GRID DEPLOYMENT OFFICE

Atlantic Offshore Wind Transmission
Stakeholder Workshop

March 22, 2023

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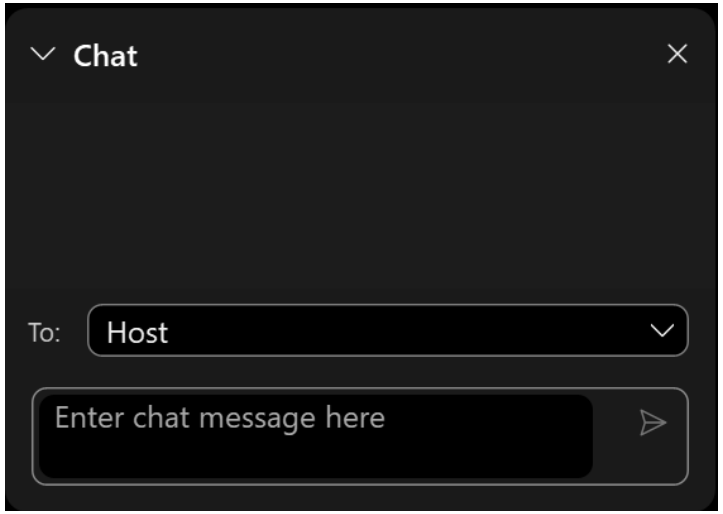
Housekeeping

Questions?

If you have technical questions – please put them in the chat box for the host.

Please submit your questions in the chat box. Reference the speaker or topic.



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Agenda

12:00PM	Welcome and Keynote Remarks
12:30PM	Transmission Development on the Path to 30 GW and Beyond
12:40PM	Atlantic Offshore Wind Transmission Study Update
1:20PM	Atlantic Offshore Wind Transmission Recommendations
2:20PM	Break
2:30PM	Panel on Current Atlantic Offshore Wind Transmission Landscape
3:20PM	Federal Program Updates
3:50PM	Summary of Day and Closing Remarks

Jennifer Granholm

Secretary,

U.S. Department of Energy

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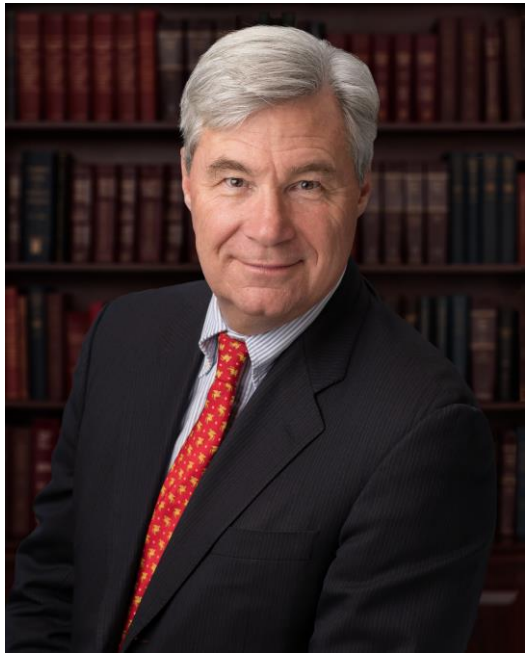
Deb Haaland

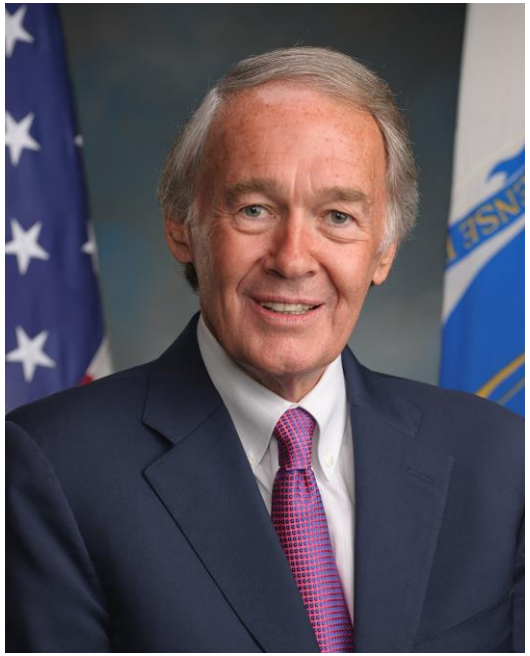
Secretary,

U.S. Department of the Interior



Sheldon Whitehouse

U.S. Senator for Rhode Island



Ed Markey

U.S. Senator for Massachusetts

Deborah Ross

U.S. Congresswoman for North Carolina's 2nd District

Allison Clements

Commissioner,

Federal Energy Regulatory Commission

Jocelyn Brown-Saracino
Offshore Wind Lead,
U.S. Department of Energy

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Greg Brinkman

Researcher,

National Renewable Energy Laboratory

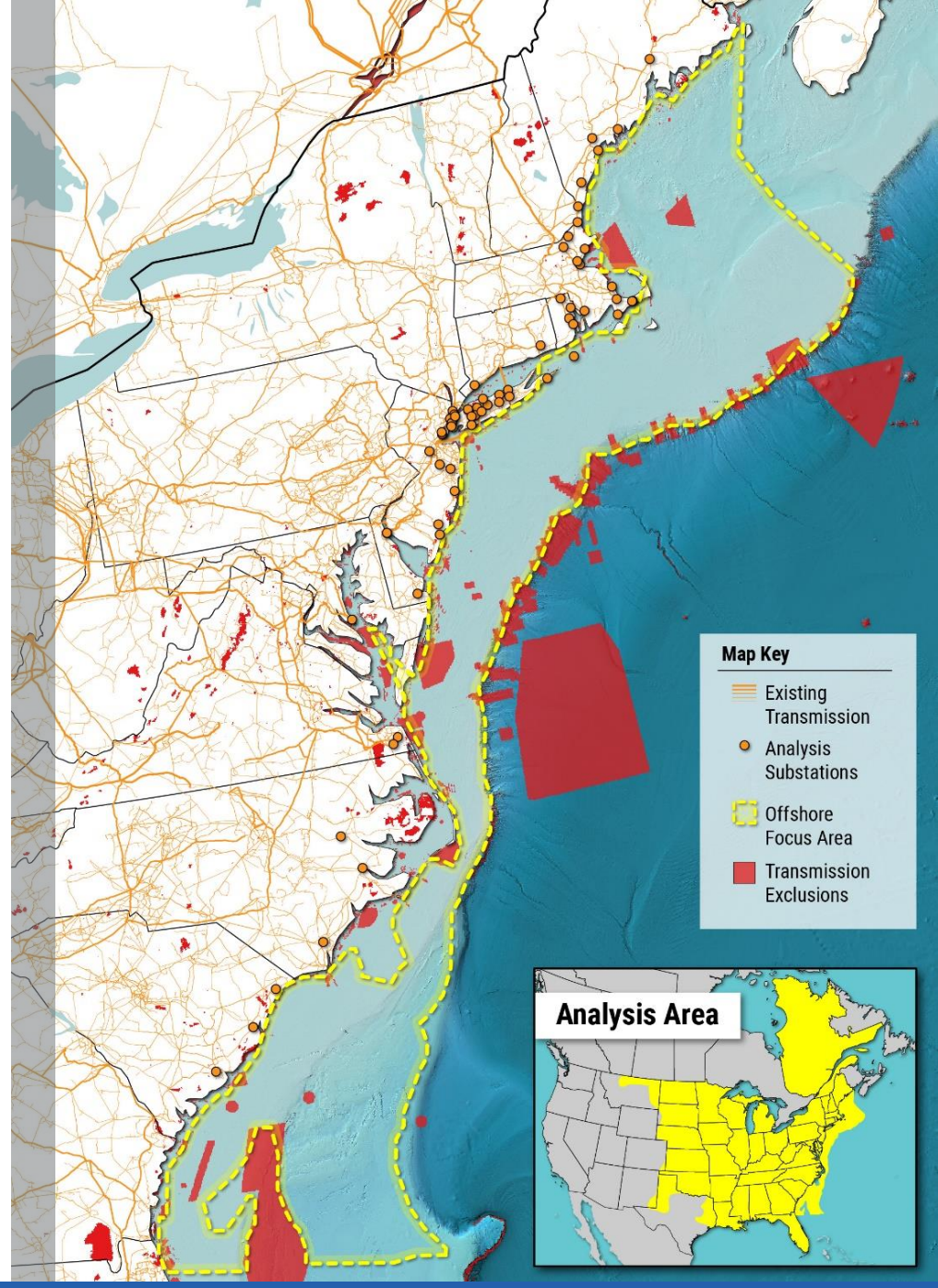
NREL
NATIONAL RENEWABLE ENERGY LABORATORY

Atlantic Offshore Wind Transmission Study
Preliminary Analysis

March 2023

Study Overview

- Studies scenarios and pathways of offshore wind (OSW) and transmission deployment
- Quantifies impacts such as economics, reliability, and resilience of multiple OSW and transmission scenarios and pathways
- Scenarios presented consider **85 GW OSW** in the Atlantic by 2050.
- Offshore wind development provides a unique opportunity to potentially add interregional transmission capacity in a lower-cost, lower-impact way.
- The team designed offshore transmission topologies to take advantage of these opportunities. These topologies are being studied in greater detail through the completion of the study later in 2023.
- The team will be studying four topologies:
  - **Radial**: Planned connections from offshore substations to onshore grid.
  - **Interregional**: Specifically designed to take advantage of opportunities to connect diverse regions by interlinking offshore platforms
  - **Intraregional**: Within-region connections that could complement (and come before) interregional solutions
  - **Backbone**: Larger, longer version of interregional build



OSW Transmission Design

Radial topology

- Designed by considering following attributes:
- Quality of offshore wind resource (and depth)
- Electrical properties of potential Points of Interconnection (focusing on POIs identified by stakeholders)
- Cable path route distance between wind and POI

Developing interregional topology

- Simulate grid operations using production cost model for a full year for the radial topology
- Observe where large price differences occur between Points of Interconnection
- Design mesh interlinks to connect areas with high price difference to maximize congestion mitigation
- Minimize cable distance as much as possible

Next steps through 2023:
Study these topologies in more detail

Radial Topology

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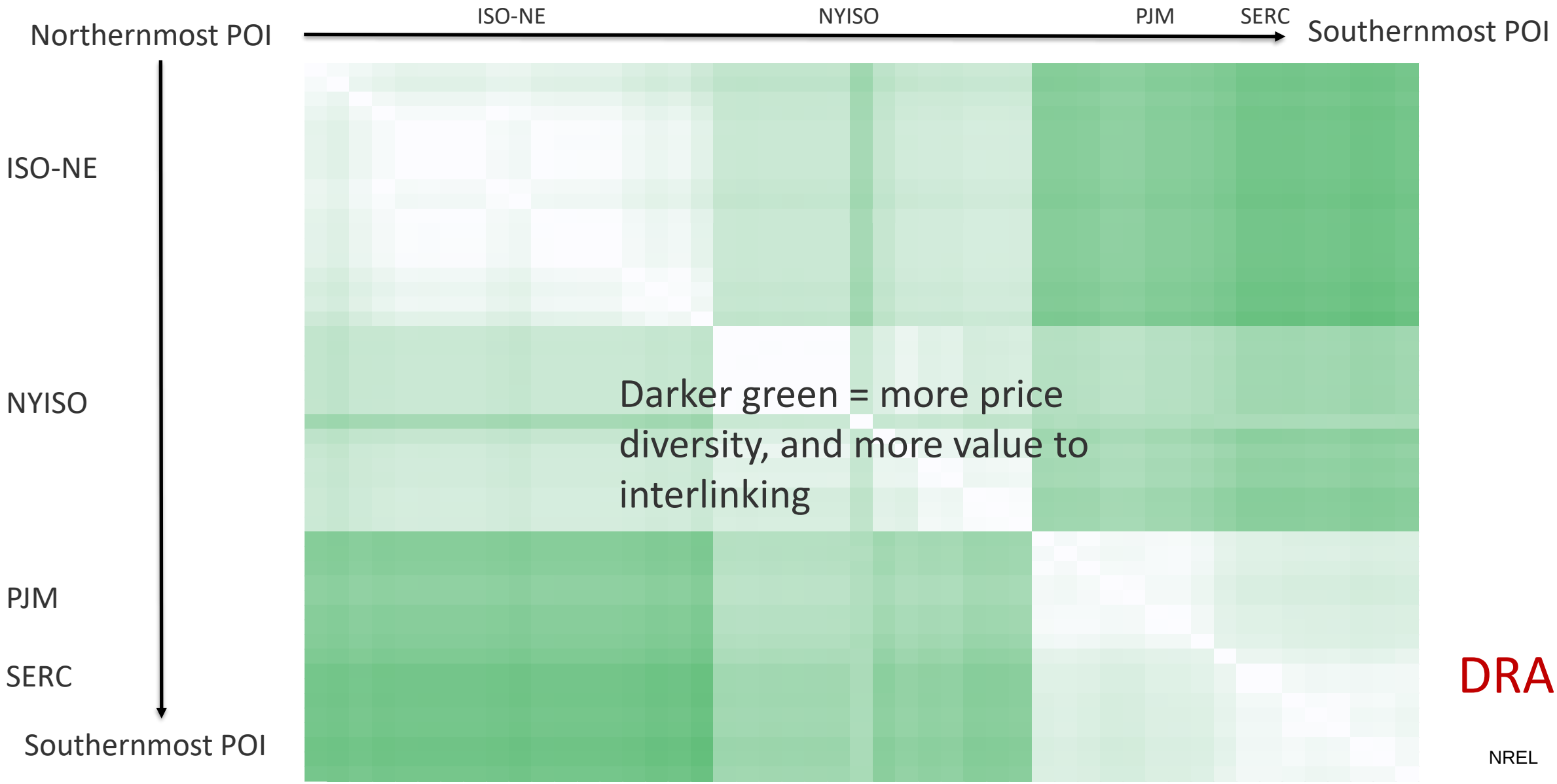
Price difference between POIs, initial 2050 analysis



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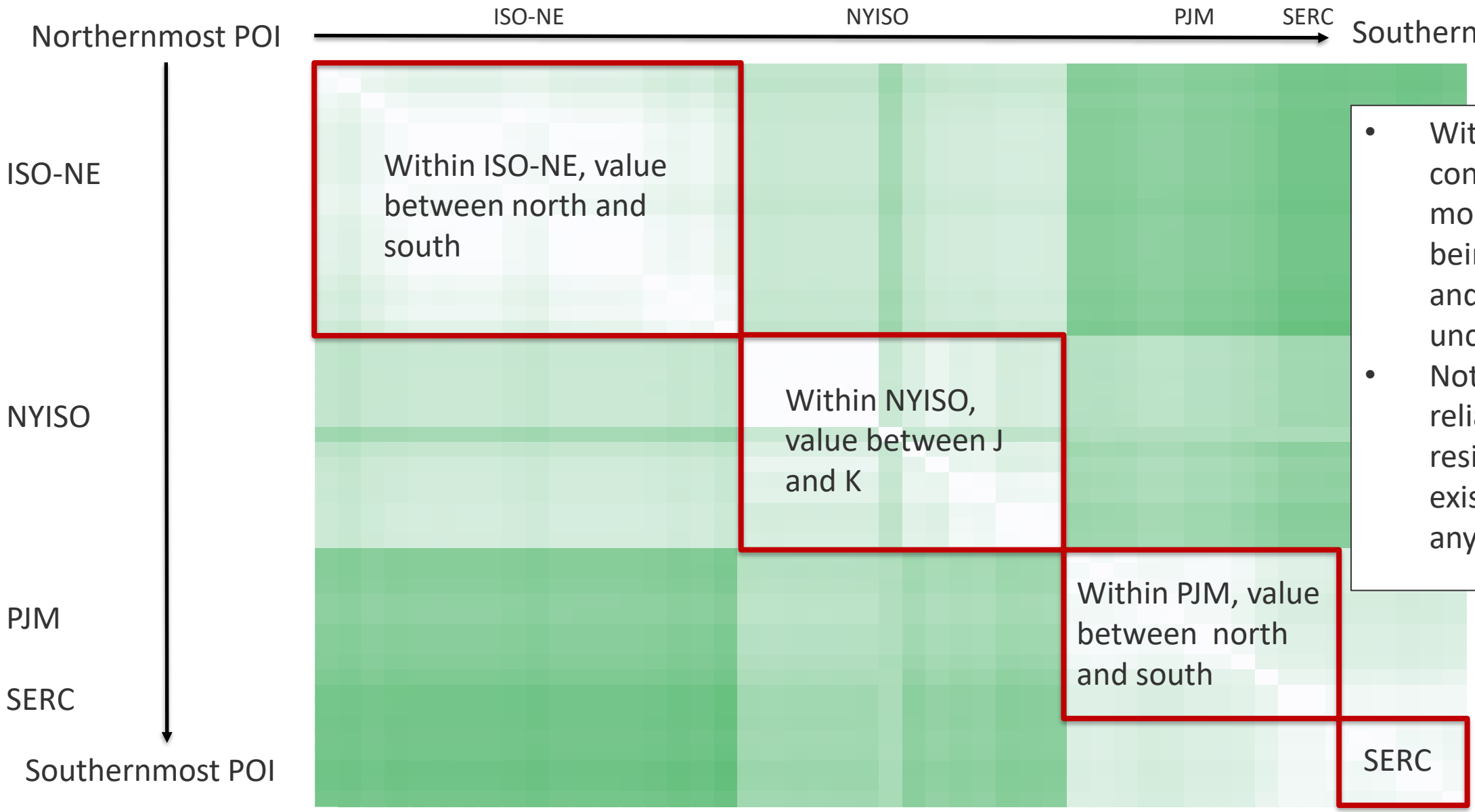
Potential congestion mitigation between regions



- Within-region congestion modeling is still being refined and has high uncertainty
- Note that reliability and resilience value exists between any POIs

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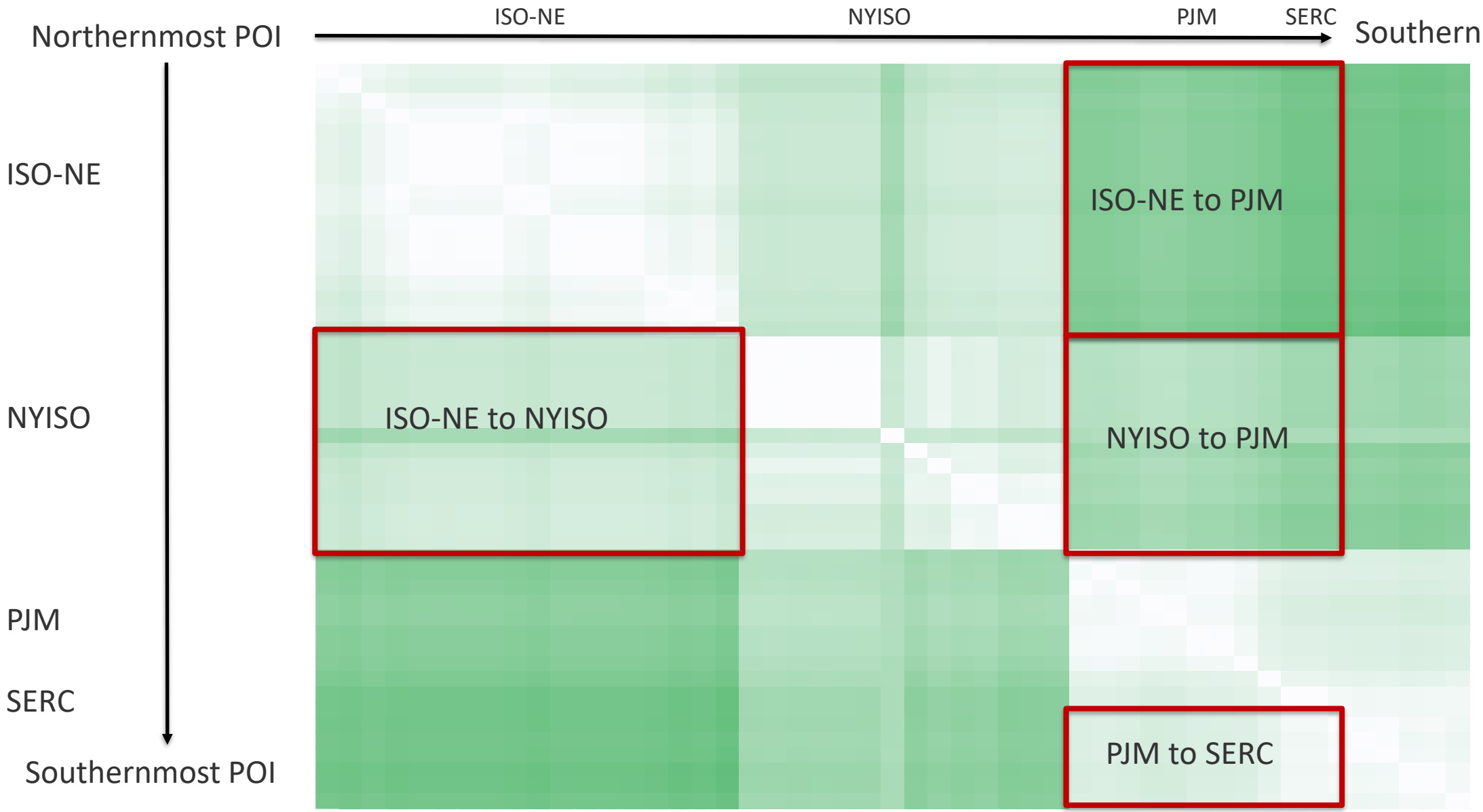
Biggest price diversity is interregional



We created topology of interlinks based on these red boxes, trying to minimize cable distance

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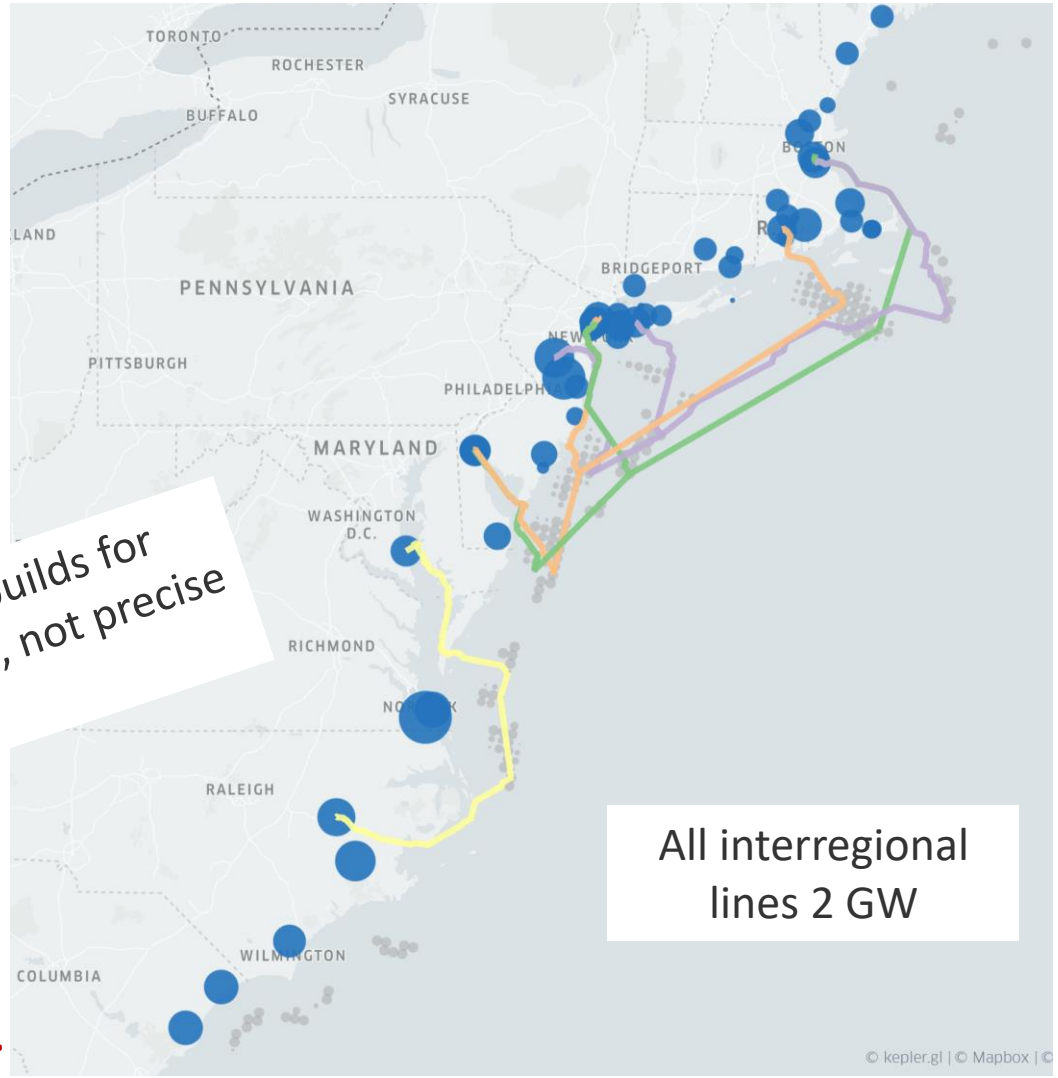
Topologies to be studied…

Radial

Interregional Network builds upon radial topology



These are intended to be representative builds for studying value of interregional transmission, not precise build prescriptions.

All interregional lines 2 GW

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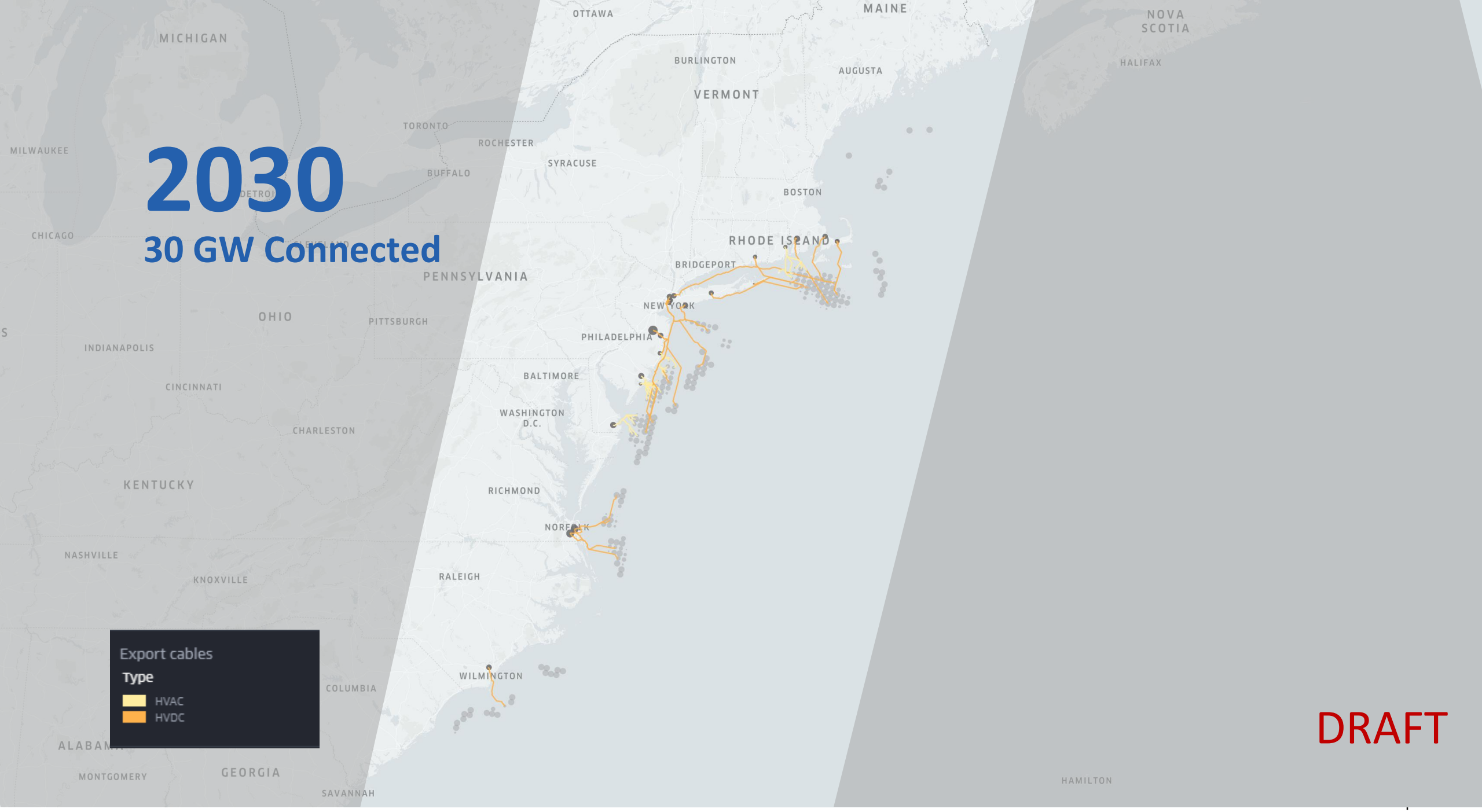
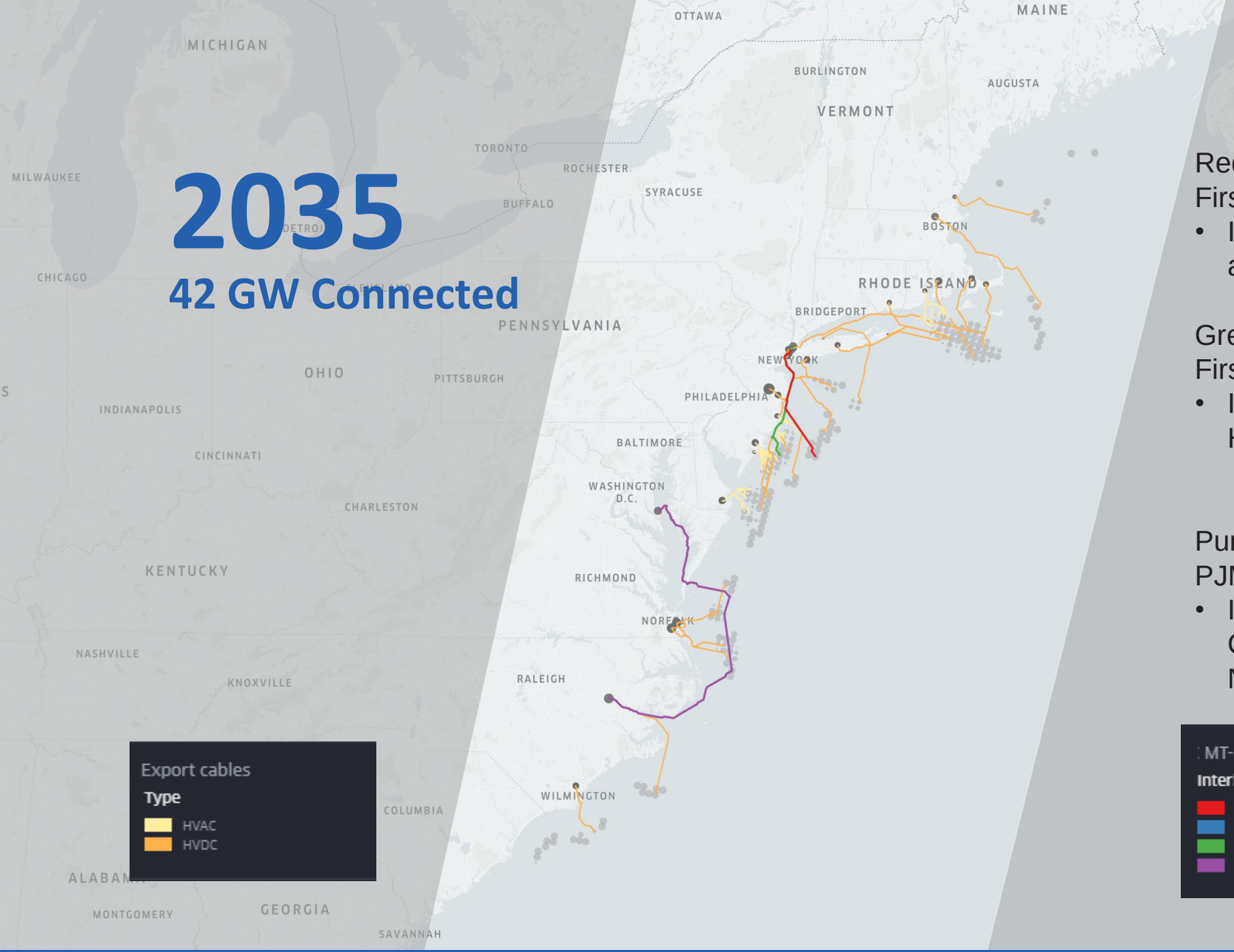

2030
30 GW Connected
Export cables
Type
HVAC
HVDC
DRAFT
MICHIGAN
OTTAWA
MAINE
NOVA SCOTIA
HALIFAX
BURLINGTON
AUGUSTA
VERMONT
TORONTO
ROCHESTER
SYRACUSE
BUFFALO
MILWAUKEE
BOSTON
CHICAGO
RHODE ISLAND
BRIDGEPORT
PENNSYLVANIA
NEW YORK
OHIO
PITTSBURGH
PHILADELPHIA
INDIANAPOLIS
BALTIMORE
CINCINNATI
WASHINGTON D.C.
CHARLESTON
KENTUCKY
RICHMOND
NORFOLK
NASHVILLE
KNOXVILLE
RALEIGH
WILMINGTON
COLUMBIA
ALABAMA
MONTGOMERY
GEORGIA
SAVANNAH
HAMILTON

2035

42 GW Connected



Red
First leg of NE-MA, NY-J, PJM

- Injects to NY zone J, using Rainey as representative POI

Green
First leg of NE-RI, NY-J, PJM

- Injects to NY zone J, using Mott Haven as representative POI

Purple
PJM-MD to SERC-Carolinas

- Injects to PJM-MD and Duke, using Calvert Cliffs, MD and Greenville, NC as representative POIs

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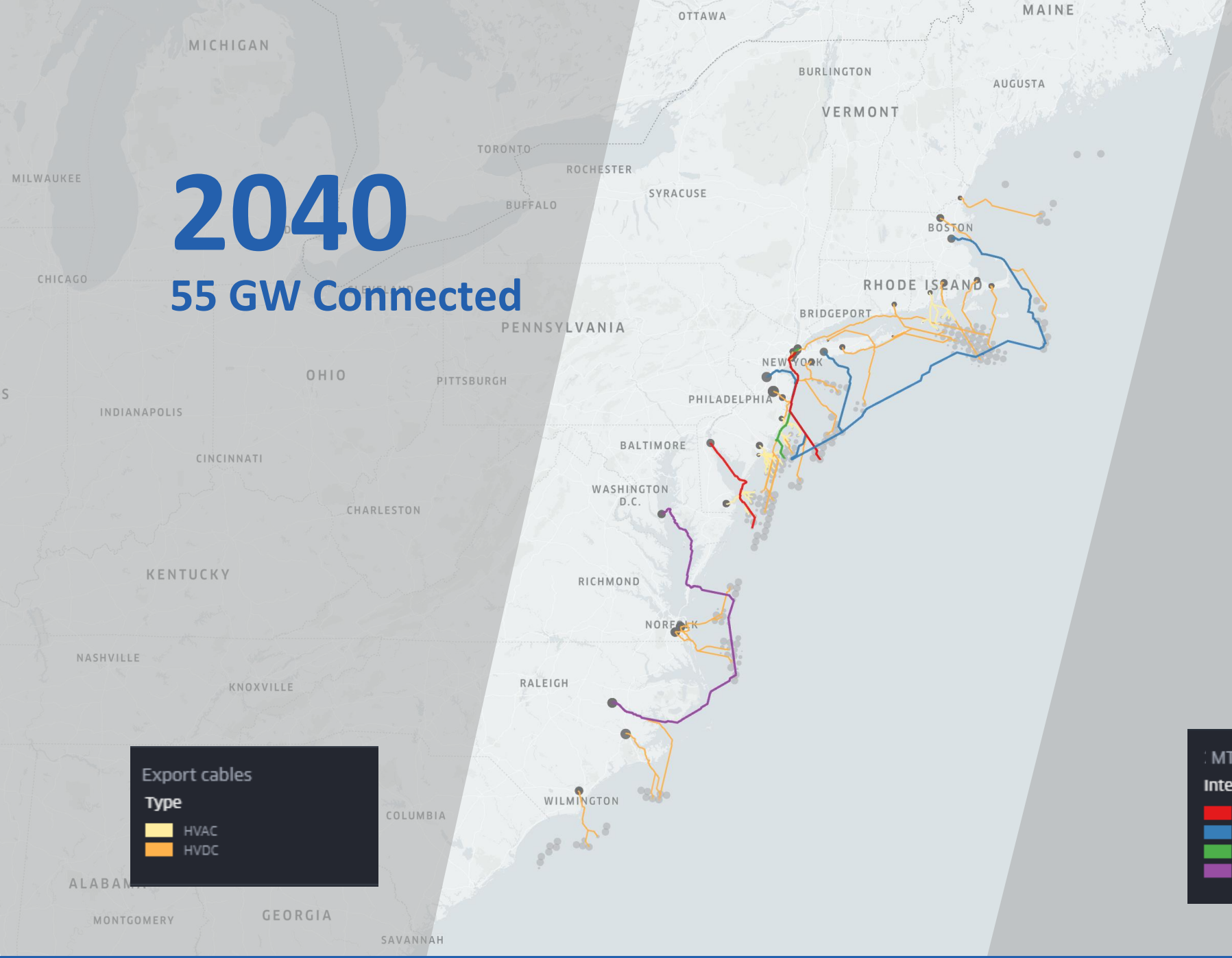
2040

55 GW Connected



Blue

NE-MA, NY-K, PJM

1st leg (NE-Massachusetts)

- Uses K Street as representative POI

2nd leg (NY zone K)

- Uses Ruland Rd as representative POI

3rd leg (PJM-New Jersey)

- Uses Deans as representative POI

Interlinks all 3 legs

Red

2nd leg of NE-MA, NY-J, PJM

- Injects to PJM-New Jersey, uses Salem, NJ as representative POI. May need alternative POI depending on nuclear relicensing

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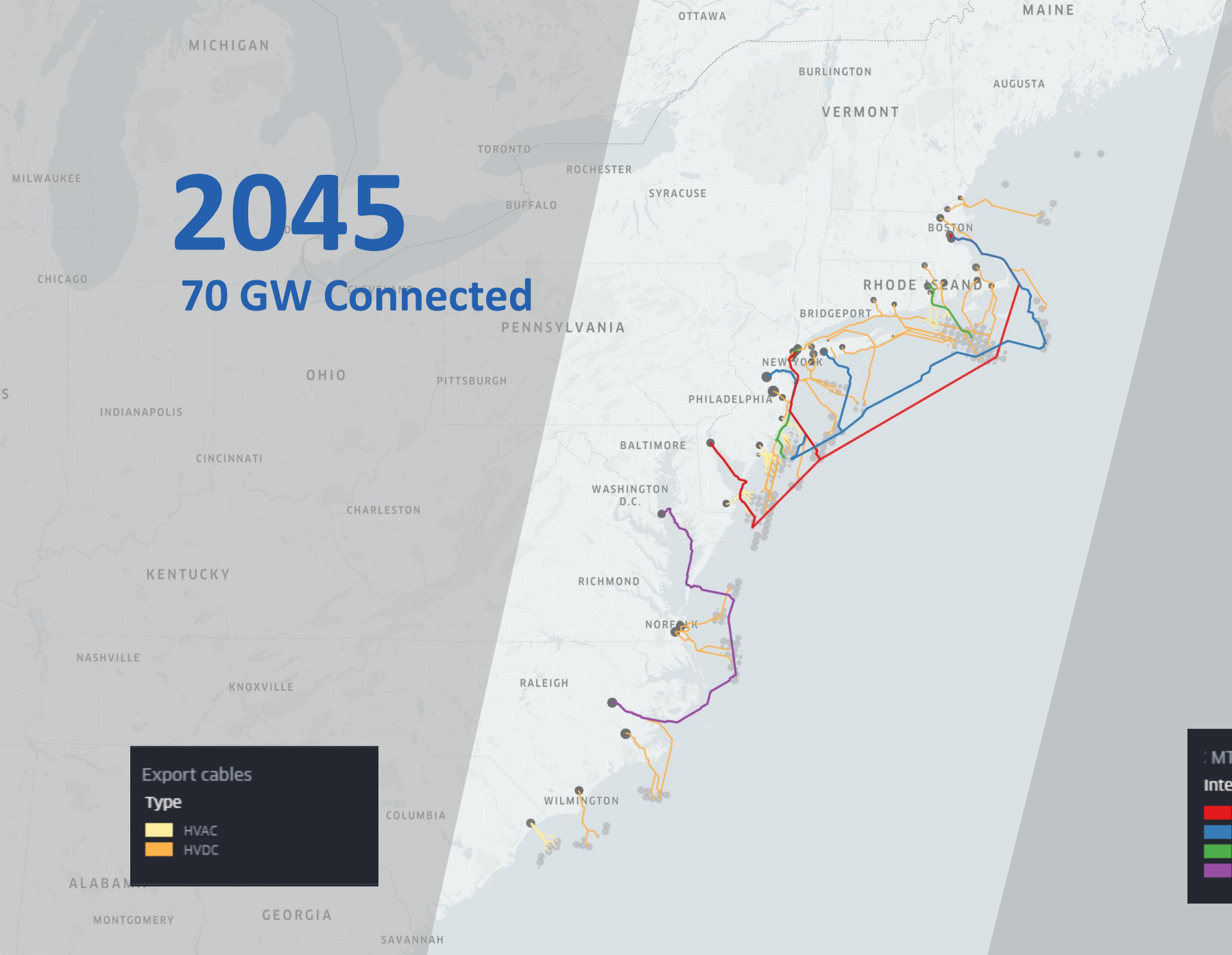
2045

70 GW Connected



Red

3rd leg of NE-MA, NY-J, PJM

- Injects to NE (Massachusetts) using Mystic, MA as representative POI

Interlinks all 3 legs

Green

2nd leg of NE-RI, NY-J, PJM

- Injects to NE (Rhode Island) using Kent County, RI as representative POI

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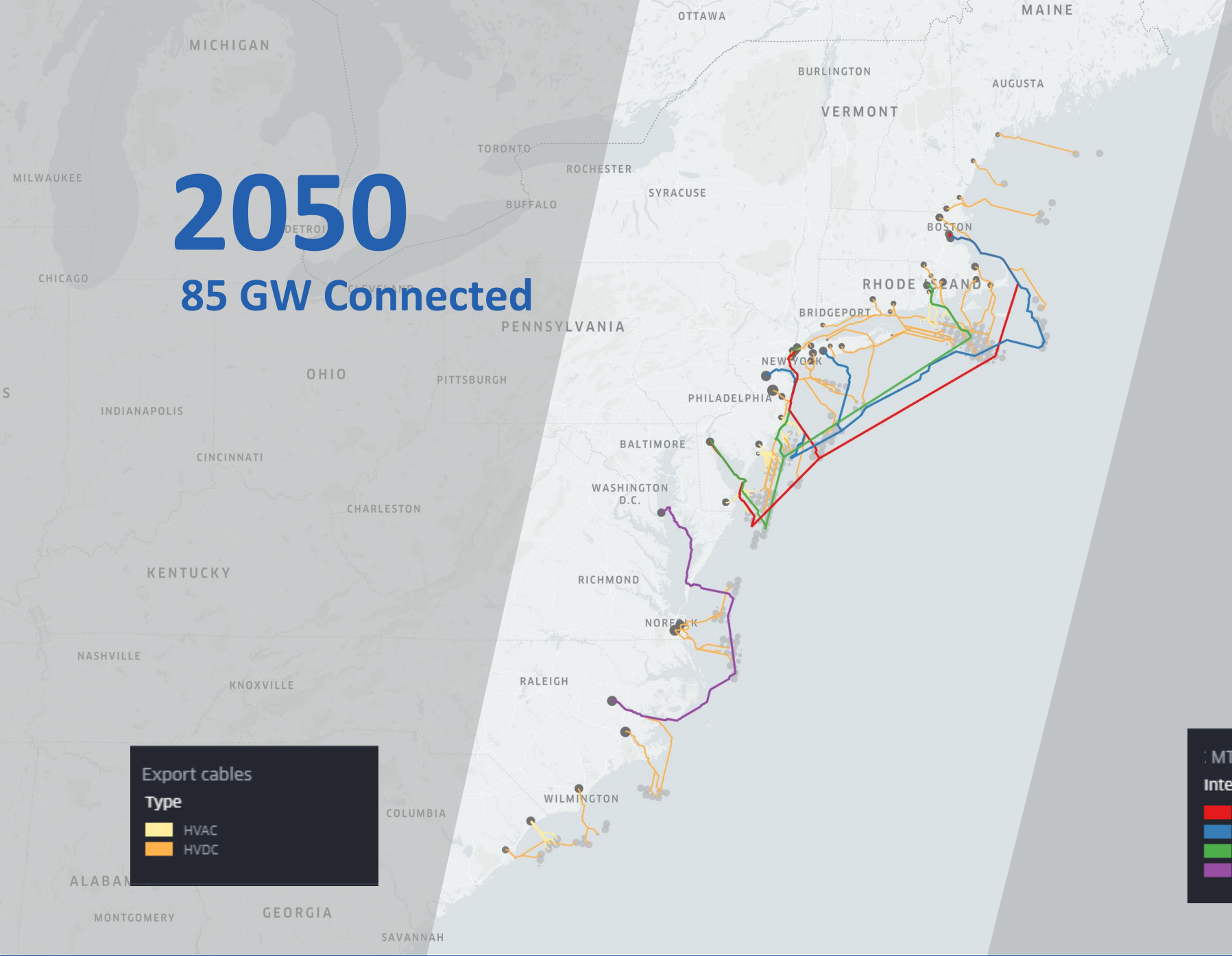
2050

85 GW Connected



Green
3rd leg of NE-RI, NY-J, PJM

- Injects to PJM (NJ) using Hope Creek as POI. May need alternative POI pending nuclear relicensing pre-2050

Interlink

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Qualitive list of benefit categories for offshore transmission

- *Reduce offshore wind curtailment* by injecting into alternate POIs depending on conditions
- *Reduce curtailment* due to export cable outage, leading to economic and resilience benefit by improving overall availability of OSW
- *Redispatch from congested areas* with high-cost generation to areas with lower-cost generation
- *Resilience and system adequacy* benefit by enabling power flows between onshore POIs
- Other potential reliability benefits due to increased transmission capacity

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Summary

- Building OSW provides opportunities (due to offshore platforms connected to strong grid POIs)
- Holistic planning can help take advantage of the unique opportunities
- We used new methods to design a planned radial topology, then used it as building block for additional transmission connections
- We used new methods to design inter-regional network to optimally take advantage of these opportunities by interlinking regions with large prices differences

Next Steps (study complete end of 2023)

- We are now studying in greater details the benefits, costs, and reliability, resilience impacts of these builds
- We are also performing a deeper analysis of these topologies, e.g., reliability, resilience, congestion / production cost, path routing, etc.

DRAFT

Summary

- Building OSW provides opportunities (due to offshore platforms connected to strong grid POIs)
- Holistic planning can help take advantage of the unique opportunities
- We used new metho… …ial topology, then used it as building block for additional transmission connec…
- We used new metho… …ge of these opportunities by interlinking regio…

Analysis will provide valuation of interregional offshore networked topology, not precise build prescriptions. Similar networks interlinking different POIs or states may provide similar value.

Next… (study complete end of 2023)

- We are now studying in greater details the benefits, costs, and reliability, resilience impacts of these builds
- We are also performing a deeper analysis of these topologies, e.g., reliability, resilience, congestion / production cost, path routing, etc.

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Thank you for your attention!

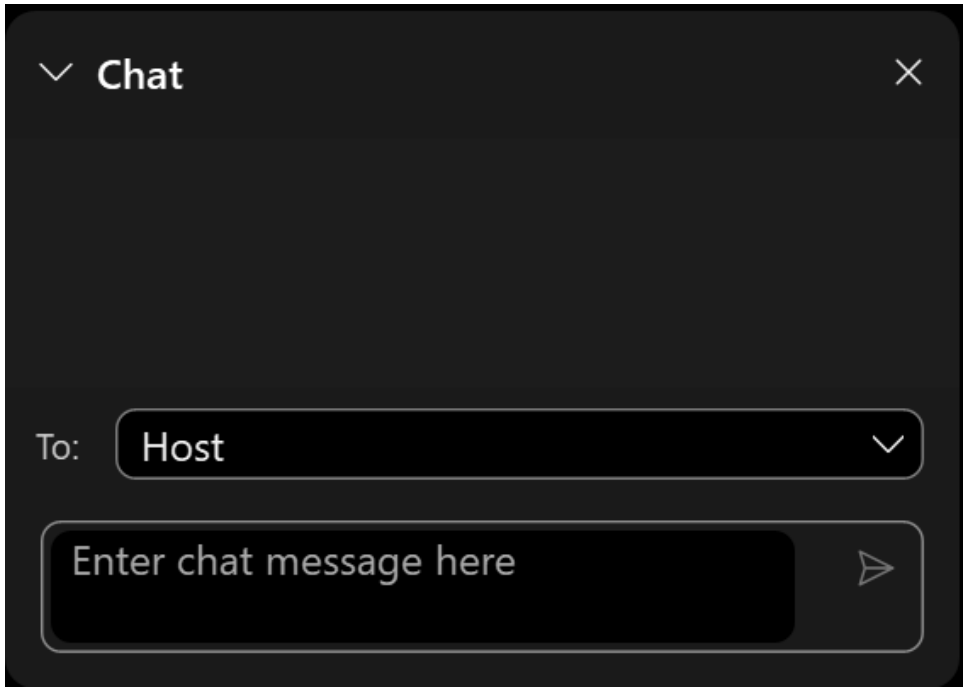
Questions?

PI: Melinda Marquis (melinda.marquis@nrel.gov)
Co-PI: Greg Brinkman (gregory.brinkman@nrel.gov)

Photo Credit : Dennis Schroeder-NREL

Questions?

Please submit your questions in the chat box.



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Alissa Baker

Offshore Wind Lead, Grid Deployment Office,
U.S. Department of Energy

Josh Gange

Renewable Energy Program Specialist,
Bureau of Ocean Energy Management

U.S. DEPARTMENT OF ENERGY

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Atlantic Offshore Wind Transmission

Preliminary Findings and Recommendations

Josh Gange, Renewable Energy Program Specialist, BOEM

Alissa Baker, OSW Transmission Lead, DOE

March 22, 2023

Immediate Recommendations

Partnerships & Collaborations | Planning & Operations | Technologies & Standardization | Economics & Support Initiatives | Siting & Permitting

Immediate Actions before 2025		
★★★	Multi-State Offshore Wind Transmission Collaborative	1.1.1.
★★★	Regional Transmission Planning Collaborative	1.1.2.
★★★	Tribal Nation Engagement	1.1.3.
★★★	Systematic Evaluation of POI Capacities	2.1.2.
★★★	NERC Reliability Standards Around Offshore Transmission	2.3.1.
★★★	Voluntary Cost Allocation Assignments	4.1.1.
★★	'Network-Ready' Equipment Standards	3.1.1.
★★	Equipment Rating Standardization for Transmission Components	3.1.2.
★★	R&D for Offshore Transmission Technology Commercialization	3.3.1.
★★	Expansion of Domestic Supply Chain and Manufacturing	3.4.1.
★★	Skilled U.S. Workforce Development	3.4.2.
★★	Federal-State Aligned Offshore Wind Transmission Siting	5.1.3.
★★	Guidance for Federal Environmental Review and Permitting Requirements	5.2.1.
★★	Permitting Agency Resources and Staffing	5.2.3.
★	Environmental R&D for Offshore Wind Transmission	3.3.2.
★	Relevant Federal Funding, Financing, and Technical Support	4.2.2.

Immediate Actions – Critical (★★★)

Partnerships and Collaborative Efforts

Multi-State Offshore Wind Transmission Collaborative

- An Atlantic coastal state Offshore Wind Transmission Collaborative would offer the opportunity to establish a shared vision on policy and coordination issues for offshore transmission development
    - Should be started now to prepare to provide input on planning action for multi-state transmission to the ISOs/RTOs

Regional Transmission Planning Collaborative

- We encourage JIPC, with continued support of the RTOs and nonregulated states, to work with the new state collaborative to include state policy goals for offshore wind and interregional transmission in their planning work. The results from the National Labs in the AOSWTS may support these interregional planning efforts once they are complete and published.

Offshore Wind Transmission Task Force

- We recommend BOEM establish a transmission task force for Federal agencies, Tribal Nations, state & local governments to discuss the siting and alignment of permitting processes of specific proposals for regional offshore wind transmission development.

Immediate Actions – Critical (★★★)

Systematic POI Evaluation

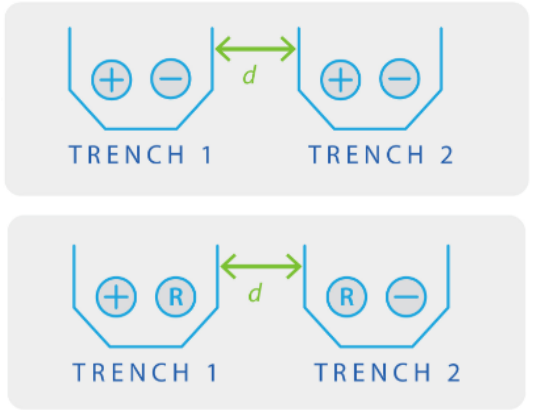
We encourage RTOs and transmission planners to systematically identify and prioritize alternatives to each POI and landing site requested by interconnection applicants, based on AC power flow characteristics, and to plan for and facilitate construction of infrastructure necessary to facilitate POIs that will most efficiently use limited landfall sites and minimize long run costs and environmental impacts.

- To support this evaluation process, we recommend that DOE publish the POI identification methods from the AOSWT study for transmission planners to consider and recreate in their own study work going forward.
- Recommend transmission planners utilize interregional groups (such as JIPC or EIPC) to highlight to industry those POIs which are best suited for offshore HVAC/HVDC networks.
- Recommend states include RTO-identified POIs in any transmission solicitations for state procurement.

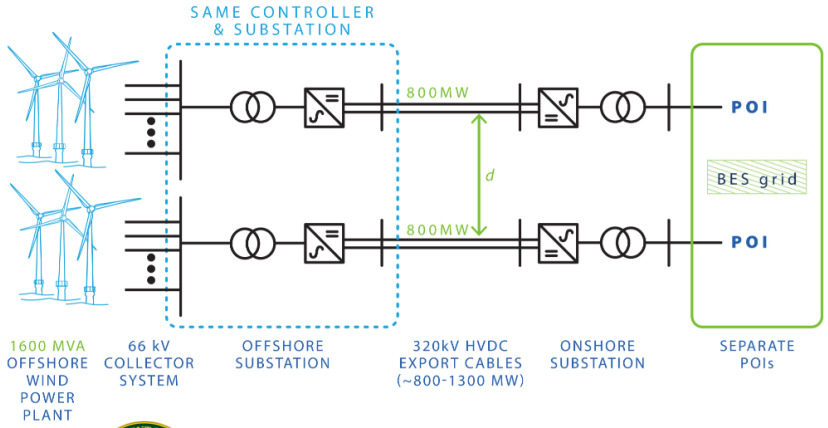
Immediate Actions – Critical (★★★)

Clarify Reliability Standards

We recommend that a Standard Authorization Request (SAR) be submitted by industry representatives to NERC on the topics listed below as soon as possible to address these gaps. While FERC could also initiate these requests by submitting a proposal to NERC under FPA Section 215, the submission of a SAR with industry support will be the most expedient way to get these clarifications made.



- TPL-001-5 , the maximum lateral separation distance between buried cables within which a common mode of failure, multiple contingency (N-1-1) is credible should be defined
- TPL-001-5 definition of P7 (i.e., N-1-1) contingency should be updated to include the maximum lateral separation distance between buried HVDC bipole with DMR cables within which a common mode of failure, multiple contingency (N-1-1) is credible
- A precise definition is needed for NERC TPL-001-5 for the non-capitalized, undefined term “generator” within the context of large offshore wind power plants.



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Immediate Actions – Critical (★★★)

Voluntary Cost Allocation Assignments

"Voluntary Agreements can further those goals by, for example, providing states with a way to prioritize, plan, and pay for transmission facilities that, for whatever reason, are not being developed pursuant to the regional transmission planning processes required by Order No. 1000.3 In addition, in some cases, Voluntary Agreements may allow state-prioritized transmission facilities to be planned and built more quickly than would comparable facilities that are planned through the regional transmission planning process(es)"
– FERC Docket No. PL21-2-000

We encourage states and RTOs to pursue voluntary cost allocation based on a mutually agreed-upon method. The following best practices have been identified for cost assignment:

- Voluntary funding agreements, through which one or more state regulatory entities and/or public utility transmission providers may agree to accept all or part of the cost burden for a specific facility, can provide a mechanism through which beneficial infrastructure can be built where that infrastructure may not otherwise have had a pathway to be planned and paid for.
- System operators to examine the viability and consequences of grant the state(s) sponsoring a project through a voluntary funding agreement exclusive or priority access to the transmission asset on market competition and system reliability, particularly during periods of system stress.
- Public utility transmission providers to include in their tariff a pre-defined regional cost allocation method for regional transmission projects as a back stop for agreements made by states.

Immediate Actions – Recommended (★★)

'Network-Ready' Equipment Standards

- We recommend RTO groups (e.g., JIPC) design and expand 'Network-Ready' equipment standards of both HVAC and HVDC subgroups, using NYPSC's standards as a starting point but adding specificity in terms of design requirements. These standards should be in place to enable future expansion as new lease areas are identified.
- We recommend that the Offshore Wind Federal-State Partnership or multi-state collaborative then take the lead to drive enforcement of standards within member states. States then could require projects to comply with specifications or through offshore wind mandates of PSC transmission permits.

Equipment Rating Standardization for Transmission Components

- As much as possible, we recommend that state solicitations are prescriptive to match the 'small, medium, and large' transmission designs that are already being utilized for European installations. Establishing equipment standards for transmission cable voltage and current capacity, connectors, and collector stations as a function of development potential and topology design will reduce burden on OEMs and transmission planners and operators.

Immediate Actions – Recommended (★★)

R&D Work for Offshore Transmission Technology Commercialization

- We recommend DOE continue supporting R&D through the national labs and in partnership with academia and industry to address key technology gaps - particularly HVDC, floating transmission components, and capabilities of inverter-based resources .

Expansion of Domestic Supply Chain and Manufacturing

- We recommend that equipment manufacturers expand domestic facilities to support OSW project demand in the U.S. to increase local equipment production and develop a skilled workforce.
- We recommend that OSW project developers reach out to transmission asset manufacturers early. Both to plan for long lead time items in their proposals and to signal market need to the original equipment manufacturers.
- Support for the all-of-government approach to OSW Domestic Supply Chain. We find the agencies' ongoing activities to be helpful in supporting the OSW Transmission supply chain needs

Skilled U.S. Workforce Development

- We encourage U.S. employers to dedicate specific focus and funding to attract and retain a skilled, trained, and diverse workforce. Offering paid internships and apprenticeships to new workers, students, and recent graduates can increase interest and experience of early career workers and facilitate a pipeline of workers for succession planning.
- We encourage U.S. community colleges, vocational trade schools, graduate, and post-graduate educational institutions to offer additional classes and programs focused on transmission and power systems, particularly HVDC and offshore systems, in order to produce more early career workers.

Immediate Actions – Recommended (★★)

State-Federal Aligned Siting

- We recommend DOE work with BOEM to conduct and publish a siting study based on networked 2050 AOSWTS topologies and share that information with states and RTOs to be included in state planning efforts. Routes identified on the Outer Continental Shelf would be further refined and vetted using Marine Spatial Planning and survey data during BOEM grant/lease planning.

Provide Guidance for Permitting Procedures and Requirements

- There is a need to develop federal guidance regarding authorization/permitting procedures and requirements for intra- and inter-regional transmission solutions where there is no authorization/permitting precedent
- We recommend that DOE, state siting authorities, and local communities consider how grant funding under the IRA funded Transmission Siting and Economic Development (TSED) grant program can be help support the development of permitting guidance.

Permitting Agency Resources & Staffing

- Ensure that state and local agencies with regulatory authority and/or special expertise have the required resources, including staffing levels and technology to efficiently review an increased number of projects.
- We recommend that DOE, BOEM, and other federal agency partners, explore and implement funding mechanisms to support the capacity of often resource-constrained Tribal Nation and local governments to meaningfully engage in the environmental review and permitting process.
- For federal agencies, direct hiring authority is recommended for expedient and effective hiring of needed staff.

Immediate Actions – Best Practices (★)

Environmental R&D for Offshore Wind Transmission

- We encourage continued interagency work on R&D and scientific research specific to transmission siting or environmental impacts.

Relevant Federal Funding, Financing, and Technical Support

- With the current administration's ambitious clean energy targets and the unprecedented levels of funding support brought through the Bipartisan Infrastructure Law and Inflation Reduction Act, federal agencies are unifying to support transmission infrastructure development. We recommend developers and states looking to develop OSW transmission projects carefully review and apply for existing and upcoming funding programs to access BIL & IRA funding.

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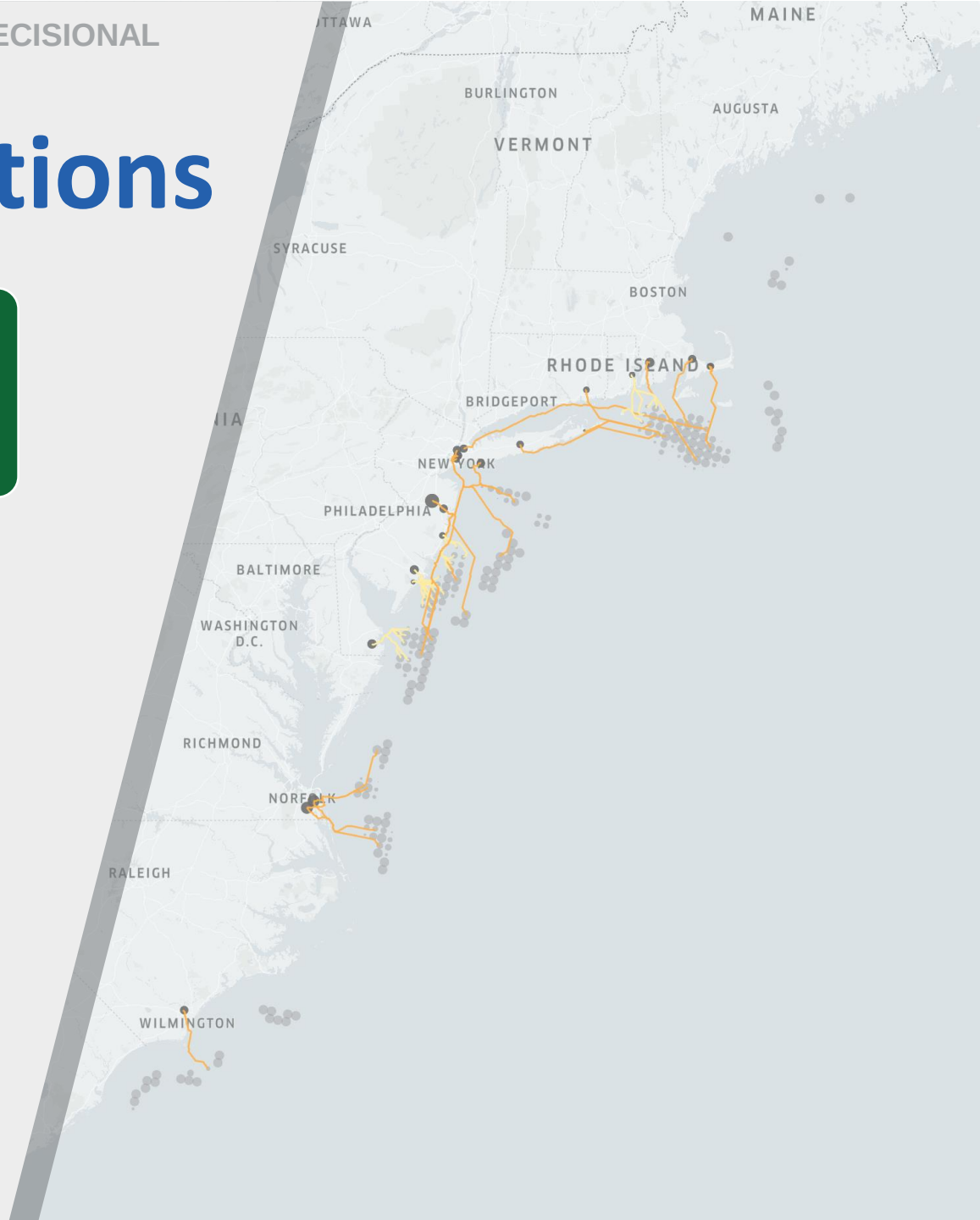
2025-2030 Recommendations

- Partnerships & Collaborations
- Planning & Operations
- Technologies & Standardization
- Economics & Support Initiatives
- Siting & Permitting

Near-term Actions for 2025 – 2030		
★★★	Interregional Offshore Topology Planning	2.2.1.
★★★	HVDC Standards Development	3.2.1.
★★★	Federal Preferred Routes for Transmission in the Outer Continental Shelf	5.1.1.
★★	Regulatory Guidance for Ownership of Network-Ready Projects	2.4.2.
★★	Data sharing for Interoperability of HVDC offshore systems	3.2.3.
★★	BOEM Competitive Right-of-way Grant Issuance Process for Preferred Routes	5.1.2.
★★	Neighboring States Achieve Renewable Portfolio Standard and Offshore Wind Goals	5.1.4.
★	Community Benefit Agreements	5.2.5.



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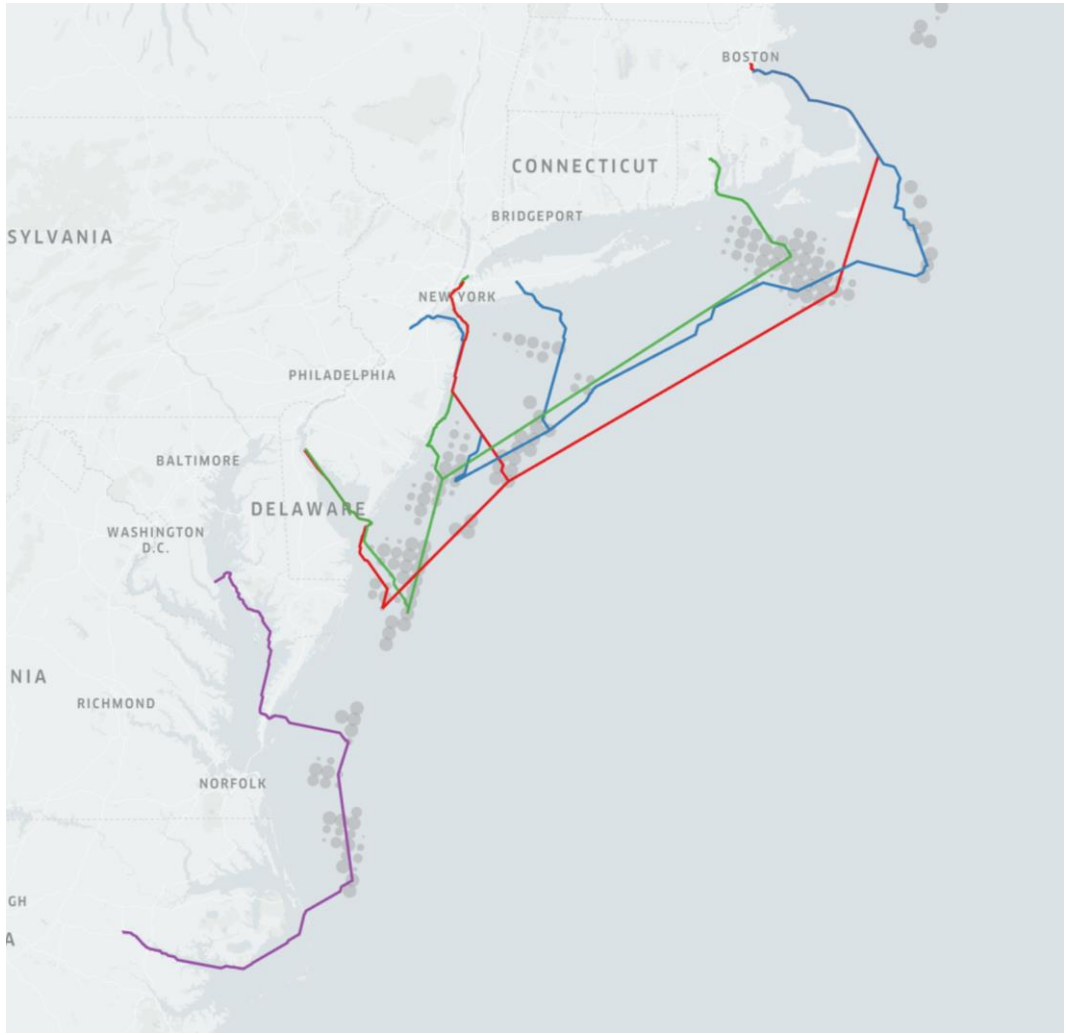
2025-2030 Actions – Critical (★★★)

Interregional Offshore Topology Planning



- We recommend the Multi-State Offshore Wind Transmission Collaborative communicate support for interregional HVDC transmission topology strategies (such as those identified by the AOSWTS) to their respective transmission planning entities and participate in conversations about benefits evaluation and cost allocation for identified interregional projects.

- We recommend the JIPC to lead a collaborative study process between the RTOs and planners in non-RTO neighboring regions to include these interregional interlinks in their regional plans based on state policy.

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2025-2030 Actions – Critical (★★★)

HDVC Standards Development

Equipment Standards

- Basic equipment requirements are defined by IEEE 1899-2017 for control equipment, protection equipment, and auxiliary secondary equipment with a voltage range of up to 800 kV. However, an effort to consider the functional requirements of HVDC equipment within the context of grid codes encountered by Atlantic coast offshore wind projects would provide guidance for equipment manufacturers and transmission planners. Further, system-based functionality requirements may also permit interoperability across manufacturers and vintage years of equipment

Operability Standards

- Like equipment standards, HVDC operability standards are relevant to radial as well as networked topologies. To optimize the flexibility of HVDC networks, topologies which evolve beyond radial interties are needed. This means that more than a single offshore and single near-shore HVDC converter station will be required to function in a coordinated fashion. Though single-vendor, multi-terminal HVDC networks are possible and perhaps even likely early in the development of the supply chain, cost effectiveness and scale will be best realized through a market-driven model that requires multi-vendor interoperability.

To further this work, we recommend an industry survey be undertaken to identify any existing standards and review common OSW transmission equipment ratings to date to identify gaps and any issues of incompatibility.

2025-2030 Actions – Critical (★★★)

Federal Preferred Routes for Transmission in the OCS

- We recommend BOEM continue to work with DOE, and other permitting agencies to identify preferred transmission routing paths, based in part on transmission topologies identified in the AOSWTS to accommodate long-term OSW deployment goals.

- Corridors/routes that are identified as 'preferred' could receive federal funding from DOE, other federal agencies, and/or congressional appropriations to conduct geophysical surveys and geotechnical investigations to provide needed data for use in the permitting process. This data would be provided to lessees, and potential grantees, for use in BOEM's review and authorization of easements and/or rights-of-way (ROWs).

2025-2030 Actions – Recommended (★★)

Regulatory Guidance for Ownership of Network-Ready Projects

- We recommend that transmission providers and stakeholders work with FERC to investigate the need for and design of specific grid contracts and regulations for offshore networks to cover topics including shared use and ownership agreements, transmission rights, open access agreements and cost allocation for shared and networked offshore facilities across multiple POIs. While multiple regions may need different policy solutions, consistent approaches between regions will be desirable, where possible.

Data Sharing for Interoperability of HVDC Offshore Systems

- We recommend transmission planning entities give special focus to perform interoperability studies around HVDC and identify modeling and data needs. There will be a need to establish guidelines or even standards for the parameters, models, interface definitions, and other pertinent information that need to be exchanged between vendors for operation of their equipment within the larger system. While working with commercially proprietary data, there may be additional need to codify the frequency and method of data exchange.
- We recommend OEMs provide data to ISOs/RTOs for interoperability studies, lead the legal and contractual work to establish a multi-vendor cooperation framework, and actively look to standardize components when reasonable. There may be a need to address liability in cases of a multi-vendor systems and OEMs may want to put forward guidelines as to what type of measures and logs should be kept in order to do so.
- We recommend that the industry at large work to establish common terminology and definitions for HVDC components or functions such that vender-specific branding does not impede our ability to communicate about this technology.

2025-2030 Actions – Recommended (★★)

BOEM Right-of-Way Grant Issuance Process for Preferred Routes

- Building off the identification of preferred routes, we recommend that BOEM issue one or more RFCIs to determine interest in regional transmission systems utilizing ROW and/or right-of-use and easements (RUE) as needed. These RFCIs could be for intra- or interregional systems where capacity and technology minimums are specified.
    - would also include an RFI component to obtain feedback on preferred technology standards and contractual obligations associated with the issuance of the ROW
- BOEM could incorporate due diligence requirements including but not limited to requirements and/or associated penalties for failing to progress through BOEM's regulatory framework within a specified schedule.

Assisting Neighbor States Through RPS & OSW Goals

State Renewable Portfolio Standards (RPS) are a key driver of U.S. clean energy policies. State RPS and offshore energy commitments can be used to incentivize integrated planning and promote the most efficient siting decisions.

- We recommend state RPS or OSW goals be amended to allow for full or partial credit of a state's own goals when an investment in OSW infrastructure helps a neighboring state achieve its goals. By incentivizing states to support the siting of cable landfall of a neighbor state, there is potential to reduce state border disputes and competition, by promoting shared benefits. By allowing cable landfall or approving onshore transmission within their jurisdiction, one state may enable the OSW benefits for another state and increase common goals.

U.S. DEPARTMENT OF ENERGY

BOEM Bureau of Ocean Energy Management

2025-2030 Actions – Best Practices (★)

Community Benefit Agreements

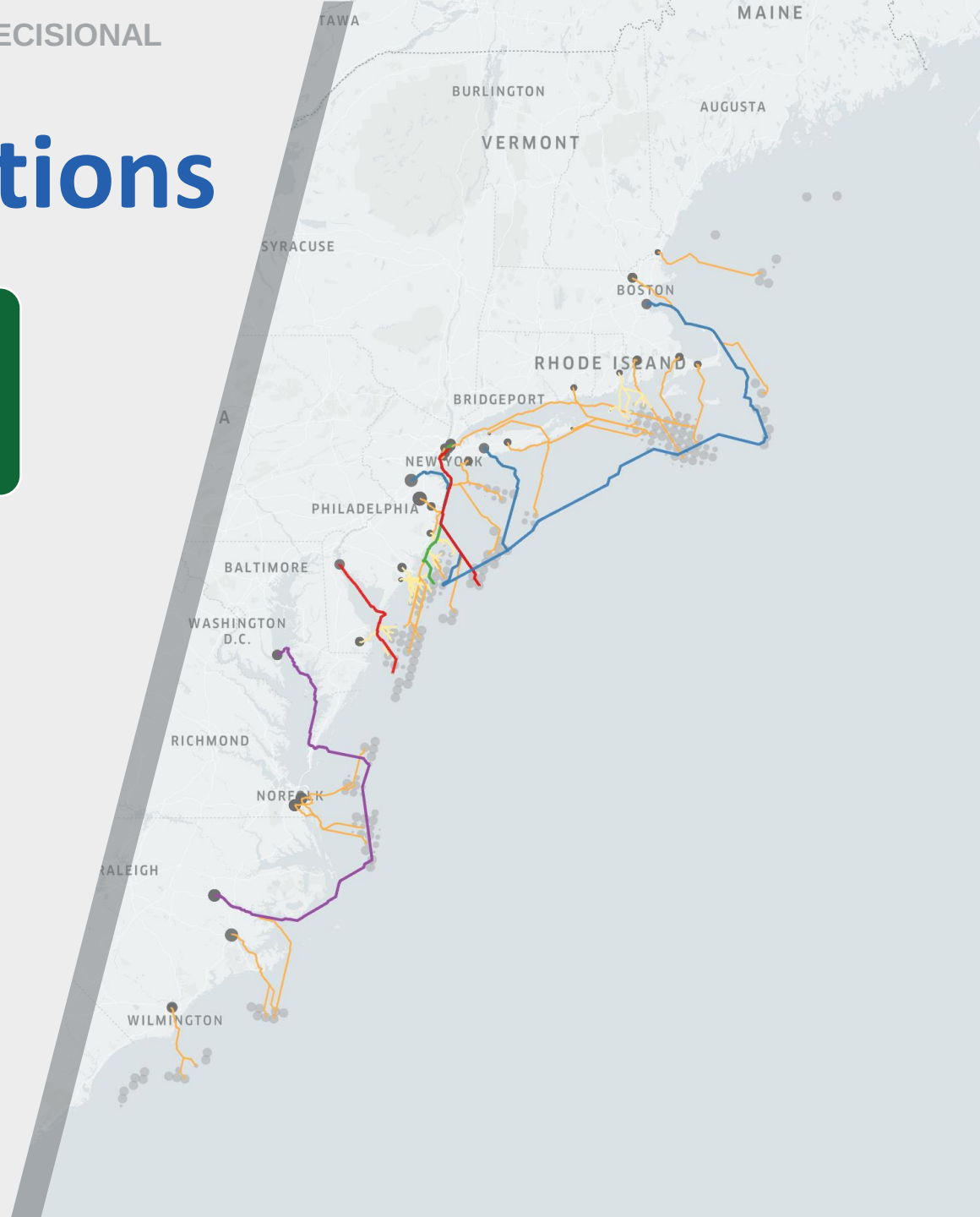
Community Benefit Agreements, or CBAs, are one way to help bring local communities into a sustained focus and to ensure that communities impacted by infrastructure are net beneficiaries. CBAs between project developers and impacted communities can play a positive role in helping to ensure that developers are affirmatively reaching out to communities and committing to provide benefits suited to each community's unique needs.

- We recommend the use of a CBA signed by a community benefits group and an energy project developer identifying community benefits that the developer agrees to provide as part of the project's development, in return for the community's support of the project.
- We recommend involvement from state and local leaders to help the process associated with CBA development by ensuring fairness, accuracy in information provided and adequate outreach.

2030-2040 Recommendations

- Partnerships & Collaborations
- Planning & Operations
- Technologies & Standardization
- Economics & Support Initiatives
- Siting & Permitting

Mid-term Actions for 2030 – 2040		
★★★	Multi-Terminal HVDC Test and Certification Center	3.2.2.
★★★	Environmental Review and Permitting Frameworks	5.2.2.
★★	Regulated Interregional Joint Planning Processes	2.2.2.
★★	Interregional Transfer Capacity Minimums	2.3.2.
★★	Offshore Cables and Substations for Continued Use as Shared Infrastructure	5.2.4.
★	Interconnection Queue Process Reform	2.4.1.
★	Enhancement of Existing Market Monitoring Roles	2.4.3.



2030-2040 Actions – Critical (★★★)

Multi-Terminal HVDC Test & Certification Center

As multi-terminal HVDC (MTDC) grids are developed, it is likely that interactions between HVDC components from different vendors and the interactions with other connected AC devices will need to be studied carefully to assure adequate tuning of controllers and protection device settings. There is currently no testing or certification center in the U.S. with the capability to test these potential interactions and ensure compatibility before they are installed. This is a national gap and while testing at international facilities may be used as a failsafe in the near future, it is highly recommended that a domestic center of excellent be established.

Further, it is recommended that the testing center be independent of any one original equipment manufacturer to eliminate any perceived bias and reduce data sharing or competitive market concerns.

2030-2040 Actions – Critical (★★★)

Environmental review and permitting frameworks

- We recommend that the environmental review and permitting requirements of each entity at each jurisdiction be well understood and coordinated, with a comprehensive permitting timetable schedule developed as part of a coordinated project plan, particularly where multiple projects would affect each others ability to interconnect to the grid. This should include project specific roles and authorities, primary points of contact, and public engagement schedules
- We recommend that BOEM, as the lead federal agency in the review of offshore transmission infrastructure, continue to work closely with Tribal Nations to identify potential natural, archaeological, and cultural resources and areas of historic and cultural or religious significance early, though the National Historic Preservation Act, and Government to Government consultations.
- For offshore wind projects that qualify to become covered projects under FAST-41, we recommend that BOEM and the Permitting Council (with the support of other Federal agency partners) encourage and facilitate Tribal Nations, state agencies, and local agencies agreeing to participate as cooperating or participating agencies in the FAST-41 process.

2030-2040 Actions – Recommended (★★)

Regulated Joint Interregional Planning Processes

Current joint interregional coordination processes need to be enhanced to take a broader view of project needs and benefits, as FERC Order 1000 only requires 'coordination' between regions, which falls short of the true need for holistic planning.

We advocate for firmer regulation and support FERC's consideration of the issue to provide a ready mechanism by which states can:

- Study collective transmission needs across two or more states that span multiple regions, considering transmission facilities that are already planned in the relevant region or regions (i.e., account for the baseline transmission plan).
- Identify transmission facilities that most efficiently or cost-effectively meet those needs.
- Allow a cost allocation method to be voluntarily determined among the participating states, including potentially among states across two or more regions.
- Ensure that the transmission facilities participating states agree to fund are incorporated into regional transmission plans (i.e., become part of the baseline regional transmission plan) so that subsequent planning studies factor in their existence (e.g., avoiding duplicative transmission facilities or facilities that are less valuable in light of the offshore wind-related transmission facilities).

Interregional Transfer Capacity Minimums

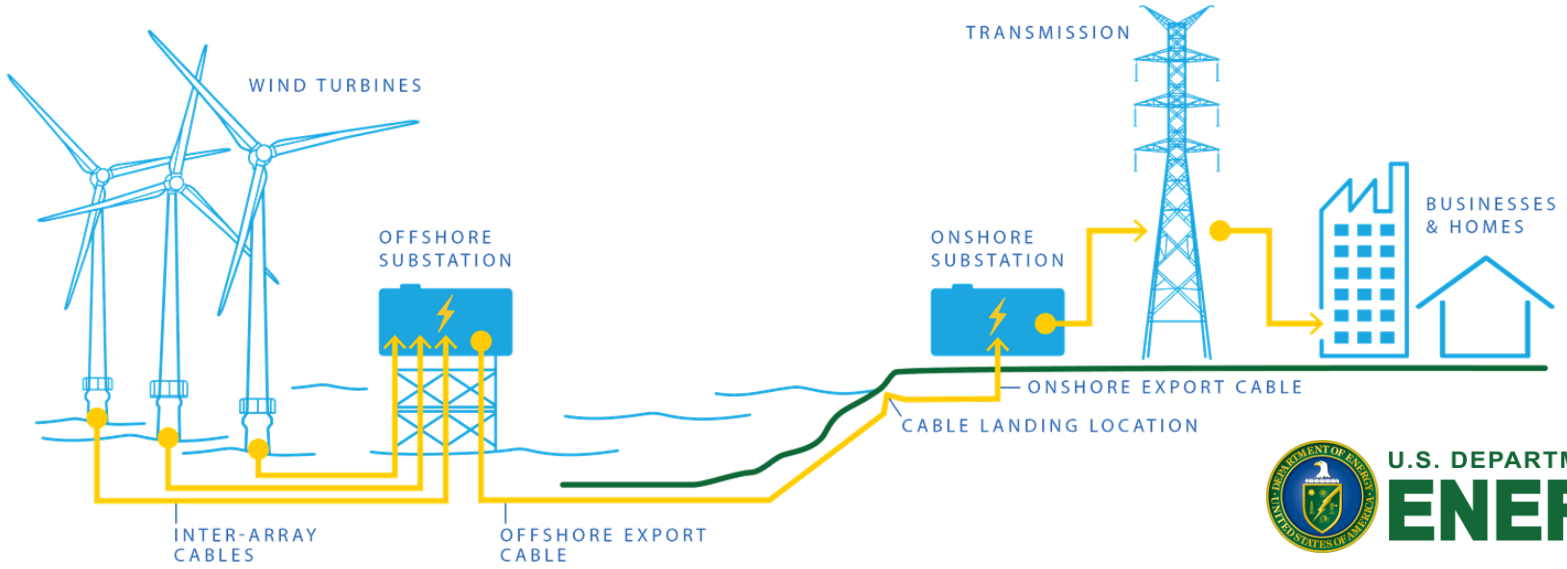
Interregional Transfer Capacity Minimums would improve resiliency, increase reliability, and combat extreme locational marginal prices across the nation but would also encourage interregional transmission projects along coastal states which could allow better ability to export offshore wind power inland.

- We encourage FERC to continue exploring the establishment of a minimum level of transfer capacity between balancing areas to encourage interregional transmission development.

2030-2040 Actions – Recommended (★★)

Assignment of Offshore Cables and Substations for Continued Use as Shared Infrastructure

- We recommend that BOEM develop guidance, or potentially regulatory revision, for the severability of the decommissioning of wind farm infrastructure and transmission infrastructure (thereby allowing the substations and export cables to remain in use beyond the individual offshore wind lease). Options may include assignment of the easement to another entity or the conversion of the easement to an independent ROW.
- We recommend that BOEM remain engaged in the international knowledge exchange agenda as the offshore wind industry matures and projects in other countries address issues associated with different life spans of project components; BOEM should work with the international community, through International Energy Agency (IEA) Technology Collaboration Programmes (TCPs) or other mechanisms, to track and contribute to research to expand the knowledge base and develop best practices. DOE should also lend its technical expertise to supporting the IEA TCPs and other international exchanges.



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2030-2040 Actions – Best Practices (★)

Reform Interconnection Queue Processes

- We recommend that FERC and the transmission planning entities prioritize the interconnection queue reform in the coming years to foster a working system for all, which will encourage offshore wind deployment to meet state and federal goals and ensure the costs for network upgrades are equitably allocated across all generation types and transmission system users.
- We recommend RTOs and transmission planners consider applications for commercial readiness requirements, such as “first-ready, first-served”, to manage their queues.
- We recommend soliciting entities, such as states with offshore wind procurements, investigate their ability to enter the queue to reserve a queue position on behalf of whatever project wins their solicitation.

DOE has ongoing work in this critical area. Read more about the i2x project and subsequent action plan specific to interconnection reform at Interconnection Innovation e-Xchange | Department of Energy

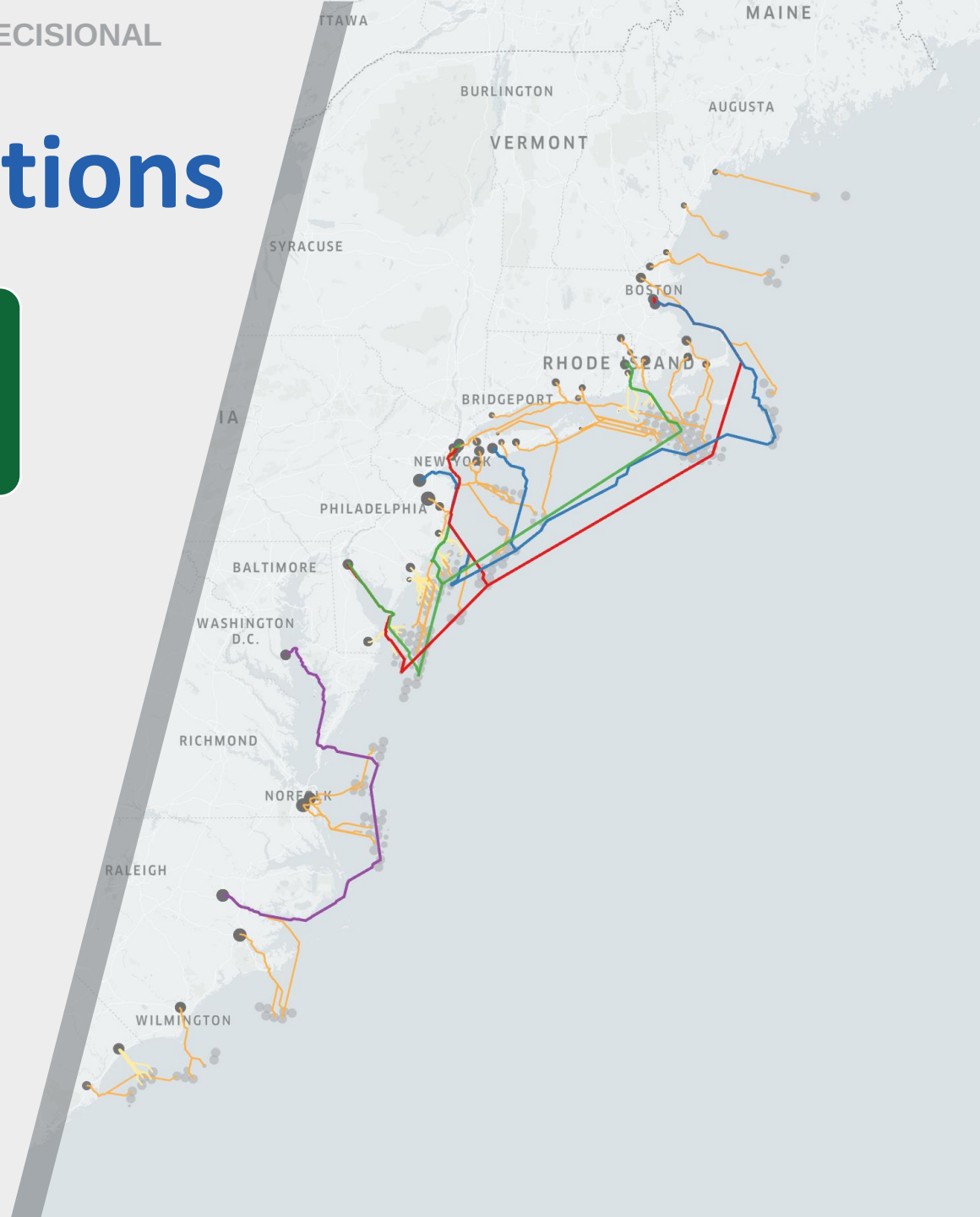
Enhance Existing Market Monitoring Roles

- We encourage FERC to review and, if necessary, enhance existing market monitoring roles to ensure efficient use of generation and transmission resources.

Long-Term Recommendations

Partnerships & Collaborations	Planning & Operations	Technologies & Standardization	Economics & Support Initiatives	Siting & Permitting

Long-term Actions for Sustainable Growth		
★★	State-Led Transmission Planning	2.1.1.
★★	Cost Allocation Methodology	4.1.3.
★★	Federally Designated National Interest Electric Transmission Corridors	4.2.3.
★	International Cooperation	1.2.1.
★	Communication Practices and Public Engagement	1.2.2.
★	Transmission Optimization with Grid Enhancing Technologies	3.1.3.
★	Best Practices for Benefit Valuation	4.1.2.
★	Equity in Ratemaking	4.1.4.
★	Consumer Advocates	4.1.5.
★	Utilization of Existing Federal Facilities Along the Coast	5.1.5.



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Long Term Actions – Recommended (★★)

State-Led Transmission Planning

We recommend state-led transmission planning should be pursued in partnership with local transmission operators. Tasks states may find helpful to support their transmission planning work:

- Pursue state-driven transmission procurement and interconnection processes through, for example, PJM's State Agreement Process or ISO-NE's Elective Transmission Upgrade process.
- Identify and name preferable Points of Interconnection to better align solutions submitted by developers with state interests.
- Make solicitations modular, similar to the approach taken in New Jersey, to allow companies to prioritize where they feel best positioned to compete.
- Develop and include incremental targets in their solicitations in addition to final capacity goals to ensure the construction schedules proposed by transmission developers align with generation investment schedules.
- Recommend modifications to state offshore wind solicitation processes to be implemented by each individual state.

Federally Designated National Interest Electric Transmission Corridors (NIETCs)

DOE may designate a NIETC to address transmission needs associated with offshore energy in federal waters. An offshore NIETC designation would allow DOE to use its authority to enter into public-private partnerships under the Transmission Facilitation Program (TFP) and may qualify for transmission facility financing through IRA Sec. 50151.

- We recommend that a NIETC is not used as a blanket to pre-select routes for a coast-wide offshore topology, but rather be designated on an as-needed basis if there are projects within a proposed corridor that would like to apply for financing available through Transmission Facilitation Program (TFP) or if the onshore implications of a NIETC would help with project permitting.

Long Term Actions – Recommended (★★)

Cost Allocation Methodology

Many cost allocation methods rely on various techniques to estimate a subset of project benefits or approximate network usage as a measure of benefits. However, no undisputable method exists.

- We recommend that the allocation of interregional transmission costs among regions should follow the regional distribution of benefits associated with the project based on a common list of benefits and methods to quantify transmission benefits among regions.
- No mechanism is recommended to compensate network users or regions that experience a lower net benefit from specific transmission projects within a cost allocation agreement. For projects of regional priority, this could be a role for federal government support.
- In cases where a new transmission facility capacity exceeds the prescribed needs of the current system, the costs for the unused portion of the facility may be distributed among all network users as network upgrade costs. This allocation will be subject to re-evaluation as the use of the facility changes and new users are prescribed so that the portion of the costs that are assigned to the network can be reduced.

Long Term Actions – Best Practices (★)

International Cooperation

- International cooperation/exchanges on transmission and consenting best practices will be key for smooth long term development of OSW.

Communication Practices and Public Engagement

- Information and jurisdiction for different aspects of offshore wind transmission can be diffuse across different types of agencies (energy offices, environmental agencies, etc.) and different levels of government (Federal, state, local). Sharing information at an early stage with all stakeholders is critical, especially with communities that may be impacted.

Transmission Optimization with Grid Enhancing Technologies

- DOE should continue to more broadly disseminate published DOE research on transmission optimization with Grid-Enhancing Technologies, with an expanded effort to inform the offshore wind transmission community about its potential applications for offshore wind.

Best Practices for Benefit Valuation

- Avoiding a cost allocation methodology that relies solely on a narrow, formulaic, understated approach to quantifying benefits, can help shift to a more holistic, multi-value benefit analysis in transmission planning.

Long Term Actions – Best Practices (★)

Equity in Ratemaking

- We encourage Public Utility Commissions to consider adopting best practice standards to ensure that low-income and vulnerable populations do not continue to be disproportionately impacted.

Consumer Advocates

- Including a consumer advocate early in the planning and decision-making process can ensure that ratepayer interests are being considered without having to bring every conversation into a public forum. Consumer advocate engagement can minimize public resistance to transmission projects, increase transparency, and lead to better outcomes that take into account the interests of ratepayers.

Use of Existing Federal Facilities Along the Coast

- We recommend exploring the use of DOD and other federal installations (e.g., U.S. Navy bases or Coast Guard stations) along the coast for cable landing sites. Opportunities exist to use dock facilities, layout yards, and other existing infrastructure to support project development.

Contact Us

www.energy.gov/gdo/offshore-wind-transmission-federal-planning-support

OSWTransmission@hq.doe.gov

U.S. DEPARTMENT OF ENERGY
Office of ENERGY EFFICIENCY & RENEWABLE ENERGY

GDO GRID DEPLOYMENT OFFICE

LPO LOAN PROGRAMS OFFICE

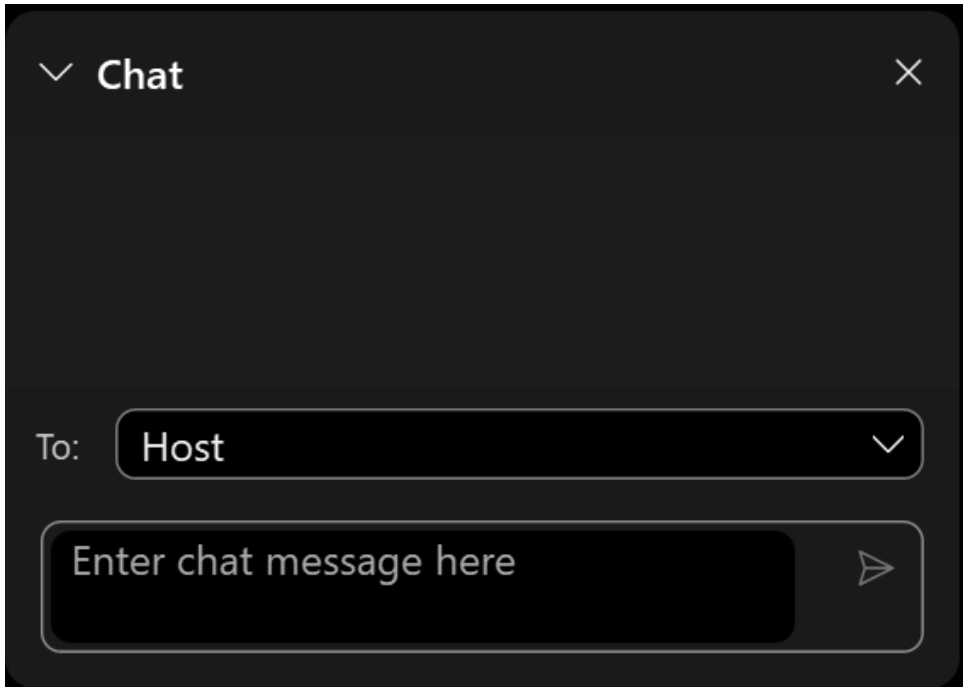
U.S. DEPARTMENT OF THE INTERIOR
BOEM Bureau of Ocean Energy Management

NREL Transforming ENERGY

Pacific Northwest NATIONAL LABORATORY

Questions?

Please submit your questions in the chat box.



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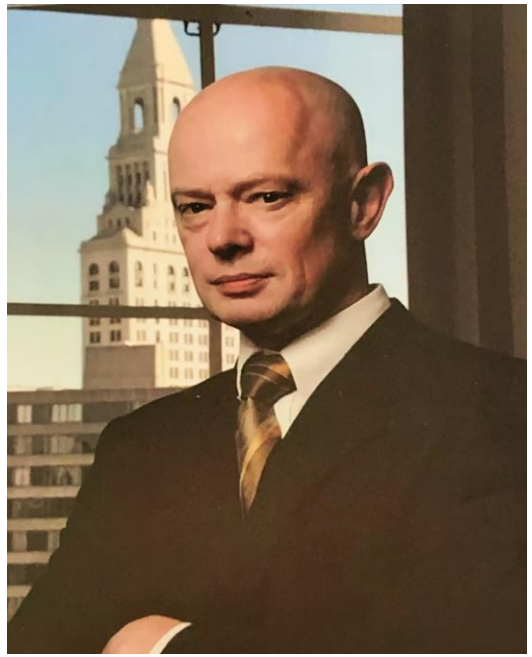
GDO GRID DEPLOYMENT OFFICE

BREAK



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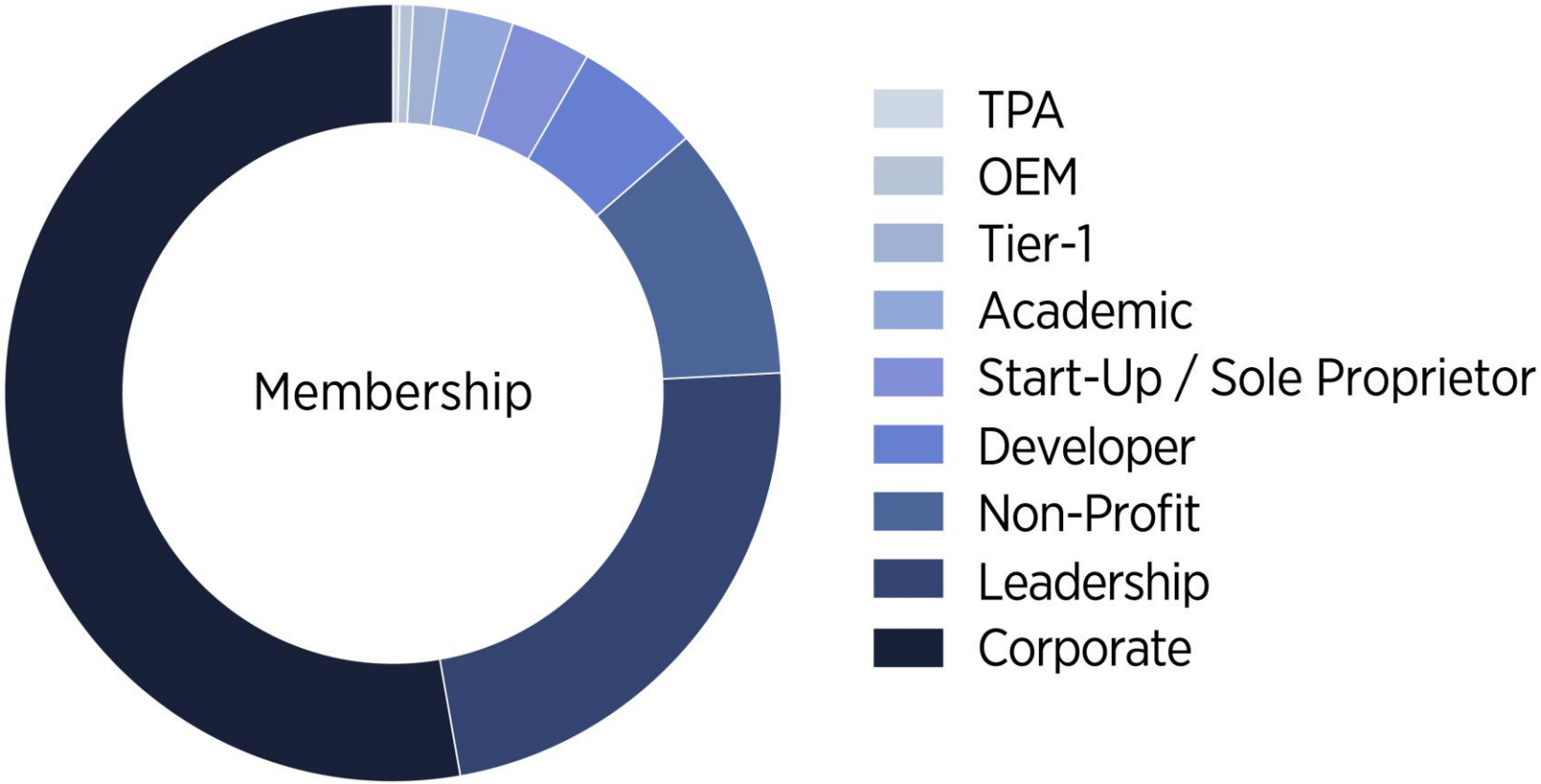
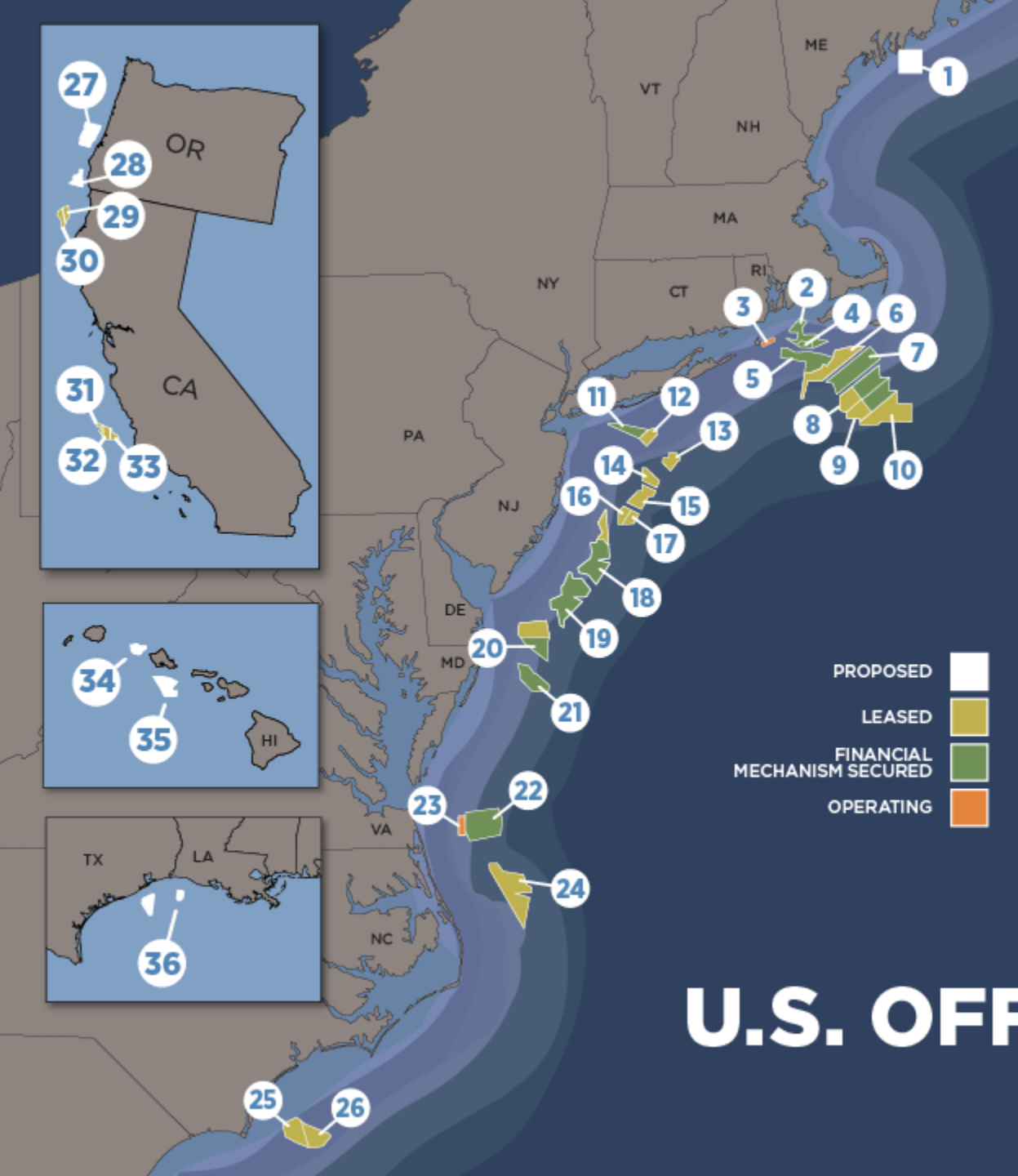
BUSINESS NETWORK for OFFSHORE WIND

Business Network for Offshore Wind

1. **Focus on developing US offshore wind industry and its supply chain**
2. **Not-for-Profit, Membership-Based**
3. **Provide: Information, *Education*, Introductions**

Network Membership Distribution





BUSINESS NETWORK for OFFSHORE WIND

1. **Maine Aqua Ventus I** (New England Aqua Ventus) [11 MW]
2. **Revolution Wind** (Ørsted / Eversource) [704 MW]
3. **Block Island Wind Farm** (Ørsted) [30 MW]
4. **South Fork Wind Farm** (Ørsted / Eversource) [132 MW]
5. **Sunrise Wind** (Ørsted / Eversource) [880 MW]
6. **Bay State Wind** (Ørsted)
7. **Vineyard Wind / Park City W. / Commonwealth W.** (CIP / Avangrid) [800/804/1,232 MW]
8. **Beacon Wind** (Equinor / bp) [1,230 MW]
9. **Southcoast Wind** (Shell / Ocean Winds) [1,204 MW]
10. **Liberty Wind** (CIP)
11. **Empire Wind 1 & 2** (Equinor / bp) [816/1,260 MW]
12. **Excelsior Wind** (Vineyard Mid-Atlantic)
13. **Bluepoint Wind** (Ocean Winds / GIP)
14. **Attentive Energy One** (TotalEnergies Renewables)
15. **Community Offshore Wind** (RWE / National Grid)
16. **OCS-A 0541** (Atlantic Shores)
17. **Leading Light Wind** (Invenergy)
18. **Atlantic Shores Offshore Wind** (EDF / Shell) [1,510 MW]
19. **Ocean Wind 1 & 2** (Ørsted) [1,100/1,148 MW]
20. **Skipjack I / II Wind Farm** (Ørsted) [120/846 MW]
21. **MarWin / Momentum Wind** (US Wind) [270/808.5 MW]
22. **Coastal Virginia OSW - Commercial** (Dominion Energy) [2,640 MW]
23. **Coastal Virginia OSW - Pilot** (Dominion Energy) [12 MW]
24. **Kitty Hawk Offshore Wind** (Avangrid)
25. **OCS-A 0545** (TotalEnergies Renewables)
26. **OCS-A 0546** (Duke Energy Renewables Wind)
27. **Coos Bay Call Area**
28. **Brookings Call Area**
29. **OCS-P 0561** (RWE)
30. **OCS-P 0562** (CIP)
31. **OCS-P 0563** (Equinor)
32. **Golden State Wind** (Ocean Winds / CPPIB)
33. **OCS-P 0565** (Invenergy)
34. **Oahu North Call Area**
35. **Oahu South Call Area**
36. **Gulf of Mexico WEAs**

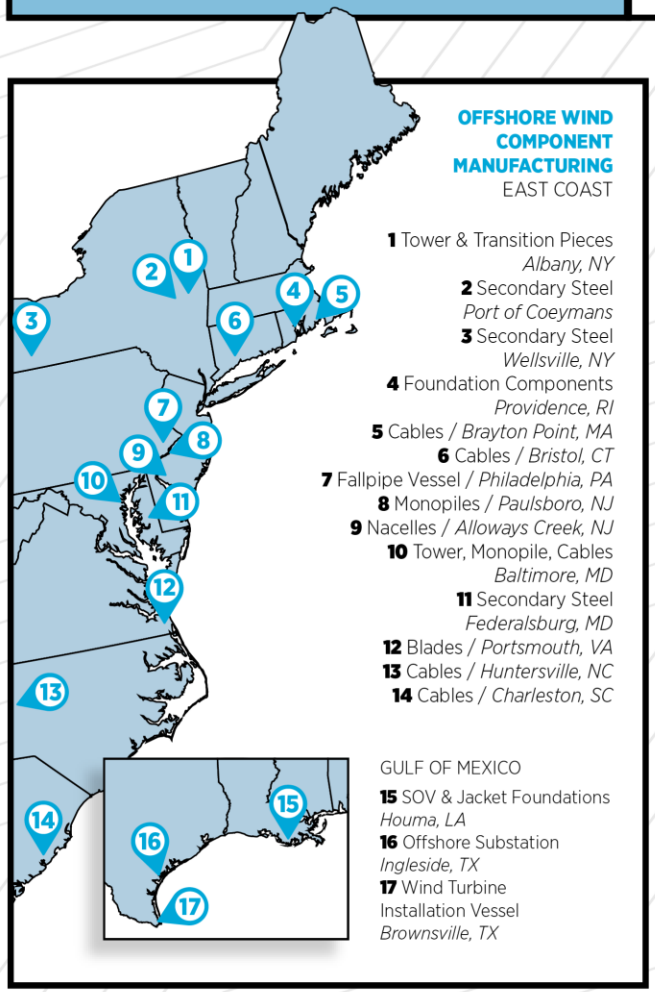
BUSINESS NETWORK FOR OFFSHORE WIND

U.S. OFFSHORE WIND MARKET

77.4GW
STATE GOALS/TARGETS

36.3GW
PATHWAY TO OFFTAKE

17.6GW
UNDER CONTRACT



OFFSHORE WIND COMPONENT MANUFACTURING
EAST COAST

1 Tower & Transition Pieces
Albany, NY
2 Secondary Steel
Port of Coeymans
3 Secondary Steel
Wellsville, NY
4 Foundation Components
Providence, RI
5 Cables / *Brayton Point, MA*
6 Cables / *Bristol, CT*
7 Fallpipe Vessel / *Philadelphia, PA*
8 Monopiles / *Paulsboro, NJ*
9 Nacelles / *Alloways Creek, NJ*
10 Tower, Monopile, Cables
Baltimore, MD
11 Secondary Steel
Federalsburg, MD
12 Blades / *Portsmouth, VA*
13 Cables / *Huntersville, NC*
14 Cables / *Charleston, SC*

GULF OF MEXICO
15 SOV & Jacket Foundations
Houma, LA
16 Offshore Substation
Ingleside, TX
17 Wind Turbine Installation Vessel
Brownsville, TX

TOTAL INVESTMENTS IN THE U.S. MARKET

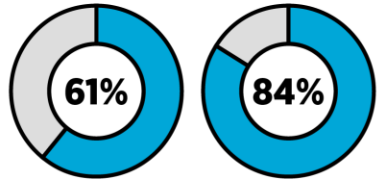
$17B

$6.1B	LEASING REVENUE
$2.4B	PORT UPGRADES
$2.1B	SUPPLY CHAIN INVESTMENTS
$1.4B	VESSELS
$1.1B	TRANSMISSION
$124M	WORKFORCE DEVELOPMENT

$8.1B OF INVESTMENTS MADE IN 2022

CONTRACTS

1,106 CONTRACTS { **166%** GROWTH FROM JAN. '21

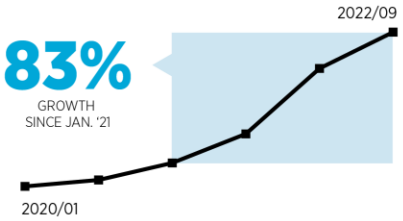


U.S. COMPANIES

U.S. FOOTPRINT

SUPPLY CHAIN CONNECT

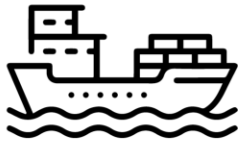
83%
GROWTH SINCE JAN. '21



2,855 COMPANIES FROM ALL **50** STATES

DATE	TOTAL
01/20/20	1,319
06/16/20	1,381
01/15/21	1,545
06/16/21	1,825
01/15/22	2,455
09/16/22	2,855

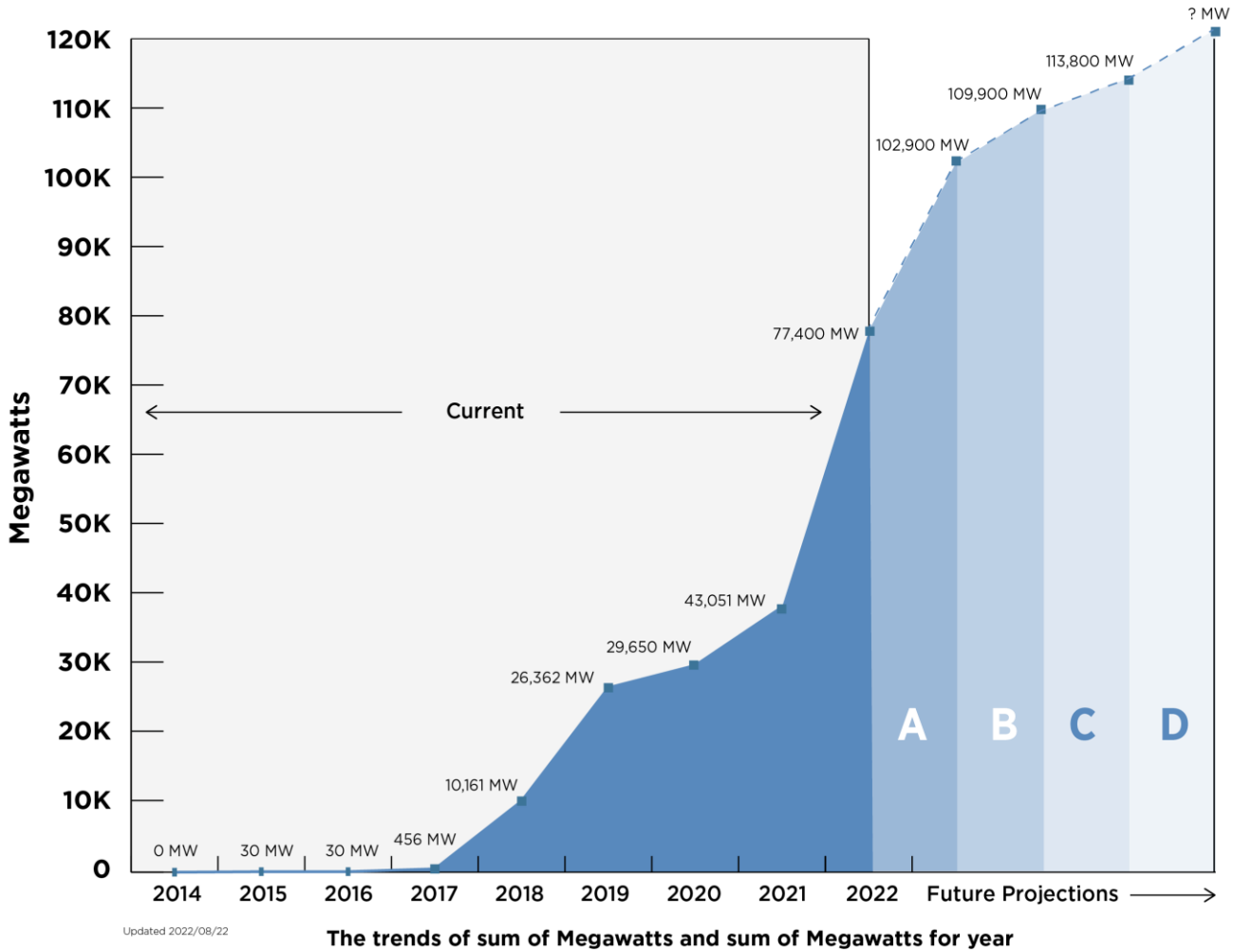
VESSELS



33 VESSELS ANNOUNCED, UNDER CONSTRUCTION, OR RETROFIT

5 SOVS, **2** WTIVS, **1** FALLPIPE / LOCAL EAST COAST SHIPYARDS BUILDING
19 CTVs; SOV SUPPLY CHAIN REACHING **12** MIDWEST & SOUTHERN STATES

Projected Future Offshore Wind Demand



Projections Legend

A **Expansion of Current State Planning Goals**
25,500 MW estimated

B **Expansion into New States (DE, NH, ME, WA, HI)**
7,000 MW estimated

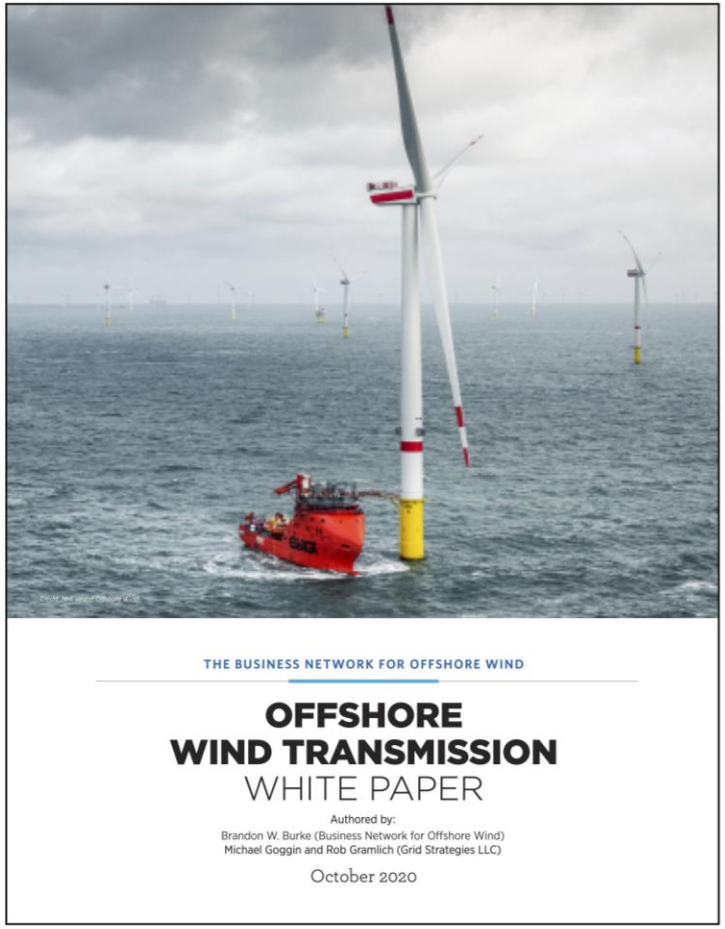
C **Residual Gulf of Mexico Capacity**
3,900 MW

D **Demand from EVs, GH, Corporate PPAs**
? MW

US Offshore Wind Development Stages

PROJECTS & ESTIMATED CAPACITY	
Record of Decision Issued • Vineyard • South Fork	932 MW
Draft Environmental Impact Statement Issued (DEIS) • Ocean Wind I • Empire Wind I & II • Revolution Wind • Sunrise Wind • Coastal Virginia Offshore Wind–Commercial • New England Wind (formerly Vineyard Wind South – Park City Wind & Commonwealth Wind)	10,300 MW
Undergoing Environmental Review • Mayflower Wind (now Southcoast Wind) • US Wind (Marwin and Momentum Wind) • Kitty Hawk North • Atlantic Shores South	5,370 MW
Site Control • Kitty Hawk South • Bay State Wind • Beacon Wind • Skipjack • Ocean Wind II • Atlantic Shores North • Vineyard Northeast (OCS-A-0522) • CIP - NY Bight (OCS-A 0544) • Bluepoint Wind (OSC-A 0537) • TotalEnergies - NY Bight (OCS-A 0538) • Community Offshore Wind (OCS-A 0539) • Atlantic Shores - NY Bight (OCS-A 0541) • Leading Light Wind (OCS-A 0542) • TotalEnergies - Carolina Long Bay (OCS-A 0545) • Duke - Carolina Long Bay (OCS-A 0546) • RWE - California (OCS-P 0561) • CIP - California (OCS-P 0562) • Equinor - California (OCS-P 0563) • Ocean Winds - California (OCS-P 0564) • Invenergy - California (OCS-P 0565)	24,310 MW

Offshore Wind Transmission Publications

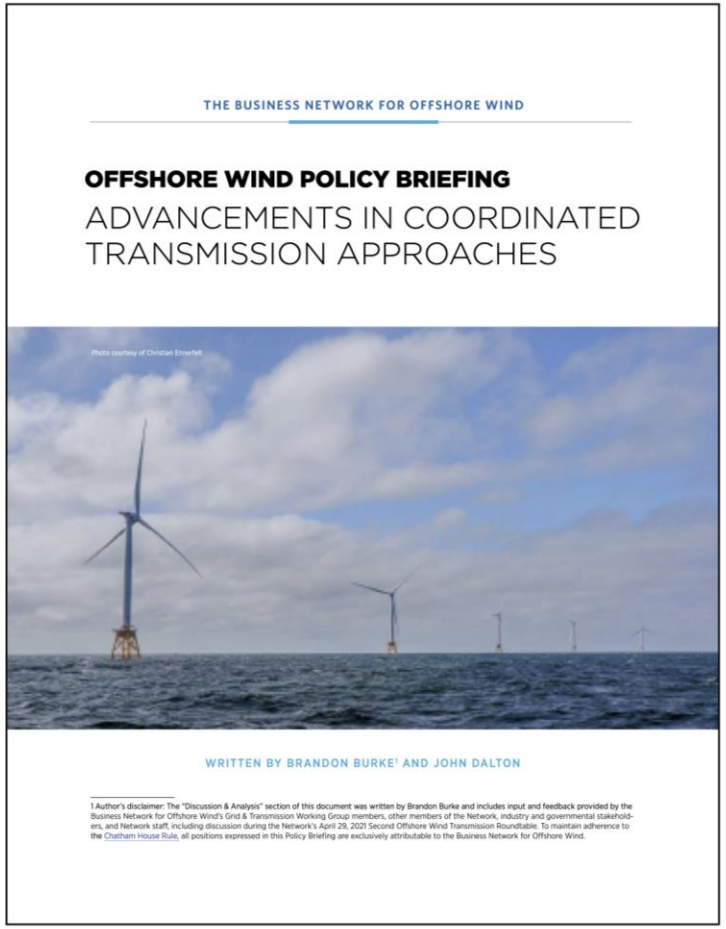


THE BUSINESS NETWORK FOR OFFSHORE WIND

OFFSHORE WIND TRANSMISSION
WHITE PAPER

Authored by:
Brandon W. Burke (Business Network for Offshore Wind)
Michael Goggin and Rob Gramlich (Grid Strategies LLC)

October 2020



THE BUSINESS NETWORK FOR OFFSHORE WIND

OFFSHORE WIND POLICY BRIEFING
ADVANCEMENTS IN COORDINATED TRANSMISSION APPROACHES

WRITTEN BY BRANDON BURKE[1] AND JOHN DALTON

10 KEY RECOMMENDATIONS:

- Integrated transmission planning should weigh all benefits
- Transmission planning should incorporate public policy requirements
- Plan proactively
- Plan for a longer time horizon
- Qualify all benefits
- Better synchronize inter-regional planning
- Government investment to maximize capacity of cable landfalls will pay off exponentially.
- The Outer Continental Shelf is uniquely federal jurisdiction and lends itself to holistic transmission planning
- FERC and BOEM can build on existing Memorandum of Understanding
- Federal highway system funding model for a holistic upgrade to the electricity grids across all three Northeast grid operators that facilitates the deployment of a minimum of 30 GW of offshore wind by 2030

Offshore Wind Transmission Publications

Recommendations for developing a multi-state transmission solicitation:

- Robust analysis of potential environmental and economic benefits
- Well defined state policy objective
- Proactive engagement of an RTO
- Ensure access to and encourage us of built facilities
- Developed cost allocation proposals

Atlantic Offshore Wind Transmission Study

1. Standardization is key to quick buildout and ensuring compatibility
2. Fed must play active role facilitating state collaboration
3. Recognize state limitations to planning and funding
4. DOE should help drive planning in all states
5. Awareness of overall industry timing development

SAM SALUSTRO

Vice President of Strategic Communication
BUSINESS NETWORK FOR OFFSHORE WIND
sam@offshorewindus.org / 414-405-4135

THE BUSINESS NETWORK FOR OFFSHORE WIND
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Business Network for Offshore Wind
@offshorewindus

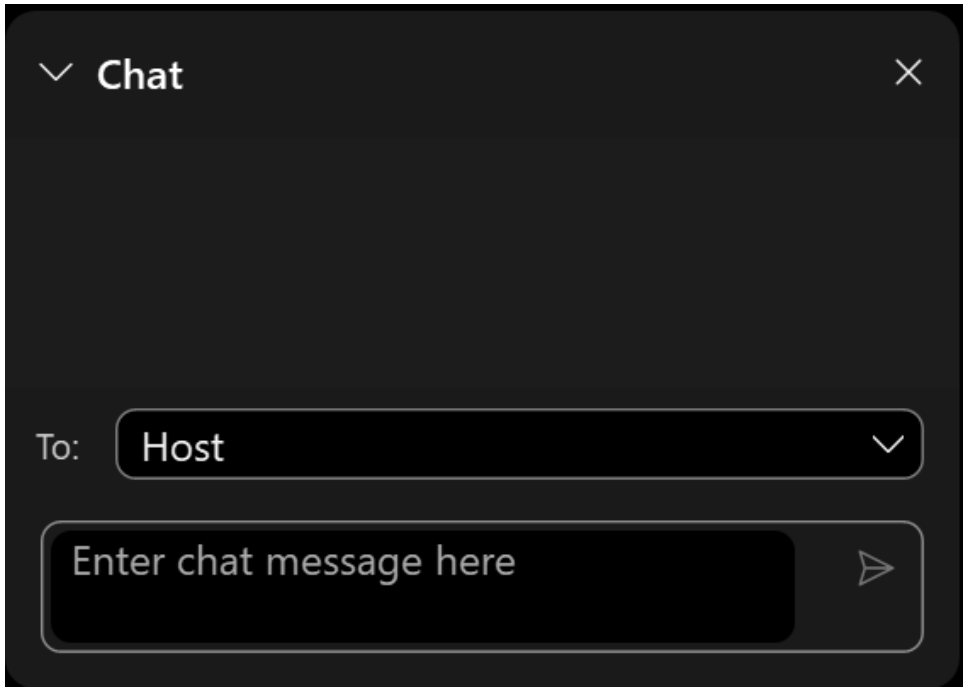
BUSINESS NETWORK for OFFSHORE WIND

Zach Smith

Vice President, System and Resource Planning,
Chair of Eastern Interconnection Planning Collaborative,
New York ISO

Questions?

Please submit your questions in the chat box.



U.S. DEPARTMENT OF ENERGY

U.S. DEPARTMENT OF THE INTERIOR

BOEM Bureau of Ocean Energy Management

GDO GRID DEPLOYMENT OFFICE

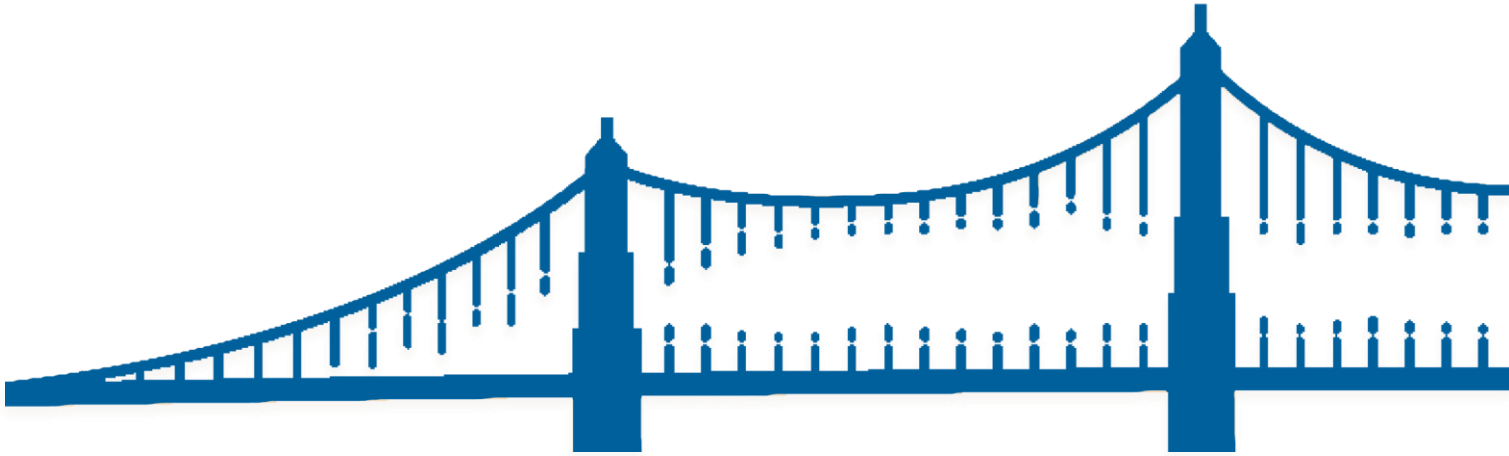
Dylan Reed

Senior Advisor, External Affairs, Grid Deployment Office,
U.S. Department of Energy

Jonathan Abebe

Senior Advisor, Loan Program Office,
U.S. Department of Energy

Loan Programs Office



Building a Bridge to Bankability

U.S. Department of Energy Loan Programs Office

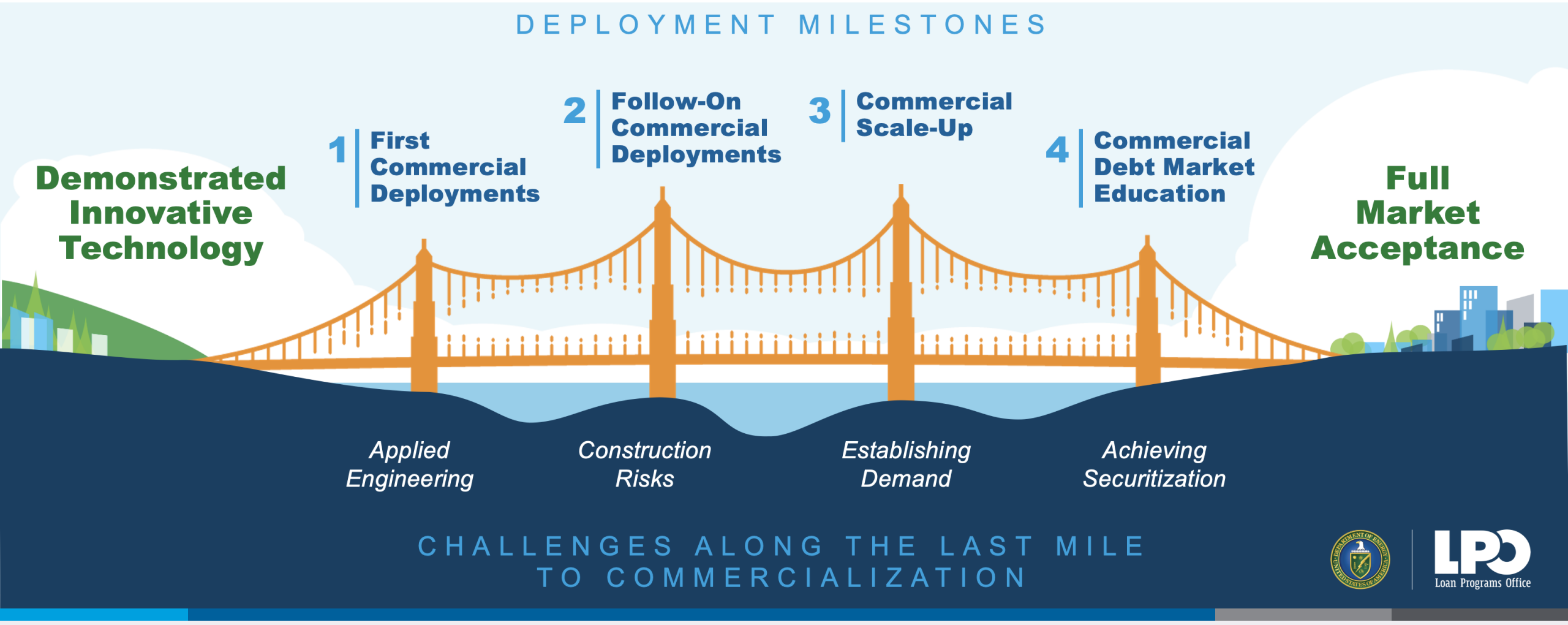
DOE & BOEM Atlantic Offshore Wind Transmission Stakeholder Workshop

Jonathan Abebe
Senior Advisor, LPO (Contractor)

March 2023

The Bridge to Bankability

Providing financing for technologies to go the last mile to reach full market acceptance



LPO Financing Programs

Project Types	Loan Program	Loan Types
Innovative Clean Energy	Title 17 (1703)	Loan Guarantees
State Energy Financing Institutions	Title 17 (1703)	Loan Guarantees
Energy Infrastructure Reinvestment	Title 17 (1706)	Loan Guarantees
Advanced Transportation	Title 17 & ATVM	Loan Guarantees (Deployment) Direct Loans (Manufacturing)
Tribal Energy	TELGP	Direct Loans & Partial Loan Guarantees
CO_2 Transportation Infrastructure	CIFIA	Direct Loans

Monthly Application Activity Report February 2023

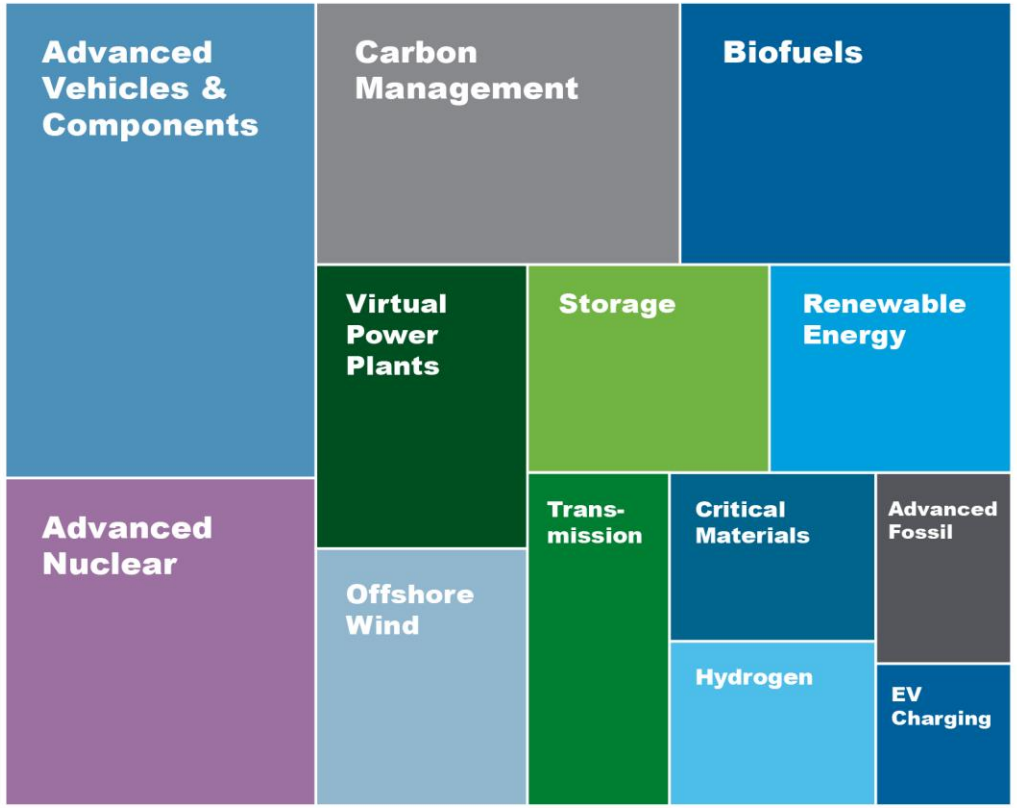
135 ACTIVE APPLICATIONS [1]

$124.1 BILLION IN LOANS REQUESTED [2]

1.6 NEW APPLICATIONS PER WEEK [3]

$124.1 BILLION

CURRENT AMOUNT OF LOANS REQUESTED BROKEN DOWN BY PROJECT TECHNOLOGY SECTOR



Notes

All data updated through February 28, 2023. For more details and a list of technology areas of interest within each LPO tech sector, see: Energy.gov/LPO/MAAR

1) Active applications include applications that have been submitted by the project sponsor(s) through LPO's online application portal and are in different stages of active review and engagement by LPO and the applicant.
2) Individual requested loan amounts are estimated and potential, subject to change, and not necessarily representative of final financing terms. **Requested loan amounts in current active applications *do not* affect available LPO loan authority.** Figure rounded down to the nearest $0.1 billion.
3) Current rolling average of new active applications per week over the previous 24 weeks. Figure rounded down to the nearest 0.1 application per week.

Potential OSW Supply Chain Projects

Under Title 17 Clean Energy Loan Guarantee Program

- Manufacturing of turbines, monopiles, towers, nacelles, blades, foundations, and subsea cables;
- Deployment of fixed-bottom and floating offshore wind farms; and
- Transmission upgrades, including HVDC deployment, required upgrades to the point of interconnection (POI) at land-based substations and transformer and conductor manufacturing.

Under Advanced Technology Vehicles Manufacturing Loan Program

- Manufacturing of maritime vessels and associated components as long as the project meets all other eligibility criteria under the ATVM program.

Loan Programs Office

Let's Talk About Your Project

Contact LPO to see what financing options may be available for your project

Call or write to schedule a no-fee, pre-application consultation: **202-287-5900** | **LPO@hq.doe.gov**

Learn more about LPO and all of its financing programs at: **Energy.gov/LPO**

Energy.gov/LPO

Jim Bennett

Senior Advisor, Bureau of Ocean Energy Management,
U.S. Department of the Interior

BOEM
Bureau of Ocean Energy Management

Outer Continental Shelf (OCS) Renewable Energy

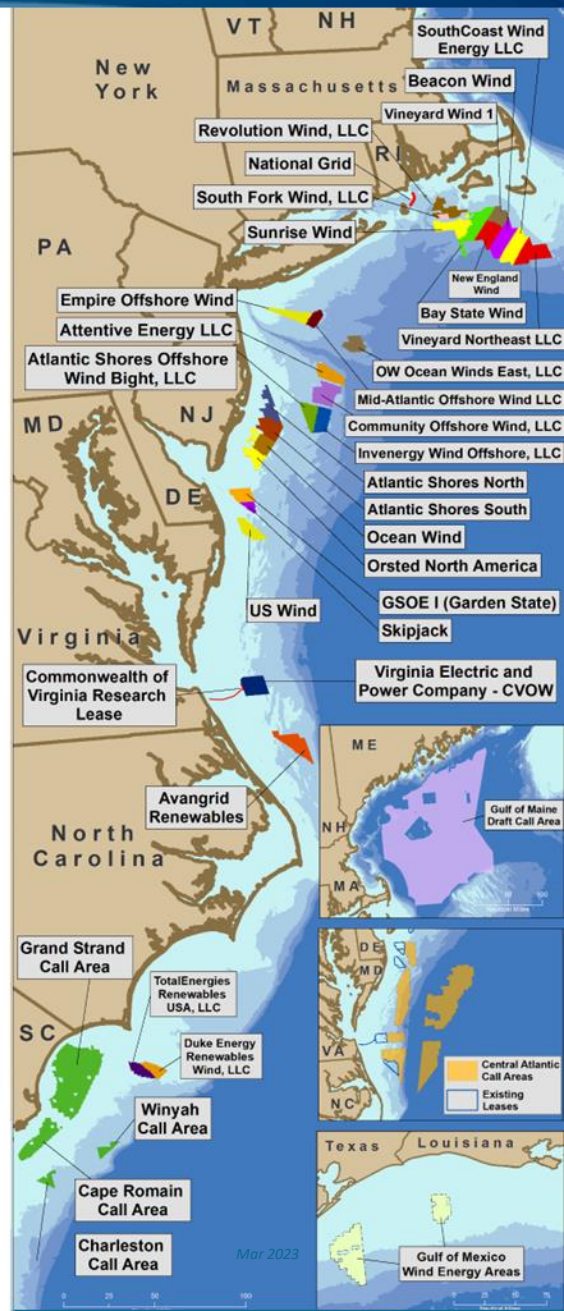
James Bennett
Bureau of Ocean Energy Management
Office of Renewable Energy Programs

Atlantic Offshore Wind Transmission Stakeholder Workshop

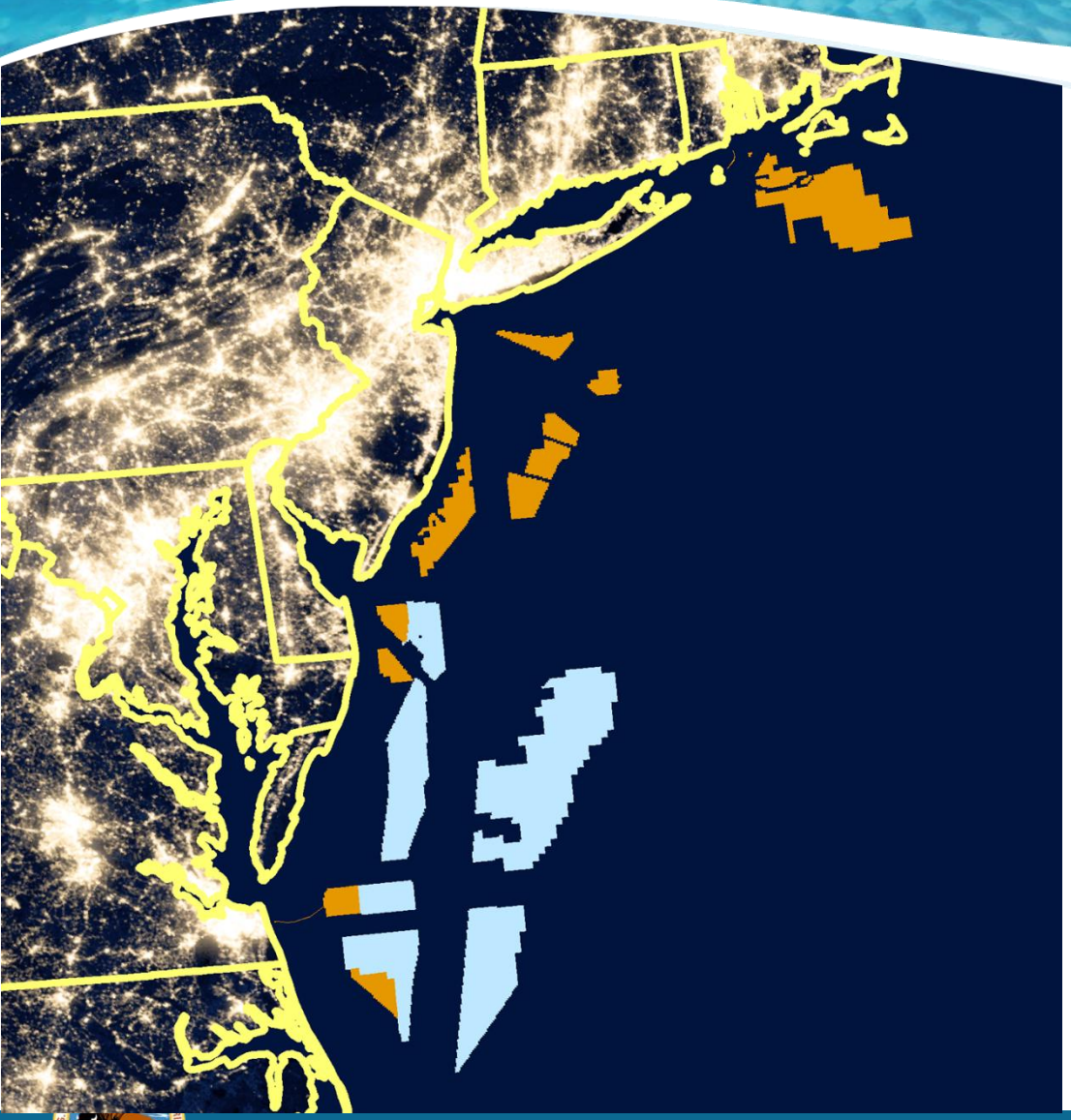
DOE/BOEM - Virtual - March 22, 2023

Renewable Energy Program by the Numbers

Competitive Lease Sales Completed:	11
Active Commercial Offshore Leases Issued:	27
Active Research Offshore Leases Issued:	2
Site Assessment Plans (SAPs) Approved:	15
General Activities Plans Approved:	1
Construction and Operations Plans (COPs):	
• Submitted to BOEM	18
• Approved Since 2021	2
• Under Review	10
• Other COPs Submitted	6
Leasing Under Consideration:	4



Atlantic OCS Renewable Energy: "Projects in the Pipeline"



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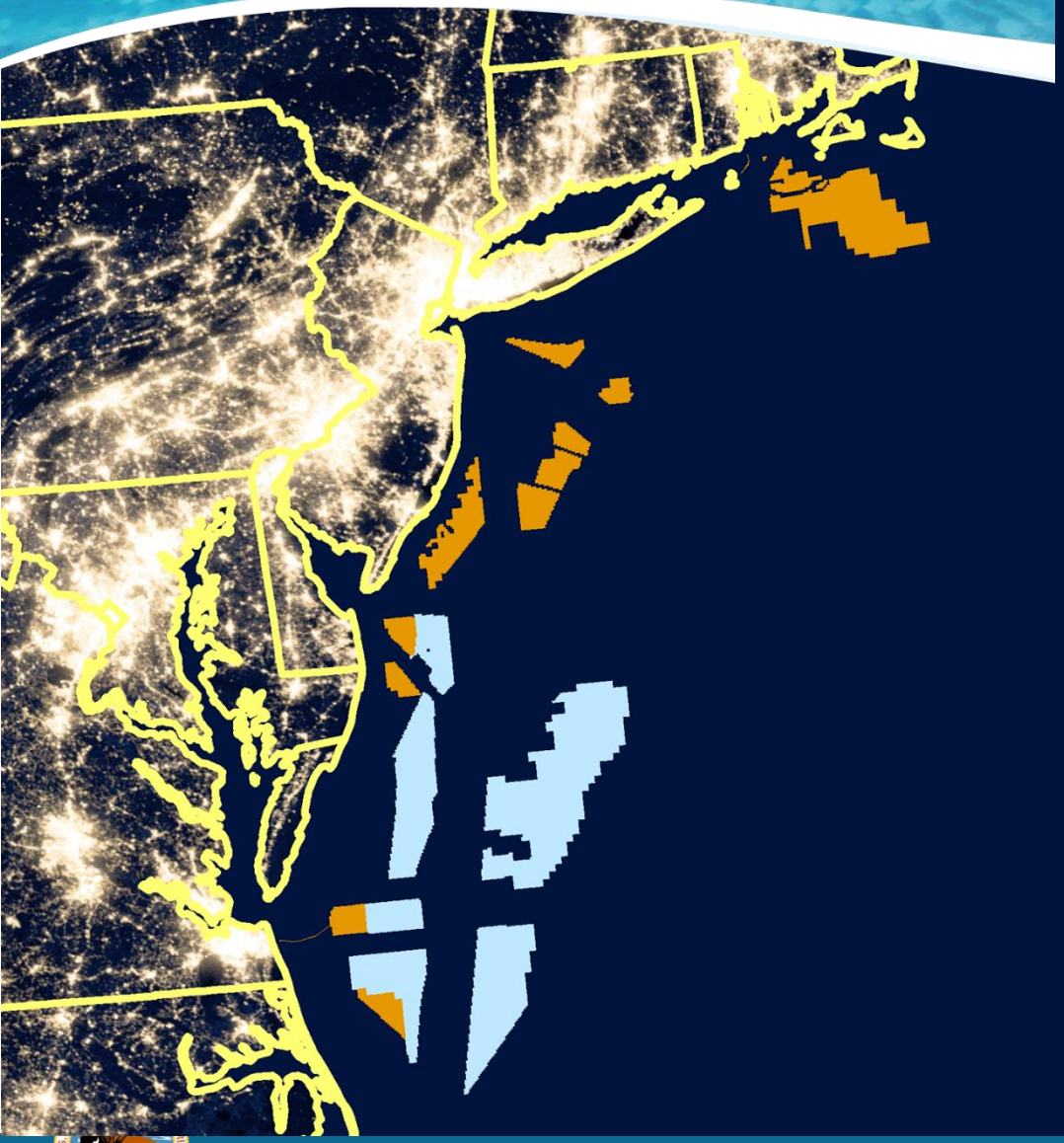
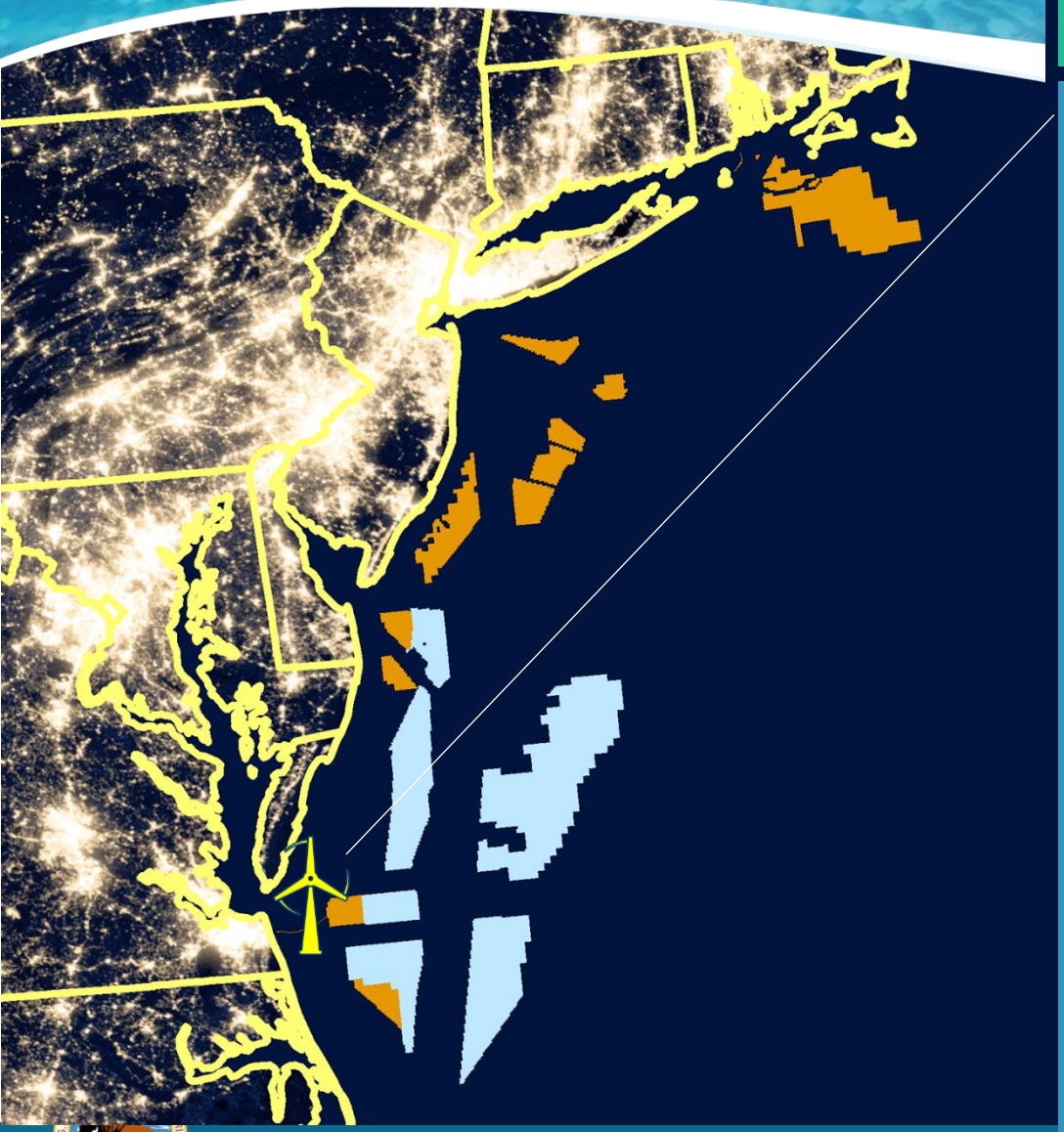


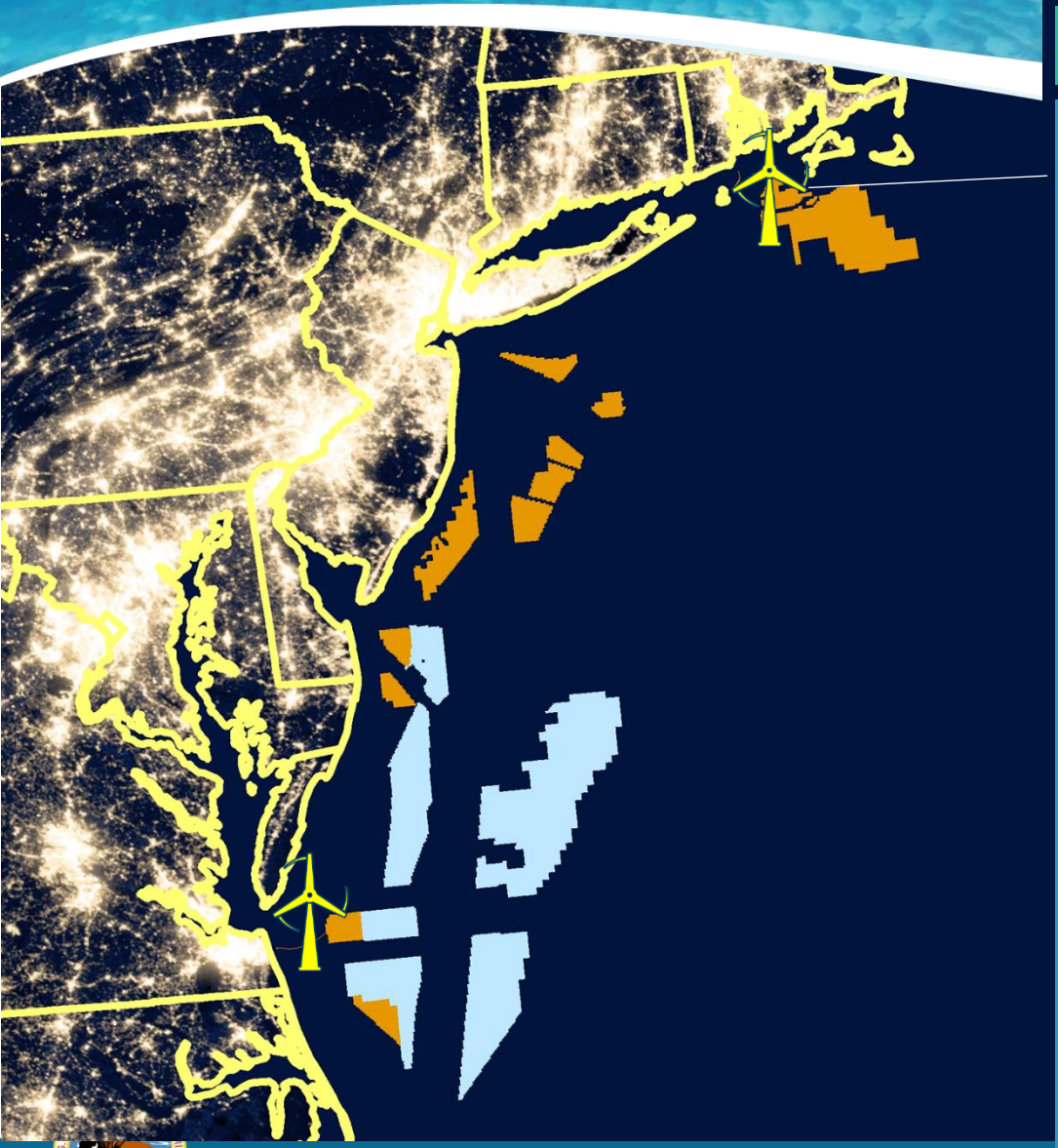
Project	Company
2020	
2030	

Atlantic OCS Renewable Energy: "Projects in the Pipeline"



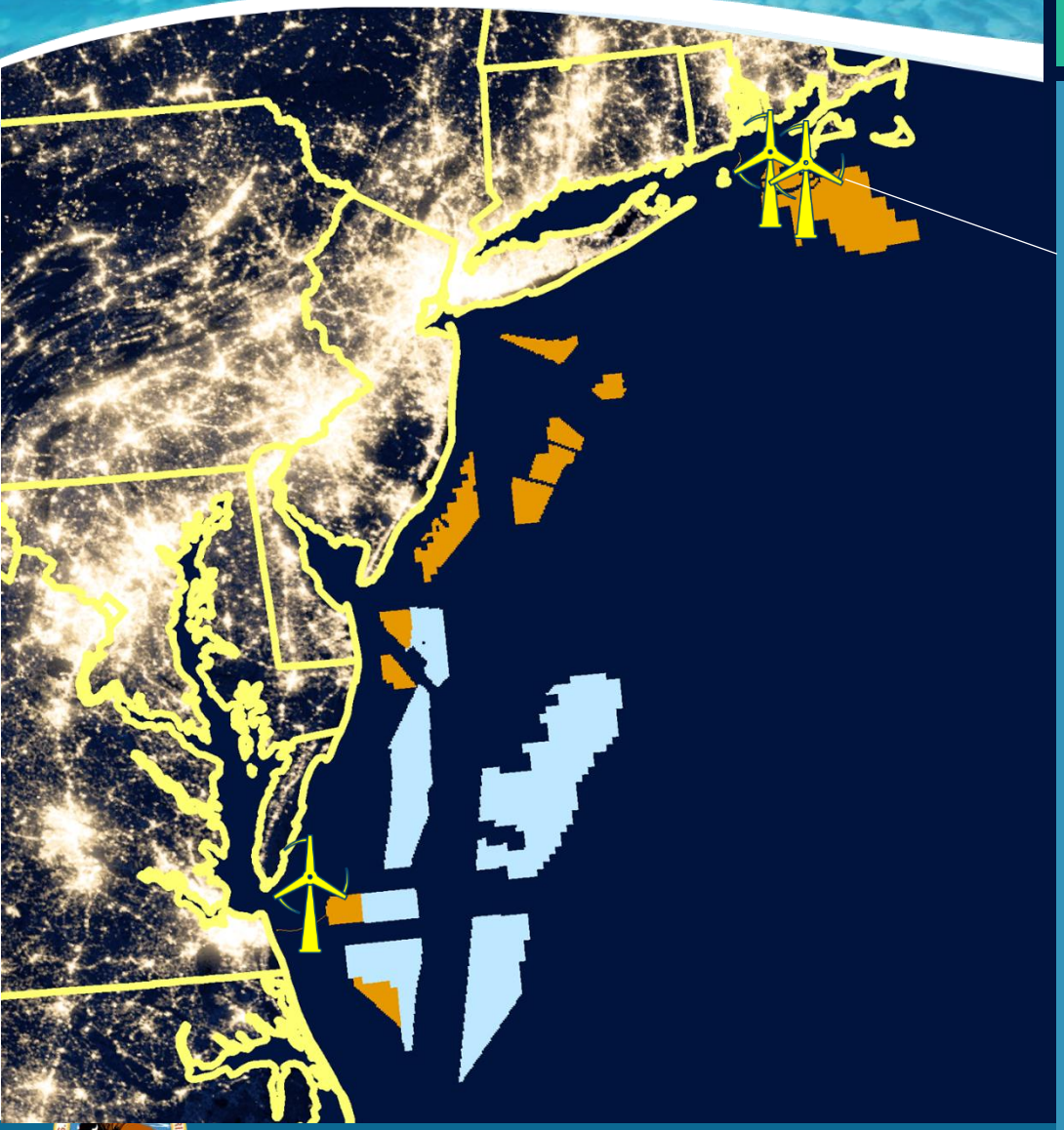
	Project	Company
2020	Coastal Virginia Offshore Wind Pilot	
2030		

Atlantic OCS Renewable Energy: "Projects in the Pipeline"



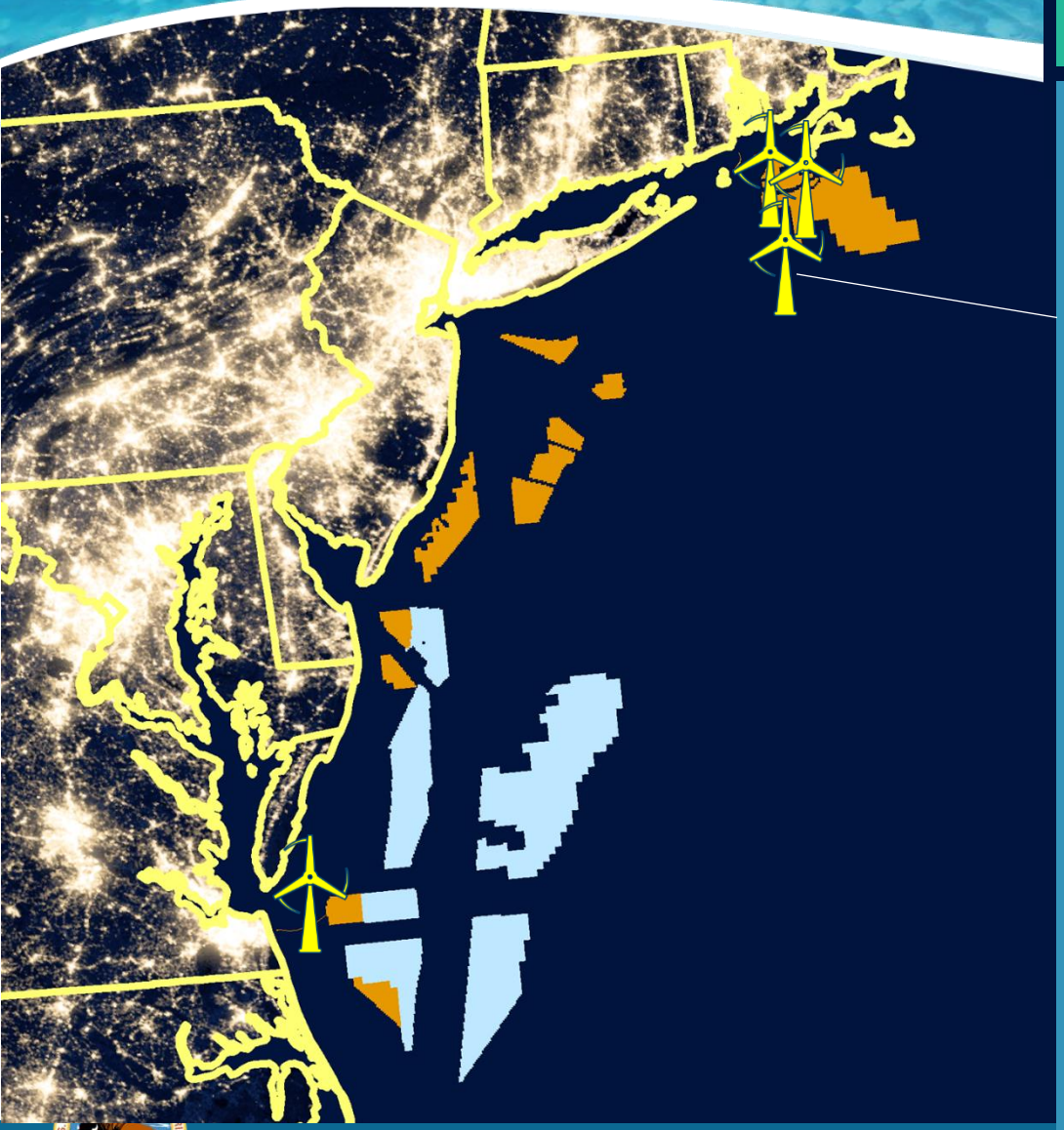
	Project	Company
2020	Coastal Virginia Offshore Wind Pilot	
	South Fork	DEEPWATERWIND
2030		

Atlantic OCS Renewable Energy: "Projects in the Pipeline"



	Project	Company
2020	Coastal Virginia Offshore Wind Pilot	
	South Fork	DEEPWATERWIND
	Vineyard Wind I	AVANGRID
2030		

Atlantic OCS Renewable Energy: "Projects in the Pipeline"



	Project	Company
2020	Coastal Virginia Offshore Wind Pilot	
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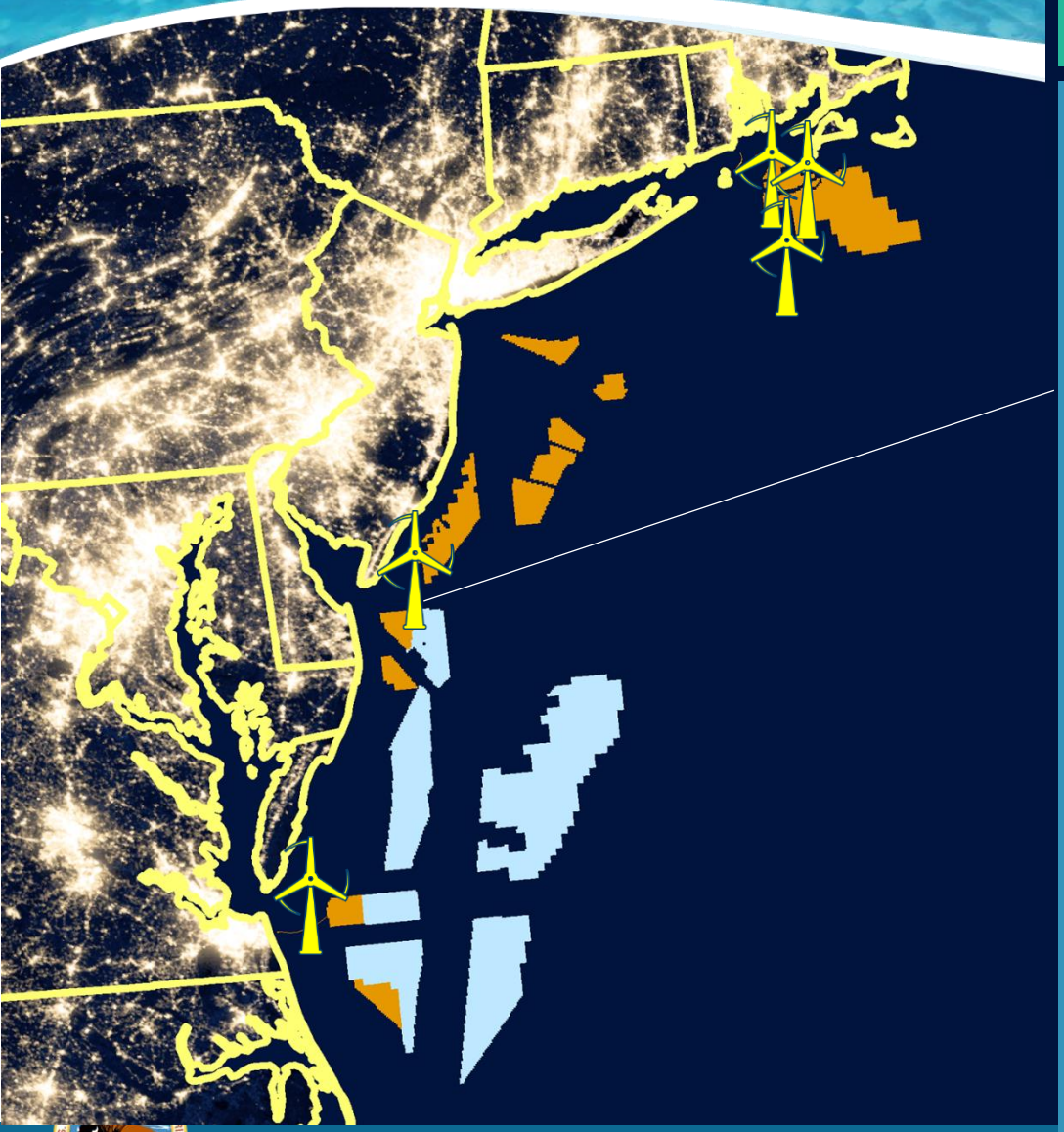
	Vineyard Wind I	AVANGRID
	Revolution Wind	DEEPWATER WIND
2030		

Atlantic OCS Renewable Energy: "Projects in the Pipeline"



	Project	Company
2020	Coastal Virginia Offshore Wind Pilot	
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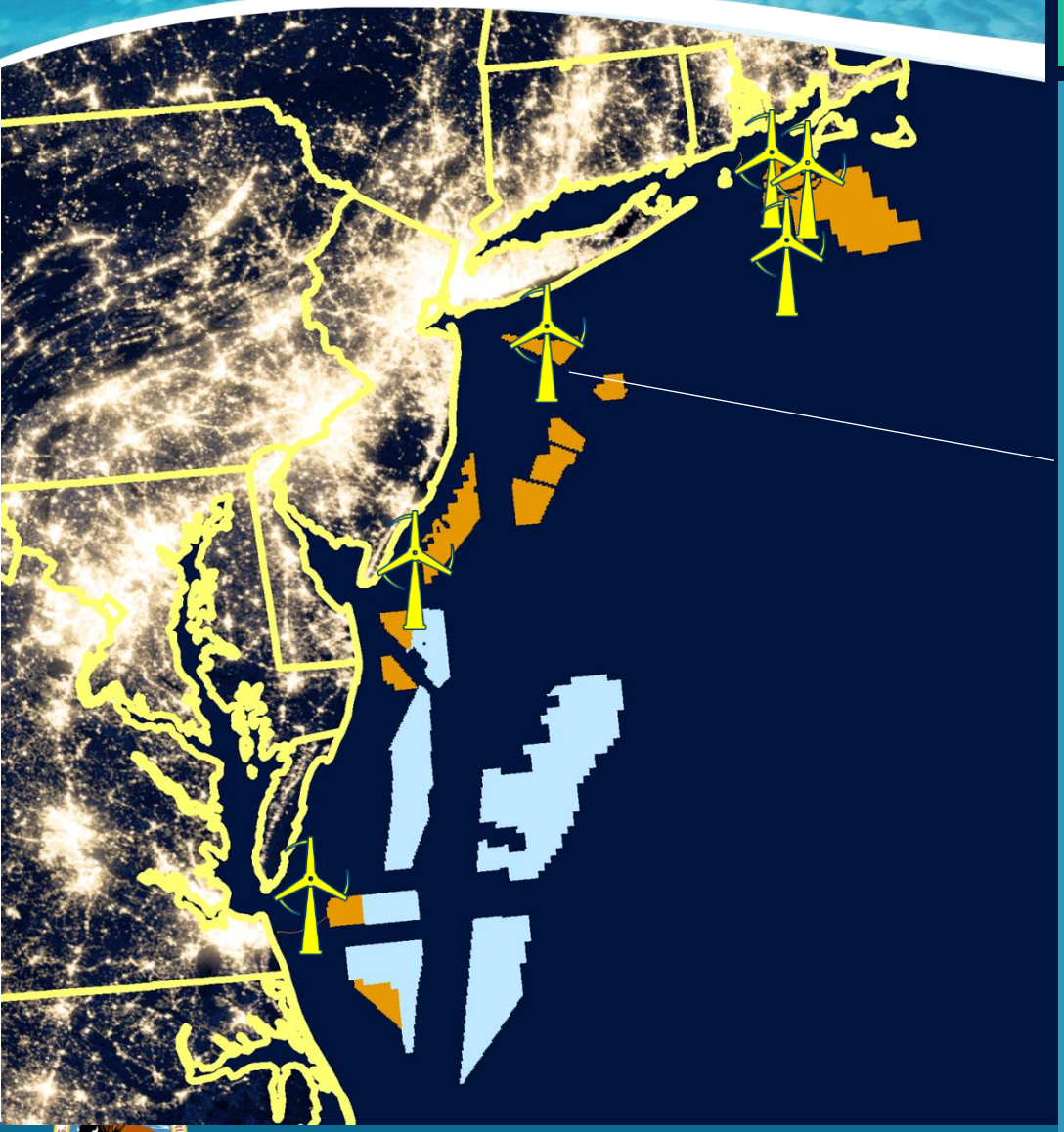
	Vineyard Wind I	AVANGRID
	Revolution Wind	DEEPWATERWIND
	Skipjack Windfarm	DEEPWATERWIND
2030		

Atlantic OCS Renewable Energy: "Projects in the Pipeline"



	Project	Company
2020	Coastal Virginia Offshore Wind Pilot	
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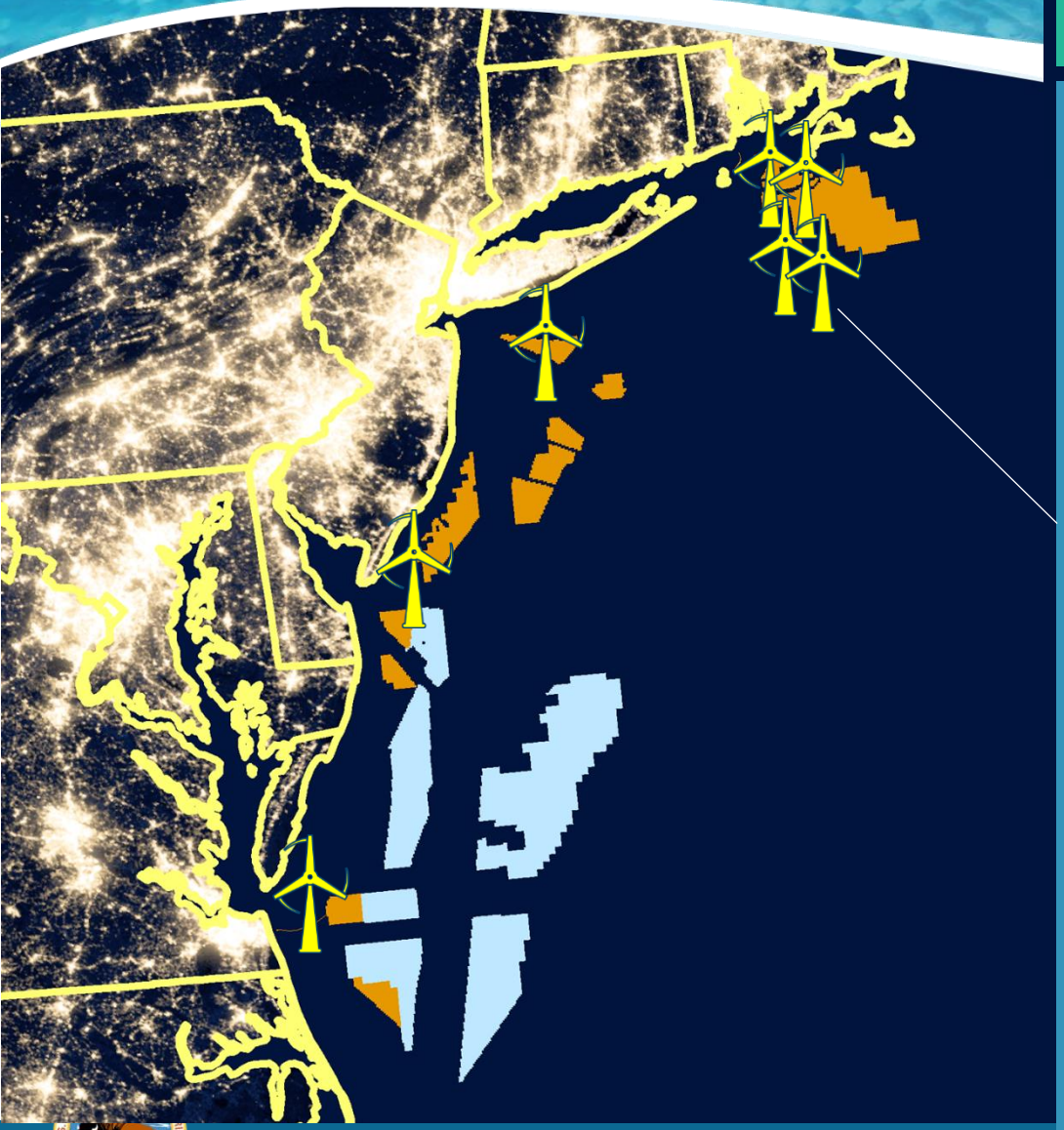
	Revolution Wind	DEEPWATER WIND
	Skipjack Windfarm	DEEPWATER WIND
	Empire Wind	equinor
2030		

Atlantic OCS Renewable Energy: "Projects in the Pipeline"



	Project	Company
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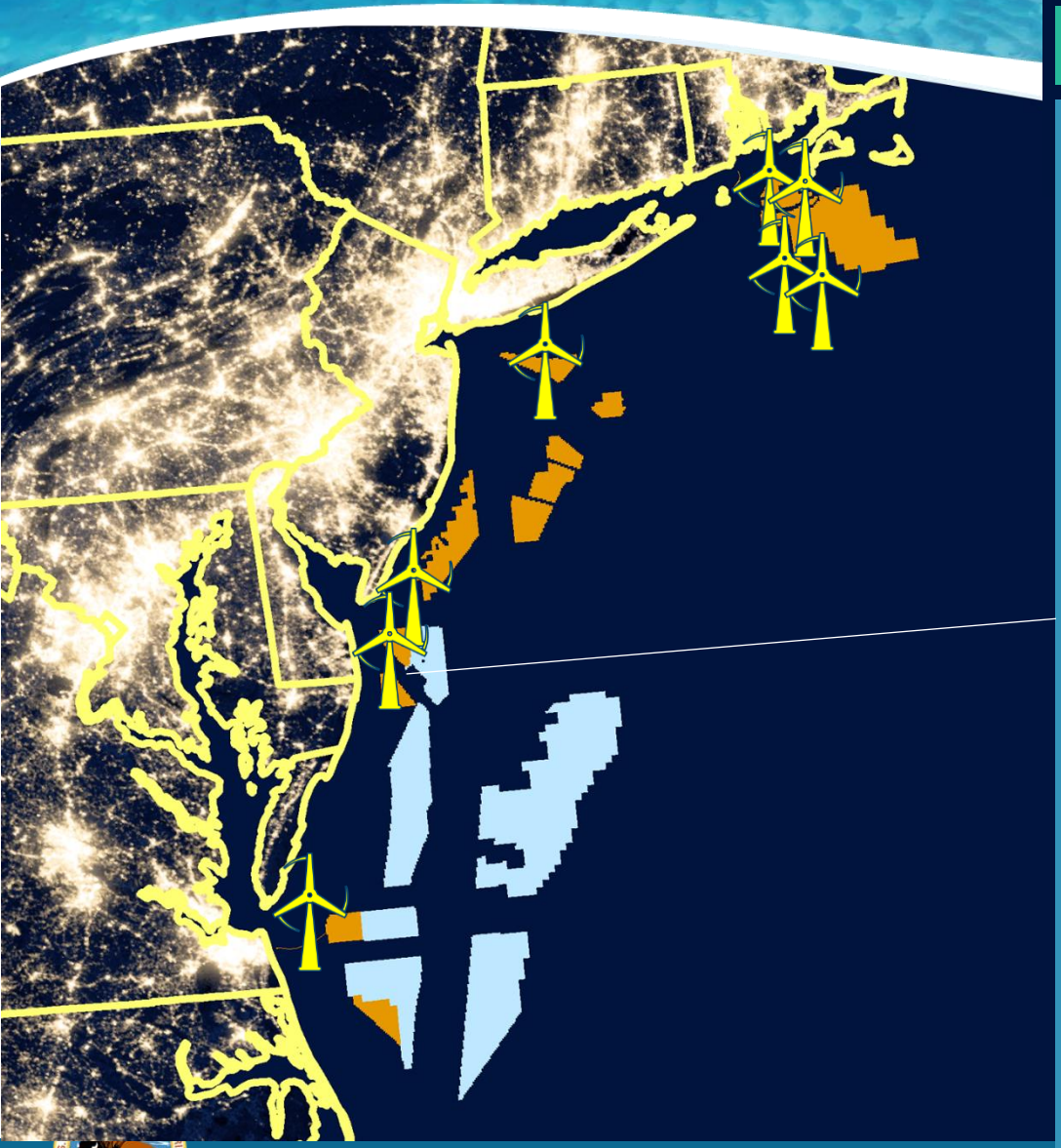
	Vineyard Wind I	AVANGRID
	Revolution Wind	DEEPWATER WIND
	Skipjack Windfarm	DEEPWATER WIND
	Empire Wind	equinor
2030	Bay State Wind	Bay State Wind

Atlantic OCS Renewable Energy: "Projects in the Pipeline"



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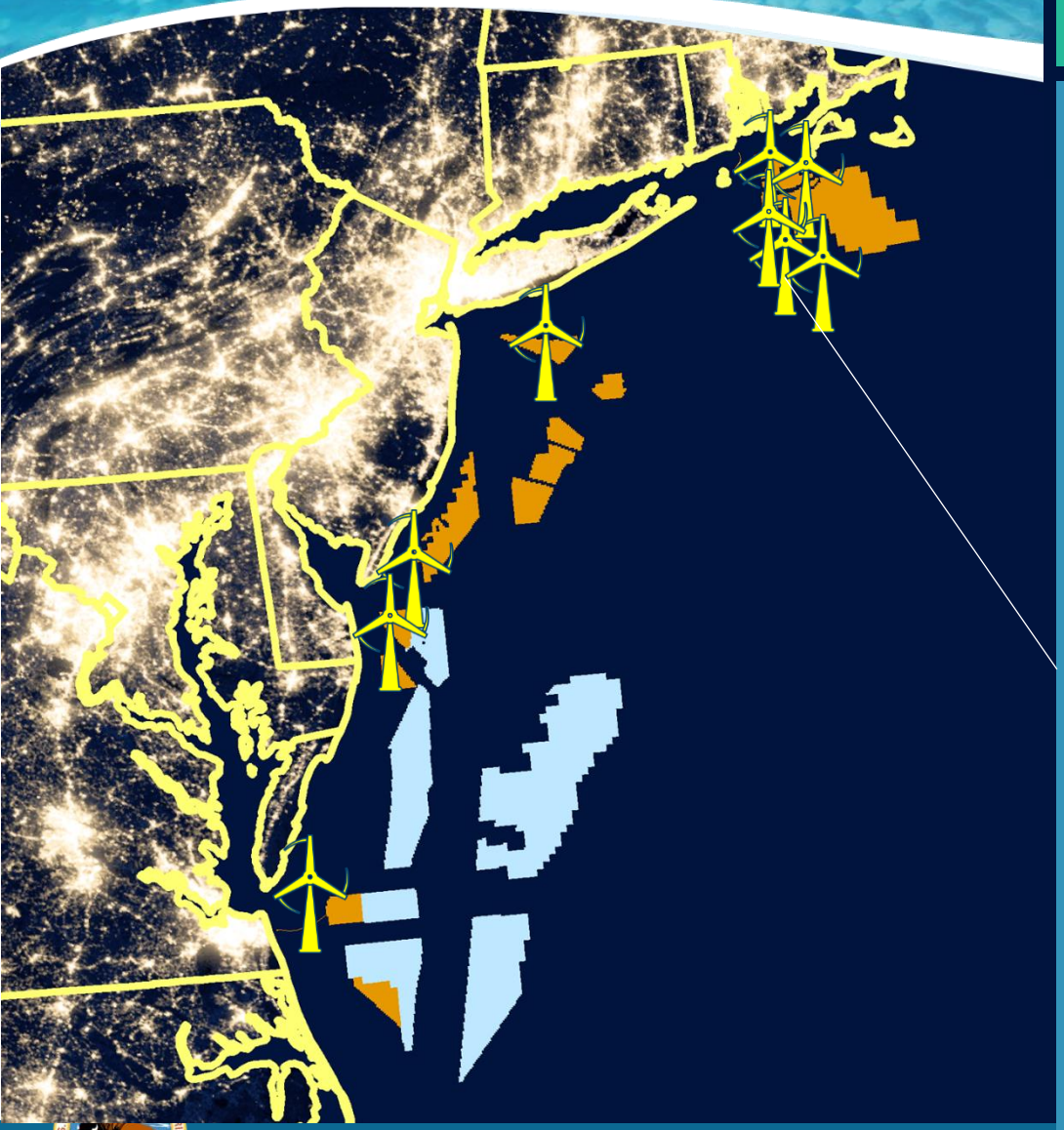
	Vineyard Wind I	AVANGRID
	Revolution Wind	DEEPWATER WIND
	Skipjack Windfarm	DEEPWATER WIND
	Empire Wind	equinor
	Bay State Wind	Bay State Wind
	U.S. Wind	US Wind
2030		

BOEM Bureau of Ocean Energy Management

Atlantic OCS Renewable Energy: "Projects in the Pipeline"



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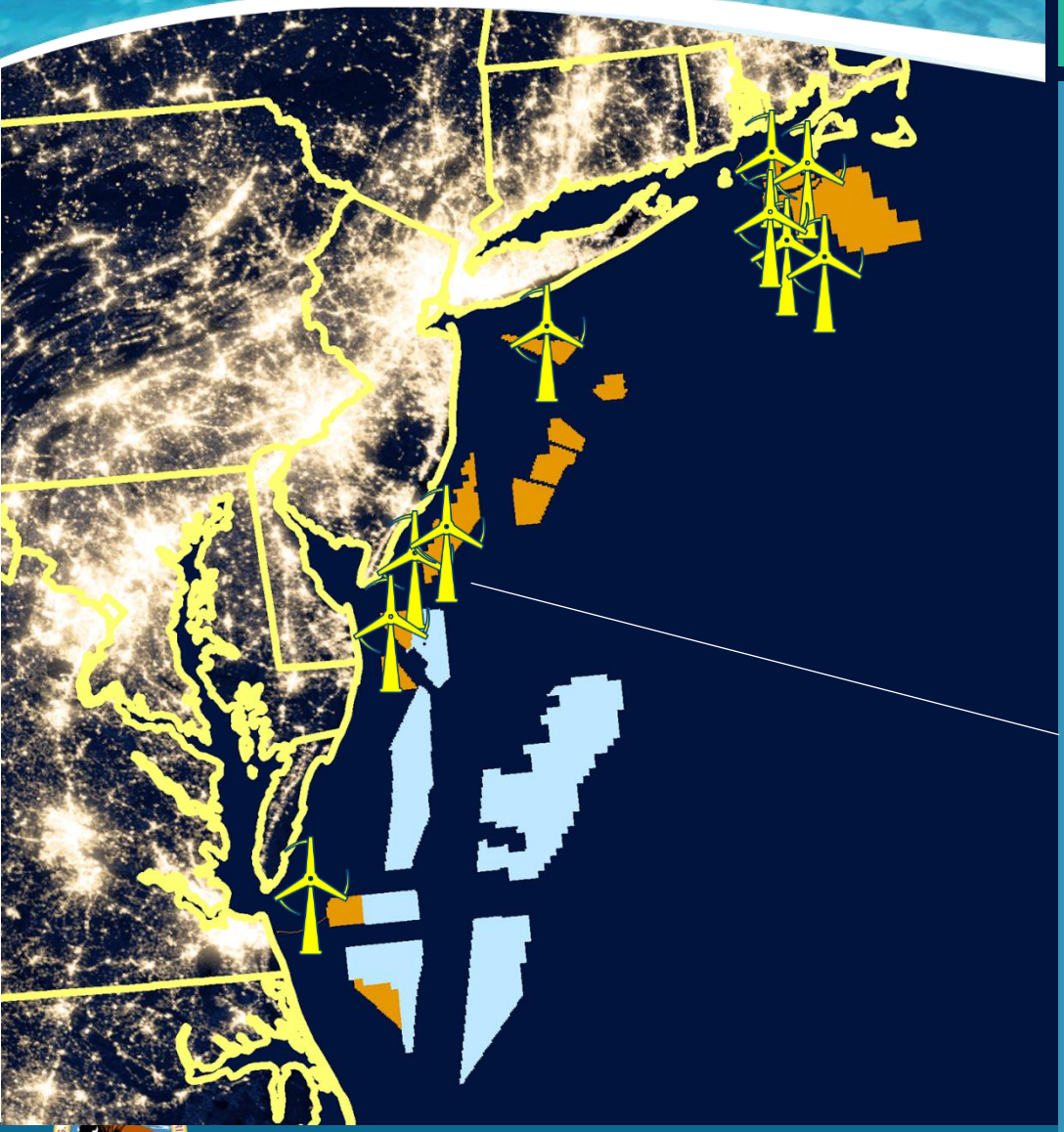
	Revolution Wind	DEEPWATER WIND
	Skipjack Windfarm	DEEPWATER WIND
	Empire Wind	equinor
	Bay State Wind	Bay State Wind
	U.S. Wind	US Wind
	Sunrise Wind	Ørsted EVERSOURCE
2030		

BOEM Bureau of Ocean Energy Management

Atlantic OCS Renewable Energy: "Projects in the Pipeline"



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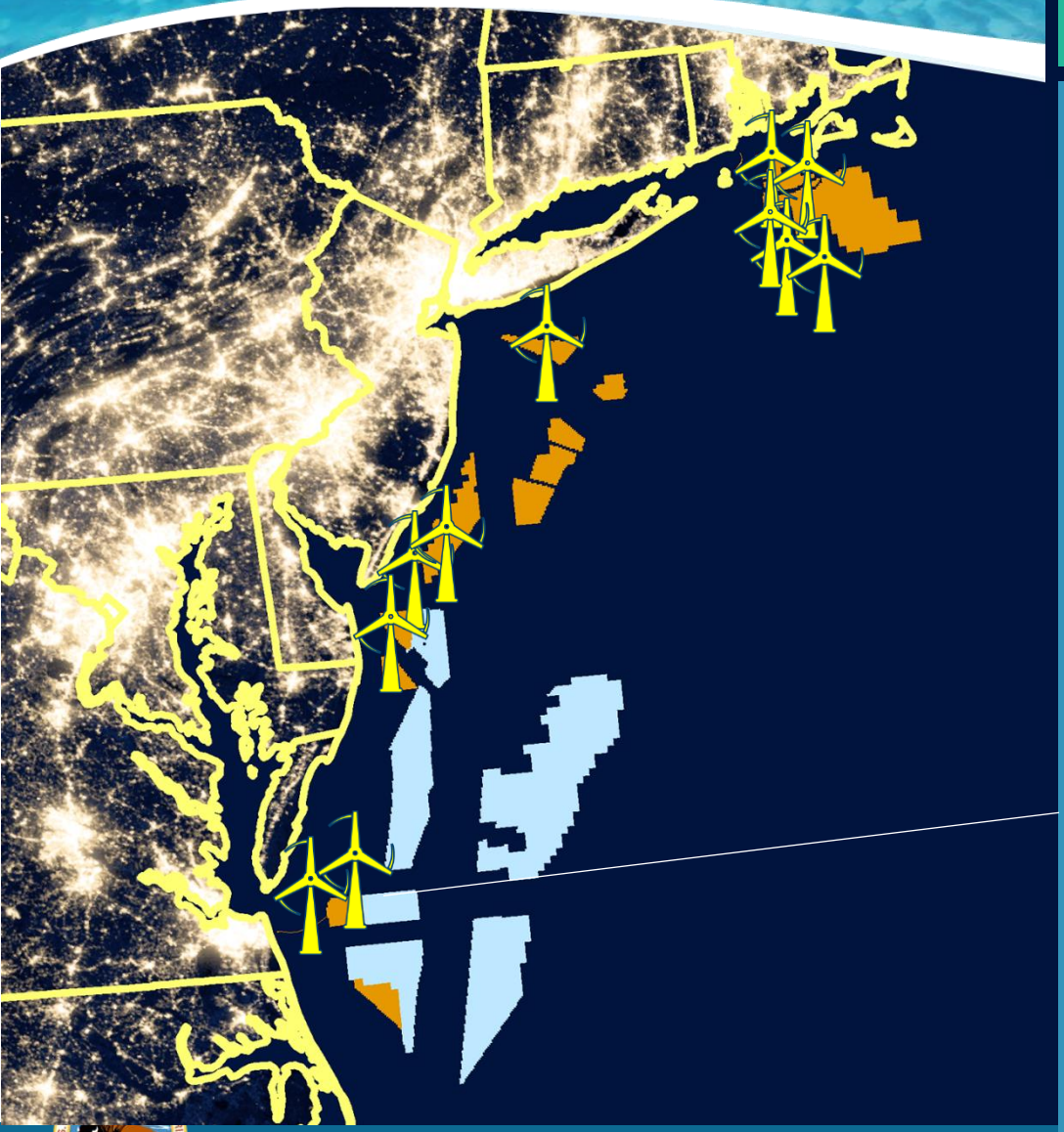
	Skipjack Windfarm	DEEPWATER WIND
	Empire Wind	equinor
	Bay State Wind	Bay State Wind
	U.S. Wind	US Wind
	Sunrise Wind	Ørsted EVERSOURCE
	Ocean Wind	Ørsted
2030		

Atlantic OCS Renewable Energy: "Projects in the Pipeline"



	Project	Company
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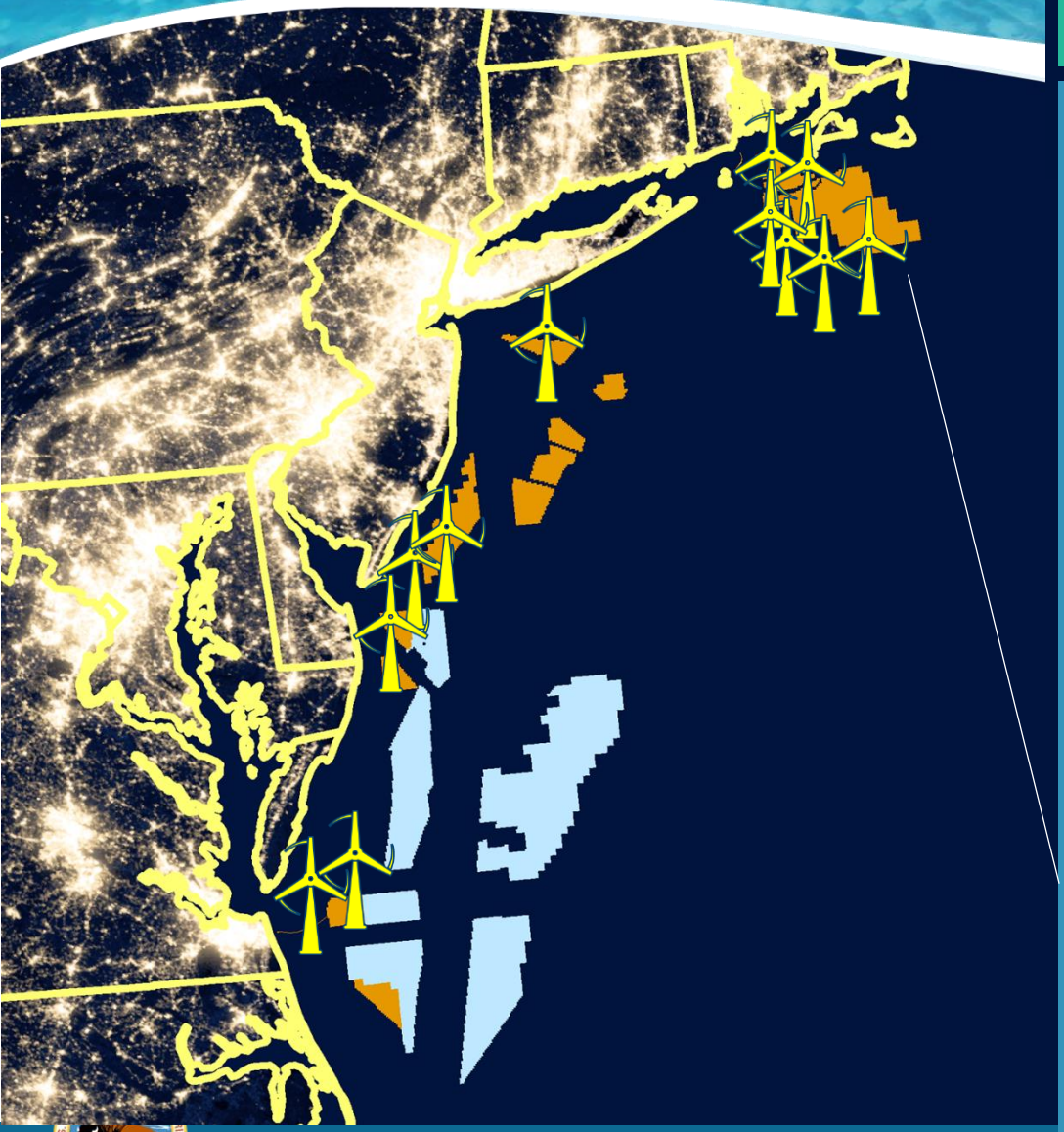
	Revolution Wind	DEEPWATER WIND
	Skipjack Windfarm	DEEPWATER WIND
	Empire Wind	equinor
	Bay State Wind	Bay State Wind
	U.S. Wind	US Wind
	Sunrise Wind	Ørsted EVERSOURCE
	Ocean Wind	Ørsted
	Coastal Virginia Offshore Wind Commercial	Dominion Energy
2030		

Atlantic OCS Renewable Energy: "Projects in the Pipeline"



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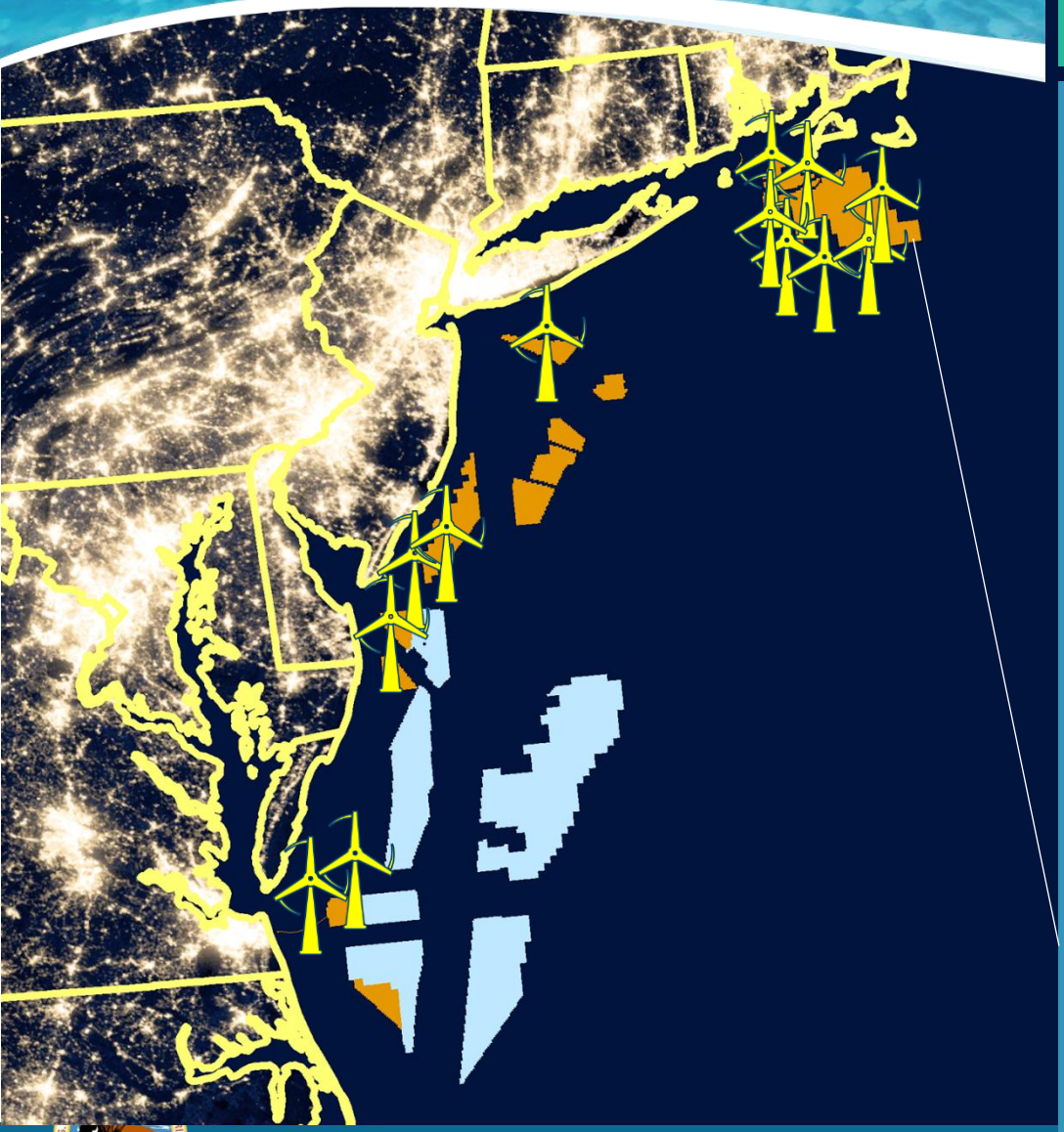
	Revolution Wind	DEEPWATER WIND
	Skipjack Windfarm	DEEPWATER WIND
	Empire Wind	equinor
	Bay State Wind	Bay State Wind
	U.S. Wind	US Wind
	Sunrise Wind	Ørsted EVERSOURCE
	Ocean Wind	Ørsted
	Coastal Virginia Offshore Wind Commercial	Dominion Energy
	New England Wind	AVANGRID
2030		

Atlantic OCS Renewable Energy: "Projects in the Pipeline"

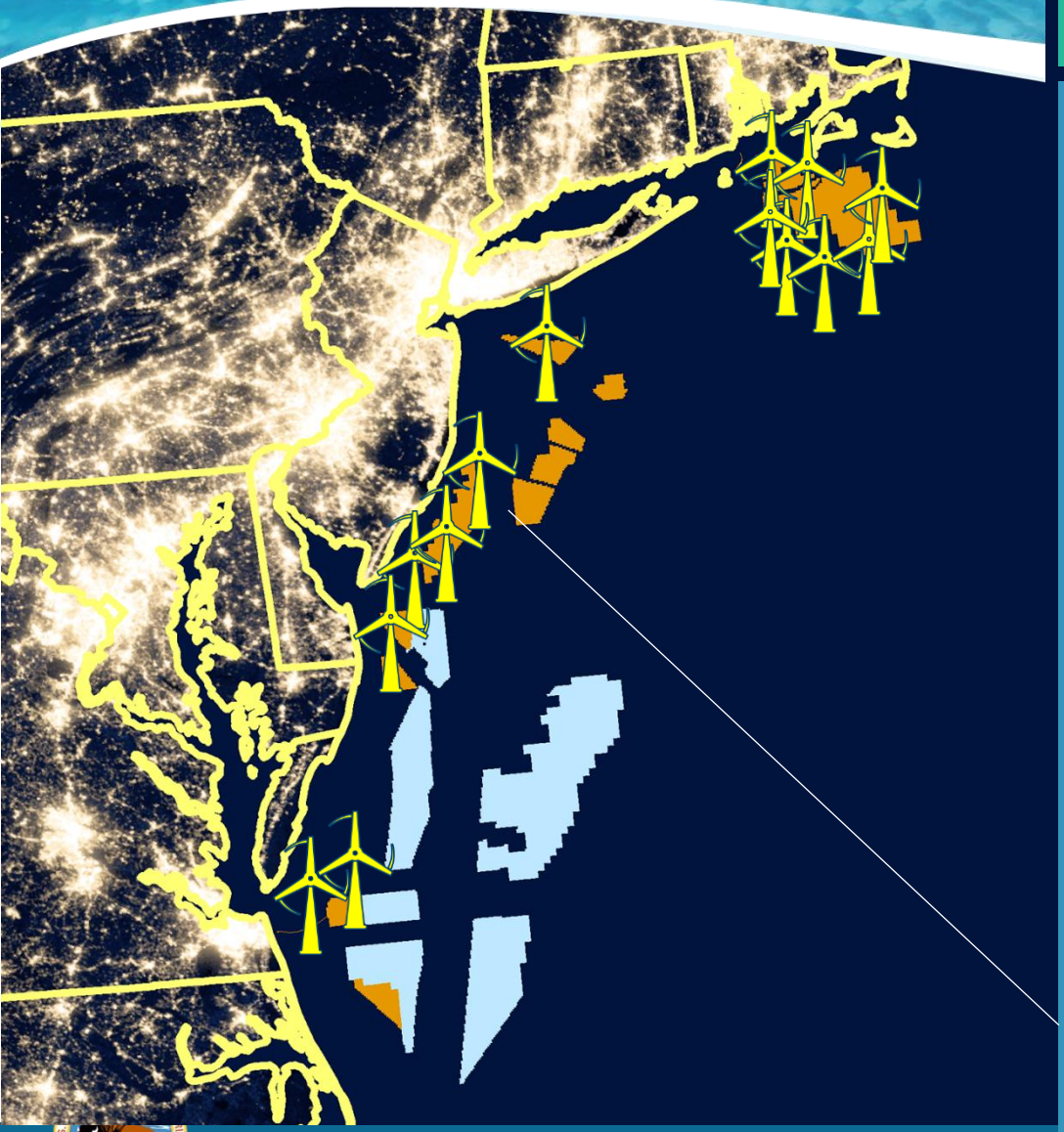


2020

2030

Project	Company
Coastal Virginia Offshore Wind Pilot	
South Fork	Deepwater Wind
Vineyard Wind I	Avangrid
Revolution Wind	Deepwater Wind
Skipjack Windfarm	Ørsted & Deepwater Wind
Empire Wind	equinor
Bay State Wind	Bay State Wind
U.S. Wind	US Wind
Sunrise Wind	Ørsted & Eversource
Ocean Wind	Ørsted
Coastal Virginia Offshore Wind Commercial	Dominion Energy
New England Wind	Avangrid
Mayflower Wind	Mayflower Wind

Atlantic OCS Renewable Energy: "Projects in the Pipeline"



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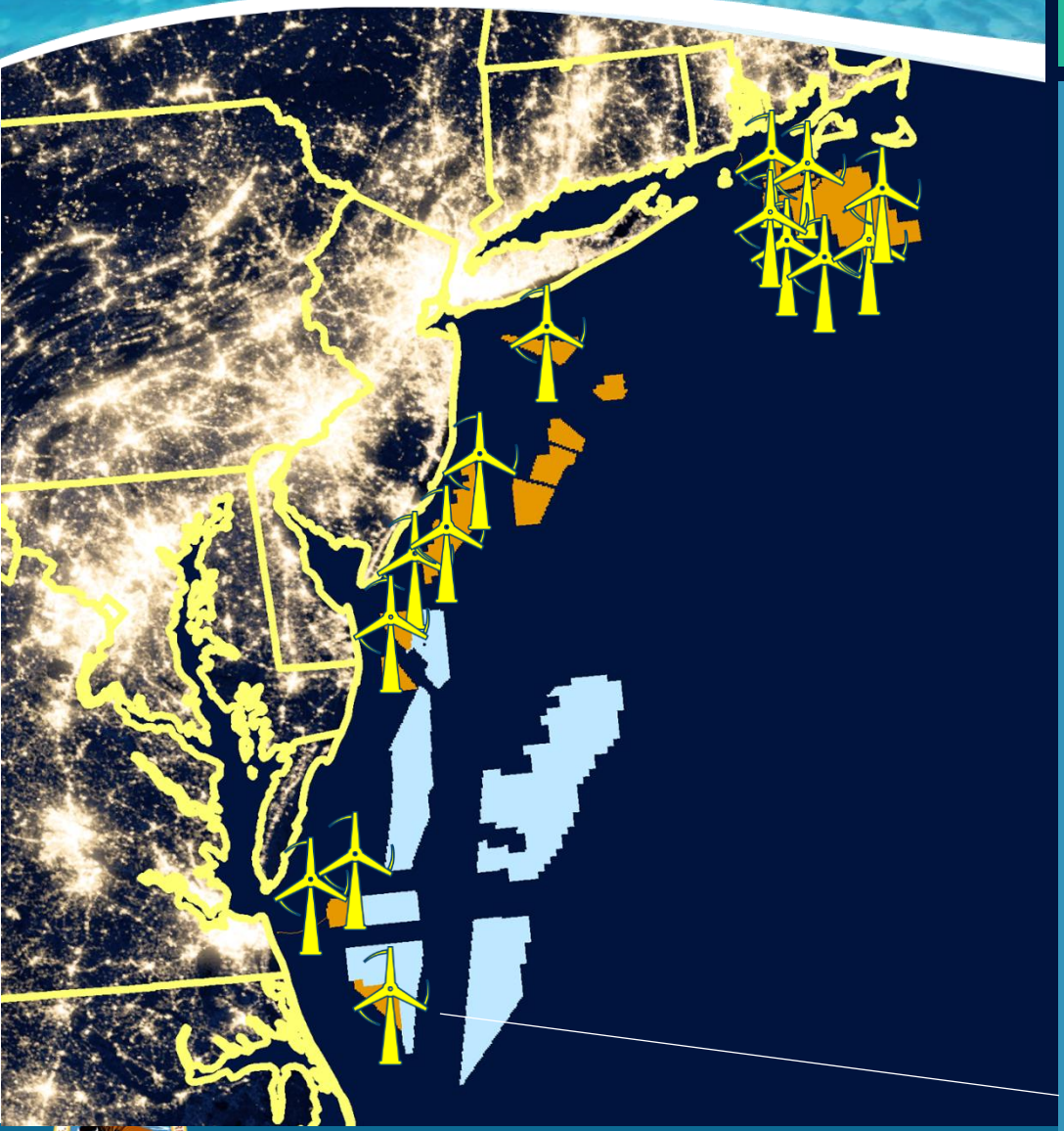
	Empire Wind	equinor
	Bay State Wind	Bay State Wind
	U.S. Wind	US Wind
	Sunrise Wind	Ørsted EVERSOURCE
	Ocean Wind	Ørsted
	Coastal Virginia Offshore Wind Commercial	Dominion Energy
	New England Wind	AVANGRID
	Mayflower Wind	MAYFLOWER WIND
	Atlantic Shores	ATLANTIC SHORES offshore wind
2030		

Atlantic OCS Renewable Energy: "Projects in the Pipeline"



2020

2030

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Empire Wind	equinor
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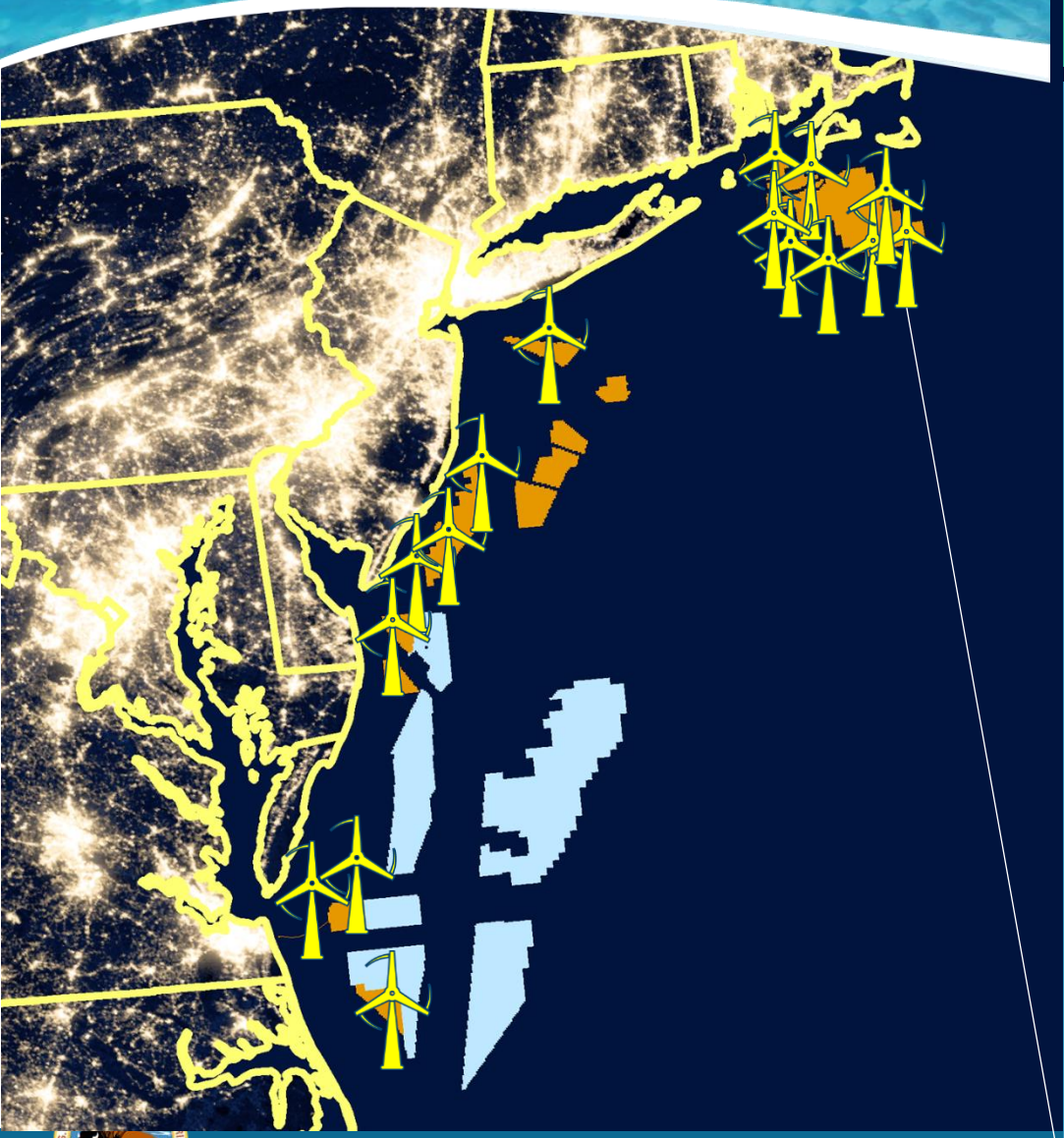
U.S. Wind	US Wind
Sunrise Wind	Ørsted EVERSOURCE
Ocean Wind	Ørsted
Coastal Virginia Offshore Wind Commercial	Dominion Energy
New England Wind	AVANGRID
Mayflower Wind	MAYFLOWER WIND
Atlantic Shores	ATLANTIC SHORES offshore wind
Kitty Hawk	AVANGRID

Atlantic OCS Renewable Energy: "Projects in the Pipeline"



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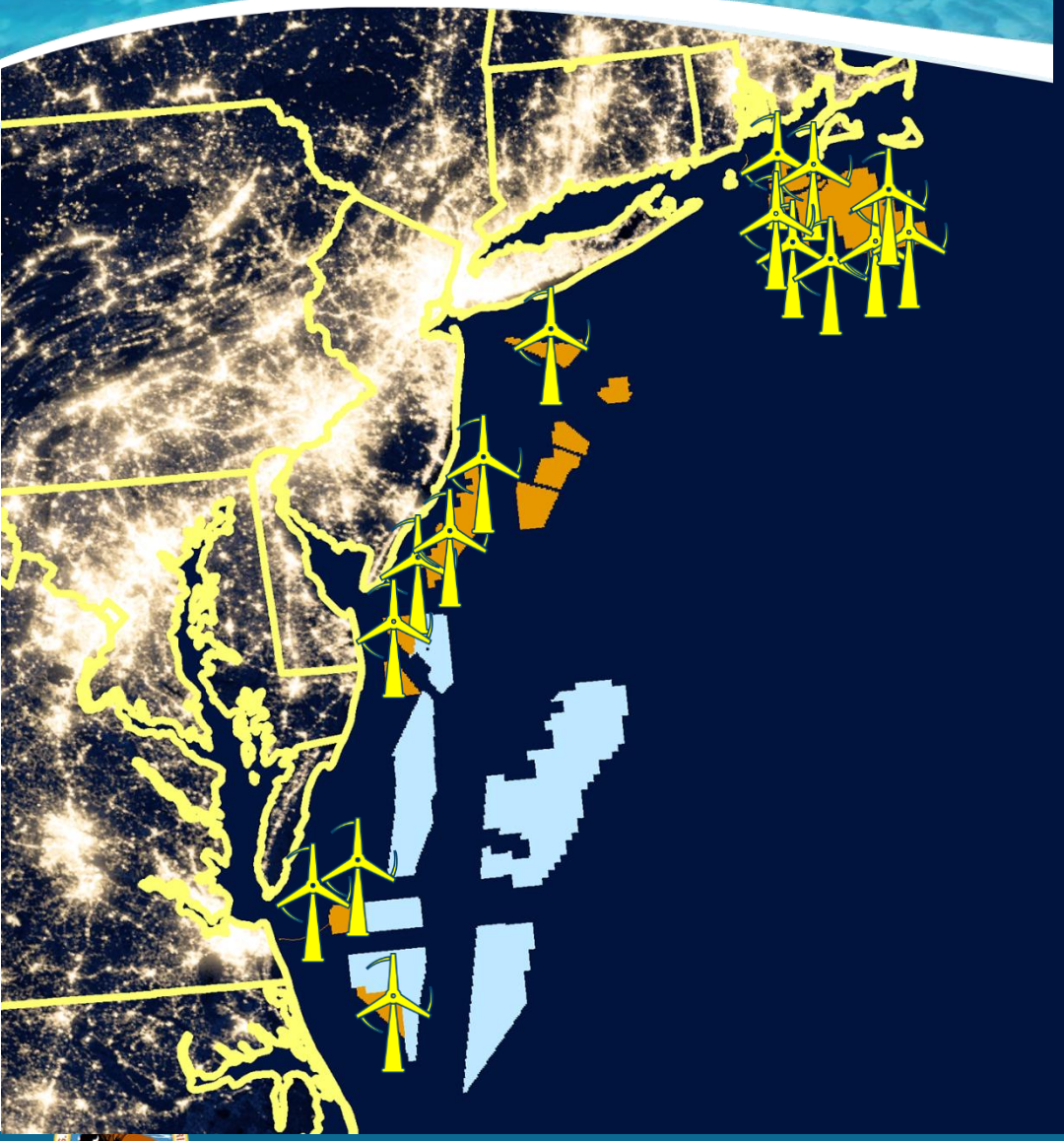
	Bay State Wind	Bay State Wind
	U.S. Wind	US Wind
	Sunrise Wind	Ørsted EVERSOURCE
	Ocean Wind	Ørsted
	Coastal Virginia Offshore Wind Commercial	Dominion Energy
	New England Wind	AVANGRID
	Mayflower Wind	MAYFLOWER WIND
	Atlantic Shores	ATLANTIC SHORES offshore wind
	Kitty Hawk	AVANGRID
2030	OCS-A 0522	VINEYARD WIND

Atlantic OCS Renewable Energy: "Projects in the Pipeline"



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	Skipjack Windfarm	Deepwater Wind
	Empire Wind	equinor
	Bay State Wind	Bay State Wind
	U.S. Wind	US Wind
	Sunrise Wind	Ørsted / Eversource
	Ocean Wind	Ørsted
	Coastal Virginia Offshore Wind Commercial	Dominion Energy
	New England Wind	Avangrid
	Mayflower Wind	Mayflower Wind
	Atlantic Shores	Atlantic Shores offshore wind
	Kitty Hawk	Avangrid
2030	OCS-A 0522	Vineyard Wind

U.S. Offshore Renewable Energy Leasing: “On the Horizon”

Transmission Recommendations

- **Options for transmission infrastructure siting**
  - Preferred Routes
  - Request(s) for Competitive Interest
- **Intergovernmental Partnerships**
  - Transmission Task Force
  - Federal-Tribal Nations-State group
- **Regulatory Guidance**
  - Process & Timing for more complex shared transmission scenarios

Modernization Rule

- **Published January 30, 2023**
  - Comment window closes March 31
- **Seeking Comments on future regulatory changes to better accommodate regional & shared transmission infrastructure**
- **Bidding credits for shared transmission solutions**

Maria Robinson

Director, Grid Deployment Office

U.S. Department of Energy

DOE's Grid Deployment Office

Mission Statement: The Grid Deployment Office (GDO) works to provide electricity to everyone, everywhere by maintaining and investing in critical generation facilities to ensure resource adequacy and improving and expanding transmission and distribution systems to ensure all communities have access to reliable, affordable electricity.

Power Generation Assistance Division	The Power Generation Assistance Division works with existing generation facilities to ensure resilience and reliability.
Transmission Division	The Transmission Division supports innovative efforts in transmission reliability and clean energy analysis and programs, and energy infrastructure and risk analysis in support of the Administration's priorities to enhance grid resilience.
Grid Modernization Division	The Grid Modernization Division oversees activities that prevent outages and enhance the resilience of the electric grid.

GDO GRID DEPLOYMENT OFFICE

Elizabeth Klein

Director, Bureau of Ocean Energy Management

U.S. Department of the Interior

Thank You!

www.energy.gov/gdo/offshore-wind-transmission-federal-planning-support

OSWTransmission@hq.doe.gov

U.S. DEPARTMENT OF ENERGY

U.S. DEPARTMENT OF THE INTERIOR

BOEM Bureau of Ocean Energy Management

GDO GRID DEPLOYMENT OFFICE