Wind energy research and the industry

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Wind energy research and the industry

Peter Hauge Madsen
Head of Dept.

Wind Energy Denmark
Annual Event 2016
What is the importance to the wind industry of having a strong Danish base?
What is the importance to Denmark of having a strong wind industry?
The Wind Industry in Denmark
Good framework conditions for the sector

Well-established sector
- Costs
- Operation
- Integration

Focus on
- Industrialization
- Reliability
- Quality and validation
- Optimization
- Innovation

Need for
- Access to state-of-the-art knowledge
- Test and demonstration facilities
- Qualified staff
- Market for demonstration

University role
- Research (knowledge generation)
  - Education and training
  - Contribution to innovation
  - Tests and consultancies
Research and test facilities

Public. 2010-15

- Full-scale testing facilities (Østerild and Høvsøre)
- Blade tests (Blaest)
- LORC
  - Nacelle tests
  - Support structures
  - Climate chambers
- Windscanner
- Research turbines
- National Wind Tunnel
- Large scale structural test facility (Villum foundation)
- Lab facilities
- ...

Web of Science 21-10-2016, topic: "wind energy" OR "wind power" OR wind turbine" OR "wind farm"
## National Research Budgets

<table>
<thead>
<tr>
<th>Nation</th>
<th>2015 Budget in mio EUR</th>
<th>Jobs X 1000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Denmark</td>
<td>14.3</td>
<td>31</td>
</tr>
<tr>
<td>Germany</td>
<td>91.1</td>
<td>150</td>
</tr>
<tr>
<td>Spain</td>
<td>86.4</td>
<td>20</td>
</tr>
<tr>
<td>Japan</td>
<td>117.2</td>
<td>4</td>
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<tr>
<td>USA</td>
<td>98.3</td>
<td>88</td>
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<tr>
<td>European Commission</td>
<td>91.9 (research)</td>
<td>330</td>
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<tr>
<td></td>
<td>197.6 (demonstr.)</td>
<td></td>
</tr>
</tbody>
</table>

Source: IEA Wind TCP, 2015 Annual Report
Concluding remarks

• Together strengthen the strategic priority of public wind energy research in Denmark
• New models for industry-university cooperation
• Increased coordination of the Danish research, test and education efforts through MEGAVIND
• Plan the Danish effort in an European and global context