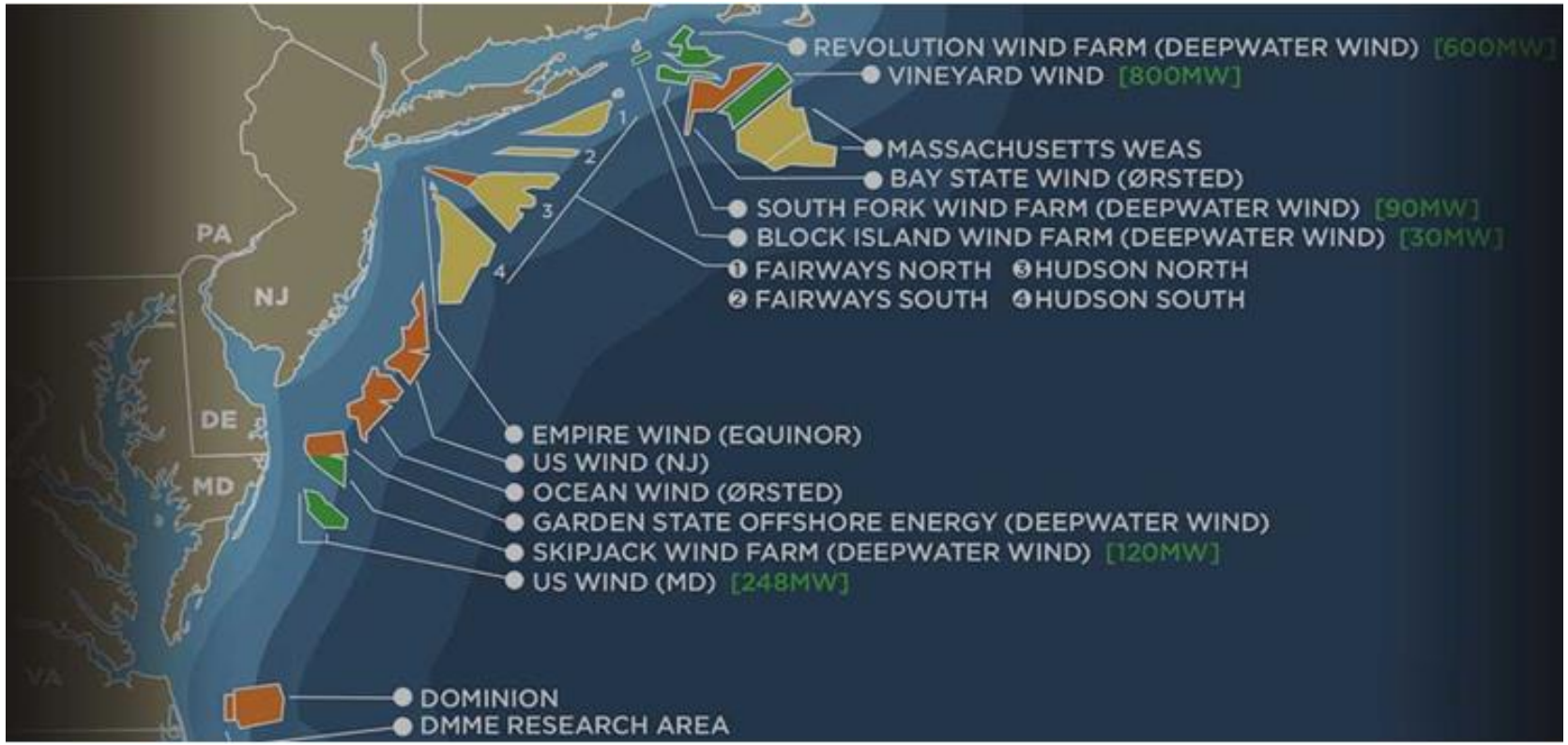
Offshore Wind and Transmission Planning and Cost Allocation Models

Michael Goggin

3 Ps of Transmission Policy

- **Planning**
- **Paying**
- **Permitting**

Lease Areas Enable Pro-Active Planning

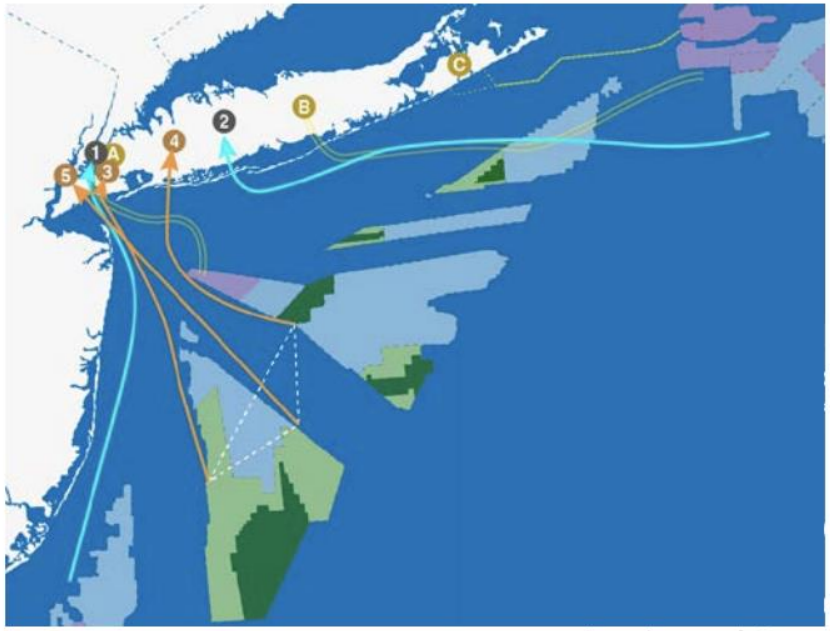


Benefits of Proactive Planning

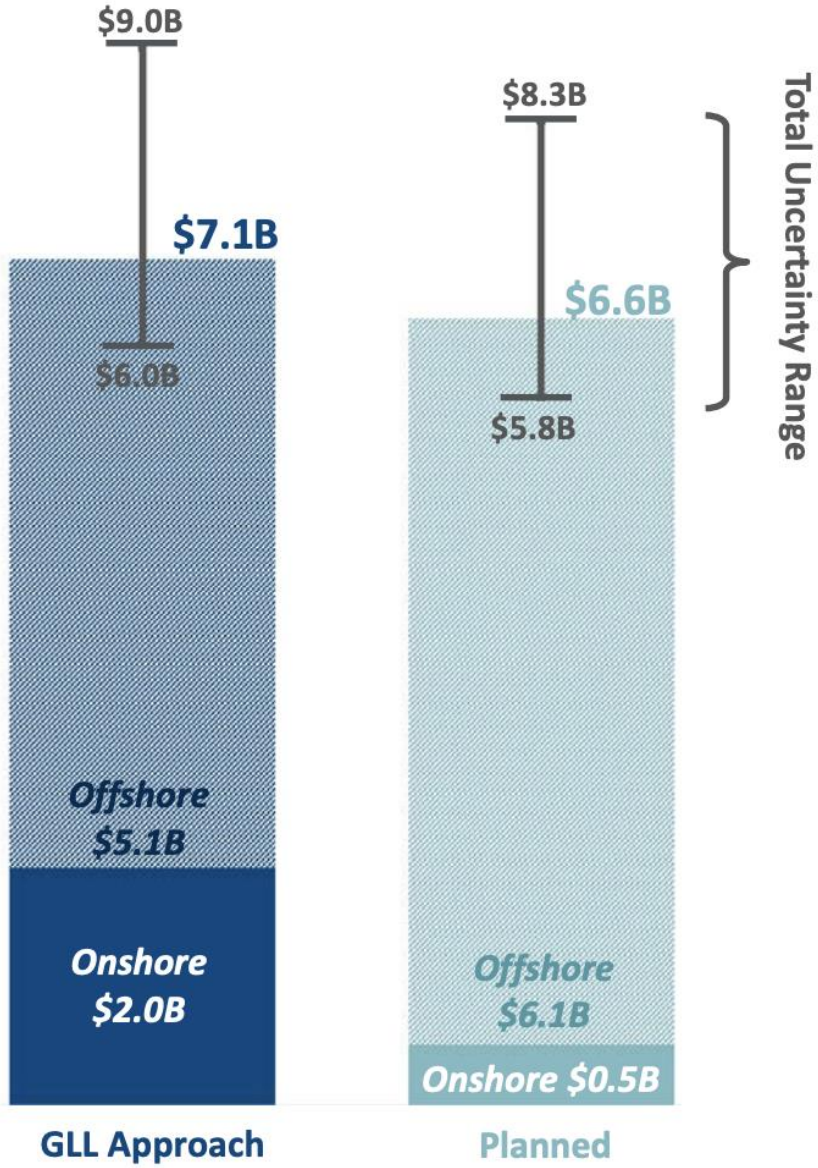
[Brattle Group: Offshore Wind Transmission: An Analysis of Options for New York]

GLL Offshore Transmission Scenario

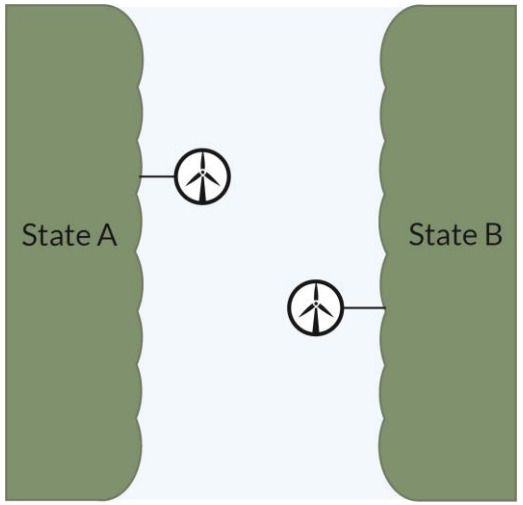
Planned Offshore Transmission Scenario



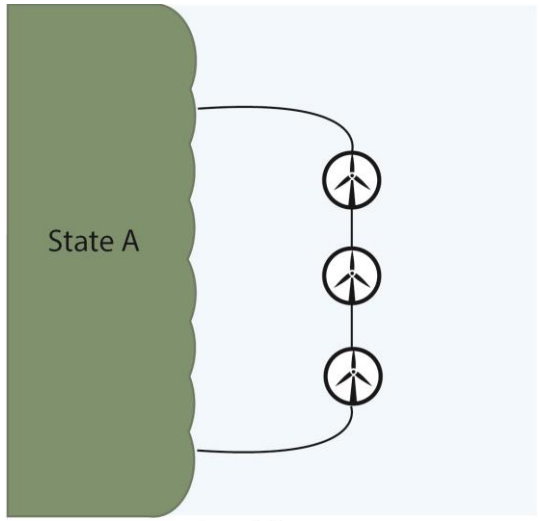
Comparison of Total Onshore Plus Offshore Transmission Costs



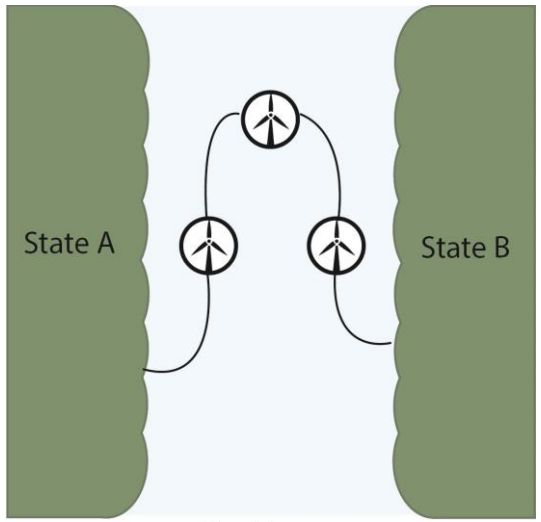
Generator Tie-Line vs. Network Transmission Systems for Offshore Wind



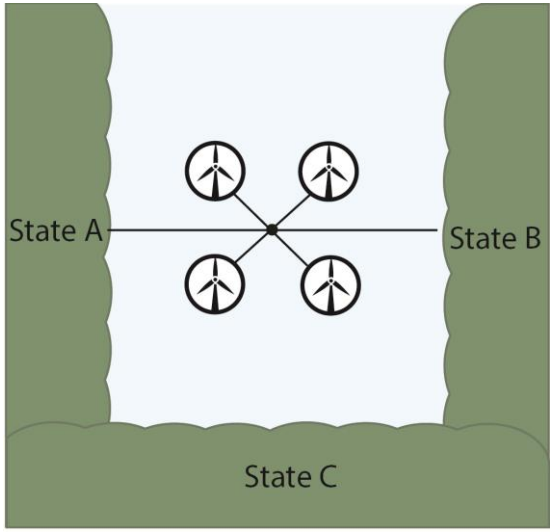
Radial



Backbone
(single state)

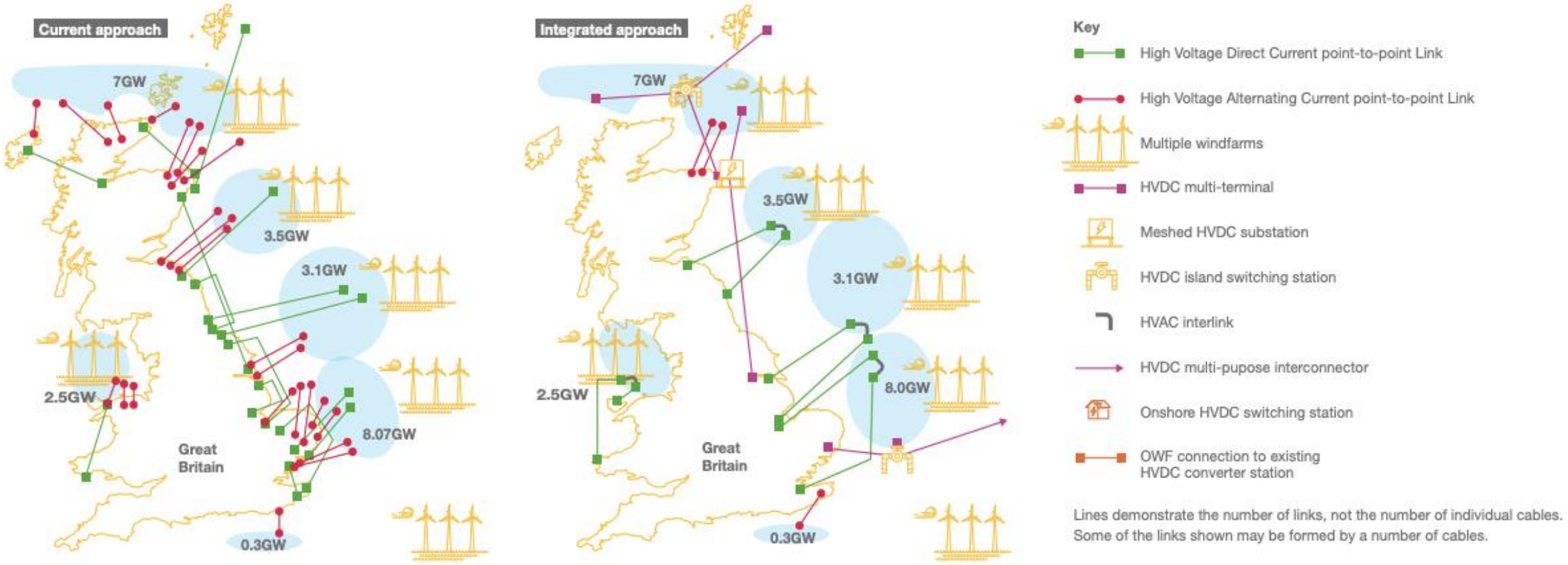


Backbone
(multi-state)



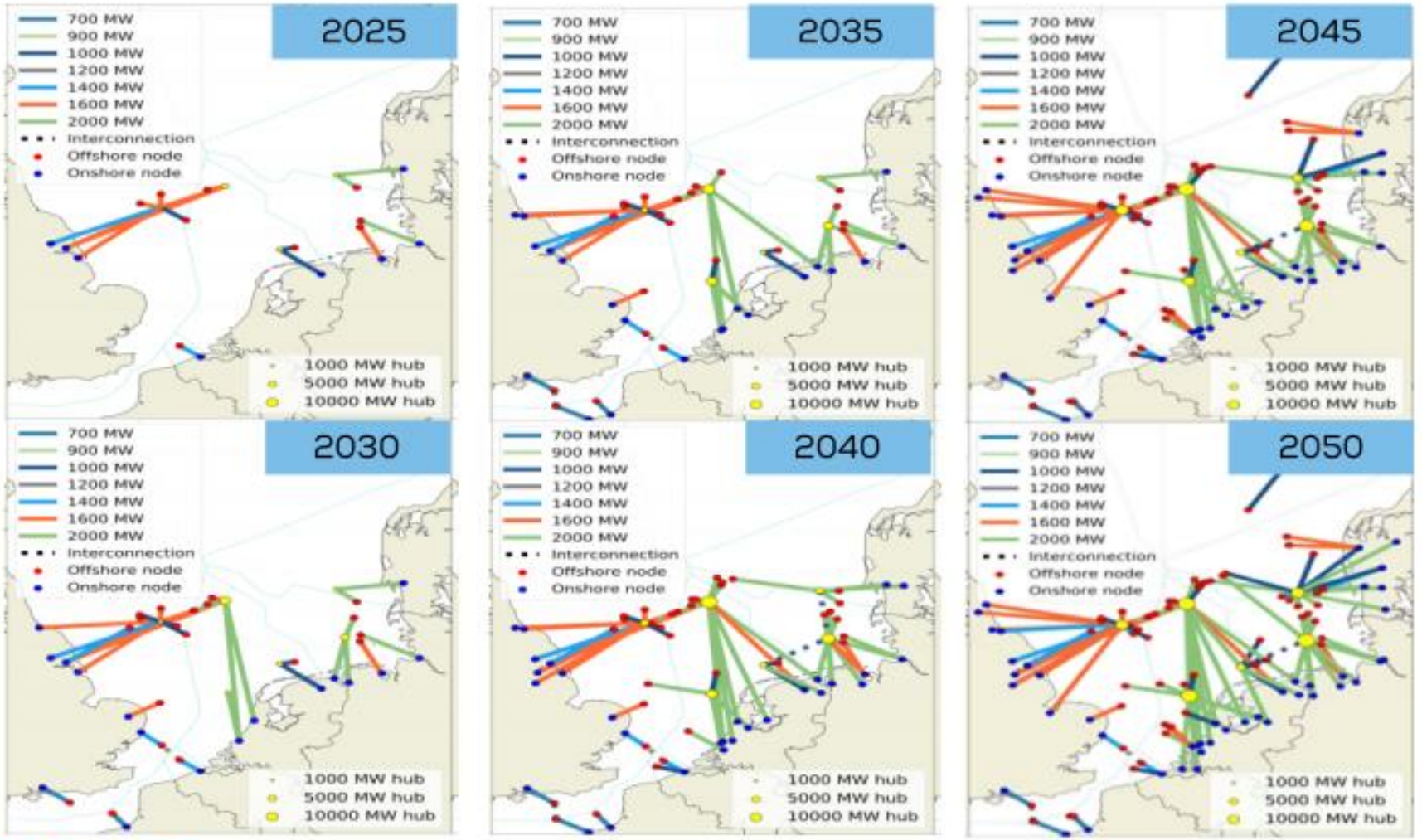
Grid/hub
(multi-state)

Lessons from European Offshore Wind



National Grid ESO Offshore Wind Coordination Project

Europe Moving Towards Coordinated, Shared Grid



Source: PROMOTioN
HUB solution evolution (2025-2050)

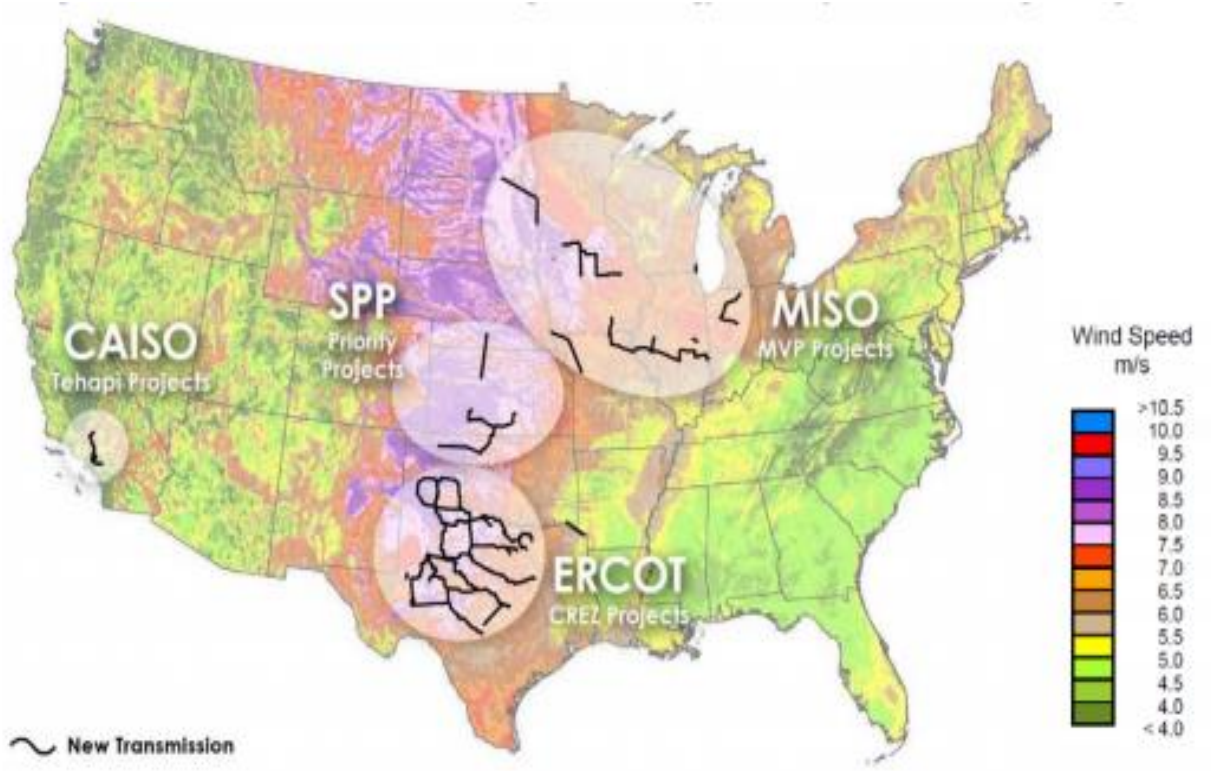
Success in Accessing Remote Renewable Areas

Transmission Plans Enabled ½ of ~110 GW US Land-Based Wind Capacity

Transmission plan	Wind Capacity Enabled (GW)
Tehachapi CA	4.5
Texas CREZ	14.5
MISO MVP	14
SPP Priority Projects, Balanced Portfolio	6
CO+ME+NV+PAC+BPA	10
Total	49

Lessons from U.S. Large-Scale Expansions

- MISO MVP, SPP priority projects, ERCOT CREZ
- 3:1 Benefit-Cost ratios
- Winning formula:
  - Pro-active multi-value planning
  - Broad, beneficiary pays cost allocation



OSW Transmission Policy Options 1/3

Option	Pros	Cons
1.Private generator lead line. Status quo	-Quicker, simpler, and less risk for developers.	-May utilize onshore interconnection points less efficiently, and smaller projects will miss economies of scale.
2.Proactively planned, regionally cost-shared open access transmission. Similar to MISO MVP, SPP priority projects, ERCOT CREZ. State policies would be accounted for in the regional transmission plans.	-Incorporates state and utility generation plans. Can incorporate interconnection queues. -Optimizes the efficient onshore and offshore transmission configuration taking all benefits into account including reliability, resilience, congestion cost reduction, and public policy.	-Requires RTO stakeholder support to propose to FERC, and FERC support to approve it. Some stakeholders often object to paying for "public goods" like regional shared transmission.
3. Proactively planned open access regionally financed, with some cost share from interconnecting generators. Based on the CAISO Tehachapi trunkline model. Current wholesale RTO customers finance the line but are paid back over time by generators as they interconnect in the future.	-Reduces cost for existing wholesale customers relative to broad cost-sharing.	-May not consider all the reliability, economic, public policy and other benefits of transmission. -A policy question for regulators is whether there is too much risk that the future generators will not come, leaving costs to be borne by existing wholesale customers.

OSW Transmission Policy Options 2/3

Option	Pros	Cons
4. Merchant transmission with anchor tenant, no cost allocation. Early projects sign up for most of the capacity on the line, leaving capacity open for others.	-Enables a larger scale and greater efficiencies than the generator lead line approach.	-May not achieve the broader efficiencies of a regionally planned network. -Addresses the offshore transmission, but not the onshore network where more efficiencies may lie.
5. Regionally planned onshore grid, with merchant offshore. The onshore connection points would be upgraded, with costs allocated to existing customers in a beneficiary pays approach. Could be used in tandem with the merchant anchor tenant model offshore.	-Can achieve savings in the use of transmission interconnection points on land. In the Brattle NY study, one-third of the transmission costs were onshore, and two-thirds offshore, and almost all of the savings were from more efficient use of the onshore connection points.	-May leave efficiencies offshore untapped.
6. Inter-regionally planned and cost allocated transmission. A plan across two or three ISOs would jointly plan and reach a cost allocation agreement for a network among them.	- Captures large efficiencies and provides reliability and resilience to all three grids.	-Very hard to achieve cost allocation agreements within regions, let alone across three. Each RTO would have to agree and make their own filing to FERC, and FERC would have to approve the cost allocation.

OSW Transmission Policy Options 3/3

Option	Pros	Cons
7. Transmission at least partially funded by the federal government. Large transmission lines, and particularly inter-regional lines, could be eligible for some cost-sharing from the federal government. Federal cost-sharing can help grease the skids for each region to contribute a share of costs.	-Federal support recognizes large and broadly spread benefits of transmission, particularly offshore transmission, and helps get over parochial fights regarding which region benefits more and should pay more. -History of federal support for transmission through the Power Marketing Agencies, TVA, and New Deal programs. Analogous to federal highway funding.	-Requires building Congressional support and finding funding. -Using non-refundable tax credits requires entities with sufficient tax liability or tax equity investors, and Congress does not typically support refundable tax credits. -Any federal government discretion to select or decide on lines would trigger a programmatic EIS review, which can take considerable time.
8. State Agreements Approach. Potentially a group of PJM states could agree to share the cost of transmission. PJM would plan the network. -This could be limited to the onshore network alone. -Alternatively both the onshore upgrades and the offshore network could be subject to a state agreement approach.	-Can address the natural monopoly and public good problems with individual project-based development. -Allows relatively broad sharing of the costs which likely increases the tolerance for larger upgrades to enable more OSW integration over time.	-It could be a challenge to get agreement from states that do not currently have large OSW commitments. As noted above, the State Agreements approach does not solve the free rider problem among states. -The State Agreement approach falls under FERC Order 1000. Utilities have been less supportive of Order 1000-planned transmission because

Roles in U.S. Offshore Wind Transmission Planning

- FERC
- States
- RTO/ISOs
- Bureau of Ocean Energy Management
- US DOE