US East Coast offshore wind market, and,
Recommendations for regional offshore wind industry development

Selected slides for BOEM NC VA Intergovernmental Renewable Energy Taskforce
Webinar, 23 July 2019
Andy Geissbuehler
US East Coast offshore wind market

Significant market changes since 2017 BOEM NC VA Task Force meeting

New York Charts 9GW by 2035 Offshore Wind Path

Ørsted Completes Acquisition of Deepwater Wind

Shell, EDF Acquire US Wind’s New Jersey Lease Area

- Awarded offtake agreements expected to exceed 4 GW in 2019
- New York State nearly quadruples offshore wind policy targets
- Lease area winning bids and acquisitions exponential increase in unit price (USD per acre; see graph at right)
- Numerous strong industrial stakeholders pursuing US market
US East Coast OSW market: policy targets to 2035

OSW targets announced by East Coast States

Capacity by annual installation (MW)

- State driven offshore wind commitments exceed 21 GW by 2035
- Additional commitments anticipated, currently estimated at 7 GW

*2018 Virginia energy plan calls for 2000MW of offshore wind by 2028
**North Carolina anticipated based on PJM interconnection queue
### US East Coast OSW market: policy targets to 2035

**OSW targets announced by East Coast States**

#### Auctioned BOEM lease areas (MW) as of Dec 2018

<table>
<thead>
<tr>
<th>State</th>
<th>Lease No.</th>
<th>Developer</th>
<th>(MW, based on 3MW per km²)</th>
<th>BOEM Auction</th>
</tr>
</thead>
<tbody>
<tr>
<td>MA</td>
<td>0500</td>
<td>Ørsted (BSW)</td>
<td>3,036</td>
<td>2015</td>
</tr>
<tr>
<td>MA</td>
<td>0501</td>
<td>Avangrid/ CIP/ (VW)</td>
<td>2,702</td>
<td>2015</td>
</tr>
<tr>
<td>MA</td>
<td>0520</td>
<td>Equinor</td>
<td>2,085</td>
<td>2018</td>
</tr>
<tr>
<td>MA</td>
<td>0521</td>
<td>Shell/EDPR (MF)</td>
<td>2,062</td>
<td>2018</td>
</tr>
<tr>
<td>MA</td>
<td>0522</td>
<td>CIP/ (VW)</td>
<td>2,143</td>
<td>2018</td>
</tr>
<tr>
<td>RI</td>
<td>0486</td>
<td>Ørsted</td>
<td>1,578</td>
<td>2013</td>
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<tr>
<td>RI</td>
<td>0487</td>
<td>Ørsted</td>
<td>1,089</td>
<td>2013</td>
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<tr>
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<td>0512</td>
<td>Equinor</td>
<td>1,285</td>
<td>2016</td>
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<tr>
<td>NJ</td>
<td>0499</td>
<td>Shell/EDF (AS)</td>
<td>2,968</td>
<td>2015</td>
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<tr>
<td>NJ</td>
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<td>Ørsted</td>
<td>2,598</td>
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<tr>
<td>DE</td>
<td>0482</td>
<td>Ørsted</td>
<td>1,561</td>
<td>2012</td>
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<tr>
<td>MD</td>
<td>0489</td>
<td>US Wind.</td>
<td>530</td>
<td>2014</td>
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<tr>
<td>MD</td>
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<tr>
<td>VA</td>
<td>0483</td>
<td>Dominion</td>
<td>1,826</td>
<td>2013</td>
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<tr>
<td>NC</td>
<td>0508</td>
<td>Avangrid</td>
<td>1,981</td>
<td>2017</td>
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</table>

<table>
<thead>
<tr>
<th>State</th>
<th>MW per 15-yr policy targets</th>
<th>BVGA forecast MW</th>
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<tbody>
<tr>
<td>MA</td>
<td>3,200</td>
<td>3,200</td>
</tr>
<tr>
<td>RI</td>
<td>400</td>
<td>430 **</td>
</tr>
<tr>
<td>CT</td>
<td>2,000</td>
<td>2,000</td>
</tr>
<tr>
<td>NY</td>
<td>9,000</td>
<td>9,000</td>
</tr>
<tr>
<td>NJ</td>
<td>3,500</td>
<td>3,500</td>
</tr>
<tr>
<td>MD</td>
<td>1,200</td>
<td>1,200</td>
</tr>
<tr>
<td>VA</td>
<td>2,000 *</td>
<td>2,012 **</td>
</tr>
<tr>
<td>NC</td>
<td>2,400 ***</td>
<td>~4,500 MW</td>
</tr>
</tbody>
</table>

* 2018 Virginia Energy Plan calls for 2000MW of offshore wind by 2028
** Includes 30MW Block Island Wind Farm and 12MW CVOW project
*** Based on Avangrid interconnection requests in PJM queue

<table>
<thead>
<tr>
<th>State</th>
<th>MW of anticipated future plans in multiple states</th>
<th>MW</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Anticipated future plans in multiple states</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>~4,500 MW</td>
<td></td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>State</th>
<th>MW</th>
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</thead>
<tbody>
<tr>
<td>Total</td>
<td>21,300</td>
</tr>
<tr>
<td></td>
<td>~28,000 MW</td>
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US East Coast OSW market: offtake agreements to 2035

Offtake agreement status

Capacity by annual installation and developer (MW)

• ~5 GW of offtake agreements awarded, with additional GW’s expected for 2019
• Cumulative forecast within the currently available lease areas enabling ~28 GW
Recommendations for regional offshore wind industry development

US East Coast opportunity

- “PPA’s” awarded: ~ 4.9 GW
- “PPA’s” anticipated for 2019: > 0.8 GW
- 10 year conservative forecast: > 15GW

“Momentum driver” Recommendations

1. Create “Virginia Office for Offshore Wind”
2. Work towards a multi-state regional supply chain cluster
3. Solicit and attract “anchor tenant” companies for major components
4. Enable and grow opportunities through partnerships and infrastructure
5. Grow opportunities through workforce development

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Recommendations for regional offshore wind industry development

Integrated team with strong leadership by Governor’s Office and DMME

- Virginia Governor’s Office
- Virginia DMME
- VEDP
- TCE
- ODU
- VA EXCOM
- VOWDA
- Port of Virginia
- VMA / VSRA

BVG Associates Project Team
BVGA – Timmons – Ramboll – Business Network - Greentree

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Thank you

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