Big Prospects for Small Wind Turbines

While 2011 figures have yet to come in, we know that the global small wind turbine market grew from 105.9 MW in 2006 to 275.8 MW in 2010. GlobalData's recent report – Small Wind Turbines (less than 100kW) – Global Market Size, Analysis by Power Range, Regulations and Competitive Landscape to 2020 – predicts even higher growth in the coming years, spurred by increasing incentives announced by various governments and by growing end user awareness. End user price is the most crucial factor affecting the growth of the market in both developed and developing countries. Also important are rebate programmes, property tax exemptions, financial incentives, annualised net metering and permitting issues.

According to the World Wind Energy Association (WWEA), it is difficult to assess the total number or capacity of small wind turbines, but in China alone there are roughly 300,000 small wind turbines generating electricity. In the US, the small wind turbine market grew 53% in 2010 to reach US$139 million; installations totaled 25.6 MW, up from 20.9 MW in 2009, according to a report by the American Wind Energy Association (AWEA). RenewableUK identifies over twenty manufacturers of small wind turbines in the UK alone.

The payback period of a small wind turbine is a major aspect of owning a system. This period depends largely on wind resource quality, tower height, siting, prevailing energy costs and turbine performance. Against this backdrop, with increasing incentives by governments and increasing energy security concerns, the report predicts that the small wind market will grow significantly from 275.8 MW in 2010 to 3726.5 MW in 2020 at a CAGR of 29.7%.

Global power generation from small wind turbines increased from 119 GWh in 2006 to 310.3 GWh in 2010 at a CAGR of 27.1%, and is expected to increase from 310.3 GWh in 2010 to 4203.8 GWh by 2020 at a CAGR of 29.8%.

Cost Analysis

The report assesses the cost of building a wind turbine according to its type, size, design and location. Installation cost is affected by the costs of construction, transportation, location, maintenance and transformers.

Of the major cost components, up-front or capital cost constitutes the primary cost of the wind turbine. Other components of the up-front cost include, for example, the cost of electrical equipment, grid connection and foundations. Up-front and capital costs constitute about 75%-90% of the total wind farm development cost depending on the speed of the wind, the supply of wind turbines in the market, and the arrangement of the wind turbines in the farm.

Land cost or land rent is the second largest component of wind energy

development, constituting about 4% of the total cost. Other identified costs relate to electric installations, consultancy, financial costs, non-electrical infrastructure and control systems. Further development is hampered by a lack of available small to medium sized turbines. The factors contributing to this limited availability are: a focus on the development of large turbine models which have a greater worldwide demand; a lack of hardware availability due to shortages of raw materials; and difficulty in obtaining certification for establishing new or additional manufacturing capacity.

Installation costs include transportation, construction and interconnection cost. Transportation costs differ with the size of the tower: the larger the tower, the greater the transportation cost will be. New tower technologies such as self-erecting designs are in development and have the potential to bring down transportation costs.

Turbine value is also affected by the cost, availability, and supply of spare parts. Some turbine components, such as gearboxes, require regular maintenance. The maintenance requirement and hence the cost of such components also depends on their design.Tough turbines are designed to operate in extreme weather conditions but they involve a tradeoff, such as lower efficiency and higher cost. Thus the cost of operating a wind turbine differs according to weather conditions or location.

Global Market Share

Many companies are currently manufacturing small wind turbines. Globally there are over 250 manufacturers of turbines with a rated capacity of less than 100 kW. In 2010, Southwest Windpower of the US sold up to 21.1% of the total number of small wind turbines sold worldwide. Northern Power Systems with 17.7% and Entegrity Wind Systems with 8.2% are followed by Southwest Windpower. Bergey Windpower stands at fourth with 3.9%. As the small wind turbine market is highly fragmented, other manufacturers' total market share stands at 45.2%.

Proven Energy Ltd of the UK was in fifth place, with a global market share of 3.9%, throughout 2010. In late 2011, however, the company entered receivership after the discovery of a technical fault in its flagship turbine model, the Proven 35-2. According to the company, the main defect was in the manufacture of the rotor shaft, because of which blades could fly off under high wind speeds causing severe safety concerns. It is estimated that Proven Energy sold around 500 turbines of the Proven 35-2 model, which has an average supply and installation cost of approximately £60,000 (US$92,796). This technical snag and the subsequent call by the company to shut down systems led to both capital and revenue losses for end users (an average lost revenue of £8538 ($13,292) per day). The total estimated capital cost lost by end users (agricultural sites, commercial premises and small wind farms) on their investment is around £30 million ($46.7 million). Receivers KPMG sold Proven Energy's business and assets to Kingspan Renewables Ltd in October 2011.

The Proven Energy crisis will be an eye-opener for other companies operating in the same market space, and there will be greater emphasis on quality from the

consumer end and more government scrutiny involved in the certification of small wind turbines in the UK. On a macro level Proven Energy's problems illustrate the dependence of FiT projects (usually agreements valid for over 20 years) on the long-term sustainability of their technology. This brings the longevity of turbine manufacturers to the foreground, and this requirement could become an entry barrier to new players.

Key Global Market Drivers

Financial incentives and government policies are the main drivers for wind uptake. Governments have introduced or are in the process of formulating policies to promote renewable energy development, which is the main force behind the explosive growth of the wind power market worldwide. There are three main markets for small wind technology.

In the US, the wind market is primarily driven by federal tax credits and state-level RPS, the key regional market on the continent. PTCs have traditionally played a vital role in boosting US wind power capacity, making the country the largest wind power market in the world. The extension of PTCs for three years and the introduction of federal ITCs in 2009 are expected to fuel the growth of wind installations in the US. High up-front cost has been the major concern among small wind power users. Financial incentives reducing installation and operation costs are the key to stimulating interest among buyers. The introduction of ITCs is expected to give a huge boost to the small wind industry, while policies targeted at reducing investment costs will be effective in increasing mid-sized wind installations.

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