# Wind Energy off the U.S. Atlantic Coast

***Offshore wind energy on the U.S. Atlantic Coast offers an enormous untapped resource.*** The region known as the Mid-Atlantic Bight, which covers nine states and the District of Columbia, stretching from Massachusetts to North Carolina, has sufficient offshore wind potential to generate a yearly average of 330 gigawatts (GW) of electric power, nearly five times the 73 GW average demand of this region.

***Offshore winds are strong and steady.*** Winds off the mid-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 of the Mid-Atlantic Bight 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, and keeps them away from migratory shorebird routes and out of the zone nearer shore, which is more crowded with other ocean uses.

***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. Here in Virginia, a wind farm twelve miles offshore from Virginia Beach could be readily integrated into the region's high-voltage transmission grid by connecting to an existing 500 KV substation in Chesapeake. Connecting even larger amounts of offshore wind there could prevent the need to import additional coal-generated electricity from west of Virginia, and the need for new transmission lines that would have to cross our parks and historic places to bring power to northern Virginia.

***Our coastline offers shelter from hurricanes.*** The entire Mid-Atlantic Bight offers many good locations for offshore wind farms. New Jersey, Delaware, Maryland, and Virginia have an extra advantage, in that for over a century, no major hurricane (Category 3 or higher) has made landfall along the coastline of these states. This makes our waters especially safe for wind turbines, even as turbine and tower designs are being improved to withstand stronger storms.

***Wind is a clean, renewable resource.*** Unlike coal, oil, gas and uranium, offshore wind is a clean, renewable energy source, which can help Virginia meet its 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. This means that up to 14,000 MW could be installed in the Mid-Atlantic Bight without any change in our power quality or reliability. Over the long term, offshore wind farms up and down the East Coast may be interconnected through an offshore north-south underwater high-voltage

cable, which would even out fluctuations over a much larger area, enabling even larger amounts of offshore wind development, and minimizing the environmental impact of multiple cable landfalls.

***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 offshore wind farms in ten countries, totaling more than 1,130 megawatts (MW). U.S. offshore projects are moving ahead in six other 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. New York and Georgia also are studying offshore project sites for near-term development.

***Virginia can start now.*** The Virginia Coastal Energy Research Consortium (VCERC) recently completed an ocean mapping study suggesting that a single study area twelve miles off Virginia Beach could accommodate 4 GW (4,000 MW) of offshore wind capacity — even after excluding areas used for U.S. Navy and NASA activities, shipping lanes, and dredge spoil disposal. VCERC has shown that this much offshore wind capacity could generate 13,000 GW-hrs of electrical energy per year, more than 15% of Virginia's present annual electric generation portfolio.

***Offshore wind is affordable.*** Construction costs have soared for conventional power plants, and their fuel prices have increased under pressure from growing worldwide demand. Construction of an offshore wind farm currently costs only 30% more than a conventional coal plant for the same rated power capacity, and the "fuel" for a wind farm is free. Over the 25-year projected power plant life, using the same range of volatility that coal prices have exhibited in the past year (ranging from $55 to $145 per ton), wind is the better investment. 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* processing costs. As an added comparison, construction of a nuclear power plant would cost approximately 50-70% more than an equivalent offshore wind facility, and would take far longer to permit, design, and build.

***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. Using fossil fuels to generate electricity 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 represents a huge risk, especially over a typical power plant service life of 25 years. Using wind is like taking out a fixed-rate mortgage and locking in stable prices decades into the future.

***Offshore wind farms create jobs.*** The economic advantages of offshore wind are even greater when job benefits are considered. Construction, installation, operation and maintenance require a skilled labor force that can be hired and trained locally. Many of the components of wind turbines can also be fabricated locally, taking advantage of Virginia's strong maritime industrial base.

***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 is 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*.