Carbon Trust

Research priorities from utility perspective – update on Carbon Trust's Joint Industry Programme

17 Oct 2017 – London

Agenda

1. Carbon Trust introduction
2. Offshore Wind Accelerator
3. Floating Wind JIP
4. ORJIP

1

Carbon Trust
Introduction

The Carbon Trust

We help leading organisations worldwide contribute to and benefit from a more sustainable future.

ADVICE AND INSIGHTS

We consult businesses, governments, public sector bodies

PROGRAMMES

We design and manage projects with real impact

ASSURANCE AND CERTIFICATION

We certify and assure achievements in sustainability

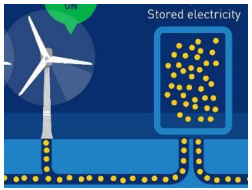
We do it with **independence**, **impartiality** and **no own economic interest.**

Our activities in Offshore Wind

OWA

Floating Wind

Energy Storage



ORJIP

International

2

OWA

Offshore Wind Accelerator – R&D

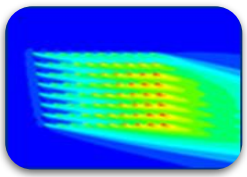
- The OWA is centred in five research areas, with technology de-risking and cost reduction being the main objective.
- Partnership with 9 developers involved in over ¾ of all operating offshore wind farms in Europe
- Promotes the engagement of industry designers, innovators, consultants and specialists

Access

Cable Installation

Electrical Systems

Foundations



Wakes and Wind Resource

A Technical Working Group (TWG) develops the R&D work in each research area

Research Priorities

Access

- Focus on the challenge of getting wind farm technicians from shore to their place of work, the offshore wind turbine
- Supporting new Vessel and Access systems in order to improve accessibility and turbine availability
- Research undertaken to better understand wind farm vessel performance

Cable Installation

- Cable failure: need to understand what is causing them and whether cables already in the water are all at risk/future cables
- Higher voltage cables. Do we need bigger than 66kV with bigger turbines?

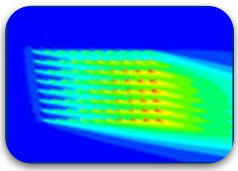
Electrical Systems

- Harmonic stability of several WF's in the same area. Investigating variations in stability as new WF's are connected to the same onshore connection point.
- Determining the fault location in very long HVAC cables – potential testing of cables pre-energisation

Research Priorities

Foundations

- Corrosion issues with aging assets - particularly monopiles
- Inspection and access to welds and grouting in small spaces or hard to reach joins



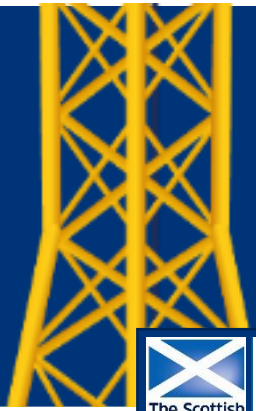
Wakes and Wind Resource

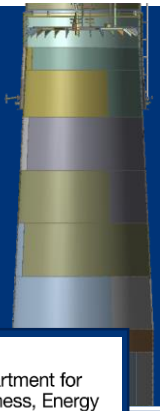
- Uncertainty of LiDAR measurements increasing cost of capital
- Lower cost ways of measuring wind speeds & site assessments

Game changing OWA Projects

JaCo

will revolutionise jacket node design and fabrication





PISA

pile design is now the new industry standard unlocking massive savings

The Scottish Government

Department for Business, Energy & Industrial Strategy

DemoWind

Netherlands Enterprise Agency

UNIVERSAL FOUNDATION

Trial of suction bucket foundation

BLUE PILOT

A ‘gentle’ hammer to make transition pieces obsolete and reduce noise emissions

3

Floating Wind

Floating Wind JIP

Focus on challenges for ***large-scale commercial floating wind farms***

10
International developers

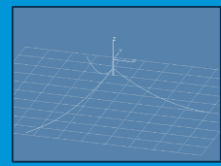
6
Projects delivered

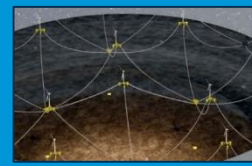
£0.5m
Spend to date

CARBON TRUST
The Scottish Government
DONG energy
EnBW
ENGIE
EOLFI
E.ON
innogy
九電みらいエナジー
Statoil
VATTENFALL
wpd think energy

1: Electrical Systems

2: Mooring Systems





3: Infrastructure & Logistics

New projects expected to launch later this year...

4

ORJIP

Offshore Renewable Joint Industry Programme (ORJIP)

Objective: Reduce consenting risk for offshore wind farms through funding research projects to better inform consenting authorities on the true environmental risk of offshore wind

16
International developers

5
ORJIP Projects

£2.5m
Total spend

- Consenting decisions often depend on the risk of environmental impact
- Due to a lack of empirical scientific data, consenting authorities can be cautious

Solution:

- Collaborative joint industry programme, funding research projects, to better inform consenting authorities on the true environmental risks

Current Projects

Current key research projects:

Bird collision avoidance study

- Understanding bird avoidance behaviour within and around a wind farm
- First study of its kind in the world
- Results in the next 6 months

Acoustic deterrent devices

- Understanding the efficacy of devices that deter marine mammals from construction zones
- Fieldwork in Iceland
- Results of the latest phase in the next 2 months

Piling affects on Herring

- Defining fish spawning populations and areas to determine the impact of piling on fish populations and looking at consent restrictions

Research Priorities

- **Acoustic deterrent devices phase 3;** to progress the acceptance of the devices with other species
- **Long term, real time monitoring;** technology road map for improving the monitoring at a wind farm, to allow real-time monitoring of environmental interaction
- **Ornithology;** look at birds displaced by wind farms, and how they are impacted and look at cumulative assessment.
- **Harbour Porpoise;** strengthening population models to understand the impact of piling construction noise on harbour porpoise
- **International priorities**; as offshore wind expands globally, developers are considering the environmental issues in emerging markets