

March 10, 2009

## China's New Generation: Driving Domestic Development

Are the Chinese favouring home-produced turbines for their accelerating wind power industry? If so, what does this mean for foreign investment and overseas manufacturers?

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London, UK [Renewable Energy World Magazine]

Inevitably the international financial crisis, which has reverberated deeply into China's economy, has had an impact on the Chinese wind power sector in a number of ways. For instance, it has contributed to declining prices for certified emissions reduction credits (CERs) under the CDM Kyoto Protocol framework, a key subsidy for wind farm development. In addition, it has caused some foreign companies to exit the Chinese wind farm development business as oil prices have declined and credit has become more difficult and costly to acquire. It has also brought on the recession that has resulted in declining energy use and falling power prices throughout China.

By most accounts, however, the impact of this worldwide financial upheaval has been limited with respect to China's burgeoning wind power industry.

This in part is attributable to the fact that the Chinese wind industry's development is in large directed by Beijing, and 80% of the market is concentrated in large state-owned enterprises. It is also due to the leadership decision in Beijing to forge ahead with renewable energy development as one element of its approach to combating the economic downturn. In fact, the centrepiece of Beijing's response to the economic slowdown in China is a US\$586 billion stimulus package – a quarter of which is expected to be allocated to environmental, renewable energy and energy efficiency projects.

Like the new Obama administration in the US, the Chinese government understands that they also can get a 'twofer' by funding renewable energy and energy efficiency projects, which will both spur economic development and advance China towards its goal of a cleaner and more sustainable future. So the silver lining to the world's economic landscape is that China appears more committed than ever to forging ahead with a robust programme of renewable energy development – a key component of which is wind power. That commitment is already being displayed through a yuan 100 billion (US\$14.8 billion) investment in renewable energy, announced in the fourth quarter of 2008, that the Chinese government is using to stimulate the economy, and a sizeable portion of which is allocated to wind power projects.

### Wind: an important source of power in China

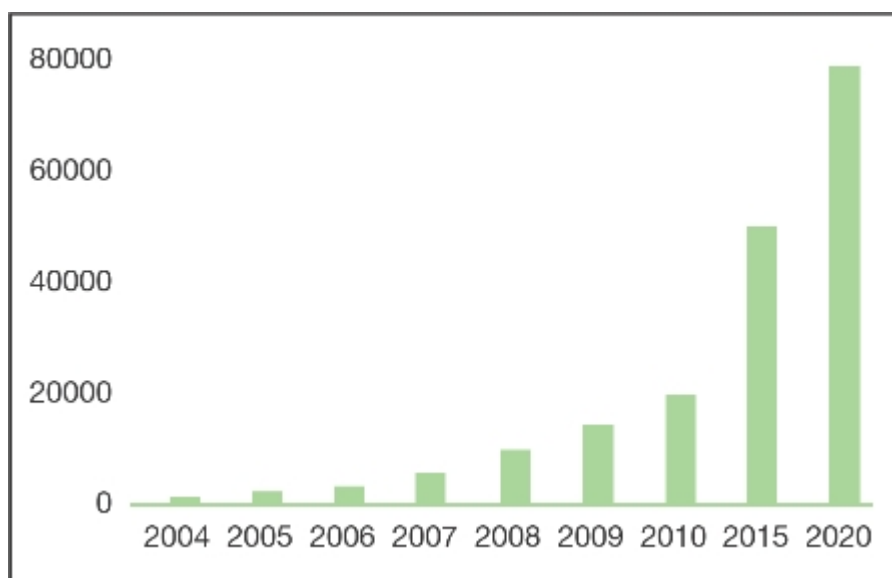
While wind power in China currently accounts for only 1.3% of total power output – compared with coal-fired power at 75% – but just three years ago wind power accounted for one thousandth of total power production in China.

At that staggering pace of development, the contribution of wind to total capacity will continue to increase, as the domestic wind industry matures and the cost per kW decreases. At the same time, the restructuring of the power industry will result in a more sustainable mix of power sources in the future.

China's wind energy potential is enormous. Chinese sources estimate that exploitable 'wind resources' that are available on land in China may be as high as 600–1000 GW, and that close-in offshore exploitable wind power potential accounts for another 700 GW.

Since the Renewable Energy Law took effect on 1 January, 2006, China's installed wind capacity has increased from 2300 MW at the end of 2005, in excess of 3200 MW at the end of 2006, to 5900 MW at the end of 2007 when China had built more than 100 wind farms in 22 provinces and cities. As of mid-2008 the country had installed more than 7000 MW of wind capacity and, according to the latest available figures, was on track to reach the symbolically important milestone of 10 GW by the end of the year – two years ahead of the revised goal.

By 2010 cumulative installed wind capacity may reach 15–20 GW and after 2011 China is expected to be adding new capacity at the rate of 7–10 GW per year. Analysts currently predict that China's base of wind power installations will total 50–60 GW by 2015, and that by 2020 it will account for 80–100 GW. The goal for 2020 was revised upward four-fold from the 30 GW goal set by the Mid to Long-Term Development Plan for Renewable Energy, promulgated by Beijing in September 2007 (*See Figure 1, below, which shows actual and revised projects for wind installations in China in MW*).



Central to this rapid development of wind power capacity in China is a series of ambitious mega-wind farm projects. There are already a series of such projects in planning (and at least one under construction) that should result in a total of approximately 100 GW of wind power by 2020 – from only six mega-projects!

These six large wind farm ‘bases’ include 12 GW in Gansu Province; 20 GW in Hami, in Xinjiang Province; 20 GW in Western Inner Mongolia; 30 GW in Eastern Inner Mongolia; 10 GW in Hebei Province; and 10 GW in Jiangsu Province.

As the third fastest-growing wind power market in the world (after the US and Spain) and the fifth largest installed base of wind power, in 2007 China attracted 15% of the world’s investment in wind power. According to Mr Li Junfeng, the vice-chairman of the Energy Institute of the National Development and Reform Commission, in 2007 alone China’s wind industry attracted investments totalling yuan 34 billion (\$5 billion).

### China’s wind equipment manufacturing industry

After several years of development, China’s wind power equipment manufacturing industry has now achieved a scale of operational and technological competence that will help accelerate the country’s development of wind power in the years ahead.

Even with its rapid growth, however, the Chinese wind power equipment manufacturing industry is not yet keeping pace with demand. According to Chinese sources, there are now 67 wind turbine manufacturers operating in China (up from 40 in mid-2007 and only six in 2004), including 27 state-owned or state-controlled companies; 23 private companies; eight joint venture companies and nine wholly foreign-owned companies.

For the first time, in 2007 Chinese wind turbine manufacturers accounted for more than 50% (55.4%) of all wind turbines installed in China, and because Chinese manufacturers are now capable of producing 1.5 MW, 2 MW and even 3 MW machines, the expectation is that Chinese companies’ share of wind turbine installations will continue to increase.

Though the numbers of wind turbine manufacturers have increased, the most significant Chinese competitors are: Xinjiang Goldwind (Jin Feng) Science and Technology Joint Stock Co Ltd, Dongfang and Sinovel Wind Power Science and Technology Co Ltd. In the view of Han Junliang, the chairman of Sinovel, the financial crisis will benefit the Chinese wind industry by hastening the consolidation of turbine manufacturers.

The domestic market will also increase as a consequence of the Notice Concerning Certain Requirements for Wind Farm Construction Management – which requires that 70% of the equipment for any wind farm project must be sourced in China. In addition, tariff changes have had the effect of supporting the development of the domestic wind turbine industry. On 23 April, 2008 the Ministry of Finance announced the elimination (as of 1 May, 2008) of tariff-free importation of wind turbines that are less than 2.5 MW.

As more than 80% of the cost of a wind turbine is in the parts, the relatively quick development of an indigenous wind power equipment parts industry is also a sign of increasing maturity.

Producing gearboxes, generators and blades, the domestic industry is able to satisfy current demand in China, and the fact that there are now more than 50 such companies indicates intensified competition, and perhaps the gradual appearance of these products on the export market.

However, China does remain largely dependent on imports for key components, such as precision bearings, electrical and control systems, and inverters. American Superconductor Corp (AMSC), for example, has been enormously

successful in selling its electrical and control systems to Chinese wind turbine manufacturers, such as Sinovel. To facilitate the import of components that are not being manufactured in China, as of 1 January 2008, the Ministry of Finance instituted a programme of rebates of tariffs and VAT taxes paid on the importation of parts and raw materials, used in the manufacture of wind turbines.

The development of an indigenous manufacturing base to support the growth of wind installations in China also promises to achieve significant reductions in generating costs. Presently, wind generated power costs 0.5–0.6 yuan/kWh (7.3–8.7 US cent /kWh) to produce, while the cost of power from coal-fired plants is far less, at 0.2–0.3 yuan/kWh (2.9–4.3 US cent /kWh).

Nonetheless, although only 19% of the 6458 wind turbines that were installed in China as of the end of 2007 were indigenously produced MW-class machines, the pace of adoption of domestic wind turbines is increasing.

According to Chinese industry sources, if 70% of wind turbines are manufactured locally, the cost of wind turbines can be reduced by 15%, and without any other changes this could see wind generation costs fall to 0.375 yuan/kWh (5.4 US cent /kWh). If all wind turbines were manufactured domestically, the cost would decline by a total of 30%, and, again without any other cost savings factored in, costs will decline to 0.332 yuan/kWh (4.8 US cent /kWh).

Factoring in a cost associated with the pollution caused by coal-fired power plants, and the likelihood that fossil fuel prices will increase, the Chinese believe that they can achieve pricing parity in the foreseeable future. They also recognize that to achieve such cost reductions, it will be imperative for them to invest, on average, 1.5%–3% of the cost of a wind farm on research and development.

Foreign wind power equipment manufacturers, including Denmark's Vestas, India's Suzlon, Spain's Gamesa, Germany's Nordex Corp, and US player GE Energy, have already aggressively engaged the Chinese wind market.

The spate of new wind turbine plants that foreign manufacturers are building in China is a result of the country's explosive growth in wind capacity, but also a result of an industrial policy that penalizes foreign imports and rewards domestically produced wind turbines.

At €60 million, Gamesa's north coast turbine manufacturing plant in Tianjin is the company's second largest foreign investment after the US. Germany's Nordex has located two of its three manufacturing centres in China and has established its Asian HQ in Beijing. Nordex expects to invest an additional yuan 500 million (\$60 million) to grow its business in China four-fold in the next three years.

Though foreign wind turbine manufacturers have a cumulative share of 65.9% (total installed base) of the Chinese wind equipment market, inroads made by the domestic industry are evident, as illustrated by the fact that the foreign manufacturers' market share of current installations has declined to 55.1%.

The industrial policies of the Chinese government (with respect to the emerging wind industry) have been described as 'escorting the Emperor' and are also contributing to the declining share of foreign manufacturers. The ability of Chinese companies to move more swiftly than foreign competitors, to build factories and secure sales in China also contributes to this erosion.

### **The importance of industrial policy**

The Chinese government appears very adept at creating conditions for the development of particular industries, in executing such a strategy they have been: setting goals; putting in place laws, regulations and policies; creating incentives; nurturing key enterprises; convening government agencies and enterprises to develop plans; while allowing market forces to flourish. Beijing's nurturing of the wind power industry displays all of these tendencies.

A November 2008 conference in Beijing (convened by the National Energy Bureau) demonstrated these forces at work. The key participants in the Chinese wind power industry from government and industry attended, including: representatives from the Pricing Department; the New Energy Department and the Planning Department of the National Development and Reform Commission; the State Power Grid Co; China Huaneng Group Co; China Datang Group Co; the Longyuan Power Group Co. (which in 2007 became the first Chinese developer to exceed 1000 MW of installed wind capacity); the Guohua Energy Investment Co Ltd; the Beijing Capital Power International Energy Joint Stock Co Ltd ... the list goes on. Among the issues discussed was access to the power grid, the system for formulating power prices, the equipment manufacturing industry, and the 'special permitting' regime. Another discussion focused on the need to both strengthen oversight and administration in wind construction planning and support systems, at both national and local levels.

With respect to incentivizing the development of the wind industry in China; in 2001, Beijing reduced the value-added taxes due on the production of wind power by half, and in the eight months between October 2007 and June 2008 provided approximately 1.4 billion yuan (\$205 million) in financial subsidies for the wind industry – including a 600 yuan/kW (\$88/kW) payment to domestic wind turbine and component manufacturers for the first 50 MW of turbines produced.

Industrial policy – including importantly the use of the ‘special permitting’ process to select and utilize domestically produced equipment for the construction and operation of those wind farms – has been a significant impetus to development of the wind industry in China. Beijing has also incentivized wind farm development through The ‘Mid to Long Term Development Plan for Renewable Energy’, so power generating companies that have an installed capacity of 5 GW or more must produce non-hydropower renewable energy of at least 3% by 2010 and 8% by 2020.

The support of the Chinese government to foster the construction of power grids – connecting far-flung centres of wind power production with the population and energy consumption centres on the coasts – is also indispensable to the successful deployment of wind power. It should, however, be noted that some contend Beijing has fashioned a system which creates an ‘indirect monopoly’ for Chinese manufacturers, which particularly disadvantages foreign manufacturers, reducing competition.

### **Dragon’s den?**

Although progress has been substantial in China, there continue to be gaps in the emerging wind power system that need to be addressed. First, Beijing has not yet completed a policy for pricing wind power. The ‘Trial Measures for Renewable Energy Power Generation Pricing and Cost Sharing’ were promulgated by the National Development and Reform Commission in 2006. They provide for the on-grid price of wind power to be determined by the administrative department of the State Council in charge of pricing – based on local conditions, in accordance with the general principal of cost plus profit-margin.

Power pricing for wind power ‘special permitting’ projects are to be determined by bid, but are not to exceed the level set by the administrative department of the State Council in charge of prices.

Secondly, the development of power grids is lagging, causing difficulties in connecting and distributing power generated from wind farm developments. So, while the ‘Measures Governing Purchases by Power Grid Companies of the Total Amount of Renewable Energy Generated’ (promulgated in August 2007) provides a market for renewable energy, the lack of a fully developed grid makes that promise somewhat illusory. In 2007, for example, the State Power Grid Co distributed only one tenth (5 TWh) of the potential energy that China’s wind farms were theoretically able to produce at a 100% load factor.

Thirdly, the technological level of domestic wind turbine manufacturers still needs to be improved, and the quality of some of the domestic wind turbine components is not high enough.

Nonetheless, in spite of some remaining issues, the Chinese wind sector is booming, backed by concerted and considered government support, and a rapidly expanding domestic manufacturing industry. It is therefore perhaps surprising that some foreign interests have withdrawn investment from the Chinese wind sector over recent months. For instance, November 2008 saw the end of BP’s co-operation with Xinjiang Goldwind (Jinfeng) to build the 148.5 MW Inner Mongolia Damao Wind Power Project, it also withdrew its investment in the Asian wind power industry. At nearly the same time, Japan’s Harakosan Co Ltd announced it would sell its 27% interest in the Hara XEMC Wind Power Co Ltd to its joint venture partner XEMC, of Hunnan Province.

Though these might be isolated cases, the old trap of lower energy prices tempting some to abandon the push towards greater reliance on wind power is suspected. Clearly, the Chinese are not taking the bait.

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