Growing Pains

Renewables Hang on in Turbulent Energy Market

Matthew Jaster, Associate Editor

The turbines are still spinning. They're spinning on large wind farms in the Great Plains, offshore in the Atlantic and even underwater where strong tidal currents offer new energy solutions. These turbines spin regularly while politicians and policy makers—tied up in discussions on tax incentives, economic recovery and a lot of finger pointing—sit idle. Much like the auto and aerospace industries of years past, renewable energy is coping with its own set of growing pains. Analysts still feel confident that clean energy will play a significant role in the future of manufacturing—it's just not going to play the role envisioned four to five years ago.

Wind's Altered Forecast

BTM Consult, an international wind market research firm, reported that wind installations reached a record 41.7 gigawatts last year. And though the consulting firm says the market will continue to grow, it has reduced its cumulative forecast for the five years through 2016 by 14 percent to almost 270,000 megawatts, citing the European credit crisis as denting confidence in the industry (fiscal irresponsibility has altered many European countries' long-term plans for wind energy). Here in the United States, the issue of a Production Tax Credit (PTC) extension remains a priority as wind supporters look to eliminate the yo-yo policies that have plagued the industry in the past.

The Windpower 2012 conference and exhibition that took place in Atlanta from June 3–6 boasted 900-plus exhibitors in an industry town square that spanned nearly five football fields. The theme of the AWEA event was "Manufacturing the Future Today." Show floor chatter included everything from the PTC extension to cutting costs in offshore wind. Everyone agreed that more work needs to be done to meet some of the lofty goals the renewable energy industry has set for itself.

"Today, we have a difficult market environment in the wind industry," says Kerstin Eckert, Siemens AG, Energy Sector. "The main challenges are price pressure, increasing competition and uncertainties regarding the future of subsidy schemes. Still, the wind industry's long-term market perspective is positive."

The SeaGen power plant is located in a strait in the natural harbor Strangford Lough. The turbine is attached to a pile structure swept by the tidal currents, which is anchored to the seabed at a depth of approximately 30 meters. The turbine's rotor blades are driven by the water currents (courtesy of Siemens).

Matt Whitby, global communication and media relations at Vestas, echoes a similar sentiment. "Vestas has communicated that the wind energy market is no longer a growth market as it was just a couple of years ago and as a result we are restructuring our business around that. The financial and economic crisis has added substantial pressure on a number of heavily indebted European countries which are facing demands for a tight fiscal economic policy. Although only very few subsidy schemes for wind power represent public expenditure, short-term considerations may have an adverse impact on the expansion of renewable energy, including wind."

These restructuring initiatives, however, do not suggest companies are no longer pursuing new wind technologies and products. In fact, a slow growth period typically provides more time to concentrate on future business, which is exactly what companies like Siemens, Vestas and GE Energy seem to be focusing on.

Vestas has recently developed the Gridstreamer technology for its latest 2 MW and V112-3.0 MW wind turbines. This technology allows for full power conversion to meet increasingly tough electrical grid requirements. Vestas is partnering in developing and testing a floating offshore turbine platform, researching the potential of so-called stealth turbines that would not interfere with nearby aviation radar.

Vestas is also developing the V164-7.0 MW turbine for the offshore market. "This will be a game changer for offshore wind energy and will be developed with a focus on the North Sea where Vestas sees the largest opportunities for offshore wind," Whitby says.

GE Energy has also expanded its wind energy portfolio with a production-based operations and maintenance (O&M) agreement unveiled at Windpower 2012. Historically, wind O&M contracts have provided an availability guarantee measured from time-based availability of wind turbines. GE has moved from time-based

Vestas is focused on cutting down costs in 2012 and beyond for its wind energy products (courtesy of Vestas).

availability to production-based ability with a goal of maximizing production for its customers. Production-based O&M reduces upfront costs, better balances the risk between the owner and service provider and ties directly into GE's annual energy production enhancement initiative.

"By focusing on production, we are adding value for our customers. We are better aligning our goals with theirs and better sharing the risk between GE and our customer. Production-based O&M brings us another step closer to running the turbines like we own them," said Andy Holt, general manager of wind services for GE Energy, in a recent press release.

At Siemens, the focal point is research and development and offshore wind opportunities.

"Innovation is one of the cornerstones of our strategy, and research and development is a high priority for our business," Eckert says. "In 2011, Siemens decided to invest 150 million euros in the further development of its wind business. Two new R&D Centers are currently being set up in the Danish towns of Brande and Aalborg. They will be opened soon."

Siemens launched its new 6 MW direct-drive wind turbine in November 2011. "The new SWT-6.0 is available with rotor diameters of 120 and 154 meters and is designed for the most challenging offshore sites," Eckert says. "The Siemens direct-drive design features 50 percent fewer parts than comparable geared wind turbines. This unique combination of robustness and low weight significantly reduces infrastructure, installation and service costs, and boosts lifetime energy output and profitability."

Siemens' traditional stronghold is the offshore business in wind, with key markets in the U.K., Germany and Scandinavia. Onshore, the company is particularly strong in North America and Europe. "Siemens and Shanghai Electric intend to set up two new joint ventures to form a strategic alliance with the Chinese wind power market.

The Predictable Tidal Turbine

One key area of potential growth in renewable energy is using tidal power as a source for electricity production. "Experts anticipate double-digit growth rates for the ocean power business and they see the (theoretical) global tidal power generation potential as large as 800 TWh/year," Eckert says.

Marine Current Turbines (MCT), which is now part of Siemens, is a producer of horizontal axis marine turbines. Since November 2008, the company has successfully generated more than 3 GWh of clean hydro power at its test site, SeaGen. Located in Strangford Lough in Northern Ireland, SeaGen is currently the world's most powerful marine current turbine. "The twin axial flow rotors of SeaGen are mounted on a single vertical structure and are driven by the flow of the tides," Eckert says. "The system looks, from a technology point of view, like an underwater wind turbine. Water has an energy density of more than 800 times that of wind. Twin rotors rotate with the movement of tidal flow and the blades can be pitched through 270 degrees to work optimally in both tidal directions."

This energy source is advantageous thanks to its predictability. "Being driven by the gravitational pull of the moon and sun, tidal cycles and flow speed are known in advance, making the power output predictable," Eckert says. "The power output of the systems could be calculated for centuries ahead."

Siemens invested in MTC to help commercialize the technology, and the company expects ocean power will be an attractive renewable technology. The first tidal turbine started operation in 2003 in the Bristol Channel, called SeaFlow (this pilot plant had a capacity of 300 kW). Five years later, MCT installed SeaGen.

"In two years the installation of two arrays is planned with four to five tidal turbines each," Eckert says. "Siemens is expecting that in 2020 tidal turbines with a combined capacity between 1 to 2 gigawatts could be installed. The price of electricity generated with these tidal turbines is similar to power offshore wind plants today."

Another project featuring several marine current turbines is at the planning stage: The eight-megawatt Kyle Rhea facility is to be built in a strait between the Scottish mainland and the Isle of Skye. Coastal regions with strong tidal currents such as those in the U.K., Canada, France and East Asia have major potentials for the utilization of this technology.

"The marine environment is extremely challenging," Eckert says. "It is still complex to execute these projects and harness the power of fast flowing currents in the open sea. The need for reliable, predictable low-carbon power gives a new impetus to technological development in this field.

What's Next?

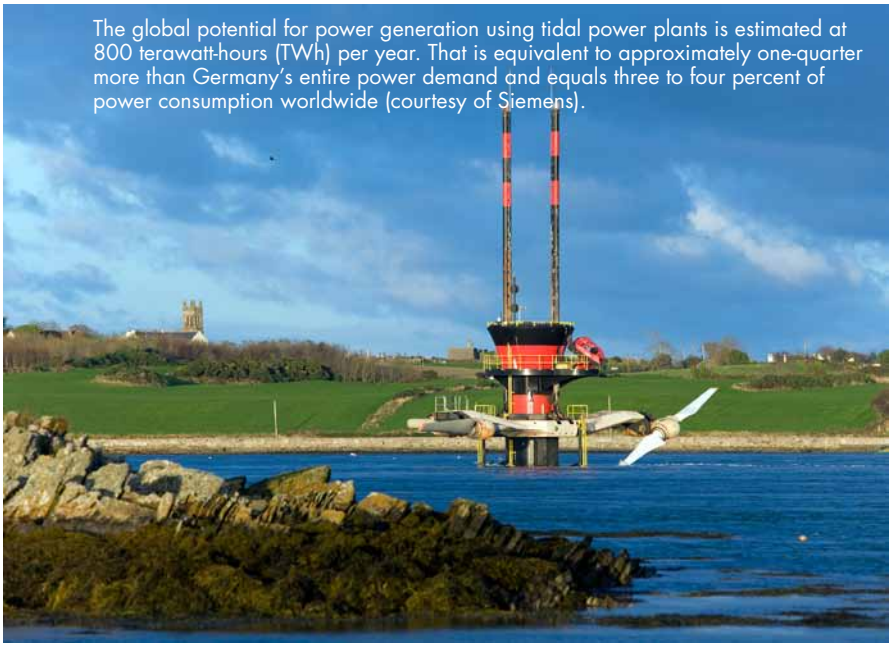
Despite widespread economic turmoil, a recent report from the Renewable Energy Association (REA) believes now is the time to invest in renewable sources, according to Leonie Greene, REA head of external affairs.

"Renewable energy is now a very big business internationally. From householders looking to turn their homes into micro power stations, right through to the biggest investment banks in the world, millions of people are investing in renewable energy. Failure to wake up to the vast opportunities and get fully behind the domestic industry will leave us lagging even further behind our international competitors."

So what needs to be done to make renewable energy competitive with other segments?

In 2012, with the cost challenges faced by the whole wind industry, Vestas is focused on taking the cost out of producing wind turbines, as well as on technologies which will earn a profit for Vestas in 2012.

"Our overall objective is to meet our customers' main requirements: lowering the cost of generating energy from the wind and doing so predictably and reliably," Whitby says. "Vestas is 100 percent in the wind energy business. Regarding other key segments, Vestas is working with customers not traditionally engaged in the energy industry, such as large corporations, that may be looking to expand their business or lower their carbon footprint.



The global potential for power generation using tidal power plants is estimated at 800 terawatt-hours (TWh) per year. That is equivalent to approximately one-quarter more than Germany's entire power demand and equals three to four percent of power consumption worldwide (courtesy of Siemens).

Cost is also the emphasis at Siemens.

"We need to make wind competitive with traditional energy sources, because price pressure is growing and wind power cannot be dependent on subsidies forever," Eckert says. "The industry will need to invest massively in innovation and industrialization. But these investments will only be realized if companies have a stable, predictable and profitable project pipeline."