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New Jersey Department of Transportation
Bureau of Research

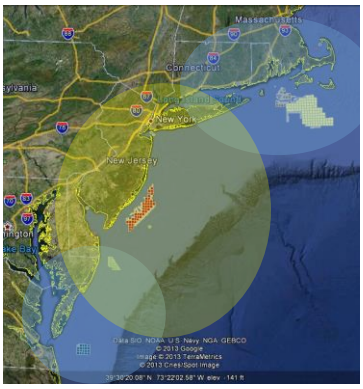
Technical Brief

Offshore Wind Development Research

The study addresses all aspects of Offshore Wind (OSW) development. This includes identifying vessel types, vessel installation methods, needs and operating characteristics through all phases of OSW installation, construction, operations and maintenance. It also identifies regulatory or legislative requirements and/or other road blocks to the use of particular vessels. The study identifies a number of New Jersey's staging ports based on port selection criteria.

Background

Offshore Wind (OSW) development research is in response to New Jersey's 2011 Energy Master Plan with 22.5% of the state's power originating from renewable sources by 2021.



The objective is to identify the critical maritime components of OSW industry development for installation, construction, operation and maintenance.

Research Objectives and Approach

The research had two main objectives:

1. Identifying vessel types, needs and operating characteristics through all phases of OSW development. Identifying regulatory or legislative requirements and/or other road blocks to the use of particular vessels. Identifying competitive advantages and disadvantages of vessel acquisition, lease, construction or other alternatives. Proposing solutions and recommendations that best position the State of New Jersey to be the national leader in OSW development, including potential inter-state or cooperative endeavors.
2. Proposing a port/OSW industry interface strategy for short, mid-, and long-term industry development. In general, identifying the maritime port life-cycle requirements for installation, construction, operation and maintenance based on geographic factors, potential manufacturing, labor pool, and port development.

The research approach was based on literature review using the European experience of equipment needs and as a base for analysis. An economic analysis was based on three OSW size development scenarios. Port selection criteria were developed based on New Jersey port characteristics and the European experience.

Key Findings

- The bulk of the economic benefit to New Jersey from offshore wind will be from wages and onshore overhead related to turbine installation and operations and maintenance activities.
- The vessel demand by vessel type depends on the adopted growth scenario.
- Offshore wind developers face three installation strategies: US Jack-up strategy, US Turbine Installation Vessel (TIV) strategy, and EU TIV strategy.
- For a 200MW project the most cost-efficient solution is to initially use a jack-up vessel. At larger capacity it is recommended to construct a purpose-built US TIV.
- The installation vessels can be owned by: offshore wind construction or service companies, financial entities, wind farm developers and major utilities.
- The offshore industry structure and function are based on five key sub-sectors in the offshore wind farm supply chain development: vessels, ports, electrical infrastructure, wind turbine, and substructures (foundations).
- The Jones Act indirectly governs the installation process and costs.
- Staging port selection and installation is based on choosing between manufacturing ports and staging ports.
- There are benefits from the development of OSW power in New Jersey, including:
    - The creation of a new high-tech industrial sector in the economy
    - The increase of manufacturing jobs
    - Increase in R&D and education
    - The increase of port infrastructure development
    - The creation in the offshore wind power supply chain
    - The increase of greener energy

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A final report is available online at: http://www.state.nj.us/transportation/refdata/research/. If you would like a copy of the full report, send an e-mail to: Research.Bureau@dot.state.nj.us.

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