Center for American Progress

Offshore Wind Energy Can Deliver Big Carbon Cuts for Coastal States

By Shiva Polefka and Elise Shulman September 17, 2015

President Barack Obama recently took a historic step toward curbing carbon pollution from America's power plants by issuing the final version of the Clean Power Plan. The plan—designed to fulfill the Environmental Protection Agency's, or EPA's, legal requirements to regulate pollution that causes climate change under the authority of the Clean Air Act—requires each state to achieve its own individual carbon emissions reduction target by 2030. The EPA estimates that the Clean Power Plan will cumulatively reduce carbon pollution from the U.S. electric power sector by 32 percent from 2005 levels by 2030.[1]

About one year from now, on September 6, 2016, all states must submit their plans, detailing how they intend to meet their individualized targets using their own unique set of industries, technologies, and resources, or formally request an extension.[2] In coastal states, particularly along the Atlantic seaboard, governors and state legislatures should look to a massive, untapped source of zero-carbon energy sitting just beyond their shores and large enough to sustain most of their required carbon pollution cuts: offshore wind power.

The great, unexplored potential of wind power

America has already caught on to the benefits of land-based wind. It is produced domestically, is free of pollution, and becomes cheaper by the day. Since 2010, 28 percent of new energy generation capacity brought online nationwide is wind-powered, and in many areas, onshore wind generation now costs less per kilowatt-hour than natural gas.[3] Through 2014, land-based wind power provided about 5 percent of U.S. electricity, supported 73,000 jobs,[4] and became the nation's fastest growing source of energy.[5]

Offshore wind has similar potential as an energy source, with much more room to grow—particularly along the Atlantic seaboard, where a multitude of factors favor development. The Atlantic coast offers a shallow seabed, detailed maps of existing ocean uses, and proximity to the large electricity demand centers of East Coast cities, where energy supplies that do not impair air quality are highly valued. Because unobstructed ocean breezes blow stronger and more consistently[6] than wind over land, they produce

electricity that is more efficient, predictable, and valuable. Eleven European coastal nations—led by the United Kingdom, Denmark, and Germany[7]—have already harnessed this potential, translating their ocean winds into more than 8 gigawatts of generation capacity, 75,000 jobs, and as much as €5.9 billion in annual investment.[8]

Yet, while 39 U.S. states have active utility-scale wind projects on land, there are currently no commercial offshore turbines operating in U.S. waters.

A secret weapon for cutting carbon and boosting energy supply

In 2012, the Department of Energy, or DOE, comprehensively inventoried the offshore wind energy resources within 50 miles of the U.S. coastline[9] and found that they could produce more than four times the entire amount of energy consumed today in the nation's electric power grid.[10]

In January 2015, the environmental group Oceana published a report that built on the DOE inventory by quantifying the offshore wind resources along the Atlantic coast that are actually available for development in the context of existing ocean uses and current development practices. Their assessment excluded near-shore zones where views would be impacted, waters deeper than 60 meters, and areas that are economically active or environmentally sensitive. Yet even Oceana's significantly more conservative results show that Atlantic states are sitting on veritable clean energy gold mines.[11] Now, new calculations from the Center for American Progress show how this remarkable abundance of offshore wind energy stacks up against the fossil fuel-powered electricity output of these states.

For example, South Carolina, North Carolina, and Virginia—three states whose governors have called for the U.S. Department of the Interior to allow new oil drilling in the federal waters off their coasts[12]—could respectively produce 4.5 times, 3.5 times, and 1.9 times more electricity annually from their offshore wind resources than what they generated from coal, petroleum, and natural gas power plants in 2012.[13] In fact, along the entire Eastern Seaboard, only New Hampshire, with its short 18 mile-long coastline, and Connecticut, whose offshore area is limited to half of Long Island Sound, lack the offshore wind resources to make them major components of their states' electric power portfolios.

TABLE 1

Offshore wind: A huge opportunity for Atlantic coast states to achieve their 2030 Clean Power Plan targets

Most Atlantic coast states have more than enough offshore wind power to replace their fossil-fueled electricity production with zero-carbon, renewable energy

	2012 electricity output from coal, petroleum, and natural gas combined cycle generation, in megawatt-hours	Maximum offshore wind potential available for development, in megawatts, at 43 percent capacity factor	Maximum potential annual electricity output from available offshore wind, in megawatt-hours	Maximum potential annual electricity output from offshore wind, as a proportion of 2012 coal, petroleum, and natural gas combined cycle output
Massachusetts	26,165,926	14,500	127,020,000	485.44%
South Carolina	40,085,190	21,000	183,960,000	458.92%
New Jersey	36,440,361	15,800	138,408,000	379.82%
North Carolina	80,440,254	31,700	277,692,000	345.22%
Rhode Island	8,140,017	2,700	23,652,000	290.56%
Maine	4,745,762	1,200	10,512,000	221.50%
Maryland	19,866,745	4,700	41,172,000	207.24%
Virginia	52,306,979	11,300	98,988,000	189.24%
New York	60,697,229	11,600	101,616,000	167.41%
Delaware	9,163,607	1,700	14,892,000	162.51%
Georgia	78,719,240	10,500	91,980,000	116.85%
Florida	203,779,465	16,400	143,664,000	70.50%
New Hampshire	8,300,824	100	876,000	10.55%
Connecticut	15,738,354	0	0	not applicable

Sources: Environmental Protection Agency, "Clean Power Plan Final Rule Technical Documents: Goal Computation Appendix 1-5," available at http://www2.epa.gov/cleanpowerplan/clean-power-plan-final-rule-technical-documents (last accessed September 2015); Andrew Menaquale, "Offshore Energy by the Numbers: An Economic Analysis of Offshore Drilling and Wind Energy in the Atlantic" (Washington: Oceana, 2015), available at http://oceana.org/sites/default/files/offshore_energy_by_the_numbers_report_final.pdf. Authors' complete, annotated calculations available at https://cdn.americanprogress.org/wp-content/uploads/2015/09/16122442/CAP-Offshore-Wind-CPP-annotated-calculations.xlsx.

In other words, offshore wind represents both a huge energy reserve for Atlantic Coast states and an underappreciated opportunity for meeting their Clean Power Plan targets by 2030.

When the EPA formulated states' 2030 emissions goals, it factored in each of their current particular emissions patterns, the extent to which carbon pollution from existing fossil fuel power plants could be reduced, and the availability of land-based wind and solar resources, so that the targets would be both ambitious and feasible.[14] While the agency stated that offshore wind generation can serve as an emissions-reduction measure for a state's electric power sector, it specifically excluded the resource from consideration when setting states' targets, because it considered the technology more costly than land-based wind or commercial solar.[15] However, much of those estimated costs stem from the initial capital investments required to get the fledgling industry started in the United States, such as transmission lines, port facilities, and other infrastructure, which will decline rapidly if and when they are distributed across an expanding array of generation facilities. Furthermore, continued technological improvements in turbine design and proven state and federal policy opportunities can substantially reduce current predicted costs. For example, a University of Delaware study for New York state concluded that these factors could reduce the cost of offshore wind energy for New York about 50 percent by 2022.[16]

Put simply, the abundance of the offshore wind resource relative to state energy demands, and its zero-carbon emissions profile, mean that Atlantic coasts states have a significant advantage—a secret weapon—at their disposal for achieving their Clean Power Plan targets. By taking steps to capitalize on their offshore wind resources, the state governments would afford themselves greater flexibility in the development of their state's individual plans for cutting carbon, reducing the extent to which they must rely on other measures, such as cutting emissions from existing power plants or scaling up solar and land-based wind. Furthermore, because the emissions credits associated with offshore wind generation could be sold to other states that need to make additional carbon cuts to achieve their own targets, offshore wind could serve as a source of revenue for the coastal states that best capitalize on this opportunity.

Finally, between the magnitude of resource availability and the track record of the European offshore wind industry, American offshore wind represents a significant economic development opportunity, one that links the prosperity of coastal communities with environmental health. In its report, Oceana concluded from its modeling that across the Atlantic region, "offshore wind creates 71 percent more jobs than could be created by offshore oil and gas drilling over the project life time."[17] And unlike development of offshore oil and gas, jobs in offshore wind and its associated marine trades do not carry the risk of disastrous spills that jeopardize other coastal industries that are vital to Atlantic Coast communities, such as tourism and commercial fishing.

Setting the policy foundation for successful offshore wind

Critics have argued that offshore wind has uncertain costs and an onerous regulatory environment. Yet action at both the state and federal levels suggests otherwise. The U.S. Department of Interior has already carried out successful, competitively bid lease sales for development rights of approximately 8,245 megawatts of wind resources in federal waters off the Northeast and Mid-Atlantic coasts.[18] That's equivalent to the capacity of about 36 average sized—228 megawatt—coal-fired power plants,[19] primed for development. And the Department of Interior continues to move forward with identification of new areas to offer for offshore wind development leases. For example, on September 9, 2015, the Bureau of Ocean Energy Management held its fourth successive task force meeting to delineate high value lease blocks offshore of South Carolina and conduct preliminary environmental impact analysis of development in those areas to facilitate future development.[20]

Meanwhile, the state of Rhode Island recently celebrated the groundbreaking of what will be the United States' first commercial offshore wind facility, the Block Island Wind Farm.[21] To become America's offshore renewable energy leader, the Ocean State's government combined a strong clean energy mandate for the state's electric power sector with a smart, stakeholder-driven ocean planning and mapping process that matched high-quality wind resource areas with those with minimal use by existing industries.[22] As a result,

the developer, Deepwater Wind LLC, received all needed permits within six months of applying for them,[23] garnered the support of the area's lobster fishermen's association,[24] and locked in a power purchase agreement that will provide power to Block Island residents at rates 40 percent lower than their current diesel-fueled system.[25] Construction for the Block Island Wind Farm began in July and is expected to generate 300 jobs and begin producing enough clean energy for 17,000 Rhode Island households by 2017.[26]

Conclusion

Offshore wind energy represents a historic opportunity for Atlantic coast states to achieve urgently needed cuts in carbon pollution from their energy portfolios, as required under the Clean Air Act, and fill the sails of a powerful—and sustainable—new economic driver. As Rhode Island's success demonstrates, other states can capitalize on this opportunity with targeted investments in infrastructure, planning, and clean energy tax incentives and reap the economic benefits already being delivered by Europe's offshore wind industry.

Between the existence of proven technology, model state policy, and a federal mandate for strategic planning in energy thanks to the Clean Power Plan, there has never been a better time for Atlantic coast states to unlock the vast potential of offshore wind.

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