

ORE Catapult Presentation

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OREC Main aims include assisting UK business and helping to bring down the cost of offshore wind.

- De-risking technology and enabling innovation
- Leading and collaborating on projects
 - Fundamental Research
 - Technology Innovation
 - Demonstration and Validation
 - Business Case Development
 - Cross Sector Technology and Services
 - Stakeholder Engagement
- Providing expertise and services in testing and demonstration



Owner and operator of world leading test, demo and validation assets



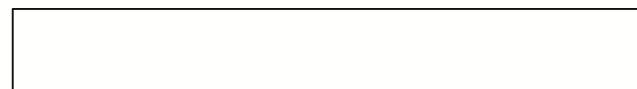
Marine Test Facility



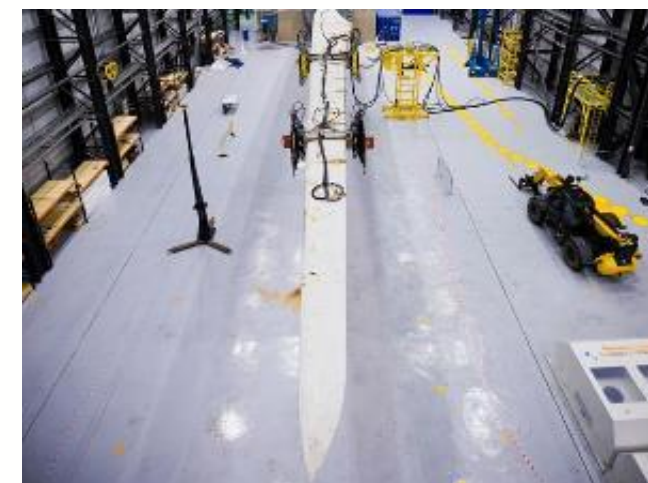
- Saltwater environment
- Still water tank
- Simulated seabed
- Testing
 - ROVs
 - AUVs
 - Subsea docking
 - Cable Trenchers



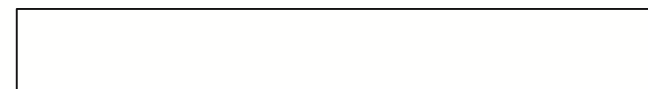
Offshore Demonstration



- Operational turbine
- Jacket foundation
- Monopile foundation
- Demonstrating
 - UAVs
 - ASVs
 - AUVs
 - Internal robotics



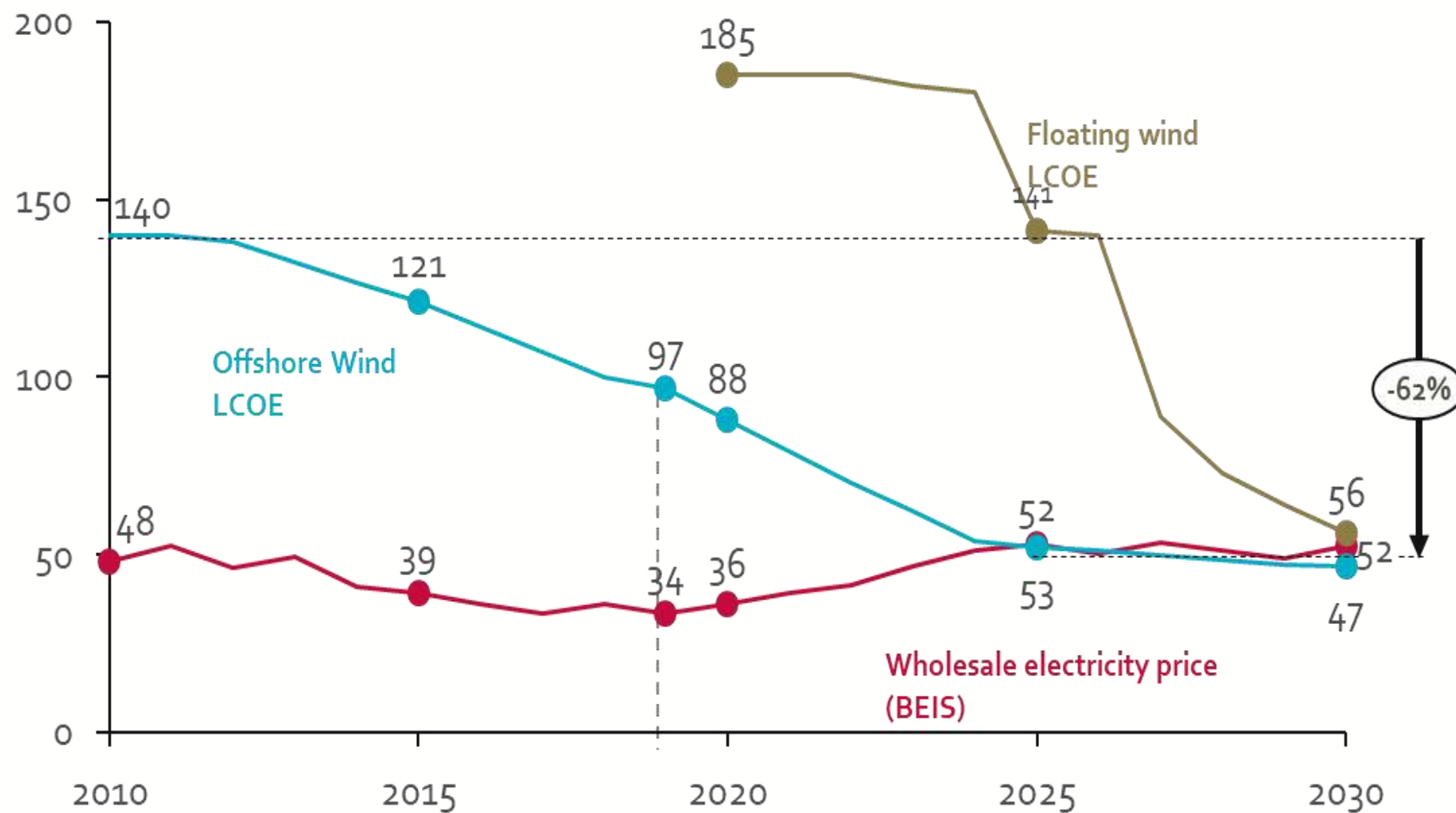
Blade Test Facility



- 100m and 50m test halls
- Blade testing hub
- Testing
 - UAVs
 - Robotic crawlers
 - Internal systems
 - External systems

Offshore wind and electricity market prices

£/MWh (2012 prices)



Source: ORE Catapult database

- LCOE of offshore wind turbines with bottom fixed foundations are expected to reach wholesale electricity price by 2025 and will decrease by 62% comparing to 2010.
- LCOE of floating wind will be comparable with wholesale electricity prices by 2030.

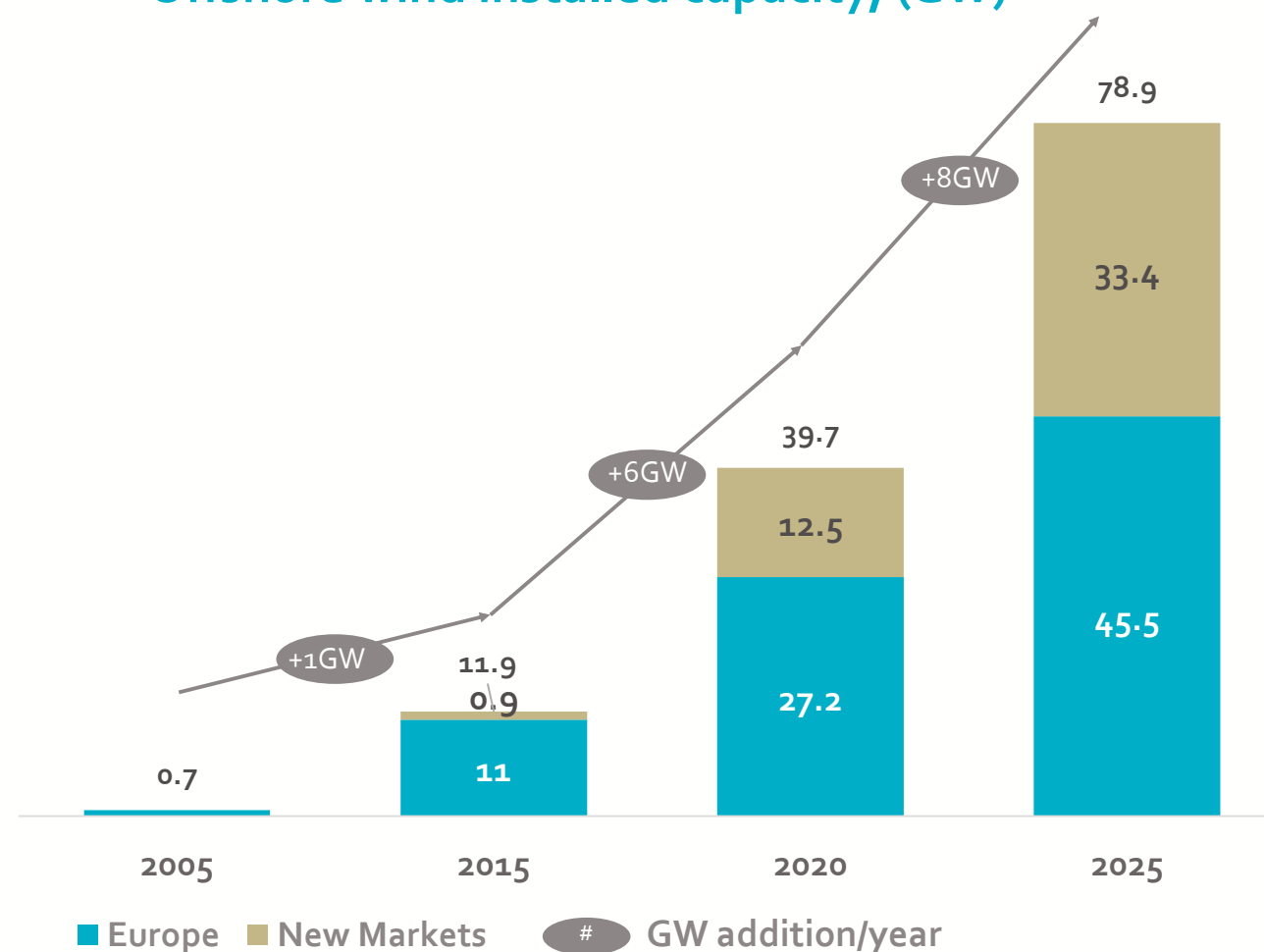
The ultimate potential for offshore renewables is truly enormous.

- **By 2020:**
- 10GW will be installed in the UK
- +10GW across the rest of Europe
- 5GW in China

- **By 2030:**
- up to 30GW in UK waters
- +20GW in the US

- **Global investment in excess of £250bn**

Offshore wind installed capacity, (GW)



Source: Bloomberg New Energy Finance (BNEF), H2 2016 offshore wind market outlook

O&M is a major contributor to the cost of Offshore Wind

- Typically costs **£75million/year** for a 1GW wind farm (Crown Estate)

O&M activities include:

- **Scheduled Maintenance** – preventative measures
- **Reactive Maintenance** – unplanned measures
- **Condition Based Measures** – continuous evaluation of system conditions
- **Statutory Inspections**



Experienced in development of test and validation processes

- Rope access is baseline method for inspection
- Typical inspection campaigns:
 - Reactive Inspections
 - End of warranty inspection
 - Annual / 2 Yearly inspection (20 – 30%)
- UAVs are becoming more common:
 - Reduced time for inspection
 - Reduce rope access and time offshore
 - Decrease cost / Improve H&S
 - However still relatively immature

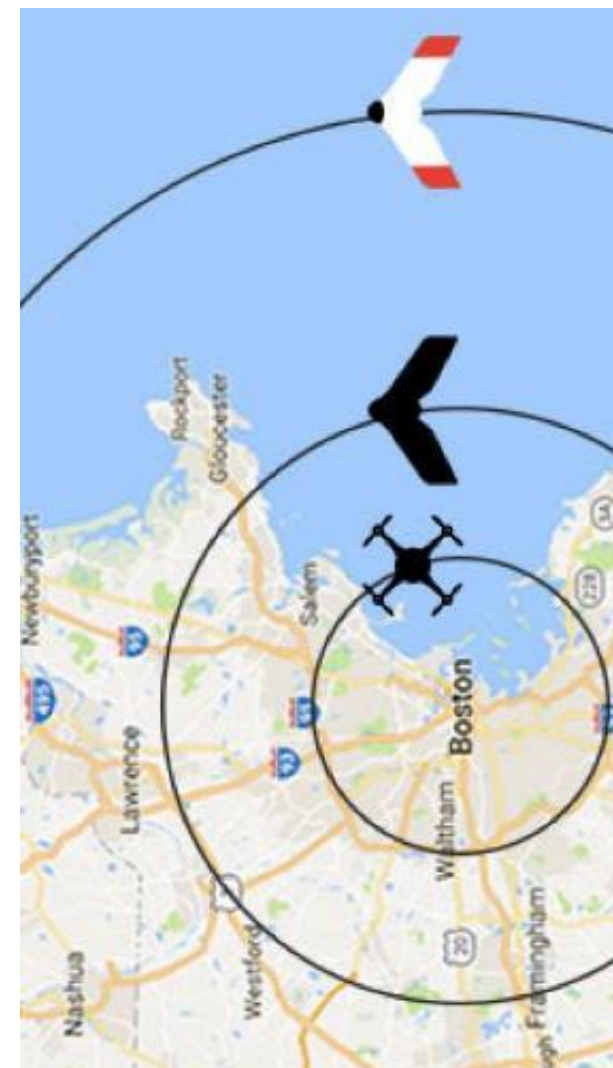


Rope access inspections are typical



UAV blade inspections are being used

- **Beyond visual line of sight operations are the ultimate goal**
- High levels of cost associated with human presence offshore
- BVLOS operations seen as:
 - High cost reduction
 - High safety improvement
- However major challenges need to be overcome:
 - Legislation
 - Technology



Feasibility Study & Market Analysis –
Perceptual robotics
UAV residency study & WASP



Funding Identification
– MIMRee – 4.2M (3M from IUK)



Engineering and Test Services for Risk Reduction – GRASP resident drone



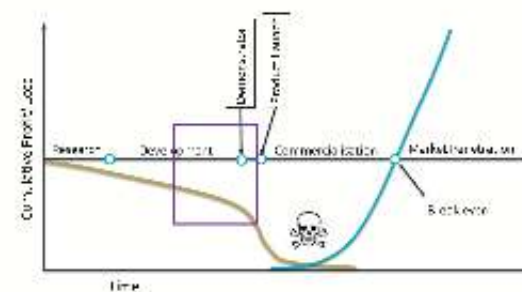
Technology Assessment & Benchmarking– Drone blade inspection workshop



Innovation Challenges – GE industry lead challenges



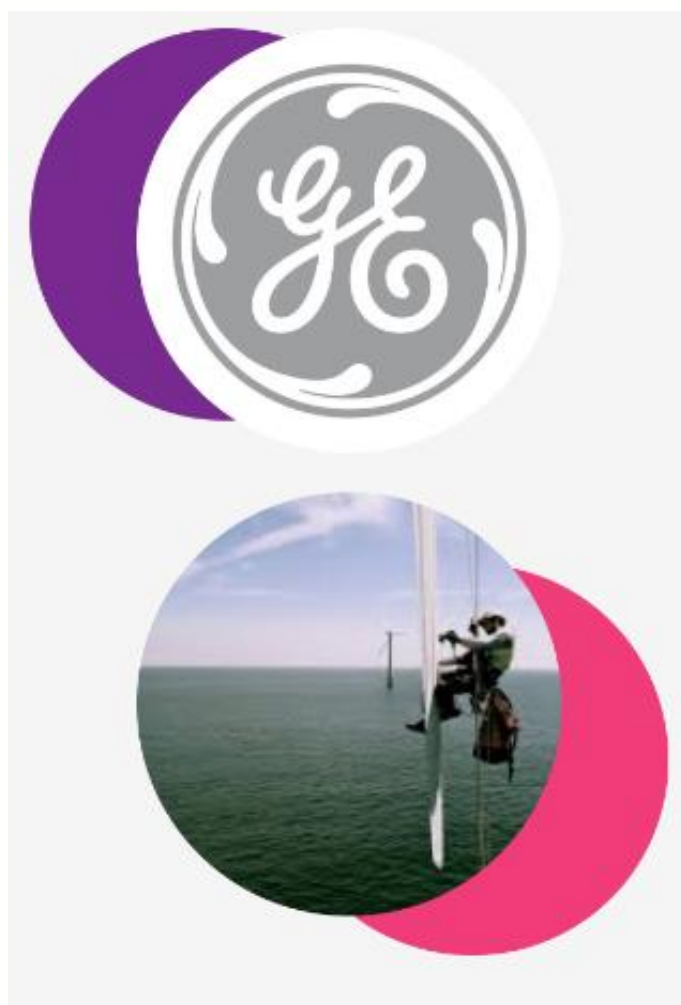
Commercialisation
- Launch academy



- Autonomous planning of inspection and repair missions
- Deployment of unmanned aerial vehicles (UAVs) from an autonomous surface vessel hub
- Visual inspection of operational rotating wind turbine blades
- The ability to conduct autonomous blade repairs
- Landing a robotic repair platform on a turbine blade using an UAV
- Remote and autonomous charging, launching, landing and storage capabilities for UAVs
- Optimisation of robotic platforms for the offshore environment
- Development of a human-machine interface for communicating with the remote hub and autonomous vehicles



Innovation Challenges –GE industry lead challenges



“The Robotics Innovation challenge competition, delivered in partnership with ORE Catapult and the Knowledge Transfer Network, is supporting GE to identify innovative solutions to innovation challenges”

“GE seeks an inspection method that eases the job by eliminating human resource exposure to rope climbing.”

Contact us

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