U.S. DEPARTMENT OF ENERGY

Office of ENERGY EFFICIENCY & RENEWABLE ENERGY

Offshore Wind Market & Grid Approach

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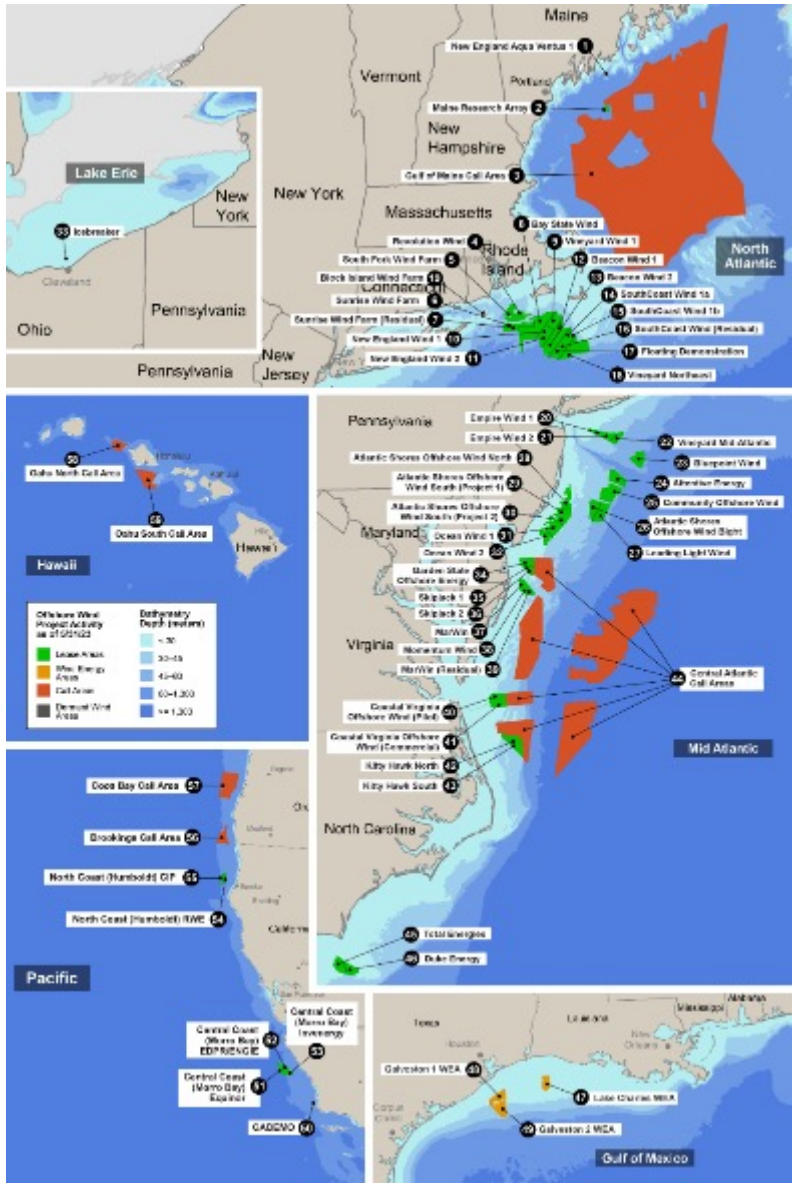
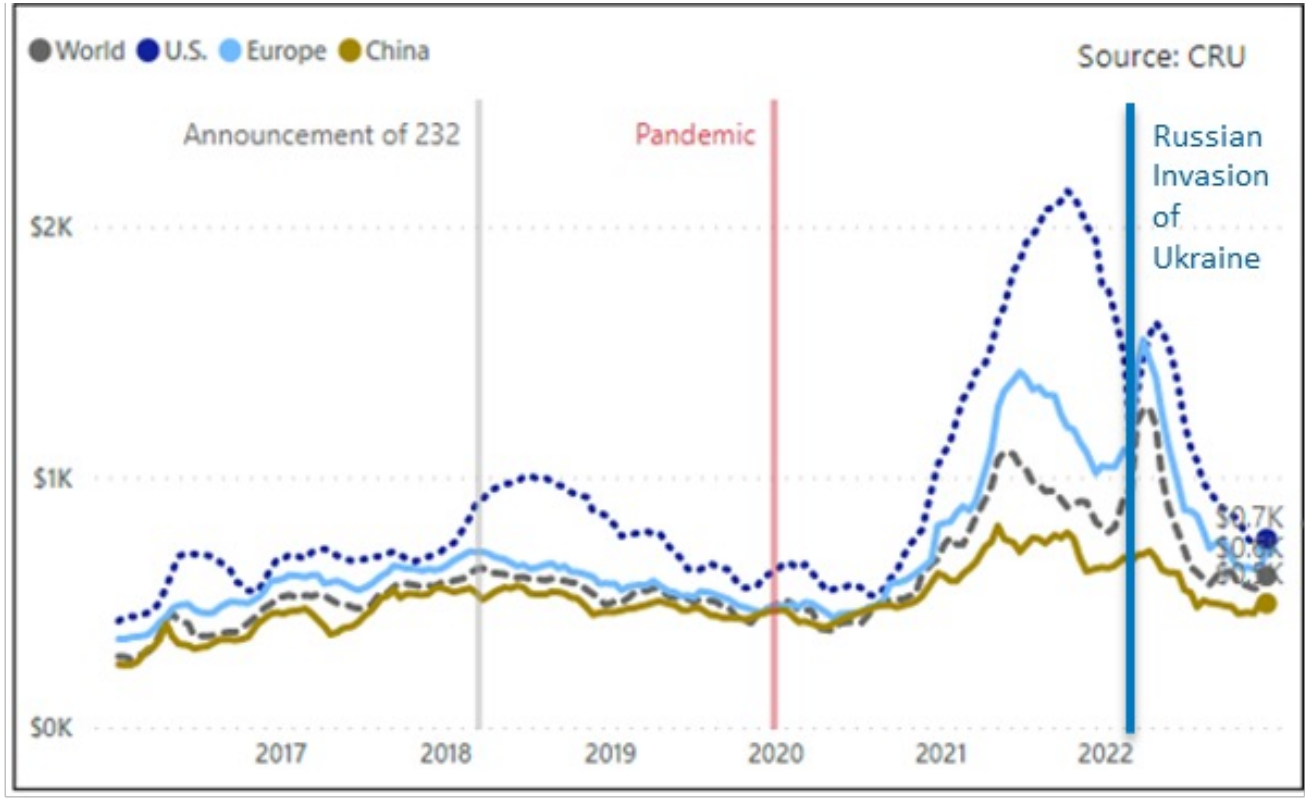
Economic and Policy Indicators Suggest Long-Term U.S. Market Growth as of May 31, 2023, While Inflationary Cost Increases May Hinder Near-Term Growth

- U.S. offshore wind energy target set in March 2021 for 30 gigawatts (GW) by 2030 with pathway to 110 GW by 2050
- 42,730 megawatts (MW) of policy commitments from seven eastern states by 2040
- 52,687 MW is estimated in total project pipeline
- 42 MW of installed capacity.



Locations of U.S. offshore wind energy pipeline activity and Call Areas as of May 31, 2023. ***Map created by John Frenzl, National Renewable Energy Laboratory (NREL)***

Power Contracts from U.S. Offshore Projects are Facing Headwinds



World, U.S., Europe, and China Rolled Hot-band Steel Price (Source CRU)

- Long-term offshore wind energy costs are projected to decline, but in 2023 fixed bottom project costs increased due to inflation, higher financing rates, and supply chain bottlenecks.
- Steel prices spiked in Oct 2021 (Figure left) due to supply chain disruptions caused by the pandemic – over 80% of an offshore wind plant is made of steel.
- Some developers which have signed 27 power contracts for offshore wind power delivery (most before recent cost rise) are canceling or renegotiating with states and utilities.
- Inflation Reduction Act provisions are softening the impacts (30% investment tax credits, possible 10% add-ons for domestic content and community benefits in under-served regions).

Atlantic OSW Transmission Study

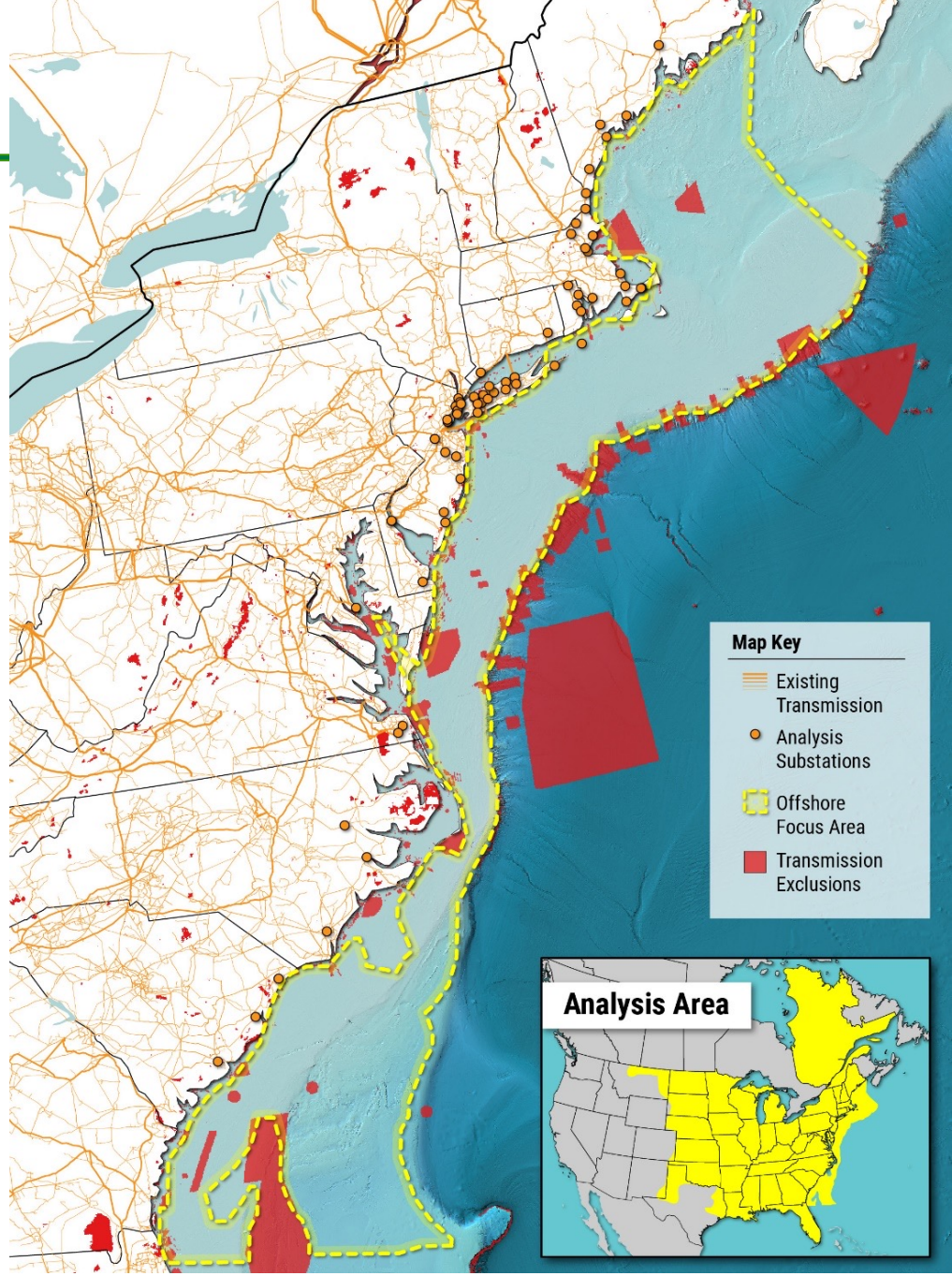
Overview

- 2-year study (November 2021 – October 2023)
- Atlantic Coast regional scope from Maine through South Carolina
- Evaluate coordinated offshore wind transmission solutions for offshore wind deployment
- Alignment with federal and state offshore wind goal Near-term (2030) and Long-term (2050)
- Key Questions:
  - What could be the costs and benefits of interlinking offshore platforms?
  - How would options impact reliability and resilience?
  - Could there be a sequence that achieves benefits without adding near-term hurdles?

NREL NATIONAL RENEWABLE ENERGY LABORATORY

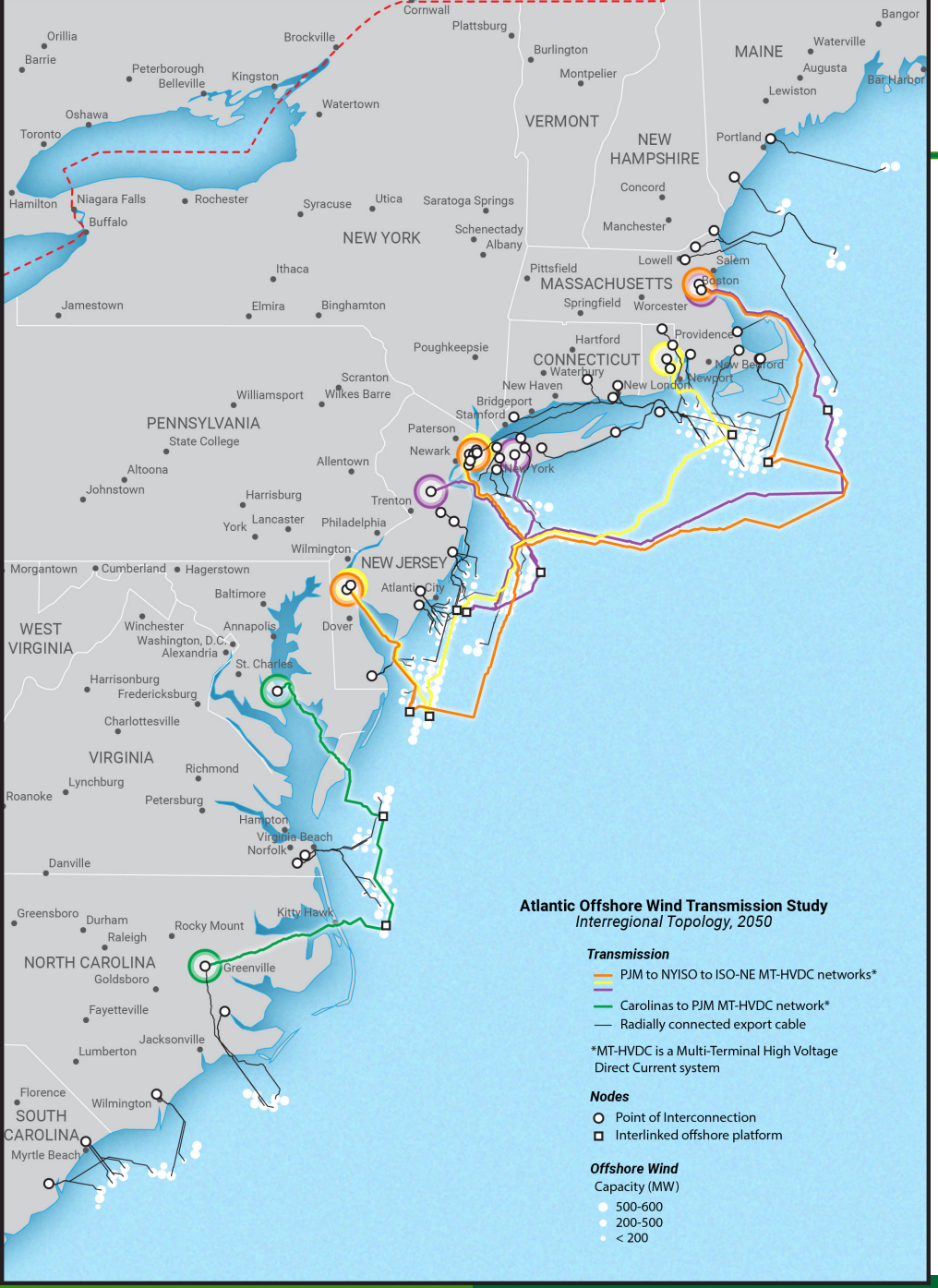
Pacific Northwest NATIONAL LABORATORY

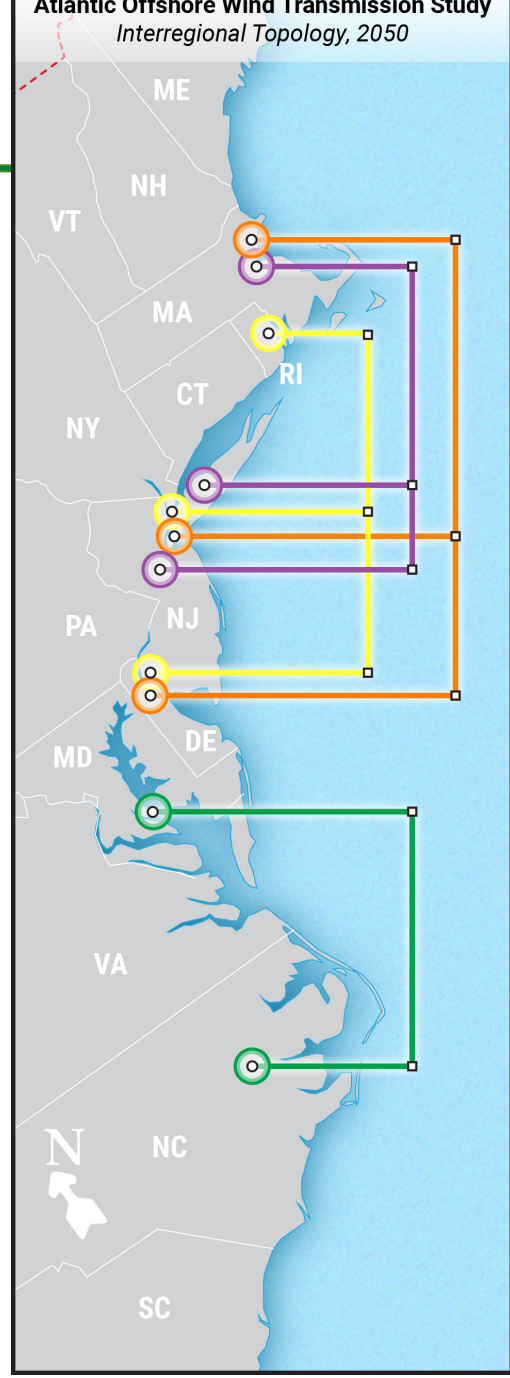
https://www.nrel.gov/wind/atlantic-offshore-wind-transmission-study.html



Interregional interlinks

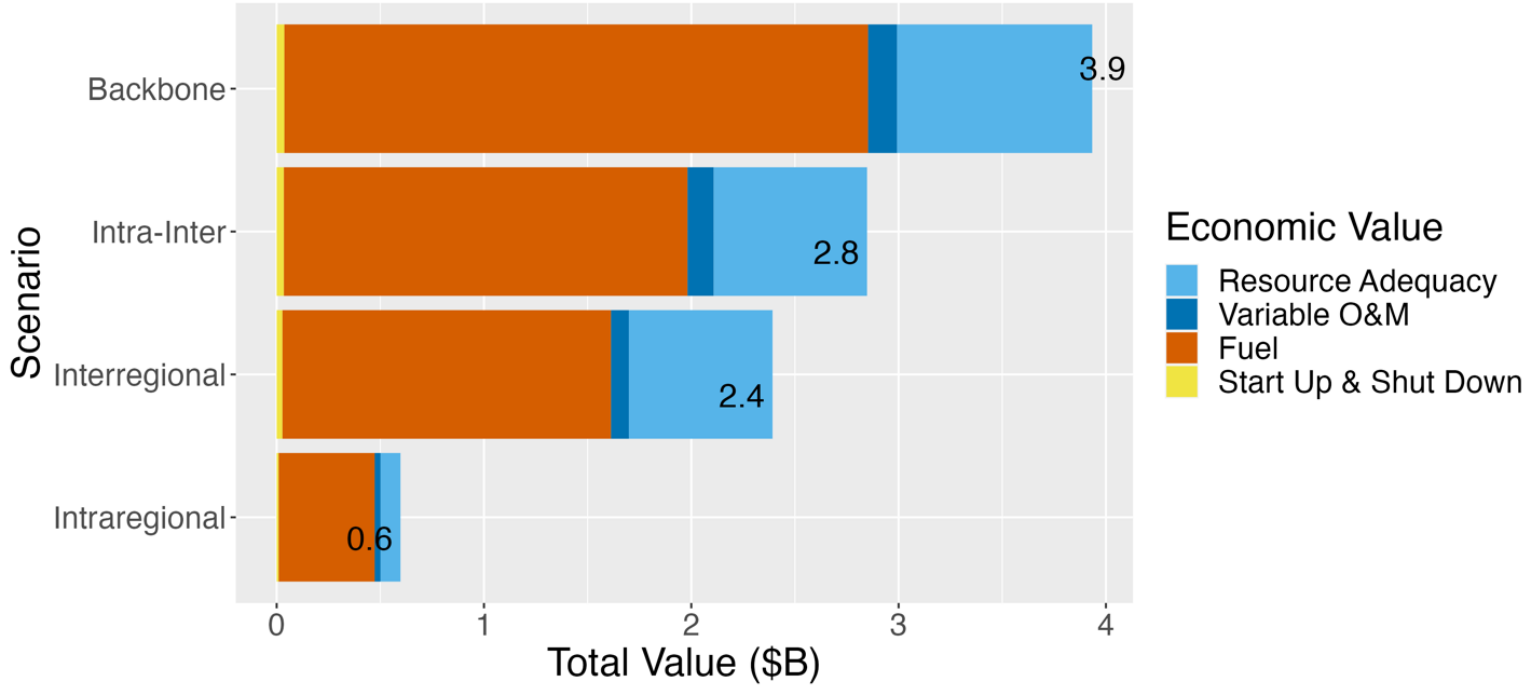
- Seven new cables, interlinking 11 platforms
- 14 GW interregional capacity
- Designed using price differentials from initial grid modeling





Economics Analysis: Benefit Evaluation

- Topologies have up to $3.9 billion of generation cost reduction during 2050



- Net value and benefits : costs

Scenario	Net Annual Value ($M)	Benefit Cost Ratio
Intraregional	310	2.1
Interregional	1480	2.6
Inter-Intra	1650	2.4
Backbone	2330	2.5

Key Takeaways

- Offshore wind will be an integral part of generation mix for Atlantic coastal states, especially for areas with high energy cost and constrained onshore transmission expansion.
- Offshore transmission connecting POIs with large price differences within a region or between regions incur production cost savings and reliability benefits.
- While different topology options have pro and cons, the benefit to cost ratio are all high enough to warrant further studies by transmission planners.
- The environmental impacts and ocean co-use can be and should be considered in designing optimal offshore transmission routes.
- POIs are getting weaker for offshore wind. Strategies exist to increase the system strength.
- Extreme weather events such as Hurricane Sandy will significantly impact offshore wind and onshore grid without proper mitigation and restoration strategies.