

the energy balancing act

■ China now stands at the forefront of a wave of renewable energy investment, but it is also looking at all the alternatives to meet its energy needs. Energy security and energy efficiency have for many years been critical considerations for the Chinese government. A key part of the government's strategy to address this has been the continued development of the renewable energy sector. China is now one of the largest producers of photovoltaic cells alongside Japan and Germany, and a leading wind power producer alongside the US and Spain.

As a proportion of total output, however, the contribution made by renewable energy in China remains small and without scale, and it is therefore difficult for renewables to compete with other forms of energy on a unit cost basis. The electricity market continues to be dominated by low-cost coal-fired generation, which accounts for almost 80% of the country's 792,500 megawatts (MW) of capacity in 2008. Wind, solar and bio-energy still account for less than 1% of the total figure, while hydroelectric, oil and gas-fired power comprise the remaining 20%.¹

China's 11th five-year plan, for the period 2005 to 2010, has identified a number of key strategies for promoting renewables, including a requirement that 3% of the new capacity of large energy companies must be non-hydro renewables, with the figure rising to 8% by 2020.

In an effort to help the sector meet this ambitious target, the country's first renewables energy law was passed in 2006 and not only provided financial support to start up projects, but also imposed obligations on grid operators to give grid access to renewable power producers.

This connectivity has been a critical success factor for many producers (particularly wind power generators), whose initial start-up generating capacity might only have been in the range of 500 kilowatts (0.5 MW) to 5 MW, quite small compared with the several hundred megawatts produced at a typical coal or gas-fired plant.

This governmental support – and just as importantly as the enforcement of connectivity requirements – has been key to the success of renewables as there was often little commercial imperative otherwise for grid companies to extend a hand to these new players. While the National Development Reform Council has tried to support wind power by allowing companies to bid to develop 100MW level wind farms with a fixed-price purchasing agreement, such fixed pricing structures have also provided little incentive to the grid operators.

As part of the new Energy Stimulus plan issued in 2008 by the China National Energy Administration, there have been further supportive measures, with the main focus being wind power. The Chinese Wind Energy Association announced in

June 2009 that seven wind power bases would be constructed in Gansu, Xinjiang, Hebei, Jilin and Jiangsu provinces as well as two in the Inner Mongolia region. These seven bases together will help expand wind capacity to over 100,000 MW within the next decade – around eight times the current level. As a means to bring investment and lower cost electricity to many less accessible parts of the country, these investments help support the government's "Go West" development objectives, as well as its environmental and energy security concerns.

Solar power projects also continue to be developed, although often as part of "off-grid" projects including integrated eco-friendly real estate developments or municipal uses such as street lighting and rural schools and hospitals. The Ministry of Finance announced in mid 2009 that it would offer subsidies of up to 50% for investments in solar projects, provided they have a generating capacity of at least 300 kilowatts. Moreover, the subsidy would cover both construction and grid connection costs.²

THE CLEAN DEVELOPMENT MECHANISM

While many renewable power producers have been established with small generating capacities at the outset, advances in technology and the continued availability of funding mean renewables projects are now being set up on a far greater scale. It is not only the Chinese



government's own policies that have supported this. The Clean Development Mechanism (CDM) of the Kyoto Protocol has also become a key vehicle, allowing companies in developed economies to offset their own carbon footprint by funding carbon reduction initiatives in emerging markets such as China.

CDM applications have now become a major force driving investment in the renewables sector. By mid-2009, more than 500 projects in China had been registered as CDM projects, accounting for 34% of projects registered globally. Moreover, they accounted for over 40% of the carbon credits or Certified Emission Reduction (CERs), according to statistics supplied by the United Nations Framework Convention on Climate Change. These include not only greenfield projects, but also investments to expand and upgrade existing industrial facilities.

The global economic crisis, combined with uncertainty as to the future structure of the carbon market, has adversely impacted market activity and carbon pricing over the past nine months. In China, further challenges are also still being addressed. For example, investors need to produce accurate financial analyses to project a target rate of return and thereby establish a suitable contractual basis for the investment. The reason for this is that CERs are only applicable to projects that would not otherwise be commercially viable, as a way to turn an uneconomic project into an

economic one.

The way CERs are traded and treated for tax purposes also remains inconsistent across different jurisdictions. In China, the implications in terms of transfer pricing and the applicability of Business Tax are still being clarified. Nevertheless the implication is clear: investments are now

being influenced by their carbon footprint and this is good news for renewables in China.

COMPETING FOR INVESTMENT DOLLARS

Renewable energy is set to grow in importance over the coming decade. The

TAX AND FUNDING INCENTIVES FOR RENEWABLES

The government has proposed a suite of tax and other incentives to support development of the renewables market, including the following:

- The income derived by CDM project enterprises from HFC (Hydrofluorocarbons), PFC (Perfluorocarbon) and N₂O (Nitrous Oxide) projects is eligible for Corporate Income Tax (CIT) exemption for the first three years, and a 50% reduction in CIT for the fourth year to the sixth year, starting from the year in which the revenue from the transfer of greenhouse gas emission reductions is first received.
- A project company would be eligible for a 15% CIT rate if it is recognised as an advanced and high technology enterprise.
- The proceeds from the transfer of CERs which are submitted to the State could be excluded from the taxable income for CIT purposes.
- It is suggested that PRC tax authorities might clarify whether the transfer of CERs shall fall within the Business Tax regime, but would however provide Business Tax exemption for the transfer of CERs.
- The project companies might enjoy a 50% reduction on VAT payable for a company which supplies electricity through wind power.
- A subsidy of RMB20 per watt of solar photovoltaic generating capacity installed may be provided for installations of at least 50kW.

wave of share listings and other capital raising by global wind and solar power companies are further testament to the interest now being shown in the sector. Many of the largest oil and gas companies are also diversifying their portfolio by investing in renewables, while in China there are now many domestic champions in renewables, most notably solar power producers such as Suntech and LDK Solar (both of which have listed in the US in recent years).

That is not to say that renewables is seen as the single answer to China's energy challenges. The authorities have also prioritised nuclear power over recent years, while the coal industry will continue to exert influence.

Nuclear power has proved particularly attractive as a way to reduce dependence on oil, natural gas and coal. It can provide a steady "base load" of generating capacity to counteract the fluctuations that are unavoidably associated with wind or solar generation. It is also a favourable option in China's coastal regions, which lie further from the country's traditional source of fuel. The State Energy Bureau has set a target of at least 5% of China's electricity to be generated from nuclear power by 2020, a very achievable figure given that individual plants typically have extremely large generating capacities.³

Indeed, there are already some 11 nuclear power reactors in commercial operation in China, located at four separate sites. A further seven reactors are under construction and several more about to start construction. With 9GW of installed capacity in 2007, the sector provided 62.86 billion kWh – equivalent

to 2.3% of China's total energy needs.

Another development which will help in reducing the environmental impact of China's energy sector is the adoption of more clean burning technologies in thermal power plants. While clean coal technologies are not yet able to fully eradicate carbon and other emissions, these applications are also potential candidates for CDM investment, and given the scale of existing coal-fired generating assets, any improvements will play a significant role in improving the environmental impact of China's energy consumption.

The Chinese government has welcomed the introduction of clean-burning systems to both new and existing power projects. Many of these systems are being developed by US energy companies, due to the fact that the US also continues to rely heavily on coal-fired generation. Ultra-supercritical technology enables power plants to operate at higher temperatures and pressures, thereby providing thermal efficiency improvements of up to 50%. Integrated gasification combined cycle systems are highly effective in reducing sulphur and nitrogen. Both can sequester carbon dioxide emissions if fitted with carbon capture technology.

Traditionally, large coal fired power plants tend to require high upfront investment, but then have the advantage of low operating costs due to the low cost of coal relative to oil or gas. However, the adoption of more sophisticated, clean-burning systems will alter that equation, for example, by entailing higher costs for operation, maintenance and disposal of by-products.

If that sounds like a bad thing, it should at least be some consolation if it helps to level the economic playing field between the different forms of power generation that will contribute to China's energy mix in the coming decade. For renewable energy, gaining access to transmission grids will continue to be a key consideration. However, government's support, combined with further technological advances that can drive down operating costs and increase scale, should help to ensure a bright future for the sector. ■

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REFERENCES

- ¹ The China Electricity Council (CEC) predicts overall capacity will rise to around 870,000 MW by the end of 2009; see "China to add 80 GW installed power capacity in 2009," *Reuters News*, 20 April 2009. However, most of that still is accounted for by coal-fired generation. In the first quarter of 2009, 10,110 MW of capacity was added, of which 8,214 MW of fossil-fired capacity, according to the CEC; see "Coal use down, capacity up," *Platts Power in Asia*, 14 May 2009.
- ² See "China announces subsidies for solar power projects," *China Knowledge Press*, 23 July 2009.
- ³ "Nuclear power to rise 10-fold by 2020," *China Daily*, 2 July 2009.