



Offshore Wind Transmission Study Phase 2 Update

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Phase 1 Study Background

- Scenario study conducted in response to a [request from OPSI](#); an independent effort between PJM and interested state agencies
- **Five scenarios** created in collaboration with PJM's coastal states (short and long-term)
- **Goal** was to analyze and identify regional transmission solutions to accommodate the coastal states' offshore wind goals, as well as *all* PJM states' RPS requirements
 - Assessed the impact to the PJM transmission system and identified costs and location of upgrades (not cost allocation)
 - Study intended to be *advisory only*

Phase 1 Study Conclusions

[Link to Report](#) (2021)

- Scenario results range from \$627.34m to \$3,213.14m
 - OSW injection totals range from 6,416 MW–17,016 MW
- Results demonstrated system impacts, identified network upgrades and upgrade costs for all scenarios, and opportunities for regional solutions
- Market efficiency analysis for the study's Scenario #1 demonstrated decreased gross load payments, especially for coastal states, among other benefits

Phase 2 provides PJM states the opportunity for additional scenarios to be developed and examined

Scenario Inputs

- Points of interconnection
- OSW capacity
- RPS targets*
- Generator deactivations**
- Combination of states

Reliability Analysis

- Thermal
- PJM-wide analysis
- Lines rated 100 kV+

Transmission Solutions

- Onshore Tx upgrades
- Greenfield Tx solutions
- Offshore Tx considerations

Market Efficiency

- Selected scenarios
- TO breakdown (and PJM state approximation)

Phase 1 considerations
Phase 2 considerations

* Necessary capacity to meet demand may change with use of 2022 Load Forecast
** Proposed update to PJM deactivation methodology





Phase 2 – Offshore Wind Scenarios

Offshore Wind Scenarios (MW)							
Scenario	Delaware	Maryland	North Carolina	New Jersey	Virginia	Total OSW Capacity	
Study Year 2028*	1	-	2,022	-	3,906	2,640	8,568
	2	-	4,000	-	3,906	2,640	10,546
	3	800	2,022	-	3,906	2,640	9,368
Study Year 2035*	4	-	2,022	-	7,648	5,200	14,870
	5**	-	2,022	-	7,648	2,640	12,310
	6**	-	2,022	-	7,648	5,200	14,870
	7	-	7,000	-	7,648	5,200	19,848
	8***	-	-	-	-	-	0

* Will model all PJM state RPS targets as being met for scenario years 2028 and 2035.

** Will include only 9,000 MW of solar in Virginia for Scenarios 5 and 6.

*** Neither PJM nor any PJM state is assuming that the offshore wind policy goals of the PJM states will not be achieved. Scenario #8 serves as an opportunity to separate the transmission impacts of offshore wind in comparison to other renewable resources that will be developed in pursuit of state policies.

- To support the goal of aligning the renewable integration scenario studies as part of the “Offshore Wind Transmission Study Phase 2” and “Energy In Transition Phase 3,” PJM will select deactivations via the approach that PJM developed and applied in the Energy In Transition Phase 2 studies
- The approach involves developing a realistic retirement scenario to offset the increased renewable penetration levels assumed in the studies
 - Formal deactivation notices
 - Regulatory requirements
 - State Policies: IL, NJ, VA, MD, NC
 - Federal Policies: EPA regulation updates (CCR, ELG, CSAPR)

- Short-term 2028 scenarios will closely match the reserve levels in the RTEP
- Long-term 2035 scenarios will allow reserves to decrease to a level in which the PJM Loss Of Load Expectation (LOLE) is 1 event in 10 years
- It is expected that in order to accommodate both the state RPS requirements and the potential deactivations, some of the scenarios may require additional resources from the PJM interconnection queue to achieve the target reserve levels
 - PJM is developing a methodology to assist in the selection of these additional resources

- For each of the scenarios, PJM will perform a full generator deliverability thermal analysis
 - Summer, winter and light load conditions
 - Bulk Electric System (100 kV+)
 - Conductor limits
- Transmission solutions will be developed for each reliability violation identified
 - Reconductor or rebuild of existing circuit
 - Transformer replacements
 - Per unit cost estimates
- A limited assessment of potential greenfield transmission solutions both onshore and offshore will be performed as warranted

- PJM will be releasing the results of the Phase 2 study in two segments (2.1 and 2.2)
- Study Phase 2.1
 - Reliability analysis on the two policy scenarios (scenarios #1 and #4) to conclude by the end of 2022
 - Results expected to be made available in early 2023
- Study Phase 2.2
 - Reliability analysis on scenarios #2-3 and #5-8 to be released in Q1/Q2 2023
 - Will also include market efficiency analysis on a select number of scenarios

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Appendix

“The purpose of this letter is to follow up on the discussion that occurred at the October 28, 2019, Board to Board meeting in Baltimore. The discussion was spurred by an agenda item that included integrating renewables, with questions presented for discussion centering on how offshore wind projects are being analyzed.....

.....OPSI would expect PJM to be actively engaged with the States by facilitating information exchange and conducting analyses and modeling studies as requested on an on-going basis. As changes in the energy landscape are occurring and state policies evolve, we support close interaction between States and PJM in these areas.”

[December 13, 2019 OPSI Letter to PJM Board of Managers](#)

- Market Efficiency simulations will be performed for a limited set of the scenarios to inform the states of the expected benefits associated with the selected scenarios
 - Congestion relief
 - Production cost reduction
 - Gross load payment reduction
 - Renewable curtailments
 - Emissions reductions
- Benefits to be identified at the transmission owner and state levels