Comments from Public Interest Organizations
On New England States' Regional Transmission Initiative Request for Information

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Introduction

Conservation Law Foundation ("CLF"), Natural Resources Defense Council ("NRDC"), Connecticut Citizen Action Group ("CCAG"), Eastern Connecticut Green Action ("ECAG"), Natural Resources Council of Maine ("NRCM"), and People's Action for Clean Energy ("PACE") (collectively, "Public Interest Organizations") appreciate the opportunity to provide comments in response to the Notice of Request for Information ("RFI") issued by Connecticut, Maine, Massachusetts, New Hampshire, and Rhode Island ("Participating States") in connection with their Regional Transmission Initiative on September 1, 2022.

Public Interest Organizations strongly support the efforts of the Participating States in issuing this RFI to lay the groundwork for integrating significant additional amounts of renewable resources, like offshore wind, into the grid and for planning and designing the transmission infrastructure necessary for such integration. We also strongly support the Participating States' effort to build a collaborative approach amongst the five states for developing the transmission solutions necessary to integrate renewables into the grid, and for developing arrangements for sharing the costs of those solutions. These efforts will help states meet their clean energy and decarbonization mandates, which are critical given the immediacy of the climate crisis.

Comments on Changes and Upgrades to the Regional Electric Transmission System Needed to Integrate Renewable Energy Resources[1]

3. Identify the advantages and disadvantages of utilizing different types of transmission lines, like alternating current (AC) and direct current (DC) options for transmission lines and transmission solutions. Should 1200MW/525kV HVDC lines be a preferred standard in any potential procurement involving offshore transmission lines?

High voltage alternating current ("HVAC") and high voltage direct current ("HVDC") have various advantages and disadvantages as methods for transmitting electricity. Thus, it is necessary to weigh all of the relevant factors when deciding whether to utilize HVAC or HVDC options.

a. Economic Factors and Efficiency

HVAC is typically more economically viable than HVDC when transmission is land-based and across shorter distances.[2] Conversely, HVDC transmission is generally more

[1] The numbers listed below correspond to the numbers in the RFI. Public Interest Organizations are only responding to the questions below at this time.
[2] Linquip Team, *HVDC vs HVAC Transmission Systems-Difference Between Them*, Linquip Technews (Feb. 2021), https://www.linquip.com/blog/hvdc-vs-hvac-transmission-systems/.

economically viable when transmitting over longer distances.[3] Additionally, the distance at which offshore/submarine HVDC becomes more economically viable than HVAC is significantly less than for land-based transmission.[4] Land-based HVDC transmission typically becomes more viable at a distance of approximately 480 miles, while submarine and underground HVDC transmission becomes more viable at a distance of around 30 miles.[5] HVAC systems require the periodic placement of substations to regulate electricity voltage; conversely, HVDC systems require only two power conversion stations—one at each end of the transmission line.[6] Conversion stations can cost several times more than substations.[7]

HVDC transmission lines are fundamentally more efficient than HVAC transmission lines.[8] HVDC transmission systems experience less line loss than HVAC systems and an HVDC line has noticeably less waste in comparison with HVAC over long-distance applications.[9] The HVDC cables themselves are responsible for the higher efficiency of the systems when compared to HVAC.[10] While there are some losses in the process of converting AC power to DC power and back again, the increased efficiency of HVDC cables make up for these losses.[11] Thus, as a transmission line increases in length, the costs of an HVAC line, including the costs associated with loss, eventually equal and exceed the higher initial cost of the HVDC system—reflected in the cost of the two HVDC conversion stations—resulting in a lower overall cost for HVDC transmission once a certain distance is reached.[12]

b. Environmental Impacts on the Marine Environment

The following is a discussion of the areas in which the impacts from HVDC and HVAC transmission lines differ.

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[3] Renewables, HVDC vs. HVAC cables for offshore wind, Reuters Events, Renewables, (2011), https://www.reutersevents.com/renewables/wind-energy-update/hvdc-vs-hvac-cables-offshore-wind.
[4] *Id.*
[5] *Id.*
[6] Linquip Team, *HVDC vs HVAC Transmission Systems-Difference Between Them*, Linquip Technews (Feb. 2021).
[7] Analyzing the costs of high voltage direct current (HVDC) transmission, Electrical Engineering Portal, Electrical Engineering Portal (Aug. 2014), https://electrical-engineering-portal.com/analysing-the-costs-of-high-voltage-direct-current-hvdc-transmission.
[8] *Id.*
[9] *Id.*; Linquip Team, *HVDC vs HVAC Transmission Systems-Difference Between Them*, Linquip Technews (Feb. 2021).
[10] Linquip Team, *HVDC vs HVAC Transmission Systems-Difference Between Them*, Linquip Technews (Feb. 2021). HVAC cables suffer from what is known as the "Skin Effect," which results in power waste. The Skin Effect, "forces the conductor to keep most of the current at its top and less current at the center," which "reduces the efficiency of the conductors being employed." *Id.* Therefore, "to provide a larger current, the cross-sectional section of the conductor" must be increased. *Id.* In contrast, HVDC cables do not experience the Skin Effect. This means that a physically larger AC cable is required to do the same work as a smaller DC cable, which necessarily impacts cost and environmental impacts. Accordingly, projects using DC cabling generally have a smaller project footprint, as the transmission corridors can be narrower than if AC cable were used. This also results in HVDC transmission lines potentially requiring a narrower right-of-way than HVAC transmission lines. *Id.*
[11] *Id.*; Analyzing the costs of high voltage direct current (HVDC) transmission, Electrical Engineering Portal, Electrical Engineering Portal (Aug. 2014).
[12] *See* Analyzing the costs of high voltage direct current (HVDC) transmission, Electrical Engineering Portal, Electrical Engineering Portal (Aug. 2014); Linquip Team, *HVDC vs HVAC Transmission Systems-Difference Between Them*, Linquip Technews (Feb. 2021).

i. EMF

Both underwater HVAC and HVDC lines emit electromagnetic fields ("EMF") that can affect marine wildlife. Marine species can sense electric and/or magnetic fields and the generation of electromagnetic fields (EMFs) from subsea cables may affect the ability of organisms to navigate and detect prey.[13] Buried cables reduce, but do not eliminate, EMF. Demersal species living on or near the seabed, where cable EMF is stronger, are more likely to be exposed to EMF than pelagic species.[14] Although there have been few studies of EMF impacts from buried cables on invertebrates, research has demonstrated that American lobster held in cages displayed behavioral differences when exposed to EMF. In that same study, little skate, an electrosensitive elasmobranch, demonstrated even greater sensitivity to EMF.[15] EMF exposure may affect sea turtles since they are known to use the earth's magnetic field for orientation and migration.[16] Marine mammals also detect EMF and, depending on the magnitude and persistence of EMF, such an effect can cause changes in marine mammal movement.[17] Potential risks from EMF to marine mammals are related to the animal's proximity to the cables.[18]

EMF from HVAC lines can have different effects than EMF from HVDC lines for fish, invertebrates, sea turtles, and marine mammals. In general, HVDC emits ten times more EMF than HVAC.[19] Given this difference, EMF resulting from HVDC is more likely to impact marine species than EMF from HVAC.[20] Indeed, studies have demonstrated that finfish and invertebrates are more sensitive to EMF emitted by HVDC than from HVAC.[21]

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[13] Zoe Hutchison, *et al.*, *Electromagnetic Field (EMF) Impacts on Elasmobranch (Shark, Rays, and Skates) and American Lobster Movement and Migration from Direct Current Cables*, BOEM (2018), https://espis.boem.gov/final%20reports/5659.pdf.

[14] Normandeau Associates, Inc., Exponent, Inc., Timothy Tricas, & Andrew Gill, *Effects of EMFs from Undersea Power Cables on Elasmobranchs and Other Marine Species*, BOEM (2011), https://espis.boem.gov/final%20reports/5115.pdf.

[15] Zoe Hutchison, *et al.*, *Electromagnetic Field (EMF) Impacts on Elasmobranch (Shark, Rays, and Skates) and American Lobster Movement and Migration from Direct Current Cables*, BOEM (2018).

[16] Kenneth Johmann & Chatherine Lohmann, *Sea turtles, lobsters, and oceanic magnetic maps,* 39 Marine and Freshwater Behaviour and Physiology 49 (2006), https://www.tandfonline.com/doi/abs/10.1080/10236240600563230?journalCode=gmfw20.

[17] Normandeau Associates, Inc., Exponent, Inc., Timothy Tricas, & Andrew Gill, *Effects of EMFs from Undersea Power Cables on Elasmobranchs and Other Marine Species*, BOEM, at 94 (2011).

[18] *Id.* at 96.

[19] Bastien Taormina, *et al.*, *A review of potential impacts of submarine power cables on the marine environment: Knowledge gaps, recommendations, and future directions*, 96 Renewable and Sustainable Energy Reviews 380, at pdf 40 (2018), https://hal.archives-ouvertes.fr/hal-02405630/document; Normandeau Associates, Inc., Exponent, Inc., Timothy Tricas, & Andrew Gill, *Effects of EMFs from Undersea Power Cables on Elasmobranchs and Other Marine Species*, BOEM, at 43-46 (2011); Ocean Wind Draft Environmental Impact Statement ("EIS"), BOEM, at 3.15-29, https://www.boem.gov/sites/default/files/documents/renewable-energy/state-activities/OceanWind1-DEIS-Vol1.pdf.

[20] Normandeau Associates, Inc., Exponent, Inc., Timothy Tricas, & Andrew Gill, *Effects of EMFs from Undersea Power Cables on Elasmobranchs and Other Marine Species*, BOEM, at 61-62, 94-95 (2011); Vineyard Wind Final EIS, BOEM, at B-32, B-44, https://www.boem.gov/vineyard-wind; South Fork Wind Final EIS, BOEM, at 3-14, 3-38, 3-56, 3-75-76, E3-14 (Aug. 2021), https://www.boem.gov/sites/default/files/documents/renewable-energy/state-activities/SFWF%20FEIS.pdf.

[21] *See* Zoe Hutchison, *et al.*, *Electromagnetic Field (EMF) Impacts on Elasmobranch (Shark, Rays, and Skates) and American Lobster Movement and Migration from Direct Current Cables*, BOEM, at xvii, 141, 145 (2018); Normandeau Associates, Inc., Exponent, Inc., Timothy Tricas, & Andrew Gill, *Effects of EMFs from Undersea Power Cables on Elasmobranchs and Other Marine Species*, BOEM, at 61-62 (2011).

ii. Noise

Noise can be produced during cable route clearance, trenching and backfilling, and maintenance from the vessels and tools used during these operations.[22] The noise produced during these activities is likely to be the same regardless of whether HVDC or HVAC cable is installed. The cable itself also produces noise during operations; however, such noises are generally higher for HVAC than for HVDC.[23] Underwater noise can have a variety of impacts on marine species including interference with marine animal communications, disruption of spawning and feeding behaviors, and displacement from important habitat.

iii. Heat

When electricity is transported, a certain amount of energy is lost as heat, leading to an increase in temperature at the cable surface and subsequent warming of the immediate surrounding environment. For buried cables, thermal radiation can warm the sediment that is in direct contact with the cable.[24] Heat emission is higher in AC than DC cables at equal transmission rates.[25] While there is evidence of thermal radiation from subsea cables, few studies exist on the subject, so the overall level of impacts is unclear.[26]

iv. HVDC Conversion Station Cooling

Unlike HVAC transmission, HVDC transmission requires an offshore conversion station. Conversion stations generally require a cooling system to cool the electrical equipment. Some conversion stations use open loop cooling systems, which pump seawater for cooling and then discharge it back into the ocean at a higher temperature than the ocean water.[27]

Open loop cooling systems of this kind have long been shown to have negative impacts from entrainment and impingement of marine life, particularly eggs, larvae, young juvenile fish, and invertebrates with planktonic life stages.[28] Moreover, the discharge of warmer water into the ocean can negatively impact microorganisms and finfish and higher energy orders above such species.[29] Because of entrainment and impingement, as well as thermal pollution, existing industrial open loop cooling systems have been phased out and restrictions on construction of

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[22] Bastien Taormina, et al., *A review of potential impacts of submarine power cables on the marine environment: Knowledge gaps, recommendations, and future directions*, 96 Renewable and Sustainable Energy Reviews 380, at pdf 11 (2018).
[23] *See Id.* at pdf 12.
[24] *Id.* at pdf 17.
[25] *Id.*
[26] *Id.* at pdf 17-18.
[27] *See Mayflower Wind Construction and Operations Plan,* Mayflower Wind, at 3-105, https://www.boem.gov/sites/default/files/documents/renewable-energy/state-activities/Mayflower%20Wind%20COP%20Volume%20I_0.pdf.
[28] *Final Environmental Impact Statement for the Port Delfin LNG Project Deepwater Port Application*, Delfin LNG, Appendix I Delfin LNG Ichthyoplankton Report (2016), https://www.energy.gov/sites/default/files/2018/11/f57/final-eis-0531-port-delfin-lng-app-i-2016-11_0.pdf
[29] Ross N. Cuthbert et al., *Emergent effects of temperature and salinity on mortality of a key herbivore,* Journal of Sea Research (2021), https://www.sciencedirect.com/science/article/pii/S1385110121001325#:~:text=Aquatic%20ecosystems%20are%20threatened%20by,change%20are%20temperature%20and%20salinity

new ones have been enacted in certain jurisdictions.[30] Thus, in contrast to HVAC, offshore HVDC transmission presents additional environmental impacts caused by conversion station cooling systems, when such systems are open loop.[31]

c. Environmental Justice Impacts

Both HVDC and HVAC transmission systems have the potential to negatively impact environmental justice communities. In particular, the construction of substations for HVAC systems and power conversion stations for HVDC could negatively impact environmental justice communities when sited there.

Substations and power conversion stations can produce negative impacts in the form of increased energy infrastructure in environmental justice communities that have been historically burdened by such infrastructure, and increased risks to public safety and to human health in areas in close proximity to the stations, and impacts to views and aesthetics, as well as noise and light pollution. In particular, substations used for HVAC systems are kept illuminated around the clock and are surrounded by locked fences for public safety reasons. HVDC conversion stations are also kept illuminated.[32]

Additionally, both power conversion stations and substations produce noise. Substations produce a constant humming or buzzing noise and the noise can be loud for adjacent property owners and can be audible several hundred feet from the substation fence. The sound can be more noticeable during nighttime hours when ambient noise levels are lower.[33] HVDC conversion stations also produce noise that is audible in the vicinity of the station.[34] Additionally, the HVAC and HVDC transmission lines themselves produce relatively low noise levels; however, the noise from HVAC lines is more audible than from HVDC lines.[35] Accordingly, siting substations and conversion stations in environmental justice communities has the potential to generate negative view and aesthetics, light, and noise impacts in communities that are already overburdened by energy infrastructure.

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[30] *See CP-#52 / Best Technology Available (BTA) for Cooling Water Intake Structure*s, New York State Department of Environmental Conservation (2011), https://www.dec.ny.gov/docs/fish_marine_pdf/btapolicyfinal.pdf.

[31] Additionally, open loop cooling for offshore wind converter stations is problematic due to the potential of fouling of intake pipes. Studies from Block Island have shown that fouling organisms quickly colonize offshore wind turbine foundations. Zoe Hutchison, *Offshore wind energy and benthic habitat changes lessons from block island wind farm,* 33 Oceanography (2020), https://doi.org/10.5670/OCEANOG.2020.406. As organisms like barnacles, mussels, and tunicates reproduce and settle, they can constrain flow through intake pipes. Fouling will be exacerbated by gelatinous plankton blooms that routinely occur throughout the entire region and during storms that suspend sediments. Inherent risks of fouling will require preventive maintenance and will add additional risk of clogging and interference with cooling, thus potentially impacting the reliability of energy delivery.

[32] *Environmental impacts of substations*, Public Service Commission of Wisconsin, at 4-5 (2013), (https://psc.wi.gov/Documents/Brochures/Impacts%20of%20Substations.pdf.

[33] *Id.*

[34] Xue-yun Ruan, *et al.*, The Noise Prediction and Control for UHVDC Converter Stations, 16 Procedia Engineering 526, 530-31 (2011), https://www.sciencedirect.com/science/article/pii/S187770581102621X?via%3Dihub.

[35] *5 Serious Environmental Impacts of HVAC Over HVDC Overhead Transmission Lines*, Electrical Engineering Portal (June 2016), https://electrical-engineering-portal.com/environmental-impacts-hvdc-transmission#audible-noise; Kamran Hafeez, *et al.*, To Investigate Environmental effects of HVDC versus HVAC Transmission Systems, J. or Basic Appl. Sci. Res., 3(8) 840, 842 (2013), https://www.researchgate.net/publication/332289945_To_Investigate_Environmental_effects_of_HVDC_versus_HVAC_Transmission_Systems/link/5cac289292851c64bd59ee15/download.

d. Deciding between HVAC and HVDC Transmission

As noted, not only do the costs for HVAC and HVDC transmission systems vary—with HVAC typically costing less than HVDC at shorter distances, but costing more at longer distances—but each technology presents different environmental and environmental justice impacts. Accordingly, when deciding between HVAC and HVDC systems, policymakers must consider cost factors, as well as potential environmental and environmental justice impacts generated by each option.

e. Preferred Cable Standard

The question asks whether 1,200 MW/525 kV should be the preferred standard for offshore HVDC transmission lines. The 1,200 MW limits likely derives from ISO-NE's protocols, which in turn, stems from Northeast Power Coordinating Council, Inc. ("NPCC") criteria. The NPCC criteria "require that a Normal Design Contingency . . . have no significant adverse impact outside the local area."[36] The maximum loss of source for a Normal Design Contingency has been jointly agreed upon by ISO-NE, New York Independent System Operator ("NYISO") and PJM Interconnection ("PJM") to be between 1,200 MW and 2,200 MW depending on system conditions within NYISO and PJM.[37] The low limit of 1,200 MW has historically been used for design contingencies by ISO-NE.[38]

The 1,200 MW limit has the potential to limit the amount of renewable energy that can be integrated into the grid by requiring an increased number of projects. In contrast, a higher limit could result in renewables being integrated into the grid through fewer projects and, thus, better enable the New England states to reach their ambitious decarbonization and renewable goals than maintaining the current limit. Further, the 1,200 MW limit could lead to the construction of duplicative HVDC transmission lines, which could increase environmental impacts to the marine environment. Accordingly, to facilitate a more efficient and accelerated integration of renewables into the grid, as well as a possible reduction in environmental impacts, the New England states should explore the possibility of HVDC transmission lines with capacity greater than 1,200 MW.

4. Comment on whether certain projects should be prioritized and why. For example, should a HVDC offshore project that eliminates the need for major land-based upgrades be prioritized over another HVDC offshore project that does not eliminate such upgrades.

This question appears to assume that an HVDC offshore project that eliminates the need for major land-based upgrades is preferable to an HVDC offshore project that does not eliminate

[36] Transmission Planning Technical Guide, ISO-NE, at 50 (Feb. 2022), https://www.iso-ne.com/static-assets/documents/2022/02/transmission_planning_technical_guide_rev7_2.pdf.
[37] *Id.*
[38] *Id.*; *see also,* Interconnection Planning Procedures for Generation and Elective Transmission Upgrades, ISO-NE, at 20 (Feb. 2022), https://www.iso-ne.com/static-assets/documents/rules_proceds/isone_plan/pp05_6/pp5_6.pdf; 2019 Economic Study, Offshore Wind Transmission Interconnection Analysis, ISO-NE, at Slide 12 (May 2020), https://www.iso-ne.com/static-assets/documents/2020/05/osw-econstudy-transmission-interconnection-analysis-may-2020-nonceii.pdf.

the need for such upgrades. In determining whether to prioritize a project that eliminates the need for land-based upgrades, policymakers must carefully weigh the advantages and disadvantages that each option presents. More specifically, policymakers must consider the potential environmental and environmental justice impacts, as well as the cost implications, for each option, including those discussed in response to Question No. 3, above.

When deciding which offshore transmission projects to select, policymakers must ensure that development occurs responsibly. Responsible development of offshore wind energy and offshore transmission: (1) avoids, minimizes, mitigates, and monitors adverse impacts on marine and coastal habitats and the wildlife that rely on them, (2) minimizes negative impacts on other ocean uses, (3) includes robust consultation with Native American tribes and communities, (4) meaningfully engages state and local governments and stakeholders from the outset, (5) includes comprehensive efforts to avoid impacts to environmental justice communities, and (6) uses the best available scientific and technological data to ensure science-based and stakeholder-informed decision making. Thus, policymakers must commit to ensuring that any offshore transmission projects that are selected avoid, minimize, and mitigate impacts to environmental justice communities and the marine environment, including but not limited to threatened or endangered species such as North Atlantic right whales; coastal and marine habitats and ecosystems; natural resources; benthic resources and essential fish habitat; and traditional or existing water-dependent uses.

The installation and operations of offshore transmission cables connecting wind farms to land can produce the following impacts to marine habitat and species: (1) interference with navigation and prey detection due to EMF; (2) sediment deposition and suspension, (3) habitat displacement, spawning and feeding disruption, and communications interference due to noise; (4) habitat conversion and disturbance from cable emplacement and maintenance; (5) entrainment and impingement of marine life and thermal pollution from open-loop cooling systems; (6) warming of the sediment due to thermal radiation; and (7) habitat disturbance from anchoring.[39] When determining where to site transmission corridors, policymakers must commit to relying on the best available scientific and technological data to avoid, minimize, and mitigate these and other impacts to marine habitat and species to the greatest extent possible. Further, policymakers must consider any impacts to environmental justice communities and tribal communities, and identify ways to avoid, minimize, and mitigate such impacts.

Before prioritizing and selecting offshore HVDC projects, policymakers should also consider legitimate onshore alternatives. Given that any offshore HVDC project will result in impacts to marine habitat and species, requiring consideration of viable onshore alternatives can help ensure that impacts to the marine environment are avoided, minimized, and mitigated.

In conclusion, rather than arbitrarily choosing to prioritize HVDC offshore projects that eliminate the need for major land-based upgrades, policymakers must weigh all relevant factors, including the environmental and environmental justice impacts, of each potential option. Carefully considering all factors for each option will help avoid and reduce impacts.

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[39] Bastien Taormina, *et al.*, *A review of potential impacts of submarine power cables on the marine environment: Knowledge gaps, recommendations, and future directions*, 96 Renewable and Sustainable Energy Reviews 380, at pdf 8-18 (2018); South Fork Wind Final EIS, BOEM, at E3 (Aug. 2021).

6. *Identify the benefits and/or challenges presented by using land based HVDC lines or other infrastructure to increase the integration of renewable energy (other than offshore wind) in New England to balance injections of offshore wind.*

Increasing the integration of renewable energy other than offshore wind in New England should, as the question suggests, help balance injections of offshore wind, in part by more evenly distributing the need for new, expanded and/or upgraded infrastructure between the onshore and offshore grids, thus reducing the likelihood of grid constraints and curtailments. Increasing the integration of renewable energy other than offshore wind will have the added benefit of increasing the diversity of the region's electricity generation resource mix, which in turn will make the grid more reliable, and help protect electricity ratepayers from the high prices and high price volatility associated with non-renewable energy sources.[40]

Using land-based HVDC lines or other infrastructure is one option for increasing the integration of renewable energy other than offshore wind, and offers potential benefits in addition to the general benefits described above. For instance, it could help reduce the need for offshore wind generation and thus offshore transmission infrastructure. Onshore infrastructure also offers the benefit of creating additional onshore transmission capacity, which will support increased electrification of the transportation and heating sectors, and help states meet their clean energy and climate goals.

For land-based HVDC lines or other infrastructure to provide these benefits, and to not generate costs or challenges that outweigh their benefits, the Participating States must coordinate and ensure that such onshore infrastructure is responsibly sited, developed, and operated, ideally within existing corridors or rights of way and/or on lands that have already been degraded or disturbed. Further, it is essential that such infrastructure, regardless of whether it increases the footprint of existing infrastructure, not exacerbate any past or current environmental and health impacts of existing electricity infrastructure, particularly on environmental justice populations who have historically borne a disproportionate share of that infrastructure in the region. The Participating States must coordinate and ensure that existing burdens from energy infrastructure are identified, and that new or expanded intrastate or interstate infrastructure is designed to avoid additional burdens and to provide benefits to already burdened populations.

One of the central challenges associated with using land-based HVDC lines or other infrastructure to increase the integration of renewable energy other than offshore wind is the historical difficulty of siting new or expanded electricity transmission infrastructure in the region, in particular HVDC lines that cross state lines or have interstate implications. As the RFI indicates, and as experience in the region has revealed, "the process of planning for, developing and building new transmission infrastructure takes many years."[41] Therefore, even in cases where infrastructure is ultimately permitted, time is a significant factor. To begin addressing these challenges, the Participating States should immediately coordinate on developing thorough

[40] *Winter Energy Market and Reliability Assessment, 2022-2023: A Staff Report to the Commission*, Federal Energy Regulatory Commission, Office of Energy Policy and Innovation & Office of Electric Reliability, at 2-3 (Oct. 20, 2022), https://www.ferc.gov/media/report-2022-2023-winter-assessment; *see also* Miriam Wasser & Mara Hoplamazian, *Why Electricity Prices are Rising Unevenly Across New England*, WBUR (Sept. 8, 2022), https://www.wbur.org/news/2022/09/08/new-england-electricity-prices-natual-gas-utility-auctions.

[41] RFI at 2.

but streamlined processes for permitting onshore grid infrastructure, and immediately work toward agreement on cost allocation mechanisms for such infrastructure.

As discussed above, using land-based HVDC lines or other infrastructure is just one option for increasing the integration of renewable energy other than offshore wind. The Participating States must also work together to identify, assess, and develop other approaches for increasing the integration of renewable energy other than offshore wind that do not involve land-based HVDC lines and infrastructure, including but not limited to: microgrids; non-wires alternatives (at the transmission and distribution grid levels); distributed generation; and grid enhancing technologies (for example, the use of dynamic line ratings).

7. Comment on the region's ability to use offshore HVDC transmission lines to facilitate interregional transmission in the future.

There is already precedent for both onshore and offshore HVDC lines facilitating interregional transmission. Currently, a 450 kV DC line connects Quebec's power grid to the ISO-NE grid. The project runs 932 miles from the Raddison substation in Quebec's Baie-James region to the Sandy Pond substation outside of Boston, via Vermont and New Hampshire.[42] There is also presently an offshore DC link between ISO-NE and NYISO—the Cross Sound Cable Interconnector—that connects New Haven, CT with Long Island, NY. While this project is limited to 24 miles in length and to a capacity of 330 MW, it demonstrates the potential for offshore interregional transmission links between ISO-NE and other regional grids.[43]

Current proposals underway further demonstrate the potential for interregional HVDC integration. The proposed SOO Green transmission project would deliver 2,100 MW of wind power from the Midcontinent Independent System Operator ("MISO") region into the PJM region via a 349-mile underground HVDC line. The SOO Green project plans to use an existing railroad right-of-way to limit impacts to landowners.[44]

Closer to New England, Brattle Group has proposed the development of a planned offshore transmission grid that would use HVDC lines to connect offshore wind farms to both the ISO-NE and NYISO grids. The NYISO proposal would include a direct HVDC line to New York City via the "Narrows" of New York City harbor.[45] The ISO-NE proposal would connect offshore wind farms of southeastern New England to points of interconnection in Massachusetts,

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[42] *Québec, New England's Clean Energy Partner*, Hydro Quebec, https://www.hydroquebec.com/clean-energy-provider/markets/new-england.html (last visited Oct. 26, 2022).
[43] *Cross Sound Cable Interconnector, Connecticut and Long Island, USA*, ABB Power Technologies Power Systems, https://library.e.abb.com/public/4664a655cb2a707fc1256f4100471f03/PT_Cross_SoundCable.pdf (last visited Oct. 26, 2004).
[44] Donnelle Eller, *Developer proposes a 350-mile underground transmission line to carry wind energy from rural Iowa to Chicago*, Des Moines Register (March 2019), https://www.desmoinesregister.com/story/money/business/2019/03/11/underground-transmission-line-would-take-wind-power-iowa-chicago/3128357002/; Ethan Howland, *SOO Green transmission project faces PJM obstacles: Are grid operators hindering the energy transition?*, Utility Dive (Jan. 2022), https://www.utilitydive.com/news/soo-green-pjm-grid-operators-helping-or-hurting-energy-transition/616966/.
[45] Johannes Pfeifenberger, et al. *Offshore Wind Transmission: an analysis of planning in New England and New York Presentation,* The Brattle Group, Slides 7-8, 17 (October 2020), https://www.brattle.com/wp-content/uploads/2021/06/21229_offshore_wind_transmission_-_an_analysis_of_options_for_new_england_and_new_york_offshore_wind_integration.pdf.

Rhode Island, and Connecticut.[46] The ISO-NE proposal would result in significant cost reductions, including over $1 billion in cost savings from the construction of fewer onshore upgrades when compared to the construction of generator lead lines for each separate offshore wind project.[47] Although Brattle does not propose interregional HVDC transmission links, its proposals demonstrate the potential for offshore HDVC lines to be employed across long distances in a planned offshore grid and could be expanded to include interregional HVDC transmission connections between ISO-NE and NYISO, as well as other regional grids, such as PJM.

The Federal Energy Regulatory Commission ("FERC") recently undertook an assessment of offshore wind integration, including, among other things, barriers to identifying interregional transmission projects that would integrate offshore wind generation.[48] In that docket, the Connecticut Department of Energy and Environmental Protection ("DEEP") noted that "forward-looking interregional planning is needed to cost effectively meet state zero carbon goals and this is especially true with offshore wind."[49] In its comments, DEEP cited a study by Brattle Group that shows that a more robust interregional transmission grid would allow up to an 80% reduction in carbon emissions without an increase in (inflation-adjusted) electricity rates.[50] More recently, FERC has initiated a rulemaking concerning transmission planning and cost allocation, which proposes to require public utility transmission providers in neighboring regions to revise coordination procedures to allow an entity to propose an interregional transmission facility in the regional transmission planning process, which would allow needs driven by changes in the resource mix and demand to be considered in interregional transmission coordination and cost allocation.[51] Public Interest Organizations support this proposal because it should help identify facilities that could more efficiently or cost-effectively meet transmission needs.[52]

In conclusion, these current, proposed, and conceptual HVDC projects demonstrate the significant potential for HVDC transmission lines to facilitate interregional transmission and the Participating States should continue to explore interregional transmission options.

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[46] *Id.* at Slide 7, 11; Johannes Pfeifenberger, et al. Offshore Transmission in *New England: the benefits of a better planned grid Presentation,* The Brattle Group, Slides 12-13 (May 2020), https://www.brattle.com/wp-content/uploads/2021/05/18939_offshore_transmission_in_new_england_-the_benefits_of_a_better-planned_grid_brattle.pdf.

[47] *Id.* at Slide 16.

[48] *See* Offshore Wind Integration in RTOs/ISOs, FERC Docket No. AD20-18.

[49] DEEP Comments, FERC Docket No. AD20-18, at 13 (May 10, 2021), https://elibrary.ferc.gov/eLibrary/filelist?accession_number=20210510-5082&optimized=false.

[50] *Well-Planned Electric Transmission Saves Customer Costs: Improved Transmission Planning is Key to the Transition to a Carbon-Constrained Future*, The Brattle Group, at 9 (June 2016), https://www.brattle.com/wp-content/uploads/2017/10/7235_well-planned_electric_transmission_saves_customer_costs_-_improved_transmission_planning_is_key_to_the_transition_to_a_carbon_constrained_future.pdf.

[51] Building for the Future Through Electric Regional Transmission Planning and Cost Allocation and Generator Interconnection, Notice of Proposed Rulemaking, FERC Docket No. 21-17, at PP 167-68 (Apr. 21, 2022), https://www.ferc.gov/media/rm21-17-000.

[52] CLF and Acadia Center Comments, FERC Docket No. 21-17, at 22-23 (Aug. 17, 2022), https://elibrary.ferc.gov/eLibrary/filelist?accession_number=20220817-5151&optimized=false.

8. Comment on any just-transition, environmental justice, equity, and workforce development considerations or opportunities presented by the transmission system buildout and how these policy priorities are centered in decisions to develop future infrastructure.

Environmental justice populations are often disproportionately impacted by energy infrastructure, including communities in which a significant number of residents are low-income, minority, or have limited English proficiency. A long history of discriminatory laws, policies, and practices that systematically disadvantage the most vulnerable have resulted in deeply entrenched inequities that persist to this day. Addressing this legacy of harm, which has been reinforced for decades, requires a reexamination of how energy infrastructure is sited and how impacts on communities, including cumulative impacts, are considered and mitigated. It also requires sustained commitment to principles of equity and environmental justice.

It is encouraging that the New England states increasingly recognize the need to elevate equity and environmental justice in the context of transmission planning and siting. This is an important first step towards ensuring that expanded transmission infrastructure in the region is equitably sited, provides workforce development opportunities to people in the region, and does not disproportionately burden environmental justice populations. The Regional Transmission Initiative presents an opportunity for the states to apply an equity lens to transmission buildout throughout New England and proactively engage with historically marginalized populations, including environmental justice communities and tribal communities, to ensure that they are not overburdened by new transmission infrastructure.

We recommend that the Participating States develop and implement stakeholder engagement best practices, including efforts to enable meaningful participation from environmental justice populations and tribal communities, and to make the Regional Transmission Initiative an open, accessible, and transparent proceeding. Critically, such outreach should start now, in the earliest phases of the initiative, to ensure that equity and environmental justice considerations are considered from the outset and meaningfully inform the process as it moves forward. Consideration of environmental justice impacts, including cumulative impacts, will be critical to achieve equitable outcomes. We encourage the Participating States to coordinate their approach to stakeholder engagement by developing a baseline set of best practices, which can be adapted as necessary depending on local context.

The Participating States are well positioned to take the lead on stakeholder outreach in the Regional Transmission Initiative, but it will also be important for states to coordinate with transmission planners and developers on outreach as specific proposals are developed and considered. Stakeholder outreach should involve, at a minimum: (1) ensuring that community members are made aware of proposed transmission projects that may affect them, (2) providing meaningful opportunities for community members and organizations to get involved, including opportunities for the public to provide written and oral comments, and (3) providing resources and technical assistance, including plain-language summaries and translated materials as needed. Targeted outreach to environmental justice communities and tribal communities is warranted because such communities bear heavier burdens from energy infrastructure, are systemically disadvantaged, and have fewer financial, legal, and political resources.

More robust public participation in regional transmission buildout, especially by stakeholders that are not currently engaged, can help build consensus and address community concerns. Stakeholder engagement early in the siting process is especially critical to identify siting concerns and begin assessing potential solutions. As the Participating States work with transmission planners and developers to identify potential interconnection points for offshore wind, they should also engage with the local community, including local officials, and request input. The Participating States should also engage with the marine community that may be affected, including fishermen and others with a commercial or scientific interest in the potentially affected area. The stakeholder process should be documented in publicly available materials. In addition, data products should clearly convey how the information was compiled and with what data, and they should acknowledge uncertainties and existing gaps in knowledge. Bringing all these stakeholders into the process early should make it easier to identify potential impacts and determine the best siting options for the undersea cables and interconnection points. It will be critical for the Participating States to strike an appropriate balance between addressing stakeholder concerns while also ensuring that transmission to support offshore wind is built at the speed and scope needed to meet the New England States' climate targets and decarbonize the regional grid.

In addition to stakeholder engagement, the Participating States should ensure that the Regional Transmission Initiative facilitates a just transition to a clean grid. The states should adopt an equity-focused lens to the transmission buildout. For example, the states should prioritize approaches that increase the benefits for environmental justice communities and otherwise marginalized populations who have historically borne the brunt of impacts from energy and industrial infrastructure and operations. Workforce development programs should specifically target residents of environmental justice communities and other populations that are currently underemployed or underrepresented in the clean energy workforce (e.g., people of color, women, tribal members, formerly incarcerated individuals) to boost their levels of participation. The jobs should provide meaningful benefits and follow prevailing wage standards. For specific projects, a community benefits agreement could be established to ensure that the host community benefits from the infrastructure and is not unduly burdened by it.

9. Comment on how to develop transmission solutions that maximize the reliability and economic benefits of regional clean energy resources.

The development of transmission solutions that maximize the benefits of regional clean energy solutions requires the identification and assessment of those benefits. The Participating States can thereby develop a common understanding of the nature and scope of benefits, as transmission solutions are being evaluated, and as the costs of solutions are being allocated. Once this shared understanding is achieved, the Participating States can begin to develop transmission solutions that maximize the benefits of regional clean energy solutions.

Regional clean energy solutions offer a wide range of benefits, including economic, reliability, and public policy benefits. As the costs of clean energy solutions decrease, they provide significant economic benefits in the form of both decreased costs of satisfying New England states' climate and clean energy mandates, and cost savings for electricity ratepayers throughout the region. These benefits will continue to manifest and increase as the price of clean energy solutions continues to fall, and as both the price and price volatility of fossil-fuel resources continue to increase. Further, given the regional nature of New England's transmission grid, ratepayer benefits from reduced electricity costs will be experienced across the region, regardless of which states are responsible for the clean energy solutions.[53] Thus, consumers in states with less ambitious policy goals will not be negatively impacted by states with more ambitious policy goals.

Regional clean energy resources also offer reliability benefits, including in the form of increased resource mix diversity associated with increased clean energy development, which will decrease the reliance on any one source of energy and thus make the regional grid more reliable. Clean energy resources can also be paired with energy storage to provide greater reliability in periods when intermittent clean energy sources are not as productive.

In addition to these reliability and economic benefits, the Participating States must also consider other benefits of regional clean energy resources, including the direct advancement and achievement of New England states' public policies, especially decarbonization and renewables mandates. Because clean energy resources generate cleaner electricity and employment opportunities, they also provide policy benefits in the form of advancing state public health and economic development policies. Given these significant benefits, the Participating States must sufficiently measure and assess benefits.

Once the Participating States have a shared understanding of the benefits of regional clean energy resources,[54] they can better coordinate the development of transmission solutions. With a complete view of the costs and benefits, the Participating States can make more informed and accurate decisions concerning the public need for transmission solutions and the siting and permitting of those solutions, and more easily reach agreement on cost sharing in a manner whereby the costs are allocated roughly commensurate with the benefits. Given the immediacy of the climate crisis in New England, the Participating States must begin work now on identifying and developing transmission solutions that maximize the benefits of regional clean energy resources, including comprehensive, but streamlined, permitting processes and cost allocation mechanisms that allocate costs based on the benefits/beneficiaries of each solution.

Comments on the Draft MOWIP

10. Identify potential Points of Interconnection (POIs) in the ISO-NE control area for renewable energy resources, including offshore wind. What are the benefits and weaknesses associated with each identified POI? To the extent your comments rely on any published ISO-NE study, please cite accordingly.

There are a limited number of existing interconnection points on the New England coast, and establishing new ones is challenging due to numerous constraints. These include the region's

[53] For this reason, Vermont will be a beneficiary of any regional transmission upgrades pursued through the initiative and should join as a participating state to ensure compliance with the principle that costs be allocated in a manner that is roughly commensurate with benefits.
[54] Like regional clean energy resources, transmission solutions designed to deliver the power generated by those resources offer numerous benefits, including economic, reliability and public policy benefits. Those benefits are discussed in greater detail below, in response to the Participating States' questions concerning transmission benefits and cost allocation mechanisms.

densely populated coastline and extensive coastal development, existing grid congestion, and the presence of environmentally sensitive areas. New interconnection points will have to be carefully selected based on consideration of multiple factors. The Maine Offshore Wind Transmission Technical Review recommends considering the following:

> the location of the offshore wind areas, grid reliability analyses, nearness of the substation to the shore, cost optimization of onshore and offshore cable lengths, onshore substation expandability, populated urban areas, impacts on the marine environment, and impacts on fishing and other near-shore activities.[55]

In addition, impacts on environmental justice populations and other marginalized communities must be considered and avoided to the greatest extent possible.

While identifying and mitigating impacts related to new interconnection points is important, there is also an urgent need to facilitate more rapid interconnection of offshore wind and other renewables in line with the New England states' climate goals. The Participating States should work with developers to strike an appropriate balance between these considerations and ensure that the Regional Transmission Initiative promotes the rapid, but responsibly sited, integration of offshore wind into the regional grid.

Physical and geographic constraints on new interconnection for offshore wind and other renewables suggest that states and developers should seriously consider repurposing existing sites and infrastructure. For example, using newly decommissioned coastal power plants as interconnection points may be a strategic way to repurpose existing infrastructure and interconnect new wind projects more quickly. This approach is being deployed in Massachusetts, where the Brayton Point power plant has been decommissioned and there are plans to use the site for a substation serving offshore wind projects. There are clear benefits to this approach. Reusing existing sites and repurposing existing infrastructure avoids the need to site new infrastructure, which is often the source of lengthy conflicts and delays. This approach should result in increased interconnection speed and overall efficiency gains. Interconnecting offshore wind more quickly also contributes to state climate goals by decreasing the emissions intensity of the regional grid.

However, using decommissioned power plants as interconnection points for offshore wind raises equity concerns that the Participating States should consider. Many of these power plants are sited in proximity to environmental justice populations or otherwise marginalized or overburdened communities. These power plants have negatively impacted host communities; in particular, emissions from these plants during their years of operation negatively impacted local air quality and the health of nearby residents. Reusing these sites as interconnection points for offshore wind would not result in the same level of localized health impacts, but it would still affect the surrounding neighborhoods and may trigger community opposition. The presence of energy infrastructure in a community—including infrastructure needed to support clean energy

[55] Maine Offshore Wind Analysis, Offshore Wind Transmission Technical Review-Initial Report, DNV Report to Maine Governor's Energy Office and Maine Offshore Wind Roadmap, at 2, 49 (Feb. 2022), https://www.maine.gov/energy/sites/maine.gov.energy/files/inline-files/Maine%20OSW%20DNV%20Offshore%20Wind%20Transmission%20Technical%20Review%20Initial%20Report.pdf.

like offshore wind—contributes to the cumulative burdens a community experiences, and these impacts must be identified and mitigated to the greatest extent possible.

Notably, one of the prospective interconnection points identified in the RFI—Bridgeport, Connecticut—is designated by the state of Connecticut as an environmental justice community[56] and distressed municipality.[57] There is already extensive energy and industrial infrastructure in Bridgeport, and area residents face cumulative burdens from these existing land uses. While the benefits of using Bridgeport as an interconnection site for offshore wind may outweigh the potential impacts, it will be critical for the state and project developers to carefully consider community input to ensure that area residents' concerns are addressed and that any projects do not unduly burden the community.

As discussed above, stakeholder outreach will be critical to ensure that communities who may be affected by transmission infrastructure are meaningfully involved in the process from the beginning and that their concerns are appropriately addressed. In addition, there should be mechanisms in place to ensure that benefits from these projects flow to affected communities and environmental justice communities in the region. This could involve, for example, project developers establishing community benefits agreements or providing workforce development opportunities and jobs to area residents. The Participating States should work with developers to support the development of initiatives that benefit affected communities and environmental justice communities more broadly.

Relevant Studies:

- ISO-NE Planning Advisory Committee, 2019 Economic Study Offshore Wind Transmission Interconnection Analysis, https://www.iso-ne.com/static-assets/documents/2020/05/osw-econstudy-transmission-interconnection-analysis-may-2020-nonceii.pdf (summary of the study)
- Offshore Wind Transmission Technical Review, Report to the Maine Governor's Energy Office and Maine Offshore Wind Roadmap (Feb. 18, 2022), https://www.maine.gov/energy/sites/maine.gov.energy/files/inline-files/Maine%20OSW%20DNV%20Offshore%20Wind%20Transmission%20Technical%20Review%20Initial%20Report.pdf
- NREL, Atlantic Offshore Wind Transmission Study, https://www.nrel.gov/wind/atlantic-offshore-wind-transmission-study.html (expected completion in October 2023)
- NYSERDA, Offshore Wind Master Plan, https://www.nyserda.ny.gov/All-Programs/Offshore-Wind/About-Offshore-Wind/Master-Plan
- Kelly Smith et al., Tufts University, Offshore Wind Transmission and Grid Interconnection across U.S. Northeast Markets (Feb. 6, 2021), https://dl.tufts.edu/concern/pdfs/47429p92q

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[56] Environmental Justice Communities, CT Department of Energy and Environmental Protection (Oct. 2021), https://portal.ct.gov/DEEP/Environmental-Justice/Environmental-Justice-Communities.

[57] 2022 List of Distressed Municipalities, CT Department of Economic and Community Development (2022), (2022 list). https://portal.ct.gov/DECD/Content/About_DECD/Research-and-Publications/02_Review_Publications/Distressed-Municipalities.

11. Similarly, comment on whether there are benefits to integrating offshore wind deeper into the region's transmission system rather than simply interconnecting at the nearest landfall (e.g., using rivers to run HVDC lines further into the interior of New England). If there are enough benefits to make this approach feasible, please comment on any obstacles, barriers, or issues that Participating States should be aware of regarding such an approach.

In some circumstances, there may be benefits to integrating offshore wind further inland rather than the nearest landfall. As discussed above, there are numerous constraints that limit the availability of coastal interconnection sites. In addition, there are questions about the advisability of siting new energy infrastructure along the coast. Several expected climate impacts, including sea level rise, flooding, and more frequent and severe storms, pose particular threats to coastal infrastructure. Locating such infrastructure further inland could convey resilience benefits, though a site-specific analysis should be done for any prospective site.

There are also several disadvantages to locating interconnection sites further inland. As discussed elsewhere in these comments, siting remains a pervasive challenge for transmission infrastructure in the region. Undergrounding lines may avoid some of the challenges associated with siting, but it is also substantially more expensive, and not without its own impacts. The further inland an interconnection point is located, the more likely it is that the project will encounter local opposition, permitting difficulties, environmentally sensitive areas or environmental justice communities that should be avoided, increased costs, or other challenges that make the project less feasible.

Using rivers to run HVDC lines inland is an option that should be considered, although the potential impacts of this approach would need to be identified and mitigated to the extent possible. Communities located along the rivers should be included in stakeholder outreach. The states or project developers should also conduct outreach to organizations that work to protect water quality in potentially affected rivers because such organizations have expertise in these water bodies and a sense of ownership over them. Failure to engage stakeholders could lead people to oppose projects that impact rivers they live nearby or work to protect.

In addition to rivers, the states should consider using existing rights of way to run HVDC lines inland. Interstate highways, state highways, and rail corridors are potential options that should be considered. These existing rights of way may be less environmentally sensitive than most rivers and may pose fewer permitting and siting challenges. The Participating States should engage with their respective Departments of Transportation to discuss the feasibility of this approach. They should also contact other jurisdictions that have considered or implemented this strategy to learn from their experience.

As discussed above in response to Question No. 10, decommissioned coastal power plants could be repurposed as interconnection sites for offshore wind. If HVDC lines are run further inland, this raises the possibility that power plants located further inland could also serve such a function. The Participating States should identify which power plants (1) have a reasonable likelihood of being decommissioned within a particular timeframe consistent with the region's expected buildout of transmission infrastructure to support offshore wind, and (2) are sited in a location that would make them a feasible interconnection point.

12. Identify likely offshore corridor options for transmission lines. Please comment on the potential for such corridor options, include size of the corridor footprint and potential number of cables that can be accommodated, to minimize the number of lines and associated siting and environmental disturbance needed to integrate offshore wind resource. For any offshore corridor identified, please indicate how the corridor avoids or minimizes disturbances to marine resources identified in the applicable plan, including the Connecticut Blue Plan and the Massachusetts Ocean Management Plan.

Public Interest Organizations do not propose specific corridor options. However, in addition to selecting transmission corridor routes for the purposes of decreasing congestion and addressing reliability concerns, the development of any offshore transmission corridor must occur responsibly, *i.e.*, development that avoids, minimizes, and mitigates impacts to marine habitats and species. *See supra* Question No. 4. In particular, transmission corridors should be selected to avoid, minimize, and mitigate impacts from (1) EMF; (2) sediment deposition and suspension, (3) noise; (4) habitat conversion and disturbance from cable emplacement and maintenance; (5) heat emission; (6) anchoring on the seafloor; and (7) other impacts associated with transmission corridor installation and maintenance. When considering potential corridor options, policymakers should assess whether consolidating several cables into a single corridor route has the potential to reduce impacts and, if so, prioritize such options. Offshore cable routes should be identified through a comprehensive ocean planning process that brings interested and affected stakeholders to the table and is based on the best science and data available to ensure science-based and stakeholder-informed decision making.

Policymakers should also require developers to conduct robust monitoring before, during, and post-construction to fully understand the potential adverse effects of offshore transmission development and operations on fisheries, marine habitat, marine mammals, marine avian species, sea turtles, bats, and terrestrial migratory birds. In particular, developers should be required to monitor the effects of EMF emitted from offshore transmission lines and the effects of cable emplacement resulting in habitat displacement on marine wildlife species.

In general, the development of a planned offshore transmission grid in New England has the potential to reduce impacts to benthic habitats when compared to the development of generator lead lines connecting each separate project to the grid. Similarly, requiring offshore wind projects to be "mesh ready," *i.e,* requiring that projects be able to plug into a shared offshore grid, and which New York regulators are now mandating for projects, has the potential to reduce impacts to benthic habitats and should be further explored for New England.[58] In a presentation for the Clean Energy States Alliance, Brattle Group noted that a planned offshore transmission grid could reduce the amount of required undersea cabling by approximately half, which could "reduce the cumulative effects of offshore transmission on fisheries, coastal communities, and the marine environment."[59] Because a planned offshore wind grid would need fewer cables, it would result in less disruption and impacts on the marine coastal environment

[58] David Iaconangelo, *First-of-a-kind N.Y. offshore wind plan shows grid challenge*, E&E News (July 28, 2022), https://www.eenews.net/articles/first-of-a-kind-n-y-offshore-wind-plan-shows-grid-challenge/.
[59] Johannes Pfeifenberger, et al, *Offshore Wind Transmission: An Analysis of Planning in New England and New York*, The Brattle Group, at Slide 12 (October 2020).

than the construction of generator lead lines for each individual project. Thus, this approach would help avoid, minimize, and mitigate impacts to marine habitats and species.

While a planned offshore transmission grid will generally help reduce impacts when compared to constructing separate project specific generator lead lines, there are important habitat areas that should be avoided when deploying an offshore grid. One type of habitat that should be avoided for offshore transmission siting to the greatest extent possible are complex habitats. The emplacement of cable for offshore transmission corridors and the anchoring of vessels used for laying cable can lead to long-term disruption of complex habitats.[60]

Benthic habitats can be classified based on their level of physical complexity, ranging from relatively simple habitats to more complex habitats.[61] Habitats where sand and mud substrates are predominant are low in physical complexity and considered non-complex or "simple" habitats. Conversely, glacial moraine and coarse sediment are classified as more complex habitats because boulders, cobbles, and pebbles are predominant in such areas.[62] These more complex habitats provide a heterogeneous variety of hard surfaces and fine material that provide habitat for many different species.

Complex, hard bottom habitat provides essential fish habitat for a number of species, including both juvenile and adult Atlantic cod. Offshore, both juvenile and adult cod prefer structurally complex hard bottom habitats comprised mostly of pebbles, cobble, and boulders.[63] Cobble substrate is critical for the survival of juvenile cod because it helps them avoid predators.[64] Studies have also shown that hard bottom habitats are important for cod reproduction.[65] Atlantic cod demonstrate spawning site fidelity, meaning they return to the same bathymetric locations year-after-year to spawn.[66]

Massachusetts, Connecticut, and Rhode Island have all recognized the importance of complex habitats and their ocean management plans seek to limit development in complex

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[60] *See, e.g.*, South Fork Wind Farm Final Environmental Impact Statement, BOEM, at 3-19-21, 3-43 (Aug. 2021) (noting that the presence of offshore wind structures, including transmission corridors, may result in moderate negative impacts to certain benthic habitat and essential fish habitat).

[61] Peter J. Auster & Richard W. Langton, *The Effects of Fishing on Fish Habitat*, National Undersea Research Center for the North Atlantic & Great Lakes and Maine Department of Marine Resources, at M-6, M-36 (May 1998), https://ocean.floridamarine.org/efh_coral/pdfs/habitat_plan/habitatplanappm.pdf.

[62] *Id.*

[63] Omnibus Essential Fish Habitat Amendment 2, Volume 2 EFH and HAPC Designation Alternatives and Environmental Impacts, New England Fishery Management Council ("NEFMC") & NMFS, at 10-14 (Oct. 25, 2017), https://www.habitat.noaa.gov/protection/efh/efhmapper/oa2_efh_hapc.pdf.

[64] *Id.*

[65] Gregory DeCelles, *et al*, *Using Fishermen's Ecological Knowledge to Map Atlantic Cod Spawning Ground on Georges Bank*, 74 ICES Journal of Marine Science 1587 (Apr. 2017), https://academic.oup.com/icesjms/article/74/6/1587/374823.

[66] Framework Adjustment 53 to the Northeast Multispecies FMP, Appendix II: Analytic Techniques: Gulf of Maine Cod and Other Groundfish Analysis, NEFMC, at AII-2 (Oct. 2014), https://www.nefmc.org/library/framework-53-information; Douglas R. Zemeckis, *et al., Spawning Site Fidelity by Atlantic Cod in the Gulf of Maine: Implications for Population Structure and Rebuilding*, 71 ICES Journal of Marine Science 1356 (Sept. 2014), https://academic.oup.com/icesjms/article/71/6/1356/2835586; Egil Skjaeraasen, *et al.*, *Extreme Spawning-Site Fidelity in Atlantic Cod*, 68 ICES Journal of Marine Science, 1472 (Apr. 2011), https://academic.oup.com/icesjms/article/68/7/1472/654316.

habitat areas. For example, the Massachusetts Ocean Management Plan ("MA Ocean Plan") identifies special, sensitive, or unique (SSU) marine habitats, including "hard/complex seafloor."[67] The MA Ocean Plan defines "hard/complex seafloor" as "seabed characterized singly or by any combination of hard seafloor, complex seafloor, artificial reefs, biogenic reefs, or shipwrecks and obstructions."[68] Under the regulations governing the MA Ocean Plan, "activities proposed in the Ocean Management Planning Area are presumptively excluded from the [SSU] Resource areas delineated" in the MA Ocean Plan.[69] The MA Ocean Plan designates areas for offshore wind transmission cables, which are in presumptive compliance with the management standards for SSU resources, provided that, "[i]nvestigations and survey confirm the predominance of soft-bottom seafloor (i.e., the general absence of hard-bottom substrate) within the preliminary areas for offshore wind transmission cables such that sufficient burial depths for cables can be reasonably expected."[70]

Similarly, the Connecticut Long Island Sound Blue Plan ("CT Blue Plan") identifies a series of ecologically significant areas ("ESA"), which includes hard bottom and complex sea floor, areas of submerged aquatic vegetation, areas of cold water corals, etc.[71] Under the CT Blue Plan, a proposed new activity may only be located in Long Island Sound if it has been demonstrated that (1) "[t]he project will cause no significant adverse impacts to the ESA . . . pursuant to the [ESA] siting and performance standards" and (2) "there is no feasible, less damaging alternative and all reasonable mitigation measures and techniques have been provided to minimize adverse impact, and the public benefits of the project outweigh the harm to the ESA and/or SHUA resource, use, or value."[72] The CT Blue Plan also provides specific ESA siting and performance standards for hard bottom and complex sea floor. For the water column of these habitats, the siting and performance standards prohibit any "alteration, including changes in sedimentation or turbidity that would significantly adversely impact ecological characteristics

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[67] 2021 Massachusetts Ocean Management Plan, MA Executive Office of Energy and Environmental Affairs--Office of Coastal Zone Management, at Table 2-1 (January 2022), https://www.mass.gov/files/documents/2022/02/25/ma-ocean-plan-2021-vol-1a.pdf. The MA Ocean Plan identifies a number of other SSU marine habitats, including eelgrass. *Id.*

[68] *Id.*

[69] 301 CMR 28.04(2)(a). This presumption may be overcome by demonstrating that the maps delineating the SSU are inaccurate or by demonstrating as follows: "[1] No less environmentally damaging practicable alternative exists. For the purposes of this standard, an alternative is practicable if it is available and capable of being done after taking into consideration cost, existing technology, and logistics with respect to the purpose of the Activity; and [2.] The Proponent has taken all practicable measures to avoid damage to [SSU] Resources, and the Activity will cause no significant alteration to [SSU] Resources. Demonstrating compliance with this standard may include the incorporation of measures to avoid resources and impacts through time of year controls such that the construction, operation, or removal of the Activity will not occur when the [SSU] Resource is present or may be adversely effected [sic]; and [3.] The public benefits associated with the proposed Activity outweigh the public detriments to the Special, Sensitive or Unique Resource." 301 CMR 28.04(2)(b).

[70] 301 CMR 28.04(6)(a).

[71] CT Blue Plan, Conn. Dept. of Energy and Env't Protection, at 4-126 (Sept. 2019), *available at*: https://portal.ct.gov/-/media/DEEP/coastal-resources/LIS_blue_plan/blueplanfinaldraftversion12september2019pdf.pdf . The CT Blue Plan defines hard bottom and complex sea floor as areas "characterized by exposed bedrock or concentrations of boulder, cobble, pebble, gravel, or other similar hard substrate distinguished from surrounding sediments and provide a substrate for sensitive sessile suspension-feeding communities and associated biodiversity." *Id.* at 3-83.

[72] *Id.* at 4-126.

and function."[73] For benthos and substrate, the ESA standards prohibit any "alteration that would significantly adversely impact ecological characteristics and function."[74]

Finally, the Rhode Island Special Area Management Plan (RI SAMP) also recognizes the importance of complex habitats. The regulations governing the RI SAMP designate certain locations as "areas of particular concern" and include glacial moraines as such designated areas.[75] The regulations explain that "[g]lacial moraines are important habitat areas for a diversity of fish and other marine plants and animals because of their relative structural permanence and structural complexity" and that glacial moraines "create a unique bottom topography that allows for habitat diversity and complexity, which allows for species diversity in these areas and creates environments that exhibit some of the highest biodiversity within the entire Ocean SAMP area."[76] Under the regulations, offshore developments, including underwater cables, are presumptively excluded from areas of particular concern, and this presumption may only be rebutted if the applicant "can demonstrate by clear and convincing evidence that there are no practicable alternatives that are less damaging in areas outside" of the area of particular concern, or that "the proposed project will not result in a significant alteration to the values and resources" of the area of particular concern."[77] Further, applicants who successfully rebut this presumption must also demonstrate "that all feasible efforts have been made to avoid damage to [areas of particular concern] resources and values."[78]

Because it would require less overall cable, a planned offshore transmission grid has the potential to further avoid, minimize, and mitigate environmental impacts when compared to constructing generation lead lines for each individual project. However, the emplacement of cables for a planned offshore transmission grid, as well as the anchoring of vessels used for laying cable, has the potential to result in long-term impacts to complex habitats.[79] Therefore, because of the importance of complex, hard bottom habitats to overfished Atlantic cod reproduction and growth and other vulnerable groundfish species, offshore transmission corridors should not be sited in complex habitats to the greatest extent practicable. Avoiding the siting of transmission corridors in complex habitats is consistent with the MA Ocean Plan, CT Blue Plan, and RI SAMP, which all presumptively exclude the siting of offshore transmission in such areas.

15. Comment on cost allocation mechanisms that would prevent cost-shifting between the states based on their policy goals and ensure that local and regional benefits remain quantifiably distinct. How should any future potential procurement identify and distinguish local, regional, and state-specific benefits (e.g., reliability) such that ratepayers only pay for services that they benefit from?

To ensure accurate and fair cost allocation in connection with the Regional Transmission

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[73] *Id.* at 4-127. Similarly, for areas of submerged aquatic vegetation and areas of cold water coral, the CT Blue Plan prohibits (1) alterations to the water column that would significantly adversely impact these resources and prohibits and (2) any bottom disturbances to these resources. *Id.* at 4-127-128.
[74] *Id.*
[75] 20-05-11.10. Regulatory Standards, 650 RI ADC 20-05-11.10.2(A)
[76] *Id.* at 11.10.2(C).
[77] *Id.* at 11.10.2(B).
[78] *Id.*
[79] *See, e.g.*, South Fork Wind Farm Final Environmental Impact Statement, BOEM, at 3-19-20, 3-30-31 (Aug. 2021).

Initiative, the Participating States should implement comprehensive cost-benefit analyses that identify and account for all relevant costs and benefits. Not only do comprehensive cost-benefit analyses ensure more accurate cost allocation by considering all types of costs and benefits, but they also ensure fair cost allocation by preventing both cost-shifting and free-riding.

There are numerous types of benefits of transmission, many of which are overlooked by traditional planning processes that focus on production cost benefits. In order to perform the comprehensive cost-benefit analyses that are foundational to accurate and fair cost allocation, the Participating States should consider a broad set of benefits. A recent study by Brattle Group and Grid Strategies outlines a suite of transmission benefits by category, including, but not limited to, (1) additional production costs benefits; (2) reliability and resource adequacy benefits; (3) generation capacity cost benefits; (4) market facilitation benefits; (5) environmental benefits; (6) public policy benefits; (7) other project-specific benefits; (8) employment and economic stimulus benefits; and (9) increased health benefits.[80] Some of these benefits were recently identified by FERC as benefits that are under consideration as components of a minimum set of benefits for regional public utility transmission providers to consider in regional transmission planning.[81] But while the list proposed by FERC is an important start, it leaves out several important benefits, including benefits relating to achieving decarbonization mandates.

Some of these transmission benefits have been characterized as difficult to quantify or even unquantifiable, but experience has shown that this is not the case. As the Brattle-Grid report indicates, many of these benefits can be readily estimated using existing planning and market simulation tools, and

> [q]uantifying a broader range of transmission benefits for individual projects or a portfolio of synergistic transmission upgrades will yield a more accurate benefit-cost analysis, provide more insightful comparisons, and would avoid rejecting beneficial investments that would reduce system-wide costs. Not quantifying these transmission-related benefits where they likely exist, results in unreasonably imposing additional costs on customers.[82]

To date, the New England region's approach to transmission planning and cost allocation has been separated by type—economic, reliability, and public policy—and this siloed approach has resulted in a paradigm that fails to consider the full range of potential project benefits and costs, and thus fails to allocate the costs of such facilities roughly commensurate with the benefits, as required by law. To address similar challenges, other regions have adopted a multi-value approach to planning and cost allocation that assesses economic, reliability, and public policy needs and a broad set of benefits.[83] The Participating States should make every effort to

[80] Transmission Planning for the 21st Century: Proven Practices that Increase Value and Reduce Costs, The Brattle Group and Grid Strategies, at 34-35 (Oct. 2021), https://www.brattle.com/wp-content/uploads/2021/10/2021-10-12-Brattle-GridStrategies-Transmission-Planning-Report_v2.pdf.
[81] Building for the Future Through Electric Regional Transmission Planning and Cost Allocation and Generator Interconnection, Notice of Proposed Rulemaking, FERC Docket No. 21-17, at P 185 (Apr. 21, 2022).
[82] Transmission Planning for the 21st Century: Proven Practices that Increase Value and Reduce Costs, The Brattle Group and Grid Strategies, at 32 (Oct. 2021).
[83] *See e.g.*, MISO's Multi-Value Planning (MVP) planning process.

likewise develop and implement multi-value planning and cost allocation in order to maximize the buildout of beneficial projects and increase ratepayer cost savings.

To more fully understand the scope of transmission benefits and develop more sound cost allocation mechanisms that are agreeable to states, the Participating States should develop a process for identifying and measuring transmission benefits that accrue at the local, state and/or regional level, while ensuring that benefits are not double counted. Cost allocation mechanisms that capture and reflect all benefits and beneficiaries will be fairer and prevent cost-shifting and free-riding. That is, cost allocation rooted in comprehensive cost-benefit analyses ensures that states and ratepayers only pay for transmission solutions from which they benefit, and conversely ensures that states and ratepayers that benefit from transmission solutions pay their share of the associated costs.

17. Comment on the co-benefits of landfalling offshore transmission lines, such as improvements to reliability and/or resilience (i.e., through the use of HVDC converters or otherwise), economic development (e.g., port development, hydrogen production, etc.) and any local system benefits. Identify ways to measure and maximize these co-benefits when evaluating transmission buildout.

Landfalling offshore transmission lines can produce co-benefits for the landfall area and for surrounding areas. For instance, landfalling such lines presents economic development opportunities in and around the landfall area, including employment opportunities in the form of transmission line and substation or conversion station construction and operation and maintenance. Depending on the location of the landfalling line relative to offshore wind generation and transmission infrastructure, and the timing of the generation and transmission development, there may also be economic opportunities in the form of port development. For instance, landfalling an offshore transmission line in an area may result in port development in that same area by or in support of offshore wind developers seeking to maximize efficiencies with respect to all aspects of offshore wind development.

The Participating States must also take into consideration that landfalling offshore transmission lines may produce environmental and/or health burdens for the landfall area and for surrounding areas. In particular, to the extent landfalling occurs in areas of prior electricity infrastructure, and to the extent that landfalling requires any new, expanded, or upgraded transmission infrastructure, the landfalling may add to the historic and disproportionate burdens borne by residents in and around that area. To mitigate any such impacts, the Participating States should consider advancing initiatives that prioritize development of infrastructure that avoids or minimizes additional impacts, and that prioritize workforce training and placement of members of those communities. States and developers should make every effort to mitigate the environmental impacts of landfalling lines. For example, an advisory group in Maine has recommended that, to the extent possible, landfalling utilize already existing high use areas (such as parking lots, etc.) so minimal habitat is disturbed and to avoid areas of sensitive wildlife habitat, and river outlets used by diadromous fish species.[84]

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[84] Maine Offshore Wind Roadmap Advisory Committee, Environmental and Wildlife Working Group Final Recommendations, at pdf 22 (July 8, 2022), https://www.maineoffshorewind.org/wp-content/uploads/2022/08/EWWG-FINAL-Recommendations-_07.11.22-1.pdf.

Conclusion

In conclusion, Public Interest Organizations strongly support the efforts of the Participating States, in issuing this RFI, to plan for and design the transmission infrastructure necessary for integrating large amounts of renewable energy into the grid and for developing arrangements for sharing the costs of those solutions. These efforts will help states meet their clean energy and decarbonization mandates, which are critical given the immediacy of the climate crisis. Throughout these comments, Public Interest Organizations have urged the Participating States to adequately consider factors other than mere differences in costs of transmission alternatives, including impacts to the marine environment and environmental justice communities and tribal communities, when weighing decisions on transmission. By adequately considering such factors, the Participating States can help ensure that transmission development not only occurs at the pace necessary to address the immense challenges posed by climate change, but also results in a just transition that avoids, minimizes, and mitigates environmental impacts to the greatest extent possible.

Sincerely,

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