CASE STUDY

Finding a green engine for economic growth
China's renewable energy policies

Key points

- ***China's renewable energy industry has been elevated to an engine for economic growth, encompassing growing international competitiveness for the accelerating number of domestic renewable energy companies.***
- ***In China, demand for wind power increased thanks to clear national targets and flexible strategic policies, including concession projects at the early stages and a feed-in tariff at a later stage.***
- ***China's focus on developing a domestic industry and a domestic market for wind power vaulted it in the position of world leader in wind power installations, bringing about the creation of hundreds of thousands of green jobs.***

There was an ambition…

In September 2009 the Government declared its intention to supply 15 per cent of its primary energy demand with power from non-fossil fuels by 2020[1] to ensure energy security and to reduce carbon dioxide emissions. To achieve this goal, the policymakers looked at lessons learned from the renewable energy developments in the European Union and the United States and decided to speed up especially its domestic wind power generation through a variety of policies, but most prominently the Renewable Energy Law enacted in 2006. Renewable energy supplied about 9 per cent of the country's energy demand in 2010,[2] barely missing the intended 10 per cent goal proclaimed in 2007[3] but strengthening the policymakers' confidence in meeting the 2020 goal.

What was done?

Setting up public tendering for concession projects

The first wind policies issued in the 1990s did not generate much impact, neither on the market nor on the industry, due to the comparatively high market price for wind electricity at that time and a lack of incentives. By 2003, the total capacity of China's wind turbines amounted to little more than 0.56 GW[4], accounting for only 0.15 per cent of the total Chinese energy capacity.[5]

To increase the wind power supply, the Government turned to a market-oriented policy for wind power concession projects in 2003 that also addressed commercial wind farms. The National Development and Reform Commission (NDRC) managed the concession projects, for which investors were selected via public tendering. The generated wind electricity was purchased through a bidding process by provincial grid companies. With this new approach, a stable domestic market began to build.

[1] Embassy of the People's Republic of China in the Republic of Botswana website "Recharging China: Clean Energy Dream?" Available from http://bw.china-embassy.org/eng/xwdt/t755048.htm (accessed 22 February 2012).

[2] Renewable Energy Policy Network for the 21st Century, *Renewables 2011: Global Status Report* (Paris, 2011). Available from www.ren21.net/Portals/97/documents/GSR/REN21_GSR2011.pdf (accessed 26 February 2012).

[3] Chew Chong Siang, *China's Medium to Long-Term Renewable Energy Development Plan* (Tokyo, Institute of Energy Economics Japan, 2007). Available from http://eneken.ieej.or.jp/en/data/pdf/383.pdf (accessed 27 February 2012).

[4] Global Wind Energy Council website "PR China". Available from www.gwec.net/index.php?id=125 (accessed 27 February 2012).

[5] Calculated using data from Asia Pacific Energy Research Center, *Energy in China: Transportation, Electric Power and Fuel Markets* (Tokyo, Institute of Energy Economics Japan, 2004). Available from www.ieej.or.jp/aperc/pdf/CHINA_COMBINED_DRAFT.pdf (accessed 27 February 2012).

Protecting and promoting domestic industries

The concession projects that had started in 2003 required that at least 70 per cent of all wind turbines are purchased domestically and that all wind turbines are assembled within China;[6] these requirements greatly influenced the market, attracting foreign investments in Chinese facilities and increasing the number of newly established local wind turbine manufactures.[7] China was able to overtake the United States of America as the greatest investor in clean energy sectors in 2009, despite abolishing the local purchasing requirements in the same year. Investments amounted to approximately US$34.6 billion[8] and exhibited the advanced stage of maturity of the renewable energy segment in China.

Drafting binding regulations

The Government adopted the National Renewable Energy Law in 2005, which took effect a year later and included two important regulations:[9] Wind power projects larger than 50 MW must be approved by the central Government while provincial governments approve all others; and the grid must purchase all the electricity generated from wind sources at a preferable price while the extra expenditure is shared by all electricity consumers in the country.

In 2007, the Government announced a national plan for renewable energy development, followed by the Twelfth Five-Year Plan for Renewable Energy in 2008 that set a medium- to long-term target for each renewable energy technology and a short-term target for wind power, aiming at a wind power capacity of 10 GW by 2010.[10]

Strengthening government support with other policies and incentives

Equally influential in the industry's development process has been the 2005 Guiding Catalogue for the Renewable Energy Industry, which contained additional mandating and incentivizing policies. A series of economic policies was introduced, such as the reduction of import duties and VAT for wind electricity selling. This was followed by a system to standardize the industry (figure 1).

[6] Dewey & LeBoeuf LLP, *China's Promotion of the Renewable Electric Power Equipment Industry: Hydro, Wind, Solar, Biomass* (New York, National Foreign Trade Council, 2010). Available from www.nftc.org/default/Press%20Release/2010/China%20Renewable%20Energy.pdf (accessed 24 February 2012).

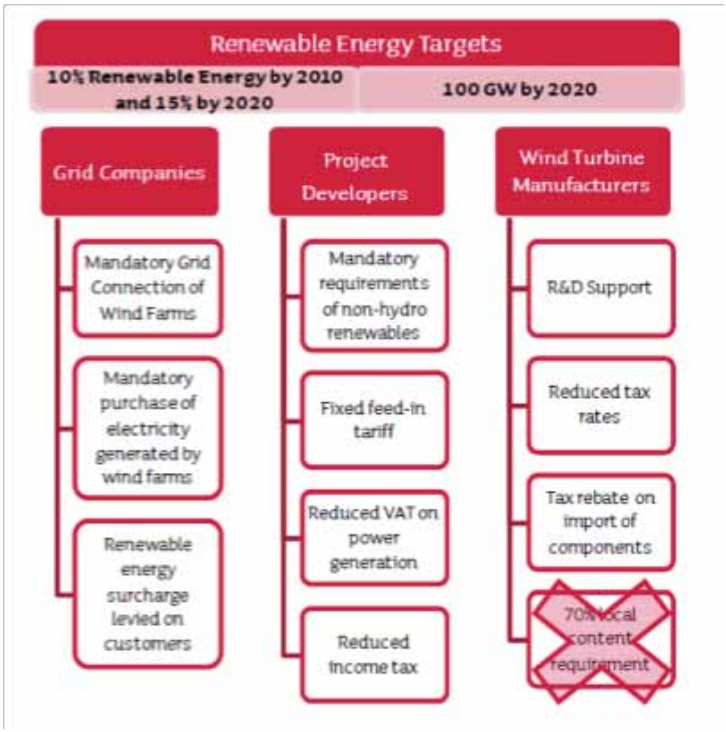
[7] *Power-technology.com digital magazine*, "Snapshot: Renewable Energy: China's Imbalanced Trade", May 18, 2011. Available from www.power-technology.com/features/feature119046/ (accessed 27 February 2012).

[8] ibid.

[9] Christian Nagstrup, "Year of the tiger: A turning point for Vestas in China?", PowerPoint presentation, 11 February 2011. Available from www.emu.dk/gym/hhx/vk/uvm/fagkons/2011/YearoftheTigerVestasFeb11.pdf (accessed 27 February 2012).

[10] China Wind Power Center website "National Policy". Available from www.cwpc.cn/cwpc/en/node/658 (accessed 27 February 2012).

Figure 1: Overview over renewable energy targets and policies, China



Source: Christian Nagstrup, "Year of the tiger: A turning point for Vestas in China?", PowerPoint presentation, 11 February 2011. Available from www.emu.dk/gym/hhx/vk/uvm/fagkons/2011/YearoftheTigerVestasFeb11.pdf (accessed 27 February 2012).

The National Development and Reform Commission together with the Ministry of Finance issued the Suggestions on Promoting Wind Power Industry in November 2006, which provided six areas of support for the wind industry: investigation and evaluation of national wind energy resources; establishment of national wind power standards together with a testing and certification system; capacity building for advanced wind power technology; domestic production of wind power equipment; grid planning and technical studies on wind power; and construction and management of wind farms.

Shifting to a feed-in tariff

After five years of tendering for wind power concession projects, China switched to a feed-in tariff in 2009, which had a stabilizing and maturing impact on the domestic market. The annual newly installed wind power capacity reached 13.6 GW in 2009 and 16.5 GW in 2010.[11]

Results

China's total energy supply from renewable energy demonstrated an average annual growth rate of about 12 per cent between 2000 and 2010 and substituted 293 million tonnes of coal equivalents by the end of that period. China became the world's biggest wind-using country in 2010[12] when its market share reached 21.8 per cent for cumulative installations and 46.1 per cent for new wind power installations. By that time, the wind power industry entailed about 260,000 jobs.

Other renewable energy sectors grew as well, such as solar PV, solar water heater or biomass (table 1). The production of photovoltaic cells, for example, reached 8 GW in 2010, and the annual growth rate consistently

[11] Global Wind Power Energy Council website "PR China". Available from www.gwec.net/index.php?id=125 (accessed 27 February 2012).

[12] Global Wind Energy Council, *Global Wind Report: Annual Market Update 2010* (Brussels, 2011). Available from www.gwec.net/fileadmin/images/Publications/GWEC_annual_market_update_2010_-_2nd_edition_April_2011.pdf (accessed 27 February 2012),

exceeded 100 per cent in the preceding five years.[13] Its global market share reached nearly 50 per cent, and approximately 93 per cent of the cells were exported to the European Union and other countries.

Renewable energy strengthened the Chinese economy

In 2010, the total amount of GDP produced by the renewable energy industry was close to 417 billion yuan (US$63 billion), accounting for 1 per cent of the total GDP (table 1). Additionally, the growth in renewable energies created more than 4 million jobs in China by 2010.

Table 1: The GDP contribution and job creation of the Chinese renewable energy sector (excluding hydropower), 2010

	GDP contribution (billion yuan)	GDP contribution (billion US$)	Employment (millions)	Installed capacity (GW)
Wind power industry	100	15	0.26	31.07
Solar PV industry	150	23	0.30	0.83
Solar water heater industry!	70	11	3.00	20.16
Biomass industry	97	15	0.79	6.69
Total	**417**	**63**	**4.35**	**58.75**

Source: ESCAP based on data from the National Development and Reform Commission, China

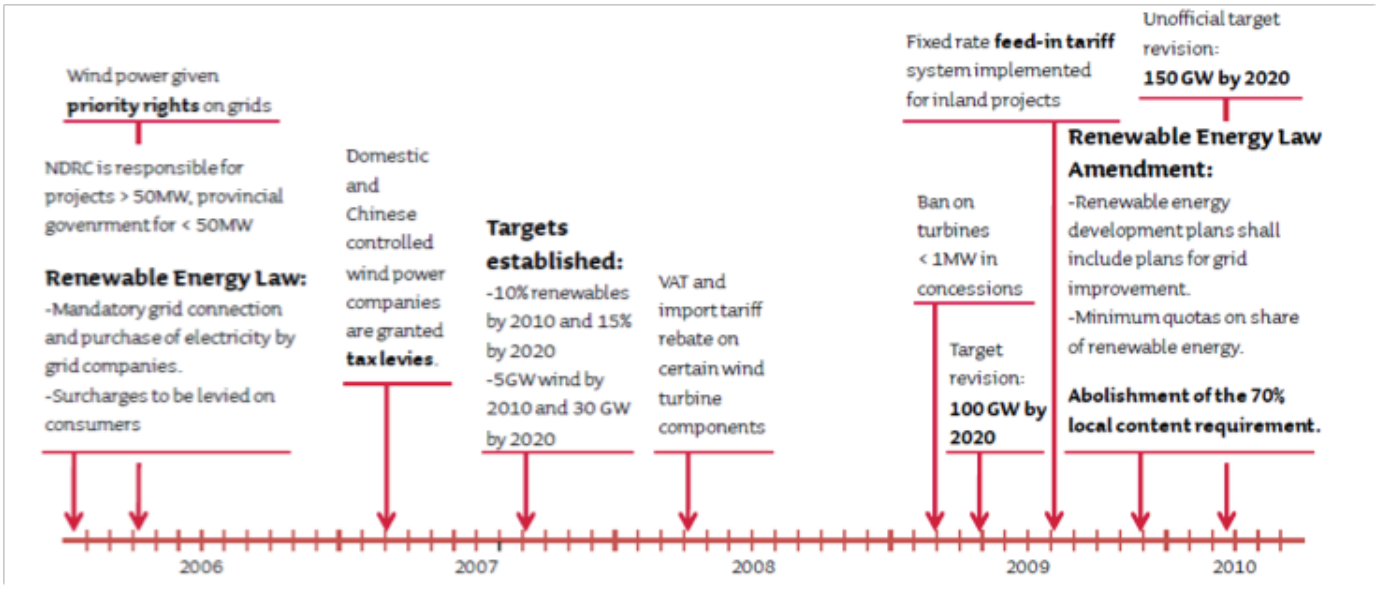
Lesson learned

Strong but flexible regulations are the best facilitator for renewable energies: A low carbon development path that fosters renewable energy needs a set of supporting laws. The Government provided a legal basis in the form of the Renewable Energy Law in 2006, for example, which evened the ground for the renewable energy sector. The regulations are not perceived as sufficient yet. The certification system for energy-saving products, established by the Energy Conservation Law in 2008, did not bring about the desired results because of inconsistencies between different certification standards and the lack of economic incentives.[14] However, the reason why the Chinese renewable energy sector has been growing successfully and why the policy gaps are probably not long-lasting hurdles to its development is the consistent optimizing process the Government exerts on its energy policies. China's renewable energy policies have been revised constantly since the first regulating attempts in the 1990s. Ineffective laws were amended and new regulations were added to the policy mix whenever the wind industry or other renewable industries started to stray from the national goals (figure 2).

[13] SEMI PV Group, SEMI China PV Advisory Committee and China PV Industry Alliance, *China's Solar Future: A Recommended China PV Policy Roadmap 2.0* (Beijing, 2011). Available from www.semi.org.cn/solarconchina/mail/2012/2011China_White_Paper_FINAL.pdf (accessed 27 February 2012).

[14] Economic and Social Commission for Asia and the Pacific, *Low-carbon Development Path for Asia and the Pacific: Challenges and Opportunities for the Energy Sector*, ESCAP Energy Resources Development Series No. 41 (Bangkok, 2010). Available from www.unescap.org/esd/publications/energy/Series/2010/Series-No-41.pdf (accessed 27 February 2012).

Figure 2: Timeline of major legislative changes within the wind-power sector in China (2006-2010)



Source: Christian Nagstrup, "Year of the tiger: A turning point for Vestas in China?", PowerPoint presentation, 11 February 2011. Available from www.emu.dk/gym/hhx/vk/uvm/fagkons/2011/YearoftheTigerVestasFeb11.pdf (accessed 27 February 2012).

Success factors

Since the early 2000s, China has aligned its national renewable energy policies with three core principles that have contributed significantly to the current prosperity of the renewable energy sector:

Building up a national producer and consumer base: Strengthening domestic markets in relation to both supply with and demand for renewable energy and related technology is crucial for long-term business development. Initially, the Government imported wind turbines and other key parts but later initiated support for building a domestic industry.

Protecting green technology markets in the early development stages: Vulnerable new technology markets, especially in emerging and developing economies facing global competition from industrialized nations, need to be protected during the initial market introduction phase. Policymakers implemented domestic purchasing and production requirements, which were abolished once the wind industry was strong enough to face global competition.

Setting ambitious but achievable goals: Policymakers did not lose sight of their initial intention to introduce renewable energy regulations and tried to set renewable energy goals as high as the Chinese capacities permitted. When the first wind power goal of installing 5 GW by 2010 was achieved ahead of time, the policymakers decided to raise the bar and changed it to 10 GW.[15]

Considerations for replicating

The Government's energy policies strongly affected China's energy development. As a result, it brought the goal of domestic energy security and increased renewable energy technology exports nearer. The Chinese renewable energy strategy and its success may be unique in some respects. Not many countries feature such an extensive and rapidly growing energy demand that eases the entrance of new companies into the market. Additionally, China's wind resources are abundant and space for their installation is readily available in rural areas. Although the scale of China's success might be unique, the mechanisms behind reaching the Chinese renewable energy goals, which were outlined above, can be replicated in other countries.

[15] Ni Chunchun, *China's Wind Power Generation Policy and Market Developments* (Tokyo, Institute of Energy Economics Japan, 2008). Available from http://eneken.ieej.or.jp/en/data/pdf/465.pdf (accessed 27 February 2012).