

Rise to join the world's elite

In 2006, China moved up to become one of the world's leading wind energy nations. The government is doing its utmost to support domestic production so that lasting growth can be expected.



The provinces Inner Mongolia and Hebei fill the top places as to the installed wind power. The map shows the newly installed wind power capacity in 2006 as well as the total installed wind power at the end of 2006.

Source: Chinese Wind Energy Association (CWEA) / China Wind Power Report 2007.

Graphic: Eilers Media www.eilers-media.de

It took a long time before China was able to expand its wind energy utilisation systematically. In the nineties, market development remained behind expectations, but since 2002 things have been accelerating rapidly (see figure 1). In 2006, a total of 1,337 MW was installed in China, moving the emerging industrial nation up to fifth place in the worldwide wind energy ranking list for new installations. The overall capacity that has been installed, however, is still fairly low: By the end of 2006, 3,311 wind power plants had been connected to the grid in China, and their total capacity had reached 2,601 MW, which is less than that of Denmark (3,136 MW).

Three phases of market development

The rapid increase in recent years has been made possible by a mixture of planned and market economics, as is typical for the vast, communist empire. The »China Wind Power Report 2007«, compiled with the assistance of Greenpeace and the Global Wind Energy Council (GWEC) [1], points out that the period of the impressive boom coincides approximately with the Tenth Five-Year Plan (2001 to 2005). Its targets might have contributed to putting an end to the difficult pioneering stage of wind energy development. The China Wind Power Report distinguishes three phases of development:

- In the demonstration phase (1986 to 1993), small wind farms were built, funded primarily by grants and cheap loans from development aid funds. At that time, government support was limited to securing the investment and providing grants for the development of individual wind turbines. The approx. 150,000 small wind turbines that



At the Dabancheng wind farm near Urumqi, in the outermost northwest of China, Goldwind has erected eight wind turbines without gearboxes, which originated from its joint venture with the German manufacturer Vensys.

Photo: Vensys

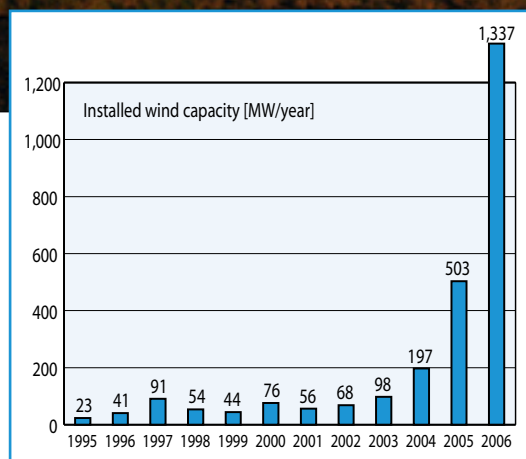


Figure 1: Waiting for the boom has been worthwhile. The capacity that is installed annually has grown considerably since the year 2002.

Source: BTM Consult

Manufacturer	Turbine type	Capacity
Gamesa, Spain	G52/G58-850	850 kW
GE Energy, USA	GE 1.5s/sl	1,500 kW
Repower North, Germany *	MM82/2000	2,000 kW
Suzlon, India	S64/1250	1,250 kW
Vestas, Denmark	V80/V90	2,000 kW

Source: China Windpower Report 2007 (GWEC et al.)
 * Repower North: Joint venture (Repower 50,01%, North Heavy Industries 33,34%, Honiton Energy 16,65%)

Table 1: Several large wind turbine manufacturers have founded their own production sites in China.

Source: China Wind Power Report 2007

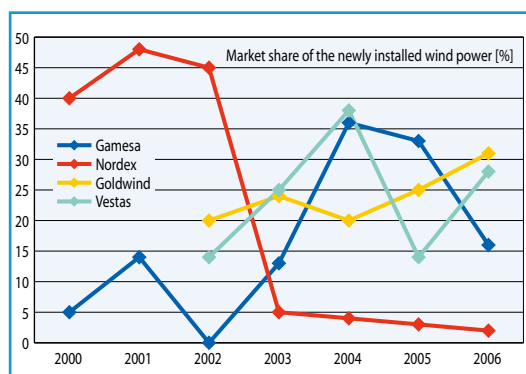


Figure 2: Market shares of the manufacturers Nordex, Goldwind, Gamesa and Vestas in China in the years 2000 to 2006

Source: BTM Consult

were installed in Inner Mongolia, with an average capacity of 100 W, are typical of this phase. The share of domestic production in the manufacturing of these small wind turbines had already reached 50% at that time.

Today there are about 70 manufacturers of wind turbines in China, whose products mostly range from 0.2 to 1 kW in capacity. Their sales figures are impressive: Approximately 30,000 turbines were sold in 2006. In 2005, just under 6,000 were exported. These were off-grid systems, which are not included in the statistics presented here because they record only grid-coupled devices. In the case of the latter, success remained rather moderate in this first phase. Although the first wind farm (three Vestas turbines rated at 55 kW each) was installed as early as 1986, things proceeded only slowly. By the end of 1995, only 44 MW had been connected to the grid in China [2].

● The industrialisation phase (1994 to 2003) was initiated in 1993 by the »National Wind Power Work Meeting«, at which a wind power industrialisation programme was decided on. One year later, the energy suppliers were obliged to connect the wind power plants to the grid at the nearest feed-in point. The feed-in tariff which was planned at that time resembles the German Electricity Feed-in Act (1990): The feed-in tariff was determined by the costs of electricity generation, the interest and amortisation payments and a »reasonable profit«. It was planned that the costs arising from the difference between this price and the average electricity tariff would be distributed among all the users of the grid. These good intentions were not, however, implemented as desired. The report attributes this to the fact that at the same time the general electricity supply in China was being reformed and liberalised. Many wind farm projects could

not be realised because the investments could not be secured. The capacity that was installed annually failed to exceed 100 MW throughout the entire industrialisation phase.

● The third phase is designated in the report as the »Scaling-up and Domestic Production Period« (2003 to 2007). In these years, the wind power plants and the factories were scaled up in order to enable the domestic manufacturers to produce ever larger units as independently as possible. The instruments of the planned economy were intentionally replaced by those of the market economy. The invitation of tenders for the projects (»Concession Tendering Programmes«) contributed greatly to this objective. Success was achieved soon. The market expanded quickly, and the market share of the domestic production rose to 41 % (2006).

Invitation to tender for projects aims at cost reduction

In the period from 2003 to 2007, the Chinese government conducted four rounds of tendering. Eleven projects (2,450 MW altogether) were put out to tender and were awarded to the supplier making the best offer. The selec-



Surprise at the trade fair Windpower Shanghai 2007: This prototype of the Chinese company Futiannordwind is equipped with a two-blade rotor. The two vertical generators are also unusual – this is obviously a truly independent development for which there is no European equivalent.

Photo: Sven Tetzlaff

round of tendering, project developers and the wind turbine manufacturers of their choice competed jointly. According to the authors of the report, these measures made it possible that »the Concession Programme played a major role in supporting wind energy development and domestic production«.

Chinese manufacturers are growing

Of course, all the leading wind turbine manufacturers want to profit from the promising market. Five of them are represented in China with factories of their own (table 1). Of the large manufacturers, only the German companies Enercon and Siemens are not present. The German wind turbine manufacturer Nordex was involved in China from an early stage, but not with the aim of setting up a production facility of its own. As early as 1998, the Hamburg-based company founded a joint venture with the Chinese company Xi'an Aero Engine in order to produce turbines of the type N43/600. In December 2005, Nordex, together with a regional energy supplier and a power station operator, founded the Nordex Wind Power Equipment Manufacturing Co. Ltd. (Nordex Yinchuan) for the production of 1.5 MW plants of the type S70/77. The early commitment paid off: Until 2002, Nordex was the market leader in China – in a market, however, that was still very small at that time (figure 2). After that, competition from the companies Gamesa and Vestas became tougher and tougher, and finally the Chinese company Goldwind achieved the leading position.

The diversity of the Chinese wind energy industry is increasing. Most companies cooperate with European partners (table 2). Goldwind began with licence production (Repower) and has recently started an ambitious joint development programme with the German manufacturer Vensys. This involves a 1.5 MW plant without a gearbox and with a permanently excited generator, which was originally developed by Vensys. The intention is to build this in China in large numbers. As one can see, the 1.5 MW class is currently predominant. But this will change. Shanghai Electric, together with Aerodyn, is developing a 2 MW plant with a rotor diameter of 82 m, and other manufacturers will follow their example. *

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Manufacturer	Turbine type	Capacity	Cooperation partner
Beizhong	80/D8-2000-80	2,000 kW	EU-Dewind (licence production)
CASC Wanyuan	AW 77/1500	1,500 kW	Acciona (joint venture)
Dongfang	FD 70B/1500	1,500 kW	Repower (licence production)
	FD 77B/1500	1,500 kW	Repower (licence production)
Goldwind	Goldwind 50/750	750 kW	Repower (licence production)
	Goldwind 70/1500	1,500 kW	Vensys (joint development)
	Goldwind 77/1500	1,500 kW	Vensys (joint development)
Hara XEMC	Z72-2000	2,000 kW	Harakosan (joint development)
Huide	55/FL1000	1,000 kW	Fuhrländer (licence production)
Mingyang	83/MY1.5se	1,500 kW	Aerodyn (joint development)
Nordex Yinchuan	S70/S77	1,500 kW	Nordex (joint venture)
Shanghai Electric	SEC 64/1250	1,250 kW	EU-Dewind (licence production)
	SEC 82-2000	2,000 kW	Aerodyn (joint development)
Sinovel	70/FL1500	1,500 kW	Fuhrländer (licence production)
	77/FL1500	1,500 kW	Fuhrländer (licence production)
Windey	WD 49/750	750 kW	Repower (licence production)
	WD 54/800	800 kW	own development
	WD 77/1500	1,500 kW	own development
Xi'an Nordex	N43/600	600 kW	Nordex (joint venture)

Table 2: These twelve Chinese companies produce large wind turbines in China, mostly in cooperation with European companies. The list is presumably incomplete and will certainly grow longer in the years to come.

Source: China Wind Power Report 2007, own research

tion criteria were a high proportion of domestic production and the lowest possible costs of electricity generation. By mid-2007, 650 MW had already been installed, and all the projects are expected to be connected to the grid by the end of 2009.

Supporting government measures ensured that the projects were attractive to investors: A fixed feed-in tariff for the first 30,000 hours of full load operation (10 to 15 years of operating time), the obligation of the regional electricity suppliers to connect the plants to the grid and to buy the electricity, the allocation of the cost differences (see above) to all the regional grids, as well as the obligation of the regional authorities to build roads that allow the wind farms to be accessed. In the fourth

Literature

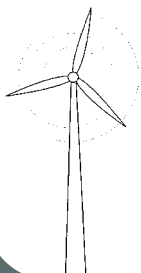
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