

A Brief Description of Wind Power in the People's Republic of China

By Joerg Moczadlo and Wang Ye*

The Framework Conditions

There are abundant wind resources in several regions of China. Especially in the “Sanbei Region” which translates to “The Three Norths Region”, significant wind resources can be found. This region includes Northeast China, the northern part of North China as well as Northwest China and constitutes the northern wind belt. A second wind belt stretches along the coastline from the province of Shandong in the north through the provinces of Jiangsu, Zhejiang, and Fujian to Guangdong in the far south of China. Even inland, some fragmented areas with considerable wind resources can be found, for example, in the province of Hubei. All in all, wind power installations can be found in 30 provinces. Even though the northern parts of China are rich in wind resources, tapping those constitutes a problem. On the one hand, the grid infrastructure in the north/northwestern part of China is not well developed, making it difficult to connect larger wind farms and to ensure secure grid operation. On the other hand, the region is sparsely populated and the main consumer centers are located in the southern coastal areas, several hundred or even several thousand kilometers, away.

The Role of Wind Power in Actual Energy Policy

Renewable energies, including the promotion of wind power, are on top of the agenda of the Central Government of China. Due to significant wind resources, wind power will play a key role in China's energy mix. This is reflected in the existence of several strategy and policy papers. Even though there is no approved 12th 5-year-plan for the development of renewable energies yet, it is expected that grid-connected wind power installations will be pushed to approximately 100 GW by the end of the current 5-year planning period (2011 – 2015).

Several years ago the Central Government passed a renewable energy law which became effective in 2006. This law and its corresponding implementation rules deal with issues like grid integration, tariffing and economic incentives to promote renewable energies.

However, in the beginning the implementation of this law caused some problems. The grid integration, for example, had to be agreed between the grid operators and the renewable power generation companies. This led to the grid operators being reluctant to integrate larger wind farms, sometimes using specious arguments. Wind farm projects were tendered and the feed-in tariffs calculated on the basis of the achieved price, with the result that bidders underpriced each other to the point that projects became uneconomical. This procedure was revised and nowadays fixed feed-in tariffs between 0.51 – 0.61 CNY/kWh¹ [1], depending on the location of the projects, have been introduced.

In 2007 the National Development and Reform Commission (NDRC), the top planning institution within the Chinese Government, released a so called “Medium and Long-Term Development Plan for Renewable Energy”, which mentions a development target of 30 GW for wind power by the year 2020.

Recently the National Energy Administration (NEA) has published a guideline for provincial and local governments, grid operators, project developers and investors. The goal is to streamline and centralize the approval process for larger wind farms so that false developments, such as not properly approved wind farm projects and disharmonized development of grid infrastructure and installed capacity within the sector are avoided.

It seems that a strong political will to promote wind power exists. But are the stipulated plans really good enough so that wind power can play a significant and reliable role in China's energy supply?

The Actual Situation

Indeed, the growth rates of wind power installations during recent years have been remarkable. They exceeded the official development targets by far. By the end of the year 2010 the installed capacity of wind power had reached 44,733 MW [2], an increase of around 27,700 MW within just one year. But remarkably, at that time only 31,070 MW [3] were connected to the grid reflecting the still existing problems of improper project approvals at the local level, scarce grid infrastructure in the north and the absence of consumers close to the generating facilities.

For the year 2011 it is expected, that another 18,000 MW will have been added, so that the installed capacity should have reached around 63,000 MW by

* Joerg Moczadlo and Wang Ye are with Bright-Consult (Beijing) Co. Ltd. They may be reached at contact@brightconsult.de
See footnote at end of text.

the end of last year. Official figures are not available yet, but sector experts and the order situation on the supplier side support this estimation.

At the end of 2011 the total installed capacity in China, therefore, was approximately 1,056 GW. This includes mainly coal-fired power stations, hydro power stations, nuclear power stations, biomass, photovoltaic and wind power, which has reached a share of around 6% of total installed capacity and 2% of total power production at the end of 2011. So far, the priority lies on onshore wind farms, which are located mainly in the wind belts. From a political point of view, offshore wind farms are still more or less in a pilot phase. The existing installations are located close to the coastline. However, the local wind turbine manufacturers are keen to develop and produce wind turbines with a larger capacity which could be technologically and economically suitable for offshore wind farms.

To push technology development, various incentives were introduced to attract foreign manufactures of wind turbines or manufactures of components. These incentives include various tax abatements or the possibility of 100 % investment from abroad without involving a local partner, which is interesting to foreign investors wishing to protect intellectual property rights.

What Developments can be Expected During Coming Years?

Looking at China's energy policy and the developments during recent years it can be said, that in the future the wind power sector will continue to grow significantly. However, due to technical and economic reasons, the focus will remain on onshore installations during the next five to ten years. The exploitation of wind resources in the northern wind belt strongly depends on grid expansion in the northern region which is currently planned and facilitated by the Central Government, the Provincial Governments and the state-owned grid operator "State Grid Corporation of China".

Meanwhile, the development of suitable technologies, especially large-scale wind turbines which are required for offshore applications, will be pushed. It is expected, that the offshore installed wind power capacity will not exceed 5,000 MW by the year 2015. In the following five years, the installation of offshore wind power will accelerate so that by the year 2020 around 30,000 MW of installed offshore wind power capacity could be reached [4].

Despite the impressive development plans for wind energy, the contribution of wind power to overall electricity production in China remains questionable due to the fact, that around 70% of the total installed coal-fired power plant capacity is younger than 10 years. It, therefore, must be assumed, that the majority of the existing coal-fired power stations will be operated for at least another 20 – 30 years, probably with a higher load factor compared to the situation nowadays, where a significant number of coal-fired power stations are facing a low demand situation.

Usually the expert community looks at large-scale wind turbines and wind farms when discussing and analyzing the Chinese wind power sector. In view of the size of China, the relatively weak infrastructure in inland regions and the considerable disparities in the level of development between the rich eastern and the poor western regions, looking at niche areas is worthwhile.

Especially remote areas in the western regions as well as smaller islands in the South China Sea provide a good market opportunity for small-scale wind turbines in off-grid hybrid applications. Although expansion of grid-connected power supply to remote areas is planned, the Central Government set up funds to foster electrification on the basis of off-grid hybrid-systems consisting of small hydro power plants, photovoltaic and small-scale wind turbines and others for areas, which cannot be connected to a power grid in the near future.

Looking at the development of the wind power sector in China, it seems that the prospects for business opportunities for companies involved in this sector are quite good. At present there are around 20 major wind turbine manufacturers, and even more smaller ones, active in China. Most of them are domestic companies. Since the competition is very strong and localization of key industries is an important aspect within the Central Government's economic policy, it can be expected, that a concentration process within the wide field of manufacturers will occur. The main portion of future demand, therefore, will be met by only a few large and capable manufacturers.

Footnote

¹ Exchange rate: 1 US-\$ ≈ 6.4 CNY (03/14/2012)

References

- 1 Renewable Energy Law, People's Republic of China
- 2 Chinese Wind Energy Association (CWEA)
- 3 China Electricity Council (CEC)
- 4 National Energy Administration (NEA)