To: Connecticut Department of Energy and Environmental Protection
From: Peter Shattuck
Date: July 2nd, 2020
RE: Clean Energy Pathways Analysis

Anbaric Development Partners (Anbaric) appreciates the opportunity to provide comments on DEEP's Integrated Resources Plan (IRP) Clean Energy Pathways Analysis. Anbaric develops clean energy projects that supply renewable energy to customers and projects that optimize the power grid using energy storage. Anbaric is developing multiple projects in the Northeast, including two projects to interconnect offshore wind directly into Connecticut.

Comments focus on the role independent offshore transmission in meeting Connecticut's energy and climate objectives and suggest modeling approaches that can best inform policy recommendations of the IRP. Specifically, modeling of the "No Transmissions Constraints" scenario should include transmission solutions that minimize expensive, slow onshore by routing offshore wind directly to load centers and other robust grid connections in Connecticut and across New England. A Connecticut-specific or joint procurement for independent offshore transmission is recommended for inclusion with broader IRP recommendations scheduled to be released with remaining Clean Energy Pathways analysis in August of 2020. An offshore transmission procurement framework is appended to these comments.

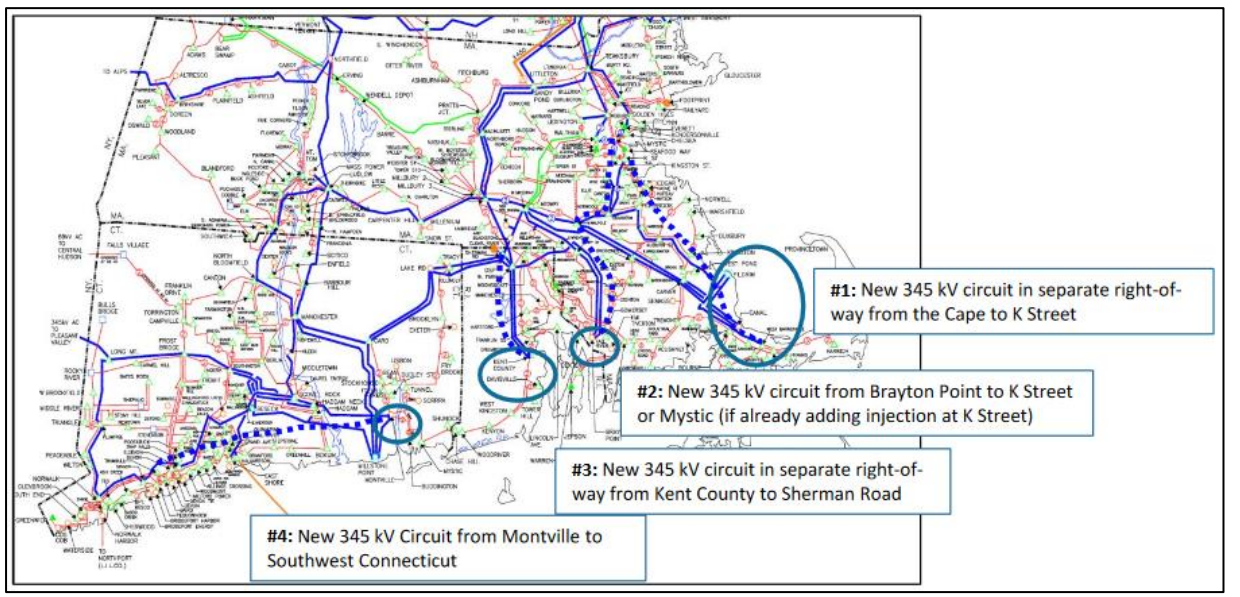
<u>Meeting Connecticut's Energy and Climate Objectives</u>

Enhancing transmission infrastructure is central to achieving Connecticut's energy and climate objectives cost effectively. Reaching a 100% zero carbon electric sector by 2040 while accounting for electrification will require a significant increase in non-emitting generation sources. Initial results from analysis by Levitan and Associates finds a need for 28GW of resource additions to enable electrification of heating and transportation and meet 2040 decarbonization goals.[1] These resource additions include 14GW of offshore wind and 5GW of energy storage.[2]

Upgrading the energy grid in Connecticut and the region is critical to achieving high levels of renewable resource deployment at lowest total cost. Investments in transmission can enable Connecticut to access world-class offshore wind resources and other renewables located distant from load centers. Investments in transmission will also reduce congestion and make better use of renewable resources that might otherwise be curtailed. Better access and utilization will drive down the cost of renewable energy.

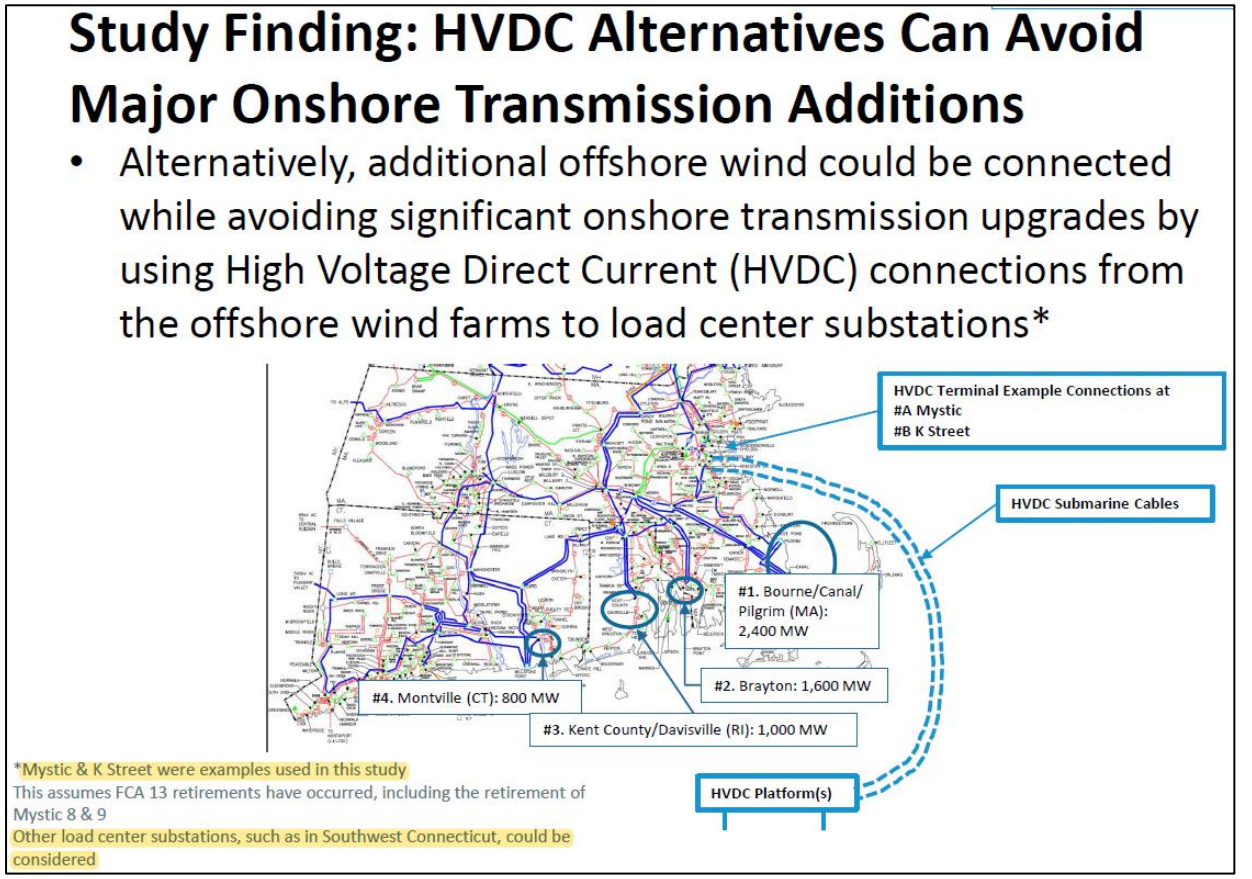
Recent analyses show that strategically developed transmission will enable Connecticut to most cost effectively achieve levels of offshore wind deployment found to be needed in preliminary Clean Energy Pathways modeling results. ISO-NE's Economic Study carried out for Connecticut and other members of the New England States' Committee on Electricity (NESCOE) found that major transmission upgrades would be required to interconnect more than 5,800MW of offshore wind to nearshore locations under the approach pursued to-date by wind farm developers (see Figure 1).[3]

Figure 1: ISO-NE Depiction of New High Voltage Transmission Rights of Way Needed to Connect Over 5,800MW of Offshore Wind to Nearshore Locations



ISO-NE's analysis additionally found that routing offshore wind directly to load centers could avoid the need for major new overland high voltage transmission corridors (see figure 2).

Figure 2: ISO-NE Depiction of Direct Offshore Wind Connection to Load Centers (highlight added)



Similar analysis by the Brattle Group found that a planned approach to developing transmission for the next round of offshore wind procurements could avoid over $1.1 billion in onshore grid upgrades and significantly reduce the risk associated with major onshore transmission projects.[4] Theses risks of major onshore upgrades are already confronting projects that states have selected, and will likely increase as accessible POIs with available interconnection capacity are used up. Specifically, ISO-NE has estimated upgrade costs of up to $786,883,800 to interconnect 2,400MW of capacity from already-selected projects into Cape Cod.[5]

Clean Energy Pathways Analysis

The Clean Energy Pathways analysis is an important tool for informing DEEP's IRP policy recommendations, and the analysis should capture benefits of routing offshore wind to demand centers and robust grid connections in order to minimize terrestrial transmission upgrades and related costs. On the June 18th webinar Levitan and Associates confirmed that direct injection of offshore wind into Connecticut was included in modeling assumptions. To the extent direct injections to Connecticut and other load centers (such as Boston) avoid overloads to the terrestrial grid, such direct injections to CT and other load centers should be maximized.

Cost savings from avoided terrestrial transmission upgrades and reduced curtailment should be included in financial modeling for the No Transmission Constraints scenario. If this is infeasible or beyond the scope of modeling, benefits of routing to Connecticut and other load centers should be acknowledged in narrative form.

IRP Recommendations

DEEP should solicit independent offshore transmission in order to realize the benefits of well-planned offshore transmission. Absent a solicitation of independent offshore transmission, generators are unlikely to propose injections to locations such as Southwest Connecticut or Boston, as routing longer distances would make their bids more costly than other generator lead line bids connecting to nearshore locations. This reality is reflected in the absence of any interconnection requests by offshore wind generators for either Southwest Connecticut or Boston.

With customary information from bidders including interconnection requests and related studies, Connecticut can evaluate the merits of different transmission configurations. ISO-NE's Economic Studies and ISO-NE studies of prior projects can additionally inform this analysis and be used to select projects that minimize costs to achieve near-term authorized procurements without compromising expanded offshore wind deployment levels recommended by the Clean Energy Pathways analysis.

Additional Benefits

Independent offshore transmission will increase competition between offshore wind developers, leveling the field between leaseholders nearer and farther from shore and driving down prices. (It is worth noting that in the recent Connecticut and Massachusetts offshore wind procurements one of the leaseholders with a lease area farther from shore declined to bid, reducing competition between developers.) In Europe, strategic investments in

transmission have enabled countries such as the Netherlands to deploy offshore wind without subsidies or utility-backed contracts.[6]

Planned transmission can additionally serve as a platform for third-party purchases of renewable energy through power purchase agreements (PPAs), enabling financing and deployment of offshore wind without relying entirely on state-led procurements. In Texas, strategic investments in transmission through the Competitive Renewable Energy Zone (CREZ) program have enabled over 2,000MW of onshore wind energy PPAs from 22 corporate buyers.[7] In the Netherlands planned transmission has enabled corporate PPAs for offshore wind.[8] Strategic investment in transmission can enable market-driven offshore wind deployment by large corporate and non-profit entities in the Northeast seeking local renewables to meet sustainability commitments.[9] For offshore wind in particular it is worth noting that independent, planned transmission is a necessary platform to enable small and mid-sized procurements pursued by third-party buyers. High voltage alternating current (HVAC) transmission systems are most economical in the 300MW to 500MW range, and high voltage direct current (HVDC) systems are most economical in the 1000MW to 1400MW range, both of which are far larger than most third-party buyer can support. However, by making transmission available to serve as a platform for procurement, states can enable third-party purchases and unlock a large source of demand.

Offshore Transmission Solicitation Models

Transmission is a shared regional resource, and multi-state collaboration can achieve a scale and impact that no one state can achieve alone. In Part II of DEEP's Notice of Revised Scope and Updated Schedule for the 2018 IRP, DEEP highlighted the importance of "engag[ing] counterparts in the other New England states on the development of assumptions and scenarios for the regional grid as part of the Clean Energy Pathways Analysis." Notice Part II, p. 2. Strategic regional transmission investment is a topic well-suited for this engagement with other states. Connecticut could build on the model of coordinating with Massachusetts on procurement of offshore wind energy in 2019 and on the transmission components of the 2015 CT-MA-RI procurement to jointly evaluate strategic transmission development that could enable multiple states in the region to achieve common clean energy objectives.

Thank you for the opportunity to comment, and we look forward to continuing engagement in Connecticut's Integrated Resource Planning process.

Peter Shattuck
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[1] Presentation for *Connecticut Integrated Resources Plan Preliminary Modeling Results Technical Meeting, s*lide 12

[2] Id., slide 13.

[3] Available at: https://www.iso-ne.com/static-assets/documents/2020/06/a4_2019_economic_study_offshore_wind_transmission_interconnection_analysis.pdf

[4] Commissioned by Anbaric, *Offshore Transmission in New England: The Benefits of a Better-Planned Grid* builds on ISO-NE's Economic Studies to calculate costs and evaluate risks associated with two scenarios: 1) the current offshore transmission approach of connecting generator lead lines to nearshore locations, and 2) a planned approach utilizing HVDC to route offshore wind to load centers and robust grid connections. For the next 3,600MW of capacity (approximate demand from CT, MA, RI and other interested states and third parties), the planned approach cost 10% less overall, avoided $1.1 billion in onshore grid upgrades, and significantly reduced risk of cost overruns and delays experienced by recent onshore transmission projects in New England. Study available at: http://ma.anbaric.com/brattlereport/. In public comments to the ISO-NE Planning Advisory Committee Al McBride, Director of Transmission Strategy and Services at ISO-NE stated that the findings of the Brattle report are consistent with ISO-NE's findings.

[5] 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.

[6] See https://www.government.nl/latest/news/2019/07/10/vattenfall-to-build-second-unsubsidised-dutch-offshore-wind-farm

[7] 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

[8] See: https://cleantechnica.com/2019/05/28/microsoft-announces-new-offshore-wind-energy-agreement-in-the-netherlands/

[9] Anbaric has been approached by large energy consumers to explore the potential of enabling third-party PPAs for offshore wind through strategic transmission investments.

Offshore Transmission Procurement Framework

July 2nd, 2020

Separating 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,[i] and Connecticut can lead this market evolution in the U.S. Separating generation and transmission will ensure the most cost-effective and lowest risk result in procurement of Connecticut's presently authorized 1,200MW of offshore wind, and will facilitate development of the 10,000MW to 14,000MW of offshore wind needed to achieve a zero carbon grid by 2040.[ii]

Under the current generator lead line (GLL) approach a leaseholder's incentive is to secure only enough transmission to develop their own lease area, regardless of whether this means underutilizing scare points of interconnection and shoreline approaches. Recent analyses by ISO-NE and the Brattle Group highlight the risks of continuing with the current approach and the benefits of independent, planned offshore transmission. ISO-NE's 2019 Economic Study shows that routing offshore transmission to demand centers can avoid overloads of the onshore grid.[iii] Consistent with ISO-NE's findings, the Brattle Group found that a planned approach to developing independent offshore transmission for the next 3,600MW of offshore wind in New England could avoid $1.1 billion in onshore upgrades, reducer overall (onshore + offshore) transmission costs by 10%, and minimize impacts on fisheries and the environment.

To realize the benefits of independent transmission Connecticut can undertake an offshore transmission procurement that can be implemented quickly utilizing available information and proven regulatory models. The Connecticut's Integrated Resource Plan (IRP), ISO-NE studies and offshore wind bids received to date can inform technical elements of the procurement. 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 in short order, and selection can be made in 2021, providing sufficient lead time for a subsequent generation procurement in 2022 or subsequent years.

The offshore transmission framework presented here is rooted in Public Act 19-71, An Act Concerning the Procurement of Energy Derived from Offshore Wind, which grants the Department of Energy and Environmental Protection (DEEP) authority to procure transmission associated with offshore wind.[iv] The framework additionally incorporates elements of prior Connecticut procurements for transmission and renewable energy and models from other jurisdictions. With this type of procurement Connecticut 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 it has

separated its transmission business from its generation business to prevent any anti-competitive behavior. The functional separation of generation holdings from transmission is required by the Federal Energy Regulatory Commission and Connecticut has extended that separation and requires divestment or physical business separation.[v] 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

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[vi] 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.

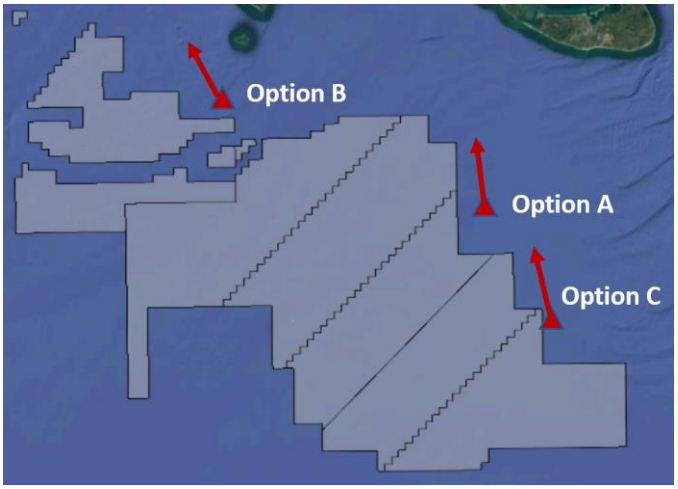
Either a market-led or a state-led approach can yield a result that stimulates competition, reduces risk and protects the environment. Anbaric recommends the market led approach because it enables greater flexibility and likely would be simpler to implement, but either approach could work.

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

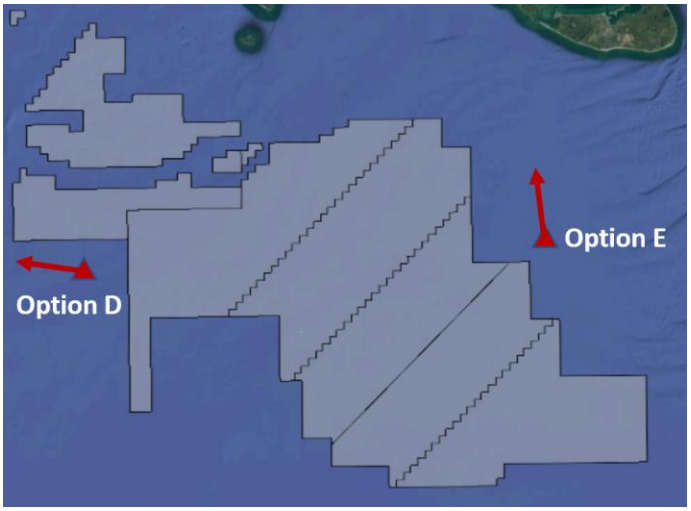
Bidders in the Transmission Procurement would propose multiple fixed price options for transmission between bidder-determined OCS locations and onshore POIs. As illustrated below in Figure 1, Transmission Bidder #1 could propose three options for locations: Option A, which is equidistant from each end 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.

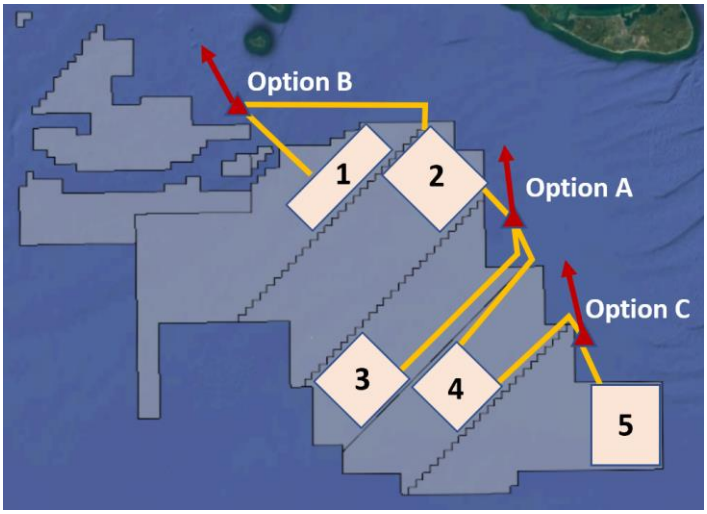
Figure 2: Transmission Bidder #2 proposes Options D & E



Connecticut would evaluate each bidder's suite of 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 Connecticut's electric distribution companies. The contract would include a placeholder for the Ultimate Transmission Option. The Ultimate Transmission Option selected at the culmination of the Generation Procurement (described below) would substitute for the placeholder in the final contract.

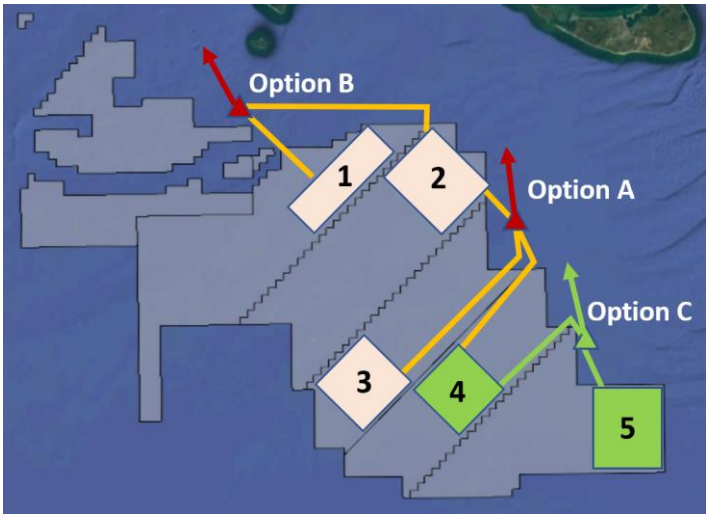
In the Generation Procurement Connecticut would direct offshore wind leaseholders to bid to interconnect to any of the collector station locations included in the suite of options chosen in the Transmission Procurement (Options A, B or C). Leaseholders could bid to connect to one or more collector station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

Figure 3: Leaseholders bid wind farms 1-5 connecting to collector stations included in Bidder #1's suite of options



Connecticut would combine costs for wind farm bids 1-5 with the cost for the appropriate transmission option (Option A, B or C) to determine the total cost of pairings of transmission plus generation. This total cost would be utilized in conjunction with other evaluation factors to determine winning bidders from the Generation Procurement and to select the Ultimate Transmission Option. Figure 4 illustrates a pairing of wind farms 4 and 5 as winners of the Generation Procurement with Option C as the Ultimate Transmission Option.

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



b) State-Led Approach

Under the state-led approach the solicitation would prescribe locations for offshore collector stations 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. Connecticut 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

Connecticut's transmission procurement should solicit transmission projects that meet the state's offshore wind energy procurement goals with the option of providing additional transmission capacity for other 3rd party customers to contract for offshore wind. Under this approach Connecticut utilities would serve as anchor customers on projects that would enable further development of offshore wind without ratepayer contracts.

For example, Connecticut could utilize its 1,200MW of procurement authority to contract for 800MW to 1,000MW of transmission capacity from a 1,200MW transmission system. The remaining 200MW to 400MW of authorized capacity could be procured from another transmission system procured jointly with another state or states. Transmission developers would sell the procured transmission capacity to Connecticut and develop the remaining capacity at their own cost and risk.[vii] This approach would enable surplus transmission capacity to be made available for 3rd party purchasers (potentially including 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[viii] 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.[ix]

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

Technical Requirements

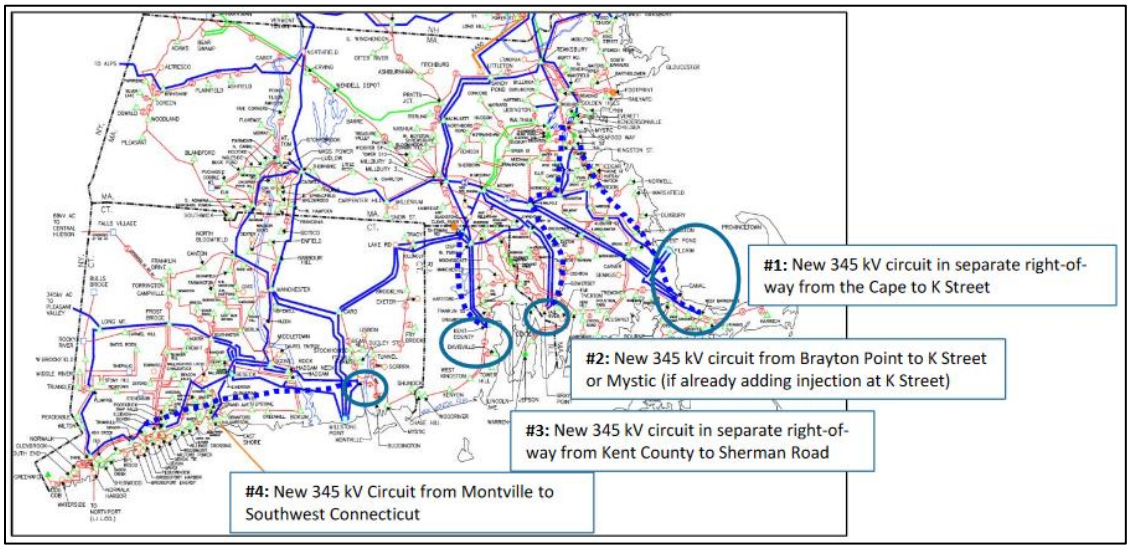
The solicitation should lay out clear technical standards and should invite bidders to propose networking capability. Standards should be based on anticipated offshore wind farms interconnecting to the transmission via array cables or export cable from a wind farm's combiner platform. Transmission bidders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

3) Ratepayer Benefit

Development of independent offshore transmission is the most cost-effective mechanism for achieving Connecticut's offshore wind goals and enabling a 100% zero carbon electric sector by 2040. 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 a third or less 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.[x] 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 high voltage transmission system to achieve state offshore wind goals when connecting at POIs on Cape Cod and other nearshore locations[xi] (see Figure 4). Initial estimates suggest that these onshore reinforcements will cost billions of dollars to complete.[xii]

Figure 4: ISO-NE depiction of 345kV transmission reinforcements to continue interconnecting offshore wind at nearshore POIs



Absent an independent procurement of offshore transmission, generators are unlikely to propose injections to locations such as Southwest Connecticut or Boston, despite the fact that such injections could avoid major onshore upgrades. Routing longer distances would make such bids more costly than other GLL bids connecting to nearshore locations. In an independent transmission procurement focusing on avoided onshore upgrades, direct injection to SW Connecticut and Boston would be viable and would make efficient use of valuable POIs.[xiii]

In evaluating the best interest of ratepayers in relation to transmission for offshore wind, Connecticut must take account of avoiding billions of dollars of upgrades that will be caused by continuing the generator lead line approach. Using customary information from bidders including interconnection requests and related studies, Connecticut can 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.

Project Risk

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 Connecticut 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 in order 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 independent offshore 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. Working from the language in Appendix E of the RFP, the framework would consist of the following:

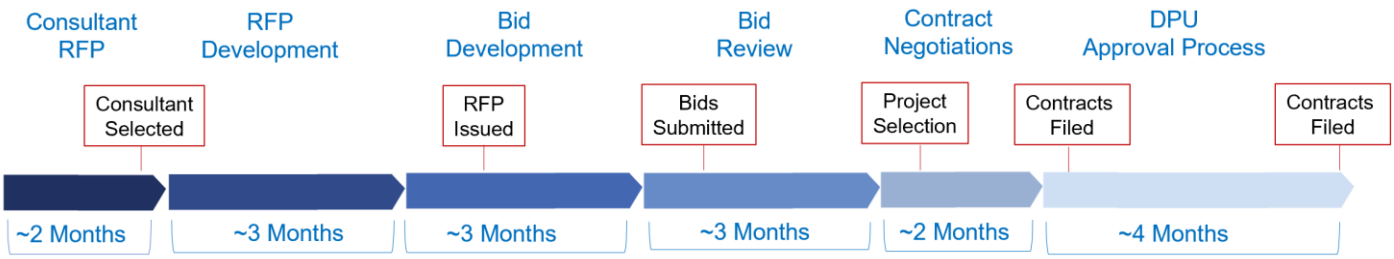
> The Transmission Developer Performance Based Tariff
>
> The Performance Based Tariff would recover the transmission revenue requirement through the EDCs and other load-serving entities in the participating New England states. Under the Performance Based Tariff, the EDCs would only be obligated to pay 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 Connecticut 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 RFP development and bid evaluation 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. This timeline is based on prior procurements in Connecticut and other New England states. Under the market-led approach to determining locations of offshore collector stations, the Transmission Procurement could take place in early 2021 followed by a Generation Procurement in late 2021 or 2022. 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 as part of a sequential procurement of offshore transmission and generation, as generators' commercial interests create irreconcilable conflicts with Connecticut's ability to cost effectively procure the next 1200MW 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[xiv] in controlling transmission exceeds competitive pressures to bid an accurate price to interconnect to a 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, Connecticut 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 Connecticut's public polity objectives.

Conclusion

The need for independent offshore transmission is clear, and Connecticut can lead the evolution of the US offshore wind market with an offshore transmission procurement 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.

Connecticut and the region cannot risk continuing with the status quo and backing into major onshore transmission upgrades that could hobble the industry. 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.[xv] Pausing offshore wind development for this long would hamstring Connecticut's efforts to achieve climate goals, and would hinder efforts to attract elements of the offshore wind supply chain to the region.

Endnotes:

[i] 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

[ii] The Connecticut Department of Energy and Environmental Protection's June 18, 2020 presentation *Connecticut Integrated Resources Plan: Preliminary Modeling Results Technical Meeting* projected need for 10,366MW of offshore wind in the 'Base Balanced Blend' to achieve a 100% carbon-free grid by 2040, and 14,066MW of offshore wind in the 'Electrification Balanced Blend' to achieve a 100% carbon-free grid by 2040. See: https://portal.ct.gov/DEEP/Energy/Integrated-Resource-Planning/Integrated-Resource-Planning

[iii] See: https://www.iso-ne.com/static-assets/documents/2020/06/a4_2019_economic_study_offshore_wind_transmission_interconnection_analysis.pdf

[iv] The authorizing procurement language in the opening section of the Act (https://www.cga.ct.gov/2019/act/pa/pdf/2019PA-00071-R00HB-07156-PA.pdf) states that the DEEP Commissioner is authorized to "solicit proposals, in one solicitation or multiple solicitations, from providers of energy derived from offshore wind facilities that are Class I renewable energy sources, as defined in section 16-1 of the general statutes, and any associated transmission…" PA 19-71 Sec 1(a)(1). Section 1(c) of the Act continues: "The commissioner may direct the electric distribution companies to enter into power purchase agreements for energy, capacity, any transmission associated with such energy derived from offshore wind facilities that are Class I renewable energy sources as defined in section 16-1 of the general statutes and environmental attributes, or any combination thereof…" (emphasis added). The statute lists four separate products that can be purchased: (1) Energy, (2) Capacity, (3) Associated Transmission, and (4) Environmental Attributes—then goes on to authorize contracting for "any combination thereof." Under the plain language rule of statutory construction (CGS 1-1(a) "words and phrases shall be construed according to the commonly approved usage of the language"), "any combination" includes "associated transmission" when procured separately as part of a larger, sequenced procurement of transmission and generation as described in this framework.

[v] Public Act 98-28, available at: https://www.cga.ct.gov/ps98/Act/pa/1998PA-00028-R00HB-05005-PA.htm

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

[vii] 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.

[viii] 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/).

[ix] 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

[x] 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.

[xi] 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), after which major new 345kV transmission rights of way would be needed. See: https://www.iso-ne.com/static-assets/documents/2020/06/a4_2019_economic_study_offshore_wind_transmission_interconnection_analysis.pdf. Cumulative state goals for Connecticut (2,300MW), Massachusetts (3,200MW) and RI (400MW) total 5,900MW. Additional demand for offshore wind needed to achieve decarbonization objectives, and demand from third parties means that 5,900MW should be seen as minimum likely demand for offshore wind.

[xii] 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

[xiii] 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.

[xiv] 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

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