points |
|---|---|
| Chapter 2<br>Project Management | - The National Development and Reform Commission is responsible for approving or reviewing hydropower projects along major rivers, hydropower projects with an installed capacity of at least 250 MW, and wind power generation projects with an installed capacity of at least 500 MW. Other projects are subject to approval at the provincial level.<br>- The biomass power generation, geothermal power generation and oceanic energy power generation projects requiring state policy and fund support should be filed to the National Development and Reform Commission for approval. |

[4] In December 2002, China separated power generation from power transmission and distribution. At present, power generation enterprises undertake power generation alone. Power grid companies take charge of power transmission, distribution and retail services.

| | |
|---|---|
| | - Grid connection tariffs of renewable energy power generation projects should be set by the price regulatory department of the State Council according to the characteristics of different types of renewable energy power generation and the circumstances of different localities under the principle of promoting renewable energy development and utilization and securing economic rationality (the price approval system). The price is subject to timely adjustment and publication based on the renewable energy development and utilization technology development.<br>- The grid connection tariff of renewable energy power generation projects under the bidding scheme should be the price determined in the bidding process. The extra costs incurred by the power grids in purchasing and selling renewable energy electricity other than hydropower should be allocated to electricity users across the country subject to specific measures to be formulated. |
| Chapter 3<br>Power Grid Enterprise Responsibilities | - A provincial and higher-level power grid enterprise should formulate a renewable energy power generation associated power grid facilities construction plan according to a medium and long-term renewable energy power generation plan of a provincial or higher-level government and incorporate it into the national and provincial power grid development programs.<br>- Power grid enterprises should vigorously undertake power grid design and research according to the planning requirements, and conduct power grid construction and renovation based on the progress and needs of renewable energy power generation projects to ensure supply of electricity to power grids at full load.<br>- Power grid enterprises are responsible for the construction and management of systems for their connection with renewable energy power generation projects.<br>- The power grid enterprises are responsible for performing measurement and statistics of renewable energy power generation output purchased. The provincial power grid enterprises should summarize and report the statistics to the energy regulatory department of a provincial government prior to January 20 each year. |
| Chapter 4<br>Power Generation Enterprise Responsibilities | - Power generation enterprises should vigorously invest in and construct renewable energy power generation projects, and assume the obligation imposed by the state on renewable energy power generation quotas. Power generation quotas and administrative measures are subject to separate provisions.<br>- Power generation enterprises should install acceptable power generation metering systems and report to the energy regulatory department of a provincial government on the previous year's installed capacity, power production and supply to power grids before January 15 each year. |

Source: Administrative Provisions for Renewable Energy Power Generation, Website of National Development and Reform Commission.

3) *Provisional Administrative Measures on Pricing and Cost Sharing for Renewable Energy Power Generation* (Implemented from January 2006)

The Provisional Administrative Measures on Pricing and Cost Sharing for Renewable Energy Power Generation provides for how to calculate prices and share costs for renewable energy

power generation as approved by the government in and after January 2006. Their key points are summarized in Table 2-2.

**Table 2-2 Outline of Provisional Administrative Measures on Pricing and Cost Sharing for Renewable Energy Power Generation**

| Chapter | Key Points |
|---|---|
| Chapter 1. General Principles | - The scope of application of the Measures includes wind, biomass, solar, geothermal and ocean power generation. Prevailing regulations on hydropower tariff are still in effect.<br>- Tariffs for renewable energy power generation are categorized into the Government Fixed Price and the Government Guidance Price. The Government Guidance Price refers to the awarded tariff of the bid winner through competitive tendering.<br>- The incremental cost of renewable energy power generation over the standard wholesale price for desulphurizating coal-fired generating units shall be shared among the sales volume of electricity in power grids at the provincial and above level. |
| Chapter 2. Pricing of Electricity | - The Government Guidance Price applies to wind power generation and the pricing standards will be determined through bidding.<br>- For biomass power generation projects where the government fixed price applies, the price standard shall be the combination of the standard wholesale price for desulphurizating coal-fired generating units in 2005 in respective provinces and a subsidy price of 0.25 yuan/kWh. For a biomass power generation project subject to competitive bidding, the bid winner's price shall apply. But the price shall not be higher than the local standard wholesale price.<br>- The Government Fixed Price applies to solar, ocean and geothermal power generation projects and the price standard shall be determined under the principle of reasonable costs plus reasonable profits by the price authorities of the State Council. |
| Chapter 3. Cost sharing mechanism | - The incremental cost for purchasing renewable energy power generation by power grid companies will be settled via tariff surcharge levied on electricity end-users nationwide. |

Source: "Provisional Administrative Measures on Pricing and Cost Sharing for Renewable Energy Power Generation," Website of the National Development and Reform Commission.

4) *Tentative Management Method for Renewable Energy Development Special Fund* (Implemented on May 30)

In June 2006, China's Ministry of Finance issued the Tentative Management Method for Renewable Energy Development Special Fund (hereinafter referred to as the tentative management method), offering additional measures to enhance support for renewable energy development. The tentative management method provides for the special fund's assistance priorities, applications for assistance, their screening and approval, financial management, tests and control, etc. Specifically, the method has allowed the central government to provide financial assistance for the development of renewable energy for oil substitutions and construction areas, and of wind power, solar and other renewable energy sources for power generation.

The special fund provides grants and subsidies covering interest on loans, giving priority to the development and utilization of three major renewable energy sources -- (1) renewable energy sources as high potential and promising oil substitutions, (2) renewable energy sources related to heat supply and air conditioning for buildings, and (3) renewable energy sources for power generation. More specifically, priority is given to the diffusion of solar and geothermal energy for heat supply and air conditioning for buildings, and to the diffusion of application of wind, solar and marine energy for power generation.

5) Medium to Long-term Renewable Energy Development Plan（hereinafter referred to as the medium to long-term development plan）(August 2007)

In August 2007, the Chinese government released the Medium to Long-term Renewable Energy Development Plan which aims to increase renewable energy's share of total energy consumption to 10% in 2010 (from 7.5% in 2005) and 16% in 2020 (see Table 2-3). The plan treats wind power generation as a key renewable energy source and sets medium to long-term wind power development goals through 2020.

**Table 2-3 Goals under Medium to Long-term Renewable Energy Development Plan**

| | 2005 | 2010 | 2020 |
|---|---|---|---|
| Renewable energy's share of total energy consumption | 7.2% | 10% | 16% |
| Annual renewable energy consumption | 160 million tons standard coal equivalent | 270 million tons standard coal equivalent | 530 million tons standard coal equivalent |
| Renewable energy's share (excluding hydropower) of total power generation | - | 1% | 3% |
| Hydropower generation capacity | 117 m. kW | 180 m. kW | 300 m. kW |
| Wind power generation capacity | 1.26 m. kW | 5.00 m. kW | 30.00 m. kW |
| Biomass power generation capacity | 2.00 m. kW | 5.50 m. kW | 30.00 m. kW |
| Annual methane gas consumption | 8 b. cubic meters | 19 b. cubic meters | 40 b. cubic meters |
| Photovoltaic power generation capacity | 70,000 kW | 300,000 kW | 1.8 m. kW |
| Solar water heaters' heat collection area | 80 m. square meters | 150 m. square meters | 300 m. square meters |
| Annual bioethanol consumption | 1.02 m. tons | 2.00 m. tons | 10.00 m. tons |

Source: "Medium to Long-term Renewable Energy Development Plan," Website of the National Development and Reform Commission.

**Table 2-4 Wind Power Generation Development Goals under Medium to Long-term Renewable Energy Development Plan**

| Item | Contents | | Notes |
|---|---|---|---|
| | FY | Goal | |
| Capacity | 2010 | 5 GW | ① Some 30 large wind power plants of the 100 MW class will be built.<br>② Jiangsu, Hebei and Inner Mongolia each will develop wind power bases for a total capacity of 1 GW. |
| | 2020 | 30 GW | ① Guangdong, Fujian, Jiangsu, Shandong, Hebei, Inner Mongolia, Liaoning, Jilin and other regions that are ready to develop large-scale wind farms will become large wind power generation regions with capacity at 2 GW each.<br>② A large wind power generation base of the 1 GW class will be developed at each of six points -- Xinjiang Daban, Gansu Yumen, Suhu Coast, Inner Mongolia Huitengxile, Hebei Zhangbei, and Jilin Baicheng.<br>③ Large offshore wind power generation facilities of the 1 million kW class will be built. |
| New installed generation capacity | 2020 | 29 GW | Total investment at 200 billion yuan |
| Equipment production | 2010 | Developing equipment production capacity mainly for domestic production | |
| | 2020 | Developing domestic equipment production capacity based mainly on independent intellectual property rights | |

Note: 1 yuan is about 16 yen.
Source: "Medium to Long-term Renewable Energy Development Plan," Website of the National Development and Reform Commission.

In order to achieve the renewable energy introduction goals in Table 2-3, the government plans to take the following measures:

- Implementing a mandatory quota system
  - Renewable energy's share of total power generation should rise to 1% by 2010 and 3% by 2020.
  - Power generators with capacity of at least 5 GW will be required to increase renewable energy's share of total power generation to 3% (excluding hydropower) by

2010 and to 8% or more by 2020.

- Renewable energy control rules will be strictly implemented for power grid operators.
- Oil firms will be required to sell gasoline containing bioethanol or biodiesel.
- Policies for renewable energy development goals will be worked out and developed.
- Relevant fiscal spending will be expanded with tax incentives being implemented.

6) Management Method for Power Grid Enterprises' Purchasing of Renewable Energy Electricity (Implemented on September 1, 2007)

In July 2007, the State Electricity Regulatory Commission (hereinafter referred to as the regulatory commission) issued the "Management Method for Power Grid Enterprises' Purchasing of Renewable Energy Electricity." Earlier, power grid enterprises were required to purchase all renewable energy electricity without any relevant administrative system. The method has established an administrative system to monitor power grid enterprises' purchasing of renewable energy electricity.

The method provides for the regulatory commission's supervision and management duties, measures and legal responsibilities regarding power grid enterprises' purchasing of renewable energy electricity. The method is outlined in Table 2-5.

**Table 2-5 Outline of "Management Method for Power Grid Enterprises' Purchasing of Renewable Energy Electricity"**

| Chapter | Key Points |
|---|---|
| Chapter 2 Administration Duties | ・ Supervise and manage power grid enterprises' plans for construction work and to accept renewable energy power generation projects.<br>・ Supervise and manage connections between renewable energy power generation units and power grids.<br>・ Supervise and manage power grid enterprises' grid connection services for renewable energy power generators.<br>・ Supervise and manage the implementation of power dispatching order giving priority to renewable energy power generation.<br>・ Supervise and manage safety of renewable energy power generation.<br>・ Supervise and manage power grid enterprises' purchasing of all renewable energy electricity.<br>・ Supervise and manage settlement of costs for renewable energy.<br>・ Supervise and manage recording and keeping of data about utilities' renewable energy power generation. |
| Chapter 3 Supervision and Management Measures | ・ Provincial power grid enterprises and renewable energy power generators shall submit reports to relevant local power administrations by the 20th day of every month about renewable energy electricity transfer to power grids, wholesale prices and settlements of prices for the previous month. Simultaneously, provincial power grid enterprises shall report on premium charges and rationing transactions for renewable energy electricity.<br>・ Power grid enterprises shall provide information to renewable energy |

| | |
|---|---|
| | power generators about amounts of renewable energy electricity transferred to power grids, electricity charges, periods of time where renewable energy electricity failed to be transferred to power grids, estimated amounts of renewable energy electricity that failed to be transferred to power grids, specific causes of such failure, and improvements by power grid enterprises.<br>・ The State Electricity Regulatory Commission, based on law, shall inspect power grid enterprises, renewable energy power generators and power dispatching entities. |

Source: "Management Method for Power Grid Enterprises' Purchasing of Renewable Energy Electricity," Website of the National Development and Reform Commission.

7) Energy-Saving Power Generation and Power Dispatch Method (pilot program) (August 2007)

The National Development and Reform Commission, the State Environmental Protection Administration and the State Electricity Regulatory Commission jointly decided on and issued the Energy-saving Power Generation and Power Dispatch Method (for test implementation) in August 2007.

The Method gives priority to renewable energy power generation, sets a priority order for power generation methods in accordance with energy consumption and pollutant emissions, and places power dispatch priority on methods in the order of lower energy consumption and pollutant emissions. It is thus designed to reduce energy resources consumption and pollutant emissions. But no revision to wholesale electricity prices is planned. The method will be first examined in the five provinces of Sichuan, Guizhou, Guangdong, Jiangsu and Henan. The method's priority order regarding power dispatching is given in Table 2-6.

**Table 2-6 Priority Order for Energy-Saving Power Generation and Dispatch**

| Priority Order | Electric Power Source |
|---|---|
| 1 | Wind power, solar photovoltaics, marine energy, conventional hydropower (including small hydroelectric power plants) |
| 2 | Output-adjustable hydroelectric plants, biomass, geothermal energy, waste-based power generation meeting environmental conservation standards |
| 3 | Nuclear power generation |
| 4 | Coal cogeneration, residual heat power generation, residual pressure power generation, waste-coal power generation and other power generation methods for integrated utilization of resources |
| 5 | Natural gas power generation, integrated coal gasification combined cycle units |
| 6 | Other coal-fired power generation |
| 7 | Oil-fired power generation |

Source: "Energy-Saving Power Generation and Dispatch Instruction Method (pilot program)," Website of the State Council.

8) 11th Five-Year Renewable Energy Development Plan (March 2008)

The National Development and Reform Commission announced the 11th Five-Year Renewable Energy Development Plan in March 2008, specifying renewable energy development

goals and priority areas for promotion between 2006 and 2010.

In September 2007, the Chinese government released the Medium to Long-term Renewable Energy Development Plan, providing for renewable energy introduction goals between 2010 and 2020. The recently released 11th Five-Year Renewable Energy Development Plan, though basically in line with the medium to long-term plan, remarkably revised the wind power generation goal for 2010 upward from 5 GW in the medium to long-term plan to 10 GW, and specified sites for and sizes of wind power plants for development, and other relevant numerical goals (see Table 2-7). On technologies for production of wind power generation facilities to promote wind power generation, the five-year plan called for achieving domestic production of 1,500 kW or larger onshore generation units and 3,000 kW offshore units by 2010.

**Table 2-7 Distribution of Wind Power Plants for Construction under 11th Five-Year Plan**

| Priority-based category | Province (city or autonomous region) | Capacity（10,000 kW） | | Project location |
|---|---|---|---|---|
| | | Completed or under construction | In operation | |
| Top priority location | Hebei | 300 | 200 | Zhangjiakou, Chengde, Huanghua, etc. |
| | Inner Mongolia | 400 | 300 | Huitengxile, Huitengliang (Ximeng), Dali, Damao, Tongliao, Bayan Nur, etc. |
| | Jiangsu, Shanghai (coast) | 200 | 100 | Jiangsurudong, Dongtai, Dafeng, Qidong and other wind farms; Shanghai Chongming, Nanhui and other wind farms; model coastal wind power generation projects in Jiangsu and Shanghai |
| | Gansu | 400 | 100 | Yumenchangma, Anxi, Baiyin, etc. |
| | Jilin | 100 | 50 | Taonan, Taobei, Tongyu, Shuangliao, Changling, etc. |
| | Liaoning | 100 | 50 | Fuxin, Changtu, Kangping, etc. |
| | Xinjiang | 100 | 40 | Dabancheng, Alashankou, etc. |
| | Subtotal | 1,600 | 840 | |
| Ordinary priority location | Shandong | 60 | 20 | Jimo, Qixia, Weihai, Dongying, etc. |
| | Guangdong | 60 | 30 | Huilai, Nanao, Lufengjiadong, Xuwen, Chuandao, etc. |
| | Ningxia | 50 | 30 | Helanshan, Zhongning, etc. |
| | Fujian | 40 | 20 | Pingtan, Putian, Zhangpu, Gulei, etc. |
| | Heilongjiang | 20 | 10 | Jiamusi, Yilan, etc. |
| | Zhejiang | 25 | 10 | Daishan, Cangnan, Cixi, etc. |
| | Shanxi | 25 | 10 | Zuoyun, Youyu, Shenchi, etc. |
| | Subtotal | 280 | 130 | |
| Other locations | | 120 | 30 | |
| Total | | 2,000 | 1,000 | |

Source: “11th Five-Year Renewable Energy Development Plan,” Website of the National Development and Reform Commission.

9) Other Administrative Instructions under Planning

In addition to the above administrative instructions that have been released, six other packages of such instructions are planned (see Table 2-8).

**Table 2-8 Regulations for Implementation of Renewable Energy Law (as of June 2008)**

| Announced | Under planning |
|---|---|
| ・ Administrative Provisions for Renewable Energy Power Generation<br>・ Provisional Administrative Measures on Pricing and Cost Sharing for Renewable Energy Power Generation<br>・ Tentative Management Method for Renewable Energy Development Special Fund<br>・ Medium to Long-term Renewable Energy Development Plan<br>・ Management Method for Power Grid Enterprises' Purchasing of Renewable Energy Electricity<br>・ Energy-Saving Power Generation and Power Dispatch Method (pilot program)<br>・ 11th Five-Year Renewable Energy Development Plan | ・ Hydroelectric Power Generation Provisions Applicable to the Renewable Energy Law<br>・ Regulations for Renewable Energy Resources Surveys and Technologies<br>・ Financial Assistance Measures for Promotion of Renewable Energy in Rural Regions<br>・ Low Lending Rate and Tax Incentive Policy<br>・ Regulations for Integration of Solar Energy Systems with Buildings<br>・ Standards for Technologies for Connection of Renewable Energy Generation Systems with Power Grid |

**2.2 Legislative Developments Regarding Manufacturers of Wind Power Generation Facilities**

1) Notice on Wind Power Generation Facility Construction and Management Requirements (July 4, 2005)

China had depended almost fully on imports for wind power generation facilities until 2005. In July 2005, the National Development and Reform Commission released the Notice on Wind Power Generation Facility Construction and Management Requirements, specifying the domestic content of 70% or more as one of standards for approval of wind power generation plants and subjecting imported facilities to tariffs.

The notice prompted foreign makers of wind power generation facilities to transfer relevant technologies to their Chinese counterparts, contributing much to improving these Chinese firms' technological capabilities and expanding a market for them.

2) Renewable Energy Industry Development Instruction List (November 29, 2005)

In November 2005, the National Development and Reform Commission released a list of 88 items for utilization of renewable energy and types of relevant equipments in a bid to promote relevant government agencies' preparation of renewable energy support measures, research and development at laboratories and enterprises, and instructions on investment and construction. The measures included 23 items for wind power.

3) Notice on Adjustments Regarding Import Tariffs for Large-output Wind Power Generation Units, Their Main Components and Raw Materials (Implemented from January 1, 2008)

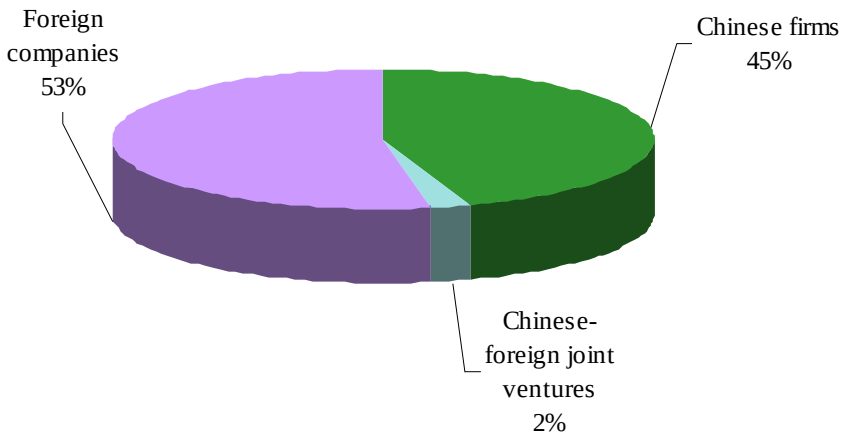
In April 2008, the Chinese Ministry of Finance announced the Notice on Adjustments Regarding Import Tariffs for Large-output Wind Power Generation Units, Their Main Components and Raw Materials, deciding to refund import tariffs and phased import value added taxes for main components and raw materials for Chinese firms' development and production of large-output (1,200kW or more) wind power generation units and repeal tax incentives for purchases of certain wind power generation units. The notice is retroactive to January 1, 2008. As from May 1, tax incentives were repealed for 2,500 kW or smaller wind power generation units to be imported by newly approved domestic or foreign projects. Until November 1, however, the State Council's notice on a review of the imported equipment tax policy (implemented since January 1, 1998) will apply to these units to be imported by projects approved before May 1.

The Ministry of Finance notice is designed to improve China's domestic wind power generation equipment manufacturing capabilities and raise technology levels from those for 600, 750 and 850 kW units to those for 1,500 kW or larger units.

As the above legislative developments for the wind power generation equipment manufacturing industry have been designed to promote transfers of advanced foreign equipment technologies to China, Chinese wind power turbine manufacturers have steadily expanded their market shares. According to the China Wind Energy Association, there were 44 wind power turbine manufacturers in China, including 19 Chinese firms, five Chinese-foreign joint ventures and 20 foreign companies.

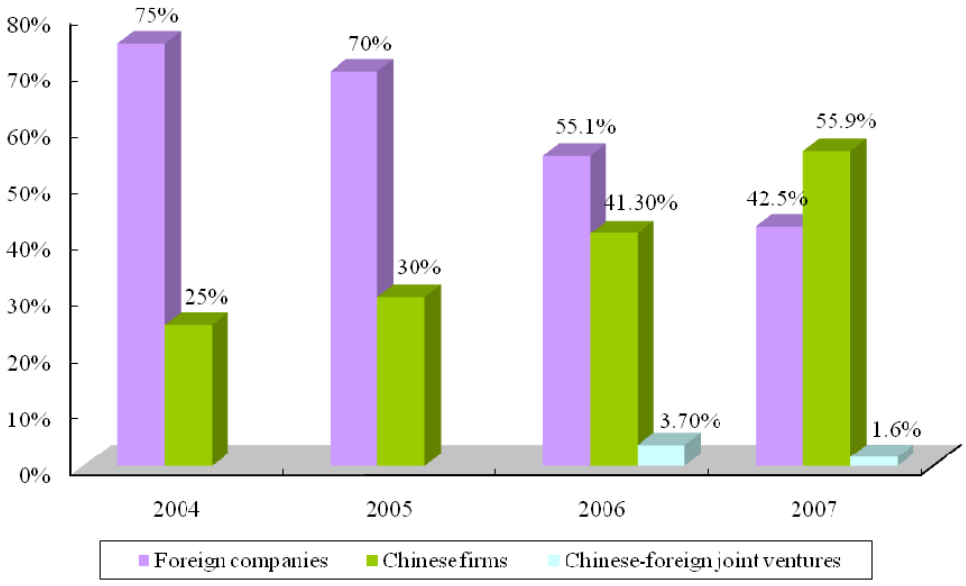
Chinese firms expanded their share of China's wind power generation equipment market in 2007 to 44.8% from 30.8% in the previous year. The share fell to 2.3% from 3.3% for Chinese-foreign joint ventures and to 52.8% from 65.9% for foreign companies (see Figure 2-1). Chinese firms also increased their share of the market for newly built units to 55.9% in 2007 from 41.2% in the previous year. The share shrank to 1.6% from 3.7% for Chinese-foreign joint ventures and to 42.5% from 55.1% for foreign companies. Chinese firms are thus expected to substantially increase their market share in the future (see Figure 2-2).

**Figure 2-1 Chinese Wind Power Generation Equipment Market Shares (2007)**




Source: "2007 China Wind Power Plant Equipment Capacity Statistics," China Wind Energy Association.

**Figure 2-2 Market Shares for Newly Built Wind Power Generation Units in 2007**

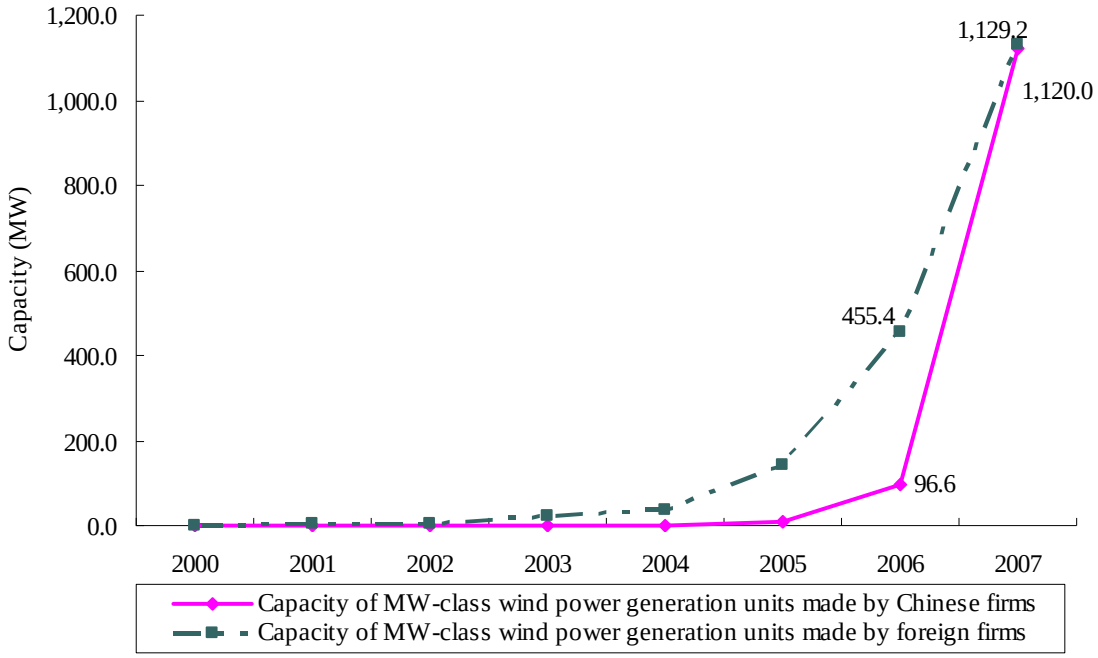



Sources: "Wind power generation: Third alternative power source in China," China power generation enterprise network; "2007 China Wind Power Plant Equipment Capacity Statistics," China Wind Energy Association.

In production of large wind power generation units with a capacity of 1,000 kW or more, foreign companies manufactured such units for a total capacity of 460 MW against only 97 MW for Chinese firms in 2006. In 2007, however, Chinese firms boosted their share of the market for megawatt-class wind power generation units fast to some 50% in 2007. Therefore, Chinese wind

power generation unit manufacturers are likely to play a central role in the market for large wind power generation units as well as less-than-1,000 kW units.

**Figure 2-3 Changes in Capacity of Megawatt-class Wind Power Generation Units in China (2000-2007)**




Source: "Wind Power Concession Projects," Shi Pengfei (presentation paper on May 27, 2008)

### 2.3 Other Factors

Factors behind fast growth in China's wind power generation market include the government's legislative developments as explained above for wind power energy and the wind power generation equipment industry. In addition, the Clean Development Mechanism (CDM) under the Kyoto Protocol can be cited as one of the indirect factors.

According to the database at the United Nations Environment Program (UNEP), a total of 202 Chinese projects were registered with the CDM Executive Board as of June 4, 2008, including 60 wind power generation projects (for a total capacity of 2.99 GW), which account for 30.7% of the total Chinese CDM projects and 45.5% of the world's total CDM wind power generation projects. CDM projects thus occupy a half of total capacity for existing Chinese wind power generators. In this way, China has taken advantage of the CDM under the Kyoto Protocol for accelerating the promotion of wind power generation projects further.

**Table 2-9 Breakdown of Chinese Projects Approved by CDM Executive Board (As of June 4, 2008)**

| Category | Number of registered projects |
|---|---|
| Hydropower | 69 |
| Wind power | 60 |
| Energy conservation | 19 |
| Biomass | 11 |
| Landfill gas | 10 |
| HFCs | 10 |
| N2O | 8 |
| CBM | 8 |
| Fuel conversion | 6 |
| Afforestation/reforestation | 1 |
| **Total** | **202** |

Source: UNEP Database.

## 3. Challenges in China's Wind Power Generation Market

### 3.1 Price Formation for Wind Power Generation

The history of China's wind power electricity price formation can be divided into two phases due to the Renewable Energy Law and relevant regulations implemented since 2006. The first phase (2003-2005) featured the coexistence of successful bid prices and government-approved ones. The second phase (from 2006) has featured successful bid prices plus government-approved premiums.

Between 2003 and 2005, electricity prices depended on successful bid prices for wind power concession projects implemented by the central government. For projects implemented by local governments, electricity prices were subject to approval by these governments. Since the Renewable Energy Law and the Provisional Administrative Measures on Pricing and Cost Sharing for Renewable Energy Power Generation were introduced in 2006, however, successful bid prices have been treated as generation costs for the government's approval of electricity prices for all wind power generation projects. The so-called government-suggested prices have been introduced.

The competitive tender system for wind power generation projects has played a major role in China's introduction and promotion of wind energy power generation. But the formation of prices through competitive tenders has impeded private sector and foreign companies from participating in the wind power generation market. In fact, tendering results for wind power concession projects show that private sector bidders won no government-led wind power development project other than the first phase (2003) (Huarui Corp. for the Jiangsu Rudong I project) (see Table 3-1). Most

successful bidders for 50,000 kW or smaller wind power development projects approved by local governments have been large state-run power generation and energy enterprises. This is because these large state-run power generation and energy enterprises have given priority to their acquisition of domestic renewable energy resources rather than profitability of projects over the past several years in anticipation of a Chinese-version RPS (renewables portfolio standard) law expected to emerge in the near future[5].

**Table 3-1 Successful Bid Prices and Bidders for Wind Power Concession Projects (2003-2007)**

| Year | Project | Proposed capacity (MW) | Accepted capacity (MW) | Successful bid price yuan/kWh | Lowest bid price yuan/kWh | Highest bid price yuan/kWh | Successful bidder |
|---|---|---|---|---|---|---|---|
| 2003 | Jiangsu Rudong I | 100 | 100 | 0.4365 | 0.4365 | 0.7191 | Huarui Corp. |
| | Guangdong Huilai | 100 | 100 | 0.5013 | 0.5013 | 0.7179 | Guangdong Yuedian Electric Power Corp. |
| 2004 | Jiangsu Rudong II | 100 | 150 | 0.5190 | 0.5190 | 0.5660 | A consortium of Longyuan Electric Power Group Corporation and Xiongya Co. |
| | Jilin Tongyu | 100 | 2×200 | 0.5090 | 0.5090 | 0.5096 | (1) A consortium of Longyuan Electric Power Group Corporation, Jilin Jineng Electric Power Ltd. and Xiongya Co.<br>(2) Huaneng New Energy Industrial Co. and China Huaneng Group Hong Kong Ltd. |
| | Inner Mongolia Huitengxile | 100 | 2×100 | 0.3820 | 0.3820 | 0.4260 | (1) A consortium of Beijing International Electric Power New Energy Co. and Beijing International Electric Power Development Investment Co.<br>(2) China Huadian Corporation |
| 2005 | Jiangsu Dongtai (Dafeng) | 200 | 2×200 | 0.5190 | 0.4600 | 0.5460 | (1) A consortium of Guohua Energy Investment Co. and China Shenhua Energy Co. (Dongtai Project)<br>(2) China Electric Power Investment Group Co. (Dafeng Project) |
| | Gansu Anxi Wind Power Plant | 100 | 100 | 0.4616 | 0.4616 | 0.5560 | Huanghe Hydropower Development Co. |
| | Shandong Jimo Wangcun | 100 | 150 | 0.6000 | 0.7261 | 0.7261 | Huadian International Electric Power Co. |
| 2006 | Inner Mongolia Ximeng Huitengliang | 300 | 2×300 | 0.4056 | 0.4058 | 0.5651 | (1) A consortium of Zhongguang Nuclear Energy Development Co. and Zhongguang Nuclear International Co.<br>(2) Beifang Lianhe Power Co. |
| | Inner Mongolia Baotou Bayin | 200 | 200 | 0.4656 | 0.4566 | 0.5550 | A consortium of Longyuan Electric Power Group Corporation and Xiongya Co. |
| | Hebei Zhangbei Danjing River | 200 | 200 | 0.5006 | 0.5006 | 0.6010 | A consortium of China Energy-Saving Investment Co. and Hong Kong Construction Co. |
| 2007 | Inner Mongolia Niaolan Yiligeng | 300 | 300 | 0.4680 | Unknown | Unknown | Xinjiang Jinfeng Science and Technology Co. |
| | Inner Mongolia Tongliao Beiqinghe | 300 | 300 | 0.5216 | Unknown | Unknown | Huarui Science and Technology Co. |
| | Hebei Shangde Yudaokou | 150 | 150 | 0.5510 | Unknown | Unknown | Huarui Science and Technology Co. |
| | Gansu Yumenchangma | 200 | 200 | 0.5206 | Unknown | Unknown | Dongfang Steam Turbine Works Corp. |

Note 1: 1 yuan is about 16 yen.

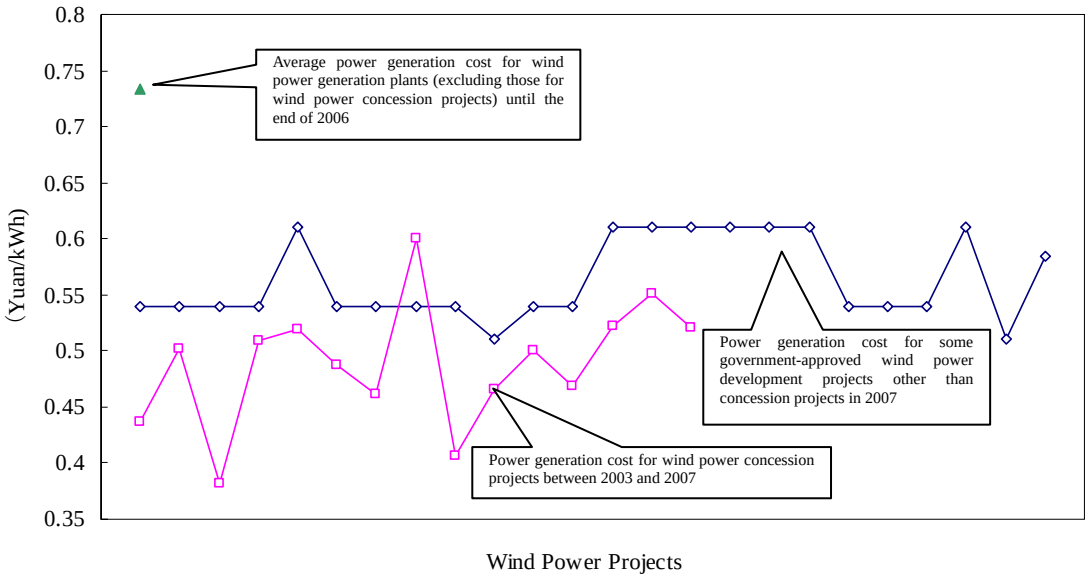
Note 2: Power generation prices in this table represent grid-connected power prices for the first 30,000 hours of operation for each generator. Prices after 30,000 hours are set at standard wholesale levels for local thermal power plants with desulfurization systems.

Note 3: In 2003 and 2004, successful bidders were lowest bidders. Since 2005, however, the weight for the bid price in screening has been revised downward gradually. The weight was lowered to 40% in 2005, 30% in 2006 and 25% in 2007. In 2007, the weight under bid-screening standards for wind power concession projects was set at 25% for the bid price, 35% for the local content of wind power generators, 20% for technological capabilities and 10% for financing capacity and financial profiles.

Sources: China Wind Energy Network and other media reports.

[5] Successful bid prices for Phase 4 (2006) and earlier wind power concession projects have generally been viewed as unusually low. In Phase 5 competitive tenders in 2007, however, the government dropped the lowest and highest bids from screening and lowered the weight of bid prices to 25% in screening, allowing successful bidders to fully cover power generation costs with revenues. These bidders still fall short of securing a reasonable internal rate of return between 8% and 10%.

**Figure 3-1 China's Wind Power Generation Prices**




Sources: Various media reports.

As noted earlier, the Medium to Long-term Renewable Energy Development Plan specified renewable energy electricity's target shares of total generation for power generation companies for the first time (an enterprise with a proprietary power generation capacity of 5 GW or more will be required to raise the share to 5% by 2010 and to 10% by 2020). If the target shares are institutionalized, large Chinese power generation enterprises will be obliged to achieve quantitative targets for renewable energy power generation.

Under the government policy, large power generation enterprises have intentionally offered low prices to exclude other bidders and win contracts even at the cost of profit because they have been able to get high returns on coal thermal and hydroelectric power generation (see Figure 3-1). Large power generation and energy enterprises have made huge investment in renewable energy sources over recent years under a business strategy giving priority to future requirements and long-term profit rather than to short-term profit. Meanwhile, small private sector companies have offered only reasonably profitable prices and have been effectively barred from taking part in the wind power generation market.

The establishment of low generation costs may not only exclude enterprises seeking reasonable business operations from the market but also prompt wind power generation enterprises to pass generation cost pressures on to the upstream sector. Wind power generation unit manufacturers may thus be affected. Chinese companies have just begun to commercially produce 750 and 850 kW wind power generation units through joint ventures and licensing agreements with foreign companies. At a time when the Chinese wind power generation unit market is growing, the formation of low wind power electricity prices in the downstream sector of the wind power

generation market may discourage generation unit manufacturers from stepping up R&D operations and prompt them to end up in short-term development in view of limited immediate profit.

The tender-based wind power electricity pricing mechanism may impede the diversification of wind power developers and the growth of wind power generation unit manufacturers. Therefore, wind power electricity price formation methods should be reconsidered further.

**3.2 Developing Ancillary Service Price System**

Since wind power generation, though clean, is unstable, power grid operators must provide ancillary services for on-grid wind power sources. So far, China has constructed small wind power generation plants mainly based on the conditions of existing power grids. These wind power generation plants provide the grid with limited electricity, having little impact on stable grid operations. Over recent years, an increase in large wind power plants is forcing grid operators to plan and construct new transmission lines. For power transmission and distribution enterprises, additional costs regarding wind power electricity purchase are for (1) transmission network construction, (2) ancillary services and (3) wind power electricity purchases. Under the Provisional Administrative Measures on Pricing and Cost Sharing for Renewable Energy Power Generation as discussed in Chapter 2, the first and third costs are covered. When transmission grids are constructed to connect wind power generators to the grid, the “premium charge for renewable energy” may cover 0.01 yuan/kWh for a distance of up to 50 kilometers, 0.02 yuan/kWh for a distance of 50 to 100 kilometers and 0.03 yuan/kWh for a distance of more than 100 kilometers. Under the premium charge system introduced for electricity retail prices in 2006, an additional 0.001 yuan/kWh is collected by regional power companies for management and distribution by the State Electricity Regulatory Commission. Similarly, the third costs are covered by the premium. The distribution of subsidies from the premium charge for renewable energy in 2006 and the first nine months of 2007 is shown in Tables 3-2 and 3-3.

As more large wind power generation plants are constructed, power grid enterprises may have to introduce an invalid power source compensation system and improve and expand existing grids. Therefore, China may have to consider the compensation for ancillary service costs for which no provision exists in the Provisional Administrative Measures on Pricing and Cost Sharing for Renewable Energy Power Generation.

**Table 3-2 Wind Power Generation Subsidies in Regions Rich with Wind Power Resources**

| Province | 2006 | | | 2007 (January-September) | | |
|---|---|---|---|---|---|---|
| | Capacity (MW) | Power generation (kWh) | Subsidies (10,000 yuan) | Capacity (MW) | Power generation (kWh) | Subsidies (10,000 yuan) |
| Hebei | 124.5 | 8,725 | 2,178 | 226.5 | 30,559 | 7,217 |
| Western Inner Mongolia | 49.5 | 14 | 4 | 289.5 | 1,389 | 2,866 |
| Jiangsu | 200 | 2,130 | 365 | 201 | 5,282 | 844 |
| Fujian | 76.2 | 11,015 | 1,707 | 121.8 | 10,265 | 1,769 |
| Jilin | 197 | 22,358 | 5,679 | 545.8 | 34,559 | 8,496 |
| Eastern Inner Mongolia | 275 | 11,300 | 3,085 | 270.5 | 33,768 | 8,004 |
| Heilongjiang | 160.8 | 6,655 | 1,686 | 190.8 | 13,340 | 3,379 |
| Xinjiang | 112.5 | 18,575 | 4,300 | 142.5 | 23,649 | 5,653 |
| Ningxia | 30.9 | 3,887 | 1,228 | 110.4 | 9,957 | 2,904 |
| Gansu | 61.2 | 2,002 | 579 | 207 | 10,075 | 2,701 |
| Shandong | — | — | — | 159.2 | 8,637 | 2,203 |
| Liaoning | — | — | — | 188.9 | 10,929 | 2,744 |

Source: Website for National Development and Reform Commission.

**Table 3-3 Subsidies for Connection of Wind Power Electricity Sources to Grid in Regions Rich with Wind Power Resource**

| Province | 2006 | | 2007 (January-September) | |
|---|---|---|---|---|
| | Capacity (MW) | Subsidies (10,000 yuan) | Capacity (MW) | Subsidies (10,000 yuan) |
| Western Inner Mongolia | 49.5 | 0.1406 | — | — |
| Fujian | 30 | 22 | 75 | 40 |
| Jilin | 49.3 | 30 | — | — |
| Eastern Inner Mongolia | 140 | 61 | — | — |
| Xinjiang | 30 | 2 | 60 | 57 |
| Ningxia | — | — | 79.5 | 59 |
| Gansu | — | — | 100 | 27 |
| Jiangsu | — | — | 54.5 | 39 |
| Henan | — | — | 15 | 40 |

Source: Website for National Development and Reform Commission.

### 3.3 Improvement of Preparations for Competitive Tender Projects

For some wind power concession projects, insufficient preparations for assessment of wind power resources have brought about various problems. In the case of the Jiangsu Rudong I project (2003), for example, only one wind observation tower was set up for a wind power resources survey. The accuracy of the survey was very low. Regarding the Jilin Tongyu project (2004), the successful bidder Huaneng New Energy Industrial Co. was instructed to develop a location that was different from the tender-related one and was not subject to a wind resources survey. As a result, a gap

emerged between the planned and actual power generation. For the Shandong Jimo project in 2005, a competitive tender came despite insufficient wind observation and land data. When the project reached the construction phase, a conflict of interest emerged regarding land utilization between this project and another. Eventually, the wind power development project was canceled. Such insufficient preparations have been seen for local government-led wind power development projects as well as concession projects. Preparations including wind power resources surveys are indispensable preconditions for developers' consideration of project stability and profitability. In the future, preparations will have to be made steadily and accurately.

As for on-site inspections of wind power plants upon their completion, inspection rules have remained unspecific. No specific countermeasures have been taken against developers that failed to meet bidding standards. Therefore, some developers' completed wind power generation units have been different from bid specifications. In the absence of a specific inspection and certification system for wind power generation units, their manufacturers are left to voluntarily inspect and certify these products. As a result, some domestic companies have put their units into the market without inspection or certification, forcing these units to suspend operations due to quality and technical performance problems.

As large wind power plants are constructed and as the market expands for domestic manufacturers of these plants, China will have to realize a specific on-site inspection system for wind power plants and require these plants to be inspected and certified in order to secure their sound operations.

## 4. Conclusion

In March 2008, the Chinese government announced the 11th Five-Year Renewable Energy Development Plan, revising upward its wind power generation capacity target for 2010. This report divided the background of the upward revision into three parts -- the government's wind power resources policy, its wind power generation equipment industry policy and indirect background factors -- and considered each part.

The Chinese government began to promote the introduction of wind power generation through wind power concession projects in 2003. It later implemented the Renewable Energy Law and relevant regulations to expand wind power generation rapidly. As a result, China's wind power generation capacity increased from 567 MW to 5.906 GW, the fifth largest in the world.

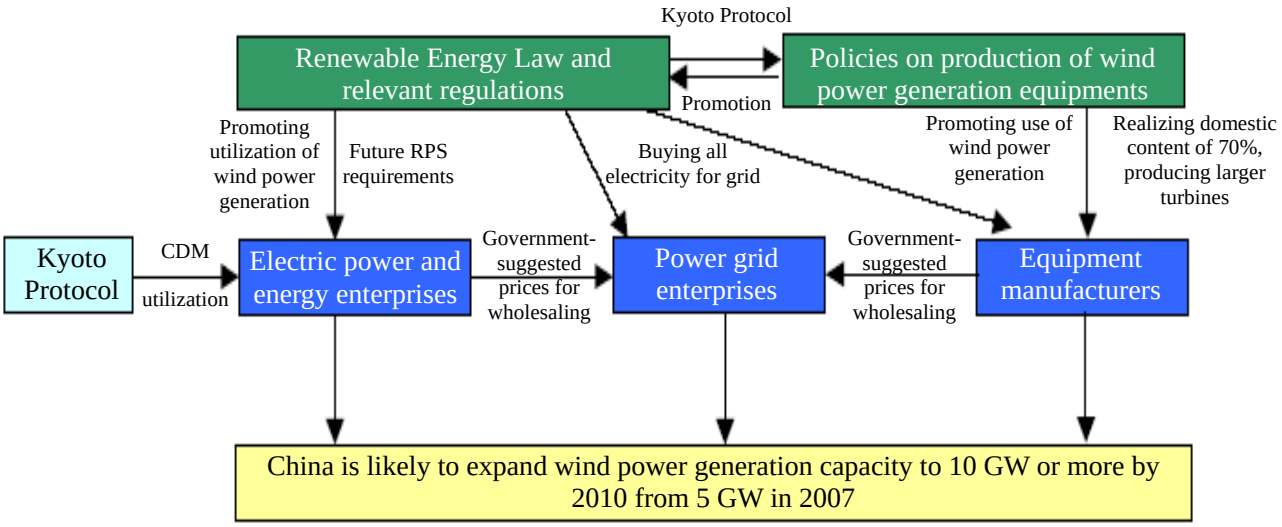
While expanding wind power generation capacity, the Chinese government has set the target domestic content of wind power generation facilities at 70% in a bid to develop domestic wind power turbine manufacturers. As a result, domestic firms' share of the market for newly built wind power generation facilities exceeded foreign companies' share in 2007 for the first time ever.

Domestic firms' share of the overall wind power generation equipment market in 2007 rose from 30.8% in the previous year to 44.8%, while foreign companies' share shrank from 65.9% to 52.8%. The share gap is expected to diminish soon. In the near future, domestic firms will take leadership in the wind power generation equipment market.

While no clear relationship has been seen between the development of China's wind power generation market and the Clean Development Mechanism, China's wind power generation projects registered with the CDM Executive Board account for 50.6% of the nation's wind power generation capacity. This demonstrates that China has taken advantage of the CDM for wind power resources development.

These factors can be illustrated in the following flowchart (Figure 4-1).

**Figure 4-1 Relationship between Wind Power-Related Systems and Market Players**




The Chinese government revised the wind power generation capacity target for 2010 in the 11th Five-Year Renewable Energy Development Plan, considering that the capacity that exceeded 5 GW in 2007 can be expected to reach or surpass 10 GW by 2010, given wind power plants under construction and planning.

While the Chinese wind power generation market has been expanding fast, China is required to normalize the market by resolving various challenges including the rationalization of wind power electricity prices, the security and maintenance of safe and stable grid operations amid an increase in large wind power plants, the improvement of wind power resources survey accuracy and the development of equipment inspection and certification systems.

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