Interregional Offshore Wind Project Study Proposal

PJM/ISO-NE/NYISO
Inter-Regional Planning Stakeholder Advisory Committee

Cullen Howe, NRDC
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On behalf of the Clean Energy Advocates

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Study Requests

1. **New York to New Jersey**
   - Based on proposed wind energy areas in New York Bight
   - Meet the needs of two active state public policy orders in NY and NJ
   - Consider value of additional transmission into NYC, Long Island, North NJ
   - Consider Biden 2035 goals

2. **Massachusetts-to-North Carolina interregional transmission network**
   - Aimed at accommodating state public policy goals
   - Include points of interconnection for currently-planned projects
   - Relative to costs of doing projects individually
   - Use sensible modular sequences of component portions of an interregional transmission network
   - Consider Biden 2050 goals

Overview

1. **Need for study examining cost and benefits of interregional transmission solutions** (Cullen Howe)

2. **Responses to questions posed by IPSAC** (Jay Caspary)

3. **Study parameters, assumptions and sensitivities** (David Littell)

Need for Interregional OSW Study
Why Now?

Atlantic Coast states' 2035 OSW planning targets

- Total anticipated offshore wind planning figure of 37.5 GW (see next slide)

March 2021 - Biden Admin. announcement on 2035 and 2050 OSW targets

- 30 GW of OSW by 2035, 100 GW of OSW by 2050
- Most of the initial 30 GW will be developed in Atlantic seaboard

June 2021 - Letter from East Coast governors to President Biden

- NY, NJ, MA, RI, NH, ME, CT, VA, MD
- "As multiple states share common Wind Energy Areas, and in some cases the same regional power system, transmission planning and development are best organized through regional, multi-state coordination."

Oct. 2021 - BOEM announcement

- Plan for up to 7 new offshore lease sales by 2025
- Includes NY Bight, Central Atlantic, Carolinas

Need for Interregional OSW Study
Why Now?

Atlantic Coast state OSW targets totaling 37.5 GW

- **Maine**: 11-MW demonstration project approved. Analysis to establish goal
- **New Hampshire**: Task force established
- **Massachusetts**: 1,604 MW procured and legislative mandate of 3,200 MW by 2035
- **Connecticut**: 804 MW procured and legislative mandate of 2,000 MW by 2030
- **Rhode Island**: Existing Block Island 30 MW, 400 MW approved, 600 MW solicitation
- **New York**: 4316 MW projects awarded, legislative mandate of 9,000 MW by 2035
- **New Jersey**: 1,100-MW project awarded and 2,658 MW awarded, exceeding legislative mandate of 3,500 MW by 2035 and increased by E.O. to 7,500 MW
- **Maryland**: Approved development of 368 MW, leg. mandate of 1,568 MW by 2030
- **Virginia**: 12 MW constructed, proposed 2,600 MW and leg. mandate of 5,200 MW by 2034
- **North Carolina**: Executive Order of 2.8 GW by 2030 and 8 GW by 2040

Need for Interregional OSW Study
Why Now?

[Oct. 2021 DOE Atlantic Offshore Wind Transmission Literature Review and Gaps Analysis]

DOE notes: "There is a lack of comprehensive evaluation across all the necessary aspects of transmission analysis to support offshore wind energy development at scale. Current reactive processes that evaluate individual offshore wind projects may not optimize benefits to support deployment of 30 GW by 2030 and beyond. ***As a result, comprehensive interregional studies of possible offshore wind transmission options are needed*.** Addressing critical gaps of aligning Atlantic Coast stakeholders over broader geographic regions, coordinating offshore wind generation with transmission development, conducting robust planning through broader connected technical analysis, developing standards, and including reliability and resilience implications will enhance decision-making for transmission infrastructure to support offshore wind energy development in the United States to reach 2030 and 2050 goals and beyond."
(p. 15)

Need for Interregional OSW Study
Why Now?

2020 National Grid UK Study

- Compared commencing OSW integration in 2025 with 2030
- **2025**: reduces overall costs by 18%, total assets by 70%, and landing points by 72% (by 2050)
- **2030**: reduces overall costs by 8%, total assets by 40%, and landing points by 38% (by 2050)

October 2021 PJM Phase 1 Study

- Includes 14 GW of announced OSW targets (MD, VA, NJ) as well as state RPS targets
- Estimated between $2.2 - $3.2 billion in onshore network upgrade costs through 2035
- PJM's feasibility and system impacts studies for current interconnection requests totaling 15.5 GW of OSW estimate **$6.4 billion** in total network upgrade costs in current queue-based GI study process
- $188/kW of renewables under proactive approach compared to $420/kW under current GI approach (Brattle)

Questions Posed by IPSAC

What is the objective of the study?

What are the needs (reliability, public policy or market efficiency) that are not currently being met?

- Reliability
- Market efficiency
- Public policy

What intra-area needs have been identified that could be addressed more efficiently by inter-area solutions than by intra-area solutions?

- PJM’s competitive solicitation for transmission for NJ offshore wind
- NYISO’s Long Island Offshore Wind Export Public Policy Need
- New York Bight ongoing lease sales
- Other state OSW targets

Questions Posed by IPSAC

What metrics are associated with the objective?

Lowest installation cost of combined onshore and offshore infrastructure?
Some other metric associated with generation production outcomes?

- Maximize net benefits to the power system, including reducing transmission and generation investment and maximizing production cost savings and reliability benefits (reduced need for RPM capacity)
- Base study metrics on developer proposals proposed in last decade, including offshore transmission proposal not studied (e.g. PJM)
- Lowest installation cost is a useful simplified metric, but may not acknowledge important benefits, such as market efficiency or reliability
- Engage OSW developers in process to develop assumptions, scenarios and metrics for study

Questions Posed by IPSAC

Inter-area solutions

Each region in IPSAC (NE, NY & PJM) may articulate offshore wind objective targets. The intra-area approach would pursue interconnecting each region's target wind amount to its own area. What would be the inter-area alternative? In one area (Region 1), interconnect more than that area's target offshore capacity to that area, and, interconnect less than another area's target to that other area (Region 2), and, build new transmission transfer capability to transfer the excess from Region 1 to Region 2? Are there any other conceived inter-area solutions?

- Beyond connecting Region 1 to Region 2, a truly inter-area solution would connect multiple regions to each other in a network, or several separate inter-area connections
  - This would facilitate efficiently meeting regions' offshore wind targets by allowing for the best wind resource to be most utilized, as mentioned above, where excess capacity could be interconnected in one region and less than others. Notably wind speeds may vary temporally including weather-driven, diurnal and seasonal variations.
  - Inter-area transmission could facilitate additional transfer capability that could have market efficiency or reliability benefits, even if interconnecting each region's target wind amount to its own area

Questions Posed by IPSAC

Offshore connections: Is there a request to evaluate connecting offshore points together – what would be the objective of doing this?

Assuming that most radial lines connecting offshore collection stations to onshore interconnection points are 800 – 1,200 MW cable connections – what is the objective of connecting offshore collection stations together?
Would each radial connection to shore (and the associated onshore network upgrades) be upgraded ("doubled-up") to be able to carry extra flow provided by the offshore station connections? Is there any other benefit envisaged by offshore grid connections?

- Reduces lost generation associated with outages of radial connections, can use geographic diversity to reduce size and increase utilization factor of shore ties. With two shore ties, can carry network flows.
- Each or a subset of radial lines would be upgraded to be able to carry extra flow provided by offshore station connections in order to fully realize market efficiency and reliability benefits of energy transfer among OSW farms and between regions
- Upsizing the radial lines may also have facility cost benefits, as expensive line construction may be able to be avoided in the future as the offshore system grows (cost of cable-laying makes it important to future-proof as much as possible)
- Connecting offshore stations together may also have a similar cost efficiency effect as offshore system grows

Study Parameters and Assumptions

Work with proposals that have been put forward

- NY and NJ offshore wind transmission proceedings
- State offshore wind targets
- State greenhouse gas emission reduction and renewable energy targets
- Consider efficiency, offshore wind, solar, onshore wind to need targets
- Use proposals already put forward grounds the starting point in terms of realities of what developers are actually proposing, designing, able and willing to build
    - Baseline scenario to compare others to: buildout of current offshore wind with current generator interconnections

Study Parameters and Assumptions

Use future scenarios for the study including baseline case

- High electrification, low carbon scenario, similar to [MISO's Future 3]
- Use scenarios meeting state OSW, GHG and RE goals and Biden OSW goals
  - Separately consider state OSW, GHG and RE goals from Biden Admin if markedly different scenarios outcomes for OSW, GHG and RE buildouts
- Baseline against a scenario building out OSW based on radial generator (below) interconnections (status quo) used for procurements to date
  - Design baseline to meet current state OSW, GHG and RE goals,
  - Cost both offshore interconnections and onshore transmission upgrades to move electricity between onshore points within and between regions
  - Likely to require some production modeling to 2035 and then transmission modeling

Study Parameters and Assumptions

Build for modularity and future-proofing

- Size system buildout and upgrades to allow for sensible project sequence and timing
- Sequence buildout to consider onshore and offshore options at various points in the process
  - Consider an iterative loopback to consider if earlier decisions that appears cost-effective were not at later stages of the buildout effective in reducing overall production costs and transmission costs
- Maximize each interconnection point to avoid unnecessary onshore upgrades
  - Consider unnecessary offshore transmission or OSW infrastructure as well
- Use existing points of interconnection like retired nuclear, under-utilized generator infrastructure

Study Parameters and Assumptions

Minimize system cost and manage cost, reliability risk by future-proofing

- Minimizing production cost is a familiar RTO function
- Managing transmission planning and cost is familiar RTO function
- Increasing electrification and changing load patterns may suggest sensitivities
- Working with large interconnecting OSW is a less familiar function
  - Considering interregional transmission and OSW transfer capability is quite unfamiliar
  - It also is prudent to management costs and reliability

- Offshore transfer capability will enhance regional reliability management
  - Offshore transfer capability may also enhance inter-regional reliability

- OSW managed well can address some of the reliability and economic challenges with growing solar and onshore wind penetration
  - Should consider generation production cost trends overall

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