

Natural resource

Biomass power doesn't enjoy the public profile of wind or solar, but it is a vital part of China's renewable energy drive

The city of Chifeng in Inner Mongolia is perhaps best known as the home of Bao Xishun, a herdsman who was until recently recognized as the world's tallest man. Beyond that, Chifeng fits into the rubric of many lower-tier cities in China's hinterlands: a community whose fortunes have long been tied to the land around it – agriculture, animal husbandry and mineral resources – but one which is keen to reinvent itself by attracting new industries and new prosperity.

The biomass power plant currently under construction in the fields nearby might help deliver this. Not only will the plant create jobs, it will also open up new income streams by purchasing agricultural waste from farmers which is then burnt to generate electricity.

"Every time we go into an area and build a power plant we are creating 1,000-1,500 jobs," said Simon Parker, CEO of Beijing-based DP Cleantech, the international renewable energy company that is building the Chifeng plant under its joint venture with State Grid Corp. "And then we give farmers money for waste products that they would otherwise slash and burn, causing environmental damage."

China's farming sector generates around 800 million tons of agricultural residues a year. Fifty-eight percent of these residues are discarded or burnt in open fields while a paltry 0.5% used in power generation. Denmark, which is generally regarded as the world leader in straw combustion technology, converts 80% of the 2.5 million tons of residues it produces each year.

Aggressive approach

Europe has set ambitious targets for biomass power adoption and China is keen to follow suit. Beijing wants renewable energy to account for 15% of total energy consumption by 2020. The target for installed biomass energy capacity is 30 gigawatts (GW), compared to 100 GW for wind power and 20 GW for solar.

Biomass capacity is likely to reach just 5.5 GW by the end of 2010 with 1.2 GW coming from agricultural waste and the rest from methane, forestry and household waste, and bagasse. In the space of 10 years, the agricultural contribution is expected to increase nearly tenfold so that it accounts for a third of the 30 GW total.



"The government's target for growth is extremely aggressive," Parker said.

The DP Cleantech-State Grid Corp joint venture, known as National Bio Energy (NBE), has 19 power plants in operation and a further 10 under construction. By the end of this year, it will have over 700 MW on the grid.

Though small, the numbers represent a remarkable turnaround since DP Cleantech – then known as Dragon Power – entered the market in 2004. At the time China had no renewable energy legislation for biomass, but within a year NBE was established. The foreign party provided the technology and expertise while the local partner offered market access.

As of the end of October 2009, the joint venture had invested just over US\$1 billion in China and DP Cleantech has used the experience to transform itself into a world leader in biomass energy.

On a basic level, a biomass power plant operates in exactly the same way as a coal-fired plant: the raw material is burned in a furnace and heat is captured in the water walls of the boiler; now in vapor form, the heat is driven through a turbine at high pressure, creating electricity. But specialist technology is required to ensure the combustion process is efficient and environmentally sound. Drag-



BEST OF BOTH WORLDS: DP Cleantech fused Danish technology and Chinese process innovation

on Power licensed it from several Danish companies and put it to work in the power plants built by NBE.

“By licensing the technology Dragon Power was able to reduce the price per megawatt of installed capacity from around US\$4.5 million to US\$1.5 million and this created a viable industry in China,” Parker said.

Put simply, the company took intellectual property from Denmark and effectively used China as a test bed, refining the processes and technology and bringing down the costs of production and im-

plementation. What emerged was a more commercially attractive approach to biomass energy. Dragon Power then acquired two of the Danish players from which it was licensing technology and, rebranded as DP Cleantech, set about marketing its solutions globally. It has a sizeable footprint in Europe, with manufacturing operations in Denmark and Poland.

DP Cleantech’s global business is entirely separate from sister company NBE, yet it could not have evolved without the experiences gained from the China-based power generation projects.

Inflexion point

The potential of biomass has yet to translate into a level of public exposure equal to that of wind or solar but Parker believes the industry is reaching an inflexion point – largely because governments are now taking it more seriously. DP Cleantech is gaining clients throughout Europe and Southeast Asia, while there is also growing interest among China’s independent power producers.

However, the low profile of biomass can also be traced back to its complexity. A considerable amount of capital must be committed up front – around US\$40 million for a 30 MW power plant – while securing agricultural waste supplies can

be a significant challenge. China lacks the industrialized agriculture systems of North America, which means NBE must work its way through a network of local authorities, cooperatives and agents. Sometimes it is necessary to go into the fields and negotiate with farmers directly.

A 30 megawatt plant requires 200,000 tons of waste a year from a 50 kilometer catchment area. Due to the fragmented supply chain, it is incredibly difficult to guarantee delivery at a stable price over several years. Raising project financing for power plant construction is no easy task.

“For coal, there is a market price and you have long-term supply agreements, so it’s easier to get project financing. In the case of biomass, it’s very difficult because there is no market price for agricultural waste,” Parker explained. “This is one of the main reasons why we haven’t seen the development of biomass as the same scale as wind anywhere in the world.”

Policy support

Parker believes NBE’s partnership with State Grid Corp has been a great asset to the group. The Chinese government has also come through with subsidies on capital equipment for farmers, road toll concessions for trucks carrying agricultural waste, and policy support that ensures biomass plants are connected to the grid and receive preferential power tariffs.

But he would like to see Beijing take steps to reduce supply chain uncertainty by maintaining tight control over approvals for new power plants. “We don’t want three power plants all being given a license to build inside the same radius of collection or everyone will lose money,” he said. “We need to feel confident of getting a return on our capital investment over 15-20 year period.”

The logic for ensuring the industry’s survival goes beyond bringing jobs to places like Chifeng; biomass offers advantages that other renewable energies cannot. As China decommissions small coal-fired plants, their grid capacity needs to be replaced with a similarly consistent source of base load power. Even the most efficient wind farm might have a utilization rate of just 30% simply because the wind doesn’t blow 24 hours a day.

“The greater the proportion of wind and solar connected up to the grid as a replacement to base load power, the more the uncertainty,” said Parker. “Commercially, if I’m running a grid I want base load power – and biomass provides it.”

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