Up in the Air

What the Northeast States Should Do Together on Offshore Wind Before It's Too Late

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Clean Energy Group (CEG) is a national, nonprofit organization that promotes effective clean energy policies, develops low-carbon technology innovation strategies, and works on new financial tools to advance clean energy markets. CEG works at the state, national, and international levels with stakeholders from government, the private sector, and nonprofit organizations. CEG promotes clean energy technologies in several different market segments, including resilient power, energy storage, solar, and offshore wind. Above all, CEG also works to create comprehensive policy and finance strategies to scale up clean energy technologies through smart market mechanisms, commercialization pathways, and financial engineering. CEG created and now manages a sister organization, the Clean Energy States Alliance, a national nonprofit coalition of public agencies and organizations working together to advance clean energy through public funding initiatives.

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Executive Summary

According to the latest news, the country's first proposed offshore wind project, Cape Wind, might never be built. Despite the best efforts of Massachusetts state officials to support the market for years, the disappointing news highlights a stark conclusion: *current offshore wind policy isn't working*.

While the Cape Wind project floundered amidst fierce local opposition, the project's difficulties highlight a larger policy problem—it is difficult, if not impossible, for any single state to jumpstart the offshore wind industry.

With the Northeast's keystone project in limbo, only a few small projects might be built. Going forward, there is no solid pipeline of large projects to prove the economic and environmental benefits of this technology and bring it to scale.

The bottom line is that a new policy approach must be put in place to support a robust offshore wind industry in the United States. To be effective, that approach must rely on multi-state collaboration.

A new multi-state policy approach must be in place to support a robust offshore wind industy in the U.S.

Offshore wind will only become cost competitive and reach its true potential if the states in the Northeast region act together to help create a market for the technology. The current, go-it-alone, single-state policy approach has failed.[1]

Without effective collaboration among the states, a market for offshore wind in the Northeast will not develop and the few small projects in development might well be the last. It is that simple.

This paper takes up the challenge of multi-state policy collaboration on offshore wind. It does the following:

- It shows the **strong regional economic opportunities** for offshore wind in the Northeast.
- It shows the multiple **regional environmental benefits** of a growing offshore wind market.
- It details the many challenges and barriers to a strong regional market, and then lists **actions Northeast states could take together** to build this market—from setting regional procurement targets to developing joint financing and development mechanisms to concerted supply chain development.
- It details specific policy measures states could adopt together to build out this market, including creation of **multi-state buyers' networks** and bargaining agents to purchase offshore wind power on behalf of multiple states.
- It then proposes a r**egional collaborative process** for the states to use to consider these measures and to decide whether to pursue offshore wind as a regional no-carbon resource.

While hopeful, this paper does not minimize the challenges. It notes that offshore wind is currently an expensive power resource, much as solar PV technology was twenty years ago. Since that time, policy measures, business models, and incentives—all targeted directly to solar technology—have brought precipitous drops in solar prices to customers. As a result of those concerted policies, in many regions of the country, solar has become an affordable, financeable, and commercially viable source of energy.

The same can happen with offshore wind. But its high upfront capital costs require significant policy support and greater multi-state collaboration to achieve scale.[2]

If the states do not act together, the region might well lose the ability to capture the benefits of an expanding offshore wind market. That will leave the offshore wind technology and supply chain development to foreign countries to capture the global market for offshore wind. It will leave the region ever more reliant on imported power or on natural gas to try to meet climate goals. It will mean the region will miss out on the economic and environmental benefits of this promising, large-scale, no-carbon energy technology.

If the country wants to capture these benefits, now is the time to decide which way the region and the industry in the U.S. will go. The policy status quo will not do.

If states do not act together, the region might well lose the benefits of an expanding offshore wind market.

Multi-State Actions on Offshore Wind: Policies and Process to Move Forward

If it is the ultimate goal of any East Coast state to develop major offshore wind projects, it is imperative that those states work together through consistent and cooperative regional policies. Multi-state action is needed to drive demand, organize procurement, and plan for transmission and distribution.

Multi-state cost sharing will reduce impacts on rate-payers and improve the prospects for the participating states to develop a native supply chain.

This paper recommends the states consider seven multi-state policies for regional action.

- *Regional Offshore Wind Target.* The establishment of a practical regional target (or target range) for offshore wind capacity would create a clear demand signal to offshore wind developers that the region is open to support projects.
- *Coordinated Policy Incentives.* Individual state policy drivers, including any incentives for developers, should be consistent across the region to drive demand and produce cost reductions over time through scale up of the offshore wind resource.
- *Financing.* States should develop new, regional financing mechanisms for regional and single projects including use of bonds and various measures through green bank financing.
- *Procurement.* Through various policy mechanisms, states should jointly mandate the procurement of power from one or more large offshore wind projects to reduce costs and create a reliable pipeline for project developers with an aggregated demand from multiple states.
- *Economic Development.* Coordinated rather than purely competitive action would spur economic development activity in the region through the creation of clean energy jobs and potentially new manufacturing facilities.
- *Transmission.* States should develop joint public funding of regional transmission and interconnection facilities associated with regional projects.
- *Permitting.* It is essential to the success of the multi-state projects that the policies ultimately adopted for permitting these facilities be standardized.

The paper also recommends consideration of various implementing mechanisms for these policies to be adopted, including a multi-state buyers' consortium, a state acting on behalf of other states as a bargaining agent, and a multi-state authority.

The paper also recommends the creation of a multi-year process for states to assess whether and how they would pursue these policies together.

Regional Opportunities for Offshore Wind

Numerous studies have shown the potential for offshore wind in the Northeast. It could be the single largest source of carbon-free electricity in the region.[3]

What those studies fail to show is how difficult it is to reach that potential with the current single-state approach.

The offshore wind projects now underway or proposed in Massachusetts, Maine, New Jersey, New York and Rhode Island[4] only begin to hint at the many challenges to build out the offshore wind market.

The Cape Wind project illustrates that it is all too easy to stall projects and undermine a single state's offshore wind policy.

- The Cape Wind project in Massachusetts illustrates that it is all too easy to stall projects and undermine a single state's offshore wind policy. It might be that no effort, either single-state or through multiple states, could have overcome the intense and well-funded opposition there. But the termination of Cape Wind's two power-purchase contracts with Massachusetts utilities— regardless of the ultimate cause of the project's apparent demise—underscores the need for a new approach to finance and support offshore wind projects that could have a greater chance of success.[5]
- In Maine, the state's effort to reopen bidding for a pilot offshore wind project, after a proposal had already been approved for a power purchase agreement (PPA), created major issues with wind development.
- The stalled Fishermen's Energy Atlantic City Project in New Jersey shows how single-state driven policy supports are not clear, robust or definitive enough to drive strong market development.
- Deepwater Wind's Block Island project in Rhode Island shows it's possible to create small-scale demonstration projects, but not at utility scale.
- The Long Island Power Authority process in New York shows how inconsistent policy pronouncements can cause market disruption.[6]

All of these projects have pursued development in the context of a single state's policy measures. The results are that:

- No state has been able to take advantage of larger, multi-state market procurement to reduce the high costs of offshore wind.
- Each state in the region that has an offshore wind policy has a different offshore wind policy mechanism.[7] Developers are reluctant to venture investment in a regulatory environment with different, conflicting and confusing market signals.
- Each state competes for the jobs and economic development benefits of the technology rather than cooperates with others in the region to build a larger market from which all states can benefit. There is no regional approach to develop an offshore wind supply chain.
- States have not cooperated to finance offshore wind projects, as compared to European governments that have integrated programs to support projects and companies in this emerging field.[8] The result is predictable: there is no pipeline of projects beyond the initial demonstration projects now struggling to come into the marketplace—and the projects that are proposed cost too much, in part because of the high cost of financing.

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- The states now do not have any standardized approach to permitting, raising the costs beyond where they should be or need to be.
- The inability to fully capture the climate benefits of offshore wind—due to the lack of multi-state policy coordination—has resulted in second best climate measures such as the efforts by some states to work together to import and procure large-scale, Hydro-Quebec power or make massive public investments in an expanded fossil fuel, natural gas infrastructure.[9]
- Perhaps most importantly, the region has not created favorable conditions for attracting consortia of European and American companies to do offshore wind projects. The world's most seasoned and sophisticated offshore wind developers in other countries do not see the U.S. as a good place to invest.[10]

Economic, Environmental, and Energy Assurance Benefits to the Region

These shortcomings in policy contrast with the region's strong incentives to develop offshore wind to meet important energy goals. The benefits of offshore wind to achieve those goals are numerous.[11]

Offshore wind can help the region diversify its fuel/technology mix by offsetting reliance on a tight gas-supply situation.

Meets RPS Mandates. The New England coastal states, New York, and New Jersey, have all adopted a renewable portfolio standard (RPS) requiring increased reliance on renewable resources. This means there is a large regional demand for renewable power and more supply will be needed to meet regional RPS requirements. Offshore wind can be an important mechanism to achieve compliance with the RPS goals.

Increases Regional Reliability. Because New England has a single power market, power transactions in one state can benefit the power needs of other states within the integrated ISO-NE system. Similar inter-system transactions from projects in New York and New Jersey can benefit their respective power pools. As a result, offshore wind power output can serve multiple regional power needs for reliability. The addition of offshore wind in the region adds power to the high-voltage grid and directly supports the reliability of supply in the state where the project is connected and in the region.[12]

Reduces Transmission Costs. Recent analysis as to the cost of adding transmission capacity to the New England region have concluded that adding offshore wind results in the most cost-effective use of new and existing transmission resources.[13]

Reduces Peak Demand. The New England region is a summer peaking system, as are New York and New Jersey, and these system peaks have been increasing over the years. Offshore wind generates more electricity during summer time peak hours, thus moderating system peak when needed the most. East Coast (Maine to Virginia) peak-time electricity demand could be met by offshore wind in all seasons except for summer, during which 74 percent of peak-time demand could be met.[14]

Increases Fuel Diversity. Natural gas price spikes due to the polar vortex cold snaps in the last few years underscore the need for greater fuel diversity in a region heavily dependent on natural gas for electric power generation. Offshore wind can help the region diversify its fuel/technology mix by offsetting the reliance on a tight gas-supply situation.[15]

Delinks Region from Fossil Fuel Prices. While the price of fossil fuels is now low, price swings and volatility are inevitable in fossil fuel markets. Offshore wind can act as a kind

of insurance policy against price volatility, giving customers assurance of price stability unlinked to global fossil fuel market swings.[16]

Increases Economic Development. In Europe, the offshore wind industry has produced tens of thousands of good paying jobs. A robust pipeline of projects in the Northeast will begin to deliver the same kind of economic development benefits.[17]

Reduces Greenhouse Gas Emissions. Offshore wind projects will displace large amounts of greenhouse gas (GHG) emissions from fossil units. This is even the case, and perhaps more needed than ever, as the region and other states move to expand reliance on natural gas power plants. True no-carbon technologies like offshore wind are needed for climate stabilization.[18]

Multiple System Benefits. Offshore wind produces multiple system benefits that no other resource can match. It can contribute to energy security and system reliability as well as economic and environmental goals. Offshore wind, if properly sited, can enhance reliability; deliver firm power to load centers; reduce overall transmission investments; stimulate new technology development; deliver jobs; and meet renewable and climate mandates. Using a system benefit approach, offshore wind could be considered cost-effective under multiple system-wide planning scenarios that look beyond pure commodity price comparisons.

True no-carbon technologies like offshore wind are needed for climate stabilization.

In addition to the foregoing system benefits, additional benefits could be attributed to large offshore wind projects developed through multi-state efforts:

- Significant price suppression through reductions to the locational-based marginal costs in the ISO or RTO to which the project is interconnected.
- Increased reliability if the project is interconnected with more than one control area.
- Streamlined procurement through the use of standardized solicitation documents.
- Ultimately lower unit construction costs attributable to efficiencies gained through the experience of developing multiple projects in the region.
- Numerous creditworthy off-takers (i.e., all of the participating states rather than just one entity) may reduce the project developer's credit risk, ultimately resulting in a lower cost of capital and, correspondingly, a reduced impact on retail rates.
- Leverage enjoyed by the states over the offshore wind developer's selection of equipment suppliers, potentially favoring local manufacturers.

The multiple benefits of offshore wind to the energy system are clear. The collaborative benefits to the development of offshore wind projects are even clearer.

Policy Goals and Rationale for Multi-State Collaboration

Some might say that the region already has been working together on offshore wind, so why the need for additional policy action.

That view misunderstands the real need and opportunity in multi-state policy collaboration. The problem is that though numerous multi-state offshore wind organizations[19] have been established in regions covering the Atlantic coastline, for the most part they have had an only an advisory role. These organizations, which have taken the form of a consortium, a council or an alliance, do not have the authority, capability, or resources to develop an offshore wind project.

The efforts of these organizations have been focused on coordinating discussions among the states—a very good start, but a more serious commitment by the individual states is needed, one that goes beyond an informal cooperation.

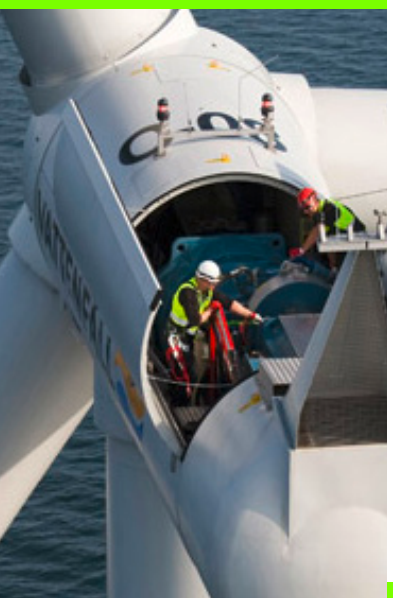
It is imperative that states work together to develop effective policy mechanisms to over come barriers.

If it is the ultimate goal of any East Coast[20] state to develop major offshore wind projects, it is imperative that states work together to develop effective policy mechanisms to overcome the major barriers associated with such projects, specifically, high capital costs, lack of infrastructure (e.g., transmission, ports) and regulatory issues.

The results of multi-state policy collaboration would be beneficial for the kinds of offshore projects that could be developed.

First, larger projects could be developed. Multi-state offshore wind projects would likely be substantially larger than a project being developed by a single state. Large projects (particularly, several large projects) would produce substantial economies of scale, resulting in reduced overall project costs per kilowatt of wind capacity.

Second, the technical costs of projects could be spread across multiple jurisdictions. The costs for certain technical aspects of the offshore wind project such as the undersea cable, mobilization, demobilization and installation vessels, which would be needed whether a project is large or small, may not be substantially higher on an incremental basis for a large project than for a smaller, single-state project.



Third, retail customers might see lower unit costs for power from large projects. For a single-state project, spreading the high costs of offshore wind to a segment of retail customers in the affected state (or perhaps all customers in the state) could potentially have significant rate impacts. Since the unit costs ($/kW) of a large project would be expected to be lower, and would be spread over a much broader base (i.e., the retail customers in the collaborating states), the ultimate retail customer rate impact would be more manageable with multi-state collaboration on project development.

Fourth, multi-state collaboration would improve prospects to develop a robust regional offshore wind supply chain. Many of the states in the Northeast possess strong demographic, workforce and industry capabilities that would support the development of numerous offshore wind

components. In addition, many of these states have existing ports with the requisite depths, construction areas, quay lengths and load bearing capacity to accommodate the construction of a large offshore wind project.[21] Taking advantage of these capabilities and logistics would have a positive impact on the opportunities for producing a strong supply chain.

Finally, it is important to distinguish progress on siting from progress on project development. While the U.S. Department of Interior's 'Smart from the Start' initiative has streamlined designating, siting and environmental review of offshore wind energy areas and the Bureau of Ocean Energy Management (BOEM) has held three commercial wind lease auctions, these efforts are primarily siting-related. The federal efforts have been encouraging, but they only move the industry so far. Siting does not guarantee that any project will be built. Multi-state action is still needed to drive demand, organize procurement, and plan for transmission and distribution.

This paper recommends the states consider seven multi-state policies for regional action.

1. Regional Offshore Wind Target

A target for offshore wind capacity would produce meaningful economic and environmental benefits.

A key first step in multi-state collaboration on offshore wind involves the development of an offshore wind target capacity for the region.

This has worked successfully in Europe and can work here. Europe has set a target of 40 GW by 2020 to drive economic growth and support over 200,000 jobs.[22] Similarly, Japan has set a target of 37 GW of offshore wind power by 2050.[23]

While no regional targets have been established to date for the East Coast of the United States, it is noteworthy that New Jersey has established an offshore wind target of 1,100 MW by 2021, and Maryland has passed legislation requiring that up to 2.5 percent of the state's energy needs be met by offshore wind beginning in 2017. Also, Massachusetts has set a goal of developing 2,000 MW of offshore wind by 2020, and Maine has set goals of 300 MW of offshore wind by 2020 and 5,000 MW by 2030.

The establishment of a practical target (or target range) for offshore wind capacity that would produce meaningful economic development and environmental benefits, while not imposing significant incremental costs on ratepayers, is the key to successful projects.

As such, the first order of business for a region considering the development of an offshore wind project would be to estimate the capital and operating costs of projects of varying amounts of capacity and ultimately selecting the "target" that produces the optimum benefits with minimal economic impacts on ratepayers.

A target is particularly significant from the perspective of developing an offshore wind supply chain. A single offshore wind project will not provide the economic development incentives to cause offshore wind component manufacturers to locate in a region. In general, manufacturers need to be assured of a pipeline of projects before making plant siting decisions.

Research shows that a demand of 100 to 150 wind turbines per year (or 500 to 800 MW per year) for a minimum of five years is required to justify an investment in a turbine manufacturing plant (including a foundry for large castings, and separate facilities for blade fabrication, tower fabrication, and nacelle assembly).[24]

2. Coordinated Policy Incentives

Many states have implemented specific programs intended to accelerate the development of offshore wind projects off their particular coasts. Following is a listing of some such programs:

Delaware – 350 percent multiplier for the REC value of offshore wind facilities sited on or before May 31, 2017.

Maryland – Maryland Offshore Wind Energy Act of 2013 established Offshore Wind Renewable Energy Certificates (ORECs) supporting a project in the range of 200 MW to 250 MW with a maximum OREC price (capacity, energy, ancillary services and renewable attributes) of $190/MWh ($2012) in addition to a maximum residential ratepayer impact of $1.50/month and a non-residential impact of 1.5 percent of total electric bills.

Massachusetts – The Green Communities Act requires utilities in Massachusetts to enter into cost-effective, long-term contracts of 10-15 years to purchase at least seven percent of their power from eligible renewable resources. The Massachusetts Department of Public Utilities approved that National Grid and NSTAR execute PPAs with Cape Wind.

New Jersey – Established OREC program intended to support a target of 1,100 MW of offshore wind.

It is essential that underlying policy drivers be applied on a consistent basis among all participating states.

While the foregoing programs may all have some merit, it is noteworthy that they are all completely different. Those differences represent a barrier to serious industry development.

For a regional offshore wind project to be successful it is essential that the underlying policy drivers, including any incentives for developers, be applied on a consistent basis among the participating states. If one state is offering ORECs and another elects mandatory PPAs, it will only cause confusion in the market and will not be effective.

Representatives of European offshore wind developers, those leading the global market, have repeatedly said this policy inconsistency is one of the primary reasons for the poor market development in the United States.

As such, the multitude of individual state programs described above cannot be employed by individual states cooperating on a regional project.

As difficult as it sounds, the participating states will need to start with a clean slate that incorporates regional policy drivers and to the extent that there are any incentives, such incentives should be applied consistently on a region-wide basis.

3. Financing

Securing construction and project financing continues to be a major barrier to the development of offshore wind projects. This is primarily because of the high capital costs and the unique risks associated with offshore wind. The presumed failings of Cape Wind to secure all its financing might have doomed the project.

Since it has been established that a multi-state offshore wind project would be substantially larger than a single-state endeavor, it will be extremely challenging for an offshore wind developer to single-handedly close financing on the entire project even with long-term agreements with creditworthy off-takers.

One approach to easing the financial burden on offshore wind developers that has been gaining some traction entails the introduction of a third party that would be responsible for the transmission and interconnection facilities associated with the project. This approach has been suggested by several developers as an option to be considered in their responses to RFPs for renewable energy projects that have been issued by certain East Coast utilities.

While to date no such approaches have advanced beyond being an option in an RFP response, such an arrangement could provide substantial cost savings if the third party were a public authority or other creditworthy tax-exempt entity.

Third-party investment in the UK's offshore transmission scheme has enabled developers to recover capital investments. Ofgem and DECC, two UK agencies, have set up an Offshore Transmission regime, enabling the agencies to regulate and license transmission projects. This model has attracted developers and provided assurances to investors that the transmission assets have been fully tested. £1.4 billion of investment has already been committed and another £1.5 billion is currently in the tender process.[25]

Green Banks could become a major contributor to the development of a sustainable offshore wind industry.

As transmission facilities represent a substantial component of the overall project costs, relieving the offshore wind developer of these costs would reduce the amount that they would otherwise need to finance. This subject will be discussed further in the Transmission section of this paper.

Other approaches that would contribute to mitigating the cost-impact on offshore wind project developers include:

Cash grants – public subsidies used to pay for a portion of the capital investment.

Loans guaranteed by federal or state governments – such loans reduce the risk associated with project financing and result in lower interest rates for the developers.

Accelerated depreciation – investors with taxable profits can reduce their tax obligations in early years by claiming higher taxable losses and, consequently, higher profitability.

Tax breaks, low-interest loans, credits or deductions – available to developers directly or indirectly through the tax code.

Prepayment arrangement – Since the direct off-taker(s) in a multi-state arrangement will most likely be one or more state agencies, it would be expected that such agencies would be authorized to issue tax-exempt bonds. As such, the agencies could prepay for a portion of the offshore wind energy which effectively results in lower financing costs to the developer and, ultimately, lower incremental costs to the ratepayer.

Balance sheet financing – Since developers typically do not have robust balance sheets, this approach would entail the developer partnering with an investor owned-utility that could finance its share of the project based on its balance sheet. Such an arrangement would require the approval of the state utility regulatory body.

In addition, creative use of public financing can significantly boost financing prospects for the industry. Again, Europe has charted a leadership role on how to do this in the United States.

A relatively new entity that could provide a major contribution to the development of a sustainable offshore wind industry is the Green Bank concept. The UK's Green Bank has been a leader in creating new financing mechanisms to support early stage offshore wind financing by the private sector.[26]

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Green Banks are government-backed financial entities dedicated to supporting renewable energy projects without resorting to grants and subsidies as governments typically do. Such a program was created in New York State in 2013. New York's Green Bank program is a $1 billion initiative designed to provide a bridge to self-sustaining clean energy financing capabilities within the State. With an initial capitalization of more than $200 million, the New York Green Bank's key objective is to attract private sector financing for the development of renewable energy projects.

The Green Bank's focus entails projects that are economically viable, but not currently financeable because of certain barriers, including projects with large up-front costs. There is every reason to believe that such an approach could be successful with offshore wind. As such, an effort to coordinate regional Green Bank financing efforts could constitute the financial underpinnings for a sustainable offshore wind industry.

4. Offshore Wind Energy Procurement

Offshore wind would spur economic development in the region through the creation of jobs and new manufacturing.

A multi-state approach entails a group of states jointly pursuing the development of one or more large offshore wind projects.

From an energy procurement perspective, there are many benefits that can be attributed to the states employing a joint approach rather than soliciting smaller projects individually. Such benefits include:

- Standardized solicitation documents would support a streamlined procurement process.
- A single procurement will result in a shorter development period, particularly if multiple regional projects are involved.
- Working jointly, the states would be expected to be able to negotiate a PPA with an offshore wind developer from a stronger position since the multi-state collaboration would have the resources to assemble a more seasoned and experienced negotiating team.
- The states would have leverage over the developer's selection of equipment suppliers and construction firms, possibly favoring local companies, including local manufacturers of certain components.

5. Economic Development and Supply Chain Strategies

A large multi-state offshore wind project would be expected to spur economic development activity in the region through the creation of clean energy jobs and potentially new manufacturing facilities. The construction of the first regional offshore wind project could serve as a catalyst for additional similar projects that would help position the particular region as a major center for the offshore wind industry in North America.

For the most part, the regions on the East Coast represent a solid base on which to develop an offshore wind industry "cluster." Clusters are geographic concentrations of interconnected companies, specialized suppliers, service providers, and associated institutions in a particular field that are present in a region.

The states on the East Coast comprise the demographics, workforce and industry characteristics upon which to build a strong foundation for an offshore wind industry cluster. For example, an offshore wind turbine includes more than 7,000 components which would be expected

to offer opportunities for the states in a region to attract some portion of the sector's manufacturing requirements.

From a demographics aspect, the states in the Northeast have demonstrated a well-educated population, strong tradition of manufacturing, and competitive wages that would make the region attractive from the perspective of manufacturing offshore wind equipment and components. In addition, several regions include clusters strong in machinery manufacturing, primary metals, and advanced materials.[27]

It is imperative that the states in the region work together to develop an optimum offshore wind economic development package.

6. Transmission

Undersea cables, offshore substations, and interconnection facilities comprise a significant share of the total capital costs for an offshore wind project. The policy makers promoting specific multi-state offshore wind projects will need to make a decision early in the process with respect to the treatment (i.e., ownership, financing, cost recovery) to be afforded the transmission portion of projects.

Adopting a uniform approach to transmission investment and ownership by multi-state collaboration is critical.

The simple solution with respect to transmission would be for the offshore wind generation developer to also develop (and finance) the related transmission facilities. While this approach is not precluded and should not necessarily be discouraged, it places an extraordinary burden on the individual developer—a burden that many developers will not be able to accommodate, even if the developer has one or more long-term PPAs with creditworthy off-takers.

Accordingly, an arrangement under which another party would develop the transmission facilities warrants consideration.

Since multi-state offshore wind projects will be relatively large, and ideally there would be more than one offshore wind project serving a region, an offshore grid may have merit. An offshore grid is an undersea backbone transmission system with a limited number of land-based interconnection points, which minimizes the environmental impacts of installing multiple radial lines to shore. Large-scale offshore wind projects, such as those contemplated by multi-state arrangements, would be interconnected to the offshore grid.

Adopting a uniform approach to transmission investment and ownership by the multi-state collaboration is critical. In the event that the multi-state participants elect to limit the offshore wind developer solely to the generation facilities, those participants will need to decide if a third-party transmission developer should finance and develop the transmission facilities or if the states should directly assume that responsibility. The benefits to the states developing the transmission facilities would be lower interest rates associated with tax-exempt debt.

However, unless a single state agency, such as the New York Power Authority (NYPA) for example, has the inclination and authority to step in and finance and own the project on behalf of all participating states, use of a private developer may be the only practical approach with respect to third party transmission ownership.

For third-party ownership of the offshore wind transmission facilities to be effective, the key is assured cost recovery. As such, the annual costs associated with the offshore wind transmission facilities would be allocated to the regional transmission customers through the RTO(s) to which the offshore wind project is interconnected.

A variation of the third-party development and ownership of offshore wind transmission facilities would entail the creation of offshore wind energy resource zones targeted for grid investment.

This approach has been successfully employed for the land-based wind industry. California, Michigan, and Texas have designated specific areas for land-based wind development to provide a level of certainty for transmission development by ensuring cost recovery through rates.

These policies provide transmission developers (and their financiers) with assurances that they will be able to recover their costs. Moreover, these policies provide wind developers (and their financiers) with assurances that there will be transmission in place to be able to deliver their energy.

7. Permitting

There are several approaches for offshore wind permitting that primarily differ in the level of centralization in producing Environmental Impact Statements (EIS) for permitting. Following are three approaches:

- Site specific for every individual project – requires individual EIS for each offshore wind project regardless of whether adjacent projects have addressed similar issues.
- Programmatic EIS (PEIS) – evaluates the impacts and identifies the required mitigation for a range of standard technologies to be installed in a relatively uniform environment. The PEIS provides guidance to developers and regulators for subsequent specific development proposals.
- PEIS over broad geographic areas followed by less detailed environmental assessments for individual projects – the objective is to gain economies of scale and scope while addressing common issues across multiple projects in a common area, thus saving time and costs.

Policies adopted for permitting offshore wind facilities must be coordinated by participating states.

It is noteworthy that, with respect to a multi-state offshore wind project, individual states have a regulatory role when such a project is proposed for construction in federal or state waters. States have authority over the first three nautical miles of a state's coastal submerged lands and states have passed coastal management laws and have developed permitting and leasing programs for offshore wind activities in submerged state lands.

Offshore wind projects proposed in state waters could be subject to a comprehensive regulation managed by a single state agency or be subject to permitting authorities managed by multiple state and local agencies. This permitting may be further complicated with respect to a regional offshore wind project since permits from more than one state will likely be required.

It is essential to the success of the multi-state projects that the policies ultimately adopted for permitting these facilities be coordinated. An example of such policy coordination is Mid-Atlantic Regional Council on the Ocean (MARCO), which was created in 2009 by Delaware, Maryland, New York, and Virginia. MARCO's objective is to facilitate regional coordination and collaboration on marine issues including offshore wind development.

It is recommended that regional entities such as MARCO on the East Coast, working with BOEM, focus on coordinating, to the extent feasible, the environmental reviews and other related activities required for permitting offshore wind projects.

Implementation Mechanisms for Policy Goals

Several multi-state organizations have been established with the goal of supporting the development of offshore wind projects. While the accomplishments of these organizations have been impressive, if the objective of some or all of the states participating in these organizations is to stimulate the development of one or more large offshore wind projects, more structured and capital intensive implementation mechanisms are needed.

Specifically, what is needed is an organization or other cooperative structure that has the authority and capability (particularly, the financial capability) to develop large offshore wind projects on behalf of participating states and to ensure that cost recovery is achieved for the project from the benefiting retail customers in those states.

What is needed is an organization that has the authority to develop offshore wind projects on behalf of participating states.

Following are descriptions of three potential mechanisms that could be employed to support the development of offshore wind projects on behalf of partnering states:

- Multi-State Consortium
- Bargaining Agent Arrangement
- Multi-state Power Authority

1. Multi-State Consortium

Under the Multi-State Consortium arrangement, "partnering" states would negotiate and execute an Offshore Wind Development Agreement (OWDA) setting forth the roles and responsibilities of the parties (including payment obligations) and the terms and conditions under which the parties would cause the project to be developed. The OWDA would likely be preceded by a Memorandum of Understanding (MOU) setting forth the objectives of the parties. While the MOU would not be binding, the OWDA would be binding on all of the parties.

The entity or agency representing each participating state would need to have the authority to bind the state to the terms and conditions of the OWDA. Whether this agency is the state regulatory commission, the state energy office, the Office of General Services, or some other state agency would be determined on a state-by-state basis. For certain states, it may be necessary to enact legislation to accommodate participation in the consortium.

Before establishing the size and location of the offshore wind project(s), the OWDA would require the participants to jointly engage contractors to perform certain studies including site screening, wind assessment, marine environmental, and visibility and aesthetic. The participants would share the cost of the studies based on an allocation formula to be incorporated in the OWDA.

The allocation formula could be based on each participating state's: (1) peak load, (2) number of retail customers, or (3) some other metric(s) agreed to by the parties. In addition, interconnection studies would be required. If the project is being interconnected to more than one control area, interconnection costs would first be allocated to the states based on the applicable control area. To the extent a control area includes more than one participating state, the costs would be apportioned between (or among) the states in the particular control area based on the allocation formula in the OWDA.

Based on the results of the studies, the consortium would issue an RFP seeking the construction of an offshore wind project of a particular capacity (or range of capacities) to be sited in a designated area (subject to the U.S. Bureau of Ocean Energy Management (BOEM) granting the required lease). The RFP would be jointly managed by the consortium members, each of which would be represented on the Selection Committee that would be responsible for evaluating the proposals and selecting a developer to permit, finance, construct, own and operate the project.

The selected developer would negotiate individual PPAs with each of the Selection Committee members, although a joint negotiation process would likely be employed to ensure that all members enjoy generally the same terms and conditions. The consortium members would make their own arrangements for the disposition within their respective states of their shares of the offshore wind energy as well as for the cost recovery for such energy through the public utility regulatory commissions of their home states.

The Multi-State Consortium arrangement would likely result in reduced financing costs (compared to a single-state venture) because the offshore wind energy would be sold under long term contracts to numerous creditworthy parties. This diversified portfolio of contract-counterparties to the offshore wind developer would result in reduced credit risk, increased lender and investor confidence and an overall lower cost of capital for the project.

There are examples of state entities that serve as bargaining agents for power purchases and sales.

The consortium approach will also facilitate regional economic development and supply chain economies of scale benefits for the participating states. It will be incumbent on the participating states to agree on a formula (to be included in the OWDA) that reasonably allocates the economic development benefits among the participants.

This will likely be a complicated arrangement since it is likely that only one state will realize the economic benefit of hosting the port. In addition, to the extent that supply chain manufacturing facilities are developed in connection with the offshore wind project(s), it is not likely that the location of such facilities will be equitably distributed among the states. As such, it is imperative that the OWDA be designed to maintain the benefit of the bargain among the participating states.

2. Multi-State Bargaining Agent Arrangements

There are examples of state entities that serve as bargaining agents for power purchases and sales that should be considered for offshore wind.

Pursuant to legislation and licenses, the New York Power Authority (NYPA) sells a portion of the output of its large Niagara and St. Lawrence generating plants to “Bargaining Agents” in seven neighboring states, specifically, Connecticut, Massachusetts, Rhode Island, Vermont, New Jersey, Pennsylvania, and Ohio. Bargaining Agents are entities that have been designated by the Governors of the particular state to negotiate preference hydropower contracts with NYPA. For example, the Bargaining Agent for Vermont is the Vermont Public Service Board. The Bargaining Agents resell the NYPA hydropower to utilities located in their states in accordance with applicable statutes.

A Bargaining Agent arrangement among participating East Coast states could be employed to support the development of a regional offshore wind project.

To facilitate the Bargaining Agent process, one state would have to step up and take the initiative. That state would need to have an existing agency or create a new agency that would be authorized to negotiate with an offshore wind developer on behalf of itself and other participating states.

While NYPA has such statutory authorization with respect to its large hydropower facilities, for example, that authorization does not extend to offshore wind developers. However, with its extensive power marketing and renewable energy experience, and if the necessary legislation were enacted, NYPA would clearly be a solid candidate to take the lead for a multi-state offshore wind initiative in the event that New York State was so inclined and if other states were not interested in serving that role.

It is noteworthy that NYPA has been quite active in offshore wind matters in recent years. Several years ago, NYPA issued an RFP for up to 500 MW of wind capacity to be sited in Lake Erie or Lake Ontario. As part of that procurement, NYPA commissioned numerous technical studies including a Site Screening Selection Study, an Analysis of Lake Ice and Offshore Structures, a Port & Vessel Assessment, an Avian Risk Assessment, a Geological Investigation of Lakes Erie and Ontario, an Offshore Wind Technology Overview and a Desktop Analysis of Critical Issues.

NYPA conducted extensive qualitative and quantitative evaluations of the bids received and held in-person interviews with short-listed bidders. Ultimately, NYPA cancelled the procurement because the proposed pricing was considered too high.

To facilitate the Bargaining Agent process, one state would have to take the initiative.

Moreover, NYPA is currently actively involved in an offshore wind collaborative jointly with the Long Island Power Authority and the Consolidated Edison Company of New York, Inc. The collaborative is focused on a 350 MW offshore wind project that could be expanded to 700 MW that would be located about 11 nautical miles off the south shore of Long Island. On behalf of the collaborative, NYPA submitted an application to BOEM for a commercial wind lease for the project. The MOU under which the collaborative has been conducting business expires in May 2015 and the parties are currently discussing an extension to the MOU term.

The foregoing is not to suggest that New York State (through NYPA) should necessarily be the lead in a Bargaining Agent arrangement for a multi-state offshore wind project. It was intended to show a potential scenario for accomplishing that objective. Once the Bargaining Agent concept has been reviewed among interested states, it is expected that any states interested in assuming the lead will make their intentions known.

Photo Credit ©Gary Norton/DOE

The Bargaining Agent for the lead state would engage contractors to perform the requisite studies. The Bargaining Agents for the other participating states would reimburse the lead state Bargaining Agent for their particular shares of the study costs. The lead state Bargaining Agent would issue the RFP for the offshore wind project and the other participating state Bargaining Agents would be part of the Selection Committee.

Once the developer has been selected, the lead state Bargaining Agent would negotiate a long-term PPA for the full output of the project. The Bargaining Agents for the other participating states would be kept apprised of PPA negotiations and their approval would be required for the lead state Bargaining Agent to execute the PPA.

Concurrent with the lead state Bargaining Agent executing the PPA with the offshore wind developer, the lead state Bargaining Agent would also negotiate a PPA with each of the other state Bargaining Agents that, with respect to all material terms and conditions, would mirror the PPA with the offshore wind developer, except that the contract capacity would be the particular amount of offshore wind capacity allocated to the particular participating state Bargaining Agent.

With respect to cost recovery, it would be incumbent on each participating state Bargaining Agent to ensure that it has secured the approval of the applicable state regulatory authority. Clearly, a Bargaining Agent would not participate in the foregoing arrangements without first having secured the requisite regulatory approvals.

As discussed in the beginning of this section, the Bargaining Agent arrangement has worked well from the perspective of sales of NYPA hydropower to neighboring states. The Governors of the seven neighboring states designated the particular Bargaining Agents, and it is not believed that any state legislation was required to accomplish such designation.

With respect to the prospect of using the Bargaining Agent arrangement for developing a multi-state offshore wind project, it is likely that legislation by participating states would be required. As such, this matter warrants further review from a statutory perspective.

3. Multi-State Power Authority

Though a Multi-State Power Authority may have little chance of being implemented, the concept deserves consideration.

Given the legal and political hurdles, this next concept of creating a multi-state power authority probably has the least chance of being implemented. But it is included nevertheless as a proposal given its strong institutional potential to act as a multi-state agent on energy matters.

While a Multi-State Power Authority would likely provide substantial benefits for the participating states, the prospects for such an organization ever being established are quite speculative. As such, consideration of a Multi-State Power Authority should not be afforded the same priority as the Multi-state Consortium and Bargaining Agent options.

Under the Multi-State Power Authority arrangement, the participating states would jointly sponsor legislation to establish the creation of a Multi-State Power Authority, generally following the concept of the Port Authority of New York and New Jersey ("PA"). The PA builds, operates, and maintains infrastructure critical to the New York/New Jersey region's trade and transportation network. PA facilities include airports, marine terminals and ports, transit networks, tunnels, and bridges.

The Multi-State Power Authority would be created to facilitate offshore wind project construction. It would be established through legislation by the participating states and would require a compact between those states. The compact would allow the participating states to act jointly on issues that are beyond the authority of a single state. The formation of such an agency would likely take several years.

Depending on the ultimate project ownership/development arrangement incorporated in the legislation, the Multi-State Power Authority could act as a financing agency and/or as a direct power purchaser.

To the extent that the Multi-State Power Authority would participate in the financing of the project, it should substantially reduce the ultimate capital costs as (1) it would likely use tax-exempt debt; (2) there would be no return on equity component; and (3) there would be no federal income taxes payable.

Moreover, the facilities of the Multi-State Power Authority would not be subject to property taxes. In the event that the Multi-State Power Authority enters into a PPA with an offshore wind developer to construct the project and provide the output, the developer's financing costs would likely be lower because they would be supported by the expected superior credit rating of the

Multi-State Power Authority. In addition, the Multi-State Power Authority's tax-exempt bonding capability could potentially be used to prepay for a portion of the offshore wind energy purchases.

The allocation of the economic development benefits between the states would be as determined by the governing board of the Multi-state Power Authority. The Multi-State Power Authority would allocate the wind generation in a manner consistent with enabling legislation, presumably such that the economic benefits are optimized and equitably apportioned between the participating states.

It would be expected that the legislation would require the electric utilities (IOUs and publicly owned utilities) in participating states, either directly or through regulatory order, to collect the allocated offshore wind costs from all retail ratepayers on behalf of the Multi-State Power Authority.

Although establishing the Multi-State Power Authority would be a lengthy and challenging process, its single regional focus and statutory capabilities should streamline the process for completing the offshore wind project.

A Multi-State Power Authority could accelerate the formation of a regional offshore wind industry cluster.

In addition, the Multi-State Power Authority's capabilities should result in a reduction in the transaction costs associated with administration and procurement as compared to separate entities in the participating states individually performing the same functions.

Moreover, this process will produce economies of scale benefits that will avoid uncoordinated procurements, which would result in offshore wind projects experiencing fits and starts that are inefficient from a manufacturer's perspective and tend to drive up offshore wind costs. A Multi-State Power Authority overseeing the development of a large offshore wind project may have leverage over a developer's selection of suppliers. In addition, the Multi-State Power Authority may have the ability to accelerate the formation of a regional offshore wind industry cluster by staging its power procurement in a manner that sends the appropriate signals to the wind manufacturing industry.

Regional Process for Multi-State Collaboration

With the likely demise of Cape Wind, the Northeast is back to square one to create a viable set of offshore wind projects, a robust industry, and a way to reduce climate impacts with larger-scale, no-carbon technology like offshore wind. Recognizing those challenges is the first step to some semblance of recovering a policy direction for this resource.

The U.S. remains decades behind Europe, which has instituted policies to create hundreds of projects, tens of thousands of jobs and a scalable, no-carbon technology platform.

The way the region is going, we might never develop an offshore wind industry. That would be unfortunate but it is not inevitable. Failure would be the result of policy choices we make or fail to make in the next few years.

It is important for the public to know that these policy choices may mean the U.S. will not pursue one of the largest emerging renewable energy resources in the East with a vast potential.

States should begin a serious review of whether to engage in a multi-state collaboration on offshore wind policy.

To succeed, offshore wind development must be a multi-state policy effort. Single-state solutions are likely doomed to fail. If the goal is to build a robust pipeline of projects at scale, which can begin to better meet renewable obligations and put the region on a path to no-carbon stabilization, states must act together.

It is, of course, easier for us to recommend that states work together to develop the offshore wind market than for states to implement that advice.

We recommend that states begin a serious review of whether to engage in a multi-state collaboration on offshore wind policy development. If they do not, we fear there will be a long period—perhaps a decade or more—when this technology will stall and fail to reach its potential. That would be bad news for the environment, the economy, and the climate of the region.

The ultimate implementation of a multi-state offshore wind development mechanism, be it a Multi-State Consortium, a Multi-State Bargaining Agent Arrangement or some other mechanism, will be a time-consuming endeavor.

Ideally, one state in a region would initiate the effort and work with interested neighboring states to implement the process. As discussed above, in some instances, legislation may be required to ensure that the participating state agencies have the required authority to commit their states to the project.

Since this is a relatively new concept, it would be expected that achieving general agreement among interested states in a region would require at least a year to accomplish. Any required state legislation, assuming that it is not controversial, potentially could be in place by the end of the second year.

Since these mechanisms could ultimately require the establishment of new state agencies, or an expansion of the authority of existing agencies, additional agency staffing (and budgeting) may be required, adding to the implementation period. As such, establishing and staffing these agencies could be expected to take a year or longer.

A very rough estimate of the timeline from the first state initiating the multi-state offshore wind concept to the issuance of an RFP for a developer for the regional project would be approximately four to six years (assuming that site and wind resource studies have been completed).

Such a timeframe is not unusual in major energy projects. If the region truly remains interested in this enormous, no-carbon energy source, such a process should be welcomed as a way to show it is serious about the challenge of climate change and benefits of economic development from no-carbon technologies.

We do not ask the states to commit now to any single policy option proposed in this paper. But they should commit to a serious process, a committed conversation, to study and consider these policy options and how they could be integrated into a regional effort.

States have a lot to learn from each other. They also have a lot to learn from other countries that have had more success with offshore wind development. By working together, states potentially have more to gain than to lose.

States should commit to a process to study and consider these policy options and how they could be integrated into a regional effort.

Proposed Activities for Consideration

The states in the region—Maine, Massachusetts, New Hampshire, Connecticut, New Jersey, New York, and Rhode Island—should initiate an offshore wind policy group to do the following:

- Establish an Offshore Wind Policy Group of high-level officials with authority to consider the policy recommendations in this report and other recommendations states may have on multi-state collaboration.
- The Group should engage in a mediated process through existing or other forums, such as the Northeast Wind Resource Center, so that committed staff is engaged to support the policy group.
- The Group should develop a work plan for consideration of policy measures through analysis and review.
- The Group should develop a joint budget for the process.
- The Group should engage outsider analytical support, if needed, to vet the technical and policy recommendations and conduct needed research and analysis.
- The Group should commit to a RGGI-like effort with the goal of creating a policy platform and related institutional support mechanisms.

Timeline

The collaborative process recommended here should be matched with a clearly defined timeline and set of interim metrics for success or failure. We propose an 18-month process for deliberation.

Having a clear timeline would avoid an open-ended process that fails to achieve the desired outcomes. Here is one possible timeline:

May-September 2015—Create Working Group and agenda for process

September-December 2015—Create detailed work plan, analytical support needs and budgets to support process

January–April 2016—Engage in intensive discussions about policy options

May 2016—Decide whether to continue or discontinue Group

September 2016—If continued, release detailed policy recommendations for next step multi-state actions.

Conclusion

After the troubling conclusion of the Cape Wind project and the uncertainty about future offshore wind projects, energy policy makers who care about the industry are at a crossroads.

The current policy direction is not working to attract developers to the U.S. There is now little to show for a decade of policy experimentation to create large-scale, offshore wind projects and markets. The industry's fate in limbo.

At the same time, there is no clear new direction that has yet emerged to capture this attractive renewable resource. Doing more of the same—the single-state approach to create market demand—obviously will not work.

The only feasible policy goal is to achieve scale through coordinated, multi-state policies.

It is clear that such an approach would be difficult and complicated. However, the positive news is that states in the Northeast probably have the longest history of working together on complex energy and environmental issues.

It is time for the states to come together once again to explore whether they want to do what's needed to create an offshore wind industry. A great deal of work is required to analyze whether the recommendations offered here, and others, would produce the desired results. But we will not know unless the states agree to come together and find out.

Without a commitment to explore new multi-state policies, the future of offshore wind in the region will remain up in the air.

Without a commitment to explore new multi-state policies, the future of offshore wind will remain up in the air.

Endnotes

[1] European efforts depend on more integrated approach that combines multiple levels of government working together on policy, finance and economic development. http://www.ey.com/Publication/vwLUAssets/Renewable_Energy_Country_Attractiveness_Index_42_-_September_2014/$FILE/EY-Renewable-Energy-Country-Attractiveness-Index-42-September-2014.pdf

[2] There is an argument to be made that the era of building any new large-scale energy project is over, that people only want small-scale distributed generation. If that is so, there might well be some major problems in reaching climate stabilization as large-scale no carbon technologies will be needed to displace fossil-fuel generation in the next fifty years. http://archive.cspo.org/projects/eisbu/report.pdf

[3] Catching the Wind http://www.nwf.org/~/media/PDFs/Global-Warming/Reports/Offshore-Wind/NWF-2014_CatchingTheWind-7_15.pdf

[4] The proposed projects are: Cape Wind (MA), Atlantic City Wind Farm (NJ), Block Island (RI), Alpha Ventus Offshore Wind Farm (ME), and Deepwater ONE (MA/RI).

[5] It appears that the developer of the Cape Wind project has failed to make several financial commitments to keep the project alive, and the utility off-takers have taken actions to dissolve their procurement obligations. Presumably, there are ways to revive the project, but none have been seriously disclosed in public. See http://www.bostonglobe.com/metro/2015/01/24/cape-wind-terminates-additional-contracts-casting-more-doubts-project-viability/voEIRKmjXziMT5HAoM41KN/story.html?event=event25

[6] Long Island Power Authority. Request for Proposals for 280 MW of New, On-Island, Renewable Capacity and Energy (October 18, 2013) http://www.lipower.org/proposals/280MW.html

[7] There are several policy mechanisms in place at the state level to encourage offshore wind development.

[8] Increasingly, state development banks and Export Credit Agencies have been playing a significant role in attracting commercial lenders to the offshore wind sector. Germany and the UK have been successful in attracting commercial lenders to take construction risk, following the investment of Kfw and UKGIB in offshore wind projects. http://www.ewea.org/fileadmin/files/library/publications/reports/Financing_Offshore_Wind_Farms.pdf

[9] The irony here is striking. In December 2013, the New England Governors released their proposal to collectively support the importation of Canadian hydropower and investment in new natural gas infrastructure. In August of 2014, these plans were put on hold after Massachusetts Governor Deval Patrick sought a delay to analyze other regional energy scenarios. http://www.governor.ct.gov/malloy/lib/malloy/2013.12.05_new_england_governors_statement-energy.pdf and http://www.nescoe.com/uploads/ScheduleExtensionStatement_1Aug2014.pdf So the state agencies know how to propose multi-state cooperative action on Hydro-Quebec and natural gas, but not yet on offshore wind. The template is there. What is missing is the political commitment to this much cleaner and productive resource.

[10] The UK is the biggest market for offshore wind, largely due to collaboration between the UK Trade and Investment (UKTI), the UK Green Investment Bank, the Crown Estate, Renewable UK, and the Offshore Wind Program Board and the recent electricity market reform, which provides support mechanism stability. The Ernst & Young's Country Attractiveness Index for Offshore Wind, which ranks 40 countries, shows the top international rankings for global offshore wind investment and deployment opportunities. http://www.ey.com/UK/en/Industries/Cleantech/Renewable-Energy-Country-Attractiveness-Index—Index-highlights A recent UKTI report finds that the greatest offshore wind trade opportunities for the UK are China, Japan, and the U.S. The recent failure to meaningfully extend the ITC may have lowered the U.S.' attractiveness.

[11] Peak load coincidence is an important phenomenon when periods of high electricity demand (peak loads) and strong offshore winds coincide. https://www.awstruepower.com/assets/OffshoreLoadCoincidence-Bailey-AWST-Windpower2013.pdf and http://web.stanford.edu/group/efmh/jacobson/Articles/I/Offshore/12DvorakEastCoastWindEn.pdf

[12] NREL study reports that wind energy can make the grid stronger by providing active power control, supporting system frequency response, and improving reliability. http://www.nrel.gov/docs/fy14osti/60574.pdf

[13] Testimony of Sue Tierney, in Cape Wind Project before MADPU, Docket No. D.P.U. 10-54, at p. 65 (June, 2010). This testimony is the basis for many of the benefits points made in this section of the paper.

[14] Peak load coincidence is an important phenomenon when periods of high electricity demand (peak loads) and strong offshore winds coincide. https://www.awstruepower.com/assets/OffshoreLoadCoincidence-Bailey-AWST-Windpower2013.pdf and http://web.stanford.edu/group/efmh/jacobson/Articles/I/Offshore/12DvorakEastCoastWindEn.pdf

[15] Natural gas infrastructure limitations have caused winter price spikes in the Northeast and Mid-Atlantic regions. offshore wind can stabilize prices by meeting the regions' peaking needs. https://www.awstruepower.com/assets/Offshore-Wind-Mitigation-of-Natural-Gas-Based-Market-Price-Spikes-During-Extreme-Cold-Weather-Conditions_Wilson_Oct2014.pdf

[16] Ibid.

[17] A 2014 report prepared for the U.S. Department of Energy estimates that current employment levels could be between 550-4,600 FTEs; employment levels are likely to double or triple once projects begin construction. Offshore Wind Market Economic Analysis http://energy.gov/sites/prod/files/2014/09/f18/2014%20Navigant%20Offshore%20Wind%20Market%20%26%20Economic%20Analysis.pdf

[18] See note 13, testimony of Sue Tierney.

[19] Such organizations include the Atlantic Offshore Wind Energy Consortium, Clean Energy States Alliance, Northeast Regional Ocean Council and Mid-Atlantic Regional Council on the Ocean.

[20] The Northeast already is engaged in discussion on collaboratively procuring energy. The region's Governors have issued various statements in the past that they want to work together on various regional energy infrastructure issues. However, the initiatives to date have focused principally on Hydro-Quebec imports and expansion of natural gas infrastructure. They have not yet focused on regional efforts to expand the offshore wind industry, an indigenous, large-scale, no carbon technology available to the region. http://www.nepool.com/uploads/GEII_20131205_Gov_Statement.pdf

[21] A DOE-funded study selected six ports in the U.S. for further analysis to determine the ports' capabilities to serve the offshore wind industry. The study found that all six evaluated ports are well suited to host O&M activities. However, significant investment would be needed to support jack-up quay-side vessels. http://www1.eere.energy.gov/wind/pdfs/wind_offshore_port_readiness.pdf

[22] European Wind Energy Association. The European Offshore Wind Industry—Key Trends and Statistics 2013. January 2013. http://www.ewea.org/fileadmin/files/library/publications/statistics/European_offshore_statistics_2013.pdf

[23] "Japan Adds 25 GW More to its Wind Energy 2050 Target". Offshorewind.biz. June 2, 2014. http://www.offshorewind.biz/2014/06/02/japan-adds-25-gw-more-to-its-wind-energy-2050-target/

[24] Virginia Coastal Energy Research Consortium, (2010). "Virginia Offshore Wind Studies, July 2007 to March 2010," Final Report. http://www.vcerc.org/VCERC_Final_Report_Offshore_Wind_Studies_Full_Report_new.pdf

[25] Information on the UK's offshore transmission regime is available here: http://bit.ly/1yOug3h

[26] The UK Green Investment bank was set up in 2012 and has already played a significant role in helping attract institutional investors to the offshore wind market. The GIB made its first investment in offshore wind in late 2012 in the Walney farm with a term loan of around €54.7m. Now, the GIB is committed to strengthening the sector with investments that allow developers to recycle capital into new projects, while at the same time attracting more investors to the sector. It has invested over £860m in six projects in the construction phase. http://www.greeninvestmentbank.com/investment-sectors/offshore-wind/

[27] The Maine Ocean and Wind Industry Initiative has compiled a supply chain database and conducted an analysis of the existing manufacturing and professional services in the state. The study found that a long time seafaring heritage in Maine, in addition to the number of industries with a record of natural resource extraction, set the foundation for a capable supply chain. Large military and commercial ship builders and experienced maritime contractors companies align with fabricators that have already proven their ingenuity in onshore wind and tidal energy development are complimented by the rich resource of firms experienced in permitting, engineering and environmental services. There are a number of companies in Maine that have already had experience in offshore wind project planning, budgeting, engineering and undersea transmission issues.

Clean Energy Group

Clean Energy Group (CEG) is a national, nonprofit organization that promotes effective clean energy policies, develops low-carbon technology innovation strategies, and works on new financial tools to advance clean energy markets. CEG works at the state, national, and international levels with stakeholders from government, the private sector, and nonprofit organizations. CEG promotes clean energy technologies in several different market segments, including resilient power, energy storage, solar, and offshore wind. Above all, CEG also works to create comprehensive policy and finance strategies to scale up clean energy technologies through smart market mechanisms, commercialization pathways, and financial engineering. CEG created and now manages a sister organization, the Clean Energy States Alliance, a national nonprofit coalition of public agencies and organizations working together to advance clean energy through public funding initiatives.

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