

## ANNEX A: BENEFIT TO TAXPAYER, GOVERNANCE AND DETERMINATION OF SPEND

The aim of the offshore wind grant funding is to boost innovation in offshore wind, resulting in reduced costs which have ultimately contributed to lowering the levelised cost of energy (LCOE), evidenced by cost modelling carried out by Carbon Trust (*Figure 1*).

ORE Catapult undertake work to support Scottish Small to Medium Enterprises (SMEs) to test and prove innovative technologies on a demonstrator turbine, and engage closely with the supply chain to increase local content in future offshore wind projects. Energy Skills Partnership work closely with Scottish colleges to ensure that the right skills are in place at the right time to support local jobs as the offshore wind sector grows in Scotland. These activities contribute to wider economic growth in Scotland through increased utilisation of the supply chain that results in job creation, and ensures Scottish workers have the skills necessary to take on these roles.

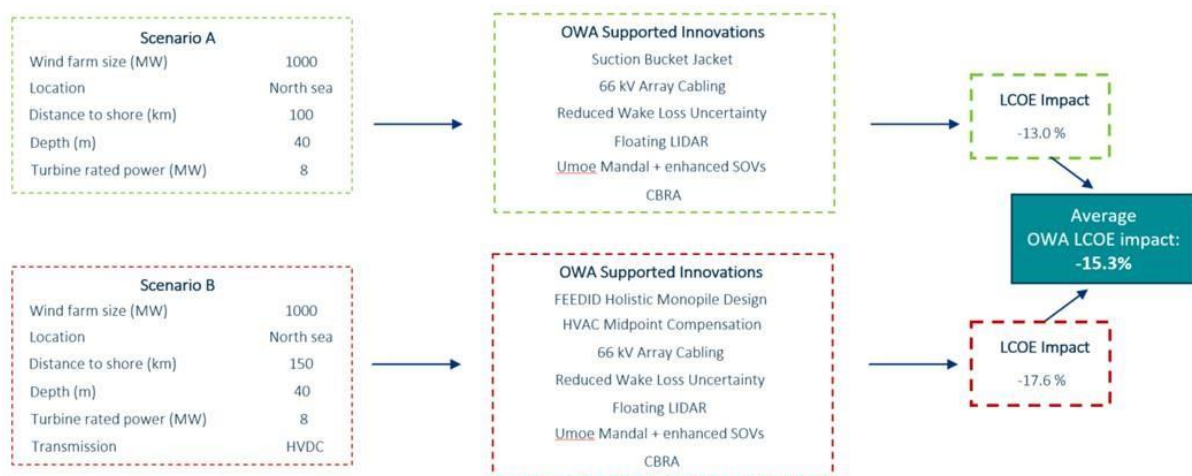


Figure 1

### Governance

Grantees submit funding proposals to the Scottish Government that include key deliverables and milestones of each project that will be undertaken. Scottish Government officials meet separately with each grantee on a quarterly basis to receive an update on progress, ensure the grantee is on track to meet agreed milestones and that funding is not claimed in advance of spend.

The milestones are evidenced through a variety of methods, such as key milestone reports, dissemination workshops, cost modelling and invoices.

OREC submit Milestone Reports for each project when a key deliverable, as set out in the ir grant offer letter, is met. These reports typically take an evidence based approach to summarising the research and work carried out, setting out conclusions and next steps for future work if applicable. The targets/milestones are also monitored via an interim progress report, due to be submitted by 31 December 2018 and an end of year report by 31 March

2019. Regular meetings between OREC and Scottish Government occur every second month to further monitor progress with projects and provides the opportunity to identify potential input from relevant policy areas or industry stakeholders.

### **Determination of spend**

Scottish Ministers made the initial determination to allocate funds to the three grantees and, as part of the submission made to Ministers by officials, were aware of the breakdown of spend per project. However the individual grantees then determined how these funds were used to carry out the projects to meet the key deliverable set out in the grant offer letters (Annex A), including activities such as tendering out external contracts.

### **Outputs/Key Deliverables**

Please see Annex B, C and D for key deliverables of Carbon Trust, Offshore Renewable Energy Catapult and Energy Skills Partnership projects, as agreed in the grant contracts issued by the Scottish Government. All outputs listed have now been achieved. Due to cost reductions, Energy Skills Partnership was able to purchase 4 laser alignment units for the same cost as the proposed 2 units set out in their grant contract.

Tangible outputs of Carbon Trust's OWA include:

**Umoe Manda:** brought new improved service vessels to the market such as Umoe Manda, which is reducing transit time and can operate in higher sea states.

**CBRA:** reduced the risk of cable failures by developing a comprehensive risk assessment for Cable installation. This is now a standard assessment used in the industry worldwide but for example also for the Beatrice Wind Farm.

**66kV:** increased the intra-array voltage level from 33kV to 66kV and brought these to market by working closely with the supply chain to help develop new transformers, switchgear and most importantly new cost effective cable designs. The higher voltage means that less cables are required as more turbines can be connected to one cable string. Aberdeen Bay is using 66kV and they are now commercially available for use in offshore wind farms.

**PISA:** improved the design standards for monopiles, which is reducing the amount of steel needed. This included comprehensive field test.

**Floating LIDAR:** validated floating LIDAR systems that are replacing met masts, reducing the cost from approx. £10m to £1m. Floating LIDARs have been used at Aberdeen Bay and Beatrice wind farms.

**Floating Wind:** brought together 10 developers to collaborate on overcoming key challenges of commercialising floating Offshore Wind. This creates big opportunities for Scotland with its strong O&G background.

**ANNEX B: CARBON TRUST OWA KEY DELIVERABLES**

<b>Access</b>	A4	Hybrid	Hybrid/Electric CTVs and offshore charging
A1	LEV	Innovator funding - low emissions vessels theme (budget flexible if run as competition)	
A2	Drones	Drones	
<b>Cables</b>	C6	FLC	Fault location in very long HVAC transmission cables
C2	FOPA	Fibre Optics Protection Assessment: Re-scoping	
C8	MBA	Mitigation of Birdcaging and Armour Lateral Buckling of Submarine Cables During Installation.	
C3	UJ	Universal Joints for Subsea Power Cables	
<b>Electrical</b>	E1	STINwind	Stability Investigations for Offshore Wind Farms with long HVAC Grid Connections (STINwind)
E9	WCP	Wind power as a controllable source of power generation	
E4	RPC	Reactive power compensation and Grid Code compliance (fast response time) comparison between Statcom and MCSR technologies.	
<b>Foundations</b>	F4	CPFFC	CPF vs. Free Corrosion Assumption
F13	LE	Lifetime Extension	
F18	NoMi	Noise Mitigation System Demonstration at Norther OWF	
<b>Wakes</b>	W3	GBE	Global blockage effect
W1	S3Y3B	Benchmarking of models, inc. farm to farm wakes, large turbines	
W13	GPPL	Impact of gusts on power production and loads	
<b>Floating Wind</b>		Evaluate feasibility of floating wind, de-risk and support commercialisation of floating wind concepts.	

## ANNEX C: OREC KEY DELIVERABLES

### Next Generation Crew Transfer (CTV) and Service Operation Vessels (SOV)

Milestone	Description	Delivery Date
1	<p>Industry engagement workshop; Identifying current and potential capabilities of Scottish supply chain</p> <p>A Scottish technology roadmap for the development of low carbon CTVs and SOVs, including market opportunity, Scottish sectoral capability and market potential</p>	November 2018
2	A FEED study identifying the options for Scottish designed and developed low carbon CTVs	February 2019
3	Technology dissemination workshop hosted in conjunction with partners	March 2019

### Technology Demonstration in TRL Accelerator Programme

Milestone	Description	Delivery Date
1	<p>Publication of Eight Innovation Challenges to the Scottish market, seeking technology, processes, or know how, to tackle real challenges reported from Scottish demonstration sites</p> <p>One Industry engagement workshop targeting 40 Scottish academics, SME's or larger industrial organisations, to demonstrate opportunity and encourage participation</p>	October 2018
2	<p>Access for up to 12 companies to validate products and services on the Levenmouth Turbine to demonstrate</p> <p>Access to site or data for up to 6 companies to demonstrate products and services in Aberdeen Bay or Hywind Scotland</p> <p>Commercialisation reports for each participating SME</p>	February 2019
3	Dissemination event showcasing potential for innovation in the fixed and floating sectors	March 2019

### Alternate Communication Systems

Milestone	Description	Delivery Date
1	Deliverable to include a comprehensive technology overview, and report specifying future requirements  Scoping document for functional and technical requirements for suitable demonstration zone	October 2018
2	Delivery of appropriate validation and demonstration on Levenmouth Turbine	December 2018
3	Demonstration in-field at either EOWDC, or Hywind or BOD windfarms	February 2019
4	Dissemination event showcasing potential for alternate communications	March 2019

### Remote Supervisory Systems

Milestone	Description	Delivery Date
1	Publication of a comprehensive technology overview, and report specifying future requirements  Dissemination event and competition launch. Targeting 40 companies and 15 submissions for innovative technologies	October 2018
2	Competition report identifying and scoring submissions  Development of a demonstration and validation plan for successful companies	December 2018
3	Demonstration on Levenmouth turbine or suitable partner windfarm	February 2019
4	Dissemination event showcasing potential for Remote Supervisory Systems	March 2019

#### Fit 4 Offshore – Opportunities for the Scottish supply chain

Milestone	Description	Delivery Date
1	Development of suitable assessment process/questionnaire for participant companies  Delivery of assessment portal Fit for Offshore	October 2018
2	Phase 1 of pilot completion of first 10 company assessments and issuing of reports	January 2019
3	Phase 2 of pilot completion of second 5 company assessments and issuing of reports  Publication of reference case studies.	February 2019
4	Dissemination event showcasing findings and potentials	March 2019

## ANNEX D: ENERGY SKILLS PARTNERSHIP KEY DELIVERABLES

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Milestone	Delivery Date
Purchase of a further two Mobile Immersive Hybrid Reality	June 2018
Purchase of two additional laser alignment units to allow the colleges to deliver the GWO BTT	June 2018
The development of a standardised training package for all colleges involved (Fife, Ayrshire, Dumfries & Galloway) including GWO Basic Technical Training	September 2018
Continuation of the GWO Health & Safety training for full time colleague students	February 2018