Subject: NE Wind transmission comments
Date: Wednesday, April 8, 2020 at 12:48:13 PM Eastern Daylight Time
From: Roy Morrison
To: Swain, Marian (ENE)

To encourage both competition and renewable development, I strongly support separately bidding future off shore wind transmission and generation to encourage broader future transmission integration and new community ownership and finance forms for renewables.

It is crucial to considered transmission planning as part of ongoing futute projects that will be integrated, as needed, into a complete renewable transmission network on land and at sea.

Further, both wind generation and transmission may, in the futute, be owned by cooperatives, groups, or association of energy consumers, for example, by municipal aggregations, cooperatives, and by public and private microgrids.

It's important to separate and appropriately cost both transmission and generation that will help encourage broad participation of new forms of community renewable energy development and ownership. For example, the use of municipal revenue bond funding could facilitate the growth of broad energy consumer equity including that of low income people as a part of city or state wide or county wide association or coop ownership and finance for transmission and generation.

It is a mistake to foreclose future options for renewable energy development,ownership and finance that can both acceletate the pace of renewable development and broaden the equity benefits to energy consumers become energy owners.

Roy Morrison
Managing Partner R&R Renewables
www.RenewableEnergyPartners.com

Sent from Yahoo Mail on Android

Subject: Off shore wind transmission comment
Date: Thursday, April 9, 2020 at 5:50:29 PM Eastern Daylight Time
From: Steve Grady
To: Swain, Marian (ENE)

April 9, 2020
Offshore Wind Transmission Comment

Marian Swain
Mass DOER
100 Cambridge St. Suite 1020
Boston, MA 02114

Dear Energy Policy Analyst
Everybody wants a clean environment. Coal and oil expel huge amounts of pollutants into the atmosphere when burnt. But your wind mills & solar arrays are not as clean as you proport.
1. Rare earth metals are an essential material, without which solar and wind generation is impossible. Currently China controls over 95% of all rare earth mining and processing. If the DOER is ever successful in displacing natural gas generation with solar and wind generation then our entire electrical grid infrastructure will be dependent on China's attitude toward the US. This Covid-19 virus is interrupting the delivery of everything Chinese made. Electricity must be US sourced.
2. Currently grid level storage is a fantasy. Solar and wind generation is intermittent, variable, non-dispatchable, inflexible and erratic. An automobile has a generator, BATTERY and a motor. A water system has a pump, PRESSURE TANK and faucet. Your renewable generators use the GRID as their battery. You should be spending our money on solving that problem. It is not wise to continue forcing the installation of these "renewable" generators unto the grid. Lithium is also controlled by China.
3. You are using our money to install these wind generators off shore, but who is paying for the transmission lines. That surprise will be dumped on the ratepayers eventually. DG stands for distributed generation, meaning if the demand and generation are close together there is less need to build transmission lines. No one lives in the ocean. These wind mills will require substantial transmission infrastructure investment.
4. Harvard University recently completed a study documenting that over 77% of all solar generating units were installed on previously productive farm land or forest habitat. The DOER is actually destroying the environment not saving it.
5. Solar generators have a documented "capacity factor" of 13.35%. Translation: Natural Gas provides 86.65% of all generation! You advertise solar & wind but you build natural gas.
5. Renewable generation should be constrained to reducing demand not supplying the grid.

Back in 1997 Massachusetts adopted it's original RPS. This law excluded Coal, Oil, Gas & Nuclear technological improvements from being considered "renewable or clean". Natural Gas Combined Cycle technology was developed after 1997. It is impossible to dump your unreliable "renewable" energy onto the grid without the stabilizing ability of natural gas generators.

In 1997 Nuclear power plants were first generation. Since 2010 there has been a concerted effort to develop and deploy Gen-4 Advanced Nuclear designs. Nuclear has a better safety record than solar or wind, yet public perception is just the opposite. These new designs will consume the waste from existing power plants. Liquid fuel burns substantially cleaner that solid fuel. They can consume the bomb grade plutonium instead of producing it.

I don't expect the DOER to promote Advanced Nuclear designs, but it is wrong to black ball Advanced Nuclear and lump it with Coal & Oil. Advanced Nuclear should be considered "renewable" when it burns up existing nuclear

waste.

Watch these videos if you have an open mind.

Copenhagen Atomics - Thomas Jam Pedersen @ TEAC10
https://youtu.be/-J70XaXbmws

No. 31 Richard Martin • Thorium Superfuel @ Googletalks
https://youtu.be/nQLDGZ81Ze0

I am not against solar and wind generation, it has a place in the future. But currently the DOER is exaggerating it's benefits and ignoring it's shortcomings.

Thanks,

Steve Grady
256 McEvoy Rd
New Braintree, MA 01531
email: ssgrady4@gmail.com
Cell: 508-450-4654

The Commonwealth of Massachusetts
HOUSE OF REPRESENTATIVES
STATE HOUSE, BOSTON 02133-1054

REP. PATRICIA A. HADDAD
5TH BRISTOL DISTRICT

TOWN OFFICE BUILDING
140 WOOD STREET
SOMERSET, MA 02726
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Speaker Pro Tempore

ROOM 370, STATE HOUSE
TEL. (617) 722-2600
FAX (617) 722-2313

Committees:
Rules & Ethics

April 17, 2020

Commissioner Patrick Woodcock
Department of Energy Resources
100 Cambridge Street Suite 1020
Boston, MA 02114

Dear Commissioner Woodcock,

As a legislative proponent of off shore wind energy and its potential as the Commonwealth's newest industry, I feel that now more than ever it offers us the opportunity to rebuild and strengthen our Massachusetts economy. By expanding the scale of off shore wind generation, we can both utilize it as an economic development tool and continue our work to achieve our environmental goals.

In last year's report you noted the benefits of the state procuring an additional 1600 mw of off shore wind and transmission is an important consideration. Separately procured transmission infrastructure which would establish a multi-user energy grid can provide the conduit for off shore wind growth and development. As you continue your assessments, it is my hope that DOER includes wind energy transmission as a separate and specific item within legislation.

When the 2016 energy legislation was crafted it did not include transmission. The 2018 energy legislation, however, did include it and would serve multiple wind farms off shore. In doing so, it will allow for transmission developers to compete for the best and most cost-effective solutions.

We have been successful with the two recent off shore wind bids with generator lead lines. I feel the next procurement should include crucial shared transmission opportunities.

Sincerely yours,

Patricia A. Haddad

PATRICIA A. HADDAD,
Speaker Pro Tempore

VINEYARD WIND

April 21, 2020

BY EMAIL TO Marian.Swain@mass.gov

Massachusetts Department of Energy Resources (DOER)
100 Cambridge Street
Suite 1020
Boston, MA 02114

RE: Second Request for Stakeholder Comment on Massachusetts OSW Transmission

To DOER:

Thank you for the opportunity to provide comments in response to DOER's Second Request for Comment on Massachusetts Offshore Wind Transmission issued on March 19, 2020, pursuant to *An Act to Advance Clean Energy,* Chapter 227 of the Acts of 2018. The comments included herein are provided on behalf of Vineyard Wind LLC ("Vineyard Wind") and reflect the substantial experience the company has gained developing the nation's first utility-scale offshore wind project for the Commonwealth of Massachusetts, as well as decades of collective experience across the Vineyard Wind team establishing and advancing the offshore wind industry in Europe, Asia, and the US.

Thank you for taking our response into consideration. As always, we stand ready to provide any further assistance you may require.

Respectfully submitted,

Vineyard Wind LLC

By: Lars T. Pedersen
Title: Chief Executive Officer

Summary of Vineyard Wind's First Set of Comments

As detailed in Vineyard Wind's written comments submitted on February 18, 2020 in response to DOER's first Request for Stakeholder Comment, Vineyard Wind believes that in deciding whether or not, and potentially how to procure offshore wind (OSW) generation and transmission independently, DOER should strongly consider the lessons learned from Europe's experience of installing 20+ GW of offshore wind as well as the US experience in successfully and competitively procuring over 6 GW of OSW to date, including:

- There is already robust competition between OSW developers in the US, which has resulted in significantly lower than expected costs for OSW with no risk exposure for ratepayers. In addition, most US offshore wind developers have either already partnered with companies that have significant local terrestrial and/or marine transmission development experience, and nothing stands in the way of independent transmission developers from offering competitive proposals to one or more OSW developers under the current procurement approach.

- The potential incremental benefits of independent OSW transmission, including reduced environmental impacts, are not guaranteed, and could likely be achieved through incremental changes to the existing generator lead line procurement approach, such as larger procurement volumes and prescription of technological requirements**.**

- There is not a single structure for procuring offshore wind implemented in the world today that consists of an independent transmission developer developing, permitting, financing, constructing, owning, and operating the transmission associated with an OSW project. It is either within the scope of the OSW generation developer or that of the transmission system operator or utility. Adding an additional stakeholder to the project delivery will delay offshore wind build-out and create unnecessary interfaces that are difficult to create a good contracting structure for.

- Separating OSW transmission from generation will eliminate the cost-effective and risk-mitigating synergies of integrated OSW project development, transfer existing risk from developers to ratepayers, while introducing significant additional risks and challenges, including stranded asset risk, project-on-project risk, financing risk, regulatory risk, and permitting risk, all of which could increase costs and risks to ratepayers.

- Benefits from independent transmission would only materialize if large transmission structures are developed (+2GW) with the aim to support multiple projects. The technology (525kV high-voltage direct current [HVDC] transmission) for such structures is not yet available in a form that would reduce the environmental footprint compared to large radial projects (800-1200MW) and waiting for such technology would effectively push project the commercial operation dates of new offshore projects to 2028-2030.

- Procuring transmission for offshore wind independently does not avoid or mitigate the need to address onshore transmission and interconnection limitations, nor does independent offshore transmission improve the feasibility of offshore wind in and of itself. If not done systematically and pragmatically to address the long-term challenges of building out and integrating offshore wind, the procurement of independent transmission could not only delay new offshore wind projects until the end of the decade, it could also stymie future efforts to achieve the Commonwealth's and the region's long-term policy goals in a timely and cost-effective manner.
- Vineyard Wind believes that the necessary conditions to reap the benefits of an independent OSW transmission system are not present unless the procurement volume is significantly greater, onshore grid development and planning are integrated, and such coordination is done at a regional level to ensure that regulatory regimes are consistent across the markets and regulatory agencies and stakeholders. Vineyard Wind would be supportive of a regional planning effort to integrate additional multi-gigawatt volumes of offshore wind through a networked offshore transmission system.

1. **Is there a structure or structures that would allow for a competitive and successful independent offshore wind transmission solicitation given the authority provided through Section 21 of the *Act to Advance Clean Energy*? Please provide comment on the following scenarios and/or provide additional scenarios:**

    a. **No separate independent transmission solicitation, but a solicitation for 1600 MW of offshore wind generation with an extended time to develop proposals, including the pairing of multiple projects and/or independent offshore transmission projects.**

    Unless clear prescriptions are provided in the solicitation, this procurement structure would introduce significant complexity and could lead to less competition among developers, as one or more of the four leaseholders off the coast of Massachusetts would have to coordinate their proposals. This structure could also provide unfair competitive advantage to certain developers that could accommodate a 1,600 MW offshore wind project within their lease area, while others may be forced to coordinate in order to bid. Much additional clarity is required on how bids would be evaluated under such a solicitation, including whether projects that integrate independent or shared transmission would be evaluated more favorably. In addition, the transmission technology necessary to accommodate 1,600 MW on a single system is not currently available, and pursuant to ISO New England's reliability and operating reserve rules, a 1,600 MW system would not be allowed to interconnect to a single point (in ISO New England, the current maximum loss of source for a Normal Design Contingency is

1,200 MW). Both of these limitations undermine the ability of the Commonwealth to realize incremental benefits from procuring 1,600 MW from a single system or develop relative to the current procurement approach; furthermore, separately procuring offshore wind transmission does not avoid or mitigate these limitations. If the Commonwealth proceeds with such a solicitation, it should ask for proposals of up to the lower of a) the maximum loss of source for a Normal Design Contingency (currently 1,200 MW, but could hypothetically be changed), and b) the maximum transmission capacity of a symmetrical monopole HVDC system (systems of up to 1400 MW are technically viable and commercially available).

b. A solicitation for 1600 MW of transmission capacity that requests project proposals that define their own technical specifications for 1600 MW of offshore wind energy generation. Subsequent offshore wind generation solicitation(s) requires bidders to submit two bids: one with a Generator Lead Line (GLL), and one that interconnects to the selected transmission projects). All bids are evaluated together.

Such a solicitation structure would introduce substantial complexity without yielding corresponding benefits. The Commonwealth's experience from the first Section 83C solicitation, where developers were required to submit expandable transmission bids, demonstrates the challenge of fairly and adequately evaluating across varying bid types, as such an evaluation is heavily dependent on assumptions that are equally complex and challenging to develop. In addition, without understanding the design specifications, facility location, and interconnection point (due to capacity market implications) of the proposed transmission projects, offshore wind developers would not be able to reasonably develop a bid with firm pricing, a guaranteed commercial operation date, and other firm commitments. Not a single third party transmission developer currently holds the necessary rights to propose an offshore wind transmission project with firm details on any of the above, with the exception of an interconnection point. In addition, without understanding the risk and cost allocation with respect to network upgrades, delay and availability liabilities, operation and maintenance scope responsibility, interface to the offshore transmission system, offshore wind developers would face significant uncertainty that would either undermine their ability to offer a firm price, or necessitate the introduction of significant risk premiums that would increase costs to consumers. Without addressing these key issues, transmission and generation projects may not be financeable, and some generation and transmission developers may find the risk too high, potentially reducing competition.

For Vineyard Wind to provide additional comments on such a solicitation structure, much more information is needed on bidding requirements and bid evaluation; for

example, would the GLL bids be for the full 1,600 MW, for increments thereof, or both? Would the evaluation continue to be primarily driven by price, or would the evaluation be changed significantly to favor proposals that demonstrate reduced environmental impacts, or other benefits? Vineyard Wind does not see viable path forward for a such a structure.

c. A solicitation for offshore wind generation that requires bidders to bid the pricing of transmission and generation separately. A project is selected, and then a subsequent solicitation is issued that allows for independent transmission developers to compete to provide the selected project with transmission service at a lower price.

In addition to the same challenges and risks introduced by the solicitation structure above, requiring separate pricing for generation and transmission will not yield the most competitive offer from developers, as developers would have to price in the uncertainty and risk of a third-party transmission system. Bid pricing for generation would be contingent upon selection of transmission, and the generation bid would have to be informed by potential transmission system design/specifications, and vice versa. Any solicitation structure that included independent transmission proposals will likely lead to procurement delays as transmission developers will have, for the most part, not yet developed transmission and interconnection strategies (interconnection applications and studies, offshore and onshore routing maturation, securing of property rights, permitting, front end engineering design studies, etc.) that offshore wind developers have been developing and maturing for years. Furthermore, as with other solicitation structures that include independent offshore wind transmission procurement, this proposed solicitation structure does not avoid, mitigate, or otherwise address all of the risks, challenges, and limitations of independent offshore wind transmission procurement, as described in Vineyard Wind's first set of comments submitted on February 18, 2020.

2. Under DOER's authority granted by the *Act to Advance Clean Energy* how can the benefits of independent offshore transmission be best captured through a solicitation?

a. **Is there a minimum capacity required to capture benefits?**

Vineyard Wind does not believe that procuring independent transmission to achieve the Commonwealth's remaining offshore wind procurement target of 1,600 MW will generate incremental benefits relative to the GLL approach. Independent transmission does not in and of itself yield benefits; effective procurement design can. If potential incremental benefits, such as fewer export cables, are to be realized relative to the

procurement of 800 MW GLL projects, the procurement volume should correspond with the lower of a) the maximum loss of source for a Normal Design Contingency, and b) the maximum transmission capacity of a monopole HVDC system, currently at 1,200 MW. If a larger system could be accommodated by ISO New England into a single point, commercially available (320kV symmetrical monopole HVDC) technology would limit the capacity of the HVDC transmission system to 1300 or 1400 MW. Waiting for larger systems to be commercially available even for GLL projects could push project CODs into the 2028-2030, and likely later for projects utilizing independent transmission. Even if the Commonwealth waited for technological advances that could accommodate the full 1,600 MW on a single system from a single or multiple projects, it is not certain that such a system would yield reduced costs relative to two 800 MW GLL projects. Lastly, any incremental benefits to be captured from a larger project or technology selection are more likely to be realized by an integrated offshore wind project, where additional costs and risks are not introduced.

b. **Are there benefits that would be stranded without doing a solicitation for 1600 MW of independent offshore wind transmission?**

No, there would not be benefits stranded without doing a solicitation for 1,600 MW of independent offshore wind transmission. A procurement of 1,600 MW of independent offshore wind transmission would not provide incremental benefits over two 800 MW solicitations with GLL bids. Furthermore, other approaches, such as requiring developers to submit 1,200 MW bids with HVDC monopole transmission solutions would provide incremental benefits over any solicitation for 1,600 MW or less of independent offshore wind transmission. The independence or separation of offshore wind transmission does not in and of itself yield incremental benefits to ratepayers, the environment, or impacted stakeholders.

3. Can these benefits be evaluated and included in a total cost and benefits analysis?

a. **What information would need to be provided in a Request for Proposals (RFP) and/or what information should an RFP request to better define the benefits and costs of the independent offshore wind transmission proposals?**

Please see Vineyard Wind's response to Question 12 in its first set of comments submitted on February 18, 2020. Ultimately, any independent transmission proposal should have to demonstrate it has or can with a high level of certainty acquire the necessary rights and permits for its transmission system, demonstrate the experience and financial capability to develop, finance, construct, and operate the transmission system more cost-effectively and efficiently than an OSW developer could under GLL

approach, and demonstrate it is able to more effectively address stakeholder concerns, especially those of environmental and fisheries stakeholders. In addition, the transmission proposal should demonstrate it reduces costs, provides incremental environmental benefits, and more effectively utilizes and integrate into the onshore transmission system, while being able to do so under a contractual framework that provides the same certainty to ratepayers and developers that a generator lead line solicitation would. Transmission developers should also be required to submit a plan for integrating generation projects, including proposed risk mitigation measures, cost allocation on network upgrades, as well as plans for delay damages, performance guarantees, operation and maintenance responsibility and liability, and transmission owner of last resort.

Responsible Offshore Development Alliance

April 20, 2020

Patrick Woodcock, Commissioner
Massachusetts Department of Energy Resources
100 Cambridge St., Suite 1020
Boston, MA 02114

Re: Second Request for Comments on Massachusetts Offshore Wind Transmission

Dear Mr. Woodcock:

The Responsible Offshore Development Alliance (RODA) is a membership-based coalition of fishery-dependent companies and associations committed to improving the compatibility of new offshore development with their businesses. Our approximately 170 members are comprised of major fishing community groups, individual vessels, and shoreside dealers operating in federal and state waters of the New England, Mid-Atlantic, and Pacific coasts. We represent a substantial number of members throughout Massachusetts including in Gloucester, South Shore, South Coast, and the Cape. On behalf of our members we submit the following comments on Massachusetts Offshore Wind Transmission: Second Request for Stakeholder Comment.

RODA submitted the attached comments regarding the Massachusetts Department of Energy Resources (DOER) Request for Comment on Massachusetts Offshore Wind Transmission as part of the first solicitation for comment. We reiterate those previous positions; any solicitation should lead to less, better-sited structure in the water and should require fishing industry participation in siting and planning stages in order to maintain the coexistence of traditional, historic commercial fishing as new renewable energy projects are sited on large areas of fishing grounds. We also recommended MA CEC study cable impacts and burial depths prior to project approval.

To supplement the points raised in the earlier letter, RODA submits the following additional comments.

MA DOER should require a coordinated transmission system within the Gulf of Maine.

RODA specifically supports the use of a coordinated transmission system within the Gulf of Maine. The Gulf of Maine is a high traffic area and is essential for multiple fisheries. If offshore wind energy projects move forward in the Gulf of Maine, its deep waters will require floating turbines anchored to the seafloor, resulting in many lines in the water preventing fisheries operations. It is therefore extremely important that the use of additional export transmission cables be minimized so as to avoid further displacement of fishing activity in the areas not impacted by turbines. In order to attain the full benefits of regionally coordinated transmission, the planning process must begin well in advance of offshore wind energy project siting and leasing, and that opportunity still exists in the Gulf of Maine.

MA DOER should evaluate each project independently to meet the needs of affected parties.

RODA believes that there is no "one-size fits all" solution for each wind energy area. A coordinated transmission system may not be appropriate for wind energy projects already under development, which already include their own transmission cables, if such projects are fully permitted before regional transmission is implemented. An integrated transmission system built after these projects could result in duplicative cables and an increased safety risk for fishing vessels operating in the area. Regional systems should have been planned and designed before the massive proliferation of projects now in the pipeline; however, absent a delay in project approvals, attempting to "backfill" such a system once several facilities have installed their own cables will likely be detrimental to the goal of coexistence.

* * * * *

RODA and its member organizations thank you for your consideration of these comments, and look forward to working with you on offshore energy transmission issues.

Sincerely,

Fiona Hogan, Research Director

Annie Hawkins, Executive Director

Lane Johnston, Programs Manager

Responsible Offshore Development Alliance

February 18, 2020

Patrick Woodcock, Commissioner
Massachusetts Department of Energy Resources
100 Cambridge St., Suite 1020
Boston, MA 02114

Re: Request for Comment on Massachusetts Offshore Wind Transmission

Dear Mr. Woodcock:

The Responsible Offshore Development Alliance (RODA) submits the following comments regarding the Massachusetts Department of Energy Resources (DOER) Request for Comment on Massachusetts Offshore Wind Transmission.

RODA is a membership-based coalition of fishery-dependent companies and associations committed to improving the compatibility of new offshore development with their businesses. Our approximately 170 members are comprised of major fishing community groups, individual vessels, and shoreside dealers operating in federal and state waters of the New England, Mid-Atlantic, and Pacific coasts. We represent a substantial number of members throughout Massachusetts including in Gloucester, South Shore, South Coast, and the Cape. On behalf of our members we submit the following comments on Massachusetts' potential solicitation for independent offshore wind transmission.

I. MA DOER should facilitate solicitations that will lead to less, better-sited structure in the water, however possible.

A separate contingent solicitation for structure installation offshore could result in greatly fewer impacts to fisheries, and must have the primary goal of developing a more efficient (less cable used) and better-sited structure in the water. If such a result will be implemented, MA should issue a separate contingent solicitation for independent transmission projects prior to additional solicitations for offshore wind projects. Offshore structures associated with wind energy areas, including transmission cables, pose a risk to the fishing industry by resulting in lost fishing grounds (due to avoidance of structure), increased risk to safety (obstructions, potential hang-ups on exposed cables), and impacts to living marine resources. It is unclear whether independent transmission would result in less cable required or if the cable locations would be more compatible with fishing activities, i.e. placed in locations where it was easy for fishermen to avoid them, and the solicitation should be structured to make sure these goals are achieved.

It is difficult to offer detailed comments on a plan with so many unknown factors at this time – will wind energy facility leaseholders be required to use the independent transmission array, will any requirements apply only to new leases, what will be the required cable burial depth? Knowing the restrictions, or lack thereof, on independent transmission systems would allow for more fully developed comments on fishing industry safety concerns. Therefore, DOER should directly include

fisheries representatives in its development, and at a minimum RODA requests that it publish a draft solicitation for public comment.

II. Any solicitation should mandate fishing industry participation in siting and planning of independent transmission projects

RODA believes in a cooperative approach when designing any offshore development project. Through its solicitation, DOER should mandate the inclusion of the fishing industry throughout the planning and siting processes of independent transmission projects. This should be done at the regional level with inclusion of industry members that may homeport outside of MA but whose businesses be affected by the solicitation. This is the only way to succeed in developing an independent transmission project that could best coexist with the fishing industry.

True collaboration between the two industries in transmission planning has the opportunity to significantly benefit each. For example, to effectively reduce fisheries impacts, cables must be sited in areas that: (1) maximize the ability for burial to appropriate depths; (2) minimize the need to dump foreign materials such as mattressing into the ocean; and (3) avoid sensitive habitats. Adherence to these guidelines also minimizes risk to cable owners since properly sited structures are less likely to become exposed or lead to gear loss claims. Fishermen can provide critical information to identify suitable areas, and this process should be formalized through the solicitation.

While siting and burial depth are the most critical factors to avoiding and minimizing impacts to fishing, it is not possible to resolve all conflicts. There, the solicitation should require developers to mitigate any unavoidable impacts, and should include evaluation criteria that would only award contracts projects with comprehensive and inclusive fisheries mitigation plans.

III. MA CEC should study cable impacts and burial depths prior to project approval

Cable depth and exposure risk are incredibly concerning to the fishing industry. RODA has consistently stated our concern that the cable depths under consideration for offshore wind energy projects are insufficient to prevent exposure under normal sea conditions. Insufficient research is currently available to inform appropriate substrate-dependent burial depths of transmission cables. Therefore, an appropriate depth for cable burial needs to be studied to minimize potential exposure or interactions with fishing gear.

Our members have heard of repeated exposure of transmission cables in the U.S.[1] and Europe when cables are buried to currently-recommended depths, which highlights the need for proper research and reconsideration on their appropriateness. Cable depth simply must be sufficient to ensure that they will remain buried in dynamic tidal areas in order to ensure minimization of impacts to fishing and the benthic environment. Moreover, it is unclear how cables are inspected to ensure that target burial depths are in fact achieved. Due to the urgency and severity of these concerns, MA agencies should conduct a full, peer-reviewed study on this matter and publish it publicly prior to permitting and installation. If such a study should find that greater burial depths are necessary to prevent cable exposure, those must be required in the approval of any project plans.

[1] https://www.providencejournal.com/news/20200208/block-island-wind-farm-to-go-offline-in-fall-to-rebury-cable?fbclid=IwAR0eNkl0-_DYR6jHNtg8mUsBxXb9JFT0slxERrzC41wmOXKUjf69qza8Tp8

* * * * *

RODA and its member organizations thank you for your consideration of these comments, and look forward to working with you on offshore energy transmission issues.

Sincerely,

Annie Hawkins, Executive Director

Lane Johnston, Programs Manager

Fiona Hogan, Research Director

April 21, 2020

Ms. Marian Swain (Marian.Swain@mass.gov)
Energy Policy Analyst
Massachusetts Department of Energy Resources
100 Cambridge St.
Suite 1020
Boston, MA 02114

RE: ***Massachusetts Offshore Wind Transmission: Second Request for Stakeholder Comment***

Dear Ms. Swain:

We are submitting these additional comments in response to the Second Request for Stakeholder Comment issued by Massachusetts Department of Energy Resources (DOER) on March 19, 2020.

As demonstrated by the first-round comments and discussed during the technical session, there are different views regarding the perceived benefits of independent offshore transmission in the next Massachusetts procurement. Transmission developers advocate for a regulatory mandate, and generation developers raised concerns based on their experience in Europe of scale, schedule and risks. Importantly, DOER was informed of many of the risks inherent in independent offshore wind (OSW) transmission systems. These risks are particularly acute in early stage OSW.

We continue to question the appropriateness of an independent transmission procurement for 1,600 MW in the near term because:

- It lacks the necessary scale. Limited to 1,600 MW, it will not be a true backbone able to facilitate future development and in fact runs the risk of becoming obsolete upon construction.
- It will delay the procurement and construction of OSW generation to the detriment of the Commonwealth.
- It introduces a reallocation of commercial risk and cost – in a manner ultimately adverse to customers.
- It attempts to solve a problem that does not exist.

OSW generation developers have identified more than sufficient points of interconnection for a 1,600 MW solicitation. Implying that generation developers will not efficiently and economically maximize those interconnection points is unfounded and overlooks the larger economics and the competitiveness of leaseholders.

Instead, as demonstrated by the overwhelming number of responses in the first round, the primary issue hindering the future, larger wave of OSW procurement will be onshore transmission system constraints. Subsequent procurements should consider the development of a comprehensive onshore and offshore network that addresses future interconnection challenges.

The following chart summarizes the considerations associated with the structural options for OSW transmission facilities identified during the first-round comments.

- **Radial (GLL)** –generator lead line installed and owned by OSW generators (anticipated to be used by Vineyard Wind and Mayflower Wind).
- **Hybrid Radial (GLL)** – two or more OSW wind generation facilities connecting to an independent OSW transmission facility (a single export cable to shore). If the Commonwealth pursues independent offshore transmission for 1,600 MW, the result could be (or closely resemble) a hybrid radial.
- **OSW Network** – a comprehensive OSW transmission system with multiple onshore interconnections for a large amount of OSW generation.

Factor	Radial	Hybrid Radial (GLL)	OSW Network
Customer Cost	Base Case with cost certainty (generation bears cost and risks including lost revenue, delays & outages)	Likely higher due to transmission developer involvement and stranded asset risk	Potential to be lower IF all risks are mitigated but could be higher and. requires significant upfront investment
Project on Project Risk	None	Yes	Yes
System Reliability	Base Case	Higher risk of generation loss.	Possible enhanced reliability and redundancy
Leveraging Existing Grid	Designed to maximize location economics	Perceived to maximize but 1,200 MW ISO-NE injection limit exists	Significant onshore upgrades required to support offshore grid
Offshore Environment	Base Case	Possibly fewer export cables but additional offshore SS and array/collector cables	Extensive offshore network
Onshore Environment	Base Case	Fewer interconnections possible, but more upgrades onshore would be required	Extensive onshore network and system upgrades
Visual Impact	Base Case	Additional offshore SS	More offshore and onshore facilities
Fisheries/ Navigation	Base Case	Greater impact	Likely most significant impact; high uncertainty
Permitting	Base Case	More extensive and new	Significant and highly uncertain; not supported by

Factor	Radial	Hybrid Radial (GLL)	OSW Network
			current federal processes
Schedule	Certainty and short	Longer (especially if procuring non-standard components that support 1600MW sizes) and impacts generation COD	Long term coordinated planning
Economic Benefits	Base Case	Likely higher costs, as potential efficiencies offset by increased offshore infrastructure and upgrades and loss of developer lead synergies	Potential economic opportunities but could be offset by greater customer costs
Greenhouse Gas	Near term offset	Longer to obtain same benefits	Potential to facilitate realization of long-term OSW potential
Fairness	True competition	Locational bias	Levels playing field (if framework and long-term plans developed collaboratively in a transparent manner & multi-state agreement)
Multi-state	No	No	Possible (requires multi-state to realize potential reliability & stability benefits)

While a comprehensive OSW transmission network has relatively more challenges, it may be a long-term option after the absorption of the current 7,000+ MW of available interconnections being studied by ISO-NE. New England policymakers currently have a goal of less than 6,000 MW of OSW. The GLL approach is the most attractive bridge to that solution. The hybrid radial adds little/no value when measured against the other options.

DOER should consider whether the resources of the Commonwealth (and stakeholders) would be better served by leading the planning for the long-term – rather than jeopardizing the next 1,600 MW round of procurement.

1. Is there a structure or structures that would allow for a competitive and successful independent offshore wind transmission solicitation given the authority provided through Section 21 of the *Act to Advance Clean Energy*[1]? Please provide comment on the following scenarios and/or provide any additional scenario(s):
    a. No separate independent transmission solicitation but a solicitation for 1600 MW of

[1] Full text of An Act to Advance Clean Energy is available at: https://malegislature.gov/Laws/SessionLaws/Acts/2018/Chapter227

	offshore wind energy generation with an extended time to develop proposals, including the pairing of multiple projects and/or independent offshore transmission projects.
b.	A solicitation for 1600 MW of transmission capacity that requests project proposals that define their own technical specifications for 1600 MW of offshore wind energy generation. Subsequent offshore wind generation solicitation(s) requires bidders to submit two bids: one with a Generator Lead Line (GLL), and one that interconnects to the selected transmission project(s). All bids are evaluated together.
c.	A solicitation for offshore wind generation that requires bidders to bid the pricing of transmission and generation separately. A project is selected, and then a subsequent solicitation is issued that allows for independent transmission developers to compete to provide the selected project with transmission service at a lower price.

The limited procurement authority provided through Section 21 of the Act to Advance Clean Energy will unlikely result in an independent OSW transmission configuration that will be successful for Massachusetts or OSW industry in general.

If Massachusetts decides to solicit proposals for independent OSW transmission, DOER also should consider requiring transmission developers participating in that solicitation to conduct an open season consistent with FERC policy in parallel. As reinforced by OSW generation developers in first round comments, nothing prohibits a transmission developer from presenting its solution to a generation developer. Moreover, a generation developer would be incentivized to partner with a transmission provider if the proposal yields an efficient and economic structure that produces a competitive advantage.

Regarding the proposed scenarios:

Scenario (a)
Of the proposed scenarios, this appears to be the best relative alternative. The structure seemingly seeks to protect EDCs/customers by requiring the transmission and generator developers to allocate risks between them. Our organization already has experience in New England (and New York) with a similar type arrangement, therefore extended time is unnecessary. Alternatively, if additional time is provided under the premise that multiple generators will partner with a transmission developer, then such a three-party (or more) negotiation would be unprecedented (and daunting) and likely destined for failure for the many reasons cited in the first round (starting with stranded asset risk). At best, this approach would yield a radial or hybrid radial configuration.

Scenario (b)
This type of solicitation requires the stakeholders to tackle all the risks of independent offshore transmission without any guarantees which would likely result in delays or unsuccessful outcomes. As a result, Massachusetts could fall further behind on greenhouse gas reduction goals (and procurements by other States in the region). Instead, the second RFP could be structured so that the EDCs and/or a creditworthy transmission provider holds the generators harmless for the commercial risks such as transmission curtailments, schedule delays, and more

as described in the first-round comments. This approach also has the potential to shift competitive balances if the design of the offshore transmission facilities advantages certain generators (or eliminates advantages of others). A radial or hybrid radial likely would result in this scenario.

Scenario (c)
While elegant in its simplicity, the decoupling of generation and transmission is not a straightforward proposition. Without detailing the complexities of bidding into that structure, an alternate pricing mechanism and other fundamental PPA modifications (e.g., delivery point) would be required to address the loss of control over, and responsibility for, transmission. As demonstrated in the first-round comments, transmission facilities are not merely an exercise in identifying the least cost option. This scenario essentially would give transmission developers a price to beat (a chance to play), but the economics would need to account for significant risks that must be assumed by the EDCs. This approach would yield some form of radial line from a technical perspective.

In the end, all scenarios allow transmission developers an opportunity to participate, but none advance the purpose of independent offshore transmission, an OSW transmission network, and the scenarios still carry many significant risks for both customers and generation developers such as schedule risk or the possibility that a transmission developer will walk away and abandon a project if the real economics don't match their original bid. And again, none of these scenarios are required or are solving any issues regarding the next round of 1,600 MW. The legislature's limit of 1,600 MW (maximum) capacity for OSW transmission may have at one point seemed sufficient. It is not. To get any of the potential benefits of an independent OSW transmission system, it needs to be built to accommodate significantly more OSW generation capacity.

2. Under DOER's authority granted by the *Act to Advance Clean Energy* how can the benefits of independent offshore transmission be best captured through a solicitation?
   a. Is there a minimum capacity required to capture benefits?
   b. Are there benefits that would be stranded without doing a solicitation for 1600 MW of independent offshore wind transmission?

Benefits resulting from independent offshore transmission will only come to fruition as a result of coordinated long-term planning and creating an offshore transmission system that has scale. Independent offshore transmission for only 1,600 MW is unlikely to produce any short or long-term benefits. Given that ISO-NE has communicated that connecting up to 7,000 MW will not create significant issues, any offshore transmission system should be designed for a value larger than that.

For independent offshore transmission to be successful, any effort needs to be thoughtfully planned at the regional level. A single state should not pursue independent offshore transmission in a vacuum. Any effort needs to be coordinated not only closely with ISO-NE, but also the other states in the region as well as OSW generation developers, the EDCs, and other stakeholders.

Long-term OSW plans of Rhode Island and Connecticut at a minimum need to be incorporated such as procurement levels and a willingness to use a coordinated OSW transmission system. Detailed feedback will also be required from OSW generation developers on locations of offshore substations, interconnection cables, and other technical details. Any effort for a coordinated, large-scale offshore transmission system will need to be closely developed in conjunction with fishermen, environmental groups, and other affected stakeholders.

As discussed at the technical conference, unlike other areas around the world, there currently is not a pressing need to develop an offshore transmission system here in New England. As New England looks to develop more than 7,000 MW in the future the bottlenecks won't likely be offshore, but possibly with the onshore transmission needed to send the power away from the coastlines. Any offshore transmission system will need to have these design considerations solved prior to implementation to be successful.

Not pursuing independent offshore transmission now will not result in any stranded benefits. It is unproven that independent offshore transmission will result in any benefits and if benefits were to materialize, then they would only be a result of coordinated planning and a system that has very large scale. For the next 1,600 MW, offshore generation developers can easily connect to shore in a cost-efficient and environmentally friendly manner.

Given that independent offshore transmission is not currently required and will not produce tangible benefits associated with the next 1,600 MW of OSW procurement, any effort to pursue independent offshore transmission should be pursued only at a scale that can help facilitate future regional OSW procurement goals after the existing POIs are exhausted (approximately 7,000+ MWs).

Additionally, if DOER goes forward with a solicitation for 1,600 MW of OSW transmission capacity, the question remains where this would be built. The location will inevitably advantage some leaseholders while disadvantaging others.

3.	Can these benefits be evaluated and included in a total cost and benefits analysis?	
	a.	What information would need to be provided in a Request for Proposals (RFP) and/or what information should an RFP request to better define the benefits and costs of the independent offshore wind transmission proposals?

It is difficult to calculate any benefits associated with independent offshore transmission versus a radial line (GLL) because there will be many unknowns such as detailed engineering plans relating to the location of assets, interconnection points, and onshore transmission upgrades. The major unknown will be true costs. Unlike a radial (GLL) model where the costs are incorporated into the PPA price and capped, it is unclear how costs would be calculated and paid under an independent offshore transmission paradigm. Costs and benefits will only become murkier with the scale of procurement and the further out in time an evaluation is considering.

From an evaluation standpoint, other than a high level LMP analysis (value of energy at the

ultimate onshore interconnection point), any comparative evaluation of independent OSW transmission projects to a project-specific interconnection through GLLs is inherently flawed since the two structures have different economic, technical and other considerations.

Obviously, there are some macro level considerations regarding the project viability that could be generally relevant on a comparative basis. For example, all bids should be viewed for the maturity of their design and planning (including transmission facilities). If two projects propose the same interconnection location, then the queue position, required system upgrades, etc. should be addressed and appropriately scored in the evaluation process, keeping in mind that it may be necessary (or economic) for OSW generation to bypass an independent OSW transmission system when responding to RFPs issued by other States or for other reasons.

If a RFP for independent offshore transmission were to occur, then the following should be required.

- Detailed information regarding the independent OSW transmission system (including proposed economic and contracting arrangements)
- Operational parameters (including potential limitations/constraints on deliverability, availability commitments and consequences, system benefits and reliability)
- Engineering and technical considerations (including design and progress through the ISO-NE process)
- Operations and maintenance experience and requirements
- Siting and property rights (including details regarding proposed onshore interconnection points)
- Permitting requirements and capabilities
- Construction plan and logistics (including access to required vessels)
- Procurement plan and progress
- Environmental impacts and mitigation plan
- Fisheries impacts and mitigation plan
- Decommissioning plan/experience
- Community outreach plan and support
- Economic benefits (including specific and measurable commitments arising from the independent OSW transmission installation and operation)
- Project schedule (including financial and other consequences of delay)
- Financial capabilities and legal considerations (including FERC strategy) and
- Organizational experience (including previous design and installation of transmission facilities for the OSW industry).

Any independent offshore transmission bid should also consider the following.

1) Exclusivity. Will use of the independent OSW transmission system be limited to exclusively serve Massachusetts EDCs? The existing Massachusetts OSW lease areas are

going to serve multiple States (MA, CT, RI and NY).

2) Technological Advances. When Germany began its experiments with independent transmission, a typical project size was approximately 200 to 300 MW. Today, we live in a supersized OSW world. American projects of 800 to 1,000+ MW are the norm thanks to technological advances that have led to supersized OSW turbines. Independent offshore transmission will need to address how the project will handle future technological advances.
3) Onshore Constraints. As ambitions for OSW increase (8,000+ MW regionally), focus on the onshore challenges will be imperative, which remain the greater issues facing the OSW industry today. It is likely that the future constraint will be transmitting coastally delivered power through the onshore grid and any independent offshore transmission proposal will need to address this.
4) Complexity. Requiring developers to conduct additional engineering and commercial analysis adds costs to bids.

* * *

We commend the DOER for conducting such extensive overreach and its inclusive approach. Regardless of the outcome of this process, we urge the DOER to strive for simplicity in the next solicitation. While there are many worthy considerations, a fast and cost-effective procurement should be paramount.

We appreciate the opportunity to provide these additional comments.

Respectfully submitted,

BAY STATE WIND LLC

By: _____
Name: Patrick P. Smith
Authorized Representative

By: _____
Name: Frederick Zalcman
Authorized Representative

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BY EMAIL ONLY

Marian Swain
Energy Policy Analyst
Massachusetts Department of Energy Resources

April 20th, 2020

Dear Marian,

Request for Comment on Massachusetts Offshore Wind Transmission

We welcome the opportunity to respond to the second Request for Comments issued on March 19th, 2020 by the Massachusetts Department for Offshore Energy Resources (RfC2).

We support the ambitious goals set by the Commonwealth of Massachusetts for offshore wind energy and the consideration it is giving to separately soliciting proposals for offshore wind transmission.

This response follows our initial response (dated February 10th, 2020) and we have not repeated points made in that submission. We have focussed on the first question in RfC2 and the issues that would need to be considered in selecting a structure that would allow for a competitive and successful independent offshore wind transmission solicitation, and then provide some considerations on the second question. We have not chosen to respond to the third question.

1 "Is there a structure or structures that would allow for a competitive and successful independent offshore wind transmission solicitation given the authority provided through Section 21 of the Act to Advance Clean Energy?"

In our response to this question we have referred to Options A, B and C as those set out in RfC2 questions 1.a., 1.b. and 1.c.

1.1 Which comes first: transmission or generation?

One of the key points raised in Question 1, is whether to combine generation and transmission in a single solicitation (Option A), seek proposals for offshore wind transmission first (Option B) and then offshore wind generation, or whether the offshore wind generation comes first (Option C) and then the offshore wind transmission. In our view it is difficult to decide on the ordering of the solicitation process unless there is, at least at a high-level, some vision of what offshore wind transmission is required to integrate the up to 1600MW of offshore wind generation into the New England onshore grid system. The question is: can the offshore wind transmission be designed before knowing which offshore wind sites will use it. A simple, but perhaps extreme, example is provided in Figure 1.

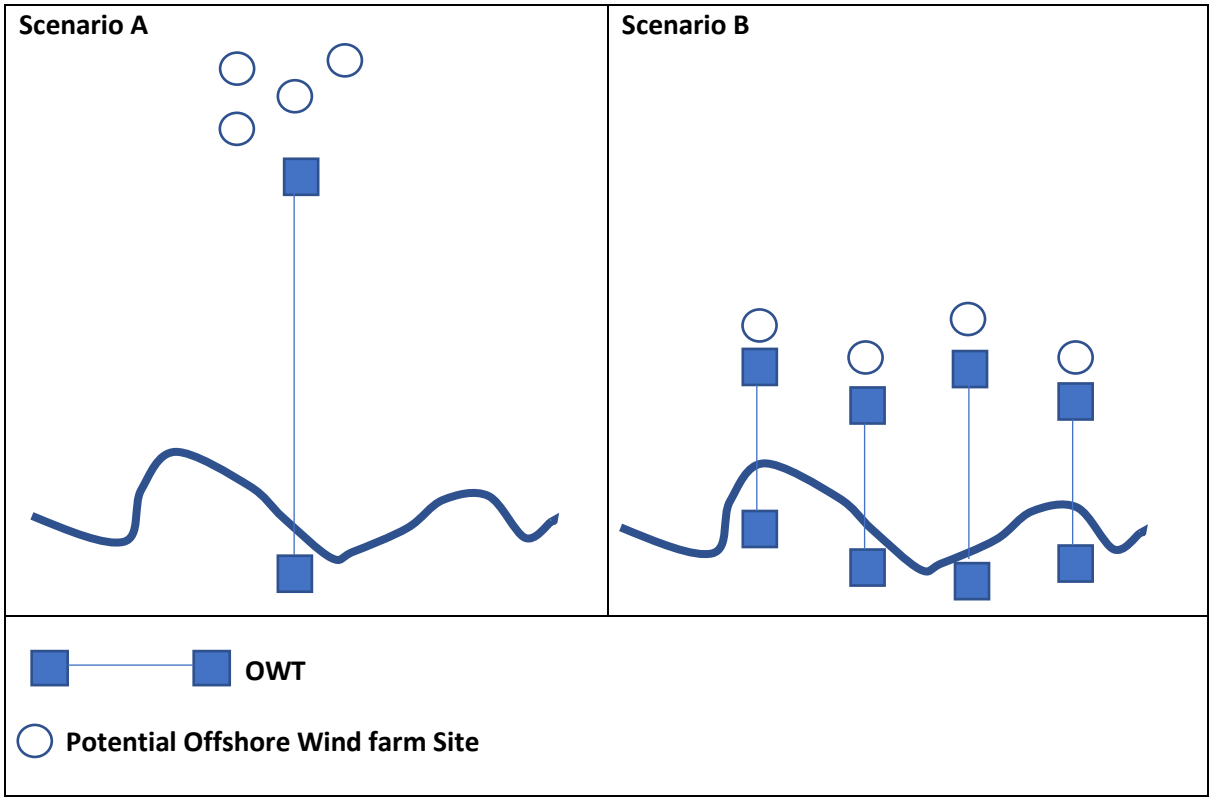


Figure 1 - Which Comes First? Simple Example

Under scenario A, it would be possible, in theory at least to run an offshore wind transmission solicitation first as the offshore wind transmission solution could be applicable, from whichever site offshore wind generation energy was procured, through the offshore wind generation solicitation process. This has some parallels with the German offshore regime, in which offshore wind farm sites are very far offshore and clustered relatively closely together.

However, under Scenario B, a different offshore wind transmission solution could be required depending on from which site offshore wind generation energy was procured. This appears closer to the Great Britain (GB) regime in which offshore wind farm sites are closer to shore (although in some instances still over 100km), and relatively spread out.

The offshore wind farm leases awarded by BOEM in the waters off the coast of Massachusetts may have some attributes of both of the above examples: they are at varying distances from shore; and contiguous.

One of the key issues is with the distance from shore of each site, with some close enough to make an AC connection most cost efficient, whilst others may require HVDC. A very different offshore wind transmission solution may be required depending on which offshore wind farm site is selected through the offshore wind energy solicitation.

Therefore, it is not clear to us at this stage, whether a single proposed offshore wind transmission could be efficient for all (or even a majority) of the relevant offshore wind generation sites. If not, it would mitigate against Option B in Question 1.

1.2 How is the least overall cost arrived at?

Whilst there are also non-cost considerations in the selection of offshore wind energy transmission, Section 21 requires that "*any selection of offshore wind energy transmission*

shall be the most cost-effective mechanism for procuring reliable, low-cost offshore wind energy transmission service for ratepayers in the commonwealth". It is assumed here that in practice it is the combination of offshore wind generation and offshore wind transmission that needs to be minimised and that the offshore wind generation site that minimises this total cost will be selected. If this is not the case then the proposals presented here would need to be amended. At present this is achieved by selecting the lowest combined offshore wind generation and offshore wind transmission bid. This minimisation of total cost, and therefore selection of least cost combination of offshore generation site and offshore wind transmission, needs to remain the case under any alternative solicitation process.

Option A in Question 1 achieves this, but leaves the control of bids in the hands of the offshore wind farm developers and may therefore be excluding transmission providers. In reality this is a continuation of the status quo but with a larger procurement round. Whilst the lowest cost total bid could be accepted, it is questionable as to whether this is likely to come from a consortium of more than one offshore wind developer obtaining the benefits of sharing offshore wind transmission infrastructure. There has been opportunity to do this elsewhere (e.g. GB) but it has not occurred in practice.

It is not clear that an offshore wind transmission solicitation under Option B can deliver this as the offshore wind transmission component would need to be designed in advance of knowing which offshore wind farm site would be selected.

Option C should provide this so long as:

- The offshore wind farm site has been selected which will provide the least cost energy delivered to the ratepayer (i.e. least cost generation plus transmission) based on an assumed transmission cost; and
- The offshore wind transmission costs assumed are representative of what a competitive market could provide.

1.3 How is a level-playing field provided for transmission bidders?

Transmission bidders are unlikely to spend the time and money competing in a solicitation for offshore wind transmission if they consider that they are not competing on a level playing field (both with respect to other transmission bidders and the offshore wind farm generators). It is important that offshore wind developers are not incentivised to load any offshore wind transmission project costs into the offshore generation part of their project in order to be competitive in any subsequent offshore wind transmission solicitation.

Option A doesn't provide a level playing field for transmission bidders as the control is in the hands of the offshore wind developers.

Option B at least allows for transmission bidders to bid independently of an offshore wind developer, but it may be difficult for a transmission bidder to provide a competitive transmission proposal in the absence of knowing which offshore wind developer is the most competitive. They would either have to select one or more developers they think will be competitive, or provide a proposal for all potential offshore wind developers. It is unlikely that this would result in the lowest cost generation plus transmission proposals for ratepayers.

Under Option C this may depend on how the winning project is selected and this is covered further under 1.5 below. The concern here would be that the offshore wind developer should not have the incentive nor the opportunity to "game" the process.

One example of the concerns that a transmission-only bidder would have is that if the winning developer is selected on the expected least cost of the combined offshore wind generation and offshore wind transmission using the figures provided by the offshore wind developer.

Under this scenario there is an incentive for the offshore wind developer to cross-subsidise the offshore wind transmission from the generation part of the project, thereby putting in a low (sub-market) cost for the offshore wind transmission which transmission bidders could not better. Whilst it may be required to deliver the offshore wind transmission at this sub-market cost, and therefore make a technical loss on this, in practice it would recover this loss through paying lower charges for use of the offshore wind transmission. We have seen examples of this in GB, where offshore wind developers have effectively provided Operations & Maintenance services for free, in order to control the availability of the offshore wind transmission, and in the knowledge that this free service will be reflected in lower transmission charges for use of the offshore wind transmission.

Possible solutions or mitigants are:

- Using a benchmark price for the offshore wind transmission rather than the generator's estimate so that any cross-subsidisation would make it less competitive (and therefore reduce the chances it would do so);
- Ensure that the offshore wind developer shares with ratepayers the benefits of a lower offshore wind transmission cost if delivered by an independent transmission provider;
- Publishing to transmission bidders the price they need to beat – at least they can then decide not to incur bid costs if they consider they cannot be competitive, and this may provide useful information to the procuring authority as to whether cross-subsidisation is occurring;
- Audit and benchmark the offshore wind farm developer's costs to determine whether cross-subsidisation is occurring, including assessing the risks of the developer's proposal; and
- *In extremis* preventing the offshore wind farm developer from providing the offshore wind transmission (which is the norm for most European countries such as Germany, The Netherlands, Belgium and France).

In the event that the offshore wind farm developer does win the solicitation for offshore wind transmission related to its project, then the following could be used to monitor the outcome and penalise the developer if there has been cross-subsidisation:

- Continue the audit post-award of the developer's proposal to see whether it is delivered to bid cost, and potentially impose penalties if not; and
- Require business separation between the offshore wind developer generation and transmission parts of the project, ideally requiring a separate SPV and arms-length contractual arrangements between the two – this would assist in the audit and monitoring process described above.

1.4 Who pays for the offshore wind transmission if not delivered by the offshore wind farm developer?

Currently in Massachusetts the GLL required to connect each offshore wind farm is a generator cost incurred and recovered by the relevant offshore wind developer through its tariff for the energy produced and delivered onshore.

Under a separate solicitation for the offshore wind transmission, and therefore a distinct separation of these costs from the offshore wind generation, the question arises as to whether the offshore wind transmission costs should still be recovered directly from the relevant offshore wind developer or through a different mechanism. In Europe different models are used: in GB the majority of the offshore wind transmission costs relating to an offshore wind farm are recovered from the relevant developer (albeit via the ISO); in Germany the offshore wind transmission costs are socialised and not recovered from the relevant offshore wind developers. Clearly this has an impact on the headline cost of energy procured from offshore wind generation in these countries.

It has been assumed here that the current situation in Massachusetts will persist, i.e. that the cost of offshore wind transmission will be recovered from the relevant developer(s) and therefore will need to be reflected in their generation bid price.

1.5 What offshore wind transmission costs are used when assessing a developer's bid in a generator solicitation?

If the offshore wind transmission provider (and therefore final offshore wind transmission cost) is identified first, or if an offshore wind developer is required to provide a combined offshore wind transmission and generation bid, then the generator will be able to take account of identified offshore wind transmission costs in its generation bid, and the procuring authority will be able to assess the developer's bids against their impact on the total cost (generation plus transmission). This would be the case under Options A and B above.

In Option C, neither the offshore wind developer nor the procuring authority would know who the identified deliverer of the offshore wind transmission was, or the cost associated with that offshore wind transmission, at the time of generation bid. This would then leave two options for assessing each offshore wind developer's bid:

a) The generator could be asked to provide a break-down of its own estimate of the total cost of the energy delivered, split into generation and transmission. It would then presumably base the cost of the offshore wind transmission component on its GLL design or an alternative solution if it thought that the most likely outcome. Its bid would be assessed against the total cost (generation plus transmission) and the lowest total cost selected; or
b) The generator could be required to use a benchmark figure, provided by the procuring authority, for the offshore wind transmission cost and to only provide a cost figure itself for its delivery of the offshore wind transmission for information (i.e. not part of the generation assessment). Here the lowest cost generation-only bid would be selected as the winning bidder.

There are potential advantages and disadvantages of each of these options:

Allowing a developer to use its own cost for the offshore wind transmission under a), and yet select the winner based on the total cost, would potentially allow the developer to cross-subsidise the offshore wind transmission portion of its bid without affecting its competitiveness (as noted in 1.3 above).

This is avoided under b) although there is little incentive on the developer here to provide a realistic cost for the offshore wind transmission part, as it is for information only. In addition, a single benchmark cost for the offshore wind transmission may not be applicable for all offshore wind sites and it may be necessary to benchmark costs for different offshore wind transmission designs for the different sites being bid by offshore wind developers.

1.6 Who benefits from offshore wind transmission being delivered at a cost lower than the offshore developer's offshore wind transmission cost?

As noted earlier, it is assumed here that the offshore wind developer pays for the offshore wind transmission required to interconnect its site. If the cost of the offshore wind transmission is not determined prior to the generation solicitation, for example under Option C, what happens if the winning bidder of the offshore wind transmission solicitation offers a lower cost for the offshore wind transmission than that assumed in the winning offshore wind developer's bid. Who gets the benefit of this lower cost and how does this impact on the incentives under the solicitation process for offshore wind transmission?

The natural answer may be that it would be the ratepayer who should benefit exclusively as the offshore wind developer has assumed a higher cost when determining its price in the

offshore wind generation solicitation, and therefore to receive a lower cost would therefore be a windfall gain it would not need to make its offshore wind farm investment viable.

However, this may lead to the developer having an increased incentive to game the process as, if it doesn't gain from a lower offshore wind transmission cost than it can build itself, it may as well build the offshore wind transmission itself, and ensure that it can do this by cross-subsiding the offshore wind transmission cost assumed in its generation bid.

However, some sharing of the benefit between the ratepayer and the offshore wind developer may provide some incentivisation to the offshore wind developer not to subsidise the offshore wind transmission bid. It would effectively be an upside to the offshore wind developer of a third party providing this element of the project.

1.7 Alternative Structure combining Option A and Option B

We offer a possible additional scenario for your consideration which would be to combine the best parts of Options A and C into a new option (Option D) as follows:

- A solicitation for 1600 MW of offshore wind energy generation with an extended time to develop proposals including the pairing of multiple projects that requires bidders to bid the pricing of transmission and generation separately;
- A 1600MW project, or combination of projects, is selected;
- A mechanism to ensure that offshore wind developers are not cross-subsidising their offshore wind transmission costs; and
- A transmission solicitation is issued that allows for only transmission bidders to compete to provide the selected project(s) (totalling 1600MW) with transmission service at a lower price (i.e. offshore wind developers are prevented from participating in this solicitation).

1.8 Concluding remarks on this question

Our conclusions in relation to Question 1, having considered all of the above issues can be summarised as follows:

i) It would be helpful to gain a view as to the most efficient offshore wind transmission designs before deciding on whether to have a separate offshore wind transmission solicitation, and if so whether to solicit for transmission proposals before generation proposals or vice-versa;

ii) Should a separate offshore transmission solicitation be used, then:
   a. If the most cost-effective offshore wind transmission is reasonably independent of the selected offshore wind generation sites, then Option B would be preferred; or
   b. If the most cost-effective offshore wind transmission is not reasonably independent of the selected offshore wind generation sites, then Option C would be preferred;

iii) If either Option B or Option C is selected, consideration of the issues described here needs to be given in the way that both the generation and transmission solicitations are conducted in order to ensure that there is a fair outcome.

2 Under DOER's authority granted by the Act to Advance Clean Energy how can the benefits of independent offshore transmission be best captured through a solicitation?

2.1 Is there a minimum capacity required to capture benefits?

The main benefits of independent offshore wind transmission are in the delivery of a co-ordinated offshore transmission system design that can do more than simply interconnect one offshore wind generator to the onshore grid. Potential benefits of a co-ordinated design include:

- Economies of scale in offshore wind interconnection;
- Reduced environmental impacts;

- Fewer public and other stakeholder acceptance issues;
- Better use of capacity at onshore connection points;
- A means to alleviate routing congestion onshore and offshore;
- A means to alleviate congestion in the onshore transmission system; and
- A means to provide interconnection between regional markets.

As individual offshore wind farms are now typically in the region of 800MW, a co-ordinated offshore transmission system would need to interconnect the full 1600MW, or provide some other design benefit, such as increased transmission capacity between constrained parts of the ISO-NE system, or even between different ISOs.

Moreover, the 1600MW of offshore wind generation would need to be located so as to be efficient for it all to be interconnected via the same offshore transmission system.

We do not offer a view on how likely these "other" benefits could be realised, and in the absence of them, it would appear that 1600MW would be the capacity required, and in reasonably close proximity. We are of the firm view that any offshore wind transmission that has more than one user (i.e. is shared infrastructure) should be delivered by an independent transmission provider.

2.2 Are there benefits that would be stranded without doing a solicitation for 1600 MW of independent offshore wind transmission

Similarly, to the response above, if a solicitation is done for circa 800MW, it would most likely only interconnect a single offshore wind farm and therefore the benefits of a co-ordinated design listed above would not be gained. A larger solicitation is likely to reveal the economies of scale.

Finally, it would also be helpful to have a longer-term view on the scale, locations and timing of offshore wind generation, and the optimal offshore grid required to integrate it into the ISO-NE grid and the Northeast US system more widely. This is an issue that policy makers and regulatory authorities are grappling with elsewhere. In our view, the solution should include a single planner of the relevant onshore and offshore grids, competitive delivery by independent transmission owners, and some (but probably limited) compensation for offshore wind developers for delays in transmission delivery.

I hope that the comments prove useful and we remain available to provide clarifications or further input if required.

Yours sincerely,

Chris Veal
Managing Director

Sebastian Libonatti
Vice President - Business Development
AVANGRID NETWORKS

By email to Marian.Swain@mass.gov

April 21st, 2020

Ms. Marian Swain
Massachusetts Department of Energy Resources
100 Cambridge St. Suite 1020, MA 02109

Dear Ms. Swain,

AVANGRID Networks, a fully owned subsidiary of AVANGRID, Inc., thanks you for the opportunity to comment on the topic of offshore wind transmission in Massachusetts. Enclosed you will find our comments in response to this request.

AVANGRID Networks, an electric transmission and distribution only company, supports the State of Massachusetts on its transition to a cleaner, sustainable and more resilient energy sector. Our corporate values as a sustainable, agile, collaborative organization are a natural fit with this effort.

The contributions of offshore wind to this effort are instrumental, as is finding the most cost effective methods of transmitting offshore wind energy to onshore consumers. In this spirit, it is the opinion of AVANGRID Networks that an organized, competitive approach to offshore wind transmission, fully coordinated by the Department of Energy Resources (DOER) and carefully planned by independent grid operator ISO New England, will benefit not only the ratepayers through lower tariffs, but all affected stakeholders.

Thank you again for the opportunity to provide input. Please do not hesitate to contact me if you should have any questions.

Yours Sincerely,
Sebastian Libonatti
Vice President - Business Development
AVANGRID NETWORKS
One City Center 5th Floor, Portland, ME, 04101
Sebastian.Libonatti@avangrid.com

Introduction

Avangrid Networks, Inc. (“AVANGRID”) submits this letter in response to the March 19, 2020 Second Request for Comment on Massachusetts Offshore Wind Transmission from the Massachusetts Department of Energy Resources (DOER).

AVANGRID would like to recognize the climate leadership displayed by Governor Charlie Baker in signing the 2018 “An Act to Advance Clean Energy,” which cemented Massachusetts as a leader in the growth of offshore wind (OSW) and a clean energy future. This aligns with AVANGRID’s purpose of working together to deliver a more accessible clean energy model that promotes healthier, more sustainable communities every day.

The Commonwealth of Massachusetts has set ambitious goals for procuring renewable energy from cost-effective technologies on an aggressive time horizon. The high-quality wind resources off New England’s coast and the advancement in turbine technology make offshore wind a key component of any plan to reach these goals. Climate change is an issue that requires the sense of urgency that Massachusetts displays; nevertheless, this urgency comes paired with practical challenges. Aiming to solicit an additional 1,600MW of OSW in addition to the 1,600MW already procured requires close coordination with the state’s Electric Distribution Companies in order to satisfy load requirements and simultaneously ensure reliability of the electric system.

As is true for all procurement processes, competition is a critical component of realizing economic efficiencies. Interest from private developers has been robust for OSW solicitations by Connecticut, New Jersey, and New York in addition to the two solicitations by Massachusetts. The notable increase in participants within the offshore wind market brings benefits to future consumers. Many states are following the lead of the Commonwealth in pursuit of advancing their clean energy goals and to secure investment in their local economies. These joint efforts are exerting downward pressure on development costs through economies of scale and incentives for technological development.

Providing OSW developers a path to deliver the power that they generate to the load centers as efficiently and effectively as possible is a critical dimension for the success of any OSW projects. This dimension has a major impact on the timeline of a project. We strongly believe separating the construction of the OSW generation component from the OSW transmission component and introducing competition in the transmission area would create:

- long term benefits for customers through lower rates;
- Improved operations for the system by optimizing transmission solutions;
- lower environmental impacts to marine ecosystems;
- lower global impacts to fisheries, onshore communities, and other stakeholders involved in the process.

1. **Is there a structure or structures that would allow for a competitive and successful independent offshore wind transmission solicitation given the authority provided through Section 21 of the Act to Advance Clean Energy?**

In their recent study[11] entitled "Achieving 80% GHG Reduction in New England by 2050", The Brattle Group has made it extremely clear for all of us: these goals can only be achieved by integrating renewables at a significantly higher rate than the 800MW per year we are currently achieving. To put into perspective, "**New England will need to accelerate annual deployments 4 to 8 fold compared to what is planned for the coming decade**. While that sounds daunting, such ramp-ups are not unprecedented"[1].

Our comments emphasize on the benefits of having a long term view while structuring short term auctions and the significant impact of those decisions on the future of our industry. Brattle's study above-mentioned, identifies the need for **3000 miles of transmission lines to be constructed to integrate 15-24GW of OSW**. For that reason we encourage a well-planned and coordinated approach for the development of offshore wind transmission. This approach has worked well in other regions and Massachusetts has all the elements to succeed.

We strongly believe the most competent entities to develop transmission need to be included in this coordinated effort to facilitate renewables integration, increase reliability for the system while reducing environmental and social impacts. **Well planned transmission not only allows for the best onshore interconnection points to be optimized but to further derisk a portion of the project that can encounter many challenges**. Transmission development in the US has been a real challenge mainly for permitting and siting reasons and this is no different for the OSW in Massachusetts. We cannot underestimate the time required to fully study our network to deliver large amounts of intermittent generation and the quantity of preliminary surveys and work to be completed ahead of a project. These steps, if accomplished in a coordinated manner, with the support of the authorities, can lead to great benefits for ratepayers.

Finally, our comments try to address every structure proposed with a critical eye to help shape an auction process that will profit ratepayers for years to come. Also, we take this opportunity to encourage the **DOER to consider the possibility to auction 2400MW of OSW and be the first region in America to host a 1200MW HVDC project**. Whether the authority increases for an additional 800MW or a partnership is created with a neighboring state, the benefits of using proven and state-of-the-art technology is the best way forward.

Please provide comment on the following scenarios and/or provide any additional scenario(s):

   a. **No separate independent transmission solicitation but a solicitation for 1600MW of offshore wind energy generation with an extended time to develop proposals, including the pairing of multiple projects and/or independent offshore transmission projects.**

Past RFPs have shown the little to no interest offshore wind developers have shown to partner with transmission developers to make proposals more competitive. By providing more time it will not further incentivize offshore wind developers to partner with other transmission developers. Once again, in this scenario, the State will only receive proposals from the same developers without encouraging new entrants and additional competition.

[1] The Brattle Group, "Achieving 80% GHG Reduction in New England by 2050," September 2019.

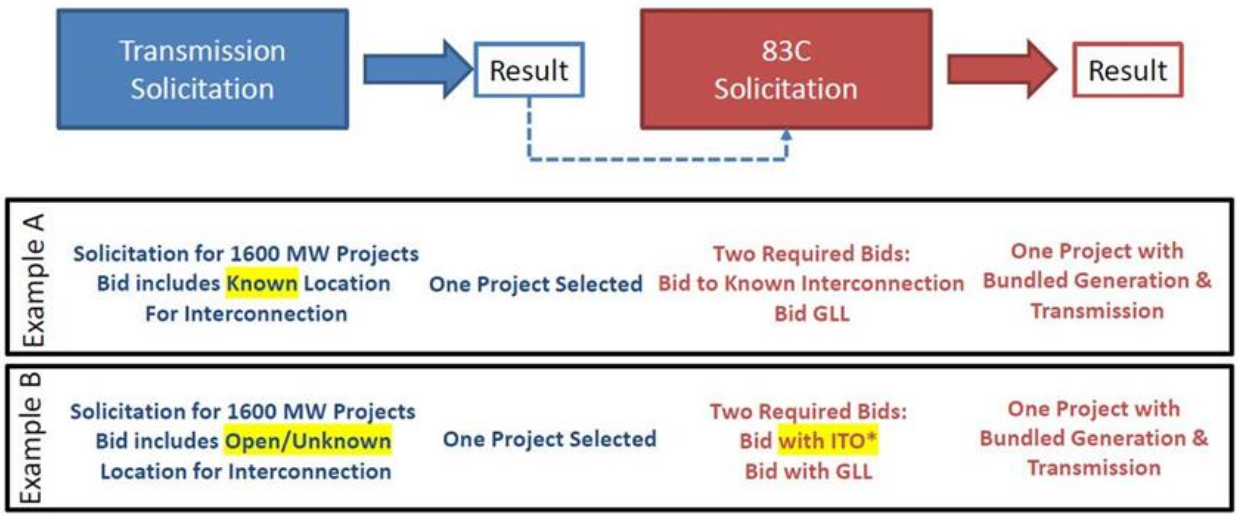
This option has been available in Europe since the beginning but to date no companies have joined, this is also true for onshore so it's not an offshore issue but more a market issue.

Offshore generators have been working on project development in their respective development zones for some time now and they will already have technical solutions identified both for their generation project proposal as well as for the corresponding offshore transmission connection.

Although this model can bring new solutions to market, it will prove challenging to harmonize the participants into finding new solutions at a point where they have their projects defined. At this stage it is difficult to see how this could be delivered unless mandated by the state.

b. A solicitation for 1600MW of transmission capacity that requests project proposals that define their own technical specifications for 1600MW of offshore wind energy generation. Subsequent offshore wind generation solicitation(s) requires bidders to submit two bids: one with a Generator Lead Line (GLL), and one that interconnects to the selected transmission project(s). All bids are evaluated together.

The proposal being made in this sub section is an improvement to what is being offered in the previous sub section (a.). In this instance, transmission developers have the opportunity to participate in an open solicitation and compete against offshore wind developers.
One key element we would like to distinguish is the **level of technical specifications** that is being asked to the transmission developer as well as the interconnection point requirement. As shown in your presentation, during the technical conference, and illustrated below, **Example A suggest a known location** for the interconnection. Having both the offshore interconnection location and the optimal onshore interconnection point saves transmission developers and the DOER 1-2 years' worth of development and dealing with communities along the route as well as congesting the queueing process at the ISONE. Narrowing down the technical specifications will also drive down costs by reducing the level of uncertainty and generate savings on the development side. Therefore, we believe, within this structure, an early identification of these elements would result in more competition, less distortion to coastal communities and other affected entities and savings for rate payers as well as an easier evaluation process for the DOER. In our first round of comments we suggested having an independent subject matter expert to determine these parameters for all potential participants, this still applies.



A few challenges with Example B are outlined below:

- Unless the requirements including connection points are defined as part of the preliminary information there is a likelihood that entrants in the market who will be accelerating plans will have **multiple touch points with the same stakeholders in the community and create further unrest and concern amongst the stakeholders in the marine environment**.

- Same issue will be encountered with the queueing process managed by the ISONE. Developers will be forced to submit multiple interconnection requests **creating a bottleneck in the process**.

- To propose an optimal transmission projects, transmission developers would have to deal with a myriad of variables related to the offshore wind generators that are not necessarily available to them. For instance the amount of MWs available to develop the lease area, the optimal location of the wind turbines, the timing to develop a specific wind area, preferred routing options for the cables, etc. This means the transmission developer may have to develop several projects in parallel to try to capture these variables to be competitive, making the process less efficient.

Strengths of the proposal in section 1.(b):

- Compared to the actual state of the market this is a definitive improvement in opening the door for new entrants.
- Transmission developers will be able to offer extremely competitive offers to the State without limiting the ability of the actual offshore wind developers to participate with their own projects.
- Should result in less landfall locations and therefore less environmental impacts and less stakeholder noise.
- In the context of Example A:
    - The overall evaluation process is reduced to fewer combinations where benefits and costs can more reasonably be compared for every project.
    - There's enough time to define the scope of the transmission RFP in 2020-2021 and issue the RFP in the 2021-2022 period and subsequently the generation solicitation. This way, the next round of winners could be selected years in advance of the 2026 deadline with an optimal solution moving ahead.

To summarize our position within this structure:

- We support the structure presented in this section which enables our organization as well as many other competitors to enter the offshore wind business.
- We strongly believe best results can be achieved if the DOER, through a subject matter expert, could define the scope of the transmission project to allow transmission developers to focus on optimizing a single solution instead of guessing a across a multitude of variables (applicable to Example A).
- Example B also provides benefits as procurement targets increase and transmission development becomes more critical.
- ISONE has done significant studies to identify the optimal onshore connection to minimize adverse impacts on its system and limit the investment in upgrades and time. We should take advantage of this immediately.
- Defining the scope of the next RFP shouldn't threat the timeline envisioned by the DOER. We believe there's enough time to execute this plan ahead of its schedule. Acting today and thinking carefully of the next steps will reduce uncertainty during the development phase of the selected project(s).
- Issuing this solicitation as early as 2021-2022 is possible and allows for all participants to work extensively on their proposal without delaying the 2024 and 2026 targets.

c. A solicitation for offshore wind generation that requires bidders to bid the pricing of transmission and generation separately. A project is selected, and then a subsequent solicitation is issued that allows for independent transmission developers to compete to provide the selected project with transmission service at a lower price.

Avangrid Networks supports this alternative given the state of the market and our intention to effectively compete. However, as aforementioned in our introduction, we strongly encourage the DOER to take a long term view and consider increasing the **procurement target to 2400MW to fully optimize transmission development as well as offshore wind generation in the region**. If this becomes the preferred scenario, we suggest prioritizing the structures proposed in section 1.(b) that will lead to greater benefits for the region and ratepayers.

The approach suggested here, for the next two 800MW tranches or a single 1600MW project, would definitely lead to cost savings by increasing the level of competition, innovation, procurement power and financing capability. This two stage process **will deliver competitive prices without limiting the ability of the DOER neither to achieve its targets** in time nor to limit the number of competitors to a handful, in the best of scenarios.

Tendering the offshore transmission project at this point will provide certainty over transmission connection costs and higher surety on the offshore wind project viability, while it provides the option for independent transmission companies to develop innovative solutions by bringing new sources of technical expertise.

To ensure transparency there needs to be strong **scrutiny on the pricing of transmission and generation separately submitted by the generators to remove any cross-subsidy** that may ultimately disadvantage transmission developers and ratepayers and drive up total MWh prices for the development. For clarification purposes, we believe the initial tender should provide prices for both assets from each developer with binding generation only and transmission only prices. Thereafter, the DOER should make available the tariff of the transmission portion, for the selected winner in the first tender, as a key element of information for the second tender.

Potential solutions to mitigate cross-subsidies with different level of complexity to implement:

Potential measures to mitigate cross-subsidies in generators' proposals:

- There should be a limited gap in price differential between generation and transmission. A threshold or minimum ratio (Transmission/Generation) could be identify and serve as potential sign that a generator might be manipulating generation prices to subsidy its transmission cost.
- Additional controls to avoid cross subsidy could be applied to the lowest generation+transmission bid. For instance, generation price above 10% of the median of the generation prices and/or transmission price lower than 10% of the median transmission prices, would be disqualified
- Create an audit process for the transmission portion of the project submitted by the generators. An independent auditor could assess the feasibility, bankability, risks of the proposal.
- The DOER could create a proxy Capex/miles with adjustments for DC and AC projects.
- The amount and quality of data provided by the generators on their transmission asset is critical to spur competition and avoid cross-subsidies. A well detailed transmission project should allow for identification of major discrepancies between bids.
- If the generator is ultimately selected, the audit process should continue until the project is online to compare projected costs versus real costs. The DOER should establish a maximum percentage amount a developer can be over the projected cost. If this target is surpassed, the generator should be penalized in its final PPA price. This measure is implemented in other states to assure for instance the proclaimed project's benefits are real throughout its lifetime.

- Even if a generator wins the overall project, they should be obligated to separate both assets and form a different entity with a different contract with the EDCs (a PPA for the generation asset, and a TSA for the transmission asset). This measure assures more transparency for both projects as well as it forces both entities to be profitable on a standalone basis.

Another key aspect of this structure, to achieve real benefits, is the value and amount of data made available by the generators for the transmission developers and to the evaluation team. These requirements have to be well defined by the DOER in advance of the generation RFP. All this information shall be made available to the authority for the offshore transmission connection to be tendered. We have provided a list, not limited to, in chapter 4 of the "Additional comments" section.

From a timing perspective, to continue to incentivize generators to invest in offshore wind the premise must be that the **transmission system will be available for connection in advance of the first turbine** to be commissioned. It is critical that the transmission connection assets are being procured no later than those of the offshore generator to facilitate contracted connection dates. This will likely mean **very closely aligned tender regimes (generation and transmission).**

The fast evolving offshore market has brought significant investments in the transmission sector which spurs innovation, brings more sources of technical expertise and financing capabilities for the construction and operation of these assets. The structure proposed in this section can help achieve these improvements at a faster pace. With this alternative, the DOER guarantees that the new selection process will end with a proposal equal or better than under the current process, given the generators will be bidding their best proposals for generation and transmission, and additionally transmission developers will compete for the transmission tranche with potentially better proposals.

2. Under DOER's authority granted by the Act to Advance Clean Energy how can the benefits of independent offshore transmission be best captured through a solicitation?

a. Is there a minimum capacity required to capture benefits?

The benefits stemming from introducing competition in the transmission portion of these projects are significant at current levels of MWs. However, these benefits accrue as the size of the project increases. This is why we believe it is critical to keep a strategic long term view while making short and medium term decisions. The value of offshore wind and its competitiveness are now clear to several northeastern states pushing their initial procurement targets to higher levels. If this is the conclusion for Massachusetts (in reference to Bill 2867) then the DOER should make the necessary efforts to promote independent transmission to avoid the pitfalls other European countries have made during their initial phases of development.

It is reasonable to think a minimum of 2400MW will be procured within the next foreseeable years in Massachusetts alone or in combination with a neighboring State. If this is the case, it is a great opportunity to leverage existing and state-of-the-art technology to build two 1200MW HVDC projects as it is currently being developed in Europe. The benefits of this proposal compared to building three 800MW projects are substantial and were largely provided during the first round of comments. These benefits are, amongst others, reduced environmental impacts to the sea bed, reduced impacts on fisheries and coastal communities, economy of scales throughout the development of the project, optimization of onshore interconnection points and reduced impact on network costs.

b. Are there benefits that would be stranded without doing a solicitation for 1600 MW of independent offshore wind transmission?

To limit a solicitation to 800 MW will definitely lead to higher environmental impacts given the number of cables installed on the sea bed (damaging the marine ecosystem) and increase the number of interactions with coastal communities, fisheries and other stakeholders affected by the development of these projects. Economies of scales can be achieved during development, construction and operation phases.
Although multiple landing options for offshore wind projects are available in New England, we can't underestimate the saturation of these onshore connections and their impact on our system. By limiting solicitations to smaller amounts in an unplanned manner will only lead to a suboptimal use of the best onshore interconnection points and apply upward pressure on for future development. We cannot underestimate the permitting, feasibility, and constructability challenges the next projects will face as well as the limited number of interconnection points available. These challenges can only translate in higher risk premiums and more restrictive financing options.

3. Can these benefits be evaluated and included in a total cost and benefits analysis?

a. What information would need to be provided in a Request for Proposals (RFP) and/or what information should an RFP request to better define the benefits and costs of the independent offshore wind transmission proposals?

In the current model, generators are minimizing distance to shore to keep their project as competitive as possible. An element that should be taken into account and valued going forward is how optimal is the interconnection point selected from a system perspective and **how its use and upgrades required can impact its future expandability**. In other words, future expansion of this energy resource as well as its costs for ratepayers depends largely on how well designed and maximized these interconnection points are. If this criteria is not considered than the participants will find no incentive to address it.

Finally, other criteria to be requested are described in chapter 4 and 5 of the "Additional comments" section following this question.

Additional comments

1. Additional Alternatives

I. Combination of Example A of Section 1. (b) without giving the ability to generators to bid a GLL

- A transmission RFP is issued in 2021 with the scope of transmission well defined. A winner is selected (generators can participate). Subsequently, a generation RFP is issued but only the generation is procured, no additional options to offer another GLL. Generators are forced to submit proposals for the full output but also lower installed capacity projects. If the transmission RFP is for 1600MW, generators have to submit prices in 400MW increments and for the full capacity if they desire.

II. Combination of Example A&B of Section 1. (b) + Section C (ability to bid on the selected winner)

- Both Example A&B have an initial RFP for transmission followed by an RFP for both generation and GLL. As it is now, if the generator wins with its GLL during the second auction, the transmission developers does not have the opportunity to offer the awarded transmission solution.
- Therefore the suggestion is to issue a third RFP that is open for transmission developers to offer the same transmission at a more competitive price.

2. Benefits of separating transmission

We consider that offshore transmission RFPs will deliver benefits to consumers and generators including:

- Introducing a greater range of financing options for transmission construction.
- Applying downward pressure on total costs through increasing the scope of competition.
- Bringing procurement benefits through engagement with high volume transmission companies.
- Opportunity for wider innovation from the market in the transmission assets.
- Eventually, separation of assets provides the opportunity for multiple developers to connect to the same offshore connection point.
- Reducing construction resource/funding requirements for generators.
- Allowing generators to focus on their core business, in accordance with their capability, capacity and risk appetite for involvement in offshore transmission.
- The separation of transmission vs generation is the standard in any onshore transmission planning worldwide. Isolated projects and timing have pushed for the offshore projects to be bundled, but the long term planning with the separation of the transmission due to its specific scope, required skills and interests, is the sustainable approach for offshore transmission planning.

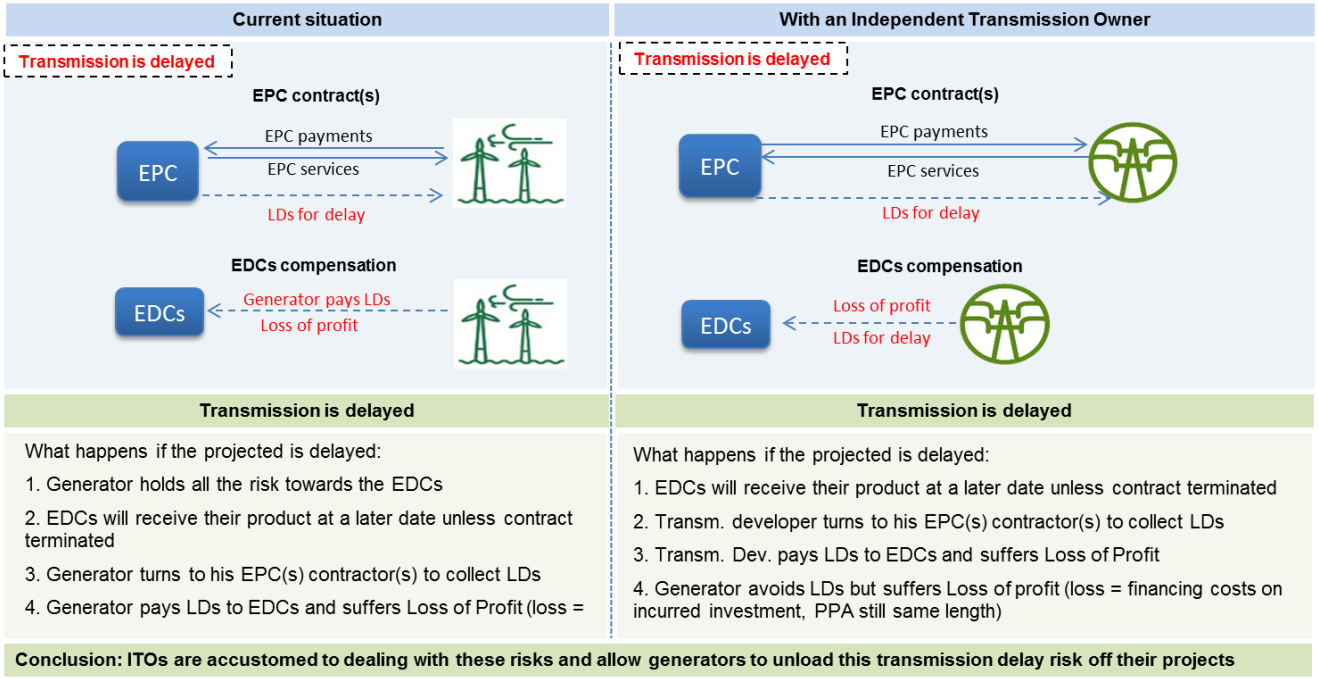
3. Risk profile (current vs new)

As it is shown in the pictures below, the total **exposure of the project is the same overall**. Under a scenario in which there is a delay with the transmission line construction, EDCs will collect LDs either from the generators (current structure) or from the transmission developers (new structure). In both cases, either the generator (current structure) or the transmission developer (new structure) will suffer a loss of profit.

The probability of this scenario happening **should be lower under a scenario where independent transmission developers can participate**. The latter is better capacitated than generators in performing the transmission line scope.

To assure this, it will be crucial to ask for specific requirements of experience and capabilities to the transmission bidders, to be applied also for the generators if they bid the transmission tranche under GLL or separately.

To conclude, under a scenario where the transmission developers are equal or more diligent than the generators in performing the transmission scope, **the risk profile of the project will be equal or better that the existing one**.



Risk Profile – second illustration

Risks	Current situation	With ITO	Comments
Development	Generator holds all development risk	Shared risks by two expert developers	Increased financial capability to absorb risks
Technical compliance	Generator holds technical risk, limited remedies through engineering contracts	Mitigated through specifications package defined before and after project selection between both developers	Joint collaboration to define detailed engineering once both projects are awarded
Construction	Mitigated partially through various contracts Cost overruns at generators' expense	Shared by two experts and mitigated through various contracts	Cost overruns assumed by each developer (and EPC contractors)
Delay	Generator holds all delay risk except for limited LDs from contracts	Each developer holds delay risk of each asset	Remedies provided by developer accusing a delay Right incentives to have a coordinated approach
OPEX	Generator holds OPEX risk No remedies for the generator	OPEX divided into two developers, each with its own core expertise	Remedies provided in the TSA in case of default
Reliability and availability	Generator holds R&A risk No remedies for the generator	ITO through O&M commits to standards	Remedies provided in the TSA in case of default
Financing	Generator sole entity financing the project	Two entities combining financing capability	Opportunity for ITO to finance it over 40-50 years
Conclusion	From a project perspective, having an independent transmission owner improves the overall risk profile of a project		

4. Data requirements from generators to allow transmission developers to bid

Critical information to be provided by the Generators under a GLL related to the transmission portion:

- Location & Layouts of the Offshore Collector Platforms
- Single line diagrams and detailed electric drawings
- Fulfilment with the grid code.
- Interconnection points.
- Active Power Transmission in each interconnection point.
- Voltage Control capability.
- Reactive Power capability
- Losses for different transmission rates.
- Reliability and Availability of the System for different transmission rates or modes of operation.
- Technical Brochures of the components considered in interconnection point.
- Voltage, Frequency, Power Factor, Resonance and Harmonic studies, Network equivalent and short circuit network characteristic for different modes of operation
- Protection Coordination study
- Startup or shutdown requirements and or procedures
- Unavailability of the Offshore System (Generation and Interconnection Point)
- Mechanical Requirements: Type of Connections
- Schedules of Engineering, Supply, Construction, Commissioning and Commercial Operation for the Project, as well as a tentative schedule of the Maintenance Program and Modernization activities during the lifetime of the assets.

5. Requirements for bidding in the transmission auction (applicable also to generators if they bid the transmission under GLL or transmission only)

From a technical point of view, the following information should be required to be an eligible bidder.

Experience in:

a) Deployment, Operations and Maintenance of Transmission Systems applicable to the proposed solution, including:
   i) HVAC Substations
   ii) HVDC Converter Stations
   iii) HVAC and HVDC Lines
   iv) Offshore Power Installations
b) Design, construction and commissioning of Transmission Systems, including Onshore and Offshore systems
c) Working and supervising contractors and suppliers specialized in design, construction, commissioning, operation and maintenance of Transmission Systems

A competitive bid process for separately-procured OSW transmission needs to take into account information that reflects the economic and technical competitiveness of each project. To this end, the following information would be most valuable:

- Project description, including type, size, and geographic and electrical location, onshore interconnection points as well as planning and engineering specifications. This item should specify all upgrades necessary on the onshore grid to receive the amount of OSW energy delivered by the project
- Projected in-service date and project schedule and how it builds in the in-service date(s) of the generation assets
- Permitting and regulatory schedule, including all federal, system, state, and local permits
- Transmission and substation routing studies that describes the management of environmental, social, political and technical aspects throughout the length of the project
- Status of any contracts that are under negotiations or in place, including any contracts with third-party contractors that demonstrate the feasibility the developer offers for completing the project within the committed timeline
- Status and expertise in OSW equipment availability and procurement of the developer that proves timelines and competitiveness of equipment procurement
- Evidence of financing or ability to finance the completion of the project
- Capital cost estimates for the development of all elements of the project
- Description of permitting requirements and specific risks facing the project at the stage of project development, including any specific proposed mitigation to permitting risks, and evidence of the reasonableness of project capital cost estimates all based on the information available at the time of the submission
- Evaluation of the Transmission Losses for the Main Components of the Offshore Transmission System, in order to calculate the capitalized losses.
- Schedules of Engineering, Supply, Construction, Commissioning and Commercial Operation for the Project, as well as a tentative schedule of the Maintenance Program and Modernization activities during the lifetime of the assets.
- Technical Characteristics of the Proposed Solution:
- Single Line Diagram of the transmission grid.
- Fulfilment with the grid code.
- On shore Interconnection points.
- Active Power Transmission in each interconnection point.
- Voltage Control capability.

Copper Development Association Inc.
Copper Alliance

7918 Jones Branch Drive, Suite 300
McLean, VA 22102

April 21, 2020

Massachusetts Department of Energy Resources
Marian Swain - Energy Policy Analyst
100 Cambridge St., Suite 1020,
Boston, MA 02114

RE: Massachusetts Offshore Wind Transmission: Second Request for Stakeholder Comment

Dear Marian,

The Copper Development Association Inc. (CDA) hereby wishes to submit the following comments in response to the Massachusetts Department of Energy Resources (DOER) and the Massachusetts Clean Energy Center (MassCEC) request for comment on Massachusetts Offshore Wind Transmission. The Copper Development Association Inc. is a U.S-based, not-for-profit association of the global copper industry and is committed to promoting the proper use of copper materials in sustainable, efficient applications. CDA supports the DOER and MassCEC goals to investigate the cost benefit of requiring the electric distribution companies to conduct additional offshore wind generation solicitations of up to 1,600 megawatts (MW). There are relentless advances in wind turbine technology and wind power in North America. CDA applauds Massachusetts for investigating procurement of additional offshore wind as an innovative and economic driver for the Commonwealth. Reliability assurance is key in advancing onshore and offshore wind, keeping costs balanced as new infrastructure is procured. Copper's high conductivity – unmatched by any other engineering metal, is used all throughout a wind turbine and the broader wind plant and plays a critical role in assuring reliability is met on all levels from generation – transmission - distribution.

Copper is there from the beginning with copper wiring coursing through wind turbine control systems that engage operation once minimum speeds are present. Copper plays an indispensable role converting the wind turbine's mechanical energy into electrical energy in the generator. After up-tower power conversion, copper cables transmit electricity from the top of the wind turbine (nacelle) down to the tower base. These are increasingly long distances. Copper's electric and thermal properties decrease load loss, keeping the power grid working at full capacity. The vitality of copper in these electric systems increases the efficiency and reliability of wind installations and the related power transmission systems. Copper cable travels these distances to the tower base where switchgear and step up transformers – both built with copper components – send electricity into a wind plant's miles of interconnecting copper cables. These buried cables eventually reach a centralized copper-enabled step-up transformer and substation where clean inexhaustible renewable energy flows into homes and businesses throughout the electricity grid.

In a study commissioned by the CDA and conducted by Navigant in 2018, entitled North American

Copper Development Association Inc.
Copper Alliance

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Wind Energy Copper Content Analysis[1] found that the generation of electricity from renewable sources, including solar and wind, has copper usage intensity typically four to six times higher than for fossil fuels. The study found that the estimate of copper usage per megawatt as is approximately 21,000 pounds for offshore wind energy, approximately 5,600 to 14,900 pounds for land-based wind energy. For example, a three-megawatt wind turbine can contain up to 4.7 tons of copper with 53% of that demand coming from the cable and wiring, 24% from the turbine/power generation components, 4% from transformers, and 19% from turbine transformers.

As we transform to a more clean and sustainable energy platform it is important to highlight that copper plays a critical role in electrical systems across clean energy markets, from generators and transformers to cabling and protective devices. These devices and their copper components work to reduce CO2 emissions that lead to global climate change. Adding 1 kg of copper to electrical or thermal systems saves between 100 and 7,500 kg of CO2 emissions and 500 to 50,000 kWh of primary energy use over a system's lifetime. This can save anywhere from $78 to $7,800 in energy costs over the product's lifetime while minimizing CO2 emissions.

Copper's conductivity, plus its ability to create high-quality, low-resistant connections is the basis for high-efficient electrical equipment leading to lower energy losses. This assures a well-adjusted cost benefit approach as Massachusetts moves forward with balanced policies to advance the offshore wind industry.

Thank you for your consideration and we look forward to working together in the future.

Sincerely,

Zolaikha Strong,
Director, Energy Policy & Electrical Markets
zolaikha.strong@copperalliance.us
(202) 558-7625

[1] **North American Wind Energy Copper Content Analysis** Prepared for Copper Development Association https://www.copper.org/publications/pub_list/pdf/a6198-na-wind-energy-analysis.pdf

April 21, 2020

Marian Swain, Energy Policy Analyst
Massachusetts Department of Energy Resources
100 Cambridge St., Suite 1020
Boston, MA 02114

Ms. Swain:

Anbaric is pleased to provide the following Offshore Transmission Procurement Framework and supplemental responses to your Second Request for Stakeholder Comment on Massachusetts Offshore Wind Transmission issued on March 19, 2020.

The Framework provides a ready-to-implement solicitation model based on procurements that have already been conducted in Massachusetts and elsewhere. This solicitation can be conducted in the near future using readily available information. The solicitation for independent offshore transmission is consistent with the intent of the enabling legislation and avoids the conflicts and delays that undermine the viability of generator lead lines and risk imperiling Massachusetts' offshore wind goals and broader climate objectives.

The solicitation would follow a two-step process: 1) solicit independent transmission options that serve all leaseholders fairly, and 2) solicit generation connecting to independent transmission. Evaluation of cost-effectiveness builds on precedents from prior offshore wind procurements, and risks are managed through project sequencing and financial incentives for timely performance. The Framework is grounded in the legislative intent of the 2018 Act to Advance Clean Energy which specifically references the procurement of "offshore wind energy transmission…independent of offshore wind generation…" As your May 2019 Offshore Wind Study found, "The only feasible way to evaluate the benefits and cost effectiveness of independent transmission is to undertake a separate one-time only process prior to undertaking a solicitation for generation."

As Massachusetts evaluates responses in this comment period, additional insight can be gained from a similar docket[1] in New York. Comments in that docket, focusing on the timing and content of an RFP for offshore wind in New York State, are now public. You will see that a host of entities responded. Noteworthy, we respectfully submit, are comments from the New York Power Authority and private market actors, which underscore the need and value of independent transmission.

The New York Power Authority observed: "Although current interconnection points currently may support individual radial project connections in New York State's nascent offshore wind market, this approach has inherent limitations as a long-term transmission solution…The coordinated approach is better suited to develop the offshore and onshore grids necessary to support…offshore wind goals.

[1] See: http://documents.dps.ny.gov/public/MatterManagement/CaseMaster.aspx?Mattercaseno=18-E-0071

Shell agreed and was more specific: "[F]or New York to position itself as the hub of the U.S. offshore wind industry and efficiently and cost effectively implement its OSW program over the longer term, the Commission also must remain focused on establishing well-planned, backbone transmission infrastructure."

Finally, Joint Utilities emphasized the cost savings of independent transmission: "It is important to point out that the cost savings to customers of coordinated transmission could outweigh the benefits of capturing Investment Tax Credits and such trade-offs should be considered in the timing of the next offshore wind solicitation."

Now is the time for the Commonwealth to issue a transmission-only RFP and reap the cost savings and environmental and community benefits that such an approach brings.

Thank you for your consideration of the Framework and our responses.

Sincerely,

Edward N. Krapels
Founder & CEO

Offshore Transmission Procurement Framework

April 21, 2020

Massachusetts' 2019 Offshore Wind Study[i] noted that "Independent transmission has the potential benefit of minimizing impact on fisheries, optimizing the transmission grid, and reducing costs." Since publication of the Study, the need for independent offshore transmission has been confirmed by emerging constraints on the onshore grid[ii] and increased attention to minimizing impacts of offshore wind development – including transmission – on fisheries, the environment, and shoreline communities.

The separation of transmission from generation for new renewable energy sources is the global standard and is the standard for onshore renewable energy in the United States. The approach of allowing offshore wind generators to own both generation and transmission to shore has been phased out in mature European offshore wind markets, [iii] and Massachusetts can lead this market evolution in the U.S. Separating generation and transmission will ensure the most cost-effective result in the next procurement for 1,600MW, and will reduce costs and risks related to additional development of offshore wind. Under the generator lead line (GLL) approach a leaseholder's incentive is to secure only enough transmission to develop their own lease area, even if this means underutilizing scare points of interconnection and shoreline approaches. This misalignment between a developer's incentive and the public's interest in scaling renewable energy is addressed by procuring independent offshore transmission.

The next step is designing an offshore wind procurement that can be implemented quickly utilizing available information and proven regulatory models. ISO-NE studies and offshore wind bids received to date can inform technical elements of the solicitation. The Transmission Service Agreement from the 2015 MA-CT-RI Three-State procurement provides a regulatory model initially developed for accessing terrestrial renewables and well suited for offshore wind. The independent transmission procurement can be initiated immediately, and selection can be made in early 2021, providing sufficient lead time for a subsequent generation procurement in 2022 as recommended in the 2019 Offshore Wind Study.

This framework identifies a pathway to issue a transmission-only RFP in q2 of 2020. It incorporates elements of prior Massachusetts procurements for transmission and renewable energy, models from other jurisdictions, and technical issues that need to be addressed in procuring independent offshore transmission. With this type of procurement, the Commonwealth will follow a proven route to affordable, low-impact, and predictable growth in the offshore wind sector.

The following sections provide implementable solutions to key components of an offshore transmission procurement.

1) Eligibility

Entities eligible to respond to a transmission solicitation must demonstrate that they are independent companies focused on developing transmission and are not encumbered by conflicts of interest created by interests in offshore wind generation. If an offshore wind generation owner intends to participate in the transmission solicitation, it should form a separate legal entity and demonstrate that has separated its transmission business from its generation business, if any, to prevent any anti-competitive behavior. The functional separation of generation holdings from transmission is required by the Federal

Energy Regulatory Commission. However, certain states, including Massachusetts have extended that separation and require divestment or physical business separation. Under Title XXII, Chapter 164, Section 1A, transmission providing entities are not allowed to own generating facilities. Therefore, generating companies that intend to compete to provide transmission service should be required to spin off separate entities to compete in a transmission system RFP. This is particularly applicable to companies that hold interests in offshore lease areas, as it is critical that offshore transmission equitably serve generation of varying ownership in all the offshore lease areas.

2) Scope & Process

Working within the bounds of statutory authority, the solicitation should indicate preferred outcomes while enabling flexibility for bidders to propose creative solutions that provide greatest value at lowest cost.

Identifying Points of Interconnection

The solicitation should specify preferred points of interconnection (POIs). Preferred POIs can be based in part on ISO-NE's 2019 Economic Study of offshore wind, which has identified capacities of coastal network locations[iv] and information on the viability of POIs from prior offshore solicitations. Preferred POI designations should also account for impacts of marine cabling on fisheries, the coastline, the environment and land-based abutters.

Determining Location(s) of Offshore Collector Stations

Offshore collector stations (OCSs) should be located to maximize competition between offshore wind developers. Rather than proscribing a single location for an offshore collector station, the solicitation should provide multiple potential locations for OCSs in order to maximize accessibility from lease areas, and thereby increase competition pressure among offshore leaseholders.

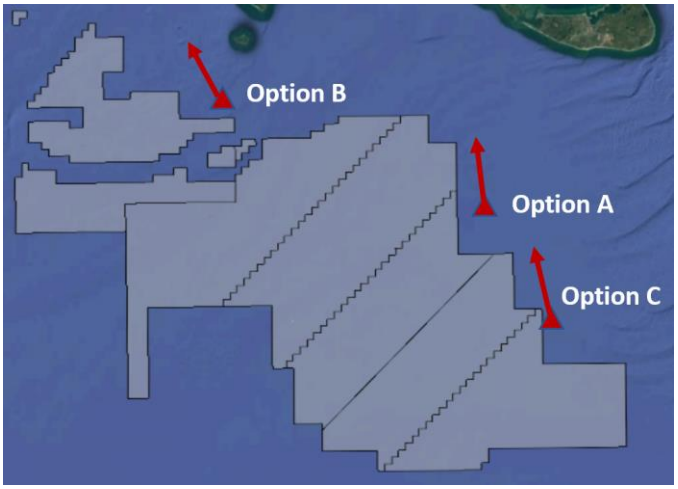
Either a market-led or a state-led approach can yield a result that stimulates competition, reduces risk and protects the environment. Anbaric recommends the market led approach because it enables greater flexibility and likely would be simpler to implement but either approach could work.

Under the market-led approach the solicitation would invite transmission bidders to propose multiple potential locations for offshore collector stations as the first phase of a two-phase procurement. Under the state-led approach the solicitation would prescribe locations for offshore collector stations, followed by a simultaneous procurement for transmission and generation connecting to the state-determined locations.

a) Market-Led Approach

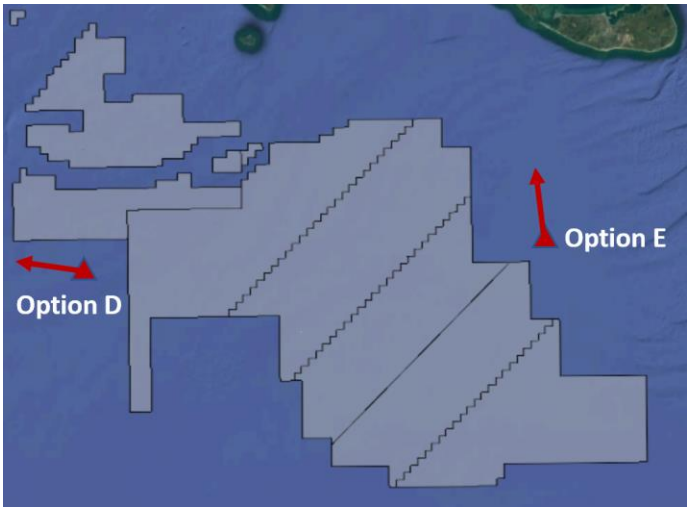
Bidders in the Transmission Procurement would propose multiple fixed price options for transmission between bidder-determined OCS locations and onshore POIs. As illustrated below in Figure 1, Transmission Bidder #1 could propose three options for locations: Option A, which is equidistant from each end of the available lease areas; Option B, which is closer to the Northwest sections of the available lease areas; and Option C, which is closer to the Southeast sections of the available lease areas. The transmission bidder would include a fixed price for each of these options in its bid.

Figure 1: Transmission Bidder #1 proposes Options A, B and C



Other bidders would propose their own fixed price options for transmission between bidder-determined offshore collector station locations and onshore POIs. For example, Bidder #2 could propose Options D & E illustrated in Figure 2 below.

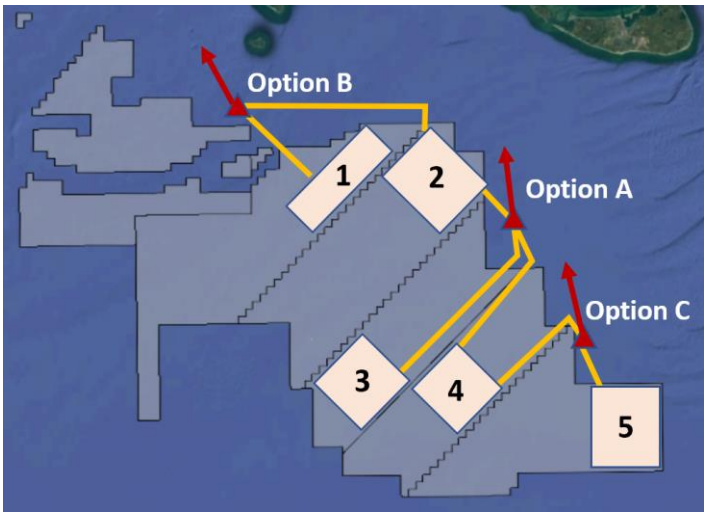
Figure 2: Transmission Bidder #2 proposes Options D & E



Massachusetts would evaluate each bidder's options considering cost, accessibility to available lease areas across proposed options, impacts on fisheries and the environment, and other factors. A single bidder's suite of options (i.e. multiple fixed price options for OCS locations and onshore POIs) would be chosen as the winner of the Transmission Procurement. For the purpose of this illustration it is assumed that Transmission Bidder #1 is the winner of the Transmission Procurement. The winning bidder would proceed to contract negotiations with Massachusetts' electric distribution companies. The contract would include a placeholder for the fixed price option (Option A, Option B or Option C depicted in Figure 1). The option selected at the culmination of the Generation Procurement (described below) would substitute for the placeholder in the final contract.

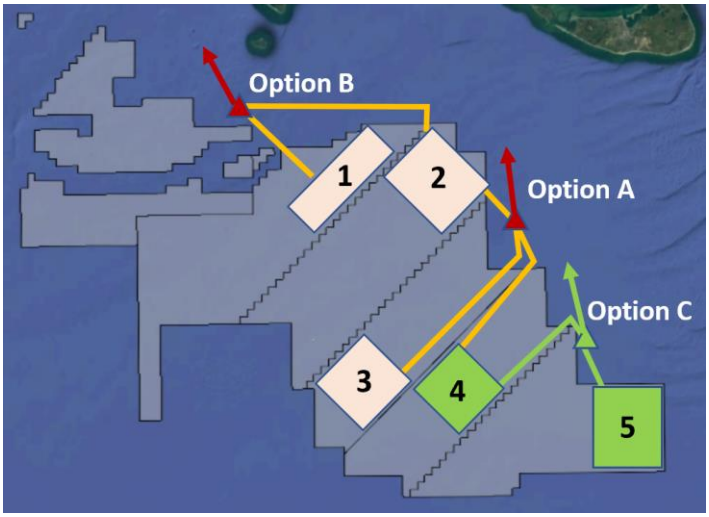
In the Generation Procurement Massachusetts would direct offshore wind leaseholders to bid to interconnect to any of the collector station locations included in the suite of options chosen in the Generation Procurement (Options A, B or C). Leaseholders could bid to connect to one or more collector station locations, as illustrated in Figure 3.

Figure 3: Leaseholders bid wind farms 1-5 connecting to collector stations included in Options A, B & C.



Massachusetts would combine costs included in wind farm bids 1-5 with the cost for the appropriate transmission option to determine the total cost of transmission plus generation pairings. This total cost would be utilized in conjunction with other evaluation factors to determine winning bidders from the Generation Procurement and to identify the particular transmission option that it would select. Figure 4 illustrates a pairing of wind farms 4 and 5 as winners of the Generation Procurement, and Option C as the ultimately selected transmission option.

Figure 4: Wind farms 4 and 5 win Generation Procurement and Option C is chosen as the transmission option.



b) State-Led Approach

Under the state-led approach solicitation would prescribe locations for offshore collector station before issuing the procurement. These prescribed locations could be determined based on surveys of generation and transmission developers or be determined by an independent consultant. Massachusetts would then simultaneously solicit 1) bids for transmission connecting offshore collector station locations to onshore POIs, and 2) bids for wind farms connecting to collector station locations. Costs for generation and transmission proposing to connect to the same offshore collector station location would be paired up to determine total costs of generation plus transmission configurations. These total costs would be utilized with other evaluation factors to determine winning bidders.

Enabling a Larger Market with Expanded Transmission Capacity

Massachusetts' transmission procurement should solicit transmission projects that meet the Commonwealth's offshore wind energy procurement goals and also provide additional transmission capacity for other customers to contract for offshore wind. Under this approach Massachusetts' utilities would serve as anchor customers on projects that would enable further development of offshore wind without ratepayer contracts.

For example, Massachusetts could utilize its 1600MW of procurement authority to contract for 800MW of transmission capacity from each of two 1200MW transmission systems. Transmission developers would sell 800MW of the 1200MW system to Massachusetts and develop the remaining 400MW of capacity at their own cost and risk.[v] This approach would enable 2400MW of transmission capacity to be built with 1600MW contracted by Massachusetts, and with 800MW of capacity available for other states, large institutions, or corporate buyers to contract directly for offshore wind. As described below, regulators in Europe enabled this type of third-party contract for offshore wind through development of independent transmission; US regulators did the same here for onshore wind.

With this expanded transmission capacity third party buyers will be able to make their own small and mid-sized procurements from generation developers. This outcome is not likely under the status quo approach due to the modularity of offshore transmission. High voltage alternating current (HVAC) transmission systems are most economical at 800MW or greater capacities, and high voltage direct current (HVDC) systems are most economical in the 1,000 MW to 1,400 MW range. These sizes are far larger than third-party buyers can support. However, by allowing transmission developers to provide surplus transmission as a platform for procurement, states can enable smaller individual purchases that in aggregate amount to a large source of demand. In European countries that developed independent transmission third party buyers have contracted directly for offshore wind in ~90MW increments[vi] and in Texas independent transmission has led to the development of over 2,000MW of wind from projects of various sizes backed by corporate power purchase agreements.[vii]

Competitive procurement open to all eligible transmission developers will ensure that as an anchor customer Massachusetts will only pay for the portion of transmission capacity allocated to Massachusetts utilities. If a developer seeks to overcharge Massachusetts for transmission capacity competitors offering lower prices will win the procurement, thus ensuring that utilities only pay for their fair share of transmission.

Technical Requirements

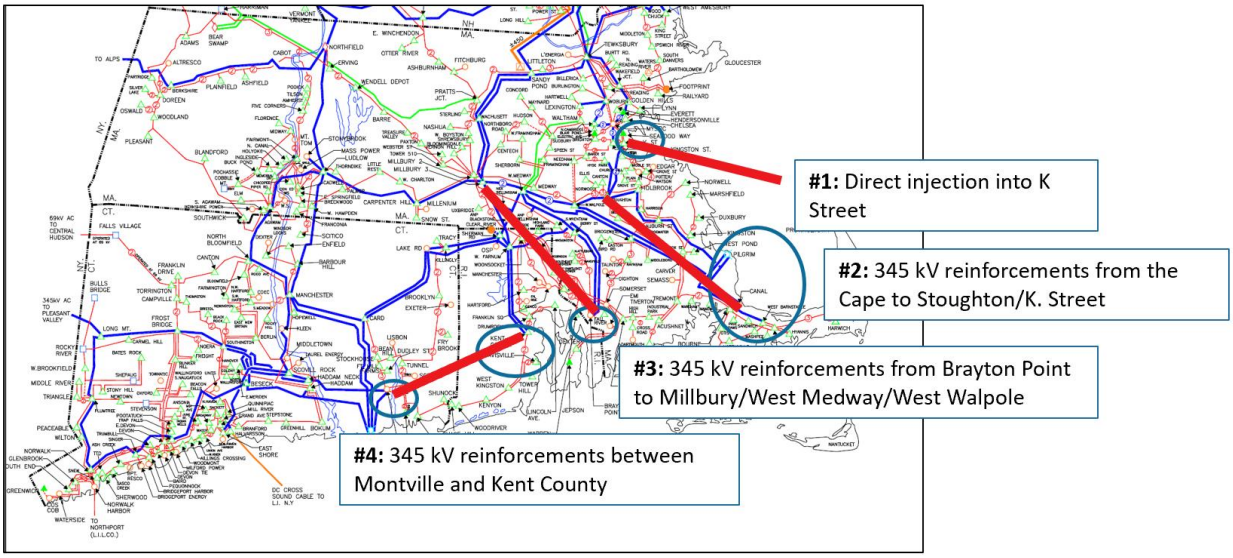
The solicitation should lay out clear technical standards and should invite bidders to propose networking capability. Standards should be based on anticipated offshore wind farms interconnecting to the transmission via array cables or export cable from a wind farm's combiner platform. Transmission bidders should be allowed to propose technical platform designs that enable direct connection of array cables and/or direct connection from an export cable from an offshore platform associated with an individual platform. As with OCS location option, transmission bidders should be able to propose these options with appropriate adjustments to pricing.

3) Cost Effectiveness

Development of independent offshore transmission is the most cost-effective mechanism for procuring reliable, low-cost offshore wind energy transmission service for ratepayers in the Commonwealth. By focusing exclusively on interconnecting offshore wind to the terrestrial grid, independent transmission can avoid risks of major upgrade costs. Under the generator lead line approach transmission typically comprises less than half of project development costs, and accordingly socially efficient transmission (i.e. using distant but high-capacity POIs) may not receive the full attention of leaseholders primarily focused on developing generation and minimizing their own interconnection costs.

The risk and cost of unanticipated interconnection upgrades is already confronting selected projects and will likely increase as accessible POIs with available interconnection capacity are used up. Feasibility Studies for interconnecting 2,400MW of capacity from selected projects into Cape Cod have estimated upgrade costs of up to $786,883,800.[viii] These estimates do not yet account for a supplemental interconnection request (QP 922) filed to increase the size of QP 829 from 1008MW to 1200MW. ISO-NE has identified major additional reinforcements to the 345kV networks running from Cape Cod to Greater Boston and other projects in southeast New England that will be required to continue interconnecting offshore wind on Cape Cod and other nearshore locations[ix] (see Figure 4). Initial estimates suggest that these projects will cost billions of dollars to complete.[x]

Figure 5: ISO-NE depiction of 345kV transmission reinforcements to interconnect offshore wind



Absent an independent procurement of offshore transmission, generators are unlikely to propose injections to locations such as K Street in Boston, as routing longer distances would make their bids more costly than other GLL bids connecting to nearshore locations. In an independent transmission procurement focusing on avoided onshore upgrades a direct injection to Boston would be viable. Available interconnection capacity remains at Brayton Point and Montville, but the access routes to each of these locations is constrained, and the estimated capacity of both locations is only 2,400MW, less than the combined 2,800MW of procurement authority for Massachusetts and Connecticut. Additional demand for offshore wind from other states and third parties, and potential future demand from Massachusetts and Connecticut means that 2,800MW should be considered a floor rather than a ceiling for demand.

In evaluating the cost effectiveness of independent transmission, Massachusetts must take account of avoiding billions of dollars of upgrades that will be caused by continuing the generator lead line approach. Incorporating avoided future costs into cost effectiveness determinations is an established practice in Massachusetts. For example, the determination of cost effectiveness of the Vineyard Wind project included costs savings of a 20-year contract for energy and Renewable Energy Certificates in comparison to projected future costs.[xi] Further, the Department of Public Utilities stipulated that it would "consider in our cost-effectiveness analysis all costs and benefits associated with [a proposed contract], including the non-price benefits that are difficult to quantify, and including costs and benefits of complying with existing and reasonably anticipated future federal and state environmental requirements."[xii]

With customary information from bidders including interconnection requests and related studies, Massachusetts can work with ISO-NE to rank projects by avoided transmission costs. ISO-NE's Economic Study and ISO-NE studies of prior projects can inform this analysis and provide an evidentiary record to demonstrate avoided transmission costs.

4) Risk Management

There are two principal categories of risk related to interconnecting offshore wind: project risk and procurement model risk. Separating transmission from generation and utilizing performance incentives will reduce both types of risk.

<u>Project Risk</u>

Risks related to interconnecting individual projects include unexpected interconnection costs, cable routing issues, and synchronization of project stages. Separating generation and transmission ensures that interconnection cost and cable routing are given the independent attention that they deserve. Procuring transmission independent of generation will enable companies that specialize in managing transmission projects to manage interconnection and routing risks and will provide Massachusetts with a broader set of proposed transmission solutions than is available under a generator lead line (GLL) approach.

Synchronization risk can be address with staggered project completion timelines and performance incentives. Projects can be sequenced so that the in-service date of the offshore transmission precedes the in-service date of the offshore generation by 6 to 12 months to provide a cushion for unanticipated project delays. Transmission developers can be incented to complete their projects on schedule by

providing return on equity (ROE) adders if projects are completed ahead of schedules, and ROE penalties if they are late. Generator claims that they must be compensated for delays in transmission completion is a new demand in the US regulatory context, and experience with independent transmission in the United States, Europe and other jurisdictions shows that planning and effective risk management approaches are sufficient to mitigate project-specific risk. It bears noting that synchronization risk will have to be addressed for onshore upgrades to strengthen coastal POIs or upgrade inland networks, where the risk of delay is likely greatest.

Procurement Model Risk

More broadly, continuing the current approach will lead to a proliferation of generator lead lines that pose an existential risk to the industry. Under the generator lead line approach developers are incented to interconnect their individual project at lowest cost, even if their interconnection underutilizes a valuable cable route or POI and makes the next project(s) prohibitively expensive. This existential industry risk is not theoretical, as a lack of attention to transmission has crippled onshore wind development in Maine, and interconnection costs for recently selected offshore wind projects proposing POIs on Cape Cod raise the specter of a repeat in the next round of procurement.

5) Regulatory Model

A Transmission Service Agreement between electric distribution companies (EDCs) and a developer of separately procured transmission could be based on a performance-based tariff outlined in the 2015 MA-CT-RI Three-State procurement. Specifically, the "Qualified Clean Energy via Transmission Project Under a Performance-Based Tariff Containing a Qualified Clean Energy Delivery Commitment Model" could be simplified by removing the Delivery Commitment, which would make it much more straightforward. Working from the language in Appendix E of the RFP, the framework would consist of the following:

> The Transmission Developer Performance Based Tariff
>
> The Performance Based Tariff would recover the transmission revenue requirement through the EDCs and other load-serving entities in the participating New England states. Under the Performance Based Tariff, the EDCs would only be obligated to pay the transmission developer, through non-by passable FERC approved transmission charges collected from all end use customers, the accepted bid price, in exchange for the transmission developer's agreement to achieve performance criteria for providing transfer capability for offshore wind energy to an ISO-NE node. The obligation of the EDCs to collect and pay the accepted bid price would be reduced in any period following a period in which the performance criteria for provision of transfer capability for offshore wind energy was not fully met. The Performance-Based Tariff would provide for a partial or full credit against the price that the EDCs would otherwise pay during such a period.

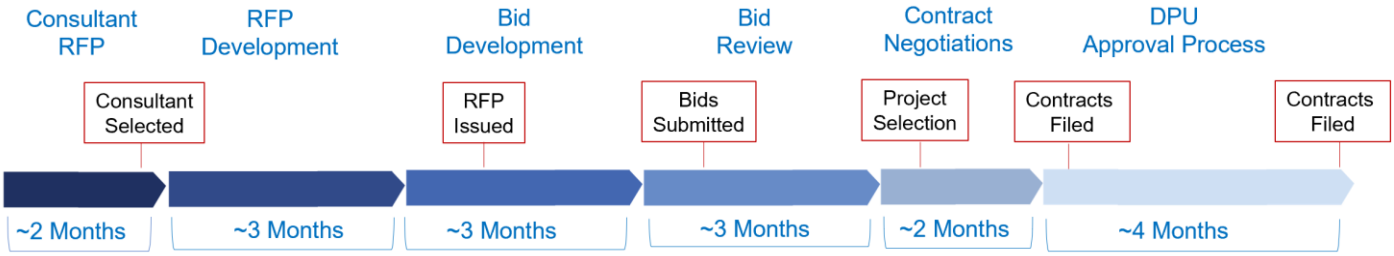
To minimize potential financial conflicts Massachusetts should retain an independent third party to assist in developing, implementing, and evaluating the procurement. EDC holding companies that include transmission development arms may seek to compete in an independent offshore transmission procurement, and the companies should therefore be removed from the selection process. As incumbent transmission owners potentially responsible for onshore upgrades, EDCs will likely face

internal conflicts of interest that could undermine the objective of reducing overall transmission costs. Additionally, components of EDC holding companies are partners with offshore wind developers, threatening to undermine the objective of developing transmission solutions that treat leaseholders equitably.

6) Timeline

A procurement for independent transmission could be carried out within 15 months. The timeline below is based on prior procurements in Massachusetts and other New England states, and would enable the Commonwealth to select independent transmission by Q2 of 2021 as recommended by the Offshore Wind Study. Under the market-led approach to determining locations of offshore collector stations, the Transmission Procurement would be followed by a Generation Procurement in late 2021. Under the state-led approach to determining locations of offshore collector stations a simultaneous procurement for transmission and generation could be carried out in late 2021. Figure 6 describes the timeline.

Figure 6: Timeline



7) Generator Lead Lines

Generator lead lines cannot be included in Step 4, as generators' commercial interests create irreconcilable conflicts with Massachusetts' ability to cost effectively procure the next 1600MW and achieve long-term decarbonization objectives. Generators make greater returns when their projects include project-specific generator lead lines, and any process that seeks to compare GLLs with connection to independent, shared offshore transmission will be undermined by generators' commercial interest in controlling transmission. With only 4 companies holding leases there is real risk that common commercial interest[xiii] in controlling transmission exceeds competitive pressures to bid an accurate price to interconnect to the shared collector system. The few offshore wind developers that hold wind lease areas today could exercise market power and inflate prices for use of independent offshore wind infrastructure in order to make project-specific lead lines appear more attractive. If generators are asked to bid their costs for transmission and generation separately, there is no way to isolate and verify the transmission cost component of a GLL, as generators could shift costs to the generation side of the project to make their transmission appear cheaper. Without a means of verifying the accuracy of generators' bids, Massachusetts cannot be certain of its ability to carry out a fair comparison of independent transmission versus generator lead lines. A generator's incentive is to develop its own lease area and not to facilitate offshore wind development beyond what the generator's lease area can hold. This incentive will lead developers to prioritize near-term development and their own interest above all else.

Conclusion

The need for independent offshore transmission is clear, and Massachusetts can lead the evolution of the US offshore wind market with a procurement in 2020 that is easy to implement and builds on established precedent. Independent offshore transmission will increase competition for both transmission and generation, optimize interconnection to the onshore grid, and reduce impacts on fisheries, the environment and shoreline communities.

Massachusetts and the region cannot risk backing into major onshore transmission upgrades that could take a decade to complete. The last major transmission projects in Southeast New England – the New England East West Solutions (NEEWS) projects – took 6.3 to 9 years for the three project components at costs more than double the original estimates.[xiv] Pausing offshore wind development for this long would hamstring the Commonwealth's efforts to achieve climate goals, and would hinder efforts to attract elements of the offshore wind supply chain to the region. Offshore wind in Massachusetts and New England is at a critical juncture, as looming transmission constrains pose a real threat to the future of the industry.

Endnotes:

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[i] Available at: https://www.mass.gov/doc/offshore-wind-study/download

[ii] As described in greater detail in endnote viii, elective transmission upgrades to accommodate Massachusetts' first two offshore wind projects could cost up to up to $786,883,800.

[iii] European countries all moved from generator lead lines to planned transmission as their offshore wind sectors matured, including most recently the United Kingdom, which recently committed to "develop coordinated solutions for transmission networks linking the windfarms to the onshore grids, while exploring the options for meshed grids rather than radial links." See: https://www.ofgem.gov.uk/system/files/docs/2019/12/fwp_programme_2020_22_web.pdf

[iv] See: https://www.iso-ne.com/static-assets/documents/2019/05/a2_2019_economic_study_draft_scope_of_work_and_high_level_assumptions.pptx

[v] It bears noting that this approach would mirror the recently approved contract between MA EDCs and Mayflower Wind enables Mayflower to develop additional capacity at its own risk, and the interconnection is for 1200MW, 400MW more than the 800MW sold to MA EDCs.

[vi] Belgium and the Netherlands both developed independent transmission, which has enabled third party customers to purchase sub-transmission quantities of offshore wind, including 92MW for Google (https://www.offshorewind.biz/2019/09/20/google-buys-norther-offshore-wind-power/) and 90MW for Microsoft (https://cleantechnica.com/2019/05/28/microsoft-announces-new-offshore-wind-energy-agreement-in-the-netherlands/).

[vii] See Corporate Renewable Procurement and Transmission Planning, 2019, available at: https://windsolaralliance.org/wp-content/uploads/2018/10/Corporates-Renewable-Procurement-and-Transmission-Report-FINAL.pdf

[viii] ISO-NE's Feasibility Study for QP 828 identifies $226,949,000 in upgrade costs with a -50% to +200% range ($113,474,500 to $680,847,000) to interconnect three projects planning to connect to Cape Cod. QP 829 estimates $35,345,600 in upgrades with a -50% to +200% range ($17,672,800 to $106,036,800), in addition to upgrades from QP 828.

[ix] ISO-NE's 2019 Economic Study finds that 5,800MW could be injected at nearshore POIs (Bourne/Canal/Pilgrim, Brayton Point, Kent Co./Davisville, and Montville). The study additionally includes a 1,200MW injection directly into Boston at the request of NESCOE (https://www.iso-ne.com/static-assets/documents/2019/04/a2_nescoe_2019_economic_study_request_presentation.pptx). However, routing of offshore wind to Boston is unlikely in the absence of independent transmission, as offshore wind generators will consider the longer run to Boston uncompetitive as part of a bundled transmission plus generation bid in comparison to competitors' interconnections to nearshore locations. This is evidenced by the lack of offshore wind interconnection requests into Boston. Detailed assumptions of ISO-NE's 2019 Economic Study available here: https://www.iso-ne.com/static-assets/documents/2019/05/a2_2019_economic_study_draft_scope_of_work_and_high_level_assumptions.pptx.

[x] ISO-NE 2019 Economic Study finds that injecting greater than 2,400MW in the Bourne/Canal/Pilgrim region could require reinforcing the 345kV corridor from Canal to Stoughton/K Street (see slide 6 of detailed assumptions https://www.iso-

ne.com/static-assets/documents/2019/05/a2_2019_economic_study_draft_scope_of_work_and_high_level_assumptions.pptx). Planned injections from Vineyard Wind I (800MW), Mayflower Wind (1,200MW, of which 800MW contracted to MA), and Park City Wind (804MW) total 2,804MW. The reinforcement identified by ISO-NE would run ~50 miles aboveground from Canal to Stoughton, and ~18 miles underground from Stoughton to K Street. At recent average $/mile costs to construct overhead 345kV transmission in New England ($12M/mile), the 50-mile overhead portion would cost ~$600 million. At recent average costs to construct underground 345kV transmission in New England ($19.5M/mile) the 18-mile section would cost ~$351million. The total Canal-K Street cost would be ~$951 million. The 2019 Economic Study identifies an additional reinforcement of the 345kV network from Brayton Point to Millbury/West Medway/West Walpole and a brand new 345kV right of way from Montville to Kent County, and these projects combined could total well in excess of an additional $1 billion. Average costs from: https://www.iso-ne.com/static-assets/documents/2015/02/a2_nht_greater_boston_cost_analysis_public.pdf

[xi] See D.P.U. 18-76; D.P.U. 18-77; D.P.U. 18-78available at: https://fileservice.eea.comacloud.net/FileService.Api/file/FileRoom/10617250.

[xii] I.d.

[xiii] Despite competitive pressures, generators united opposition Anbaric's application to the Bureau of Ocean Energy Management for an independent offshore grid in federal waters off of New York and New Jersey. See: https://www.regulations.gov/docket?D=BOEM-2018-0067

[xiv] See: https://www.iso-ne.com/static-assets/documents/2015/02/a2_nht_greater_boston_cost_analysis_public.pdf

Supplemental Responses to Stakeholder Questions

The Offshore Wind Procurement Framework provided above is the most cost-effective mechanism for procuring reliable, low-cost offshore wind energy transmission service for ratepayers in the Commonwealth. The framework utilizes the authority provided through Section 21 of the Act to Advance Clean Energy and is consistent with the legislative intent to procure offshore transmission independent of generation.

The following responses supplement the framework with responses to DOER's specific questions.

1. Is there a structure or structures that would allow for a competitive and successful independent offshore wind transmission solicitation given the authority provided through Section 21 of the Act to Advance Clean Energy?

Please provide comment on the following scenarios and/or provide any additional scenario(s):

a. *No separate independent transmission solicitation but a solicitation for 1600 MW of offshore wind energy generation with an extended time to develop proposals, including the pairing of multiple projects and/or independent offshore transmission projects.*

Procuring offshore wind without a procurement for separate, independent transmission would diverge from the path first established by the Legislature and followed by DOER itself. The 2018 Act to Advance Clean Energy directed DOER to consider a procurement of transmission separate from generation by authorizing DOER to "require distribution companies to jointly and competitively solicit and procure proposals for offshore wind energy transmission…that may be developed *independent of*…such offshore wind generation…." (emphasis added). The Legislature then specified the type of transmission that it was focused on: "transmission service...made available for use by more than one wind energy generation project." These two steps, taken together, impose a requirement to "consider" a procurement of a specific type of transmission for offshore wind that is separate from generation.

The DOER followed this "consider" requirement and developed its 2019 Offshore Wind Study. That document confirmed the Legislature's intent to "consider" the procurement of transmission separate from generation and determined that:

> "The only feasible way to evaluate the benefits and cost effectiveness of independent transmission is to undertake a separate one-time only process prior to undertaking a solicitation for generation." [1]

After reaching such a conclusion at the direction of the Legislature, it would be difficult to justify rejecting the recommendation of an evaluation sought by a Legislature itself interested in procurement of independent transmission. Procuring bundled generation and transmission through offshore wind generators would contradict considered steps taken by the Legislature and DOER over the last two years and fail to realize – let alone fully assess – the benefits of independent transmission.

b. *A solicitation for 1600 MW of transmission capacity that requests project proposals that define their own technical specifications for 1600 MW of offshore wind energy generation. Subsequent*

[1] DOER, 2019 Offshore Wind Study, page 17.

offshore wind generation solicitation(s) requires bidders to submit two bids: one with a Generator Lead Line (GLL), and one that interconnects to the selected transmission project(s). All bids are evaluated together.

This approach is similar to the approach described in the Framework, with the notable exception that offshore generators should not be able to submit GLL bids due to unreconcilable commercial conflicts.

Generators' commercial interests in continuing the GLL model rather than an infrastructure first model will lead to their under-bidding the cost of the generator lead line or shifting transmission costs to the generation part of the project in order to favor preferred business model. In such a context, meaningful comparison of bids (independent transmission vs. a generator lead line proposed by a generator) becomes impossible. Further, GLLs are inconsistent with legislation authorizing transmission that would serve at least two offshore wind generators.

In relation to technical specifications, allowing transmission bidders to define technical and geographic specifications for how the wind farms (more than one) will connect to an offshore collection platform is a practical approach that draws on precedent from mature European markets. In the Netherlands, Germany, and Belgium transmission is developed separately from generation, and transmission owners provide technical standards for interconnecting wind farms. A similar approach can be utilized in Massachusetts.

c. A solicitation for offshore wind generation that requires bidders to bid the pricing of transmission and generation separately. A project is selected, and then a subsequent solicitation is issued that allows for independent transmission developers to compete to provide the selected project with transmission service at a lower price.

This approach is inconsistent with the intent of the legislation and the findings in the 2019 DOER Study (See response to 1a.) and suffers from the same problems of incentives described above in response to question 1b.

More broadly, Massachusetts must recognize that meeting the Commonwealth's (and the rest of New England's) climate goals will depend on significant additional buildout of offshore wind. A 2019 study by the Brattle Group identifies the need for 43GW of offshore wind to meet decarbonization objectives across New England.[2] Approaches reliant on GLLs do not consider the significant transmission challenges and planning that will be required to bring significant quantities of wind to shore. Continuing to consider only the next increment of development will make it more difficult to achieve climate goals. In contrast, planning and building transmission in advance and separate from generation will enable offshore wind deployment levels needed to achieve decarbonization commitments. Independent transmission to serve this next 1600 MW must be cost effective now and must avoid impeding further offshore wind development.

2. Under DOER's authority granted by the Act to Advance Clean Energy how can the benefits of independent offshore transmission be best captured through a solicitation?

a. Is there a minimum capacity required to capture benefits?

[2] See: https://www.brattle.com/news-and-knowledge/news/brattle-study-achieving-new-englands-ambitious-2050-greenhouse-gas-reduction-goals-will-require-keeping-the-foot-on-the-clean-energy-deployment-accelerator

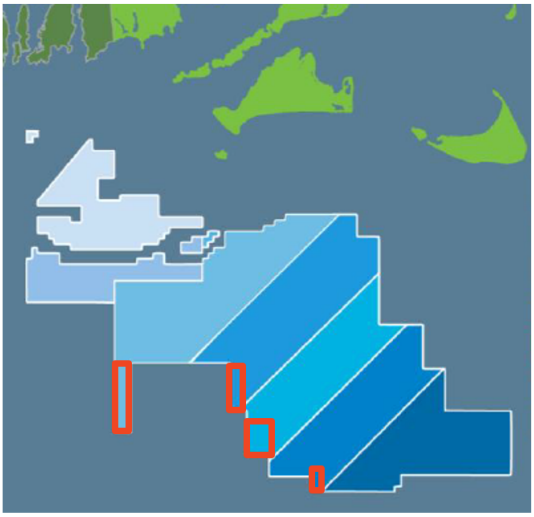
Independent transmission at any scale provides benefits by increasing competition for transmission, and by enhancing competition among the generators. A well-planned transmission system designed and developed in advance will also mitigate 'interconnection risk' faced by individual wind developers as they proceed through the ISO-NE interconnection study process.

There is no minimum capacity at which independent offshore wind provides benefits, there are economies of scale, and benefits become greater as demand for offshore wind becomes greater. As stated in response to question 1c, Massachusetts would be wise to consider the Commonwealth's and New England's long-range climate goals as it plans the next 1600 MW of offshore wind transmission.

b. Are there benefits that would be stranded without doing a solicitation for 1600 MW of independent offshore wind transmission?

Ceding development of offshore transmission to generator lead lines risks stranding offshore wind resources. As lease areas are developed there are likely to be residual lease site areas smaller than the standard 400MW project increment (see figure 1). In the absence of independent transmission these residual areas would either be developed at higher cost (due to the use of oversized transmission) or will not be developed at all. Further, developing GLLs serially increases risks that individual projects will fail, thus stranding (or at least delaying) offshore wind. Permitting transmission lines through coastal communities is challenging and places every single project at risk. Additionally, the ISO-NE interconnection study process leads to highly uncertain costs that may change by orders of magnitude as projects advance through the process. One way or another, the costs of these risks are borne by the rate payers of Massachusetts. By conducting a procurement for 1600MW of independent offshore transmission Massachusetts can reduce the risk of stranding residual lease areas and reduce risk of permitting and interconnecting multiple GLLs serially. Higher capacity transmission systems can carry more energy on fewer transmission lines in narrower corridors, thus minimizing impacts on fisheries and the environment. In order to reduce the risk of stranding offshore wind resources Massachusetts should utilize the full authorized 1600MW of procurement authority to develop larger transmission projects.

Figure 1: Illustration of residual lease site areas that may be uneconomic to develop without independent transmission



3. Can these benefits be evaluated and included in a total cost and benefits analysis?

a. What information would need to be provided in a Request for Proposals (RFP) and/or what information should an RFP request to better define the benefits and costs of the independent offshore wind transmission proposals?

As described in the procurement framework, established approaches for determining cost-effectiveness can be applied to independent offshore transmission. A significant component of cost effectiveness determinations should be based on avoided transmission costs. Accordingly, respondents should provide information on the total cost of a project, including the upgrade costs of fully delivering a project's

capacity without curtailment. This information can be provided through ISO-NE interconnection requests and related studies, and/or additional third-party studies.

Additionally, the competitive process for transmission will incentivize bidders to submit low price bids that show innovative financing mechanisms, including lower cost of capital. For example, in ISO-NE's Boston 2028 procurement for transmission to replace the retiring Mystic Generating Station, Anbaric proposed a 7.9% Return on Equity (ROE), lowest ever in the region for a transmission project and dramatically below that of regulated transmission projects, which can run over 11% in New England.[3] To further incent competitive financing bidders should be required to disclose the ROE of their projects.

[3] See: https://anbaric.com/press-release-mystic-reliability-wind-link-new-details-released-on-plan-to-bring-renewable-energy-directly-to-boston-area/

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April 21, 2020

Marian Swain
Energy Policy Analyst
Massachusetts Department of Energy Resources
100 Cambridge St., Suite 1020
Boston, MA 02114

Subject: Second Request for Comment on Massachusetts Offshore Wind Transmission Issued by DOER

Dear Ms Swain,

This letter is submitted on behalf of Shell New Energies US LLC and Shell Energy North America (US), L.P. (collectively, Shell) [1] in response to the Massachusetts Department of Energy Resources (DOER)'s second request for comment on offshore wind transmission.

1. Background

DOER noted that responses to the January 15, 2020 Request for Comment and the March 3, 2020 technical conference raised important questions concerning offshore wind transmission. DOER consequently invited responses from stakeholders to specific questions posed by the Department. As a BOEM leaseholder and an experienced renewable generation developer, Shell is committed to ensuring the success of Massachusetts' Offshore Wind (OSW) program and is pleased to offer the following comments.

2. Responses of Shell to DOER Stakeholder Questions

Questions posed by DOER are in italic, followed by the Shell Response.

1. Is there a structure or structures that would allow for a competitive and successful independent offshore wind transmission solicitation given the authority provided through Section 21 of the Act to Advance Clean Energy2? Please provide comment on the following scenarios and/or provide any additional scenario(s):

a. No separate independent transmission solicitation but a solicitation for 1600 MW of offshore wind energy generation with an extended time to develop proposals, including

[1] Shell Energy North America (US). L.P. and Shell New Energies US LLC are individually referred to herein as "Shell Energy" and "Shell New Energies," respectively, and collectively as "Shell."

the pairing of multiple projects and/or independent offshore transmission projects.

Shell Response: There is little incentive for OSW projects to pair up. It is almost impossible for both projects to receive the same benefit. The projects also depend heavily on the systems being delivered at the right time and being reliable over the asset life (a prime driver of Levelized Cost of Energy). This is the reason that in markets such as the UK, projects elect to build the transmission system for their own projects prior to selling it to the offshore transmission operator (OFTO). Shell believes it is unlikely that two or more wind farms will "pair" together for a common transmission link or shared point of interconnection.

b. A solicitation for 1600 MW of transmission capacity that requests project proposals that define their own technical specifications for 1600 MW of offshore wind energy generation. Subsequent offshore wind generation solicitation(s) requires bidders to submit two bids: one with a Generator Lead Line (GLL), and one that interconnects to the selected transmission project(s). All bids are evaluated together.

Shell Response: The success of this strategy depends on the criteria used to evaluate the alternative offshore generation bids. For example, Shell believes that the evaluation should be weighted toward the efficient use of offshore transmission and beach landings for offshore cables.

c. A solicitation for offshore wind generation that requires bidders to bid the pricing of transmission and generation separately. A project is selected, and then a subsequent solicitation is issued that allows for independent transmission developers to compete to provide the selected project with transmission service at a lower price.

Shell Response: This option seems similar the OFTO system in the UK. This is a good idea in principle. However, transmission systems realized to date in the UK are still "selfish" due to the way onshore grid connections are identified and upgrades paid for. There is also a preference in the UK for the generator to build the required transmission due to risk profile for non-deliverability and good life cycle design. Because the generator holds most of the risk for the non-performance of the transmission operator, bias could be introduced between the project developer and the transmission developer relationship and impact the approach to the required work.

2. Under DOER's authority granted by the Act to Advance Clean Energy how can the benefits of independent offshore transmission be best captured through a solicitation?
a. Is there a minimum capacity required to capture benefits?

Shell Response: Yes, Shell believes that any solicitation should be driven by the delivery of cost-effective onshore capacity with a route offshore that is achievable for the full volume; Shell recommends above 2GW capacity.

b. Are there benefits that would be stranded without doing a solicitation for 1600 MW of independent offshore wind transmission?

Shell Response: Significant parts of the ISO-NE grid are unsuitable for the injection of a large amount of wind generation. This certainly includes Cape Cod. Shell believes the best approach is to use initial

projects to create the development of a large injection backbone, focusing on the best point of access for offshore power to the grid.

3. Can these benefits be evaluated and included in a total cost and benefits analysis?
a. What information would need to be provided in a Request for Proposals (RFP) and/or what information should an RFP request to better define the benefits and costs of the independent offshore wind transmission proposals?

Shell Response: DOER and ISO-NE should review plans to permit and inject the total Commonwealth targets into the system. Shell also encourages DOER to investigate how to improve the transmission interconnection queue process with ISO-NE. To evaluate the bids, the Commonwealth must estimate the additional costs to reinforce the onshore grid to allow the connection of the additional wind farms and their ability to receive necessary permits. This is particularly important for the overall success of a multi-year program, as the initial projects are likely to take the easiest route to shore, potentially making impossible future connections in large areas. In the existing system, grid reinforcements are at the expense of the generator. However, the costs are prohibitive and insufficient places have been identified to land all the wind farm export cables. To be effective, this effort must also define cost allocation for these upgrades.

3. Conclusion

Shell appreciates the opportunity to provide its views on these important questions. In sum, Shell encourages the Commonwealth to establish well-planned, backbone transmission infrastructure. By working backward from the on-land considerations from landing sites to substations, and then expanding to address the at-sea infrastructure, the Commonwealth will best be able to recognize the inherent system limitations and reduce the overall capital costs of the implementation of the Commonwealth's offshore wind mandate.

Respectfully submitted,

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General Manager, Americas Offshore Wind
Shell New Energies LLC

Tamara Nameroff
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Tufts Power Systems and Markets Research Group
Tufts University School of Engineering
The Fletcher School of Law and Diplomacy

Massachusetts Department of Energy Resources
100 Cambridge Street
Suite 1020
Boston, MA 02114

Date: April 21, 2020
Attn: Marian Swain, Energy Policy Analyst
Subject: Second Round Comments on Offshore Wind Transmission

Ms. Swain:

In response to a second request for comments on offshore wind transmission from the Massachusetts Department of Energy Resources (DOER), a team of students and faculty mentors at Tufts University submits these comments. This work builds upon our first round of comments and incorporates insights from additional independent analysis, the technical conference co-hosted by the DOER and the Massachusetts Clean Energy Center (MassCEC) on March 3, 2020, and consultation with key industry players.

Best regards,

Tufts Power Systems and Markets Research Group

Submission Contents

1. INTRODUCTION

The Tufts University Power Systems and Markets research group provides public information on the global transition to renewables.[1] In recognition of the Massachusetts Department of Energy Resources (DOER) 2020 requests for comment regarding offshore wind (OSW) transmission, this report focuses on the Wind Energy Areas (WEAs) Offshore Massachusetts and Rhode Island and their role in ISO New England's (ISO-NE) transition to renewables.

Our analysis is predicated on the belief that the future electricity grid will require systems-level upgrades both onshore and offshore in order to reach our stated goals for a carbon-neutral 2050. The necessary build-out of interconnections between these two grids (onshore and offshore) is unprecedented in scale and speed in the United States. Since 2018, Massachusetts has procured two 800-megawatt (MW) offshore wind projects that will both be located within federal waters. During this time, New York, Connecticut and Rhode Island have also procured similarly sized projects within the WEAs Offshore Massachusetts and Rhode Island for a total of over 4,000 MW. In 2019 alone, over 7,000 MW of offshore wind was procured by states up and down the East Coast, for total U.S. commitments of over 12,000 MW. At this rate, the size and speed of OSW installations could overwhelm and congest our current land-based coastal grid, damaging the industry's reputation and short-changing its growth potential. To avoid these issues—and as noted in Tufts' previous submission to the DOER—there are four externalities that DOER must consider as it evaluates transmission proposals. Quantitative analysis of these externalities is the subject of a forthcoming white paper by the Tufts research group.

- **Sustainability of the OSW Industry:** Massachusetts aspires to achieve net-zero emissions by 2050. While offshore wind is poised to play a major role in these efforts, its ultimate relationship to the overall energy system remains to be determined. Stakeholder engagement identifying objectives for the regional energy system in 2050 will set up the industry for success. In acknowledgement of the tension between the objectives to move quickly and to move thoughtfully, we recognize the need for an adaptive management approach that allows the earliest projects to move forward. At the same time, the exploration of independent systems-level OSW transmission and grid integration must progress as quickly as possible.
- **Grid Performance:** Reliability, resilience, and redundancy are essential to a functioning grid and must be weighted similarly to short-term ratepayer benefits in any serious decision-making framework. Networked offshore connections would provide more paths for each developer to deliver power to shore.
- **Environmental Impacts:** By channeling the generated power into fewer transmission corridors, the OSW industry could reduce impacts to the benthic environment, fisheries, and marine mammals.
- **Social Impacts to Coastal Communities:** Reducing the total number of export cables would result in fewer landfall locations and less disruption to coastal communities. Additionally, a systems-level approach would lend itself to a broader and more comprehensive stakeholder engagement process, which could prioritize equitable distribution of these lines. Low-income communities and communities of color are disproportionately required to bear the social costs of facilities deemed undesirable by the public. In our view, a regionally coordinated offshore transmission network would encourage stakeholder engagement by driving a discussion around efficient and equitable utilization of points of interconnection (POIs).

These four externalities motivated our group to develop two interconnection scenarios for full build-out of the WEAs Offshore Massachusetts and Rhode Island (see Section 3.2). These scenarios help visualize the impact of different offshore transmission topologies. Envisioning networked offshore transmission as a natural part of the

1 Any and all views expressed herein represent the opinions of Power Systems and Markets seminar participants and do not represent official positions of Tufts University or its Schools.

build-out process (Scenario 2) is currently hindered by the Massachusetts 83C framework for solicitations, which limits interconnection approaches to 1,600-MW increments. While this framework is set up to facilitate learning on a project-by-project basis, the increasing speed of project development urgently requires a roadmap that considers the full build-out.

1.1. Massachusetts Department of Energy Resources 83C Solicitation Process

The consideration of an independent transmission solicitation is predicated on the idea that separating transmission projects from generation projects could deliver a more desirable and efficient OSW transmission system. Separating transmission from generation opens the opportunity to bundle transmission for multiple generation projects into transmission corridors that reduce construction time, environmental impacts, and cost for the WEAs overall. An independent transmission system can also strategically utilize onshore POIs to reduce the need for upgrades to the land-based grid. With proper legislation, an independent transmission system could stabilize interconnection costs for OSW developers over the long term, thereby ensuring the economic sustainability of the OSW industry in the region.

Independent transmission benefits the system when it is planned and built with the full build-out of the WEAs in mind; acquiring transmission incrementally precludes that possibility. The DOER is required to operate within the 83C solicitation process, which mandates bids with maximum capacities of 1,600 MW. This process imposes two limitations on the transmission system. First, it caps the capacity of an individual corridor at 1,600 MW, providing minimal opportunity for bundling. Second, it prevents more than one corridor of reasonable size from being proposed at a time. This forces the system to be planned and built incrementally. Under this framework, the benefits of a network can only be considered as externalities at each step. For the market structure to adequately capture the benefits of a networked offshore transmission system, the limits imposed by the 83C solicitation process must change. Considering an independent transmission solicitation without allowing for the possibility of a networked system undermines the intentions of the independent system.

The comments and analysis at the center of our response consider a networked grid, referred to as Scenario 2. The hypothetical scenario uses four high voltage direct current (HVDC) corridors with 2,400 MW capacity each to deliver the approximately 8,000 MW of yet-unaccounted-for generation in the WEAs to shore. The capacities of the HVDC corridors make Scenario 2 incompatible with the 83C solicitation process. The networked grid onshore took over 130 years to evolve; based on the speed of OSW bids, and the magnitude of states' renewable goals, the offshore grid and its integration with the land-based grid will not have nearly that kind of time to mature organically. A systems-level plan for this offshore grid and an independent transmission solicitation structure which internalizes the benefits of a networked system are necessary to ensure the health of the industry as the WEAs build to scale.

1.2. Interconnection Considerations: ISO-NE Queue and Regional Limitations

In order to interconnect with the grid, generators must apply to join the interconnection queue. ISO-NE then studies the project, its effects on the grid, and any system upgrades needed to absorb the power. This queue is public—it allows developers to see how many projects are filing for interconnection and where they plan to inject their power. The queue is especially useful in analyzing potential offshore transmission networks because the number of accessible and cost-effective POIs is limited.

Since 2008, ISO-NE has provided an annual regional electricity outlook report. These reports contain metadata on the interconnection queues for each year. While approximately 70% of the queue tends to withdraw before coming to fruition,[2] the types and quantities of proposed generation reveal the industry trajectory and trends in

2 ISO New England, Inc. 2016-2020 Regional Electricity Outlook. https://www.iso-ne.com/about/regional-electricity-outlook/.

future generation. Figure 1 shows the most recent five years of proposed generation by type in the ISO-NE interconnection queue. Each of the graphs is reported in MW and scaled with respect to the total generation in the 2020 interconnection queue, which amounts to approximately 20,900 MW. In the last two years, the scale of OSW proposals has come to dwarf that of land-based wind proposals. Despite the pause in procurements, another 4,000 MW of OSW was proposed for study in the last year alone.

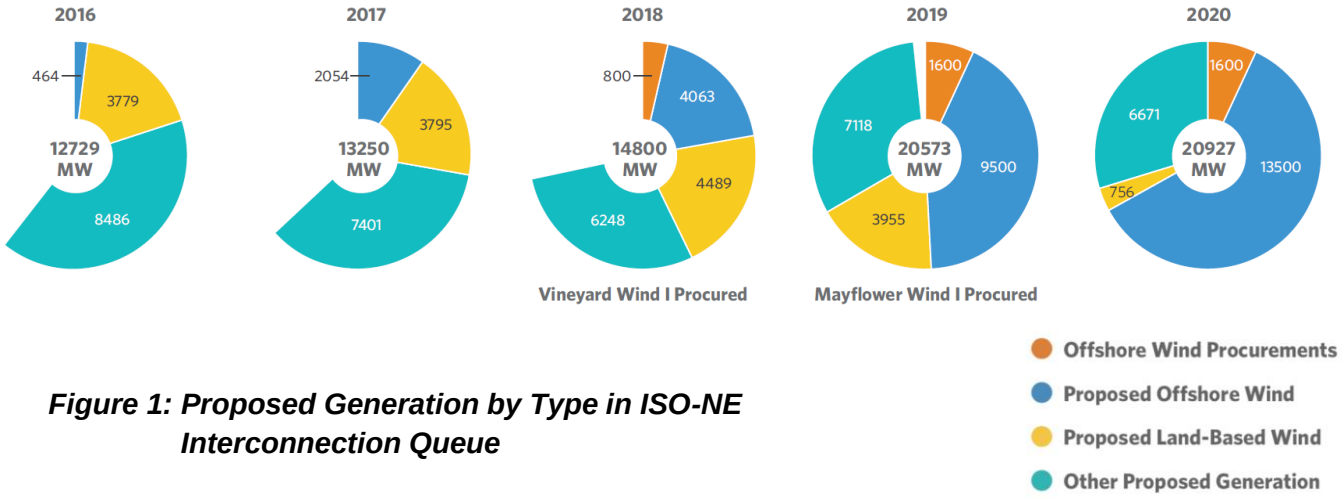


Figure 1: Proposed Generation by Type in ISO-NE Interconnection Queue

We recognize that if interconnection is handled improperly, it could hamstring the OSW industry before its full potential is realized. The ISO-NE queue is a prominent target for transactional gamesmanship within the energy industry. The eagerness of developers to claim a spot should be a clear indicator to regulators that accessible and economical POIs are a precious resource. Determining interconnection on a project-by-project basis can result in sub-optimal utilization of onshore resources. Table 1 presents a list of the most accessible POIs grouped by region using the preliminary results from ISO-NE's 2019 economic studies.[3]

If OSW proposals continue to grow at the rate observed over the last five years, these currently available POIs will be distributed by ISO-NE during the first few rounds of procurement. The 2,400 MW of OSW procured by Massachusetts and Connecticut are already poised to use all the available transmission capacity in the Cape Cod/Pilgrim area. Future developers (OSW or transmission) will be faced with an expensive choice: upgrade coastal substations already serving existing projects or interconnect further inland. It is our opinion that a networked grid would improve the stewardship of existing POIs and facilitate systems planning that reduces conflict and confusion surrounding interconnection.

3 McBride, Alan. ISO New England. Massachusetts Offshore Wind Transmission Technical Conference.3 Mar. 2020, https://www.mass.gov/doc/technical-conference-slide-presentations-morning-session-hosted-by-masscec-pdf/download. PowerPoint Presentation, p. 49.

Table 1: Estimated OSW Interconnection Capacity Available in Key Regions

Interconnection Regions	Estimated Available Capacity	Generators & Substations of Interest	Location
Cape Cod, Pilgrim	2,400 MW	Barnstable Switching West Barnstable Pilgrim Canal Bourne Switching	Barnstable, MA Barnstable, MA Plymouth, MA Sandwich, MA Bourne, MA
Kent, Davisville, Manchester St	1,500 MW	Kent County Davisville Manchester St	Warwick, RI Washington, RI Providence, RI
Millstone, Montville	2,100 MW	Millstone Montville	Waterford, CT Uncasville, CT
Brayton Point	1,600 MW	Brayton Point	Somerset, MA
Mystic	1,200 MW	Mystic	Charlestown, MA
Long Island	unknown	East Hampton Ruland Rd Holbrook	East Hampton, NY Farmingdale, NY Ronkonkoma, NY
Total	**8,800 MW +**		

2. STATUS OF PROCURED PROJECTS

To date, six OSW projects have been procured from the WEAs Offshore Massachusetts and Rhode Island through state solicitations. The procured projects total over 4,000 MW of OSW capacity, 3,000 MW of which are expected to connect to ISO-NE at substations on Cape Cod, Massachusetts and in Rhode Island. The remaining 1,000 MW have been procured by New York and will connect to Long Island. Table 2 summarizes key information about these projects.

New projects from the WEAs are moving from concept through procurement at a staggering rate. In 2017, South Fork Wind was the only project to finalize a PPA.[4] Two major projects—Vineyard Wind 1 and Revolution Wind—followed with contract awards in 2018.[5, 6] The most recent wave of projects includes Sunrise Wind, Mayflower Wind 1, and Park City Wind, all of which received contract awards in the latter half of 2019.[7, 8, 9]

4 NYSERDA. "Governor Cuomo Announces Approval of Largest Offshore Wind Project in the Nation." 25 Jan. 2017. https://www.nyserda.ny.gov/About/Newsroom/2017-Announcements/2017-01-25-Governor-Cuomo-Announces-Approval-of-Largest-Offshore-Wind-Project.

5 NS Energy. "Revolution Wind Project." NS Energy.com. Web. https://www.nsenergybusiness.com/projects/revolution-wind-project/.

6 Murphy, Matt. "Mass. Selects Vineyard Wind For 800-Megawatt Offshore Wind Farm" 23 May 2018. WBUR. Web. https://www.wbur.org/bostonomix/2018/05/23/vineyard-wind-massachusetts-offshore-farm.

7 NYSERDA. "Governor Cuomo Executes the Nation's Largest Offshore Wind Agreement and Signs Historic Climate Leadership and Community Protection Act." 18 Jul. 2018. https://www.nyserda.ny.gov/About/Newsroom/2019-Announcements/2019-07-18-Governor-Cuomo-Executes-the-nations-largest-osw-agreements.

8 EDP Renewables. "Massachusetts selects mayflower wind energy's 804 MW low cost energy proposal." EDPR News. 31 Oct. 2019. Web. https://www.edpr.com/en/news/2019/10/31/massachusetts-selects-mayflower-wind-energys-804-mw-low-cost-energy-proposal.

9 Vineyard Wind. "Vineyard Wind Selected to Deliver 804 MW of Clean Offshore Wind Power to Connecticut Electricity Customers." 5 Dec. 2019. Web. https://www.vineyardwind.com/press-releases/2019/12/5/vineyard-wind-selected-to-deliver-804-mw-of-clean-offshore-wind-power-to-connecticut-electricity-customersnbspnbsp.

There are multiple objectives to balance as the industry expands. We understand the need to allow the earliest projects to proceed without further delay. We wish to emphasize, however, the importance of developing a thorough systems-level assessment as soon as possible. Legislative, technological, and contractual barriers to implementation must be evaluated and addressed in parallel. With immediate mobilization, it is possible to imagine some of the later projects in Table 2 as part of an offshore network.

Table 2: Procured Offshore Wind Project Information [10, 11, 12]

Project Name	Date Award Announced	Turbine Count	Turbine Capacity	Project Capacity	Point of Grid Interconnection	Export Cables
South Fork Wind *Ørsted/Eversource*	Jan. 25, 2017 *NY PPA finalized*	15	8 MW	120 MW	Buell Lane Substation (NY)	1 x 138 kV AC
Vineyard Wind 1 *Vineyard Wind*	May. 23, 2018 *MA contract awarded*	84	9.5 MW	798 MW	Barnstable Switching Sta. (MA)	2 x 220 kV AC
Revolution Wind *Ørsted/Eversource*	May. 23, 2018 *RI contract awarded* Jun. 13, 2018 *CT contract awarded*	88	8 MW	704 MW	Davisville Substation (RI)	AC
Sunrise Wind *Ørsted/Eversource*	Jul. 18, 2019 *NY contract awarded*	110	8 MW	880 MW	Holbrook Substation (NY)	AC
Mayflower Wind 1 *Mayflower Wind*	Oct. 31, 2019 *MA contract awarded*	67	12 MW	804 MW	Bourne Switching Sta. (MA)	AC
Park City Wind *Vineyard Wind*	Dec. 5, 2019 *CT contract awarded*	67	12 MW	804 MW	West Barnstable Substation (MA)	AC
Total Procured Capacity 4,110 MW						

Note: White cells indicate researched, publicly available information. Light grey cells are assumed or calculated.

3. GENERATOR LEAD LINES VERSUS NETWORKED TRANSMISSION

Our analysis focused on comparing system-wide effects of the current generator lead line approach to a regionally coordinated transmission network. Using technical and legislative assumptions discussed in Section 3.2, we estimate that full build-out of the WEAs Offshore Massachusetts and Rhode Island can provide approximately 12,000 MW of power. Scenarios 1 and 2 envision the final, full build-out with two different topologies described below and depicted in the attached figures:

Scenario 1— Presumes that all developers wish to interconnect individually to shore using generator lead lines. This is the route that Vineyard Wind 1, Mayflower Wind 1 and Ørsted/Eversource are currently pursuing.

10 Massachusetts Clean Energy Center. Massachusetts Offshore Wind Transmission Technical Conference. 3 Mar. 2020, https://www.mass.gov/doc/technical-conference-slide-presentations-morning-session-hosted-by-masscec-pdf/download. PowerPoint Presentation, p. 15-18.

11 Bragg, Ann. "Vineyard Wind Picks Turbine Supplier." Cape Cod Times, 27 Nov. 2018, www.capecodtimes.com/news/20181127/vineyard-wind-picks-turbine-supplier.

12 Siemens Gamesa. "Siemens Gamesa conditionally awarded largest U.S. offshore wind power order to date: 1.7 GW from Ørsted and Eversource." 18 Jul. 2019, https://www.siemensgamesa.com/en-int/newsroom/2019/07/190718-siemens-gamesa-offshore-orsted-usa.

Scenario 2— Presumes that ISO-NE, DOER, and/or independent transmission developer(s) collaborate with OSW developers to implement networked transmission for all projects without contracts awarded. Although we feel that earlier and broader implementation of a networked system would greatly enhance its benefits, we have opted to assess a narrower and more conservative implementation of a networked system.

Scenario 2 would require significant planning to generate a network that could be expanded over the coming decades in several phases. For instance, the Mystic substation in Boston is unlikely to be a POI in the first several procurements while closer substations are still available. It is included in the Scenario 2 topology diagram as a late addition to the modular network.

3.1. Status of Current Technology

Recognizing the dynamic nature of this industry, we wish to state clearly our assumptions regarding policy and technical limitations used to develop the scenarios. We recognize that these limitations may change significantly as technology improves and policy progresses.

Table 3: Offshore Transmission Technology and Installation Assumptions

Description	Value	Notes and Sources
Maximum HVDC line capacity	1,200 MW	ISO-NE single-sourced contingency limits[13]
Maximum HVAC (345 kV) line capacity	400 MW	PJM Training Presentation[14]

3.2. Offshore Transmission Topologies for Full Build-Out of the WEAs

The offshore transmission lines depicted in the topologies for Scenario 1 and Scenario 2 incorporate publicly available grid information and insights from knowledgeable industry professionals. These scenarios are intended to illustrate potential outcomes and identify high-level issues that need to be addressed. We recognize that regional power systems are complex, and future transmission installations will require data collection, analysis, permitting, design, and public engagement over multiple iterations.

Both transmission topologies in Scenarios 1 and 2 are built from the same base assumptions about the number of turbines the WEAs will contain and how large those turbines will be. In 2019, the lease holders came together to support a proposal for uniform 1 x 1 nautical mile (nm) grid spacing of wind turbines. The proposal included a study by Baird into vessel navigation through the WEAs with supporting geospatial maps of turbine locations and navigation corridors.[15] We applied the information shown in Table 2 to the turbine map to allocate procured project areas and estimate the total capacity of the WEAs, arriving at an estimate of approximately 12,000 MW. For all areas without known turbine specifications, we assumed a nameplate turbine capacity of 12 MW.

Wind lease areas were divided into projects of reasonable size varying from 552 MW to 1,008 MW (see Figure 2). Our team recognizes that ISO-NE procurements have been in 800-MW increments thus far, but we anticipate that future projects could be larger in size as developers seek to maximize the potential of their lease areas and the capabilities of existing transmission technology.

13 ISO-NE. “Single-Sourced Contingency.” Operations Reports. Web. https://www.iso-ne.com/isoexpress/web/reports/operations/-/tree/single-src-cont.

14 PJM. “Transmission System Operations T01.” 2014. Web PPT. https://www.pjm.com/~/media/training/nerc-certifications/TO1-transmissionops.ashx.

15 Baird. “Vessel Navigation through the Proposed Rhode Island/Massachusetts and Massachusetts Wind Energy Areas.” 31 Oct. 2019.

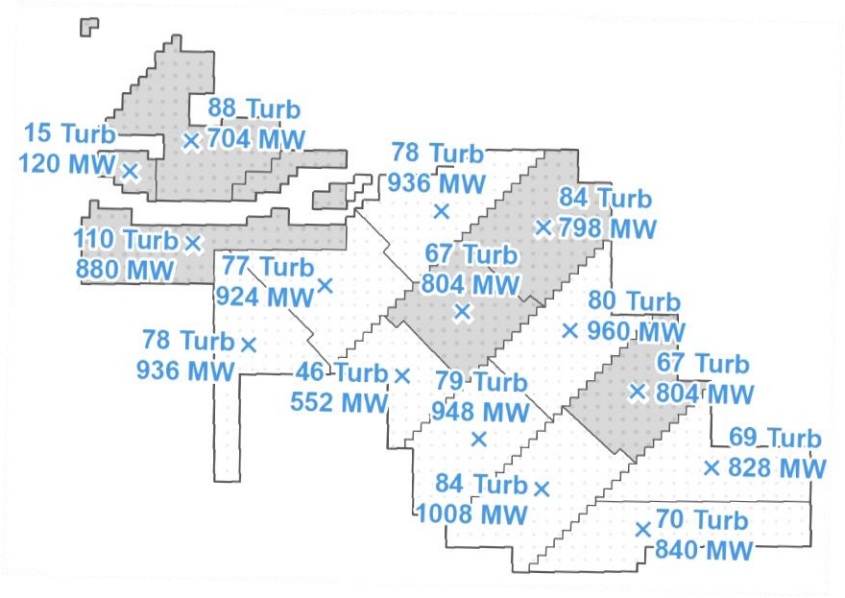


Figure 2: Locus of Estimated Project Capacities

For Scenario 1, we assume that HVDC transmission is used for export cables exceeding 60 miles in length, unless developers of procured projects have indicated otherwise. HVDC transmission provides less power loss per unit length than high voltage alternating current (HVAC), resulting in a tradeoff where the additional cost of HVDC components is outweighed by the power loss over long-distance HVAC. While HVAC lines can be extended using midpoint reactive compensation to operate at comparable distances to HVDC, this still requires an additional, costly platform. Furthermore, networking OSW farms would be simpler with DC technology than with AC technology because AC components require synchronization.[16] HVDC systems are limited by the nameplate capacity of the voltage source converter (VSC) platform. For this analysis, we assumed that a single VSC could handle up to 1,200 MW, which is also the largest single-sourced contingency allowed by ISO-NE.[13]

For the required capacity in Scenario 2, each of the four export cable routes in the HVDC network would need to accommodate 2,400 MW. This may necessitate additional electrical infrastructure such as VSC platforms and redundancy in cables to avoid the single contingency limit. Our analysis assumes that each 2,400-MW HVDC export route would require two VSC platforms each rated to 1,200 MW. Scenario 2 also assumes that all procured projects listed in Table 2 will proceed as currently planned, utilizing generator lead lines to the POIs identified by their respective developers.

The transmission connections to shore reflect the information about select POIs summarized in Table 1. Callouts are used to identify the estimated available transmission capacity for a given substation or set of substations. Substations are grouped together when they share transmission lines and their available interconnection capacities are presumed to be interdependent. The label “Sent” is used to indicate the amount of OSW capacity being routed to a given substation, ignoring line losses. For Scenario 2, we omit the “Sent” label for networked interconnections. An advantage of the networked system is that it reduces congestion by providing multiple routes for power to get to shore. Due to the time-varying nature of line utilization, we are unable to directly correlate offshore capacity to individual onshore points.

16 In an AC network, the time-varying nature of voltage and current causes significant loss of power if not synchronized across the entire transmission system. HVDC transmission has little or no time-varying element; therefore, HVDC lines do not require synchronization. This makes it simpler to connect two or more HVDC cables from different sources. We recognize that a combination of HVAC and HVDC will likely be used in the final build out. While synchronization of networked transmission is standard practice onshore, a benefit of HVDC transmission is avoiding this need, which eliminates cost and potential points of failure to the system.

The labels for Mystic, Millstone, and Manchester Street are identified with asterisks because those locations are not currently viable, but they remain promising POIs for the future:

- Mystic could have available capacity as of 2024, contingent on the proposal ISO-NE selects under Federal Energy Regulatory Commission (FERC) Order 1000.[17]
- The Millstone Nuclear Power Station, owned by Dominion Energy, has a PPA with Connecticut state utilities amounting to half of its 2,100-MW capacity through 2029.[18] After the PPA expires, continued operation of the plant may prove uneconomical, opening the door for OSW to take advantage of the existing onshore transmission infrastructure serving the plant.
- Manchester Street is a 500-MW natural gas facility in Providence that has not been identified by ISO-NE as an at-risk generator. However, it could still be a contender for future OSW interconnection, as Governor Raimondo has committed Rhode Island to 100% carbon-free power by 2030.[19]

4. POTENTIAL POLICY IMPLICATIONS

As the DOER and other regulators consider the path forward for OSW in the region, multiple system-wide objectives should be considered. In our opinion, the overarching goals of this new system should be carbon neutrality, grid function, ratepayer costs, regional workforce development, and environmental justice.

We encourage regulators to look at full build-out of the WEAs with an eye toward how the system should function regardless of the limitations inherent to the current legislative frameworks. Land-based grid limitations can be difficult to overcome[20, 21] and thus deserve attention as an integral part of the offshore transmission discussion. To realize the benefits associated with improved offshore and onshore transmission networks, New England states will need to work together to standardize offshore transmission elements. Building an offshore network will require coordination between legislators, developers, and equipment manufacturers to create benchmark specifications for transmission infrastructure. This infrastructure will include but is not limited to cable ratings, transmission voltages, collectors, and converters. The task of standardizing offshore transmission infrastructure in large part falls upon the FERC and the North American Electric Reliability Council (NERC).

New York and New Jersey have made bold commitments to procure large quantities of OSW, and these commitments have helped the industry visualize the scale and speed of growth for the East Coast as a whole. New England should follow suit—the industry will not see the need for system-wide transmission planning in this region without states taking a lead role in the discussion. A bold commitment is needed to instill confidence and garner acceptance for system-wide planning.

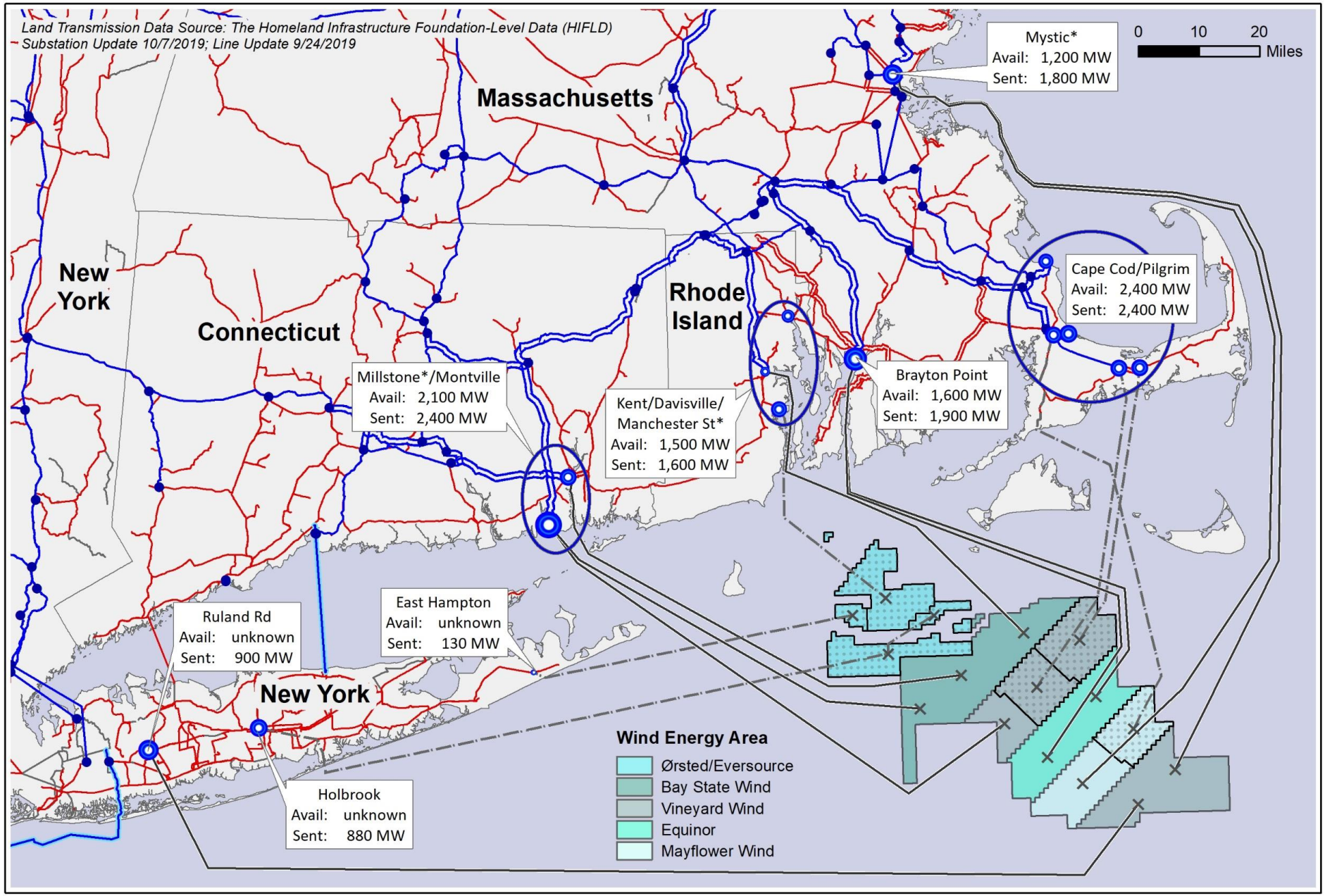
17 Oberlin, Brent. ”Boston 2028 Request for Proposal—Change in Mystic Generation Station Retirement Date.” ISO-NE. 13 Jan. 2020. Web. https://www.iso-ne.com/static-assets/documents/2020/01/mystic-retirement-boston-2028-final.pdf.

18 Proctor, Darrell. “Dominion Brokers 10-Year Deal to Keep Millstone nuclear Plant Open.” Powermag. 16 Apr. 2019, https://www.powermag.com/dominion-brokers-10-year-deal-to-keep-millstone-nuclear-plant-open/.

19 DiSavino, Scott. “Rhode Island Governor aims for 100% renewable power by 2030.” Reuters. 17 Jan. 2020, https://www.reuters.com/article/us-usa-rhode-island-renewables/rhode-island-governor-aims-for-100-renewable-power-by-2030-idUSKBN1ZG2BI

20 The Northern Pass, a proposed 1,100 MW transmission project connecting hydropower in Québec to consumers in Massachusetts, failed after an investment of $300 million and nearly a decade of effort. An alternative project, the New England Clean Energy Connect (NECEC), is still working its way through Maine regulatory bodies.

21 Ropeik, Annie. “In Unanimous Vote, N.H. Supreme Court Upholds Northern Pass Denial,” New Hampshire Public Radio, 19 Jul. 2019. https://www.nhpr.org/post/unanimous-vote-nh-supreme-court-upholds-northern-pass-denial#stream/0.



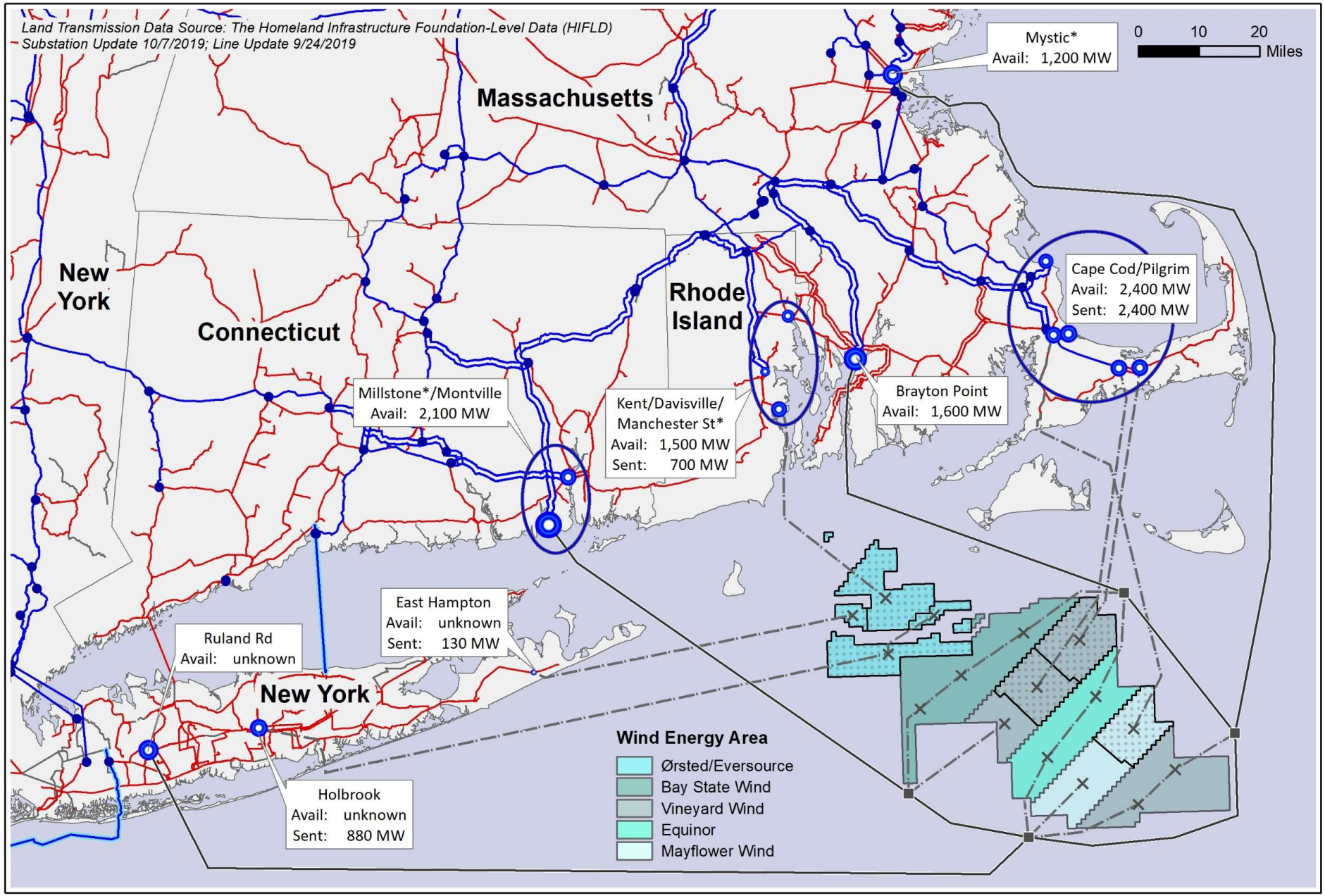
Scenario 1: Generator Lead Lines

Total Estimated Wind Energy Area Capacity – 12 GW

April 21, 2020

OSW Points of Interconnection
Procured OSW Projects
OSW AC Transmission (<60 mi)
OSW DC Transmission (>60 mi)
≥ 345 kV Substations
≥ 345 kV AC Transmission
69- 230 kV AC Transmission
150- 500 kV DC Transmission

Tufts University



Scenario 2: Networked Transmission

Total Estimated Wind Energy Area Capacity – 12 GW

April 21, 2020

OSW Points of Interconnection
Procured OSW Projects
OSW AC Transmission (<60 mi)
OSW DC Transmission (>60 mi)
≥ 345 kV Substations
≥ 345 kV AC Transmission
69- 230 kV AC Transmission
150- 500 kV DC Transmission

Tufts University

5. CONTRIBUTORS

Samuel Lenney is a master's student studying electrical engineering. Within the Tufts power systems and markets seminar, he focuses on trends in developing technologies related to offshore wind transmission and the challenges and opportunities they bring. Beyond offshore wind he researches novel semiconductor materials that will enable the next generation of photovoltaic and solar energy devices. He received his B.S. in physics from Tufts University in 2019.

Oliver Marsden is an electrical engineering senior. He competes in mock trial and is pursuing an economics minor. Oliver will stay for a 5th year to complete a master's in electrical engineering. His aim is to apply his specialized technical knowledge, public speaking experience, and financial proficiency to budding interdisciplinary fields within renewable technology. He spent the last two summers honing those skills: in 2018, at a mine in eastern Arizona operated by Freeport McMoran, and in 2019, at Community Energy Inc., a solar development firm in Philadelphia.

Sean Murphy is a civil engineering senior who has focused his studies on water, transportation, and energy. Sean has worked on energy from government, utility, and now academic perspectives. He spent a summer in the Medford Office of Energy and Environment, which led him to explore the discipline academically, and gave him the opportunity to work for Central Maine Power as an intern in the high voltage lines projects unit in 2019. He is also researching water resources methods to develop optimal control rules for merchant energy storage systems.

Kelly Smith, P.E., CFM, is a master's student offshore wind energy engineering. She works as a part-time contractor for the National Offshore Wind Research and Development Consortium. Prior to her graduate studies, Kelly spent eight years working in water resources engineering and environmental consulting, most recently for Hodge Water Resources, LLC. Her analytical expertise is in the numerical modeling of environmental systems. She currently serves on the board of New England Women in Energy and the Environment. Kelly holds a B.S. in environmental engineering, summa cum laude, from Tufts University.

Chisaki Watanabe is a master's student at the Fletcher School. Her research focuses on climate change diplomacy and energy security. She was an energy reporter for Bloomberg News in Tokyo and covered power markets and renewable energy in Japan and other Asian countries. She has a M.S. in mass communication from the College of Communication, Boston University, and B.S. in journalism from Sophia University in Tokyo, Japan

Eric Hines, Ph.D., P.E., F.SEI directs the offshore wind energy graduate program at Tufts University, where he is the Kentaro Tsutsumi Professor of the Practice in structural engineering. Dr. Hines has over 20 years of experience engineering innovative infrastructure and large-scale testing. Major projects include the Wind Technology Testing Center in Charlestown, MA, the New Bedford Marine Commerce Terminal, Beijing's Yin Tai Center, the digital twin verification processes for the new San Francisco-Oakland Bay Bridge and the Block Island Wind Farm. He works at the technology/policy interface to develop systems-level design concepts. He studied engineering and public policy as an undergraduate at Princeton University and a Fulbright Fellow in Germany. He holds a Ph.D. in structural engineering from the University of California, San Diego.

Barbara Kates-Garnick, Ph.D. is a professor of practice at the Fletcher School. She recently served as Undersecretary of Energy for the Commonwealth of Massachusetts (EEA). Her prior work in public service includes Commissioner of Public Utilities (MA DPU)., Assistant Secretary of Consumer Affairs, and Director of Rates and Research (MA DPU). Dr. Kates-Garnick has been a Vice President of Corporate Affairs at KeySpan. She was on the founding team of NewEnergy. She currently sits on the Boards of Anbaric Transmission and PowerOptions. She also serves on the Energy and Environmental Systems (BEES) Board of the National Academies of Science, Engineering and Medicine. She has a Ph.D. in international political economy from the Fletcher School of Tufts University, an A.B., cum laude, in political science from Bryn Mawr College and was a pre-doctoral fellow at the Center for Science and International Affairs at the Kennedy School of Government, Harvard University.

Aleksandar Stanković, Ph.D., F.IEEE, is the Alvin H. Howell Professor of Electrical Engineering at Tufts University. Dr. Stanković has over 30 years of experience in power systems engineering and control. He has chaired the Power Systems subcommittee of the Institute for Electrical and Electronics Engineers (IEEE) Power Engineering Society and served as a distinguished lecturer for the IEEE Circuits and Systems Society. He has edited the IEEE transactions of Smart Grids and co-edited a book series on Power Systems and Power Electronics for Springer. His work on power system stability and grid blackouts has over 2000 citations, making him one of the most sought-after voices on grid reliability in the Northeastern United States. Dr. Stanković completed his undergraduate and masters work at the University of Belgrade and holds a Ph.D. from MIT.

April 21, 2020

Marian Swain
Energy Policy Analyst
Department of Energy Resources
100 Cambridge Street, Suite 1020
Boston, MA 02114

re: Offshore Wind Transmission – Second Request for Stakeholder Comments

Dear Ms. Swain,

NSTAR Electric Company d.b.a. Eversource Energy ("Eversource Energy" or the "Company") appreciates the opportunity to provide the following feedback on the March 19, 2020 Department of Energy Resources ("DOER") Second Request for Stakeholder Comments related to Massachusetts Offshore Wind Transmission (the "Request"). As noted in the Request, this second round of comments is intended to allow stakeholders to respond to the first round of written comments on Offshore Wind Transmission and the discussion at the technical conference held on March 3, 2020.

Eversource Energy recognizes the significant opportunities for Massachusetts and the region toward development of a significant offshore wind industry and has worked diligently with the other Massachusetts electric distribution companies ("EDCs"), the DOER, and the Office of the Attorney General ("AGO") to help facilitate the development of that industry in a cost-effective manner of the benefit of its customers. Through the combined directives contained in Section 21 of An Act to Advance Clean Energy, Chapter 227 of the Acts of 2018 ("Section 21" or the "Act") and Section 83C of Chapter 169 of the Acts of 2008, as amended by Chapter 188 of the Acts of 2016) ("Section 83C")),[1] the Legislature established a framework for the development of an offshore wind generation industry, and for the potential development (i.e., upon the DOER's direction) of an offshore wind transmission network. Given that any offshore transmission network solicitation must be developed consistent with the provisions of both Section 21 and Section 83C, it is critical that the transmission network considerations be aligned with the development of the offshore wind generation that is required to be solicited under Section 21 and Section 83C. Consistent with the dual statutory requirements, Eversource Energy has proposed a solicitation framework, set out in detail below, which satisfies the dual requirements of Section 21 and Section 83C, including capturing the potential environmental and financial benefits associated with an offshore transmission network, while mitigating risks to customers, including ensuring

[1] Section 21(b)(iv) requires that any solicitations for generation and/or transmission must be conducted pursuant to Section 83C. Thus, Section 21 and Section 83C must be read in concert, and the Company, as well as the other Massachusetts EDCs, must meet the requirements of both sections.

that transmission costs are mitigated to the extent possible and that any transmission cost overruns are not borne by customers as required by Section 83C(d)(5)(iv).

Below, the Company provides its responses to the specific questions DOER included in its March 19, 2020 Request:

Q1. Is there a structure or structures that would allow for a competitive and successful independent wind transmission solicitation given the authority provided through Section 21 of the Act to Advance Clean Energy? Please provide comment on the following scenarios and/or provide any additional scenario(s):

a. No separate independent transmission solicitation but a solicitation for 1600 MW of offshore wind energy generation with an extended time to develop proposals, including the pairing of multiple projects and/or independent offshore transmission projects.

b. A solicitation for 1600 MW of transmission capacity that requests project proposals that define their own technical specifications for 1600 MW of offshore wind energy generation. Subsequent offshore wind generation solicitation(s) requires bidders to submit two bids: one with a Generator Lead Line (GLL), and one that interconnects to the selected transmission project(s). All bids are evaluated together.

c. A solicitation for offshore wind generation that requires bidders to bid the pricing of transmission and generation separately. A project is selected, and then a subsequent solicitation is issued that allows for independent transmission developers to compete to provide the selected project with transmission service at a lower price.

Eversource Response to Q1:

Based on the Company's analysis and experience with similar solicitations, the best way to ensure a competitive, cost-effective solicitation for energy and transmission as required by Section 21 and Section 83C is to solicit for all 1600 MW mandated in Section 21, as described by the DOER in Q1(a) above. In order to meet the requirements of both Section 21 and 83C, including the customer protections both explicit and inherent in Section 83C, the solicitation should be designed with sufficient flexibility and timing milestones and should require independent transmission developers to partner with generation developers in order to ensure a cost-effective solution that would eliminate the risk for cost overruns and stranded costs. Proposals should be presented with sufficient detail on interconnection points, rights-of-way and environmental mitigation plans to demonstrate that the project is not only cost- effective but feasible in its design. Eversource's solicitation design benefits include:

- Allows bidders to demonstrate the potential benefits and economies of scale that can result from designing a larger system upfront.
- Requires generation and transmission developers to coordinate on bids, thereby capturing any efficiencies that independent transmission developers may be able to provide, while mitigating risks to customers.

- Significantly reduces or eliminates customers' exposure to stranded cost risk and developer project-on-project risk as opposed to independently procuring transmission and generation.
- Results in a complete design and total cost for 1,600 MW of generation that is deliverable to the existing onshore transmission system.

Conversely, the transmission solicitation framework posed by the DOER in Q1(b), which would result in the selection of a transmission project in advance of the selection of a generation project that would utilize the transmission network, has the distinct possibility of creating stranded cost risks for customers, which is contrary to Section 83C(d)(5)(iv) and its requirement that transmission costs are mitigated to the extent possible and that transmission cost overruns are not to be borne by customers. For example, a transmission network proposal based on development of 1,600 MW of generation may be selected, but the subsequent generation solicitation reveals that a 1,200 MW generation project is the most cost – effective option for consumers in accordance with Section 83C. The transmission developer would likely attempt to transfer the cost and risk of the 400MW of stranded transmission development onto customers. Such an attempt would be contrary to the requirements of Section 83C(d)(5)(iv). Similarly, a timing disconnect between when a stand-alone transmission project proceeds without the necessary coordination with the generation it seeks to serve would lead to stranded costs that the transmission developer would likely try to transfer that risk to customers. Such an attempted cost/risk shifting is incompatible with the requirements of Section 83C(d)(5)(iv). Therefore, the Eversource solicitation proposal outlined above and explained further below was developed specifically to avoid such a situation.

From a practical standpoint, it is difficult to envision how a beneficial transmission service solution can be derived under a structure where the transmission project is developed independent of the generation it seeks to serve. There are myriad siting and other considerations which have implications for project feasibility and cost. For example, it seems unlikely that an independent transmission build-out could be structured in such a way that optimizes interconnection points without advance knowledge of which lease area the generation developer is utilizing or where that generation will be delivered.

Option Q1(c) as posed by DOER would require a two-step solicitation, where separate generation bids would be selected first and then the transmission project to serve that generation would be solicited. While this structure avoids some of the fundamental misalignments associated with Option Q1(b) described above, it creates a serious structural issue. It is a far better construct to require that the generation and transmission developers coordinate their projects as set out in Option Q1(A)", rather than attempt to create an after-the-fact combination of the projects following bid selection. There are many financial and contractual considerations for developers on projects of this magnitude, and it is impractical to assume that the generation and transmission developers, who have very different and in some cases competing interests and objectives, will create a successful project partnership following the EDCs' selection of their respective bids. Eversource Energy acknowledges that there is value in a competitive bidding process but these

benefits of competition will be realized through the Option Q1(a) structure. Option Q1(c)" is not likely to provide additional benefits, but it is likely to result in drawn – out contract negotiations and future conflicts among the parties. Such an impact is not in customers best interests. From a practical perspective, soliciting generation and transmission separately as contemplated in Q1(c) would require the generation developer to submit a significant amount of technical details with the bid to be used in the subsequent transmission solicitation. It is conceivable that generation developers would balk at providing such commercially sensitive information to third-parties as part of a future solicitations, especially if the transmission developers also competed in the generation market. It would also require the generation developer to keep its bid open for a very long time, since after selection it would likely take 12-18 months to properly undertake the transmission solicitation. Generation developers would likely not be supportive of relying on stale pricing contained in their bid at the time of construction, while any price refresh would cause concerns regarding whether the winning bid was still the most cost-effective option available to customers consistent with the requirements of Section 83C.

As discussed in further detail below, Eversource Energy's solicitation proposal would allow for the development of independent transmission and the potential benefits that would flow from that development, as contemplated by Section 21, while ensuring that customers are protected from unnecessary risk as required by Section 83C. The Company's proposal will lead to an efficient and effective solicitation, resulting in cost-effective options for customers.

Q2. Under DOER's authority granted by the Act to Advance Clean Energy how can the benefits of independent offshore transmission be best captured through a solicitation?

a. Is there a minimum capacity required to capture benefits?
b. Are there benefits that would be stranded without doing a solicitation for 1600 MW of independent offshore wind transmission?

Eversource Response to Q2:

As explained above, the best and most efficient way to procure the most cost-effective solution for customers is to have one solicitation for 1600 MW and to require independent transmission providers to partner with generation providers (see they Company's response to Q.1(a), above).

a. The EDCs should solicit for the entire amount of capacity allowed under Section 21, 1600 MW, in order to provide the maximum amount of scale to produce the greatest amount of benefits for customers.
b. Yes, there are benefits of scale inherent in soliciting for the entire 1600MW, as the greater the amount of generation solicited for under the request for proposals process, the lower the ultimate cost to the customer. Specifically, fixed costs for a project can be spread over a larger amount of capacity effectively lowering the per MW of capacity charge. Additionally, it would allow for efficiency in the design of the cable layout and the transmission route. These benefits can be captured with the "Option 1a" approach

by allowing independent transmission developers to design the most efficient and cost-effective offshore transmission systems specifically designed for 1,600 MW of generation from specific generation projects consistent with the coordination the developers would undertake in relation to interconnection points, rights-of-way and environmental mitigation plans, as well as risk-sharing. This process will provide the most benefits for customers while insulating them from risk.

Q3. Can these benefits be evaluated and included in a total cost and benefits analysis?

a. What information would need to be provided in a Request for Proposals (RFP) and/or what information should an RFP request to better define the benefits and costs of the independent offshore wind transmission proposals?

Eversource Response to Q3:

The best way to evaluate a project is to have all of the developers bid on the same basis, such that each project can be evaluated against one another. That is a fixed firm price for generation and transmission whether as a GLL arrangement or a partnership with an independent transmission provider. Evaluating transmission alone without a specific tie to the generation requires the evaluation team to make certain assumptions regarding stranded costs as a possible scenario in which the generation does not materialize. This is an inherent problem with a transmission only solution.

a. To avoid this, Eversource Energy proposes that an RFP require all bids to include both generation and the necessary transmission to deliver that generation. This applies to bids by a single developer (i.e., GLL bids) and bids that represent a partnership between a transmission developer and generation developer(s).

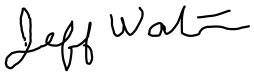
   All bids should include a fixed price for transmission and a fixed price for generation, regardless of transmission ownership or design. Therefore, bids that would traditionally be considered a GLL must break out their fixed transmission costs separately to allow for a direct comparison to bids that represent a coordinated effort between a transmission developer and generation developer(s). In this manner, the evaluations of the bids will comport with the Section 21(a) requirement that any selected transmission proposal be the "most cost-effective" mechanism for procuring reliable, low-cost offshore wind energy transmission service for customers, as well as the Section 83C requirements regarding cost-effectiveness (see Section 83C(d)(5)(iii)).

   Due to the extremely high volume of offshore wind interconnection requests in the ISO-NE queue, the current amount of offshore wind generation already procured by states in New England, and the limitations of the existing transmission system in Southeast Massachusetts and Rhode Island, interconnection plans may have a significant impact on both the market value of energy and the ultimate feasibility of the

offshore wind projects in this solicitation. Therefore, Eversource Energy firmly believes that an RFP should require all bidders to provide detailed interconnection plans in order better define costs and benefits of all proposals.

Eversource Energy appreciates the opportunity to provide these comments to assist the DOER in evaluating a potential offshore transmission solicitation. Eversource sees the value in working collaboratively with the DOER and other stakeholders to continue to advance important Commonwealth energy and environmental policies. The information provided by Eversource Energy in these comments, including its proposals regarding the development of a potential solicitation are designed to enable customers to enjoy significant benefits while insulating them from risk consistent with the directives of Section 21 and Section 83C. Eversource Energy looks forward to continuing to work with the DOER regarding offshore wind generation and transmission solicitations for the benefit of customers across the Commonwealth.

Sincerely,



Jeffery S. Waltman

Response to DOER's Second Request for Stakeholder Comments Regarding Offshore Wind Transmission

April 21, 2020

The undersigned groups (collectively, "the environmental stakeholders") appreciate the opportunity to respond to the Department's questions[1] on the matter of independent transmission to connect offshore wind generation with the onshore grid. The environmental stakeholders previously submitted comments in response to the first request for comments.[2] Please direct any followup questions or requests for clarification to the following individuals:

- David Zeek, Sierra Club, Massachusetts Chapter, davidazeek@gmail.com, (617) 423-5775
- Deborah Donovan, Acadia Center, ddonovan@acadiacenter.org, (617) 742-0054, ext 103
- Amber Hewett, National Wildlife Federation, hewetta@nwf.org, (978) 518-6888
- Susannah Hatch, Environmental League of Massachusetts, shatch@environmentalleague.org, (617) 963-0072
- Caitlin Peale Sloan, Conservation Law Foundation, cpeale@clf.org, (617) 850-1770

Separating transmission from generation procurement, while complex, has the potential to deliver optimal outcomes for consumers and the environment. In our first comment letter, we urged DOER to take into account the big picture view of offshore wind generation and a transmission system architecture to serve it. We continue to urge DOER to consider Massachusetts' offshore wind transmission needs holistically, rather than piecemeal, and to ensure that a transmission-only procurement can produce viable projects before making the effort to conduct the solicitation. There are significant opportunities for regional cooperation and to take advantage of economies of scale in service of building out the 8,000 megawatts (MW) of offshore wind power in ISO-New England's interconnection queue without sacrificing the need to move ahead as expeditiously as possible.

The undersigned groups participated in the technical conference held by DOER on March 3, 2020. DOER clarified at the technical conference that a near-term transmission solicitation would be bounded by DOER's interpretation of its current statutory authorization for generation and transmission bids. As DOER proceeds, we encourage the department to take into account a number of ongoing analyses, forums, and regional market processes that support the examination of a regional build-out of an offshore wind transmission system to support significantly more capacity than Massachusetts' current authorization.

We further encourage DOER to take into account a number of ongoing state and regional analyses, forums, and market transformation and transmission planning processes that can inform the examination of a build-out of a regional offshore wind transmission system. We believe the following analyses and processes are likely to provide relevant information and, potentially, justification to support the consideration of significantly more capacity than Massachusetts' current authorization in a transmission solicitation. Further, we recommend that DOER engage substantively in these processes to

[1] Massachusetts Offshore Wind Transmission: Second Request for Stakeholder Comment, March 19, 2020.

[2] Response to Questions Posed by DOER for Written Stakeholder Comments Regarding Offshore Wind Transmission, February 18, 2020, jointly submitted by Massachusetts Sierra Club, National Wildlife Federation, Conservation Law Foundation, Union of Concerned Scientists, and Acadia Center.

leverage its efforts and shape the regional examination of future offshore wind transmission needs to inform any separate transmission procurements.

MA Decarbonization Roadmap. As DOER is aware, the EEA's development of a roadmap to achieving a 2050 net-zero carbon target, including a comprehensive research and modeling effort "…that will identify the strategies, policies, and implementation pathways for Massachusetts." It is reasonable to expect that the Roadmap will include a plan and rough timetable for Massachusetts' future offshore wind power needs.

ISO-NE's 2019 Economic Studies. Preliminary results of two Economic Studies are now available. As discussed at the March 3, 2020 technical conference, the studies, done at the request of NESCOE[3] and Anbaric,[4] examine the impacts of increasing the amount of offshore wind on transmission and wholesale markets (NESCOE), regional energy market prices, emissions, and fuel security (Anbaric). Depending on the scenario, the results published so far show that a 6-8,000 MW build out could lower regional carbon emissions by 45-50% and systemwide energy production costs by roughly 30-40%. The studies are looking at five locations where offshore wind could connect to the land-based transmission network. Offshore wind power above 7,000 MW would require significant improvements to the transmission network. Final results should be available in June or July of this year.

Transition to the Future Grid. At the March 2020 meeting of the New England Power Pool (NEPOOL) Participants Committee, NESCOE, ISO-NE and the NEPOOL stakeholders discussed the upcoming launch of an 18-month discussion and study process referred to as "Transition to the Future Grid."[5] That process is expected to commence in late spring or early summer of this year. This effort will examine the region's power system and market structures in response to achieving state clean energy and carbon policies, including OSW procurements.

Public Policy Transmission Upgrade studies. As required by FERC Order 1000, ISO-NE solicits input regarding the need for upgrading the region's transmission system in response to state statutes and regulations, including the GWSA. This complex process[6], which takes place at least every 3 years, has the potential to result in a competitive regional procurement of transmission resources that meet the needs of state policies. Although states have yet to explore this mechanism as a means of ensuring transmission resources for state-driven clean energy resources such as OSW, this alternative approach should also be considered in comparison to the single-state procurement DOER is exploring.

[3] 2019 Economic Study - Preliminary NESCOE Results, ISO-NE presentation to the Planning Advisory Committee, December 19, 2019.
[4] 2019 Economic Study Requests Results - Anbaric, ISO-NE presentation to the Planning Advisory Committee, March 18, 2020.
[5] Transition to the Future Grid: Preliminary Discussion of Study-Related Process, NESCOE presentation to the NEPOOL Markets and Reliability Committees, April 7, 2020.
[6] Public Policy Transmission Upgrade Process, ISO-NE presentation to the Planning Advisory Committee, January 17, 2020.

A recent meeting of the New England Electricity Restructuring Roundtable[7] addressed the issue of offshore wind power transmission. Jurgen Weiss of the Brattle Group[8], predicted that New England may ultimately have over 40 GW of offshore wind power. Peter Shattuck of Anbaric[9], warned of the congestion that may ensue from unplanned expansions of offshore wind transmission. He identified nine points for onshore interconnect for a planned transmission approach that would not overload the grid. Bob Kump of Avangrid[10], said that over 3,000 miles of offshore lines will be required to integrate approximately 15 to 24 GW of offshore wind power. At this size, the offshore transmission network would be comparable to the network built to serve the Competitive Renewable Energy Zones in Texas.

DOER could consider exploring the feasibility of alternatives if it moves forward with an offshore wind transmission solicitation, including but not limited to the following:

- Seek additional discretion from the legislature to reframe the solicitation's size constraints;
- Allow transmission projects with capacity above the 1,600 MW to participate in a solicitation and offer a portion of their projects;
- Design the solicitation for a range of offshore wind generation increments, with the statutory target of 1,600 MW as a lower bound;
- Coordinate with other states in the Northeast to define future regional offshore wind power transmission needs and create a regional solicitation; or
- Consider a longer timeframe for the solicitation in order to take maximum advantage of findings and conclusions produced by the studies described above.

The benefits of a transmission-only procurement could be realized if conducted in a way that supports the near- and long-term objectives for offshore wind power for both the state and New England and aligns with Massachusetts' decarbonization roadmap. Several studies underway mentioned above for ISO-NE and other key organizations provide guidance on what the ultimate scope and scale of such a procurement should be. DOER should ensure that the time spent developing any separate transmission procurement supports the full responsible build out of the scale of offshore wind needed to power New England, rather than a narrow focus on the current 1,600 MW procurement authority. The urgency of the climate crisis requires aggressive and efficient action.

[7] New England Electricity Restructuring Roundtable (#165) Transmission System Evolution and Wholesale Market Re-Design for a Decarbonized New England, March 13, 2020.

[8] T&D and Deep Mid-Century Decarbonization in New England, March 13, 2020, Jurgen Weiss.

[9] Greening the Grid Transmission: System Evolution for a Decarbonizing New England, March 13, 2020, Peter Shattuck.

[10] Transmission System Evolution for Decarbonizing New England, March 13, 2020, Bob Kump.

nationalgrid

April 22, 2020

Marian Swain, Energy Policy Analyst
Massachusetts Department of Energy Resources
100 Cambridge Street – 1020
Boston, MA 02114
Marian.Swain@mass.gov

Re: Massachusetts Offshore Wind Transmission – Second Round Comments of National Grid

Dear Ms. Swain:

On behalf of Massachusetts Electric Company and Nantucket Electric Company, each d/b/a National Grid ("National Grid"), attached please find National Grid's second round of comments on offshore wind transmission in Massachusetts. These comments were solicited by the Massachusetts Department of Energy Resources ("DOER") on March 19, 2020, pursuant to An Act to Advance Clean Energy, Chapter 227 of the Acts of 2018 (the "Act").

The Act requires the DOER to: (1) investigate the necessity, benefits and costs of requiring the electricity distribution companies to conduct solicitations and procurements for up to 1,600 MW of additional offshore wind; and (2) evaluate previous solicitation and procurement processes and make recommendations for any improvements. Additionally, the Act allows DOER to require the EDCs to jointly and competitively solicit and procure proposals for offshore wind energy transmission sufficient to deliver energy generation procured under the Act, pursuant to Section 83C of Chapter 169 of the Acts of 2008 (the "Green Communities Act"), as amended by chapter 188 of the Acts of 2016, An Act to Promote Energy Diversity (the "Energy Diversity Act").

In addition, National Grid is sending copies by e-mail to the Independent Evaluator and copying the Steering Committee distribution list. If you have any questions, please let us know.

Sincerely,

NATIONAL GRID

Timothy J Brennan

_____

Timothy J. Brennan
Director, Regulatory Strategy and Integrated Analytics
National Grid USA Service Company, Inc.
(617) 543-2112

National Grid Second Round Comments

I. Introduction

National Grid appreciates the opportunity to respond to the Second Request for Stakeholder Comment, issued by the Department of Energy Resources ("DOER") on March 19, 2020. DOER has focused commenters on fulfilling the Commonwealth's Offshore Wind ("OSW") clean energy objectives in a timely and cost-effective way.

One of the proposals on which DOER sought comments is a procurement approach for the electric distribution companies ("EDCs") where there is "[n]o separate independent transmission solicitation but a solicitation for 1600 MW of offshore wind energy generation with an extended time to develop proposals, including the pairing of multiple projects and/or independent offshore transmission projects."[1]

National Grid proposed this approach (referred to below as the "Integrated Procurement Approach" or "IPA") in comments submitted to the DOER on February 18, 2020. We remain convinced that IPA is the best option under current circumstances. These comments offer additional details and clarifications about the IPA in four broad areas: consistency with current requirements, advantages for the interconnection and regulatory process, cost and schedule benefits, and the likelihood of a successful project.

II. Summary: The Integrated Procurement Approach Has Key Advantages

The DOER should direct the electric distribution companies to issue a single Request for Proposals ("RFP") for the 1600 MW of additional OSW generation and all associated delivery facilities – that is the IPA. National Grid does not support a separate Independent Offshore Transmission ("IOT") solicitation; rather, OSW bidders should respond to the RFP with bids to supply both 1600 MW of OSW generation and all associated delivery facilities. The IPA will allow and incent developers to comprehensively consider and propose 1600 MW of delivery facilities with the least environmental impact, the most market benefits, and that are the most cost-effective for customers.

IPA's chief advantage is that it secures the benefits sought to be obtained using an IOT approach – minimizing offshore delivery infrastructure and impacts on the environment, natural resources, etc. – using a simpler, more cost-effective approach, and one with which DOER and the EDCs have already gained much experience. IPA does this while also providing an extended bidding period to allow bidders to prepare higher-quality bids supported by mature studies, and

[1] DOER, "Massachusetts Offshore Wind Transmission: Second Request for Stakeholder Comment" (issued March 19, 2020) at 2.

to allow the benefits of rapidly improving OSW technology and supply chains to accumulate for the benefit of customers.

Another key advantage of the IPA is that it offers substantial implementation flexibility. In addition to the option for an extended bidding period, IPA contemplates accepting bids from single OSW developers, groups of OSW developers, or one or more OSW developers partnered with one or more transmission developers, as long as they present a single, integrated proposal for all aspects of the project. The IPA can also allow for phased project development of both generation and delivery facilities, with staggered commercial operation dates as allowed in the two prior OSW solicitations, thereby mitigating any concerns about IPA's larger scale. While IPA will require each bidder or bidder partnership to submit a 1600 MW proposal (barring a certification of inability to do so[2]), once this requirement is met bidders can also submit bids of lesser capacity for consideration.[3]

In sum, the IPA will give bidders the opportunity, incentive, and flexibility to fully analyze and apply creative solutions to designing a single comprehensive delivery system for the full 1600 MW of OSW generation, at low cost, on DOER's preferred schedule, and with the least impact to the environment, natural resources, etc.

III. The Integrated Procurement Approach is Consistent With Massachusetts' Offshore Wind Goals and Requirements

A. Overview

Since 2016, DOER and the EDCs have advanced the Commonwealth's interests in OSW. For example, the mandatory procurement of the first 1600 MW of OSW generation was completed seven years ahead of schedule.[4] In 2018, new legislation directed DOER to study whether to procure an additional 1600 MW of OSW generation by 2035, and whether to solicit an IOT.[5] In 2019, DOER's OSW Study concluded that the EDCs should procure an additional

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2 IPA contemplates that a bidder or bidder partnership may certify an inability to submit a full 1600 MW bid for sufficient reason, for example, if the remaining generation siting capability of its offshore lease area is less than 1600 MW.

3 Allowing the submittal of such additional bids for evaluation allows for the possibility that a smaller sized project (e.g., 1200 MW), or a portfolio of two or more proposed projects (e.g., 400 MW plus 1200 MW), might be shown to more beneficial and best to select for customers in this solicitation.

4 The Legislature established its initial requirements for procurement of OSW in Section 12 of "An Act to Promote Energy Diversity," St. 2016, s. 12 (the "Energy Diversity Act") (enacting "Section 83C," a new section of "An Act Relative to Green Communities," St. 2008, c. 169). Section 83C set the initial rules and requirements for OSW procurement in Massachusetts, requiring the first 1600 MW of OSW to be solicited and under contract by 2027. See Section 83C(b).

5 See "An Act to Advance Clean Energy," St. 2018, c. 227, s. 21(a) (the "Clean Energy Act"), which provided that such IOT must "not exceed the generation capacity authorized by this section . . . [and that] any selection of offshore wind energy transmission shall be the most cost-effective mechanism for procuring reliable, low-cost offshore wind energy transmission service."

1600 MW of OSW "if found to be cost-effective," possibly by way of two 800 MW solicitations conducted in 2022 and 2024. DOER's OSW Study also recommended holding a technical conference to assess whether and/or how a solicitation for an IOT should be conducted.[6] Finally, while Massachusetts temporarily amended Section 83C to remove the "price to beat" cost cap from the second-round OSW solicitation, which was conducted in 2019 and completes the first mandatory procurement of 1600 MW,[7] the "price to beat" cost cap will be in effect again for subsequent OSW solicitations, including the additional 1600 MW that has been determined to be appropriate for solicitation by the DOER OSW Study. St. 2019, c. 48, s. 2, 4, 5. The IPA is consistent with all of these goals and requirements, as discussed in more detail below.

B. The Integrated Procurement Approach is Consistent with the Procurement Terms within Section 83C

The IPA would involve a single RFP for the EDCs to solicit the remaining OSW required in Massachusetts (i.e., 1600 MW). The Massachusetts Legislature directed DOER to investigate whether to "conduct additional offshore wind generation solicitations and procurements of up to approximately 1,600 megawatts" and whether to "solicit and procure proposals for offshore wind energy transmission sufficient to deliver energy generation procured pursuant to this section" without exceeding these limits. Clean Energy Act, s. 21(a). For the 1600 MW of OSW generation prescribed by the Legislature, IPA achieves the same benefits of a unitary, integrated delivery system sought to be obtained through an IOT approach, but in a much simpler and more cost-effective way than through an IOT approach. Given the legislative limitation to 1600 MW, the IPA is superior to other options. A single RFP would also be consistent with Section 83C(b), which provides in relevant part that "[t]he distribution companies may conduct 1 or more competitive solicitations . . . ."[8] While the DOER OSW Study recommended conducting the procurement in two 800 MW rounds, it did not require it or suggest that such an approach is essential. Consequently, procuring 1600 MW of OSW in a single RFP is consistent with the procurement terms within Section 83C.

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[6] The DOER Wind Study at 14-15 described the IOT option as being "separate from the energy generation and would need to be completed before the offshore wind generation is solicited. . . . The transmission solicitation could occur in 2020, prior to the solicitation for the additional offshore wind generation, which would follow the solicitation process and framework provided in Section 83C."

[7] It established the condition that each solicitation subsequent to the first must procure OSW at a levelized cost per MW lower than the corresponding levelized cost of the previous solicitation (the "price to beat"). This temporary amendment was initially included in the 2020 State Budget, but later enacted separately. "An Act Relative to Offshore Wind Contract Pricing," St. 2019, c. 48, s. 1, 3, 6 ("OSW Contract Pricing Act").

[8] Section 21(b) of the Clean Energy Act provides that "any additional solicitations conducted pursuant to this section shall be subject to the required solicitation and procurement process of said section 83C of chapter 169 of the Acts of 2008, as amended by said chapter 188 of the Acts of 2016." Thus, the terms of Section 83C(b) apply to the next 1600 MW of OSW as well, allowing it to be procured in a single solicitation.

C. The Integrated Procurement Approach is Consistent with the DOER's Recommended Schedule and Allows More Time for Proposal Development

The IPA proposes to award a contract in 2024, which is consistent with the schedule recommended in DOER's OSW Study. This could allow bidders an extended period to prepare their bids. For example, the RFP might be issued in 2021, with bids not due until 2024. The EDCs' deadlines for the first 1600 MW of OSW prescribed in the Energy Diversity Act have already been met (substantially ahead of schedule), and DOER "may require said additional solicitations and procurements by December 31, 2035" for the next 1600 MW. Clean Energy Act, c. 227, s. 21(a). DOER's OSW Study recommends a schedule under which the entire 1600 MW would be procured by 2024 (or 2026 if necessary). Thus, the IPA would match DOER's recommended schedule for procurement of the full 1600 MW, and satisfy the legislative mandates eleven years before their deadline.

D. The Integrated Procurement Approach Allows Developers to Form Partnerships

The scope of the IPA may encourage bids from single OSW developers, but also from groups of OSW developers or combinations of OSW developers and transmission developers, and such combinations and partnerships can be allowed under the IPA. The first two Section 83C solicitations entertained and selected bids submitted by partnered developers, which should be permissible for the upcoming procurement as well. Recall also that the 83D solicitation resulted in the selection of a generation developer (i.e., Hydro Quebec) partnered with a transmission developer (i.e., Central Maine Power).

E. The Integrated Procurement Approach Will Allow Straightforward Application of the "Price to Beat" Requirement

Section 83C(b) provides that DOER "shall not approve a long-term contract that results from a subsequent solicitation and procurement period if the levelized price per megawatt hour, plus associated transmission costs, is greater than or equal to the levelized price per megawatt hour plus transmission costs that resulted from the previous procurement." While the Legislature suspended this requirement for the 2019 second round OSW solicitation, this "price to beat" requirement will be in effect and applicable to the upcoming OSW procurement.[9] Applying the "price to beat" to an IOT would likely be complex[10]; by contrast, determining a

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[9] Section 1 of the OSW Contract Pricing Act strikes out of Section 83C(b) the following words for 2019, but reinstates them in 2020 and future years: "provided, however, that the department of public utilities shall not approve a long-term contract that results from a subsequent solicitation and procurement period if the levelized price per megawatt hour, plus associated transmission costs, is greater than or equal to the levelized price per megawatt hour plus transmission costs that resulted from the previous procurement."

[10] For example, trying to tie together IOT and generation bids made at different times by different entities for purposes of deciding whether they meet the "price to beat" might add another step in the solicitation while the different entities adjust the financial and technical aspects of their bids to accommodate what may be unanticipated aspects of the other bid (generation or transmission) they are being paired with. It may also be inefficient to select IOT bids to go through the entire multi-step bidding process, only to discover at the end that because of some financial or technical aspect these IOT bids have no chance of being part of a generation plus IOT combination that meets the "price to beat." The IOT may also raise the complicated

levelized price per megawatt-hour should be no more complicated for an all-in 1600 MW project than for an all-in 800 MW project; thus, the application of the "price to beat" for IPA should be straightforward. Indeed, the OSW Evaluation Team has already formulated an approach for doing this for integrated bids like those to be solicited under the IPA.

IV. The Integrated Procurement Approach Should Facilitate the Interconnection and Regulatory Process

A. Overview

National Grid considers the IPA a prudently measured but beneficial step forward from the 400 to 800 MW OSW solicitations that the Commonwealth has undertaken so far. The IPA is a simpler, more efficient way of achieving the goals the Commonwealth has been hoping to achieve through the IOT approach, including a considered and well-planned electric delivery system that minimizes unnecessary infrastructure as well as environmental and other resource impacts, to be implemented on a schedule that meets the DOER's recommended timeline, and that allows developers ample time to submit high-quality bids.

B. The Integrated Procurement Approach Offers Interconnection Advantages

The IPA should not present novel challenges with regard to project interconnections with the regional transmission system; rather, it may offer advantages. The IPA will allow for an interconnection approach that is substantially identical to those of the last two OSW solicitations. The ISO-New England Inc. ("ISO-NE") has publicly confirmed that, despite its 1200 MW single contingency rules, 1600 MW of generation capacity can be interconnected at a single location on the system, as long as correct technical procedures are followed.[11] In addition, recent ISO-NE studies indicate that up to 7000 MW can be interconnected in coastal Southeast New England without the need for major transmission system upgrades, and that at least two interconnection points (i.e., Brayton Point and Barnstable) can handle 1600 MW or more of OSW power injection.[12] In addition, the IPA may increase bidders' ability to incorporate paired storage into their bids, as IPA's larger project size and integrated delivery facilities may make storage more economically and technologically feasible.

In addition, as discussed above, the IPA could provide bidders with several years to prepare their bids. Interconnection studies contain some of the most important information supporting bids, but shorter RFP bidding schedules often do not offer sufficient time to complete the ISO-NE multi-step interconnection process, especially when, like now, there are already projects totaling more than 18000 MW of capacity in the ISO-NE interconnection queue, many

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question of how to reflect the potential for stranded transmission costs when comparing various bids, including in assessing the "price to beat."

[11] ISO-NE confirmed this most recently at the joint DOER and Mass Clean Energy Center technical conference held on March 3, 2020.

[12] A. McBride, "ISO-New England's Interconnection Process and Integrating Offshore Wind, etc.," March 3, 2020 presentation, slides 14-15; P. Boughan, 2019 Economic Study – Preliminary NESCOE Results, December 19, 2019 presentation, slides 7 and 9.

of which are proposed in the same area as Massachusetts' OSW projects.[13] If the extended bidding period option is adopted, the additional time offered by the IPA approach may result in OSW bids with substantially more complete, detailed, and reliable interconnection studies than previous solicitations.

C. The Integrated Procurement Approach Offers Simplified Siting, Permitting, and Achievement of Milestones

The IPA eliminates the potential need for separate federal leasing and permitting for the generation and transmission portions of the OSW project, as may be necessary under an IOT arrangement, where generation and transmission are developed separately by different entities. Siting and permitting may also be easier and less costly under the IPA for a single entity submitting a unitary bid encompassing generation, delivery, and interconnection than it would for two or more smaller bids, simply because multiple smaller bids would require multiple expenditures of the time and effort of siting and permitting to reach the Commonwealth's target OSW capacity. In addition, if transmission and generation are solicited separately, developers would have to learn each other's specific project details, and may have to adjust or modify their proposals to ensure an adequate technical fit, adding time and complexity to both the evaluation process and the permitting process.

V. The Integrated Procurement Approach Offers Project Cost and Schedule Benefits

To the extent that the IPA extends the bidding period (e.g., out to 2024), this in itself should facilitate substantial OSW cost savings. U.S. OSW-related supply chains are just beginning to develop, but given the rapid pace of OSW procurement, they are likely to mature rapidly, and by 2024 will likely have reached a point where prices are lower and the reliability of component fabrication and supply is greater. Technological progress on wind turbines is another area where the state of the art is advancing rapidly: less than five years ago, 6 MW turbines (like those installed at the Block Island Wind Farm) were the state of the art: the current crop of OSW developers are planning to use the much more efficient 12 MW turbines, and even more efficient 15 MW turbines are in development. Thus, putting off final project selection by just a couple of years may result in large customer savings in this area as well. Other aspects of OSW technology, including piling installation and offshore cable installation are also advancing, and schedule extension may also see the creation of fleets of U.S.-based vessels capable of installing OSW components, leading to further price drops compared with the use of European vessels as required today. Increased experience with OSW by regulatory agencies may reduce permitting and licensing delays. Last but not least, by 2024, like the OSW developers, DOER and the EDCs will likely have gained substantial additional "lessons learned" from the Vineyard and Mayflower projects, which are, after all, the first large-scale OSW projects in the U.S. These "lessons learned" should give DOER and the EDCs a big advantage in the evaluation and selection of the mandated additional 1600 MW of OSW.

In addition to the cost reductions resulting from the extended bidding period, IPA will also eliminate "project-on-project risks" like problems with design or schedule coordination, or

[13] See McBride, Mar. 3, 2020, slides 7 and 8.

liability if either a generation or delivery project is late or defective, causing losses to customers and/or the developer(s) of the other aspects of the project.

IPA will also reduce the risk of increased costs by eliminating the danger of transmission stranded costs that may arise if the delivery facilities are evaluated, selected, and constructed to some capacity before the full 1600 MW of generation capacity has been solicited and evaluated.

Finally, IPA will allow DOER and the EDCs to conduct a single RFP, a single set of contract negotiations, and a single permitting process, as compared to an approach with two or more solicitations of 800 MW or less.

VI. The Integrated Procurement Approach Increases the Likelihood of Project Success and Maximizes Benefits

The IPA is simply a scaled-up version of a type of solicitation that DOER and the EDCs have successfully conducted twice before. Thus, the procedures developed and the lessons learned in the previous solicitations will apply directly to the IPA. This makes it highly likely that IPA can be implemented successfully within DOER's recommended overall timeframe. This is especially important in view of the current uncertainties that the COVID-19 pandemic has injected into legislative and regulatory processes, supply chains, availability of components and expertise, near-term load growth, and other factors. IPA's extended bidding period option may further enhance IPA's potential to accommodate COVID-19-related disruptions, particularly given the ongoing disruptions to European trade, because many of the vessels and components used in OSW generation and undersea cable construction currently used are of European origin.

VII. Conclusion

National Grid believes that IPA is the option best calculated to achieve the Commonwealth's OSW policies and objectives under current circumstances. The IPA maximizes the same benefits that the Commonwealth has been seeking to maximize through its consideration of IOT. The IPA gives bidders the opportunity, incentive, and flexibility to fully analyze and apply creative solutions to designing a single comprehensive delivery system for the full 1600 MW of OSW generation, in order to achieve more cost-effective delivery of clean energy to the Commonwealth with less environmental and resource impact. Yet the IPA is much simpler, more cost-effective, and is a straightforward continuation of past OSW solicitation practices. Moreover, the additional time the IPA provides bidders to prepare their bids will allow for significant additional benefits associated with the additional experience, technology advances, and supply chain improvements expected to be gained during this time. Accordingly, National Grid urges the DOER to select the IPA approach for the currently mandated 1600 MW OSW procurement.

April 21, 2020

BY ELECTRONIC SUBMISSION

Marian Swain
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RE: Massachusetts Offshore Wind Transmission: Second Request for Stakeholder Comment

Equinor Wind US LLC ("Equinor") is pleased to have the opportunity to provide comments to the Massachusetts Department of Energy Resources ("DOER") and the Massachusetts Clean Energy Center ("MassCEC") on the general costs and benefits of coordinated offshore wind transmission for Massachusetts.

Equinor, combined with its affiliates and ultimate parent Equinor ASA, is a global energy producer with nearly five decades of experience in safely developing and operating large-scale offshore assets and infrastructure, including offshore wind resources and electric transmission systems. The company's existing offshore wind farms power over 1 million homes in the UK and Germany. Additionally, Equinor holds Lease OCS-A 0520, located offshore New England, and OCS Lease A-0512, located offshore New York/New Jersey. Equinor is in early phase development of both leases. Equinor's 816 MW Empire Wind project, within OCS Lease A-0512, was recently selected as a winner in New York State's first offshore wind solicitation. As the leaseholder of OCS-A0520, located 20 miles off the coast of Massachusetts, Equinor is looking forward to working with Massachusetts and all regional stakeholders to realize offshore wind development goals in the region.

In its initial comments, dated February 18, 2020, Equinor identified several potential problems with a solicitation for Independent Offshore Transmission ("IOT").[1] Delays in the development, permitting, and construction of IOT could delay the commercial deployment of offshore wind generation resources relying on these facilities to interconnect to the grid. Also, development of IOT could result in either under-utilization of lease areas or under-utilization of transmission assets. In general, the additional risks, complexity, and uncertainty caused by bifurcating the ownership of the generation component and transmission component of an offshore wind facility could increase the costs of both, to the detriment of ratepayers.

Equinor believes that the most efficient and cost-effective option is to allow offshore wind developers to retain responsibility for development of the transmission and interconnection facilities necessary to connect their projects to the grid. As discussed further below, Equinor is not opposed to solicitations that give offshore wind developers the flexibility to propose a range of generation

[1] For the purposes of these comments, IOT refers to both independently-owned backbone transmission facilities as well as interconnection facilities that are owned by a party that is not affiliated with the offshore wind generation developer.

and transmission solutions, including solutions that rely on IOT, as contemplated in National Grid's proposal for a unified generation and transmission solicitation for 1,600 MW. However, the unified RFP schedule can and should commence in early 2022 and proceed according to a timeline very similar to that used successfully in past procurements. It can then be concluded, and contracts executed that same year. Delaying the submission of bids until 2024 is likely to lead to fewer options for Massachusetts to the detriment of ratepayers, as other states are likely to enter into commitments during the interim to secure the capacity of offshore wind resources.

In response to the questions posed by DOER, Equinor offers the following comments:

Is there a structure or structures that would allow for a competitive and successful independent offshore wind transmission solicitation given the authority provided through Section 21 of the Act to Advance Clean Energy? Please provide comment on the following scenarios and/or provide any additional scenario(s):

a) *No separate independent transmission solicitation but a solicitation for 1600 MW of offshore wind energy generation with an extended time to develop proposals, including the pairing of multiple projects and/or independent offshore transmission projects.*

   Equinor understands this scenario as envisioning a solicitation similar to the unified structure proposed by National Grid, with the generation developer allowed to choose between a Generator Lead Line ("GLL") solution or an IOT transmission solution. Equinor believes that this scenario represents the least risky option that has been identified by DOER and MassCEC. By allowing offshore wind developers to propose either GLL or IOT transmission solutions, developers gain the flexibility to collaborate with transmission developers where doing so could result in lower bid prices and cost savings for Massachusetts ratepayers. It would also allow offshore wind developers to continue to propose solutions that rely on a GLL transmission solution where this model presents the most efficient and cost-effective solution to facilitate the interconnection of their projects.

   Equinor believes that such a flexible solicitation framework will maximize the supply options for Massachusetts, leading to lower costs for ratepayers. Notably, this framework would allow comparison of the relative cost savings and efficiencies of a variety of GLL and IOT transmission solutions, ensuring that Massachusetts ratepayers are able to realize any economies of scale or other efficiencies, regardless of whether these can be achieved through the use of a GLL or IOT approach to development. At the same time, this solicitation option would avoid the significant complexities and project delays that are likely to result from separate procurement of generation and transmission solutions, as Equinor described in its initial comments in this proceeding.

   Equinor also agrees that conducting a solicitation for 1,600 MW will allow Massachusetts to capture increasingly valuable economies of scale in turbine design, construction and deployment. This has the potential to deliver the best possible prices for the power produced and delivered to ratepayers. The value of these efficiencies, delivered to hundreds of thousands of retail customers over twenty years, would be enormous.

b) *A solicitation for 1600 MW of transmission capacity that requests project proposals that define their own technical specifications for 1600 MW of offshore wind energy generation. Subsequent offshore wind generation solicitation(s) requires bidders to submit two bids: one*

with a Generator Lead Line (GLL), and one that interconnects to the selected transmission project(s). All bids are evaluated together.

This solicitation option has a number of advantages over alternative structures that would compel offshore wind developers to interconnect to a backbone transmission facility, including providing offshore wind developers clarity on project parameters prior to bidding. However, Equinor believes that giving developers the flexibility to propose a range of potential options – as contemplated in the first scenario – is more likely to result in a solicitation process that delivers the most value for Massachusetts ratepayers.

This solicitation option appears to assume that there is a single transmission solution that can meet the needs of the various offshore wind developers capable of serving Massachusetts. In practice, however, there are likely to be significant differences in the development plan and strategies that are being employed by those companies that have been granted offshore wind leases by the U.S. Department of the Interior, Bureau of Ocean Energy Management. Each offshore wind lease area is unique, with each lease coming with its own set of risks and rewards that can vary significantly based on the characteristics of the lease area. In addition, each of the companies that currently hold offshore wind leases obtained its leases at different times, resulting in projects at various stages of development and maturity.

Given these differences, there is no assurance that a transmission solution that is selected through the initial solicitation process will actually represent a viable solution for those developers that are interested in competing to meet Massachusetts' needs. Where the selected transmission solution is ill-suited, it is likely that offshore wind developers will be forced to price the additional costs and uncertainties associated with reliance on the selected transmission solution into their bids or will simply rely exclusively on GLL solutions, thereby undermining the purpose of structuring the initial solicitation in the first place. In either case, the likely result is higher costs and fewer supply options for Massachusetts ratepayers.

In the event that Massachusetts proceeds with a solicitation process structured in the manner described above, it would be critical that Massachusetts work with offshore wind developers to ensure that the solicitation is tailored to providing a transmission solution suited to a broad array of potential projects. The solicitation must include adequate safeguards to ensure that the selected transmission project represents a viable solution that can be brought online on time and screening out "speculative" proposals that may appear attractive "on paper" but that ultimately result in project delays and higher costs.

In addition, it is important that the solicitation process be structured in a manner that ensures that the initial selection of a transmission solution does not preclude an offshore wind developer from proposing a GLL solution that relies on the same cable landing spots, cable routes, and interconnection points as the selected transmission solution. Otherwise, the initial selection of a transmission solution could have the unintended, and undesirable, effect of limiting the supply options available to serve Massachusetts' needs.

Any solicitation process that requires offshore wind developers to connect their generation projects to the grid using IOT facilities also must include appropriate safeguards to ensure that developers are held harmless against delays and increases in costs associated with the use of an IOT solution. For instance, an offshore wind developer should not be penalized in the event that it is unable to bring its project online by its estimated commercial operation date due to delays in the construction of IOT facilities. The solicitation process should also

provide guidance on who bares the cost from unexpected downtime in operation, ensuring that an offshore wind developer is not penalized if an asset is offline due to issues with the IOT. In addition, offshore wind developers should be given the opportunity to adjust their bid prices to reflect increases in cost arising from the use of an IOT solution. Equinor believes that attracting robust voluntary participation by offshore wind developers in any solicitation involving an IOT solution will depend in part on the state working with offshore wind developers to implement these and other contractual protections to reduce the risks associated with the use of an IOT solution. Absent such protections, offshore wind developers will have a powerful incentive to commit their projects to meet the needs of other states and markets.

c) *A solicitation for offshore wind generation that requires bidders to bid the pricing of transmission and generation separately. A project is selected, and then a subsequent solicitation is issued that allows for independent transmission developers to compete to provide the selected project with transmission service at a lower price.*

Under this option, it appears that an offshore wind developer that is selected through the solicitation process would effectively be required to interconnect to an IOT solution identified by a third party—to interconnect either the selected project or a group of projects—if that option appears "cheaper" than the estimate of transmission costs provided by the selected offshore wind developer.

Equinor believes that this solicitation option is likely to create significant uncertainty for offshore wind developers without any corresponding benefit for Massachusetts ratepayers. It is unclear what purpose would be served by allowing a third party to propose a transmission solution that interconnects a single generation project (or even a handful of generation projects). The companies that currently hold offshore wind leases off the coast of Massachusetts and nearby states include some of the most experienced offshore wind developers from around the world, each with a demonstrated track record of successfully developing large scale projects on a realistic development timeline. Each of these companies has the expertise needed to efficiently and cost-effectively interconnect their projects to the grid and to offer solutions that provide value to Massachusetts ratepayers.

The primary effect of this solicitation option would be to encourage prospective transmission developers to "undercut" the offshore wind developer by submitting a bid below the selected developer's cost of transmission. While this may result, at least on paper, in a combined generation and transmission solution that appears cheaper than the offshore wind developer's initial proposal, these cost savings may quickly disappear given the additional complexities associated with bifurcating ownership of offshore wind generation and transmission.

This option may also invite litigation that has the potential to generate additional uncertainty and increase costs. In effect, the result of this option would be that access to interconnection and/or transmission capacity necessary to interconnect with the ISO New England, Inc. ("ISO-NE") market would be determined by the state solicitation process. This may result in challenges to the proposed solution on the basis that it is inconsistent with the open access policies established by the Federal Energy Regulatory Commission ("FERC") or otherwise intrudes on FERC's exclusive jurisdiction over the rates, terms, and conditions of wholesale transmission and interconnection service. Although Equinor does not here address the

merits of these arguments, any solicitation framework that has the effect of dictating what entities should be given access to transmission service is likely to attract such challenges.

2) *Under DOER's authority granted by the Act to Advance Clean Energy how can the benefits of independent offshore transmission be best captured through a solicitation?*
   a) *Is there a minimum capacity required to capture benefits?*

   There is no absolute size below which a project will fail to deliver benefits. However, the smaller the supply of power generation solicited and procured, the greater the costs per MW. The larger the supply of power generation solicited, the greater the ability of project developers to deliver the benefits of efficient project development costs through economies of scale in both turbine construction and operation, as well as in transmission construction and operation.

   That said, a procurement should allow developers to submit proposals for projects up to 1,600 MW. This will allow developers the flexibility to propose projects of a size that they judge to be the least risky and most efficient solutions. This flexibility will inure to the benefit of ratepayers through better prices for power and better contract terms.

   b) *Are there benefits that would be stranded without doing a solicitation for 1600 MW of independent offshore wind transmission?*

   If the size of the solicitation is large (for example up to 1,600 MW), thereby allowing for substantial economies of scale, it is not obvious that any benefits would be stranded using a GLL strategy for transmission. Efficiencies in transmission at this scale would be just as readily captured with a GLL strategy as with an IOT strategy.

3) *Can these benefits be evaluated and included in a total cost and benefits analysis?*
   a) *What information would need to be provided in a Request for Proposals (RFP) and/or what information should an RFP request to better define the benefits and costs of the independent offshore wind transmission proposals?*

   As explained in Equinor's comments above, successfully conducting a solicitation process for IOT solutions will require close coordination with offshore wind developers to ensure that the RFP is designed in a manner that results in the proposal of solutions that are capable of meeting developers' needs.

CULTURAL HERITAGE PARTNERS
LAW • POLICY • STRATEGY

April 21, 2020
By Email

Marian Swain, Energy Policy Analyst
Massachusetts Department of Energy Resources
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Boston, MA 02114

Re: Request for Comment | Potential Solicitation for an Independent Transmission of Offshore Wind Energy to Onshore Electrical Grid

Dear Ms. Swain:

The Town of Nantucket writes in response to the request for comments issued by Massachusetts Department of Energy Resources (DOER) regarding the possibility of an independent transmission of offshore wind energy to the onshore electrical grid. Nantucket supports the Commonwealth of Massachusetts' clean energy and economic development goals. At the same time, Nantucket requests that DOER consider impacts to historic and cultural resources as DOER works to implement these goals.

Offshore wind development, including independent transmission, involves massive infrastructure installations including, but not limited to, the placement of transmission cables, offshore collector stations and/or substations, onshore substations, and interconnection locations. As Nantucket has requested in the past, we ask that DOER pay heightened attention to avoiding harm to the Nantucket Historic District, a National Historic Landmark, as Section 110(f) of the National Historic Preservation Act requires.

In addition, Nantucket requests that DOER consider ways to avoid, minimize, or mitigate adverse effects to any other affected properties listed in or eligible for listing in the National Register of Historic Places. DOER's Offshore Wind Study, published May 31, 2019, does not adequately consider these issues. Visual impacts, in addition to other cumulative effects, should therefore be part of any planning and permitting review process conducted by DOER going forward. Mark C. Kalpin of Holland & Knight highlighted some of these issues during his presentation at the Massachusetts Offshore Wind Transmission Technical Conference on March 3, 2020.[1] DOER should take them into account. Nantucket also believes that DOER's future planning should consider how to maximize the sharing of energy development benefits with the communities impacted by development projects.

Nantucket has consistently supported our collective need to develop alternative clean energy sources. As a remote island, Nantucket is at the forefront of climate change and recognizes the need to reduce global carbon emissions. However, as the second oldest and largest contiguous historic district in the contiguous United States, Nantucket does not believe that renewable energy development must come at the expense of a community's historic and cultural heritage. Giving greater attention to historic preservation concerns in DOER's planning process for

[1] Mark C. Kalpin, *Legal and Regulatory Issues Associated with the Development of Offshore Wind Transmission: An Overview*, Massachusetts Offshore Wind Transmission Technical Conference (Mar. 3. 2020).

offshore wind energy, including independent transmission procurement, will help ensure a more efficient and effective review process for future projects going forward.

We would welcome the opportunity to discuss these issues with you and your colleagues. Thank you for considering our comments.

Respectfully submitted,

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