BOEM
Bureau of Ocean Energy Management

FACT SHEET

Offshore Wind in the U.S. Gulf of Mexico: Regional Economic Modeling & Site-Specific Analyses

In a study funded by the Bureau of Ocean Energy Management (BOEM), researchers from the National Renewable Energy Laboratory (NREL) assessed offshore wind energy resources in the Gulf of Mexico to quantify its technical and economic potential. The results will inform federal and Gulf of Mexico state strategic energy planning over the next decade.

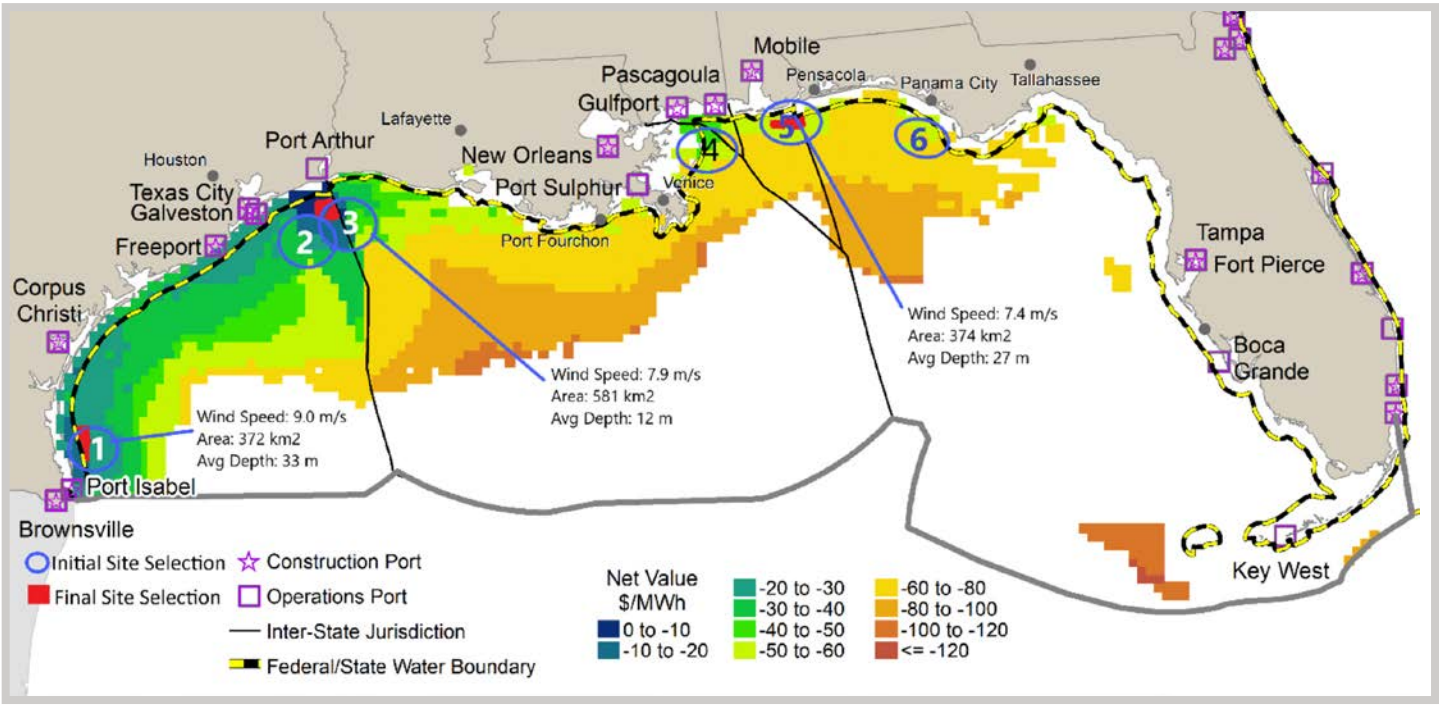

Figure 1. Estimated net value for Gulf of Mexico (2030 Commercial Operation Data)

NREL provided BOEM with regional Gulf of Mexico heat maps, which included technical offshore wind resource potential, levelized cost of energy (LCOE)[1] estimates, and a summary of net value[2] (Figure 1). NREL established site selection criteria for hypothetical wind plant locations in the Gulf of Mexico and recommended to BOEM six viable study areas: Site 1 (Port Isabel), Site 2 (Galveston), Site 3 (Port Arthur), Site 4 (New Orleans), Site 5 (Pensacola), and Site 6 (Panama City). From these six sites, three sites were selected for more detailed cost analysis to represent possible future offshore sites in the Gulf of Mexico: Site 1 (Port Isabel), Site 3 (Port Arthur), and Site 5 (Pensacola).

An analysis of jobs, earnings, regional gross domestic product (GDP), and regional economic output to support the construction and operation of a 600-MW offshore wind project in the Gulf of Mexico was analyzed using Site 3 (Port Arthur) as the reference site. The results indicate that a single offshore wind project could support approximately 4,470 jobs and $445 million in GDP during construction and an ongoing 150 jobs and $14 million annually from operation and maintenance labor, materials, and services. Results are based on a project with a commercial operations date of 2030 (Figure 2).

Figure 2. Economic activity supported from the construction and operation of a 600-MW Gulf of Mexico o□shore wind project

To determine the possible future economic and job potential of offshore wind in the Gulf of Mexico, the three sites that were selected for more detailed cost analysis (Site 1 [Port Isabel], Site 3 [Port Arthur], and Site 5 [Pensacola]) met most of the following criteria (Figure 3):

[1] LCOE is the average minimum price at which electricity must be sold in order to break-even over the lifetime of the project.
[2] Net value is the difference between LCOE and Levelized Avoided Cost of Energy (LACE) (Net value ($/MWh)i = LACEi – LCOEi)

- **High regional net value**—The highest economic potential and closest proximity to viable ports.
- **Large area**—At least 350 kilometers2 (km2)/86,487 acres to support the commercial development of a utility-scale wind plant, realize economies of scale, and demonstrate the economics of plant scaling to at least 1,000 megawatts (MW), assuming an array density of 3 MW/km2.
- **Low LCOE**—While the best economic potential (net value) and lowest LCOE do not always correlate, these three sites were chosen partially for their low LCOE.
- **Good location**—In federal waters (BOEM jurisdiction) and far enough from shore to avoid conflicts with coastal communities over viewshed issues.
- **Shallow water**—Depths of less than 40 meters/131 feet and respectful of viewshed setbacks needed for coastal communities.
- **Minimal potential use conflicts**—Avoid environmentally sensitive areas, shipping lanes, and oil and gas infrastructure.

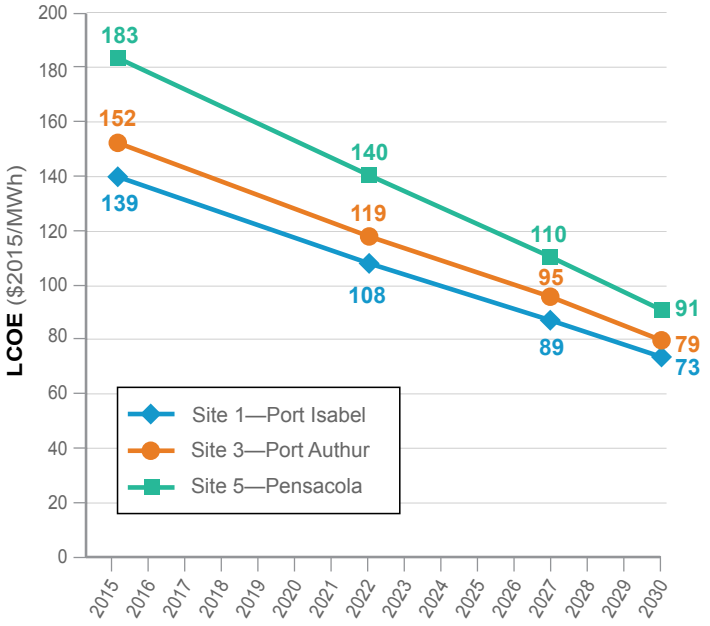

Figure 3. Estimated LCOE for the three modeled Gulf of Mexico sites from 2015 to 2030 (Commercial Operation Data)

These LCOE values indicate trends consistent with other cost declines seen in Europe and the northeastern United States, though at a slower pace. This pace can be attributed to the need for further technology to address hurricanes and lower wind speeds, less-favorable economics relative to the northeastern United States, and lack of current state policy commitments that are driving offshore wind development in other U.S. regions.

Advantages

Resource Quantity
1/3 of U.S. shallow water resource is in the Gulf of Mexico—shallow water lowers substructure cost

Proximity to Oil and Gas Supply Chain
Offshore wind can leverage existing capabilities

Mild Climate
Warmer waters and lower sea states can decrease operating costs and increase turbine access

Challenges

Hurricane Exposure
The risk of a major hurricane could increase turbine and substructure cost

Low Average Wind Speeds
Lower wind speeds decrease capacity factors and increase LCOE

Softer Soils
Soft soils limit the type of substructure and increase substructure cost

Figure 4. Advantages and challenges of offshore wind in the Gulf of Mexico

Overall, this study concludes that:

- Highest wind resources are in the western Gulf of Mexico, which corresponds to the most favorable economics.
- The highest net value is near the Texas/Louisiana border (Site 3 Port Arthur), where higher levelized avoided cost of energy makes potential offshore wind development more attractive.
- None of the studied sites achieved positive net value (e.g., where LCOE is less than the levelized avoided cost of energy).
- Some north Texas sites near Port Arthur were estimated to have a net value greater than negative 10 per megawatt hour, which is within the margin of error to determine economic viability (e.g., positive net value).

Researchers determined that further analysis is warranted to assess:

- Technology design and cost requirements for the Gulf of Mexico in terms of hurricanes and wind speed and how they may impact siting.
- Impact of larger capacity (12 MW to 15 MW) turbines (expected over a timeframe that extends to 2032 Commercial Operation Data), lower unit cost for turbines in general, and finance rates as low as 7% fixed charge rate.
- Technology risk and how it may affect insurance cost and insurability.
- Siting conflicts with other ocean uses and the ocean environment.

About the Bureau of Ocean Energy Management

The Bureau of Ocean Energy Management (BOEM) promotes economic development, energy independence, and environmental protection through responsible, sicience-based management of offshore conventional and renewable energy, and marine mineral resources.

For More Information
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