Center for American Progress

Making the Economic Case for Offshore Wind

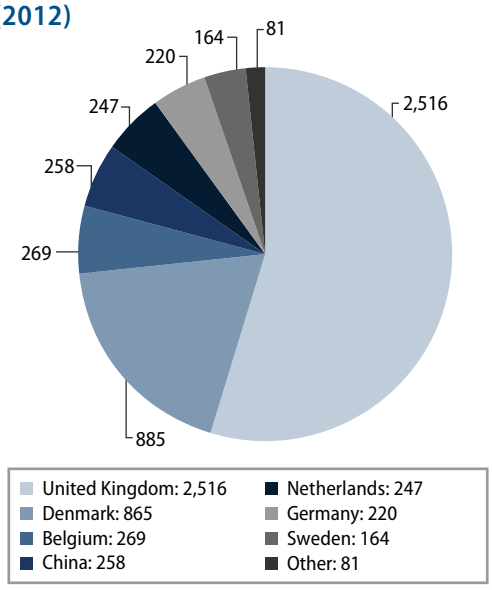
Michael Conathan February 28, 2013

In his State of the Union address last month, President Barack Obama touted the growth of the American renewable energy sector that has occurred during his time in office—particularly the doubling of "the amount renewable energy we generate from sources like wind and solar." He pointed out that "Last year, wind energy added nearly half of all new power capacity in America."[1] These metrics are proof that the renewable energy sector is capable of boosting economic growth while moving us away from the dirty energy sources of the past.

Yet despite the booming expansion of onshore renewable energy facilities, the United States still lags behind many other industrialized countries when it comes to development of a resource that we have in abundance in close proximity to some of our areas of greatest demand for electricity: offshore wind. As we have stood on the sidelines over the past two decades, other countries such as Denmark, the United Kingdom, Germany, and even China have leapt ahead of us, recognizing the inherent value of this strong, commercially viable, renewable resource. As of June 2012, the rest of the world boasted 4,619 megawatts of installed offshore wind energy capacity,[2] while the United States has yet to begin construction on its first offshore wind turbine.

FIGURE 1

Global installed offshore wind capacity (2012)



Source: Reproduced from Earth Policy Institute, Plan B Updates, based on Global Wind Energy Council, 4C Offshore, EWEA

Under President Obama, the Department of Energy announced its intention to close that gap by developing 54 gigawatts of offshore wind capacity by 2030—more than 10 times the amount currently installed worldwide—and has begun taking proactive steps to achieve this target.[3] In just the past five months, the administration has made major strides toward encouraging renewable energy development on the outer continental shelf. In October the Department of the Interior signed its first lease under the "Smart from the Start" program with NRG Bluewater Wind for a wind farm off the coast of Delaware.[4] In November the department announced the first-ever competitive lease sales, giving multiple companies the opportunity to bid for leases on previously identified "wind energy areas" in federal waters off the coasts of

Virginia, Massachusetts, and Rhode Island.[5] And In December the Department of Energy announced that it will fund seven offshore wind technology demonstration projects, including Fishermen's Atlantic City Windfarm in New Jersey; pilot projects in California, the Great Lakes, Connecticut, and Maine; and two turbines off the coast of Virginia.[6]

Despite these advances and pledges of support, critics of the offshore wind industry insist that the technology is too expensive to fully compete with traditional sources of energy—fossil fuels—without massive subsidies. To put that theory to the test, the Center for American Progress, the Clean Energy States Alliance, the Sierra Club, and the U.S. Offshore Wind Collaborative commissioned a study from the Brattle Group—a consulting firm based in Cambridge, Massachusetts—to investigate the costs and benefits of developing a commercial-scale offshore wind industry in the United States.

To date, most studies of offshore wind energy development tended to analyze individual projects, focusing on the specific costs and benefits of building a particular offshore wind farm. Since the next offshore wind farm built in the United States will actually be the first, and first-in-class products or projects of any kind are inherently more expensive, the results of these analyses don't accurately account for the broader economic impact of developing an entire offshore wind industry the way that the Obama administration and the Department of Energy have suggested. Therefore, we asked the Brattle Group to develop estimates of the overall investment that would be required to develop such an industry in the United States and how that investment would affect the price of electricity.

The results showed that there is great value in investing in offshore wind energy development, specifically:

- The investment required to develop 54 gigawatts would range between $18.5 billion and $150 billion.[7] By comparison, subsidies to the oil industry from 1950 to 2010 were $369 billion, $104 billion to the coal industry, and $121 billion to the natural gas industry.[8]

- The development would result in an average monthly-rate increase for American consumers ranging from 0.2 percent to 1.7 percent—as little as 25 cents per month for the average household electricity bill.[9]

- Even with natural gas prices at an all-time low, the cost of electricity from offshore wind could equal the cost of electricity from gas turbines in about a decade.[10]

The Brattle Group's analysis does not account for any subsidies to the offshore wind industry such as the production tax credit or the investment tax credit, both of which currently apply. The production tax credit gives developers a tax credit for every kilowatt of energy produced from eligible sources, while the investment tax credit allows investors and developers to write off 30 percent of the amount invested in new qualifying

renewable energy projects. Developers can take advantage of one, but not both, of these incentives. Therefore, the Brattle Group's positive results likely underestimate the positive economic growth offshore wind can provide.

The Brattle Group examined the cost trends for offshore wind both with and without carbon pricing or some other mechanism of internalizing the external costs of burning fossil fuels. This analysis reflects that such a policy is likely to become a reality at some point in the coming years. Americans are becoming increasingly aware that the price they pay for conventional energy simply doesn't cover all its costs.

Perhaps the most obvious example of this phenomenon is the increasing frequency and skyrocketing cost of extreme weather events.[11] In January Congress appropriated $50.5 billion in funding to help the mid-Atlantic and southern New England regions recover from superstorm Sandy[12]—just one of the 25 weather disasters in 2011 and 2012 that caused at least $1 billion in damages.[13] As a result, Americans have become increasingly convinced that human-induced global climate change plays a role in the growing power and proliferation of storms, droughts, and wildfires. New polls show that 73 percent of Americans believe climate change is causing a greater frequency of extreme weather events to occur.[14]

In light of the Brattle Group's findings, we recommend that Congress and the Obama administration take the necessary steps to accelerate development and implementation of the following policies:

- **Put a price on carbon.** The Center for American Progress's Richard Caperton made the case for imposing a price on carbon in his December 2012 report.[15] He posits that "By raising new funds, driving new investments, and reducing the likelihood of the most catastrophic consequences of climate change, a carbon tax is a tool that can take on our country's three most pressing challenges: the deficit, joblessness, and the climate crisis." All three of these challenges can be addressed by offshore wind development, and a carbon tax is a critical step toward leveling the playing field for offshore wind and all sources of renewable energy.

- **Accelerate the "Smart from the Start" program.** As stated above, the Obama administration has already begun to make up for lost time during previous administrations when it comes to offshore wind development. This program uses the principles of comprehensive ocean planning to identify and prioritize areas suited for offshore wind development, and to reduce conflicts among other users of offshore space before parcels are put up for lease.[16] This reduces conflicts later in the game when delays are costlier and more disruptive.

- **Move swiftly to enact the Incentivizing Offshore Wind Power Act.** This week, Sens. Tom Carper (D-DE) and Susan Collins (R-ME) introduced a bill that would make the first 3,000 megawatts of offshore wind energy capacity eligible for the investment tax credit, Reps. Bill Pascrell (D-NJ) and Frank LoBiondo (R-NJ) introduced an identical bill in the House.[17] By granting the tax credit to a set amount of energy generation capacity rather than having the credit expire on a specific date, this bill removes the pressure for developers to act before they're ready and ensures the early stages of offshore wind development will receive adequate and appropriate financial assistance regardless of when construction begins.

- **Roll back oil subsidies.** While boosting the development of emerging technologies, the Obama administration must work to end unfair tax breaks for mature and polluting energy industries. In 2012 the top five oil companies made $118 billion in profit.[18] Rescinding the billions of dollars in annual subsidies that these companies receive[19] will help level the playing field for renewable energy development and allow for smarter investment of federal funds.

Given the inherently volatile nature of commodity prices and the likelihood that the externalities of fossil-fuel consumption will at some point be internalized to their cost, an investment in developing this offshore wind energy in America to diversify our energy portfolio is a commitment worth making.

The current state of offshore wind in the United States

The U.S. offshore wind industry is emerging from the political doldrums that derailed its early days, and finding champions such as Sen. Carper in the process.[20] Sen. Collins has championed funding for a deepwater offshore wind development project in her home state of Maine, and has taken over as lead co-sponsor of Sen. Carper's bill following the retirement of her former colleague, Sen. Olympia Snowe (R-ME).[21] Governors such as Maryland's Martin O'Malley (D) have prioritized offshore wind development as well.[22] They view it as a political victory on multiple fronts: creating jobs in construction, operation, and maintenance; contributing to a diverse energy portfolio; and moving them closer to renewable energy targets and away from polluting fossil fuels.

As political opposition has fallen away from offshore wind projects, its detractors have turned more toward economic arguments against further development of this technology, suggesting that it will increase electricity rates. As with any new product or technology, the first U.S. offshore wind farm will undoubtedly face steeper costs for construction and development. As industries develop, however, experience, technological developments, and economies of scale will cause those costs to decline. Such is the case with everything from energy development to consumer electronic products—flat-screen televisions, for example. The question is not, then, whether the cost of offshore wind energy will come down but rather how quickly.

Additionally, to correctly compare the cost of offshore wind—or any renewable energy technology—to traditional energy sources, we must incorporate the cost externalities of oil, gas, and coal-fired power generation that are currently being ignored. These include the societal costs of pollution—greenhouse gas emissions, particularly carbon, for example—generated by fossil-fuel electricity. Offshore wind has none of these external costs.

In President Obama's second Inaugural Address, he clearly indicated that climate change would be a priority for him in his second term, asserting that a failure to respond to climate change "would betray our children and future generations."[23] He described an imperative not to "cede to other nations the technology that will power new jobs and new industries." We must consider the likelihood that in the years to come, the federal government will open its eyes to the imperative that some kind of economic incentive must be applied to reduce our dependence on carbon-based energy sources.

The Brattle Group's analysis accounted for two scenarios: one in which the United States developed such incentives, and one in which it did not. In both cases it found that offshore wind development was clearly on the path to economic viability.

How we arrived at the numbers

We asked the Brattle Group to investigate the macroeconomic impacts of building a commercial-scale offshore wind industry in the United States. It based its work on three underlying, well-established principles:

- As technologies mature, their costs decline.
- "In the presence of unpriced externalities,"—for example, in the case of electricity generation, carbon and other health-related costs of pollution from burning fossil fuels—"new technologies cannot compete effectively with existing, more mature technologies."[24]
- The future costs of both renewable and fossil-fired electricity generation are "highly uncertain," so ensuring mature technologies exist across a spectrum of sources is "equivalent to buying insurance against the risk that the current, incumbent and cheaper technologies will be more expensive … in the future."[25]

Pursuing offshore wind as a viable source of renewable energy is therefore a means of not putting all our eggs in one basket when it comes to ensuring an affordable energy future, particularly when accounting for the likelihood that at some point the external costs of carbon pollution might be incorporated into the cost of energy generation.

The study assumes three different estimates of a so-called learning rate—the speed at which the industry would be able to cut costs based on lessons learned from past experi-

ence. The slow learning-rate scenario involves a high starting cost and a learning rate of 3 percent annually. The medium scenario starts with a cost that is equivalent to the first proposed projects in the United States—but still below the current cost in Europe—and a learning rate of 5 percent. And the high scenario starts at the European price point and a learning rate of 10 percent. The report defines a learning rate as "the rate at which costs decline for each doubling of the installed capacity."[26]

The three key measurements that the analysis focused on were the projected average increase in cost to ratepayers; and the date and investment required to bring offshore wind to a point where it costs the same as traditional energy sources, referred to as "grid parity"; and an estimate of the overall investment required to develop the proposed 54 megawatts of offshore wind capacity.

One last note about the figures in the study: Because of the uncertainty surrounding U.S. tax policy as it relates to renewable energy production, the Brattle Group did not include subsidies in its estimate of the cost of offshore wind. In January 2012 Congress extended both the production tax credit and the investment tax credit for offshore wind through the end of 2013. If the current tax structure remains in place, the numbers contained in this report will look significantly better for the offshore wind industry.

The economic viability of offshore wind

Taking each of our metrics in turn shows that even without including in the cost estimate the assistance from federal subsidies, the results of this analysis are resoundingly positive.

Overall investment required

Of course, getting the offshore wind industry off the ground in the United States will require an upfront investment, and in its analysis, the Brattle Group found that a build-out to 54 gigawatts of offshore wind capacity would require an investment ranging from $18.5 billion to $52 billion—"assuming some greenhouse gas externalities are included in the market price."[27]

To place this figure in context, the Brattle Group also explored subsidies to other existing energy technologies and found them to be "comparable in size" to the investment required to develop America's offshore wind industry.[28] Domestic oil subsidies, for example, from 1950 to 2010 totaled approximately $369 billion, while coal subsidies totaled $104 billion, and natural gas totaled $121 billion.[29] Recall that these subsidies are for industries that are already decades old and, as in the case of oil and gas, are making annual profits in excess of $100 billion industrywide.

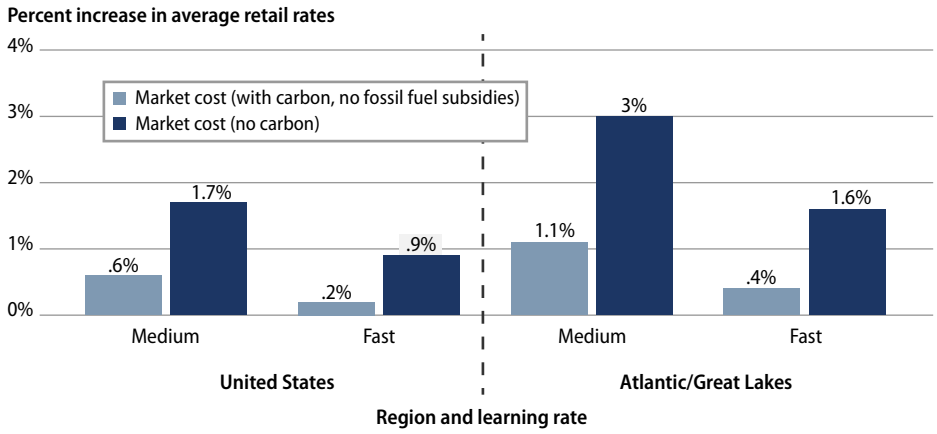
Cost to ratepayers

How does this investment translate to the average American's monthly electric bill? Numerous studies have shown that Americans living in coastal regions are willing to pay modestly higher electricity bills if they know their electricity supply includes local offshore wind farms. A poll released in January 2013, for example, showed that 72 percent of Maryland residents would be willing to pay $2 more per month for their electricity bills to develop an offshore wind industry.[30]

The Brattle Group analysis finds that the cost of building out a domestic offshore wind industry under the medium- or fast-learning scenarios—even without federal subsidies—will result in an electricity rate increase of 0.2 percent to 1.7 percent if the cost is spread across the whole country, and a 0.4 percent to 3 percent increase if costs are borne entirely by consumers in the Atlantic and Great Lakes regions. This equates to a range of 0.06 cents to 0.5 cents per kilowatt hour.[31] (see Figure 2)

FIGURE 2

Average percentage rate increase based on medium- and fast-learning scenarios in the offshore wind industry



Source: Jurgen Weiss, Mark Sarro, and Mark Berkman, "A Learning Investment-based Analysis of the Economic Potential for Offshore Wind: The Case of the United States" (Washington: The Brattle Group, 2013), p. 3

Put another way, the Energy Information Administration estimates that the average monthly consumption for an American household is 860 kilowatt hours, which translates to an increase of between $0.25 and $2.08 per month for the average family. (see Table 1)

TABLE 1

Average dollar rate increase based on medium- and fast-learning scenarios in the offshore wind industry

Grid parity benchmark	Learning scenario	Total learning investment 2014-2030	Rate impact	Rate impact	Average monthly bill impact
		(2012$ billion)	(2012 c/kWh)	% Rate Increase	$/month
Market cost (no carbon)	Medium	$149.6	$0.22	1.7%	$2.08
	Fast	$79.4	$0.12	0.9%	$1.10
Market cost (with carbon, no gas subsidy)	Medium	$51.9	$0.08	0.6%	$0.72
	Fast	$17.7	$0.03	0.2%	$0.25

Source: Jurgen Weiss, Mark Sarro, and Mark Berkman, "A Learning Investment-based Analysis of the Economic Potential for Offshore Wind: The Case of the United States" (Washington: The Brattle Group, 2013), p. 50.

Conclusion

If there is one thing that Republicans and Democrats can agree on when it comes to America's energy future, it is that we should be doing everything we can to generate as much of our power from domestic sources as possible. The Brattle Group's analysis shows that development of a large-scale offshore wind energy industry in the United States is not only economically viable but is also a key means of diversifying and developing our domestic energy portfolio. Given the uncertainty inherent in predicting future market conditions and commodity prices, this study provides ample evidence that the Obama administration is acting prudently and proactively by prioritizing offshore wind development through programs such as "Smart from the Start."

One of the catchphrases that gets tossed around cavalierly in Washington by both political parties is the need for an "all-of-the-above" energy strategy. Republicans say the president is failing to achieve this when he makes any decision not endorsed by the American Petroleum Institute. But the reality is that no true all-of-the-above strategy can be complete if it leaves out a commercially viable, renewable, and domestic resource with the potential to make major contributions to meeting our country's energy needs.

While no single energy source can turn back the tide of climate change that is already raising sea levels, acidifying our oceans, and contributing to extreme weather events such as the Midwestern drought and superstorm Sandy, as President Obama said in his Inaugural Address, a failure to respond to climate change "would betray our children and future generations."[32] Affordable domestic offshore wind can and must be a part of this solution.

Michael Conathan is the Director of Ocean Policy at the Center for American Progress.

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