Wind energy off the Atlantic coast: plentiful, renewable, and affordable

Offshore wind energy on the U.S. Atlantic Coast offers an enormous untapped resource. The Atlantic states together have an offshore wind potential capacity of 1024 gigawatts (GW) of electric power,[1] an amount far in excess of the region's entire energy use.[2]

Offshore winds are strong and steady. Winds off the Atlantic coast are rated at Class 4, 5 and 6. This compares favorably to the Class 3 and 4 winds typical of most utility-scale wind projects on land. Offshore turbines can thus achieve a higher "capacity factor," producing a significantly higher annual average power output than similar turbines sited on land. Offshore wind turbines also can be larger than land-based turbines, realizing better economies of scale, because their components can be shipped entirely by water, avoiding road and rail restrictions on length and weight.

The continental shelf favors East Coast locations. The outer continental shelf along much of the U.S. Atlantic coast remains shallow for many miles out, allowing for placement of wind turbines twelve or more nautical miles offshore while still in less than 30 meters of water. The shallow depth allows for construction using commercially-proven monopile foundations, while the greater distance from shore makes wind farms barely visible from beaches. This also keeps them outside migratory shorebird routes and away from other ocean uses that crowd the zone nearer shore.

Offshore wind is located where the demand is. Most major cities of the eastern U.S. are relatively near the coast. Offshore wind farms can provide power to these load centers without requiring long distance transmission lines. Connecting offshore wind into our existing power grid could prevent the need to import additional coal-generated electricity from the mid-west, as well as the need for expensive new transmission lines that would cross half the country, and that often face public opposition.

Wind is a clean, renewable resource. Unlike coal, oil, gas and uranium, offshore wind is a clean, renewable energy source, which can help states meet their renewable energy targets. Offshore wind turbines emit no air pollution and don't foul our rivers; they pose no risk of mercury poisoning; they do not cause asthma or other lung ailments. They require no mountaintop removal coal mining, produce no radioactive waste, do not spill toxic sludge onto our beaches, and do not consume scarce fresh water resources for washing coal or cooling generating plants.

The lights will not go out when the wind blows less strongly. Modern utility grids can easily accommodate fluctuations in wind generation up to the point that wind power reaches about 20% of a region's total generation.[3] In addition, offshore wind farms up and down the East Coast could be interconnected through an offshore north-south underwater high-voltage cable, which would even out fluctuations over a much larger area. This would enable larger amounts of offshore wind development and minimize the environmental impact of multiple cable landfalls. In the longer term, other renewable sources and new storage methods, along with transmission, may eventually allow 100% clean electricity.

Offshore wind is a proven, commercially available technology. Offshore wind offers an energy solution that can be adopted *now*. The technology is well established worldwide, with 15 years of operating experience, in ten countries and totaling more than 1,130 megawatts (MW). U.S. offshore projects are moving ahead in four Atlantic states. Delaware has recently approved a 450 MW wind farm 11.5 miles off its coast, and a 420 MW wind farm in Nantucket Sound off the southern coast of Massachusetts has nearly completed federal review. Rhode Island and New Jersey have recently awarded projects of 400

MW and 350 MW, respectively. Additionally, New York, Virginia and Georgia are studying offshore project sites for near-term development, and Maine recently announced plans to design and test technology for wind farms in deep water.

Offshore wind is affordable. Construction costs have soared for conventional power plants, and their fuel prices have increased under pressure from growing worldwide demand. The offshore wind contract in Delaware, with only existing Federal credits, will deliver power at the same price currently being charged for dirty power in the Mid-Atlantic states.[4] Even in Virginia, where electricity has historically been cheap, research suggests that offshore wind power is a better investment than a new coal-fired generating plant.[5] Wind becomes even more attractive when the cost of coal is adjusted to include carbon dioxide emission costs, either in the form of a carbon tax or a carbon cap-and-trade program, or in the form of carbon capture and sequestration costs.

Wind energy offers price stability. Conventional fuels, including oil, coal, natural gas and uranium, are increasingly subject to price volatility. Once a wind farm is built, however, its fuel is free, making it possible for businesses and consumers to reliably forecast their energy costs well into the future. When a state approves construction of a fossil fuel generating plant, it is like taking out an adjustable rate mortgage; consumers are committed to paying for fuel price increases, as well as any costs of additional emissions controls that might be required by future environmental regulations, for the entire life of the plant. This is a big risk for ratepayers, especially over a typical power plant service life of 25 years or more. Using wind is like taking out a fixed-rate mortgage and locking in stable prices for decades into the future.

Offshore wind farms create jobs. Construction, installation, operation and maintenance require a skilled labor force that can be hired and trained locally, creating thousands of new jobs.[6] Many of the components of wind turbines, as well as the ships needed to install them, can also be fabricated locally, taking advantage of the strong maritime industrial base present in several eastern states.

Atlantic coast governors support offshore wind. In a May, 2009 letter to Congressional leaders, eleven East Coast governors stated their support for offshore wind power development, noting that "the wind resources of the Eastern seaboard states—both onshore and offshore wind—represent one of our nation's most promising yet underdeveloped source of renewable energy."[7]

The public supports offshore wind. A scientific survey by the University of Delaware found that over three-quarters of the state's population supported the proposed offshore wind project, even if it were visible from shore. When offered a choice between the offshore wind project and an equivalent new generating plant using coal or natural gas, over 90% voted for wind, *even if it were to cost more*.[8]

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[1] http://www.doi.gov/ocs/slides-At.pdf

[2] Energy Information Agency (EIA), http://www.eia.doe.gov/cneaf/electricity/epa/epa_sum.html

[3] Department of Energy, Office of Energy Efficiency and Renewable Energy, "20% Wind Energy by 2030: Increasing Wind Energy's Contribution to U.S. Electricity Supply." http://www1.eere.energy.gov/windandhydro/pdfs/41869.pdf

[4] http://www.ceoe.udel.edu/windpower/deproject.html

[5] Hagerman, G., 2009. Ppt: "Offshore Wind: Potential Energy and Economic Benefits to Virginia," slides 31-32.

[6] Musial, W., 2007. Offshore wind electricity: a viable energy option for the coastal United States. *Marine Technology Society Journal*, Vol. 41, No. 3, pp. 32-43.

[7] Available at http://files.eesi.org/governors_051109.pdf.

[8] University of Delaware, 2007. http://www.udel.edu/PR/UDaily/2007/jan/wind011607.html, also *Wind Energy* 12(2): 183 - 202. DOI: 10.1002/we.316