Subsea Innovation challenges in Offshore Wind

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Agenda

- Who are the ORE Catapult
- UK Market Context
- Creating the Challenges
- Innovation Challenges
- Case Studies
- Funding Options
The Catapult Network
A long-term vision for innovation & growth

11 Catapults

£1.4bn IUK programme, funded by BEIS
To transform the UK's capability for innovation
Driving growth in key strategic sectors for the UK

“Affordable energy from Wind, Wave and tidal”

Research
Testing
Program Development
Driving research & innovation: Collaboration & Partnership

Industry Advisory Group
Chair: SPR

Responding to industry need

Research Advisory Group
Chair: Edinburgh University

Access to best research and facilities

Partnerships and strategic alliances
UK’s offshore renewable energy opportunity

- 1,465 offshore turbines (3,320 in Europe)
- 5.1GW operational (11 GW in Europe)
- 10GW installed by 2020
- Latest CFDs £105-120/MWh indicate LCOE £102-107/MWh
### Offshore wind Market Opportunity

**Global Market**
- **Now**: 11GW
  - UK Market: 5GW
- **2020**: 20GW
  - UK Market: 10GW

<table>
<thead>
<tr>
<th></th>
<th>Value of total project %</th>
<th>UK content / GVA</th>
<th>Key players</th>
<th>Time to Market and Dev costs</th>
<th>Barrier to entry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turbine</td>
<td>30-35%</td>
<td>Low-Med</td>
<td>OEMs</td>
<td>Long / High</td>
<td>High for turbines, med for tech.</td>
</tr>
<tr>
<td>BOP</td>
<td>35%</td>
<td>Med</td>
<td>OEMs and Tier 1</td>
<td>Med / high</td>
<td>High</td>
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<tr>
<td>O&amp;M</td>
<td>20-25%</td>
<td>High-V High</td>
<td>Large offshore contractors SMEs</td>
<td>Short / High for ops, low for tools</td>
<td>Low</td>
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**Key players**
- **OEMs**: Long / High
- **Tier 1**: Med / High

**Big opportunity for UK supply chain innovation and investment**
Cost Reduction Monitoring Framework: informing priorities

- Each year ORE Catapult tracks cost reduction on behalf of the industry through financial “audit” and interviews with the supply chain.
- The resultant “CRMF” is the dashboard which is used to inform where we focus efforts.
Informing innovation: O&M Forum

- Discussion forum with UK offshore wind farm owner/operators
- Attended by offshore wind farm asset managers

Outputs

- Valuable insight to help shape ORE Catapult activities
- Joint Industry Projects
- Innovation Challenges
Cost reduction strategies for O&M

- Reduce demand for vessels/technicians through improved planning/dispatch decisions and use of autonomous vehicles
- Reduce fuel costs for vessels via increased efficiency of performing maintenance tasks (improved planning and use of autonomous vehicles for inspection and servicing)
- Better turbine access in the winter due to improved access forecasting
- Fewer missed opportunities to perform O&M due to improved access forecasting and improved planning
- Improve reliability through improved condition monitoring of components
- Increase life-time of wind farms using software tool that enables improved management of wind farm components
- Optimized selection and scheduling of resources intra-day (vessels, technicians, equipment, inventory) due to improved planning and access forecast
Engaging the supply chain: Needs Driven Innovation

**Owner/Operators**

Subsea cable faults contributed to 77% of the financial losses of offshore wind projects – Must improve!

**ORE Catapult**

Innovation Challenge Call

Collaborative Innovation Project

**Supply chain innovators**

+ External Funding

Ideas

Innovations

Technology Solutions
Innovation Challenge Process

Stimulate innovation

Due diligence/suitability assessment
- Validate technology, commercial proposition
- Develop plan and define collaboration.
- Define and source development resources

Collaborative project
- Identify and access test and demo assets.
- Partners and funding
- Routes to market.

- Challenge areas launched and on website with Expressions Of Interest (EOI) process.

www.ore.catapult.org.uk/innovationchallenges
## Subsea Innovation Challenge Examples

<table>
<thead>
<tr>
<th>Knowledge Area</th>
<th>Innovation Challenge Area (examples)</th>
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<tbody>
<tr>
<td>Electrical Infrastructure</td>
<td>Prevention of free spanning cables</td>
</tr>
<tr>
<td>Foundations &amp; substructures</td>
<td>Improved Scour Monitoring</td>
</tr>
<tr>
<td>Operation &amp; Maintenance</td>
<td>Develop autonomous solutions for subsea survey</td>
</tr>
<tr>
<td>Environmental</td>
<td>Improve marine mammal detection during piling operations</td>
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</tbody>
</table>
Case Study: Marine Growth on Jackets

Current Mitigation Method
- Time Consuming
- Vessel required
- Intensive technician support
- Risk
- Cost

Potential Solution
- Collaboration between Wind Farm Owner/Operator, UK SME and ORE Catapult

- Foundations have design limitations for marine growth
- Permanently reducing marine growth could reduce steel requirement
- CAPEX & OPEX impact
Case Study: Enhanced trenching capability

The Challenge
Improve trenching efficiency

The Solution
Develop a trencher with enhanced manoeuvrability and speed

2 yr. R&D project with IHC Engineering Business

£300k ERDF Funding secured
Technology Demonstration: Met Mast & Docks

Catapult platform providing broad spectrum of opportunities for:

- LiDAR and floating LiDAR validation
- Evaluating environmental conditions
- Foundations with detailed data capture
- Collecting wildlife data
- Geotech research
- Wet testing
Innovation Funding Opportunities

SCORE program
Grants £50,000 (40% of eligible costs)
SMEs in Cambridgeshire, Essex, Norfolk and Suffolk

Up to £20k (70% funding with 30% in-kind contribution)
Access Scottish Universities researchers and lab test facilities
Scottish SMEs
1 week decision turnaround
1) Infrastructure Systems call
- Opened on 3rd October
- Register by 30th Nov
- Closes 7th Dec
- £35K - £2 million

2) Emerging Technologies call
- Opened on 3rd October
- Register by 30th Nov
- Closes 7th Dec
- £35K - £2 million

€50,000 - €2.5 million
70% Funding
ORE Catapult Partners & Funding Opportunities

ESA Integrated Applications Promotion

- Goal of supporting development of new operational services that use space systems.

- Space systems include Satcoms, Positioning, Earth Observation …

- Challenges that can be addressed go from wind farm connectivity through operational command systems to mammalian tracking.

- Funding available for feasibility studies and technical demonstrators – applications assessed quarterly.

- Support available to assemble projects via ESA Ambassadors for Offshore Energy

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  https://artes-apps.esa.int/ambassador-platforms/offshore-energy

NOAA 3hr wave prediction

SAR turbine wake image
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