NEMOEC
NEW ENGLAND MARITIMES OFFSHORE ENERGY CORRIDOR

The New England – Maritime Offshore Energy Corridor: Frequently Asked Questions

The Basics:

What are you proposing?

The New England – Maritimes Offshore Energy Corridor would be a shared offshore backbone transmission corridor that directly connects US and Canadian offshore wind resources to population centers and industrial users at the coasts. The transmission corridor would run from Nova Scotia to the New England states and carry electricity from offshore wind projects on both sides of the US-Canadian border. Existing planning regimes often miss opportunities for cross-border collaboration on electricity planning. This initiative seeks to break down those silos and shift the conversation toward shared growth and benefits.

Why should stakeholders support this concept?

Using a shared transmission corridor would minimize stakeholder and environmental impacts through streamlined cable routing and shared infrastructure, while enabling even greater scale of offshore wind development and its associated economic benefits.

Shared transmission in the offshore environment connecting Nova Scotia to New England carries benefits for a diverse set of stakeholders. This streamlined approach will reduce the cost of offshore wind, minimize disruption to the marine environment associated with cable corridors for individual projects, and bring substantial system reliability benefits for the region.

How much will it cost?

The total cost of the corridor will be impacted by many factors, many of which are unknown at this stage. Initial estimates of the offshore infrastructure deployment fall within the $6-$8 billion USD range for the first 2000 megawatt (MW) block of energy. The system should be designed to facilitate scalable deployment over time and to support various ownership and cost-recovery mechanisms. This approach will not only produce substantial ratepayer savings through system reliability benefits and reduced cost of decarbonizing the region, but also stimulate more economic benefits from offshore wind deployment than would otherwise be realized. The initiative must be viewed holistically and when compared against the alternative approach of fragmented offshore wind deployment or continued reliance on volatile fuel-based resources and the cost of failing to meet climate goals.

How long will it take?

With a clear pathway to development, the initial phase of the NEMOEC corridor could be operational as early as 2032.

Who will pay for the project?

The system should be designed to facilitate scalable deployment over time and to support various ownership and cost-recovery mechanisms. Substantial public funding is currently available via the Inflation Reduction Act (IRA) and Infrastructure and Investment Jobs Act (IIJA) in the US to help support investments in shared energy infrastructure, and we are encouraging similar policy support in Canada. Most project costs are likely to be borne in some way by individual project developers, who must include these costs as part of their investment case as they normally would.

What makes this project different than similar projects proposed in the past?

The NEMOEC proposal was designed specifically to address challenges that have thwarted similar proposals in the past. Moving transmission to the offshore environment helps avoid the complexities of securing siting approvals from multiple local and state governments along the length of an onshore transmission line because the vast majority of the cable route will be located in federal waters. The proposed scale of this corridor, which can facilitate many gigawatts of energy development, improves the economics of building subsea transmission. Our stakeholder-centric approach has helped build crucial dialogue with key stakeholders from the very beginning, which we hope will establish long-term goodwill toward the initiative and continue to inform the planning process so that we can maximize benefits for all stakeholders.

Why now?

With a Bureau of Ocean Energy Management (BOEM) auction expected in the Gulf of Maine in late 2024 and offshore leasing targeted in Nova Scotia for 2025, now is exactly the right time to discuss how these adjacent market opportunities can be built out in a thoughtful way. Substantial public funding is currently available via the Inflation Reduction Act (IRA) and Infrastructure and Investment Jobs Act (IIJA) in the US to help support investments in shared energy infrastructure, and we are encouraging similar policy support in Canada.

Why offshore transmission?

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What are the next steps?

Our work has already begun to shift the conversation on how this region should consider its energy planning needs. We will continue our work to facilitate dialogue between policymakers and institutions on both sides of the border to build consensus on the mutual benefits of this proposal and the need for continued collaboration across borders and regions.

Following on the success of our white paper, which quantifies some of the benefits and key considerations for pursuing this proposal, the NEMOEC Coalition is preparing to launch the second phase of its work. This phase will focus on expanding our Coalition, executing an economic analysis to quantify the offshore wind deployment and supply chain advantages of this approach, and continuing to build support among key stakeholders. Our work has already begun to shift the conversation on how this region should consider its energy planning needs. We will continue our work to facilitate dialogue between policymakers and institutions on both sides of the border to build consensus on the mutual benefits of this proposal and the need for continued collaboration across borders and regions.

Technical Questions:

Will the proposed corridor act as a point-to-point connector or could it be part of a larger meshed HVDC grid?

Our white paper analyzes several design options to evaluate their relative costs, benefits, and impacts. The recommended design would use HVDC cables and substations that are capable of connecting to a larger meshed HVDC grid.

Have you analyzed onshore grid requirements or identified potential points of interconnection?

A grid study was not included in the scope of the white paper, in part because specific wind energy development areas have not yet been identified. The NEMOEC Coalition urges ISO New England to work collaboratively with utility planners in Atlantic Canada to undertake the comprehensive grid modeling efforts required to inject future offshore wind energy into the grid and identify optimal points of interconnection and onshore upgrades. Some of this work is already underway, and we applaud the leadership of the Northeastern States in establishing the Northeast States' Collaborative on Interregional Transmission to drive interregional grid planning efforts.

Are there security threats or risks associated with a shared corridor?

Our energy system is a prime target for security threats of all kinds, both physical and virtual. Any transmission line is vulnerable to damage and disruption, but a networked offshore grid using HVDC circuit breakers offers technical advantages in the event of disruption, such as black start capabilities and the ability to re-route power.

Why is bidirectional energy transfer important?

The capability to move energy in a bidirectional manner underpins several of the key benefits that were included in the estimate of monetized benefits, including balancing cost reductions and capacity benefits. With a relatively low overlap in the electricity generation profile of Gulf of Maine and offshore Nova Scotia wind farms, and two regions that currently have a mismatch in the timing of peak load, the ability to move power dynamically offers substantial commercial and ratepayer advantages and maximizes the efficient use of our offshore wind energy resources.

Are there examples of successful cross-border transmission development for mutual benefit?

Cross border projects have existed between the Canada and United States for decades. The Phase II HVDC line enables bidirectional flow between the two countries and a ready market in the New England region that sees imports on many days of over 1400 MWs. There are also two 345kV high voltage transmission lines between New Brunswick and Maine that allow for system support between the two regions on the synchronized AC system, which allows for contingency support between the connected grids. This collaboration is continuing with a new high voltage line between Canada and Maine sponsored by the Commonwealth of Massachusetts through a competitive RFP process, and the Champlain-Hudson line which will connect Canadian power to the large downstate New York energy market via an HVDC line. Internationally, the 765 km Viking Link HVDC subsea cable connecting the UK and Denmark is nearing completion and expected to deliver energy before the end of 2023. These examples showcase the ability of utilities, developers, state, provincial, and federal governments to work collaboratively to improve access to power markets and add mutually beneficial electric system resiliency and reliability.

Are there reliability risks associated with large amounts of energy being carried along a single corridor?

Reliability issues with large power in-feeds can be mitigated in a few different ways. The first is to have multiple circuits where each is operated at an energy level that can be handled by the connected systems in the event of a transmission cable loss. The second is to network offshore wind transmission so that there are multiple paths for power to flow. Where that occurs, as in most "backbone" ocean transmission designs, the power supply lost when one cable has an interruption can be instantly rerouted to existing cables that can carry some of the power from the lost line. This mitigates the overall size of the loss to the power system.

Siting and Stakeholder Questions:

Will the siting of this corridor have negative impacts on important wildlife areas or other ocean users?

Several key factors are expected to influence the siting decisions for the NEMOEC corridor, including the location of offshore wind energy projects in the region. Once these areas are known with a greater level of specificity, the work of siting the corridor can begin and will be subject to the environmental and permitting requirements of BOEM and their Canadian counterparts. These requirements will include an avoidance and mitigation strategy for any potential impacts to wildlife and other ocean users. However, the key benefit that NEMOEC offers as an alternative to the individual radial connection approach is that a single streamlined cable corridor will significantly reduce the potential scale of impact to wildlife and other ocean users, both as a result of its consolidated footprint as well as its more efficient construction approach.

How will local communities benefit?

Not only will local communities benefit from the quantified system benefits, which will help reduce the cost of offshore wind and create a more resilient electricity grid, but the commercial advantages of this approach are also expected to drive a larger volume of offshore wind deployment in the region. Quantification and economic analysis of these volumetric benefits will be the focus of our next phase of work, with an emphasis on quantifying the potential economic benefits to local communities. Local communities will also benefit from the reduced disruption and streamlined footprint of the approach, with fewer cable landings to bring the energy to shore and less impact on existing ocean users.

Have you begun consultations with fishing or indigenous groups?

Given the early stage of the initiative and undefined nature of the offshore energy areas, formal consultation on behalf of the NEMOEC proposal has not begun. However, we have actively solicited the engagement and input of indigenous groups and fishing interests in the region as we have worked to incorporate the interests and concerns of local stakeholders in defining the vision for this Corridor.

Are there different ways the corridor's construction could be phased, such as beginning with radial HVDC lead lines and connecting the two regions later?

Absolutely. The Corridor was imagined as a modular concept where the capacity and network could be built out in stages as additional energy projects are approved. This type of lead-line to backbone approach can work if the appropriate HVDC standards are put in place to ensure interoperability so that the two regions could be connected at a later stage. However, many of the system benefits quantified in our white paper will not materialize until the two regions are fully linked.

Where will the corridor land?

The white paper scope did not include a full grid study, which will be considered as potential next step for the coalition. We anticipate that there may be multiple landing points at either end of the corridor as the system is scaled up over time. It's important to note that the landing locations will also be influenced by regulations dictating the maximum energy rating at a single point of injection within the New England ISO, a regulation which today would force the corridor to utilize more landing points than is technically necessary.

Regulatory Questions:

What role would the US Bureau of Ocean Energy Management or other federal agencies play in this proposal? Are they engaged with your work?

The US Bureau of Ocean Energy Management (BOEM) will play an essential role in realizing the vision of the NEMOEC Corridor. The decisions made in advancing offshore wind leasing in the Gulf of Maine will be material to determining the optimal size and location of the Corridor. BOEM also holds the authority to grant a Right of Way for the Corridor for the portions of the route in US Federal Waters. Other US federal agencies such as the US Department of Energy's Grid Deployment office, the National Renewable Energy Laboratory, and the Federal Energy Regulatory Commission may also play supporting role in advancing these efforts, alongside counterpart Canadian federal agencies such as Natural Resources Canada. All of these stakeholders have participated in at least one of our stakeholder workshops, and the Coalition looks forward to continued dialogue with these agencies.

What are the biggest risks to the proposal?

Success of the NEMOEC proposal hinges on four key elements:

1. International cooperation on grid planning and regulations – we must establish venues for the collaborative planning of energy infrastructure across the broader Canadian-American Northeast

2. Commercial structures that facilitate financing and cost recovery – many of the quantified benefits identified in the white paper are realized by different parties, referred to as "dispersion

of benefits". The construction and cost recovery of the NEMOEC Corridor will require the establishment of a commercial structure such as a procurement or tariff mechanism that would provide sufficient cost recovery and commercial certainty for the project to secure investment.

3. Cost-effective project development opportunities for offshore wind – without offshore energy resources being developed in both the Gulf of Maine and offshore Nova Scotia many of the quantified benefits would need to be recalibrated, and it is unclear if the proposal would still reach the threshold of positive returns on investment.

4. Public support as a least-impact, lowest-cost, value-add solution – the Coalition sees public support as the most essential ingredient for a successful proposal, and the NEMOEC Corridor was envisioned as a way to address the most common concerns that drive public opposition to energy projects. Strong public support for smart, efficient solutions will be crucial to driving the regulatory reforms needed to accelerate progress on climate action.

How are industry and government working together on this? Who will lead the concept forward?

The Founding Members of the NEMOEC Coalition have been actively engaged in discussions with policymakers on both sides of the border as we work to advance this concept. It is our goal to identify champions representing key government stakeholders to endorse this concept and take a leadership role in the cross-border grid diplomacy necessary for success.

Who would operate and govern the transfer of electricity along the corridor?

An offshore network is much like an onshore network from a regulatory and operational perspective. This type of transmission can be viewed as an expansion of the existing grid. Electric system operators in both connected regions can control the dispatch of resources and use of the transmission line(s) similarly to how cross boarder HVDC and AC lines between Canada and the US are administered today. While there may be other novel approaches, there are well established regulatory and operational frameworks in place.

What kind of market structure would support a project like this?

A project like this is best supported by regional governments through funded transmission solicitations. This approach provides policy makers with a mechanism to design and procure transmission that can reduce the number of lines needed to scale the offshore wind market by delivering power to electricity users while reducing the costs and impacts of export cables. This approach enables much greater operational flexibility for all connected systems and reduces risk for offshore wind project developers by providing a transmission network for interconnection. In doing so, consumer cost savings from large amounts of free-fuel renewable power can be realized by households and businesses on both ends of the project, while increasing reliability and reducing greenhouse gas emissions to meet policy targets.

Economic Questions:

Is this really the right time to be discussing major energy investments when households are struggling with their energy bills?

It has never been more crucial to proactively plan for a more resilient energy future. Protecting ratepayers from volatility and geopolitical instability by building a more resilient system using zero-fuel-cost resources, which can be diversified and balanced across the region, will safeguard household budgets in the future and provide much-needed system reliability benefits to keep power flowing to homes and businesses. Moreover, federal funding is available right now to help offset these essential investments.

How do the economics compare to a radial lead-line approach?

This question is difficult to answer in broad terms because we do not yet know where the offshore energy areas will be located. In some circumstances, a project that is close enough to shore to utilize alternating current (AC) technology for its interconnection cables would see a cost benefit in doing so, but this approach typically means far more cable landings and therefore a higher level of impact to local stakeholders. Crucially, most of the system benefits quantified in the white paper rely on the dynamic transfer of energy between regions, which would be lost in a radial lead-line approach. The cost benefit modeled in the white paper for utilizing an AC radial lead line to connect a theoretical Nova Scotia wind farm to shore in Nova Scotia achieves only modest cost savings compared to an HVDC backbone approach, without materializing the same grid and energy system benefits.

How does this corridor fit with the Atlantic Loop proposal?

Meeting the broad decarbonization needs of the region will require more than 100 gigawatts of new renewable electricity generation, and diversifying these resources across a broader region has demonstrated benefits for grid reliability and reducing costs to ratepayers. While we have not modeled the interaction between the Atlantic Loop and the NEMOEC Corridor, we expect the business case of either proposal would likely be improved by inclusion of the other, especially given the perpendicular nature of the energy flows (East-West for Atlantic Loop and North-South for NEMOEC). The North American Renewable Energy Integration Study, a collaboration between government agencies in the US, Canad, and Mexico, released a study in 2021 indicating that improved international energy transfer would generate $10-$30 billion USD (2018 dollars) in net value.

What about global supply chain risks and constraints? HVDC breaker orders are on very long lead times.

This is a real concern, and the sooner we can gain clarity on the siting and regulatory disposition of our proposal, the sooner a project proponent can be identified and orders placed for these long lead-time components. Given that the most optimistic timeline outlined in the white paper indicates commercial operations circa 2032, we do expect that the required HVDC circuit breakers will be commercially available, and manufacturers are already working to rapidly scale their production capacity to support the robust global offshore wind market.

Will Canada just be exporting electricity to New England?

Canada's offshore wind resource potential off the coast of Nova Scotia is world-class, with significant areas that are potentially suitable for low-cost fixed bottom offshore wind deployment. Some of this resource is needed locally to help contribute to the decarbonization of the Nova Scotia grid, where more than 60% of electricity today is generated by coal. It is expected that electrification and growth of a local green hydrogen cluster could increase energy needs in Nova Scotia several times over in the coming decades. Even with this local demand, it is likely that additional offshore wind could be developed for the purposes of exporting electricity to New England, and the corridor could also serve as one of several regional transmission links that can supply Canadian hydroelectricity to the US market. That being said, the corridor is expected to function on a bi-directional basis, with energy flowing in both directions to maximize efficient utilization of energy resources across the entire region.

Will Canadian offshore wind compete against US offshore wind?

While costs will continue to decline as we deploy greater volumes of floating offshore wind, today floating applications are more expensive than fixed-bottom offshore wind technologies. Gulf of Maine wind farms, which will require floating technologies due to water depths, will benefit substantially from the cost savings associated with shared transmission. Other mechanisms, such as state-driven procurement policies and associated local workforce or other requirements will also help drive deployment at both ends of this transmission corridor. Given the overall needs for new clean energy generation in the region, which includes a projected demand of upward of 100GW of new renewables in New England alone, there is more than enough market opportunity to go around.

Will Maine still benefit from OSW if the corridor doesn't land there?

Landing points for the Corridor have not yet been identified, and as the Corridor scales over time there may be multiple landing locations, any of which could include opportunities to inject energy into a Maine Point of Interconnection (POI). That said, Maine's electricity grid is managed by the New England ISO. Energy generation in one part of the ISO brings benefits to other parts of the system. Future offshore wind procurement mechanisms will also provide Mainers with more direct benefits of offshore wind development by incentivizing various local workforce and economic activities as well as securing energy offtake that will help reduce the cost and volatility of future energy bills. The activity associated with the deployment of offshore wind in the Gulf of Maine will create jobs across the region, including in Maine, and Maine's strong maritime economy can play an essential role in offshore wind development in the Gulf of Maine and off the coast of Nova Scotia.

Why hasn't this approach been used for other US offshore wind projects?

In the early days of US offshore wind market development, the newness of the industry to US shores and the lack of sufficient planning mechanisms led developers and policymakers to support individual, radial connections for offshore wind development. Since those early days, policymakers have substantially increased their commitment to offshore wind and subsequent stages of project development are becoming increasingly challenging to interconnect. Other regions are considering similar approaches to shared or networked offshore transmission connections for future development.