



State Policies Can Unleash U.S. Commercial Offshore Wind Development

By Shiva Polefka September 2017



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Three turbines of the Block Island Wind Farm stand offshore of Block Island, Rhode Island, August 15, 2016.

Credit: AP/Michael Dwyer

Contents

- 1 Introduction and summary**

- 6 Why offshore wind deserves special treatment by state governments**

- 10 Case studies of 3 coastal states leading the charge for offshore wind**

- 28 Conclusion: Policy options for other coastal states**

- 32 About the author and Acknowledgements**

- 33 Endnotes**

Introduction and summary

The development of America's offshore wind energy could diversify and substantially decarbonize the nation's electric power portfolio and bring a new surge in investment and employment to the country's working harbors. The U.S. National Renewable Energy Laboratory estimates that America's maritime and Great Lakes waters encompass the equivalent of 7,203 terawatt hours per year of electricity generation potential, based on 2016 technological capabilities, and excluding important areas such as shipping lanes and marine protected areas.¹ For comparison, the U.S. Energy Information Administration reports that domestic electricity consumption in 2015 totaled 4,087.31 terawatt hours, just 57 percent of the clean wind power available offshore.²

According to the National Renewable Energy Laboratory, the vast majority of this resource—88 percent—occurs seaward of the 3-nautical-mile boundary of most coastal states' maritime jurisdictions, over the federal waters and the seabed of what is legally referred to as the Outer Continental Shelf. In 2005, Congress passed the Energy Policy Act which authorized the U.S. Interior Department to issue leases and permits for renewable energy development on the Outer Continental Shelf, and in 2009, then Secretary of the Interior Ken Salazar announced finalized regulations for the federal offshore wind energy development program.³

Thanks to tens of billions of dollars in public and private investments in Europe, the economics of offshore wind have evolved rapidly, with dramatic cost declines since 2014 pushing the offshore wind technology toward competitiveness with other zero-carbon energy resources. This in turn has stimulated private-sector demand for offshore wind development rights in U.S. federal waters, by both homegrown American firms, and deep-pocketed international energy companies. Since 2009, the Bureau of Ocean Energy Management (BOEM), the Interior Department's lead agency for offshore renewable energy, has conducted seven competitive lease auctions for commercial development rights to offshore wind-energy areas under the program established by Secretary Salazar.

Comprising more than 1 million acres of U.S. federal waters, these lease sales have generated more than \$58 million in winning bids for offshore wind development rights—money that flows into the U.S. Treasury and to American taxpayers.⁴ In December 2016, BOEM completed its most successful offshore wind lease auction yet, awarding a U.S. subsidiary of Norway’s Statoil corporation a 79,350-acre lease off New York for a remarkable \$42.47 million winning bid, almost triple the total income from all previous lease sales.⁵

Although these mileposts demonstrate institutional capacity within the federal government to plan offshore wind projects, and growing interest by the private sector to develop offshore wind, these factors have not yet been sufficient for the completion of a commercial offshore wind-generation facility in federal waters. Meanwhile, President Donald Trump’s personal hostility toward renewable energy technology, including offshore wind development near his Scottish golf resort and his administration’s abandonment of U.S. leadership on climate policy, suggest that little additional support beyond the existing leasing and permitting framework can be expected from the federal government in the next four to eight years.⁶

In contrast, the Block Island Wind Farm, a 30-megawatt facility in Rhode Island state waters, began commercial operations in December 2016, becoming the first such power plant in the United States. As explained below, this remarkable accomplishment is due almost entirely to progressive energy policy reforms, marine spatial planning, and focused political leadership within the Rhode Island state government. In other words, state-level policy will continue to play an essential role in the realization of a thriving commercial offshore wind industry and in the realization of the resource’s potential as an economic and environmental asset of national significance.

Three states—Rhode Island, Massachusetts, and New York—have each recently passed or promulgated different policies to stimulate private investment in offshore wind development and harness the resource as a major source of clean energy. There is a strong economic case for their efforts: For example, a 2016 economic study by offshore-wind supply chain specialists found that for the state of Massachusetts, a commitment to developing 2,000 megawatts of offshore energy capacity would drive technological and industrial advances that would more than halve projected costs by 2030, bringing the resource to competitiveness with the state’s other major energy sources.⁷

In each state, the private sector has responded to these states' policies with significant, concrete investments and actions toward commercial development.

Policymakers in other U.S. coastal states now have a ripe opportunity to provide what may be the final push needed to bring commercial offshore wind development to fruition and begin capturing the industry's economic and environmental benefits.

This report provides an overview of the case for state government action to foster the fledgling domestic offshore wind energy industry and surveys the origin, implementation, and impact of offshore wind policy in three states—Rhode Island, Massachusetts, and New York. These states serve as exemplary cases for other coastal states endowed with access to this abundant, climate-safe, renewable resource.

This report concludes with a list of policy options for other coastal states also considering pursuit of the strategic benefits of offshore wind energy, based on the key elements underpinning the success of the three states highlighted. When considered together, these elements comprise a policy toolkit that could be of value to other coastal states seeking to capitalize on their offshore wind resources. These policies include:

- **Strong renewable energy requirements:** Renewable energy mandates, which require states' utilities to supply at least a certain minimum proportion of electricity generated from renewable sources, underpin all three states whose offshore wind energy industries are rapidly progressing. In all three states, policymakers have increased these renewable energy standards over time.
- **Legislation that guarantees demand for offshore wind:** Laws that guarantee demand for offshore wind energy—often called offshore wind “carve-outs”—played a critical role in the realization of the Block Island Wind Farm and the influx of investor and developer interest in Massachusetts' offshore wind industry.
- **Comprehensive ocean planning:** Rhode Island and Massachusetts both completed comprehensive ocean plans in advance of offshore wind development. This planning was vital for Rhode Island to become home to the nation's first commercial wind farm, suggesting that it may be essential to accommodate a major new offshore industry without harming existing ocean users, degrading the environment, or provoking conflict and litigation with coastal stakeholders.

- **Fair consideration of costs:** Rhode Island and Massachusetts have passed legislation that sets the terms for public utilities commissions to evaluate offshore wind project proposals. These allow a given proposal's advantages and costs to be properly and transparently accounted for, without being unfairly compared with the costs of obsolete or carbon-intensive energy sources.
- **Focus on market development:** While supportive policies are needed in the short term, states should simultaneously structure their offshore wind programs to foster market development. Massachusetts' competitive bidding process already appears to be delivering valuable market impacts, with world-leading developers competing on price and additional benefits such as in-state supply chain development and deployment of battery-based storage.⁸
- **Require long-term contracts for competitive proposals:** Rhode Island and Massachusetts passed laws that require utilities to enter into long-term contracts, known as power purchase agreements, with offshore wind projects assessed to be competitive and reasonable. Such contracts incentivize developers to compete, provide developers access to private sector finance to complete approved projects, and can support long-term price stability for ratepayers.
- **Investment in infrastructure:** The state of Massachusetts made significant public investments in needed port infrastructure in the city of New Bedford, with the goals of spurring offshore wind development in the state and capturing the employment and other economic benefits of supply chain development. Recent moves by industry to locate in New Bedford indicate that developers took notice.
- **Executive leadership, which can drive significant progress:** New York, unlike Rhode Island and Massachusetts, has stimulated significant private-sector investment and activity without dedicated legislation, instead relying on a comprehensive strategy, public investments in planning, and the formalization of policy through regulatory action—all executed by the state's executive branch. In Rhode Island, strong executive branch leadership played an essential role in the establishment of key policies and in the completion of the nation's first commercial wind farm.

Offshore wind presents coastal state policymakers with profound opportunities to capitalize on an abundant clean energy resource and fill the leadership vacuum that now exists at the federal level for facing the global climate crisis. By studying,

formulating, and implementing policies such as those identified in this report, coastal and Great Lakes states may be able to replicate the remarkable progress in the development of offshore wind achieved by Rhode Island, New York, and Massachusetts and begin reaping the economic and environmental dividends.

Why offshore wind deserves special treatment by state governments

Offshore wind is a resource that could provide a large proportion of the electric power needs of many coastal states, without emissions of pollutants that degrade human health, worsen ocean acidification, and exacerbate global warming. In many cases, coastal states have readily available offshore wind resources of a magnitude multiple times that of their total fossil fuel-powered electricity generation.⁹ As a result, commercial development of offshore wind could help individual states comply with their established renewable portfolio standards or greenhouse gas-emission reduction targets, as well as federal clean air and pollution-reduction requirements.¹⁰

Furthermore, offshore wind energy development would also advance the efforts of American states and cities that are seizing the mantle of U.S. global climate leadership. After the Trump administration announced its intention to withdraw the United States from the Paris Agreement, myriad state and local leaders have coalesced to sustain the U.S. commitment made by the Obama administration—a 26 percent to 28 percent reduction in greenhouse gas emissions from 2005 levels by 2025.¹¹ For example, more than 200 cities and 9 states, including North Carolina, have joined businesses and universities across the country to form We Are Still In, the largest national coalition in support of the Paris Agreement.¹² Meanwhile, Govs. Jerry Brown (D-CA), Jay Inslee (D-WA), and Andrew Cuomo (D-NY) launched the U.S. Climate Alliance, which now has 13 member states plus Puerto Rico.¹³ Because 12 of the 14 Climate Alliance members lie along Pacific, Atlantic, or Great Lakes coasts, offshore wind could represent a major component of the group's efforts to achieve substantial greenhouse gas emissions reductions.

The establishment of a domestic offshore wind industry would provide a multitude of additional valuable benefits to coastal states and energy consumers. These include reduced water use by the electric-power sector, reduced exposure to the price volatility of fossil fuels used in thermal generation plants for electric power producers and consumers, and strategic diversification of states' electric

power supplies at a time when many large coal and nuclear power plants are being decommissioned, leaving looming gaps in state supply portfolios.¹⁴ Offshore wind also offers benefits to grid management because the resource is widely available near coastal urban centers, while major land-based sources of renewable energy are often either widely distributed or located hundreds of miles inland from coastal cities, requiring significant investment in new overland transmission.¹⁵ Recent data also shows that offshore winds track well with daily demand patterns, particularly early evening surges,¹⁶ reducing the need for natural gas-based back-up generation capacity that is sometimes required in areas with significant solar and onshore wind energy supplies.¹⁷

Finally, mounting evidence indicates that offshore wind is rapidly becoming economically competitive in major urban electricity markets. Offshore wind is overcoming once prohibitive capital costs that were long considered the foremost obstacle to development in the United States.

At the heart of these cost reductions are the industrial advancements made through the dramatic growth of Europe's approximately 15-year-old, 3,344-turbine, 11,538-megawatt offshore wind industry.¹⁸ Beginning in the early 2000s, the European Union set successive binding goals for renewable energy production for its members, and several coastal EU countries concluded that offshore wind energy was a resource with significant potential to reduce carbon pollution emissions without engendering land use conflicts. Accordingly, countries such as the United Kingdom, Germany, the Netherlands, Denmark, and Belgium began providing offshore wind developers with generous subsidies and other supports, including long-term power purchase contracts and guaranteed dispatch of electricity output over the grid. By ensuring steady demand for wind farm output, developers in turn have been able to access private capital markets to finance construction.¹⁹

These measures were extremely effective. Over 10 years between 2004 and 2014, Europe's installed offshore wind generation capacity grew almost twelvefold, from 622 megawatts of generation capacity to 8,008 megawatts.²⁰ Counterintuitively, costs per unit of capacity steadily rose until 2014, as developers quickly completed large projects in available nearshore areas and pushed further offshore into deeper, more difficult waters in which to build and operate, while simultaneously developing the specialized technologies required to ensure the long-term durability and performance of maritime wind turbines.²¹

Nevertheless, efficiencies and industrial learning accrued within the sector, and growing construction capacity and turbines that roughly doubled in generation capacity pushed it toward meaningful economies of scale, countervailing the increasing difficulty of construction further offshore.²² For example, as state-of-the-art turbines grew from 2 megawatts to 6 megawatts in generation capacity over the past 10 years, developers were able to dramatically reduce the number of expensive seabed foundations and the quantity of transmission lines needed to complete a project of a given capacity. In January 2017, a partnership between leading wind turbine manufacturers Vestas and Mitsubishi Heavy Industries Ltd. announced that its prototype 9-megawatt offshore turbine—at a gargantuan 722 feet tall with 38-ton blades that measure 263 feet in length—was successfully producing electric power, illustrating that the economics of turbine installation continue to improve at a significant rate.²³

In 2014, European offshore wind reached a tipping point, and since then, costs have fallen sharply. Private analysts in early 2016 foresaw reductions in the levelized cost of offshore wind energy—the production cost per unit of energy over the lifetime of a given wind farm—of around 30 percent to 33 percent by 2030, relative to a median baseline of \$169 per megawatt-hour in 2014.²⁴ However, evidence from several countries suggests an even steeper decline in production costs is already being realized.

In the United Kingdom, levelized costs at new offshore wind farms peaked five years ago and have declined 11 percent since then.²⁵ During the latter half of 2016, multiple European projects proposed through competitive bidding processes secured bids from developers at costs dramatically lower than the industry had ever previously reported and well ahead of independent projections. In July 2016, DONG Energy, the Danish corporation known as the world's largest offshore wind developer, won two projects amounting to a combined 1,400 megawatts of capacity at a levelized cost of around 82 euros per megawatt-hour, around half the median cost in 2014.²⁶

Swedish utility and electric power producer Vattenfall recently won rights from the government of Denmark to construct a 600-megawatt facility in the country's Baltic Sea maritime territory with a bid of 49.90 euros, approximately \$53.40, per MWh.²⁷ The project will supply the equivalent of 23 percent of Denmark's household electric power demand at a cost that Vattenfall asserted is 60 percent below the country's legally mandated production cost cap.²⁸

Similarly, on December 12, 2016, a consortium led by Royal Dutch Shell won a concession for a huge 700-megawatt project in the Dutch waters of the North Sea with the Netherlands' lowest-ever contract price of 54.50 euros, around \$57.70, per MWh.²⁹

In 2014, the European offshore wind industry supported 75,000 jobs,³⁰ and based on current trends in industry growth, it is expected to support between 170,000 and 204,000 jobs by 2030.³¹

For comparison with common existing U.S. energy sources, the U.S. Energy Information Administration estimates that for domestic commercial projects developed for completion in 2022, average production costs before federal tax credits will average \$55.80 per MWh for onshore wind and \$66.30 per MWh for solar photovoltaic.³² Conventional combined-cycle natural gas power plants are projected to produce electricity for \$58.60 per MWh by 2022.³³ Although European and American offshore wind development costs can certainly be expected to differ, particularly while the U.S. industry builds up the necessary port infrastructure needed to stage offshore-wind turbine installation, the European industry today is demonstrating that offshore wind energy can compete on economic terms with other major energy sources, even without accounting for the other strategic benefits that it can provide.

In recognition of these benefits, the governments of several Northeastern states are taking major steps to make offshore wind part of their clean energy portfolios. Rhode Island, New York, and Massachusetts have each pursued distinct policy pathways to spur private-sector investment in commercial offshore wind energy development, with growing evidence of success. A survey of these approaches may help other coastal state governments formulate their own strategies in pursuit of the benefits of offshore wind energy.

Case studies of 3 coastal states leading the charge for offshore wind

Rhode Island

On December 12, 2016, Deepwater Wind LLC's five-turbine, 30-megawatt, \$290 million Block Island Wind Farm offshore of Rhode Island officially completed post-construction testing and validation and commenced commercial electricity delivery to the state's power grid, becoming the first such facility in the United States.³⁴ The project's commencement ended decades of highly polluting and expensive diesel-powered generation within the community on Block Island and rewarded Rhode Island's policymakers for years of work to make their state the U.S. offshore wind power leader.

Three state policies embody those efforts: the Renewable Energy Standard (RES), which established clean energy use requirements; the Ocean Special Area Management Plan (SAMP), which produced a comprehensive ocean plan protecting existing resources and uses of the ocean areas under the state's jurisdiction; and the Long-Term Contracting Standard for Renewable Energy, which mandates power purchase agreements with clean energy developers and creates specific mechanisms for offshore wind. The establishment of each policy required significant leadership and sustained political will from Rhode Island's executive and legislative branches of government, which together formed a three-part policy foundation for Rhode Island to launch its new offshore renewable energy industry.

Renewable Energy Standard

Originally enacted in 2004 and reauthorized and extended in 2016, the Renewable Energy Standard mandates that Rhode Island's utilities supply an incrementally larger percentage of their retail electricity from renewable sources—including solar, wind, and hydroelectric—each year. By 2035, the state's retail electricity supply is required to be at least 38.5 percent renewably powered.³⁵

Following the original enactment of the RES, the state's Office of Energy Resources assessed Rhode Island's renewable energy resources to facilitate and chart out how utilities could best fulfill the new mandate.³⁶ In 2007, the agency published findings showing that 95 percent of the state's wind energy opportunity lay offshore,³⁷ making offshore wind development "the only feasible method for the state to meet the legislative goal," as the executive director of Rhode Island's Coastal Resources Management Council put it.³⁸

Following the publication of this wind assessment report, the governor's office held several stakeholder meetings to discuss siting possibilities for an offshore wind project.³⁹ Based on the input from local citizens, nonprofit organizations, and a wide array of industry representatives, the state selected areas south of Block Island for a pilot offshore wind project, concluding that those areas would be "the most cost effective locations for offshore wind [in state waters], on a dollars to per megawatt-hour basis, and large enough to meet the [Renewable Energy Standard] supply goal."⁴⁰

The state also identified the uniquely favorable economics of the site, noting that it "could have the additional benefit of bringing economical power to Block Island residents, who are presently supplied by on-island diesel generators" rather than the statewide grid.⁴¹

On April 3, 2008, Rhode Island's Office of Energy Resources issued a request for proposals for the Block Island project.⁴² Seven separate developers bid and Deepwater Wind was selected as the state's preferred developer. On January 2, 2009, the state and Deepwater signed a joint development agreement, with Rhode Island committing to help Deepwater Wind negotiate the permitting process and Deepwater Wind committing to develop the Block Island project.⁴³

Ocean Special Area Management Plan

Rhode Island leaders recognized that in order to capitalize on their offshore wind resource and fulfill their agreement with Deepwater Wind, they had to bring coherence and order to the daunting thicket of state, federal, and tribal jurisdictional authorities that exist offshore. Simultaneously, they had to respect and incorporate the perspectives of myriad, sometimes antagonistic, ocean stakeholders, including conservationists, fishermen, shippers, coastal-property owners, and the Narragansett Indian Tribe.⁴⁴ Between 2008 and 2010, empowered by supportive leadership from the governor, the state's Coastal Resources Management Council led a formal marine spatial planning process to comprehensively map Rhode Island's

offshore wind resource, along with marine ecosystem features and assets and all other major ocean uses. To ensure the maximum level of accuracy and political buy-in for the process, the management council completed the initiative in close collaboration with the above-noted array of governmental and private stakeholders.⁴⁵ The resulting Rhode Island Ocean SAMP helped identify a narrow area southeast of Block Island as the best bet for a pilot wind farm. Specifically, the site allowed for access to the state's strongest, steadiest wind resources identified in earlier assessments while avoiding conflicts with traditional uses such as fishing, recreation, and conservation.⁴⁶ The careful siting and wealth of accessible scientific data afforded by the Ocean SAMP was particularly important because state and federal law required that Deepwater Wind receive approvals from at least 10 distinct state and federal agencies.⁴⁷

According to Deepwater Wind officials, the Ocean SAMP accelerated project development and minimized opposition from other ocean stakeholders that lived and worked around the project area.⁴⁸ The Ocean SAMP also laid the groundwork for future offshore wind development on the federal Outer Continental Shelf beyond the state waters of both Rhode Island and Massachusetts; this is discussed in the following section on Massachusetts state policy.

Long-Term Contracting Standard

In 2009, in parallel with the development of the comprehensive marine spatial plan, the state legislature also passed the Long-Term Contracting Standard for Renewable Energy, a state law establishing three important provisions for the state's utilities relative to the launch of the offshore wind industry.

First, it required that electric power distributors solicit 10 to 15 year contracts for renewable energy proposals annually until at least 90 megawatts of clean energy generation were locked in under long-term contract.⁴⁹ Second, the statute ordered The Narragansett Electric Company—a subsidiary of National Grid PLC and Rhode Island's primary retail electricity utility—to enter into a power purchase agreement for the construction of the Block Island offshore wind farm and participate in the construction of a new subsea cable to connect both the wind farm and the community on Block Island to the state's grid.⁵⁰ Third, the statute includes a provision empowering the state utilities commission to require a long-term contract—up to 15 years—between future “utility-scale” (specified in the law as 100- to 150-megawatt) offshore-wind energy projects and the state's electricity distributors, if the utilities commission determines such contracts are “in the best interests of electric distribution customers in Rhode Island.”⁵¹

These provisions reflected Rhode Island policymakers' understanding that power purchase agreements are a core requirement for offshore wind projects because such contracts guarantee developers a predictable, long-term revenue stream and because they serve as collateral within private-capital markets, opening doors for project finance.⁵²

In sum, Rhode Island successfully set the table for commercial offshore wind development through a combination of policy support for clean energy; comprehensive ocean planning that formally integrated the equities of stakeholders, pre-empted conflicts, and mapped resource availability; and political leadership to adapt the state's utility policy to accommodate the unique features of the new energy resource embodied in offshore wind. These policies clearly facilitated the successful development of the Block Island Wind Farm and therefore ought to be closely considered by other states looking to launch offshore wind industries.

Massachusetts

Like Rhode Island, Massachusetts laid the foundation for development of its abundant offshore wind energy supply through the passage of renewable portfolio standards and comprehensive marine spatial planning. However, Massachusetts' current policy regime for offshore wind is distinguished by additional factors, including hard lessons learned from the perhaps quixotic Cape Wind project, a looming clean energy supply shortfall, public support for dockside infrastructure, and a newly passed offshore wind policy indicating that the state's lawmakers are eager to claim the leadership that currently rests with Rhode Island. These lessons and policy mechanisms should be scrutinized by other states considering the development of offshore wind resources.

Cape Wind

For nearly 15 years, the 130-turbine Cape Wind project proposed for federal waters south of Cape Cod in Nantucket Sound embodied offshore wind energy in the United States. Unfortunately, its prominence often corresponded to its myriad challenges. First proposed in 2001 before the Department of Interior established its offshore-wind permitting framework under the Energy Policy Act of 2005, the developer sited the proposal opportunistically, in a manner more akin to the staking of a claim than through the ocean planning and competitive leasing processes that characterize contemporary federal offshore wind development.⁵³ Perhaps as a result, Cape Wind faced relentless litigation from multiple stakeholders,

including an advocacy organization funded by affluent coastal property owners, a tribe of the Wampanoag Nation, Martha's Vineyard fishermen, and the nearby town of Barnstable, for a total of at least 32 distinct lawsuits.⁵⁴ Cape Cod resident and billionaire industrialist William Koch, the brother of well-known political activists Charles G. Koch and David H. Koch, reportedly provided more than \$5 million in donations to fund litigation and other opposition activities against the Cape Wind project.⁵⁵

Cape Wind also faced a federal bureaucracy ill-prepared to evaluate and permit the project. Several years into project evaluation, following passage of the 2005 Energy Policy Act, the project faced new statutory requirements that changed the lead agency for permitting from the Army Corps of Engineers to the Department of the Interior, a move that necessitated a second round of environmental impact analysis.⁵⁶

Despite this array of challenges, Cape Wind's developers ultimately won almost all of the lawsuits against the project, secured their offshore lease, and received approval for almost all of the federal regulatory requirements for the planning and design of an offshore wind farm in federal waters.⁵⁷ Nevertheless, the cumulative adversity took a significant toll on the project. In January 2015, National Grid and NSTAR Electric Co., Massachusetts' two main utilities, terminated their power purchase contracts with Cape Wind, citing the developer's failure to obtain sufficient financing and initiate construction by the December 31, 2014, deadline mandated by the terms of the contracts.⁵⁸ In April 2016, the project was dealt yet another setback when the Massachusetts Energy Facilities Siting Board refused to extend the project's existing subsea transmission line permits after the developer requested a two-year permit extension.⁵⁹ Many officials now consider the project unlikely to move forward.⁶⁰ Nevertheless, as of January 2017, the developer remains current on the payments to the federal government required to retain rights to the offshore lease.⁶¹

The Massachusetts policy framework for offshore wind today

Irrespective of Cape Wind's fate, Massachusetts policymakers and appropriators have taken additional significant steps to facilitate offshore wind development. These actions are already driving millions of dollars in private investment by multiple firms and promise the delivery of vast new energy supplies from federal offshore wind leases.

Like Rhode Island, Massachusetts lawmakers established baseline requirements for the state's utilities to supply electricity generated from renewable sources. In 2008, the state passed a law requiring at least 15 percent of the electricity sold by retail suppliers in the state to be sourced from eligible new renewable resources, such as wind and solar, by 2020.⁶² The law also required Massachusetts utilities to enter into cost-effective, long-term contracts of 10 to 15 years to purchase at least 7 percent of their power from new grid-connected renewable power generation sources.⁶³

These provisions have engendered contracts for more than 1,000 megawatts of new onshore wind projects across New England states to supply Massachusetts consumers.⁶⁴ As of 2015, however, only 9.4 percent of net electricity production originated from renewable sources, while 71 percent came from burning coal and natural gas.⁶⁵ Additionally, power producer Entergy Corp. announced the pending 2019 closure of the 680-megawatt Pilgrim Nuclear Power Station,⁶⁶ which is responsible for 84 percent of Massachusetts' zero-carbon-emissions electric power.⁶⁷

In short, as of early 2016, utilities and policymakers faced a looming shortfall of clean energy projects in the pipeline, with respect to both state clean energy requirements and overall electricity supply.

The offshore wind carve-out: Energy diversity legislation of 2016

On August 8, 2016, Massachusetts Gov. Charlie Baker (R) signed into law a bill titled An Act to Promote Energy Diversity that state legislators crafted and passed on a bipartisan basis to address the emerging clean energy shortfall.⁶⁸ Along with provisions to support energy efficiency measures, long-term contracts for all clean energy sources, and the procurement of imported hydroelectric power, the law, often referred to as the Energy Diversity Act, established a new dedicated offshore wind requirement for the state's electric power distribution companies.

Specifically, Section 83C of the law orders the utilities to “enter into cost-effective long-term contracts for offshore wind energy generation equal to approximately 1,600 megawatts of aggregate nameplate capacity not later than June 30, 2027,”⁶⁹ with nameplate capacity representing the maximum potential output of a given wind turbine or group of wind turbines. Provisions of this so-called carve-out in the state's electric power portfolio for offshore wind also link it to the Department of Interior's process for competitively auctioning development leases in federal waters. Specifically, for offshore-wind projects to qualify toward fulfillment of the state mandate, they must be located at least 10 miles from the state's coastline—

that is to say, in federal waters—and on federal lease blocks acquired in a competitive auction after January 1, 2012.⁷⁰ These conditions exclude the controversial Cape Wind project from benefiting from the new law. They also address concerns about offshore wind farms' impacts on coastal views and the siting of projects without the advance planning process that characterizes the Bureau of Ocean Energy Management's development program.⁷¹

The Energy Diversity Act also included features to control costs, foster efficiency and competition among offshore wind developers, and capture other economic benefits. First, each of Massachusetts' retail electricity suppliers are required to solicit a minimum aggregate of 400 megawatts of offshore wind generation capacity for long-term contracts. This scale approaches that of some of the largest in Europe, including the aforementioned Danish and Dutch projects, at 600 megawatts and 700 megawatts, respectively, that won bidding processes with previously unheard of low bids. Both the scale of the procurement requirement and the competitive bidding process established by the law support market development in Massachusetts, providing a vehicle for developers to achieve economies of scale and invest in a domestic supply chain while also being exposed to competition.

Second, the law requires that after each proposal by a developer for a power purchase agreement is approved by the state Department of Public Utilities, subsequent projects will not be approved unless they propose a production cost that is less than the previously approved project.⁷² This component could stimulate investment and competition in the short term, and provides distribution companies and ratepayers with a statutory bulwark for price stability over the longer term.

On April 28, 2017, the Massachusetts carve-out prompted its first formal action by the state's utility companies when National Grid, Unitil Corp., and Eversource Energy jointly applied to the Department of Public Utilities for approval to issue a request for proposals from offshore wind developers for projects between 400 and 800 megawatts of capacity for 15 to 20 year contracts, demonstrating their readiness to comply with the law.⁷³ On June 21, 2017, the department issued its approval of the draft plan the utilities submitted;⁷⁴ on June 29, the utilities and the Department of Energy Resources jointly issued the state's first request for proposals for long-term contracts for offshore wind energy projects between 400 and 800 megawatts of capacity, as required by the Energy Diversity Act.⁷⁵ The solicitation set a December 20, 2017, deadline for submission of proposals by offshore wind energy developers.⁷⁶

Three offshore wind developers that own leases in the federal waters off Massachusetts have publicly expressed their intentions to submit proposals in response to the utility companies' request: Deepwater Wind; Bay State Wind, a partnership of global offshore wind leader DONG Energy and the utility company Eversource; and Vineyard Wind, a partnership of Danish investment fund Copenhagen Infrastructure Partners and Avangrid Renewables, a U.S. subsidiary of Spanish energy giant Iberdrola.⁷⁷

The request for proposals contains two main provisions to foster competition among the developers. First, each bidder is required to submit at least one proposal of 400 megawatts of capacity, allowing for a head-to-head comparison among competing proposals. Second, bidders may also submit alternative proposals of any size within the range of 200 to 800 megawatts, which may provide for a greater array of potential projects for the utility companies and the Department of Public Utilities to choose from. All proposals must provide for commencement of commercial operation by January 1, 2027.⁷⁸

Observers must wait until the end of 2017 to see whether this first round of proposals produces viable offshore wind project options for the state and its electricity consumers. However, on July 31, Deepwater Wind looked to get a jump on the development process and its two competitors and publicly announced a 144-megawatt proposal on a portion of the federal lease it owns 30 miles off mainland Massachusetts.⁷⁹ Dubbed Revolution Wind, the proposal included a novel 40-MWh, grid-attached electricity storage component, which would theoretically allow the wind farm to supply offshore wind energy to the grid at times of peak demand. Such functionality could benefit both grid stability and the project's revenues by supplying project output during times of peak wholesale prices. Deepwater's proposal offered two variations, a 96-megawatt alternative and a 288-megawatt version.⁸⁰

Perhaps even more novel than the storage component, however, is that Deepwater's proposal was submitted not to compete with other offshore wind energy projects within the framework of the Energy Diversity Act's offshore wind carve-out but rather to be considered for a long-term power purchase agreement under a separate provision of the law that requires procurement contracts for competitive commercial scale projects of all clean energy sources, including onshore wind and solar.⁸¹ While expected production costs for Revolution Wind were not disclosed in the public materials for the project, and it remains to be seen whether it will in fact be directly competitive with other renewable energy technologies in 2017, Deepwater's willingness to fully develop and submit a bid that

goes head-to-head against other, more established renewable energy technologies suggests that the company has accrued significant confidence in its ability to achieve dramatic cost reductions on a timescale well ahead of most independent predictions.

The Massachusetts Oceans Act and ocean management plan

In 2008, the Massachusetts state legislature passed the Oceans Act,⁸² which required the state government to develop a comprehensive ocean plan for state waters to serve as a “blueprint for the protection and sustainable use of state ocean waters” that “protects critical marine habitat and important water-dependent uses and sets standards for new ocean-based development.”⁸³ The Oceans Act also requires that the ocean plan be revised and updated as needed every five years.

In accordance with the law, the state completed its first ocean plan in 2009, followed by a major revision and update to the plan in January 2015.⁸⁴ As a state initiative, the ocean plan’s geographic extent is largely limited to waters of state jurisdiction, generally those within three nautical miles of shore.⁸⁵ Consequently, the ocean plan is not directly relevant to the siting of the offshore wind farms that will fulfill the state’s Energy Diversity Act.

Nevertheless, the state’s energy and ocean planning staff proactively capitalized on the process to address subsea energy transmission from future offshore wind farms to the Massachusetts mainland. In 2014, the state’s lead publicly funded entity for renewable energy development, the Massachusetts Clean Energy Center, joined with the state Executive Office of Energy and Environmental Affairs and Office of Coastal Zone Management to commission a study to “analyze and understand the transmission infrastructure necessary to interconnect future Massachusetts offshore wind projects to the regional electric grid” and to make recommendations on subsea transmission corridors that “minimize cost and environmental impact.”⁸⁶

In 2015, the Energy and Environmental Affairs Office integrated the offshore transmission study’s findings into the new version of the ocean management plan, compiling its findings with other relevant geographic data on factors such as existing subsea cables, coastal hazard areas, and sensitive habitats.⁸⁷ As a result, the ocean plan identified and mapped four prospective corridors for offshore wind energy transmission and flagged them for further study.⁸⁸

Though a seemingly minor component of offshore wind development, the delineation and public release of these four potential transmission routes in the 2015 ocean plan represent a concrete example of the value of ocean planning. Developers gain increased certainty and a clearer path toward necessary permits, while existing ocean stakeholders and the public gain reduced risk of unintended environmental or economic harm.

The New Bedford Marine Commerce Terminal

In parallel with Cape Wind's saga and the passage of Massachusetts' offshore wind carve-out, state and local leaders also actively supported development of the port infrastructure needed to establish a supply chain for offshore wind turbines within the state. In a bid to capture the employment and other economic development benefits associated with regional expansion of a future offshore wind industry, the administration of former Gov. Deval Patrick allocated bond-sale revenue to provide the bulk of the approximately \$113 million investment required to construct the 26-acre New Bedford Marine Commerce Terminal. Tailored to provide storm-protected berthing for deep-draft marine construction vessels and barges that transport the football field-length turbine blades, and engineered to bear the extreme loads associated with the behemoth components of offshore wind turbines,⁸⁹ the New Bedford terminal was completed within the city's port area in 2015.⁹⁰

After the apparent unravelling of the Cape Wind project, the Patrick administration received significant criticism that the terminal was a waste of public funds.⁹¹ In December 2016, however, the three development companies vying to fulfill Massachusetts' offshore wind energy mandate—Deepwater Wind, Bay State Wind, and Vineyard Wind—jointly announced a commitment to lease the terminal for \$5.7 million per year, contingent on state and federal approval of their wind farm proposals.⁹² In sum, the three companies are currently planning offshore projects on secured federal leases of 519,436 acres, preliminarily estimated to encompass more than 3 gigawatts of wind energy.⁹³ In February 2017, Deepwater Wind announced the opening of its Massachusetts administrative headquarters in New Bedford as well. During an event to celebrate the office's opening, Deepwater CEO Jeff Grybowski linked the investment to the presence of the New Bedford Marine Commerce Terminal, stating, "We chose to come here to New Bedford because this industry will be centered around the [Massachusetts] SouthCoast (sic)."⁹⁴ On June 29, 2017, Vineyard Wind also opened management offices in New Bedford.⁹⁵

On July 31, 2017, Deepwater Wind also linked its Revolution Wind project proposal to operations at the New Bedford Marine Commerce Terminal. Upon approval of a long-term contract for the energy produced by the wind farm, Deepwater committed to conduct final turbine assembly and staging operations at the facility, as well as the maintenance and long-term operations.⁹⁶

Net effect: Toward national leadership

Driven by a short-term need to diversify the state's energy supply, a recognition of the long-term need to decarbonize it, and a commitment to secure the potential economic benefits of a major new industry, Massachusetts lawmakers formulated what is now the United States' most aggressive approach to fostering a commercial offshore wind industry within their state to serve energy consumers statewide. Based on a statutory mandate that sets a minimum for offshore wind's energy production, a comprehensive ocean-planning regime to facilitate offshore construction, and proactive public investment in port infrastructure, the state has laid a policy groundwork that is beginning to yield dividends in the form of burgeoning competition among major international players in the offshore wind industry, as well as local management and supply-chain development investments.

Cumulatively, the three companies that own federal leases offshore of Massachusetts have access to approximately 3 gigawatts of wind energy resources.⁹⁷ If fully built out, and operating at the roughly 40 percent average capacity factor exhibited by Denmark's offshore wind industry,⁹⁸ these projects would generate about 10.5 million MWh of electricity per year—representing approximately 19 percent of the state's 54.6 MWh of total electric power demand in 2015.⁹⁹ This level of output would also represent more than double the total 2015 electricity generation of the state's Pilgrim Nuclear Power Station,¹⁰⁰ which is scheduled to be permanently shut down in 2019.¹⁰¹

Finally, as the nascent American offshore wind industry embarks on full commercial development of the wind resources available offshore of Massachusetts, evidence of cost-related dividends from Massachusetts' commitments and investments has begun to emerge. A 2016 study by economists and supply chain experts from the University of Delaware forecast a 64 percent decline in the levelized cost of offshore wind energy production for New England, from the calculated production cost of the Block Island Wind Farm, \$0.30 per kilowatt hour, to the completion of the state's first 2,000 megawatts of capacity slated for the federal waters of Massachusetts, \$0.108 per kilowatt hour in 2027.¹⁰²

The researchers determined that the dramatic reductions in production cost will accrue from a combination of continued technological improvements, such as the increasing turbine sizes discussed earlier, and the multitude of industrial benefits associated with a policy commitment to the construction of a sequence of large-scale projects. These include the cost-reducing effects of competition among developers and equipment suppliers; the creation of an experienced regional workforce that becomes increasingly skilled and efficient over time; and the establishment of a pool of experienced offshore wind investors who see less risk and thus expect lower rates of return.¹⁰³

Should this magnitude of decrease in costs be realized, it would accord with the performance of the European market, while serving Massachusetts' ratepayers and rewarding Massachusetts policymakers whose initiatives fostered the offshore wind build-out.

New York

In contrast to Rhode Island and Massachusetts, New York's multipronged offshore wind policy has flowed almost entirely from the state's executive branch, specifically the administration of Gov. Andrew Cuomo. To date, the Cuomo administration's strategy also differs from the other two states in that the government's near-term objective is to reduce the initial costs and risks of offshore wind development by funding and carrying out a series of specific predevelopment activities, such as environmental studies and wind resource assessments for use by developers, rather than begin with statutory offshore wind power-demand guarantees. The range of these activities, which other states could emulate to attract investment in offshore wind development, is outlined below.

While unilateral administrative action to drive a locally untested new energy source may seem risky, the Cuomo administration's aggressive approach is motivated by several key factors that imply the policy has significant durability.

First, overwhelming majorities of the state's voters support action on climate change. Data from Yale University's Program on Climate Change Communication show that 82 percent of New Yorkers support public funding for research into renewable energy sources, 75 percent support regulating carbon dioxide as a pollutant, and 69 percent support setting strict limits on the emissions of carbon dioxide from existing coal-fired power plants.¹⁰⁴

This expansive popular support for clean energy and climate action underpins two general Cuomo administration initiatives around clean energy. In 2016, it established one of the nation's most aggressive renewable energy mandates, the Clean Energy Standard, which requires that 50 percent of New York's electricity be supplied by renewable energy sources by 2030, with a phase-in schedule beginning in 2017.¹⁰⁵ Additionally, the administration received approval from the state's utilities regulator, the Public Service Commission, to establish a 10-year, \$5 billion Clean Energy Fund to support clean energy development and energy efficiency measures, paid for by levying a surcharge on the state's energy ratepayers.¹⁰⁶

Second, the state faces the 2021 retirement of the Indian Point Energy Center nuclear power plant, a 2,000-megawatt facility that generates more than 25 percent of the electricity consumed by New York City and Westchester County—with no associated emissions of carbon pollution.¹⁰⁷

To meet the state's energy needs without tapping new fossil fuel sources and fulfill the ambitious Clean Energy Standard, the state's utilities must deliver several gigawatts of new renewable energy supplies to New York electricity consumers. Within this context—and in consideration of estimates that between 10 and 39 gigawatts of wind power are readily available for development in the waters from 12 to 50 miles offshore of New York's coastline—on April 29, 2016, the Cuomo administration identified offshore wind as “an essential renewable energy resource” for the state to fulfill its 50 percent clean energy mandate.¹⁰⁸ On January 10, 2017, in the annual state of the state address, Gov. Cuomo committed to the development of 2.4 gigawatts of offshore wind development in the federal waters offshore New York by 2030,¹⁰⁹ an ambitious target that, if fulfilled, would vault New York to the fifth-largest wind-energy producing state in the country—onshore or offshore.¹¹⁰

So far, the Cuomo administration's plan to meet this capacity goal—equivalent to installing 400 turbines of the type currently spinning off Block Island—involves multiple, interwoven initiatives using existing legal authority aimed at reducing development risks and costs, guaranteeing long-term demand for generated power, and preventing conflicts with ocean stakeholders and environmentally sensitive areas.

The Cuomo administration's capacity to deliver on these aims and fulfill the grand goal remains to be seen. However, its first concrete steps have already begun to mobilize tens of millions of dollars in public and private capital for offshore wind development to serve New York state. Because these measures may be replicable by other coastal states, they are reviewed below.

New York's Offshore Wind Master Plan and predevelopment activities

The New York State Energy Research and Development Authority (NYSERDA) is the state's lead governmental entity for the implementation of projects to reduce pollution and increase efficiency and resilience in the state's energy systems.¹¹¹ It also leads the state's offshore wind development program.¹¹²

In early 2016, NYSERDA received approval from the New York Public Service Commission to invest \$15 million from the state's Clean Energy Fund to develop the institutional knowledge, baseline data, and bureaucratic mechanisms to facilitate private-sector delivery of offshore wind energy in federal waters to New York's electricity consumers.

As justification for its approach, the agency cited an independent University of Delaware study completed in 2015, which found that a \$10 million investment in these types of predevelopment activities to supply baseline data and reduce risk and uncertainty could reduce the levelized costs of New York offshore wind projects by an estimated 1.3 percent, equivalent to \$160 million in savings over the 25-year lifetime of just one 600-megawatt wind farm.¹¹³ In other words, the state concluded that the \$15 million investment would jumpstart the offshore wind industry in New York and then pay for itself many times over through cost savings, should Gov. Cuomo's capacity installation goal be even partially achieved. NYSERDA's approved proposal for the offshore wind program outlined a multitude of activities in two main phases, with the overarching goal of "reducing the cost of [offshore wind] in New York," in line with the state's "commitment to develop the resource to maximize the energy, climate, and economic value."¹¹⁴

The first \$5 million of the \$15 million investment was approved for the agency to formulate a "New York Offshore Wind Master Plan" to serve as the state's "comprehensive state roadmap to advance Atlantic offshore wind in a manner that is sensitive to environmental, maritime, and social issues in a cost-effective manner that maximizes environmental and economic benefits."¹¹⁵ The agency set a deadline of December 2017 for the document, which would ensure completion before the conclusion of Gov. Cuomo's second term in office.¹¹⁶

NYSERDA outlined a multitude of activities to be completed as part of the master plan process, including environmental and economic studies, mapping and planning, and public hearings. Specifically, the agency intends for the master plan to include several core categories for research, preliminary policy development, and public engagement. First, NYSERDA aims to complete several specific studies to

identify offshore wind power development sites in federal waters, and conduct preliminary mapping of existing uses and risks. According to its proposal, this includes maritime, aviation, and security risk assessments; mapping of historic, cultural, and coastal view resources; and commercial and recreational fishing assessments and essential fish habitat studies. A key component of this research, however, is to identify the data gaps that require new site-specific data gathering activities, such as wildlife distribution and wind patterns, that private-sector developers would need to accelerate siting, design, permitting, and completion of offshore wind projects.

A second category of master plan activities centers on the development of state utilities policy—such as cost, benefit, and interconnection studies—and the formulation and analysis of specific mechanisms for energy offtake from offshore wind facilities and electric power distributors.

The third category of activities in the master plan captures NYSERDA's strategy to engage the array of affected New York stakeholder groups, such as the fishing industry, environmental advocates, the maritime community, industry, tribes, intergovernmental partners, and rate-paying residents and businesses. The agency outlined a series of public hearings and education and targeted outreach events. Outreach to two groups will be of particular importance. First, NYSERDA identified engagement with the utilities that will receive and distribute offshore wind energy—namely the Long Island Power Authority (LIPA), Con Edison, and the New York Power Authority—as a core component of outreach within the master plan development process. Formulation of the policy mechanisms by which utilities will procure electric power from offshore wind farms will be perhaps the most important output of the master plan process; accordingly, careful coordination with the utilities will help ensure success.

Second, blocs of the region's fishermen have strongly voiced concerns about offshore wind development, fearing that development will degrade critical habitats or lead to exclusion from traditional fishing grounds.¹¹⁷ On February 8, 2017, two fishing trade groups sued in federal court for a preliminary injunction to halt the Bureau of Ocean Energy Management's planning efforts for an offshore wind energy area south of western Long Island that was originally proposed for development by the state of New York.¹¹⁸ Days later, the presiding judge declined to issue the injunction, on the basis that BOEM's planning and permitting activities were not causing demonstrable harm to the industry.¹¹⁹ Nevertheless, the litigation underscores the importance of state government outreach to the fishing community and rigorous inclusion of their input into the formulation of offshore wind planning.

In sum, the master plan, according to NYSERDA, is a document intended to “identify and prioritize pre-development activities including resource assessment, baseline environment studies and site characterization that will reduce [offshore wind] project risks and costs in New York.” The agency projects publication of the Offshore Wind Master Plan by December 2017.¹²⁰ Shortly thereafter, NYSERDA is expected to present a formal implementation plan to the New York Public Service Commission. Upon approval by the commission, the Offshore Wind Master Plan—including a procurement mechanism—will have the legal force and durability of state regulation.¹²¹

The second core phase, for which NYSERDA received approval to invest the remaining \$10 million authorized by the New York Public Service Commission, involves carrying out the broad range of site-specific research and data gathering activities needed to fully characterize the resources and the environment in the federal waters areas where offshore wind could be developed and to fill the data gaps identified in the master plan. NYSERDA refers to this phase as “pre-development activities,” which are intended to culminate with the full public release of all accumulated resource and environmental data for use by developers and other stakeholders.¹²² Expenditures for predevelopment activities are scheduled to conclude in 2018, implying a 2019 release to the public and to private developers of the collected data.

Other activities to accelerate New York offshore wind energy development in federal waters

In addition to the Offshore Wind Master Plan process, the state government has undertaken specific proactive initiatives to kindle the state’s offshore wind industry and signal to the private sector that New York’s burgeoning demand for offshore wind is both real and for the long term.

New York’s first significant move was the nomination of an approximately 127 square-mile area 11 miles south of western Long Island for consideration as a federal offshore Wind Energy Area to the Department of Interior’s Bureau of Ocean Energy Management. In September 2011, nine months into the Cuomo administration, the New York Power Authority proposed installing as many as 194 3.6-megawatt turbines, for a net 700-megawatt capacity project, to help power the Long Island and New York City electricity market.¹²³ In response, and in accordance with a federal offshore wind development framework that prioritizes competitive leasing, BOEM launched a process to study the proposal and seek out interest among any other potential developers.¹²⁴

By January 2013, BOEM determined that sufficient private-sector interest existed to formally initiate the agency’s competitive leasing process.¹²⁵ In March 2016, the agency announced the delineation of lease blocks available for development that largely corresponded to the site proposed by the New York Power Authority nearly five years prior, setting the stage for a competitive auction.¹²⁶

As a component of the state’s Clean Energy Standard, the Cuomo administration directed NYSERDA to play an active role in BOEM’s December 15, 2016, auction for the Interior Department’s 79,350-acre offshore Wind Energy Area delineated to the south of Long Island.¹²⁷

NYSERDA’s goal was to secure development rights at auction but then serve as a “packager” rather than a developer.¹²⁸ This meant they would conduct the in-depth resource- and environmental-impact analyses and then conduct their own competitive bidding process to attract developers with reduced costs and increased certainty.¹²⁹

NYSERDA publicized its intention to be “in it to win it,” with respect to BOEM’s auction for the offshore wind leases.¹³⁰ After 33 rounds of competitive bidding among five different entities, however, a U.S.-based subsidiary of Norwegian oil giant Statoil, which had begun investing in offshore wind energy facilities in Europe, won the offshore wind lease with a bid of \$42,469,725.¹³¹ Both the vigor of competition and the magnitude of the winning bid were unprecedented in the history of BOEM’s offshore wind program, indicating an internalization by the private sector of the state’s positive demand signals.

Meanwhile, in late January 2017, the board of directors of the state-owned Long Island Power Authority voted to approve a 20-year power purchase agreement for the output of the 90-megawatt, 15-turbine South Fork Wind Farm proposed by Deepwater Wind on its federal offshore wind lease 30 miles east of Montauk.¹³² LIPA’s directors—the majority of whom were appointed by Gov. Cuomo—approved the contract as a component of the utility’s commitment to procure 280 megawatts of on-island renewable energy and to provide support for East Hampton’s municipal goal of achieving 100 percent renewable energy use by 2030.¹³³ Estimated to cost approximately \$740 million,¹³⁴ Deepwater Wind expects the project to be operational as soon as the end of 2022.¹³⁵

The aggressive and successful procurement of development rights by a deep-pocketed, experienced offshore energy developer, as well as the successful pursuit of approval of a major new project by America’s only established offshore wind energy developer, bodes well for New York’s approach. It suggests that the Cuomo administration’s executive branch-driven—but comprehensive—strategy is a sufficiently strong signal to the private sector that the state is ready and willing to buy offshore wind energy from commercial developers.

New York blazes a trail, and investment dollars follow

The legislatures of both Rhode Island and Massachusetts helped launch offshore wind development within their states through the passage of statutes that guarantee demand for the output from offshore wind projects—what many advocates and policymakers perceived as an essential signal to developers and financiers who must overcome tremendous startup- and supply chain-development costs to move forward with America’s first commercial offshore wind projects.

Through the creative application of several existing policy tools, however, the Cuomo administration appears to be succeeding in stimulating the private sector to make significant investments in offshore wind development in the federal waters off the Empire State, through executive branch regulations and initiatives alone.

While one governor’s policies and commitments may seem less durable than state law, in this case, they are well integrated with the state’s overall greenhouse gas emissions reduction strategy; an approved \$15 million investment to fund resource assessments, planning, and other activities to reduce developer risk; and formal approval of a long-term power purchase agreement to greenlight a specific 90-megawatt project in federal waters. Perhaps most importantly, upon completion and approval by the New York Public Service Commission, the New York Offshore Wind Master Plan will have the force and durability of regulation, at which point the state will join Rhode Island and Massachusetts as an electricity market with a legally binding offshore energy requirement.

Cumulatively, these actions have stimulated record-setting private-sector investments that suggest special legislation may no longer be required for a state to launch offshore wind energy.

Conclusion: Policy options for other coastal states

While Rhode Island, Massachusetts, and New York appear to be the leading states for commercial offshore wind energy development, other states are progressing as well. Maryland and New Jersey have both instituted favorable policies that provide bonus renewable energy credits to offshore wind projects within a framework of relatively strong renewable energy mandates for their states' electric power companies. In both states, significant commercial projects have been proposed for development on successfully auctioned federal offshore wind lease blocks. In May 2017, the Maryland Public Service Commission approved ratepayer-funded subsidies for two offshore wind projects proposed in federal waters off the Maryland coast, essentially greenlighting the two developers to begin seeking necessary federal permits.¹³⁶ The approvals, however, were conditioned upon numerous requirements related to in-state employment and more than \$100 million in infrastructure and business development investments. Two months later, the congressman representing Maryland's Eastern Shore—an offshore wind opponent—introduced federal legislation to bar any further federal action on the two projects.¹³⁷ In New Jersey, private-sector investment remains largely on hold pending approvals from the state's permitting authorities under the leadership of Gov. Chris Christie (R), whose prior support for offshore wind changed to opposition during his campaign for president.¹³⁸

Nevertheless, estimates of the readily available wind resources offshore of both states range well into the gigawatts,¹³⁹ indicating that should forward-looking political leadership materialize, the two states could unlock massive new clean energy supplies and the associated private investment and job creation.

Meanwhile, the Department of the Interior continues to move ahead identifying, delineating, and auctioning lease blocks for offshore wind energy development on both the Atlantic and Pacific coasts. In addition to the states already discussed in this report, BOEM has sold lease blocks off the coasts of Virginia and North Carolina,¹⁴⁰ two states with among the best offshore wind resources in the country.¹⁴¹ The agency is also moving ahead with lease planning off the Central

Coast of California, responsive to private-sector interest in developing large wind farms comprised of cutting-edge floating wind turbines.¹⁴² Finally, in 2016, the Department of Energy provided a significant grant supporting the launch of a pilot project in Lake Erie off the coast of Ohio, known as Icebreaker, to advance research and development of commercial designs for offshore wind turbines in ice-prone—but windy—waters, such as those of the Great Lakes.¹⁴³

When considered together, the policy experiences of the three states discussed in this report comprise a policy toolkit that could be of significant value to other coastal states that wish to capitalize on their offshore wind resources. That toolkit includes the following elements.

- **Strong renewable energy requirements:** Renewable energy mandates serve as a policy baseline for all three states, whose offshore wind energy industries are rapidly progressing. In all three states, policymakers have increased these renewable energy standards over time. In part, such portfolio standards prevent an unfair cost comparison between new offshore wind energy generation and legacy fossil fuel generation, for which production costs are often artificially low due to depreciated physical capital and a lack of direct pricing of carbon emissions. At best, renewable power mandates provoke critical evaluation of the relative merits of different clean energy supplies, such as the time-of-day production profile differences between solar and offshore wind. Analysis of these differences can then help policymakers enact further reforms that maximize supply diversity, rate stability, and other important benefits for each state's energy consumers.
- **Legislation that guarantees demand for offshore wind:** Establishing legislatively guaranteed demand for offshore wind energy—often called an offshore wind carve-out—played a critical role in the realization of the Block Island Wind Farm and underpins the influx of investor and developer interest in Massachusetts' offshore wind industry. However, it should not be viewed as a panacea due to the host of challenges associated with situating massive new industrial facilities within the marine environment.
- **Comprehensive ocean planning:** Rhode Island and Massachusetts both completed comprehensive ocean plans in advance of offshore wind development. This planning was vital for Rhode Island to become home to the nation's first commercial wind farm, suggesting that ocean planning may be essential to accommodate a major new offshore industry without harming existing ocean

users, degrading the environment, or provoking conflict and litigation with coastal stakeholders. When states work with federal, local and tribal partners to map out existing ocean uses, resources, habitats, and other important economic, ecological, and cultural features of the marine environment, they facilitate development of offshore wind energy development and other future economic activities by pre-empting illegal development, conflicts, and public antipathy.

- **Fair consideration of costs:** Rhode Island and Massachusetts lawmakers both passed legislation that sets the terms for public utilities commissions to evaluate offshore wind project proposals, so that a given proposal's advantages and costs are properly and transparently accounted for without being unfairly compared with the costs of obsolete or carbon-intensive energy sources.
- **Focus on market development:** While supportive policies are needed in the short term, states should simultaneously structure their offshore wind programs to foster market development. Massachusetts' competitive bidding process already appears to be delivering valuable market impacts, with world-leading developers competing on price and additional benefits such as in-state supply chain development and deployment of battery-based storage.
- **Requirement of long-term contracts:** Rhode Island's and Massachusetts' offshore wind laws require utilities to enter into long-term contracts, known as power purchase agreements, with offshore wind projects assessed to be competitive and reasonable. Such contracts incentivize developers to compete, provide access to private-sector finance to complete approved projects, and can support long-term price stability for ratepayers.
- **Investment in essential infrastructure:** Under the leadership of then-Gov. Deval Patrick, the state of Massachusetts made significant public investments in port infrastructure in the city of New Bedford, with the goals of spurring offshore wind development in the state and capturing the employment and other economic benefits of supply chain development. In combination with the state's offshore wind carve out, this infrastructure has attracted significant commitments from major developers for both management and construction jobs in New Bedford.
- **Executive leadership, which can drive significant progress:** New York, unlike Rhode Island and Massachusetts, has stimulated significant private-sector investment and activity without dedicated legislation, instead relying on a

comprehensive strategy, public investments in planning, and the formalization of policy through regulatory action—all executed by the state’s executive branch. While dedicated state law provides arguably the clearest signal to investors of a state’s desire for offshore wind energy, New York has shown that a combination of public investment in market development and planning, a robust clean energy standard, and focused political leadership can deliver substantial private investment and long-term contracts with developers.

Offshore wind remains a nascent industry in the United States, but the environmental and economic case for harnessing this strategic resource becomes stronger by the day. With the current lack of leadership from the federal government on both the exigency of proactive climate policy and the fostering of 21st century technologies and jobs, offshore wind provides coastal state governments with twin opportunities: rectifying the federal leadership vacuum on addressing the global climate crisis and capitalizing on a resource that is profoundly abundant and a major source of private-sector investment and job creation. State policy makers should look to innovations and hard lessons provided by the current state government leaders—Massachusetts, Rhode Island, and New York—and venture boldly forth to seize them.

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The Center for American Progress is an independent, nonpartisan policy institute that is dedicated to improving the lives of all Americans, through bold, progressive ideas, as well as strong leadership and concerted action. Our aim is not just to change the conversation, but to change the country.

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As progressives, we believe America should be a land of boundless opportunity, where people can climb the ladder of economic mobility. We believe we owe it to future generations to protect the planet and promote peace and shared global prosperity.

And we believe an effective government can earn the trust of the American people, champion the common good over narrow self-interest, and harness the strength of our diversity.

Our Approach

We develop new policy ideas, challenge the media to cover the issues that truly matter, and shape the national debate. With policy teams in major issue areas, American Progress can think creatively at the cross-section of traditional boundaries to develop ideas for policymakers that lead to real change. By employing an extensive communications and outreach effort that we adapt to a rapidly changing media landscape, we move our ideas aggressively in the national policy debate.

