EPRI ELECTRIC POWER RESEARCH INSTITUTE

P201 Back Pocket Insights

KEY INSIGHTS

- **Offshore wind deployment could reach 31–256 GW by 2050**, which is a broader range than other U.S. studies due to the range of uncertainties analyzed.

- **Stringent climate policies, lower relative costs, transmission expansion, and increased siting limitations** for land-based wind and solar could increase offshore wind deployment.

- **Offshore wind's role can be large regionally, especially for Atlantic coastal states**, reaching a 20% generation share in New York and New England by 2050.

- Offshore wind may provide a **hedge against the uncertainty of competing land uses and inter-regional transmission.**

This brief is based on the paper "Expanded Modelling Scenarios to Understand the Role of Offshore Wind in Decarbonizing the United States" published in *Nature Energy* (2023)

Understanding the Role of Offshore Wind in U.S. Decarbonization

by P. Beiter, T. Mai, M. Mowers, and J. Bistline

New research examines how the economics of offshore wind energy deployment depend on policy, technology costs, transmission, and siting.

Offshore wind in the U.S. is still in its nascent stage with 42 MW of capacity installed, but state policy commitments are expected to increase this market by three orders of magnitude through 2040 to nearly 40,000 MW. However, projected costs of offshore wind relative to land-based resources imply there is significant uncertainty about offshore wind's deployment, despite its large resource potential and anticipated role.

This analysis uses detailed modeling under a wide spectrum of future conditions to explore unknowns about future policies, market conditions, social acceptance, and siting considerations with competing land-based resources. We find a **broader range of offshore wind deployment than other U.S. decarbonization studies, between 31-256 GW by 2050** (Fig. 1), which is 1-8% of generation.

Model results suggest that:

- **Offshore wind capacity could rise with stringent climate policies, lower relative technology costs, transmission expansion, and increased siting limitations for land-based resources**.
- In many scenarios, offshore wind deployment is limited to current state commitments, though growth could be higher with decarbonization policies and widespread electrification.

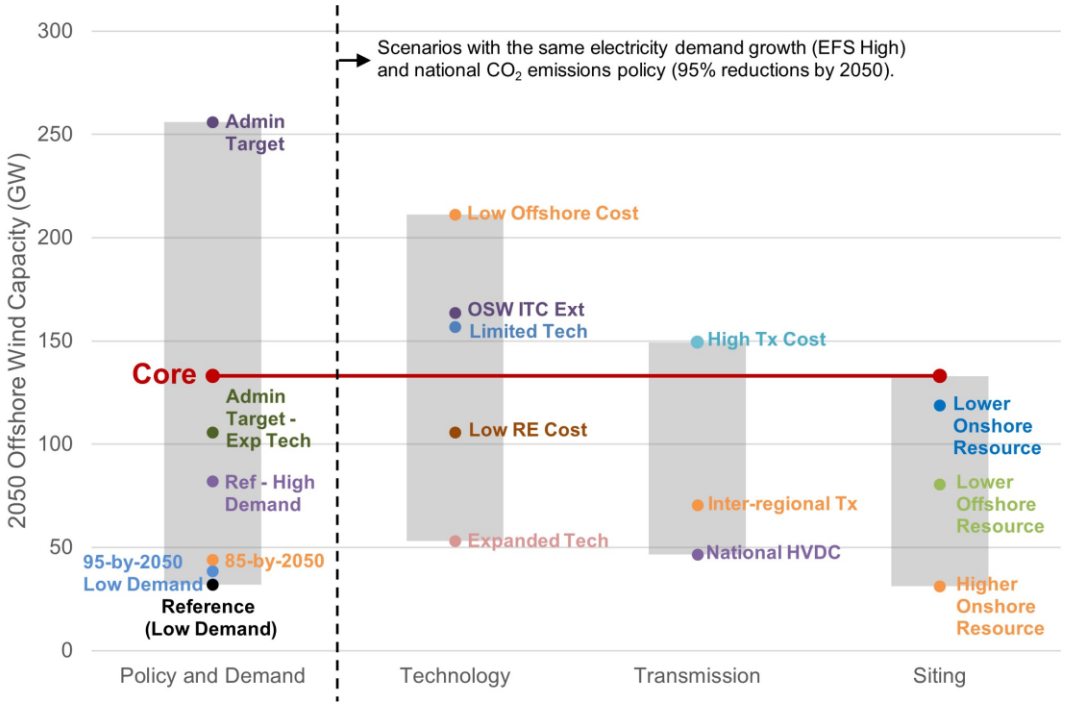

Figure 1. Installed offshore wind capacity in 2050 across scenarios. The 85- and 95-by-2050 scenarios assume CO_2 caps of 85 or 95% below 2005 levels by 2050. Based on Beiter, et al. (2023).

Offshore wind's role can be large regionally, especially for Atlantic coastal states, reaching up to a 20% generation share in New York and New England by 2050 under the core scenario due to proximity to load centers and state policies, even when it comprises 5% nationally. Development is expected to start in the North Atlantic and expand to the South Atlantic and Great Lakes regions after 2040.

The siting of competing land-based clean energy resources also impacts potential markets for offshore wind, given how new **capacity is projected to be dominated by solar PV and land-based wind** (1,800 GW and 556 GW, respectively, in the core scenario). Offshore wind also depends on the availability of other emerging generation options, falling by 70 GW when carbon capture and advanced nuclear are included.

The analysis points to transmission constraints and costs as drivers of offshore wind deployment, with **offshore wind perhaps functioning as a hedge against the uncertainty of competing land uses and inter-regional transmission investments.** Yet these factors are unknown and likely vary regionally and may be a complex function of the policy environment.

Our study illustrates how modeling choices and uncertainties about policies, technologies, and deployment limitations affect offshore wind deployment. The increased contribution of offshore wind energy in some regions can be used to identify investment needs for workforce training, supporting infrastructure, and coordination between planning authorities.

FOR MORE INFORMATION

Read the full paper: Beiter, et al. (2023), "Expanded Modelling Scenarios to Understand the Role of Offshore Wind in Decarbonizing the United States." *Nature Energy*.

EPRI CONTACT

John Bistline jbistline@epri.com