Wind Power Update

• National Perspective
• WV Perspective
• Who’s Buying and Why
• Industry Trends
National Perspective

• 35,000 MW in the pipeline
• 23% Increase over 2017
• 99% built in rural America
• > $1 Billion in State & Local Taxes and Lease Payments
• $12 Billion in new investment
• 114,000 Employed in Wind
• 500 US Factories
Figure 1
U.S. Annual and Cumulative Wind Power Capacity Growth (Utility-Scale Wind)

Utility-scale wind capacity includes installations of wind turbines larger than 100-kW for the purposes of the AWEA U.S. Wind Industry Annual Market Report. Annual capacity additions and cumulative capacity will not add up due to decommissioned and repowered capacity. Wind capacity data for each year is continuously updated as information changes.
West Virginia Perspective

• 6 Operating Wind Farms
• $1.2 Billion Investment
• $5 Million Annual Taxes
  • Property, State and B&O Taxes

• 5 Projects Under Consideration
• $815 Million Investment
• $4.3 Million Taxes
• $3 Million Lease Payments
• Hundreds of Construction Jobs

<table>
<thead>
<tr>
<th></th>
<th>Mt Storm</th>
<th>New Creek</th>
<th>Pinnacle</th>
<th>Mountaineer</th>
<th>Laurel Mountain</th>
<th>Beech Ridge</th>
</tr>
</thead>
<tbody>
<tr>
<td>MW</td>
<td>264</td>
<td>94.5</td>
<td>55.2</td>
<td>66</td>
<td>97.6</td>
<td>100.5</td>
</tr>
<tr>
<td>Owner</td>
<td>CCI</td>
<td>Enbridge</td>
<td>Clearway</td>
<td>Glidepath</td>
<td>AES</td>
<td>Invenergy</td>
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<tr>
<td>County</td>
<td>Grant</td>
<td>Grant</td>
<td>Mineral</td>
<td>Preston/Tucker</td>
<td>Randolph</td>
<td>Greenbrier</td>
</tr>
</tbody>
</table>
What do Voters Think?

- 70% of Voters - Favorable
- 66% say...
  - “we should encourage wind energy companies to invest more in our state”
  - “wind energy will create jobs and economic opportunity in areas that need it, while helping keep West Virginia’s air clean.”
- 53% have seen a wind farm
- 74% of them have a favorable opinion of them
West Virginia Perspective

• Long history of energy production and export
  • Coal
  • Natural Gas
  • Wind
  • Solar
Wind Industry’s Perspective

• Part of the Community
• Investment
• Jobs
• Lease Revenue
• Taxes
• Community Benefit Funds
U.S. corporate & industrial (C&I) renewables market activity through 2018

<table>
<thead>
<tr>
<th>Offtaker</th>
<th>GW under contract</th>
<th># of PPAs</th>
<th>% of market share (MW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Facebook</td>
<td>2.2</td>
<td>24</td>
<td>14.1%</td>
</tr>
<tr>
<td>Google</td>
<td>2.1</td>
<td>15</td>
<td>13.7%</td>
</tr>
<tr>
<td>Amazon</td>
<td>1.1</td>
<td>14</td>
<td>7.3%</td>
</tr>
<tr>
<td>AT&amp;T</td>
<td>0.8</td>
<td>4</td>
<td>5.2%</td>
</tr>
<tr>
<td>Walmart</td>
<td>0.8</td>
<td>10</td>
<td>5.1%</td>
</tr>
<tr>
<td>Apple</td>
<td>0.8</td>
<td>7</td>
<td>5.0%</td>
</tr>
<tr>
<td>Microsoft</td>
<td>0.6</td>
<td>5</td>
<td>4.1%</td>
</tr>
<tr>
<td>Exxon Mobil</td>
<td>0.5</td>
<td>2</td>
<td>3.2%</td>
</tr>
<tr>
<td>Equinix</td>
<td>0.4</td>
<td>3</td>
<td>2.4%</td>
</tr>
<tr>
<td>Zotos International</td>
<td>0.3</td>
<td>3</td>
<td>2.2%</td>
</tr>
<tr>
<td>Other</td>
<td>5.9</td>
<td>138.0</td>
<td>37.7%</td>
</tr>
</tbody>
</table>

Source: Wood Mackenzie
Figure 61
Non-Utility Wind Power Purchases, by Year

Note: Data include publicly announced physical and virtual power purchase agreements (PPA), direct ownership of onsite or offsite wind projects, and large-scale REC purchases associated with specific wind projects. Data is recorded at the time of announcement and does not indicate when the associated wind project is placed into operation.
Wind’s Future – The Trends

• We must innovate
  • Continue to drive down costs
• Advance Technology
• Offshore
• Storage
• Repowering
Figure 84
Evolution of the “Average” Utility-Scale Turbine

<table>
<thead>
<tr>
<th>Year</th>
<th>Average Hub Height (m)</th>
<th>Average Rotor Diameter (m)</th>
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<tbody>
<tr>
<td>2000</td>
<td>58</td>
<td>48</td>
</tr>
<tr>
<td>2005</td>
<td>75</td>
<td>65</td>
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<td>2010</td>
<td>80</td>
<td>84</td>
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<tr>
<td>2015</td>
<td>82</td>
<td>102</td>
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<tr>
<td>2018</td>
<td>88</td>
<td>116</td>
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