

China Wind Power Update

by Christopher Flood, in Beijing

Despite a recent tide of positive news generated by the Chinese wind power industry, a deeper look reveals a large number of challenges facing both equipment manufacturers and project developers as the domestic industry continues to mature.

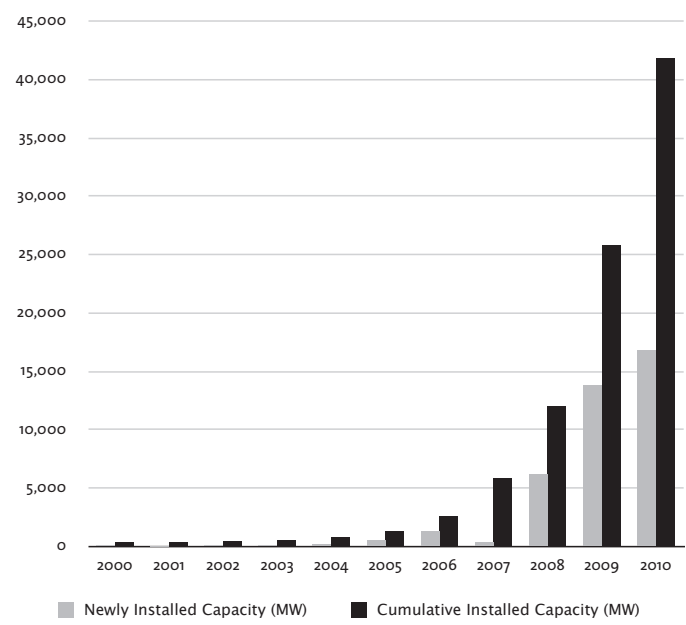
Days after the January announcement that China had surpassed the United States in 2010 as the world leader in installed wind power capacity, Sinovel, its largest wind turbine manufacturer, raised US\$1.4 billion in an initial public offering on the Shanghai Stock Exchange, pricing the offering at the top of the range. Just weeks earlier, Datang Renewable Power, China's second largest wind power generator by capacity, raised US\$643 million in its own Hong Kong IPO. The second half of 2010 also saw public offerings in Hong Kong by Shenzhen-listed wind turbine manufacturer Xingjiang Goldwind Science & Technology and on the New York Stock Exchange by China Ming Yang Wind Power Group, the country's largest non-state-owned turbine firm.

Away from the public markets, the news from the China Renewable Energy Industries Association that China had installed 16,800 megawatts of new wind generating capacity in 2010, for a total of 41,800 megawatts, was met with a mixture of surprise and resignation from those outside of the Chinese industry, as many observers predict China will dominate the world market for many years to come.

Continuing the trend, China's National Energy Administration has recently forecast that there will be 55,000 megawatts of total installed capacity in China by the end of 2011.

However, growth rates—while remaining far higher than any other major market—have slowed from the unsustainable doubling of the market for each of the five years from 2004 to 2009, to 61% last year and a projected 60% in 2011.

Table 1



Source: 2010 China Wind Power Outlook; the author

In addition, the People's Bank of China's recent monetary tightening, which began last fall, has increased pressure on highly leveraged developers who are now facing rising interest rates. Safety concerns are also being raised in the domestic market as a number of deaths and other accidents have recently been reported involving wind turbine technicians.

China is also facing challenges to its domestic innovation policies benefiting the wind sector. As reported in the January 2011 *NewsWire*, the United States has initiated dispute resolution proceedings at the World Trade Organization to challenge the legality of one of its wind turbine manufacturing subsidies, which is described in more detail below.

Other observers point to lingering concerns over grid connectivity for Chinese wind projects. In late February, the State Electricity Regulatory Commission, or the / continued page 2

Wind Power

continued from page 1

SERC, issued a report indicating that unused wind-generated electricity for the first six months of last year amounted to 2.8 billion kilowatt hours as a result of poor grid connections and transmission issues. Although the grid connection problem is not new to the Chinese wind sector, the news shows that the measures recently enacted to deal with the issue have been ineffective in the short run.

The difficulties facing Chinese equipment manufacturers are reflected in Sinovel's stock price, which is down more than 20% since its IPO on concerns over increased competition, declining turbine prices and slimmer margins in the domestic wind turbine sector. Although the market may to some extent simply be reacting to an overvalued offer price, it is telling that Goldwind is also down about 25% after its postponed offer raised only about half of the initial target.

Despite these and other issues facing the Chinese wind market, industry observers remain upbeat on the Chinese sector and see China as the key driver of global growth in the industry for the foreseeable future. Therefore, it is becoming increasingly important for wind industry participants from around the world to have an understanding of the factors driving the development of the Chinese market, its legal and policy framework and the dynamics of the market's major project developers and equipment manufacturers.

Policy Support

The foundation for the development of policy support to China's wind sector is the Renewable Energy Law, which was enacted in 2006 and amended in 2009. Consistent with lawmaking in most areas in China, the Renewable Energy Law serves as a framework allowing a number of government agencies to fill in the detail. It is supported by a large number of national, provincial and local policies, implementing regulations and technical standards.

As discussed in detail in the September 2010 issue of the *NewsWire*, the Renewable Energy Law covers four principal areas. First, it calls on the energy authority of the State Council (China's cabinet) to set renewable energy generation targets. Since the enactment of the Renewable Energy Law, the National Reform and Development Commission, or the NDRC, the government's principal economic planning agency, has set economy-wide targets for the reduction of energy and carbon intensity per unit of GDP and specific targets based on renewable energy technology.

However, the development of targets has not kept pace with the development of the market. To use only the most recent example, the target currently in place for wind generating capacity by 2020 (30,000 megawatts) was set only in 2008, but was surpassed in 2010 by a wide margin. The NDRC is reportedly now considering changes to the 2020 targets set out in Table 2, with some observers calling for a target of 230,000 megawatts or perhaps more by 2020.

Table 2

	2006 Actual	2009 Actual	2020 Current Target	2020 Proposed Target
Hydro power	130 GW	197 GW	300 GW	300 GW
Wind power	2.6 GW	25.8 GW	30 GW	150 GW
Biomass power	2 GW	3.2 GW	30 GW	30 GW
Solar PV	0.08 GW	0.4 GW	1.8 GW	20 GW

Source: Eric Martinot, 2010

The second key feature of the Renewable Energy Law is the mandatory market share provisions—known in some jurisdictions as a renewable portfolio standard—that require power companies to meet specified targets for producing power from renewable sources. The *Medium and Long-Term Plan for Renewable Energy Development* published by the NDRC in 2007 provides for an industry-wide requirement of 1% of total power generating capacity from non-hydro renewable energy by 2010, rising to 3% by 2020. On a generator-specific basis, every power company with a capacity of more than 5,000 megawatts must increase its share of installed non-hydro renewable energy capacity to 3% by 2010 and 8% by 2020.

A significant problem with basing the standard on installed capacity and not power generated is that the measures create distorted incentives. The actual performance of projects is not relevant to considering whether the targets have been met, which critics complain has led to inefficient investments. However, the binding effect of the targets has nonetheless created a powerful incentive for the big power generating firms to invest heavily in the development of the wind sector. This is a key reason for its enormous expansion in recent years.

/ continued page 3

Wind Power

continued from page 2

Third, the Renewable Energy Law requires that grid companies provide grid connections to renewable energy projects within the geographic scope of their grid systems and that they purchase all of the power generated by these projects. However, the reluctance of grid companies to comply with this provision has left, according to various estimates, between 20% and 30% of China's wind projects without a grid connection. This reluctance arose principally because of the cost of providing connections to projects located in remote regions. A large proportion of China's wind energy resources are concentrated in a narrow band of about 200 kilometers along its northern border, far away from its major population and industrial centers. As a result, the cost of extending grid connections is high, as is the risk to grid stability posed by the addition of new and potentially unstable capacity.

The 2009 amendments to the Renewable Energy Law attempted to address this issue through a number of measures discussed in the September 2010 *NewsWire*. However, these amendments are clearly either insufficient or need more time to take effect. As noted earlier, the February SERC report estimates that grid connection problems led to 2.8 billion kilowatt hours of lost electricity in the first six months of 2010 alone.

Finally, the Renewable Energy Law lays the foundation for the enactment of a series of financial incentives, cost sharing measures and pricing arrangements intended to support the economic viability of renewable energy projects and government support of technological development and grid expansion costs. On cost sharing, the main principle reflected in the law is that the incremental cost of renewable power is to be paid by the end user through an electricity surcharge.

Prior to August 2009, pricing for wind power projects was determined primarily on the basis of bid prices submitted in connection with the NDRC's national concession tender process. However, the national concession system was dominated by large state-owned firms that were driven by the mandatory market share requirements to acquire wind generating assets and large enough to be able to subsidize money-losing wind projects with revenue from conventional generating assets. The result was very low tariffs for wind projects, corner cutting by some concession winners under pressure to reduce costs and a low level of private (*i.e.*, non-state-owned) investment in the sector.

In August 2009, the government took a major step toward dealing with these pricing issues by introducing a national feed-in tariff for onshore wind projects. The FIT divides China into four regions based upon the quality of their respective wind resources. The tariffs per kilowatt hour are RMB 0.51 (US\$0.077), RMB 0.54, RMB 0.58 and RMB 0.61 (US\$0.93) and represent a premium to the national average of RMB 0.34 per kilowatt hour paid to coal-fired electricity generators. The introduction of the FIT brought an end to pricing determined on the basis of the tender process and more certainty in investment decision-making. However, it remains to be seen whether it will lead to increased profitability of wind power projects in the long run.

Other Policy Initiatives

In addition to the Renewable Energy Law and related regulation and policies, the wind sector in China is supported by a number of other policies and initiatives.

Manufacturing Subsidy. The Ministry of Finance created a special fund in 2008 that provides grants to producers of wind turbines in China of RMB 600 (US\$91) per kilowatt for the first 50 turbines produced, provided they have a capacity of at least 1.5 megawatts. To qualify for the grant, certain components of the turbines must be produced in China. The intention behind the subsidy was to encourage indigenous innovation in the wind sector. However, it is now the subject of the ongoing WTO consultations between the United States and China concerning its legality under the trade body's rules.

Local and Provincial-Level Incentives. A vast array of pricing and tax support, "soft" incentives and other policies have been adopted at the local and provincial level to attract wind energy equipment manufacturing and project development. Provinces and localities have competed in offering incentives in order to attract high-profile project and manufacturing developments.

Tax Incentives. A favorable income tax rate is available to renewable energy equipment manufacturers, which is among a group of eight "encouraged" high technology industries to benefit from the preferential rates. Under the policy, the preferential rate is 15% for renewable energy equipment manufacturers, as opposed to 25% for businesses in other industries. Project developers can also benefit from the favorable rates. Other tax incentives include a VAT and import tariff rebate available since 2008 on the import of certain wind turbine components. The rebate is / *continued page 4*

Wind Power

continued from page 3

available to manufacturers with sales of more than 50 units per year and a capacity of at least 1.2 megawatts, offering a substantial benefit to Chinese manufacturers, the majority of which remain heavily reliant on imports of certain key components.

Wind “Mega Bases.” To accelerate growth of an industry with an abundance of existing momentum, the Chinese government in 2009 announced the planned development of seven wind “mega bases” located in the northern provinces of Hebei, Gansu, Xinjiang, Inner Mongolia (2) and Jilin and the eastern province of Jiangsu. Each is expected to have generating capacity of at least 10,000 megawatts, and according to the government’s plan, they will collectively contain 138,000 megawatts of installed capacity by 2020, assuming adequate grid connections can be constructed. Development of the mega bases is to take place in phases and construction has begun on each of the seven projects, with some installed capacity already completed.

Offshore Wind Power. One of the areas being watched most closely by industry participants is the recent decision to move ahead with developing China’s vast offshore wind resources. The government has been accelerating plans for offshore wind development and expects capacity to reach as much as 5,000 megawatts by 2015 and 30,000 megawatts by 2020. It was only in 2010 that China completed construction of its first offshore wind pilot project.

The *Interim Measures for the Administration of Offshore Wind Power Development* were introduced in 2010 and provide the regulatory basis for the development of the sector. Bidding on the first four concessions located off Jiangsu province concluded in October. The projects were awarded to three of the “big 5” state-owned power generating firms—China Longyuan (a listed subsidiary of China Guodian), Datang and China Power Investment Corporation—and to Shandong Luneng, another state-owned developer. Foreign developers are confined by the measures to holding a minority position in any offshore project.

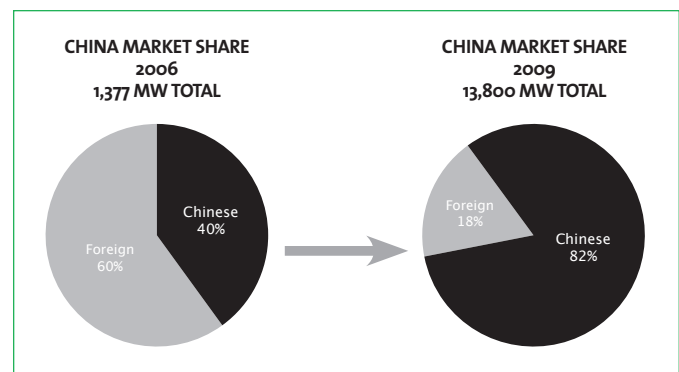
State of the Industry—Equipment Manufacturers

In addition to the overall development of the wind power industry initiated by the policy measures discussed earlier, specific measures aimed at boosting the capacity of the domestic manufacturing industry have contributed to its spectacular growth.

One such measure was the requirement—scrapped in 2009—that 70% of parts and components used in projects developed under China’s national concession program be manufactured domestically, though not necessarily by Chinese manufacturers. In addition to incubating the domestic industry, the measure also brought a significant amount of foreign technology and know-how to China. In order to get a piece of the growing market, many foreign manufacturers set up manufacturing bases through joint ventures or wholly-owned Chinese subsidiaries. In addition to this, foreign market participants point to an informal preference for domestic manufacturers among project developers as another key factor boosting their development.

The principal consequence of these factors has been the remarkable growth of manufacturing capacity among domestic firms, both in absolute terms and also as a percentage of total capacity. In 2000, domestic manufacturers’ share of the Chinese market was less than 10%. By 2009, this had grown to about 74% for both new and cumulative installed capacity.

Figure 1



Source: Joanne Lewis, 2010

In 2004, there were fewer than five domestic manufacturers of wind turbines. Now there are about 70 at various stages of development from large-scale mass producers to aspiring market entrants, which combined to make China the largest manufacturer of turbines in the world starting in 2009. Conversely, of the approximately 25 foreign manufacturers that have entered the China market at some stage, fewer than 10 remain today. However, those that do remain generally appear to be very committed to the market. Vestas, for example, has constructed the world’s largest turbine manufacturing facility in northwest China. / *continued page 5*

Wind Power

continued from page 4

Another consequence of domestic industry support has been the creation of “national champion” manufacturers, which are beginning to expand globally. Three Chinese turbine manufacturers—Sinovel, Goldwind and Dongfang Electric—rank among the world’s top 10 manufacturers of turbines in terms of newly-installed capacity. They have done so by dominating the domestic market with 25%, 19% and 15% market share of newly-installed capacity, respectively.

Going forward, market watchers expect domestic manufacturers to achieve major advances in technological sophistication. All domestic manufacturers—including each of the three “national champions”—rely to some degree on foreign technology licenses. In fact, each of the top five domestic manufacturers license German technology. However, there is a movement towards more homegrown technological innovation, supported by various policy initiatives. There is now a group of 10 to 15 up-and-coming manufacturers capable of mass producing megawatt-scale wind turbines and about 10 more capable of producing megawatt-scale turbines in smaller numbers. Of the up-and-coming domestic manufacturers, about half rely on homegrown technology.

Chinese manufacturers have also made large strides in the development of turbine capacity. Sinovel, which just last fall completed its first five-megawatt turbine, announced in February that its six megawatt model would be in production by June 2011 and that a 10-megawatt turbine is under development.

Another focus for the future is expected to be the export market. Pushed by declining growth rates domestically, equipment makers are expected to increase their efforts in this previously neglected market. The anecdotal evidence shows that Chinese manufacturers are already changing focus.

From the perspective of the foreign manufacturers in the domestic market, preliminary steps have been taken to address concerns over discriminatory treatment in favor of domestic manufacturers—for example, the elimination of the 70% local content rule. However, foreign manufacturers will continue to call for more transparency and openness in the concession tender process and for the elimination of preferential incentives directed at building the domestic industry.

State of the Industry—Developers

As with conventional power generation, state-owned firms dominate power generation in the wind sector. All of China’s

major project developers are state-owned enterprises. China’s four developers with more than 1,000 megawatts of installed capacity are all among the “big 5” state-owned power generating firms—China Longyuan (a listed subsidiary of China Guodian), Datang, Huaneng and Huadian. All of the top 15 developers—representing about 80% of capacity—are state-owned or controlled. The dominance of the state-owned sector is the result of a combination of several factors, including mandatory market share provisions and other non-economic influences on investment decisions, easier access to financing from state-owned banks, greater familiarity with the tender and approval process for projects and greater ability to obtain grid connections from state-owned grid companies. Foreign and private investment potential has been left largely untapped, which has meant that a competitive market for wind project development has failed to develop.

A number of factors have led to foreign developers playing a limited role in Chinese wind power projects. The relative dominance of the state-owned sector is discussed above. Another critical barrier has been the inability of foreign-controlled projects to receive approval under China’s clean development mechanism rules. Because of historically low pricing levels, many wind projects in China rely on additional revenue generated through the clean development mechanism, or CDM, under the Kyoto Protocol to ensure profitability. About half of China’s wind projects are registered under the CDM, which in turn amount to about 40% of those registered worldwide. However, in order to qualify under the CDM, the project developer must be at least 51% Chinese-owned.

Other barriers commonly referred to by foreign market players arise out of the regulatory treatment of foreign investment in China regardless of the industry. The issues include the fact that, despite China’s massive foreign exchange reserves, the ability to repatriate funds from China is subject to regulatory approval from the State Administration of Foreign Exchange. In addition, Chinese law requires project developers to structure their investments through a domestic Chinese investment vehicle, which must be capitalized onshore. Limits on the debt-to-equity ratio of a foreign invested entity means that a foreign-owned project company can only borrow approximately 66% of total project costs. In addition to the limitations on leverage, there is limited flexibility in structuring equity investments through Chinese investment vehicles. For example, preferred stock does / *continued page 6*

Wind Power

continued from page 5

not exist under Chinese corporate law, which limits the ability to structure a preferred return.

Economic and Environmental Pressures

So what is driving all of this activity in the wind sector? The short answer is that it is being driven by the same factors driving development of wind power capacity around the world. However, the scale and complexity of the Chinese situation requires a separate look.

Most observers are familiar with the rapid pace of China's economic growth since the beginning of the reform era in the late 1970s, with annual growth rates hovering at or around the 10% mark. Maintaining this pace of expansion has required a significant amount of energy, in part because of the structure of China's economy, which has historically relied to a large extent on energy-intensive manufacturing and heavy industry to drive growth. According to the International Energy Agency, China became the world's largest consumer of energy in 2010 (a conclusion China itself disputes), and its energy demand is expected to double during the period from 2005 and 2030.

The rapid increase in China's energy consumption and the energy intensity of its economy have raised two issues that have led policymakers to explore alternative sources of energy. First, China's limited domestic supply of natural resources has led to concerns over energy security. China became a net coal importer in 2007, despite abundant domestic supply, and has been a net importer of oil since 1993. In an effort to address these concerns, China's energy policymakers have pursued the twin goals of expanding access to alternative sources of supply, for example by acquiring overseas resources, and diversifying the energy supply mix, with a principal focus on renewable energy. Despite these efforts, however, China's oil imports have doubled since 2005.

The second consequence of China's rapid increase in energy consumption will be equally familiar to observers.

A tremendous strain has been placed on China's environment, the most visible consequence of which is the high levels of air pollution affecting China's cities and industrialized areas. Though it is important to note that per capita carbon dioxide emissions amount to only 33% of the OECD average, China has become the world's single largest emitter of carbon dioxide. The large majority of new power generating capacity is being satisfied through the construction of coal-fired plants and coal-fired generating capacity still accounts for approximately 77% of total.

In response to these and other economic pressures, Chinese policymakers have been focusing on a number of measures aimed at shifting its economy's focus away from manufacturing and heavy industry toward higher value-added manufacturing and services. Policies aimed at stimulating this gradual shift in focus comprise the foundation of what is described by the Chinese government as "scientific development," which has become one of the catchphrases most closely tied to the current President Hu Jintao era.

The renewable energy industry has been a major beneficiary of this policy shift. Investments in the sector have allowed policymakers to encourage the development of clean energy sources while simultaneously promoting its value-added manufacturing sector. The wind sector has naturally benefitted the most. China's long coastline and large land mass contribute to it having abundant wind energy resources.

Although observers have questioned the reliability of the statistics, China appears to have in the range of 1,500,000 and 2,000,000 megawatts of wind energy resources based on the results of a series of government and independent studies. By way of comparison, China's total electric power capacity was 620,000 megawatts in 2006 and 860,000 megawatts in 2009, and according to at least one estimate, capacity is expected to reach 1,600,000 megawatts by 2020. Although wind energy currently accounts for less than 1% of that total, government and industry watchers see it accounting for a larger piece of China's future energy puzzle. ☺

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