ØRSTED WIND POWER WAY OF WORKING WITH RD&D

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Jørn Scharling Holm,
Technology Partnership Manager
Ørsted’s overview of levers for CoE reduction

Multiple levers to drive down cost in offshore wind power

1. Scale
   - Turbines size
   - Sites size
   - Vessel size

2. Innovation
   - Foundation
   - Electrical infrastructure

3. Industrialisation
   - Transition from single supply to multiple global suppliers

Rapid technological development
Wind turbine rotor diameter, year of commissioning

- 80 m: 2002
- 90 m: 2005
- 107 m: 2007
- 120 m: 2011
- 154 m: 2014
- 164 m: 2016
- 180 - 200 m: 2020

Boeing 747, 76m
Ørsted R&D strategy and types of collaboration

1. R&D strategy review

2. Project outcome, scope and impact
   - Project management efficiency and administration
   - Confidentiality and IPR
   - Competence match
   - Internal / external funding

3. Foundation concept
   - Wake models
   - Geoscience models

Types of R&D projects:
- Internal R&D projects
- Small collaborative R&D projects
- Joint Industry Projects
- R&D Programmes
- Large R&D consortium projects
Ørsted R&D strategy and types of collaboration

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3. Types of collaboration:
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### Ørsted’s R&D Programme

#### R&D Strategy
- organised in 5 Roadmaps

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- **Roadmap 1: Wind & Waves**
  - Measurements: Lidar, radar, buoys
  - Modelling: Lay-out, AEP, Loads, etc.
  - Power curve validation

- **Roadmap 2: Foundations, Geoscience and Marine**
  - Geotechnical survey methods
  - Monopile/ jacket design methods
  - Soil-structure interaction
  - Underwater noise damping
  - Corrosion protection

- **Roadmap 3: Electrical Infrastructure**
  - Substation design
  - Array and export cables layout and installation
  - Grid simulations
  - Grid connection
  - Ancillary services

- **Roadmap 4: WTG O&M**
  - Component reliability
  - New components
  - New O&M inspection and replacement methods

- **Roadmap 5: Logistics**
  - Logistics modelling and optimisation
  - Accommodation set-up development

#### Objectives

Enable the pipeline, CoE reduction, Risk reduction, HSE performance, Design standard improvements and competence development
Collaboration with universities and research institutions
- building competences leading to improved R&D

List not exhaustive.
Example on joint demonstration and commercialisation - Carbon Trust OWA

Six research areas - Focusing on everything but the turbine, representing roughly **70% of offshore wind energy costs**

LCOE Breakdown

- Development: 2%
- Construction: 12%
- Finance: 33%
- Installation: 19%
- Foundations: 12%
- Electrical: 12%
- Turbine: 22%

Source: Navigant
Innovation is critical to delivering cost reduction and building supply chain capability

- Balance of support required across technology readiness levels (TRL)
- Forging links between industry and academia can maximise market penetration of new technologies
- Greater information and data sharing can accelerate technology innovation

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Thank you for your attention