Drivers for innovation

13/02/2018 | Andrew Tipping
Agenda

• Brief introduction to ORE Catapult
• Offshore Wind Market Overview
• Key Market Drivers for NDT
• OWIX (Offshore Wind Innovation Exchange)
The Catapult Network

Innovate UK

- Designed to transform the UK's capability for innovation
- Core grant leveraged with industry and other public funding
Our Mission:
Accelerate the creation and growth of UK companies in the ORE sector

• Reduce the cost of offshore renewable energy
• Deliver UK economic benefit
The Role of ORE Catapult

- Operating £1/4bn of world-leading test and demonstration facilities in support of UK innovation.
Our Impact in 2017 / 18

- £1.4bn Value of Test Facilities
- 46 Companies Supported with Product Development
- 241 Industry Collaborations
- 195 Academic Collaborations
- 100 R&D Projects
- 196 Yearly Uplift in Competitive R&D
- 58% Yearly Uplift in Competitive R&D
- 33 International Projects
Commercialising technology with SMEs

164 SMEs supported in 2017/18

410 SMEs supported since 2013
Offshore wind market overview
UK Offshore wind projects

UK Project Rounds:

Round 1: 1.2 GW
Round 2: 5.6 GW
Round 2.5: 1.7 GW
Round 3: 24.4 GW
Scottish Territorial Waters 1: 1.8 GW
UK wind energy capacity

Sector deal vision: 30 GW offshore wind by 2030
UK wind turbines

- Wind turbine installation growth rate is estimated at 5% offshore
- Increase in size of turbine rating (> 10 MW) = reduced installation rate as fewer turbines needed for same energy production
Consistent growth of offshore wind globally over the last five years with the market more than tripling in size.
United Kingdom
• 2020 Operational Turbines
• 8.53 GW

Rest of Europe
• 2470 Operational Turbines

Globally
• 5046 Operational Turbines

http://electricinsights.co.uk/#/dashboard?_k=q8az3x
Market drivers
Drivers for NDT market: Increasing asset value

12MW in 2025 = £3.3m/yr. (£53/MWh price)
2MW in 2004 = £0.7m/yr. (£140/MWh price)

12MW = £9k /day
2MW = £2k /day
Less is more: Wind farms growing with fewer turbines

175 turbines 630MW

London Array

87 Turbines 659MW

Walney Extension

Competitive CfD Auction process drives cost reduction
The cost of failure

12MW = £9k/day

Large Jackup vessel = £1-200k/day

Mobilisation = ?

Replacement blade = 350-400k

Weather delay = ?
Reducing operational cost through predictive maintenance

- Reliability testing
- Condition monitoring (NDT)
- Analytics
- Predictive maintenance
- Scheduled pre planned maintenance
Life extension & Repowering

- 25 Year Design Life
- Consenting as lengthy and risky process
- £80m to get project ready for CfD bid
- Increase output of existing fleet?
- Moving beyond 25?
Case Study: iFROG

Develop a robotic NDT inspection platform to support maintenance of offshore wind turbine foundations

ORE Catapult role:
• Industry requirements
• Testing and validation
• Commercialisation strategy
Case Study: Bladebug

Multi use robotic platform for wind turbine blade inspection

• Increase operational window
• Reduce rope access requirement
• Enhanced data to support maintenance strategy

Innovate UK
OWIX: Offshore Wind Innovation Exchange
Picking winners in a complex landscape
Innovate UK family

OWiX is delivered by the KTN and ORE Catapult
**OWiX competition introduction**

**Requirements that OWiX fulfills**

- **Offshore wind technical issues**
  - OEMs and utility companies have:
    - Confidential engineering challenges to solve with no time to explore markets
    - Low exposure to companies outside the offshore wind supply chain

- **Technical solutions from other sectors**
  - Solution providers find it difficult to:
    - Find the right person within a target customer’s organisation
    - Prove the value proposition of products
    - Understand customer’s time constraints
Example challenge

Challenge: “Subsurface structural inspection of large composite wind turbine blades”

- Solution should be capable of detecting a minimum physical flaw/defect of 10mm at a resolution of +/- 5mm, ideally to the depth of 5cm. The flaws may include a surface/subsurface crack, voids, debonding, delamination, etc.
  - The priority is to identify sub-surface defects
  - Validation of solution: within 1 year
  - Field trials: within 1-2 years
  - Commercial implementation: within 3 years

- Solutions must be able to be operated safely and reliably in offshore conditions with:
  - Wind speeds of 8m/s, with gusts of up to 25m/s
  - An ambient temperature 0-40 C
  - Heights of 100-200m from sea level
  - Distances up to 25km from shore, ideally up to 40km

- New solutions must offer faster inspection rate at a lower overall cost. Current industry practice is capable of inspecting three blades per day at an estimated cost of £6,000.
- An ideal solution should aim to achieve a 50% overall improvement on cost and time of inspection.
NDT Challenges so far

Wind

• Inspection of the blades in the factory to ensure quality manufacture including no wrinkles or sharp edged voids.
  – Drones
  – Robots
    • X Ray back scatter
    • Ultrasound
    • Microwave
    • Light systems
OWiX results in numbers

How the competition performed

- **69** applications across seven challenges in two competitions
- **20** Previously unseen UK companies were given the opportunity to pitch their idea
- **6** live demonstration projects with an OEM and a utility company
- **4** Commercial contracts are in place between a turbine OEM and OWiX winners
Finding the challenges

OWiX

The Offshore Wind Innovation eXchange (OWiX) is an innovation platform that solves offshore wind industry challenges by running competitions to connect solution providers in different sectors directly with offshore wind industrials.
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