

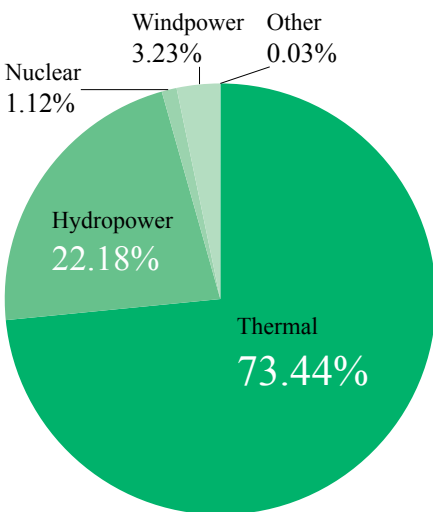
An Overview of China's Renewable Energy Market

[By Jane Shi and Shelly Zhao, Asia Briefing; Christoph Michael and Nico Dapprich, Dezan Shira & Associates]

The renewable energy market grew by 15.5 percent year-on-year in 2010 to US\$20.5 billion.¹ China's renewable energy development, financially immense, is part of the state government's long-term domestic diversification and self-sufficiency strategy.

In the 12th Five-Year Plan, policymakers called for non-fossil fuel energy production to reach and stay above 11 percent of total energy production by 2015. The wide range of alternative power generation systems encompassed under the heading "non-fossil fuel energy" include the renewable energy sources of hydropower, wind power, solar and biogas, and nuclear - the first four discussed in this article.

China Power Generation by Sector, 2010



While renewable energy development is driven largely by the a monstrous energy demand juxtaposed with forecasts of limited supply of traditional energy

Source: AB analysis, based on DB data²



resources, renewable energy development is driven also by pressure to reduce environmentally-harmful emissions. These include sulfur dioxide, nitrous dioxide, methane and most prominently carbon dioxide. The 12th Five-Year Plan explicitly aims for a reduction of carbon dioxide emission of 17 percent by 2015. Specific reduction goals, as previously indicated by the NDRC, vary geographically, as shown in the map.

Carbon trading schemes and low carbon efforts are also receiving continued policy support through pilot programs in designated areas such as Baoding, Chongqing, Guiyang, Hangzhou, Nanchang, Shenzhen, Tianjin, Xiamen, Guangdong, Hubei, Liaoning, Shaanxi, and Yunnan. These have required the provinces and cities specified to establish

green economy plans that address issues of energy use, green building, and industrial efficiency, among others.

China will spend an estimated US\$1.54 trillion on clean energy projects in the next 15 years. Government investments in this sector come through a variety of channels, including state-owned investment vehicles and financial institutions and financial and tax policies. China Investment Corporation, a US\$300 billion-asset-holding state wealth fund, is investing heavily in Chinese clean-energy companies and foreign operators with projects in China. Similarly, the China Energy Conservation Investment Corporation, a state holding company, invests heavily in energy conservation, pollution control and renewable energy private sector projects.

¹ Datamonitor. "Industry Profile: Renewable Energy in China." April 2011.

² "12th Five Year Plan: Chinese Leadership Towards a Low Carbon Economy." Deutsche Bank Group, DB Climate Change Advisors. April 4, 2011.

Experts from the Harvard China Forum and GE agree that investment opportunities in the clean energy sector will only increase in the future in China, especially as green energy becomes widely institutionalized in Chinese national policy. The financial markets also give telling statements about predictions of sector expansion. IPO releases from Chinese companies in particular have surged as the government and market gear up for the years of energy-efficient and green economic developments ahead. In 2010, four of the top five IPOs in renewable energy internationally were Chinese companies, mainly in wind and solar, with a combined raised value of US\$2.472 billion. In March of this year, Sinovel Wind Group raised 9.46 billion yuan (US\$1.4 billion) on the Shanghai Stock Exchange to become the country's largest green energy IPO to date.

For foreign companies in particular, mergers and acquisitions (M&As) in the green energy sector are also hot, especially between Chinese and foreign companies as the former looks to capitalize on foreign technology and expertise and the latter on bigger roles in China. Worldwide M&A deals in renewable energy grew 225 percent year-on-year in 2010, with solar and wind power responsible for around one-third of the deals in both industries. M&A deals in the green energy sector in China amounted to US\$2.126 billion in 2010 – 60 percent of renewable energy sector deals in the Asia Pacific.

Below, a quick overview of four of China's main renewable energies: solar, wind, hydropower, and biogas.

Solar Power

Solar energy reportedly accounts for less than 0.01 percent of domestic energy production in China, but this speaks more to the large size of the country's energy sector than to the country's role in this sector. China is in fact the major player in the international solar power market, both in terms of absolute production and consumption. China manufactured the most solar panels in the world in 2010.

In terms of consumption, it boasted 65 percent of the world's solar water heaters, including 80 percent of newly installed water heaters in 2010.

And the sector will grow - solar energy is the government's "poster child" of renewable energy growth. This includes domestic consumption, which is receiving a strong government push; last month China updated its target to 10 gigawatt for installed solar power capacity by 2015 and 50 gigawatt by 2020, according to an official at the National Development and Reform Commission's Energy Research Institute.

Among the government tax incentives specifically targeted at the solar sector, the government provides subsidies on investments under what is referred to as the Golden Sun program, announced by the National Development Reform Commission in July 2009. These subsidies include 50 percent of grid-connected solar investments and 70 percent of off-grid PV power investments (300 kW minimum capacity, 1-year maximum construction period, 20+ years planned operations).³

Foreign investors have been getting involved in China's solar power market by setting up production facilities in the country, M&As with Chinese companies, and R&D. Key recent examples include:

- U.S.-based National Clean Fuels acquired China National Solar in 2010
- Australian National University and Trina Solar, a Chinese solar product manufacturer, joined together in a three-year R&D collaboration to produce high-efficiency solar cells
- Centrosolar Group AG, of Germany, announced its first anti-reflective coating production line in Huzhou, China.

The solar power market in China has also seen a fair share of domestic companies merging together to gain better presence and marketshare. One prime example is Hangzhou Boiler Group, which recently acquired a 20 percent stake in Zhenjiang

Supcon Solar Energy Technology in a US\$7.7 million deal.

Wind Power

In 2010, every second newly installed wind turbine internationally was installed in China. In the words of Secretary General of the Global Wind Energy Council, Steve Sawyer, earlier this year, "China has become the single largest driver for global wind power development." From 2004 to 2009, the compound annual growth rate of the wind energy sector in China was 134 percent, accounting for an added 13.8 gigawatt of energy.⁴ China is the largest wind energy producer in the world, with a total installed wind power capacity of 44.5 gigawatt.⁵

Foreign players entering the wind power market will likely best be able to participate in projects organized on a provincial level, the Boston Consulting Group (BCG) suggests in a recent study with analysis of market share among national SOEs, international players, provincial SOEs, national policy-motivated independent power producers (IPPs) and national financially motivated IPPs in provincial, national, and offshore project forecasts. So far, international players have been barred from participation in projects on a national level, and the forecast for 2015 assumes this policy stance. Though the proportion of national level projects to provincial level projects is set to increase significantly from 2009 to 2015, the total number of provincial level opportunities for foreign players is likely to increase based on what we know to be China's increase of renewable energy efforts overall.

The largest turbine manufacturer in China will likely be generating more than US\$3 billion in annual revenue at 10 to 15 percent profit margins according to the same BCG report, a stunning achievement compared to an estimated US\$200 million to US\$300 million in annual revenues in 2007.

Among the government tax incentives specifically targeted at this sector is

³ Pricewaterhouse Coopers. http://download.pwc.com/ie/pubs/2011_renewables_deals.pdf

⁴ Interim Measures for the Management of Financial Subsidies for the Golden Sun Pilot Project promulgated by the Ministry of Finance; Ministry of Science and Technology; National Energy Bureau in July 2009, Cai Jian [2009] No. 397; Article 7, Article 4, Article 5.

⁵ 2010. Alberts, Larry and Tin Yin. "East Wind: Prospects for Equipment Manufacturers in China's Burgeoning Wind-Power Sector." The Boston Consulting Group.

an immediate VAT rebate (50 percent) applied to selling self-manufactured electric power generated from wind power.⁶

Additionally, the NDRC enacted a fixed feed-in tariff for electricity produced by new onshore wind power in 2009. The tariffs per kilowatt hour are set at 0.51 yuan (US 0.075, GBP 0.05), 0.54 yuan, 0.58 yuan and 0.61 yuan and represent a significant premium on the average rate of 0.34 yuan per kilowatt hour paid to coal-fired electricity generators.⁷

Overall regulations in the sector have been quite restrictive for direct foreign involvement, and with heavy competition from Chinese wind power companies, many foreign players have been getting involved in the sector through M&As and JVs. Recent activities of note include:

- GE entered a JV with Harbin Power Equipment in 2010 to grow sales of wind turbines in the China market. The new venture, in which GE will hold 49 percent and HEC 51 percent, will supply turbines for near-shore and offshore operations in China.
- Vestas, a Denmark wind power turbine manufacturer, in May secured a long-term contract totaling 250 megawatt of turbines to Inner Mongolia Guibang Shengtai Investments and to complete a 100 megawatt contract in Shandong Province. Guibang Shentai is a private company with interests in the financial and industrial sectors in addition to energy.
- Gamesa, of Spain, recently confirmed a deal to supply 300 megawatt of production turbines to China Resources New Energy Group. It is the first contract to be signed in a series of projects recognized by a memoranda of understanding signed in April 2011 for Gamesa to supply a total of 900 megawatt of turbine capacity to three Chinese companies.
- Last month, First Solar Inc, a U.S. manufacturer of solar panels, and China Power International New Energy Holding Ltd. announced long-term collaborations to establish greater

investment opportunities in China and U.S. for each other.

Hydropower

China leads the world in total installed hydropower capacity, with 213 gigawatt (primarily in the Western and Southern provinces) at the end of 2010. Having plateaued for a bit in the 1990s, hydropower development gained renewed government support in the 2000s, benchmarked in 2006 by the completion of the initial phase of the Three Gorges Dam on the Yangtze River. Full completion of the Three Gorges Dam is expected early this summer, with the last turbine currently in testing.

While the Three Gorges Dam has received the lion's share of international attention, other hydropower stations are almost equally massive. The Xiluodu and Xiangjiaba hydropower stations on the Jinsha River, for example, have a combined 18.6 gigawatt capacity, greater than that of the Three Gorges Dam. Yet the social and environmental issues connected to large-scale hydropower – such as population relocation, ecological disruption, and arable land disruption – have caused state agencies to increase their support for smaller, rural hydropower facilities of 50,000 kilowatt capacity or less. Rural hydropower capacity is expected to reach 74 gigawatt by 2015, according to China's Water Resources Ministry, roughly 26 percent of total hydropower capacity by that year. Between the second half of 2010 and the first quarter of 2011, 10 major new hydropower stations were approved, with 50 gigawatt of total installed capacity and investments of more than RMB200 billion.

China's installed hydropower capacity is estimated to reach 380 gigawatt by 2020, according to a 2011 analysis completed by China Research & Intelligence. Hydropower equipment production, technology improvement, construction material and operational support services, and transmissions technologies are just some of the areas foreign investors may be able to contribute.

Biogas

Biogas – a renewable natural gas substitute from the anaerobic digestion of solid waste – is gaining ground in China as a renewable energy source.

As China is the world's second-largest consumer of corn and producer of half the world's pork, the country will be in critical need of wide-spread installation of biogas digesters, if not already. In 2010, the national pollution survey estimated that 406 million tons of animal waste was dumped into waterways in 2007. State government now mandates biogas digesters for farms with over 1,000 cattle, 10,000 pigs, or 100,000 chickens, but while there are multiple state, provincial and local subsidies available, only about 3 percent of China's large and medium-sized operations currently have proper facilities to handle waste.

On the usage side of biogas production, daily cooking and single-home lighting was once the only feasible uses for the small amounts of fuel that came from rudimentary small-scale digesters in China. But with modern technology and expanded capacity potential, current biogas engines manufactured by the likes of GE are capable of churning natural waste into large amounts of renewable energy. In Nanyang city, Henan province, for instance, a 36 megawatt power station running GE engines is being installed in one of the nation's largest ethanol plants to produce electricity for use on the regional grid and within the plant itself. The station is expected to reduce annual carbon emissions by 1.1 million tons. Certain biogas processes are also capable of producing energy for chemical production and vehicle fuel.

For professional advice on investment in China, please contact Dezan Shira & Associates at info@dezshira.com or visit www.dezshira.com.

⁶ Notice on VAT Policies for Products Made from Comprehensive Use of Resources and Other Products (Cai Shui [2008] No. 156) Article 4.

⁷ Circular on the Establishment of Feed-in Tariffs on On-grid Wind Power Projects (NDRC Price [2009] No. 1906) (关于完善风力发电上网电价政策的通知) promulgated by the NDRC in August 2009.