Opportunities in the U.S. Wind Market

Britt Theismann
Senior Vice President, Chief Operating Officer
American Wind Energy Association
American Wind Energy Association (AWEA)

• Founded in 1974

• More than 2,400 business members
  • Wind project developers
  • Wind turbine manufacturers
  • Component manufacturers: towers, blades, gears
    • More than 8,000 parts in a turbine

• www.AWEA.org extensive information on US wind resources
American Wind Energy Association

• Develops policies and conducts analysis to support wind industry growth
• Executes wind industry’s legislative agenda
• Promotes wind energy through advocacy, advertising and media relations
• Convenes conferences and workshops to educate public and bring industry together
“The U.S. possesses sufficient and affordable wind resources to obtain at least 20% of its electricity from wind by the year 2030.”

The 20% Wind Energy Scenario

Primary Findings:

• 20% wind electricity would require about 300 GW (300,000 MW) of wind generation
• Affordable, accessible wind resources available across United States
• Modest cost to integrate wind into electric grid
• Raw materials available
• Transmission a challenge
20% Wind Scenario

Cumulative Installed Capacity (GW)

- Offshore
- Land-based

Years:
- 2000
- 2006
- 2012
- 2018
- 2024
- 2030

Values:
- 0
- 50
- 100
- 150
- 200
- 250
- 300
2008: Fourth Record Year of Growth

• Installed 8,353 MW in 2008
  • Enough to serve over 2 million homes
  • Channeled $17 billion of economic investment into U.S. economy

• 50% growth in total wind power generating capacity in a single year

• Wind power is a leading source of new power generation, along with natural gas
  • Wind provided 42% of new U.S. power producing capacity in 2008
The U.S. installed more than twice the installations necessary in 2008 to get to 20% electricity generation by 2030. The cumulative capacity of 25.3 GW was not projected to be reached until late 2010.
Wind Manufacturing Facilities Across the U.S.

- 55 manufacturing facilities opened, expanded or announced in 2008
- Wind industry now employs 85,000 in U.S.
U.S. is World Leader in Wind Power

With over 25,000 megawatts, the U.S. is now the #1 wind energy producer in the world.

Global Wind Energy Council,
January 2009
The Political Environment in 2009

President Obama called a doubling of renewable energy in 3 years
On February 17, 2009, President Obama signed the American Recovery & Reinvestment Act (ARRA)

Multiple provisions to benefit wind industry
ARRA Benefits for the U.S. Wind Industry

- Extends production tax credit through 2012
- Allows for a temporary 30% investment tax credit
- Tax credit can be swapped for Treasury grant
- Small wind turbines now eligible for full 30% ITC
- New 30% manufacturing tax credit
- New loan guarantee program
- R&D funding
- Transmission funding
2009 Environment: U.S. Congress

- Renewable Electricity Standard (RES)
- Climate Change Legislation
- Transmission Reforms
National Renewable Electricity Standard

• AWEA: 25% by 2025 RES
• National policy for renewable energy
• Congress acting Fall 2009
• Outcome uncertain
Federal Level Transmission Policies

• Interconnection-wide transmission planning
• Interconnection-wide transmission cost allocation and certainty for cost recovery
• Federal siting
National Climate Change Legislation

• Seeking cap-and-trade law to reduce carbon dioxide emissions 15-20% by 2020 to reduce global warming
• Congress acting summer 2009
• Outcome uncertain
Domestically Manufactured Components
The U.S. installed more than twice the installations necessary in 2008 to get to 20% electricity generation by 2030. The cumulative capacity of 25.3 GW was not projected to be reached until late 2010.

Installed capacity as of January 2009 => 25 GW so industry is two years ahead of schedule.
Outlook for 2009

U.S. Wind Installation Growth

Over 4,000 MW installed in 1st half of 2009

2,860 MW commissioned in 1Q09

1,210 MW commissioned in 2Q09

>5,500 MW under construction (for completion in 2nd half of 2009 and/or first half of 2010)
Britt Theismann, AWEA  202.383.2500
btheismann@awea.org

For more info:
www.awea.org/valuechain
www.awea.org/legislative
www.20percentwind.org
RES Analysis, updated 6/5, includes Senate ENR Amendments from 6/4
Additional RE Generation Required for RES Compliance

- 25% RES by 2025 (original Markey/Udall, Obama Platform)
- 20% RES by 2021 with 5% EE (original Bingaman)
- Latest House Proposal, 20% by 2021 with up to 8% EE
- Latest Senate Proposal, 15% w/ 4% EE
- Latest Senate Proposal, 15% w/ 4% EE, (w/ 6/4 amdmts)
- Existing State RPS

RES Analysis, updated 6/5, includes Senate ENR Amendments from 6/4
Building the Wind Manufacturing Capacity in the U.S.
Wind Turbine Technology

- **Hub Height:**
  60-100 meters
  (197-328 feet)

- **Rotor Diameter:**
  70-100 meters
  (230-328 feet)

- **Total Weight of Turbine:**
  230 - 340 tons
Turbine Components

There are over 8000 components in a turbine, including:
Over 500,000 Total Jobs Supported By Wind In DOE report

Fact: in 2008, 35,000 new jobs added

New U.S. Manufacturing Capacity
2008 Installations by WTG Mfgr

<table>
<thead>
<tr>
<th>Company</th>
<th>MW Capacity</th>
<th># of Turbines</th>
</tr>
</thead>
<tbody>
<tr>
<td>GE Energy</td>
<td>3657</td>
<td>2438</td>
</tr>
<tr>
<td>Vestas</td>
<td>1120</td>
<td>569</td>
</tr>
<tr>
<td>Siemens</td>
<td>791.2</td>
<td>344</td>
</tr>
<tr>
<td>Suzlon</td>
<td>736.1</td>
<td>363</td>
</tr>
<tr>
<td>Gamesa</td>
<td>616</td>
<td>308</td>
</tr>
<tr>
<td>Clipper</td>
<td>595</td>
<td>238</td>
</tr>
<tr>
<td>Mitsubishi</td>
<td>516.4</td>
<td>515</td>
</tr>
<tr>
<td>Acciona WP</td>
<td>409.5</td>
<td>273</td>
</tr>
<tr>
<td>REpower</td>
<td>102</td>
<td>51</td>
</tr>
<tr>
<td>Fuhrlander</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>DeWind</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>AWE</td>
<td>1.8</td>
<td>2</td>
</tr>
<tr>
<td>Other</td>
<td>3.9</td>
<td></td>
</tr>
</tbody>
</table>

Includes Turbines Larger Than 100 kW
U.S. Manufacturing Locations

● Over 40 U.S. states host wind related manufacturing

● Wind manufacturing is spread across the U.S. with major turbine manufacturers operating in varied regions

● With the growth in the industry, many states have recently entered into the supply chain.
Current Manufacturing Capacity

- There are well over 120 manufacturing facilities for turbines and large components currently online in the U.S.
- U.S. manufacturers are producing all the turbine’s components.
- In 2005, about 70% of turbine & major components were imported into the U.S.
- Domestically manufactured components in turbines account for about 50% by value.
Over 4,000 MW installed in 1st half of 2009

2,860 MW commissioned in 1Q09

1,210 MW commissioned in 2Q09

>5,500 MW under construction (for completion in 2nd half of 2009 and/or first half of 2010)
Wind Energy Growth Outlook

• Locations of proposed wind projects offer some insight into likely locations of future development

• Of course, not all proposed projects will be built

• Bulk of proposed projects located in Midwest/Plains/Texas

• Transmission availability likely to be major determinant of growth in the near- to mid-term
NERC: Planned and Proposed Wind Capacity by Region

Source: NERC

[Bar chart showing wind capacity by region for 2008 and 2017 for ERCOT, FRCC, MRO, NPCC, RFC, SERC, SPP, and WECC, with bars divided into blue for existing, orange for planned, and yellow for proposed capacity.]
300,000 MW of Proposed Wind in Interconnection Queues
300,000 MW of Proposed Wind in Interconnection Queues
Wind Queues by State

MW of Proposed Wind Projects

State
## Near-term Transmission Projects for Wind

<table>
<thead>
<tr>
<th>Transmission Project</th>
<th>Voltage (kV)</th>
<th>MW of Wind Expected</th>
<th>Year Online</th>
</tr>
</thead>
<tbody>
<tr>
<td>Populus-Terminal (ID, UT)</td>
<td>Double 345</td>
<td>1,600</td>
<td>2010</td>
</tr>
<tr>
<td>Walla Walla-McNary (OR, WA)</td>
<td>235</td>
<td>400</td>
<td>2010</td>
</tr>
<tr>
<td>Southwest Intertie (ID, NV)</td>
<td>500</td>
<td>1,850</td>
<td>2011</td>
</tr>
<tr>
<td>Northeast Energy Link (ME, NH, MA)</td>
<td>(DC) 320</td>
<td>1,000-2,000</td>
<td>2012</td>
</tr>
<tr>
<td>BPA lines from Open Season (WA, OR)</td>
<td>500</td>
<td>2,800</td>
<td>2012</td>
</tr>
<tr>
<td>CREZ (TX)</td>
<td>345</td>
<td>9,859</td>
<td>2012-2013</td>
</tr>
<tr>
<td>CO-WY intertie (WY)</td>
<td>345</td>
<td>900</td>
<td>2012-2013</td>
</tr>
<tr>
<td>CapX (MN, SD, ND)</td>
<td>345</td>
<td>2,275</td>
<td>2012-2014</td>
</tr>
<tr>
<td>Tallgrass/Prairie Wind (KS, OK)</td>
<td>765</td>
<td>5,800</td>
<td>2013</td>
</tr>
<tr>
<td>Tehachapi (CA)</td>
<td>500</td>
<td>4,500</td>
<td>2013</td>
</tr>
<tr>
<td>Pawnee-Smoky Hill upgrade (CO)</td>
<td>345</td>
<td>500</td>
<td>2013</td>
</tr>
</tbody>
</table>

Total ~32,000 MW
Other Analysts’ Projected Wind Growth Nationwide

Note: AWEA does not make industry forecasts or endorse any external forecasts.
“A green, renewable energy economy isn’t some pie-in-the-sky, far-off future – it is now. It is creating jobs – now – and it can create millions of additional jobs, an entire new industry, if we act – now.”

Barack Obama
Conclusions

- U.S. wind power growing
- Driven by need for jobs and carbon reduction
- More U.S. manufacturing facilities needed
- The long awaited US Treasury Grant Program has finally started generating checks, spurring a return to 30% growth for the US Wind Energy Industry.