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Abstract
The National Offshore Wind Energy Grid Interconnection Study (NOWEGIS) is one of several efforts funded by the United States Department of Energy to help remove barriers to offshore wind construction. To fulfill the objectives of this study, 3 years of 10-minute wind production profiles for hypothetical offshore wind projects in the Great Lakes, Atlantic Ocean, Gulf of Mexico, and Pacific Ocean were synthesized. Results will be used to help assess integration impacts and evaluate future deployment scenarios. The study team consists of the National Renewable Energy Laboratory (NREL), Duke Energy, the University of Pittsburgh, and AWS Truepower, and is led by ABB Inc. This paper discusses the development of the wind production profile data set, including the site selection, modeling the wind resource, and synthesizing realistic production profiles.

Objectives
• Objectives of this work:
  • Select locations for 54+ GW of offshore wind
  • Model realistic net production profiles for selected sites

Site Selection
• Use NREL ReEDS model 2030 projections for build-out scenario per zone based on wind resources, cost, and wind variability [1]
• Incorporate areas identified by The Bureau of Ocean Energy Management, Michigan Great Lakes Wind Council, 4C Offshore database as being favorable for offshore development


table

<table>
<thead>
<tr>
<th>Region</th>
<th>Number of Sites</th>
<th>Total Cap. (MW)</th>
<th>Mean Size (MW)</th>
<th>Mean NCF</th>
<th>Mean Dist. (km)</th>
<th>Mean Windp (100m, m/s)</th>
<th>Mean COE (5/MWWh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atlantic</td>
<td>84</td>
<td>68,229</td>
<td>812</td>
<td>0.401</td>
<td>40.6</td>
<td>8.642</td>
<td>207.7</td>
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<tr>
<td>Gulf</td>
<td>115</td>
<td>226,174</td>
<td>204</td>
<td>0.334</td>
<td>21.5</td>
<td>8.786</td>
<td>253.5</td>
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<tr>
<td>Lakes</td>
<td>26</td>
<td>50,411</td>
<td>158</td>
<td>0.393</td>
<td>25.1</td>
<td>8.487</td>
<td>251.4</td>
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<td>Pacific</td>
<td>27</td>
<td>24,577</td>
<td>864</td>
<td>0.416</td>
<td>47.1</td>
<td>11.430</td>
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<tr>
<td>Total</td>
<td>309</td>
<td>194,429</td>
<td>614</td>
<td>0.396</td>
<td>37.0</td>
<td>5.502</td>
<td>219.8</td>
</tr>
</tbody>
</table>

Results
• 54 GW of sites with lowest COE retained for further analysis
• 76 final sites
• Net CF ranges from 44%-63%
• Highest CF in deep waters offshore Oregon, California, New England

Wind Resource
• Build upon Eastern Wind Integration and Transmission Study (EWITS; [2])
• Model offshore 10-minute wind resource from 2004-2006 at 2-km resolution using the Mesoscale Atmospheric Simulation System
• Compare modeled speeds to elevated offshore measurements

Production Profiles
• Model net power production for 2004-2006 at each site following EWITS [2]
• Increased wake losses to account for larger turbines
• Reduced electrical losses to include only from turbine to offshore substation
• Adjusted modeled diurnal profile based on offshore measurements
• Apply correction to reduce spurious diurnal ramps due to ingestion of data into model

References