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## China's Wind Power Industry: Localizing Equipment Manufacturing

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When 2007 ended, China's installed base of wind power totaled just over 6 gigawatts (GW), earning the country fifth place among the world's largest wind energy producers (after Germany, the U.S., Spain and India), up from sixth place in 2006. Wind power industry statistics show that by the end of 2008, China's total installed base of wind power production will have reached 10 GW; some experts are estimating that by 2010, the total installed capacity for wind power generation in China will reach 20 GW and that by 2020 China's installed base of wind power will total 100 GW (current global wind installation is 94 GW).

In 2007 an estimated 24 billion Yuan [approximately US \$3.28 billion] was invested in China's wind energy sector. Not surprisingly, this level of investment has spawned an industry — local manufacturers are responding by producing the equipment and components that the wind energy industry requires to sustain this growth.

It is conservatively estimated that between 2006 and 2015, 100 billion Yuan [US \$14.5 billion] will be spent on equipment and component purchases to further develop China's wind power industry. According to the Ministry of Commerce, by the end of 2006 there were more than 100 Chinese companies manufacturing equipment and components for the wind industry.

Foreign wind power equipment manufacturers, including the most significant international wind turbine manufacturers, [Vestas](#), [Suzlon](#), [Gamesa](#), [Nordex Corp.](#), [Honiton Energy Ltd.](#) and [GE Energy](#), have aggressively engaged this market. Though foreign wind turbine manufacturers' share of the market has declined from nearly 75% a few years ago to 55% now, the foreign presence in China's wind industry remains significant.

Foreign wind power equipment manufacturers have made strategic investments in China, allowing them to remain dominant even as indigenous Chinese wind equipment capabilities grow. At EU €60 million, Gamesa's factory in Tianjin, which manufactures wind turbines, is the Spanish company's second largest foreign investment (after the United States).

Also located in Tianjin is Vestas' Wind Turbine Equipment (China) Co. Ltd., which manufactures blades and does wind turbine assembly.

Nordex has located two of its three manufacturing centers in China and has established the company's Asia headquarters in Beijing. In the next three years, Nordex expects to invest an additional 500 million Yuan [approx. US \$71 million ] to grow its business in China four-fold. GE Energy's Shenyang wind turbine plant produces 1.5-MW-class wind turbines.

### **Localization of Equipment Manufacturing**

To help spur the development of an indigenous wind power equipment and components industry, Beijing has mandated that all new wind power projects have at least a 70% Chinese component. Wind power equipment manufacturers also now enjoy a 50% discount on value added taxes (VAT) payable in China.

On April 23, 2008 the Ministry of Finance announced two changes to import tariff regulations with respect to the wind power industry, further spurring development of Chinese wind power equipment manufacturing. The first change, effective January 1, 2008, implemented a tariff and VAT rebate program for imports of parts and raw materials used in the manufacture of wind turbines. This change was significant because a large percentage of parts and raw materials used in the manufacture of wind turbines still must be sourced from outside of China.

The second tariff change, effective May 1, 2008, eliminated the tariff-free importation of wind turbines less than 2.5 MW. This tariff change is a strong indicator that the Chinese wind turbine industry is maturing rapidly; as recently as late 2007 Chinese wind power equipment was incapable of producing megawatt-class wind turbines.

Megawatt-class turbines are increasingly produced domestically and the elimination of tariff-free imports of wind turbines less than 2.5 MW in size will give added impetus to the domestic production of increasingly large wind turbines.

The economics of the wind power equipment industry are quite favorable. At present the cost of construction of wind power in China is approximately 8000-9000 Yuan/Kw [US \$1170-1315 /kw] and 60% to 70% of those costs are equipment purchases. Because many of the most important Chinese wind power equipment and components companies have grown out of large industrial companies (including several public companies), there appears to be sufficient financial strength for these companies to grow.

Funds to finance new wind power equipment and component manufacturing in China have come primarily in the form of commercial bank loans, retained earnings and equity investments.

## Turbines

According to Steve Sawyer, secretary general of the [Global Wind Energy Council](#), by 2009 China will become the world's largest producer of wind turbines. At present China has at least 40 wind-power turbine manufacturers: 17 are state-owned or state-controlled companies, 12 are private Chinese companies, 7 are joint-venture companies and 4 are wholly foreign-owned companies.

Though China has yet to export wind turbines, China's two largest wind turbine manufacturers — Xinjiang Jinfeng (Goldwind, whose December 2007 initial public offering (IPO) was the first pure-play wind power equipment Chinese stock offering in the U.S.) and [Sinovel](#) — have plans to export in 2009 and 2010.

Many of the largest wind turbine and other equipment manufacturers have licensed technology from western companies, including from [AMSC Windtec](#), [REpower](#), [Aerodyn](#), [Vensys](#) and [Garrad Hassan](#). Most of the largest Chinese wind turbine manufacturers have begun to produce 1.5-MW wind turbines and gradually these Chinese wind turbine manufacturers, having purchased designs for 2-, 3- and 5-MW wind turbines, are developing prototypes of larger wind turbines.

## Bearings

The Chinese wind power industry continues to depend on imports for its supply of bearings. However, this dependence may be short lived. On December 11, 2007, the [Timken Company](#) entered into a joint venture agreement with the [Xiangtan Electric Manufacturing Co., Ltd.](#) to manufacture ultra-large bore bearings for the main rotor shafts of megawatt-class wind turbines. The bearings will be manufactured in China with some of the bearing materials and components coming from the U.S. The new US \$38 million plant, which will be located in Hunan Province, will begin construction in 2008. Timken will have an 80% interest in the new venture.

## Blades

The largest wind turbine blades to be manufactured in China to date (measuring 40.25 meters long) are now being manufactured by the China Materials Science and Technology Wind Power Blades Joint Stock Co. Ltd., in Beijing. The "Sinoma 40.2" blades that the company produces are manufactured in conjunction with a German wind blade designer. Presently, China Materials has a demonstration production line capable of producing 10 sets of molds/year and 200 sets (600 blades) of Sinoma 40.2 blades/year. The company has agreements with wind turbine manufacturers and already has supplied 30 sets of blades, 5 of which are being installed in wind farms in China's Northeast. China Materials is currently developing 2.5-MW blades and anticipates eventually having five different sized blades by 2010.

The Shanghai Prime Machinery Company, whose shares are listed in Hong Kong, is another significant Chinese wind turbine blade manufacturer. Aerodyn has licensed its blade manufacturing technology to Canada's Hanwei Energy Services Corp. for the latter to produce 37.5-meter and 40.3-meter blades for 1.5-MW turbines.

## Gearboxes

Comprising roughly 15% of total wind turbine cost, gearbox manufacturing is critical to China's localization of components and equipment. The gearbox converts between slowly rotating, high torque power from the wind turbine rotor and high speed, low torque power used for the generator.

China's largest manufacturer of gearboxes is [China High Speed Transmission](#), which in 2007 captured nearly 80% of domestic market share. Last year, the company raised US \$272 million through a Morgan Stanley-led IPO in Hong Kong and currently supplies gearboxes to both Goldwind and GE Energy.

The CEO of Germany's Nordex Corporation has noted China High Speed Transmission is one of only two companies in China able to produce gearboxes for the 1.5-MW turbine that Nordex produces. Although China High Speed Transmission only has a three percent global market share, it has major export plans for the near future. Tempering these ambitions will be increasing raw material costs, including steel prices that have nearly doubled from US \$535 a ton in 2007 to over US \$1,000 a ton in 2008.

Retail investors seeking to participate in China's wind-power boom can invest in the [ETF "FAN" that was recently explained by Peter Lynch on REW.com](#). In addition to the well-known foreign companies that have a significant piece of the Chinese wind power industry, FAN includes a handful of publicly-traded Chinese companies whose revenues are derived (at least partially) from sales into the wind industry.

The Chinese components of FAN include Goldwind (turbines), Harbin Wind Power Equipment Co., Ltd., Shanghai Prime Machinery Co. (blades), China High Speed Transmission Equipment Group Co., Ltd. (wind transmission equipment and gearboxes), China Wind Systems, Inc. (forged rolled rings) and China WindPower Group Limited.

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