The Thanet Offshore Wind Farm is currently the largest offshore farm operating in the world (courtesy of Vattenfall).

The Thanet project was completed in September 2010 and will boost offshore capacity by 30 percent (courtesy of Vattenfall).

Coastal Question Marks

DOES NORTH AMERICA'S RENEWABLE ENERGY SOLUTION LIE OFFSHORE?

Matthew Jaster, Associate Editor

Just off England's southeast coast, more than 100 Vestas V90 wind turbines are generating electricity equivalent to the annual consumption of 200,000 British households. The Thanet Offshore Wind Farm, completed in September 2010 by Vattenfall, the fifth-largest generator of electricity in Europe, will provide a significant increase of green energy to the U.K., boosting offshore wind capacity by 30 percent. It's currently the largest offshore wind farm operating in the world.

British Secretary of State for Energy and Climate Change Chris Huhne participated in the September opening ceremony for the Thanet project. "We are in a unique position to become a world leader in this industry. We are an island nation and I firmly believe we should be harnessing our wind, wave and tidal resources to the maximum. I know that there is still more to do to bring forward the large sums of investment we want to see in low carbon energy in the U.K., and we as a government are committed to playing our part," he said in a press release.

The time, money and resources being spent on offshore wind projects in Europe and Asia—40 projects operating in 10 countries—have spurred more dialogue on the role offshore wind energy could soon play in North America. The catastrophic effects of the Gulf oil spill and the continual reliance on fossil fuels here in the United States suggest other energy options still need to be explored.

The Benefits Offshore

According to the American Wind Energy Association (AWEA), offshore wind turbines generate more power than their onshore counterparts thanks to higher wind speeds and steadier streams. Larger turbines are more feasible offshore, capturing more wind while being able to generate energy near more densely populated areas. The U.S. Department of Energy found that 54 GW of the 300 GW envisioned by 2030 could be found offshore. These developments could spur manufacturing, assembly and transport activities in coastal cities and provide various green jobs to the manufacturing sector.

Since 2009, ten countries have had wind projects installed offshore including Belgium, China, Denmark, Finland, Germany, Ireland, the Netherlands, Norway, Sweden and the United Kingdom. A crucial element in sustaining renewable energy in North America will be the continuous push for projects that include smaller renewable energy segments such as offshore and community wind.

While the current administration has supported many of these renewable energy initiatives, more needs to be done. A recently released report, "Untapped Wealth: The Potential of Offshore Energy to Deliver Clean, Affordable Energy and Jobs," by Oceana, an international conservation group, sees much more potential for this area of wind energy.

Jacqueline Savitz, Oceana senior campaign director, recently said in Washington D.C. that "Harnessing offshore wind power in Atlantic waters is a much more cost-effective way to generate energy than oil and gas drilling. If we can get more energy for less money, create more jobs and protect our environment from spills, why not choose offshore wind over oil and gas?"

Oceana says that the offshore investments it has recently proposed to Washington could produce 30 percent more electricity than economically recoverable offshore oil and gas. The group believes offshore wind in Massachusetts, North Carolina, Delaware, New Jersey, Virginia and South Carolina could completely reduce the need for fossil fuels in some states while replacing some of the demand in others. The report recommends the United States eliminate federal subsidies for fossil fuels and redirects such efforts into renewable energy development and energy efficiency programs

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Ten countries, including England have installed offshore wind farms since 2009 (courtesy of Vattenfall).

immediately. It goes on to argue that offshore drilling for oil and gas should be stopped and that the time has come to make the tax credit for wind energy permanent.

Offshore Wind: Prospects and Politics

Companies already involved in wind energy or those considering the market might want to keep a close eye on offshore wind in the coming years. Most of the wind energy parts for offshore farms are currently being made overseas in Germany and China. Getting the necessary parts in a timely fashion could prove difficult unless U.S. manufacturers become more involved in this wind segment. Though several offshore farms are in the planning stages, only Cape Wind in Nantucket Sound has received final approval and is scheduled to complete construction in 2012 (*Ed.'s note: See sidebar on page 27 for more information on U.S. offshore projects*).

The real question is what's taking so long? The "Development Plan on Emerging Energies" report out of China was released in July 2010. The report outlines wind production goals through 2020 by the Chinese government, stating that offshore wind power is expected to reach 30 gigawatts and coastal provinces were required to start drafting offshore business models. In the next three to four years, 514 MW could be installed along the China coastline. According to the report, 17 MW have been installed already.

"China is open for business and it's now the most attractive market for clean energy businesses—which means our jobs could go overseas," Denise Bode, CEO of AWEA, recently said. "Over the last few years, we've seen new factories and wind farms grow here at home. And we know that clean energy technology can continue to be one of the bright spots in the U.S. economy."

The New York Times recently reported that the booming Chinese clean energy sector, now more than a million jobs strong, could grab hold of these technologies and never let go. As the world's population grows by nearly a third, to nine billion people by the middle of the century, North America will need to remain focused on clean energy as coal and oil reserves all but disappear. *The New York Times* goes on to say that much of China's clean energy success lies in aggressive government policies that help this crucial export industry in ways most other governments do not. These measures risk breaking international rules to which China and almost all other nations subscribe, according to some trade experts.

In Washington, renewable energy is a highly-contested and politically-charged chess match between Republicans and Democrats. Instead of addressing the energy issues, specifically the oil spill and North America's energy future, political candidates continue to argue back and forth for votes.

In response to rhetoric flying around Washington that a renewable energy standard would actually increase electricity prices, Bode of the AWEA said, "As a top official in charge of keeping electricity rates low in Oklahoma, the wind projects I approved saved consumers more money while protecting consumers from the risk of volatile fuel prices of conventional generation."

The AWEA, in fact, published some facts on its website to rebut some

of the recent talk on Capitol Hill. The organization says more renewable energy through a national RES (renewable energy system) will lower fuel prices, stabilize electricity rates and shield ratepayers/consumers from fuel price spikes and regulatory risks.

Independent studies from the U.S. Energy Information Administration (EIA) found that an RES could save consumers anywhere from $400 million to $2 billion. The EIA has also found that a national RES would lower natural gas and coal prices and often lower electricity prices. Policies and price signals, according to AWEA, however, do not fully recognize the value of electricity generated with zero-emissions. Without a long term renewable energy policy the demands for clean energy will probably not be met.

In late September, an RES bill was introduced by Senators Bingaman, Dorgan and Collins and applauded by the AWEA in a statement: "This bill comes at a time when Americans need jobs and more clean energy resources. And wind energy can create jobs and clean energy right here at home."

Hopefully, U.S. manufacturers of bearings, gear drives and other wind components will reap the benefits of a long-term renewable energy strategy. As has been the case for many years, those invested in wind energy projects in the United States must wait on Washington while Europe and Asia continue to move forward on offshore wind production.

Meanwhile, the debate on the benefits of wind energy, particularly offshore wind farms, is far from over. Detractors argue that tougher weather conditions mean limited access to routine maintenance. Others say that the saline environment creates the need for longer-lasting, more robust parts, which in turn means more money. Homeowners near and around proposed offshore sites worry that these wind farms might harm ocean views.

Though some environmentalists still worry about the natural impact of offshore wind, the AWEA says that offshore turbines can create artificial reefs and that extensive studies in Europe have revealed no significant bird impacts and that for the most part,

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Better Late Than Never

With 40 offshore projects in operation in Europe and Asia, North America is a little late to the party. But that doesn't mean that there aren't several farms in various stages of planning. Here's a brief rundown of some current and upcoming offshore wind projects in the United States:

Cape Wind, Nantucket Sound. The United States' first offshore wind project, Cape Wind, received final approval in April 2010 and is scheduled to complete construction in 2012. Built in Nantucket Sound, Cape Wind will feature 130 wind turbines producing up to 420 MW of clean, renewable energy. Cape Wind is currently the only offshore project that is past the planning stage. The project's website, *www.capewind.org*, states that the offshore wind farm will provide renewable energy capable of replacing 113 million gallons of oil per year, stabilize Massachusetts electricity prices and conserve and help lower natural gas costs. The jobs gained from environmental, geological and oceanographic studies, 18-plus months of construction and the jobs needed to maintain, monitor and operate the wind farm present further economic advantages. More importantly, it boosts the manufacturing technology sector, allowing Cape Cod to build more state-of-the-art facilities to attract even more high-tech engineering and manufacturing jobs.

Block Island Wind Farm, Rhode Island. After months of uncertainty, an approval vote in August paved the way for an eight-turbine wind farm off the coast of Block Island. Deepwater Wind, the project developer, hopes to expand with 106 additional turbines in the future. The company has been selected by two states, Rhode Island and New Jersey, to build wind farms offshore. Without visual impact issues, these turbines can be large in scale with zero pollution or dangerous waste. The Block Island Wind Farm hopes to become a 28.8 megawatt offshore wind farm approximately three miles southeast of Block Island consisting of 5–8 turbines. The wind farm will generate approximately 107,222 megawatt hours annually, supplying the majority of Block Island's electricity needs. Excess power will be exported to the mainland. Deepwater plans to commence site preparation in late 2010 and to commence commercial operations in 2012.

Mid-Atlantic Wind Park. NRG Bluewater Wind is currently developing projects in Delaware, Maryland, New Jersey, and New York. The company has responded to numerous requests for proposals and requests for information in these states as well as Rhode Island and North Carolina. It is also exploring projects in the Great Lakes and Canada. The NRG Bluewater Wind projects are in various stages of development.

Great Lakes Wind Farm. The Lake Erie Energy Development Corporation (LEEDCo) has recently selected a team of companies to develop an offshore wind farm on Lake Erie. It will be the first offshore wind farm built on a fresh water lake in North America. The initial project will see a five-turbine 20 MW pilot plant set up on the lake some 8 km to 16 km from the city of Cleveland. This is expected to start generating electricity by late 2012. LEEDCo says it could see the development expanded to as much as 1 GW of generating capacity by 2020.

Northern California. Researchers have been looking at a specific area in Northern California for possible offshore distribution. They've found that a wind park at Cape Mendocino would supplant about five percent of California's electricity coming from carbon-emitting sources. When combined with offshore wind energy at several other sites, it may be possible to produce between at least a quarter—and potentially all—of California's electricity. Though the transmission lines available to deliver such power are found in the southern part of the state, Pacific Gas and Electric Co. is looking into building new transmission lines in Northern California. For more information on offshore wind potential in North America, visit *www.awea.org*.

The Lillgrund Wind Farm off the coast of Sweden is the third largest offshore farm in the world (courtesy of Vattenfall).

A visual simulation of how Cape Wind in Nantucket Sound would appear from a boat at a distance of one mile (courtesy of Cape Wind).

birds avoid wind farms altogether.

Shipping routes are a growing concern, however, particularly around the U.K. With each and every new offshore proposal—and there are plenty out there—shipping companies raise concerns that routes will be altered. Also, there are still skeptics that don't believe the promised energy savings from wind, offshore or otherwise, can actually ever be achieved.

As the debate continues on wind energy in North America, there are at least some positives in the power transmission community. According to the Power Transmission Distributors Association's (PTDA) quarterly business index, the power transmission/motion control industry experienced rapid growth during the second quarter of 2010. Manufacturers are expanding at a rapid rate and distributors posted a much higher growth index than previous years. The survey anticipates that this momentum will continue into 2011. One wonders how big a role renewable energy might play for the power transmission community in the future.