THE WINDS OF CHANGE:

Offshore Wind Blowing in Big Energy

BY CHRISTINE GIORDANO

With wind power becoming the next big green energy and jobs wave, there is a race in New York State for who will get the first wind turbines in the water. The metro New York area may soon see turbines turning offshore in the Rockaway region, while others are working to place a wind farm in the Great Lakes. As the Atlantic Ocean's energy potential generates a hotbed of interest from governments and companies across the coast, the U.S. government will be working to approve projects faster than ever, and, in New York, officials say businesses have been waiting for Governor Andrew Cuomo to take office in order to put their projects in motion.

Currently, however, the U.S. doesn't have a single turbine in the ocean.

It is lagging behind Europe and China with tapping the resource that is now considered one of the cheapest energy sources available. Europe learned a fast, hard lesson years ago during the nuclear disaster at Chernobyl in 1986, when it became evident that nuclear reactors and their waste can be devastating. Since then, Europe has installed 948 clean energy turbines at 43 offshore wind farms, with new plans for a vast network of turbines of over an area of about 293,000 square miles in the North Sea. By 2030, the network could produce 16% of electricity consumption, according to a Forbes report.

China also just launched its first major offshore wind farm and is generating 102 megawatts (MW) of electricity, which is enough electricity to power about 25,000 homes. According to The New York Times, January 14, China has passed the United States as the world's largest builder and installer of wind turbines.

The winds of change are starting to blow. U.S. Interior Secretary Ken Salazar recently released a plan to speed the offshore permitting process, and said the U.S. will move faster to approve wind-power farms off the Atlantic Coast in hope of attracting investors and getting offshore projects in motion. The announcement follows The U.S. Department of Interior's 2009 findings that 100 percent of U.S. electricity demand could be met from off-shore wind, mainly in the shallower waters of the Atlantic between North Carolina and Delaware.

"Wind potential off the Atlantic coast is staggering," Salazar said. "There is, I think, a singular, unique opportunity to do something that's major to take care of the power needs of America," as reported in Bloomberg News. Regulators are to identify good wind development areas and smooth potential conflicts with states and federal agencies over issues such as shipping lanes before leases are offered, and new leases may be issued late this year or early in 2012.

States are to receive 27 percent of total revenues collected by the federal government for projects in federal waters, at least 3 miles offshore.

Middelgrunden, Danish Offshore Windfarm in Copenhagen Photo by Gordian Raacke

The Next Big Energy and Jobs Wave

Companies such as Google, and investors Good Energies and Marubeni are seeing the ocean's potential, and trying to launch a project to build a 350-mile cable on the east Atlantic coast to power offshore wind farms. The total cost of the transmission line is estimated to be $5 billion to power about 1.9 million homes.

The National Wildlife Federation (NWF) released a report that calls wind the "next big clean energy and jobs wave."

The report noted, "The Atlantic States would generate $200 billion in new economic activity and create more than 43,000 permanent, high-paying jobs if 54 GW of the 212.98 GW of available offshore wind resources were utilized," citing the National Renewable Energy Library. "54 GW of offshore wind production would generate as much energy as is produced by 52 coal-fired plants in the United States each year. Generating an equivalent amount of electricity from fossil fuels would emit 97.2 million metric tons of carbon dioxide annually —— the amount of carbon dioxide emitted by almost 17.7 million cars annually."

Six gigawatts of offshore wind projects have been proposed for the Altantic coast. They total enough wind power for about 1.5 million homes, with 212 GW of power in shallow waters -- the best area for current technology. New York has 37.4 GW of wind potential, and, after considering environmental and socioeconomic factors, 15 GW of which are truly commercially available.

GE's managing director Kevin Walsh sees the offshore wind market as a potentially fertile opportunity, reported Marketwatch, with wind power comprising the largest piece of his unit's $6 billion renewable energy investment, including $5 billion between 2006 and 2010. In 2009 and 2010, GE Energy Financial Services signed $1.5 billion in deals for wind farms.

Offshore wind is a better bet than land-based wind because the winds at the top of buildings tend to be very turbulent, which is not ideal for turbines.

–Dr. James Manwell, professor at University of Massachusetts at Amherst

Deepwater Wind, which is planning a 200-turbine, 1,000 megawatt wind farm for the Rhode Island Sound, also announced plans to develop an offshore transmission network to run between southern New England and eastern Long Island, and transmit power to Massachusetts, Rhode Island, New York, and Connecticut. Planning phases to are begin in 2014 and be operating by the end of 2015.

Meanwhile, New Jersey, with its incentives and tax rebates for wind energy, may develop the first set of serious commercial turbines in the areas around Manhattan. To produce enough power for almost 2,000 homes, The Port Authority of New York and New Jersey is planning five wind towers some 300-feet tall, on the west side of New York Harbor. Bayonne, N.J. may also power a sewage pumping station by wind turbine.

But skeptics look to the decade-long battle Cape Wind fought in order to win government approval for the nation's first offshore wind farm on Nantucket Sound, facing objections from landowners who claimed their property values would decline if their ocean views were dotted with spinning turbines. Salazar signed the 28-year lease for the $1 billion project in October, with Massachusetts utility regulators agreeing to buy half of its generated electricity for 18.7 cents per kilowatt-hour.

Why the ocean?

It seems there is nothing like an offshore breeze, when it comes to turbines. Generally, wind needs to blow about 11 m.p.h. to generate profit from feeding its energy into the grid, and winds at sea are steadier and thought of as the ideal nighttime complement for solar energy after the sun sets. Offshore wind is a better bet

than land-based wind because the winds at the top of buildings tend to be very turbulent, which is not ideal for turbines, said Dr. James Manwell, professor at University of Massachusetts at Amherst, who has studied wind energy for 30 years.

New York State

The Great Lakes and the Rockaway project are vying for their places in New York history. But things may lean toward the offshore project downstate due to demand and experience: for starters, turbine operators have more experience with ocean winds, as opposed to freshwater winds.

And, as squeaky wheels tend to get the most oil, metro New York is high on the energy-needy scale. There isn't a lot more room in the urban area to build more power plants, yet the demand for electricity in Manhattan and Long Island continues to grow. Energy demand spikes every summer with air conditioning use, and every winter when Christmas lights blink on. Utilities have been tapping other markets for power, such as New Jersey and Connecticut, but officials are trying to figure

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out other ways to solve the energy dilemma.

"We have to figure out what else we can do. So here's an example of building clean generation that isn't going to cause any additional pollution in that area, that can be built right where the electricity is needed most," said Carol Murphy, executive director of the Alliance for Clean Energy New York, Inc.

Cost has always been an issue for offshore turbines. The Cape Wind project, for example, will cost at least $2 billion to produce enough power for 200,000 homes. But when measured against the subsidies to other energies such as nuclear, they're more cost effective, said Murphy.

"It will be more expensive in the short term, but we talk about offshore wind because the winds are much stronger and more persistent and more predictable, and not as variable as they are on land, and, we believe, they will certainly pay off," said Murphy.

There are scores of new turbine designs being invented. Some work vertically. Others have smaller blades. The New York State Energy Research and Development Authority (NYSERDA) is building ways to test their effectiveness within its business incubators, said Murphy, but generally, the tried and true brands win favor for most projects.

Murphy, who is also part of Governor Andrew Cuomo's transition team, speculated that many businesses have been holding back and waiting for the new governor to take office. During his campaign, Cuomo stated in his Power NY white papers that he wanted to make New York "the nation's leader in wind power." (see www.andrewcuomo.com)

"If you look at the white papers, they're pretty well detailed on what his positions on clean energy are, and he does very much support on and offshore wind," said Murphy.

Within the white papers, he calls wind "the most promising renewable resource for large-scale energy generation in New York," noting that wind energy costs have dropped more than 80-percent in the last 20 years.

"Now, with the support of the federal production tax credit for wind power generation, state-of-the-art wind power plants can generate electricity for less than 5 cents/kWh, a price that is competitive with new gas-fired power plants. The next generation of wind turbine technology is expected to lower this cost even further," reads the report.

The wind farm near New York City would most likely be in area "13 to 17 nautical miles from the Southeast Rockaway peninsula." At press time, the area was being studied for the offshore project, with results due "shortly," according to Connie Cullen, spokeswoman for NYPA, (see LINYCoffshorewind.com)

The project is part of a seven-member collaborative between Con Edison, Long Island Power Authority (LIPA), New York Power Authority (NYPA), New York City Economic Development Corporation, New York State Energy Research and Development Authority (NYSERDA), The Port Authority of New York & New Jersey and the Metropolitan Transportation Authority (MTA).

Still wading through the permitting phase, it is expected to request bids early this year. It is yet unknown whether it will use turbines that are domestic or foreign.

"The Collaborative will select a project developer for the construction, ownership and operation of the offshore facility via a Request for Proposal process," wrote Con Edison spokesman Mike Clendenin in an emailed response. "The turbines utilized in the project will be dependent upon the technology and manufacturer selected by the developer who will construct the project. A timeline for permitting and the RFP will be determined once we have completed several economic and environmental assessments."

There is a now a famous photo of New York City Mayor Michael Bloomberg looking over the vast field of wind turbines 13 miles off the coast of Denmark, while he was overseas for the climate talks in Copenhagen about a year ago. Seeking for ways to reduce dependence on pollutants and foreign oil, Bloomberg was already planning the consortium between government and utility companies. The article, published by *The New York Times* Dec. 14, 2009, quotes him as saying, "I don't understand what there is to complain about... Would they be rather be staring at a coal plant?...It gives you a feeling for what it will be, I hope, off the Long Island shore."

The metro wind farm is planned to start with 350 megawatts, and may eventually have the capacity to generate 700 megawatts. The Great Lakes wind farm would have the potential to produce 500 megawatts of electricity, to be bought by the New York Power Authority.

"In my mind, whichever one starts first is fine," said Murphy.

China and the Turbine Business

Regarding the wind turbine business, China may give the market a run for its money.

The winds are beginning to favor the country with the large workforce and goldmine of rare materials. China garnered a large part of the wind market when manufacturers such as Spanish-based Gamesa, aimed to profit from the Chinese workforce. As they trained the Chinese worker, they shared valuable manufacturing techniques. Then they sold their million-dollar turbines to the Chinese market. In 2005, China changed the rules. It mandated that foreign companies had to buy equipment in which at least 70 percent of the value was domestically manufactured. The declaration was later repealed when challenged by the Obama administration, but China now owns about half of the $45 billion global wind turbine market, according to a report in *The New York Times*. Most of the turbines available are from Europe, with the exception of GE, from the United States. To compete with the lower-cost Asian products, industry giant Vestas is closing four factories in Denmark and one in Sweden, and laying off one-eighth of its 24,000-person labor force.

To make matters even a bit more competitive, China has yet another thing in its favor, says Professor Manwell. Currently, one of the most difficult things about a wind turbine is that, like many mechanical things that whir and spin, its gear boxes require maintenance. When turbine companies shift away from the high-maintenance gear boxes, they replace them with magnetic devices that rely on rare earth materials.

"The rare earth materials are from China. China constricts the supply, and shuts its mines," which keeps the value of the materials high, said Manwell. Currently, 95-percent of rare earth materials are from China, which is one of the few countries willing to perform the dangerous radioactive process that is used to separate them from iron ore. As toxic chemicals leech dangerously close to the Chinese drinking water supply, China said they needed the quota reduction to shut polluting mines and meet domestic demand.

The material, neodymium, is precious to turbines and hybrid cars, but right now, companies are researching ways around using rare earth materials, yet haven't found the solution yet, said Manwell.

And the Prize Goes to...

The true winner of the energy race, however, will be whoever figures out how to best store it, said Murphy.

What's needed is a way to store the energy that is produced by wind and solar, then place it to the electrical grid at the times it is needed most. That's the missing link that will propel renewable energies to massive worldwide use. "They will probably get a Nobel prize," said Murphy. ■

Green Events

February

8 **Tuesday**
NYSERDA Workshop. SBDC second series of free workshops. Submission requirements February 8. Small Business Development Training Center Research and Development Park, Building 17, room 145. Stony Brook Road. 8:30 am registration, workshop 9 am. 631-632-9837or e-mail Leslie.Rurup@stonybrook.edu.

10 **Thursday**
Environmental Roundtable hosted by NYS Senator Kenneth P. LaValle. 5 to 7 pm. Suffolk County Community College, Selden campus. Babylon Student Center, Montauk Point Room 212. For reservations call 631-696-6900.

17 **Thursday**
The Neighborhood Network 12th Annual Organic Turf Show. Designed for turf care professionals, features vendors of 100% natural horticulture products, and workshops on organic care of lawns, athletic fields, and even non-toxic indoor pest control. http://neighborhood-network.org/events/trade_show.htm

28 - **March 2**
Energy Innovation Summit. Catalyzing Energy Breakthroughs for a Secure American Future. Washington, D.C.
Connect with America's Brightest Innovators.
Join more than 1,800 energy leaders to explore how global energy challenges are directing research and investment priorities and driving American innovation.
http://www.eere.energy.gov

March

4 **Friday**
Sustainable Long Island 5th Annual Sustainability Conference. 8 am. Carlyle on the Green. Keynote Woody Tasch. Attend for the day or just lunch. Register online www.sustainableli.org or email Katie Kelly at kkelly@sustainableli.org Call 516-873-0230 for information. ■

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