CATAPULT
Offshore Renewable Energy

Supply Chain Support.

Hugh Riddell, Regional Partnership Manager

Marram Wind, Peterhead, November 29th 2023

Photo courtesy of Principle Power. Artist: DOCK90

THE OFFSHORE RENEWABLE ENERGY CATAPULT

The UK's Leading Technology Innovation and Research Centre for Offshore Renewable Energy

Our Mission is to Accelerate the Creation & Growth of UK Companies in the Offshore Renewable Energy Sector.

- Unique facilities, research & engineering capabilities
- Bringing together innovators, industry and academia
- Accelerating creation and growth of UK companies
- Reducing cost and risk in renewable technologies
- Growing UK economic value
- Enabling the transition to a low carbon economy

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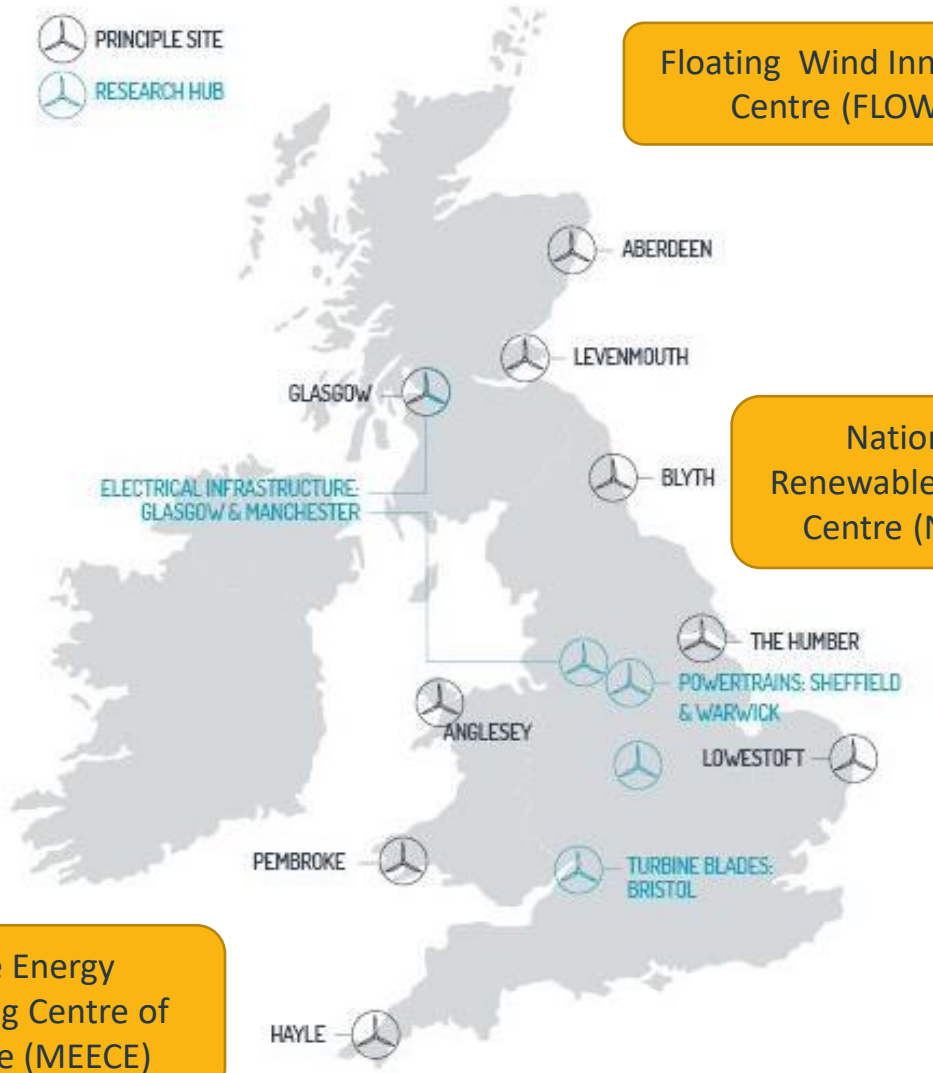
OFFSHORE RENEWABLE ENERGY CATAPULT

Over 300 engineering, research and sector experts

World-leading test and demonstration facilities

Collaborating with Industry, Partners and Academia to develop the Offshore Renewables sector though:

- Research
- Innovation
- **Testing & Validation**
- **Supply Chain Growth**



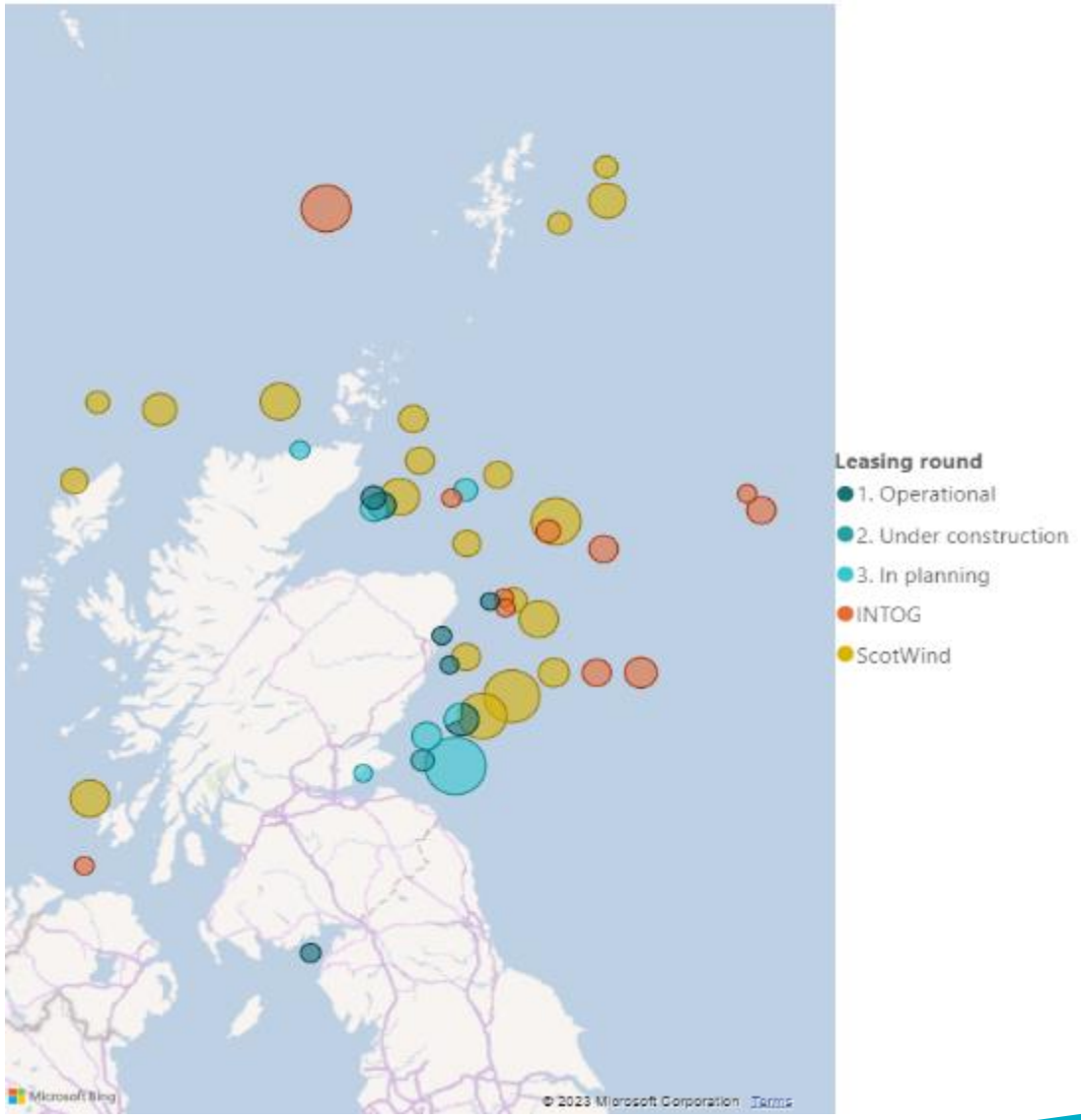
Floating Wind Innovation Centre (FLOWIC)

National Renewable Energy Centre (NREC)

Marine Energy Engineering Centre of Excellence (MEECE)

Committed Member of Inclusive Employers
We are a Living Wage Employer
AFBE-UK Inspiring People Of BME Origin In Engineering
INVESTORS IN PEOPLE We invest in people Standard

SIGNIFICANT CAPACITY OFF THE NORTH-EAST COAST.....



- **Scotland has become a world leader in the development of floating offshore wind** with the world's largest floating offshore wind farm, Kincardine (50MW), commissioned in two phases from 2018-21
- Planned floating wind projects off Scotland's coast currently make up **31% of the global floating pipeline**.
- **Significant opportunities for supply chain companies in the North East of Scotland** who have the capabilities, expertise and experience of 40+ years in offshore floating technologies.

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FLOATING WIND INNOVATION CENTRE (FLOWIC)

- **Innovation centre** based within W-Zero-1, Altens, Aberdeen;
- **Testing and demonstration** facilities to support the development and qualification of **“critical components”** – dynamic cable systems, mooring and anchoring systems;
- **Reducing risk and cost** associated with critical components in **advance of deployment** in large scale projects;
- **Global centre of excellence** for dynamic cabling systems and mooring and anchoring systems;
- Provide technology developers with access to testing and demonstration **infrastructure critical to the development and qualification of technology**;
- **Unique blend** of world leading expertise, testing and demonstration facilities;

ETZ
ENERGY TRANSITION ZONE

Images courtesy of ETZ

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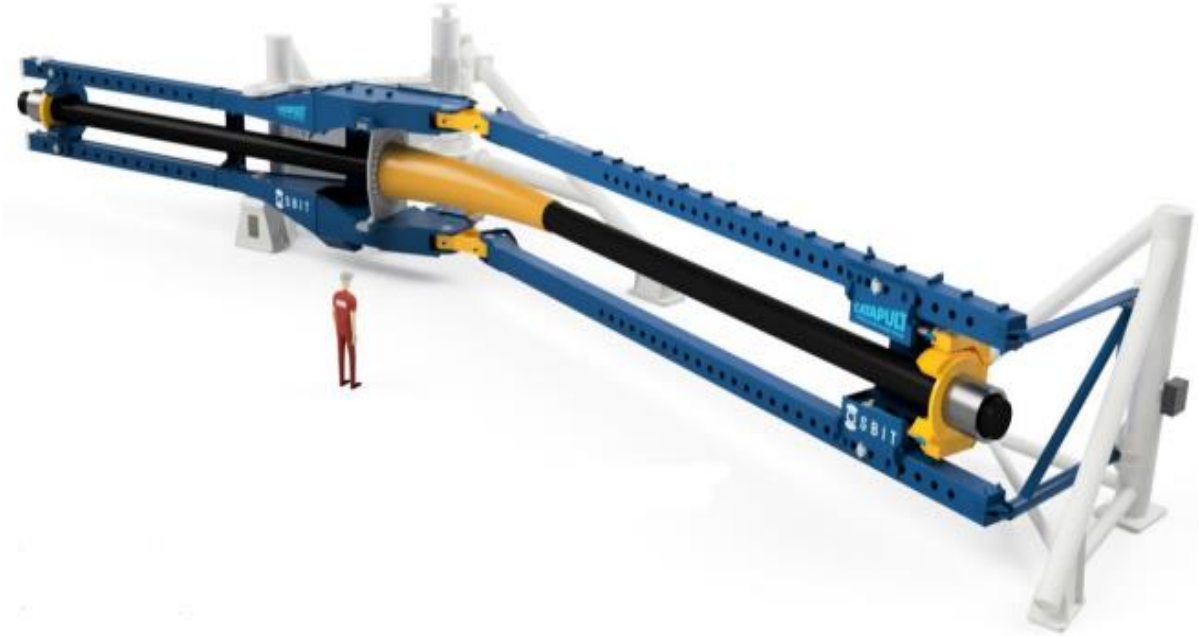
DYNAMIC CABLE FLEX FATIGUE RIG

- The rig will be used to support the development and qualification of “critical components” for dynamic cable systems for large scale projects:
  - Reduce risk
  - Reduce cost
  - Improve system integrity & reliability
- Diverse and efficient design
  - Accommodate different cable lengths & outer diameters
    - 5m through to 25m
    - 50mm to 500mm
  - Accommodate bend stiffeners & formers
    - Bend stiffener flanges from 200mm to 1500mm
    - Bend stiffener connectors up to 1500mm
  - Accommodate a variety of loading regimes
    - Tensile loading between 10kN to 1000kN
    - Moment capacity applied up to 1500kNm
    - Max test frequency of 6 seconds (10cycles/min)
    - Symmetric and asymmetric bending patterns;
    - Long term fatigue testing programmes (>10000 cycles);
    - Mechanical, positional and thermal data acquisition system (DAS);



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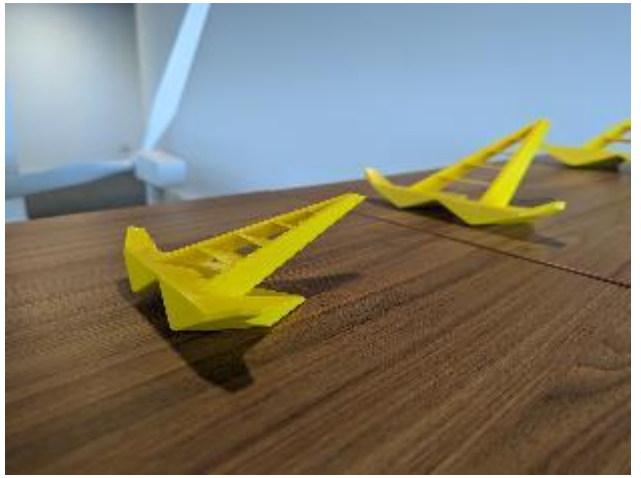
SCALED ANCHOR TEST RIG

- Scale Testing Allows Rapid Prototyping / Testing
  - Scale testing is an established industry practice
  - Cost effective
  - Time efficient
  - Repeatable
- Innovative and Versatile Rig Design
  - Capable of being used with all main anchor types
    - Gravity, Driven Pile, Drag Embedment, Suction Pile, Drop, Vertical Load
  - Adjustability to perform a range of tests for anchor performance
    - Installation, holding power, pull out
  - Compatible with multiple winches to enable testing of novel multi-mooring configurations
  - Can perform wet and dry testing
  - Shared anchor load testing
  - Maximum Line Tension – 2000N
  - Line tensions measurement – 0.5% of load



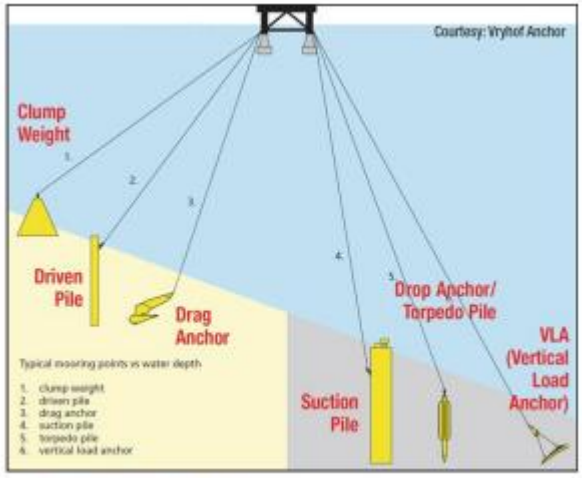


Image Courtesy: VryHof

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HEXAPOD 6 DEGREES OF FREEDOM UNIT

- 1800KG load capacity to allow simulated movement of offshore scale & full-size equipment in a simulated marine environment
- Provides up to 0.77m" of movement across a six degree of freedom, allowing us to accurately scale test environmental scenarios
- High degree of repeatability and accuracy for confidence in results - +/-1mm tolerance at full scale of travel
- Capable of providing pitch, roll, yaw, surge, sway and heave movements at a speed of 0.77m/second

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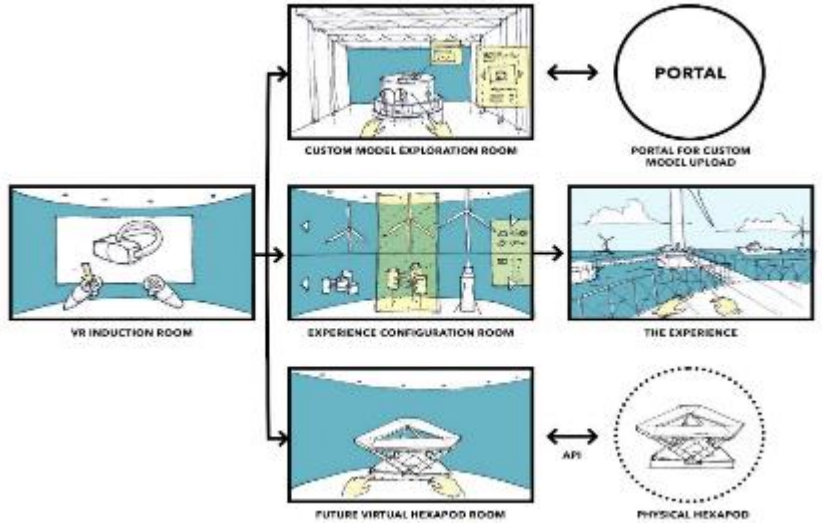
VIRTUAL FLOATING OFFSHORE WIND TURBINES

- Virtual Reality / Immersive Simulation Allows Operations to be Simulated Virtually
  - Reduces costs
  - Reduces risks
  - Highly flexible and adaptable
  - Allows visualization of new technologies and component – import 3D models, view in first person

- Virtual Reality / Simulation Studio in FLOWIC
  - Will provide fully immersive environment for research, training and virtual testing and demonstration;
  - Four full virtual reality FOWTs available, based on leading substructure designs;
  - Adaptive and versatile platform means FOWTs, environment, operations can be changed & updated
  - Platform allows for “hardware in the loop” testing, including link to Hexapod;



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FUTURE DEVELOPMENTS

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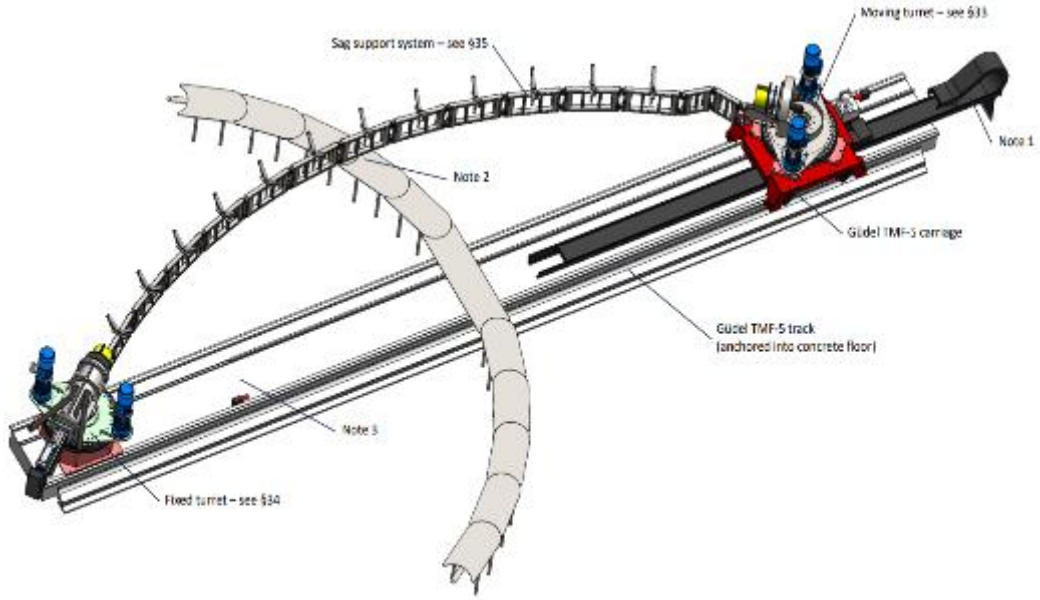
DYNAMIC CABLE COMPRESSION RIG

- The rig will be used to support the development and qualification of “critical components” for dynamic cable systems for large scale projects:
  - Reduce risk
  - Reduce cost
  - Improve system integrity & reliability
- Compression and combined bending/compression
  - Accommodate different cable lengths & outer diameters
    - Length up to 15m
    - Outer diameter from 150mm to 300mm (66kV, 1200mm2
  - Accommodate a variety of loading regimes
    - Compression loading 10% of max Tensile load
    - Combined compression and bending currently being discussed with industry
    - Max test frequency being determined through modelling of potential designs



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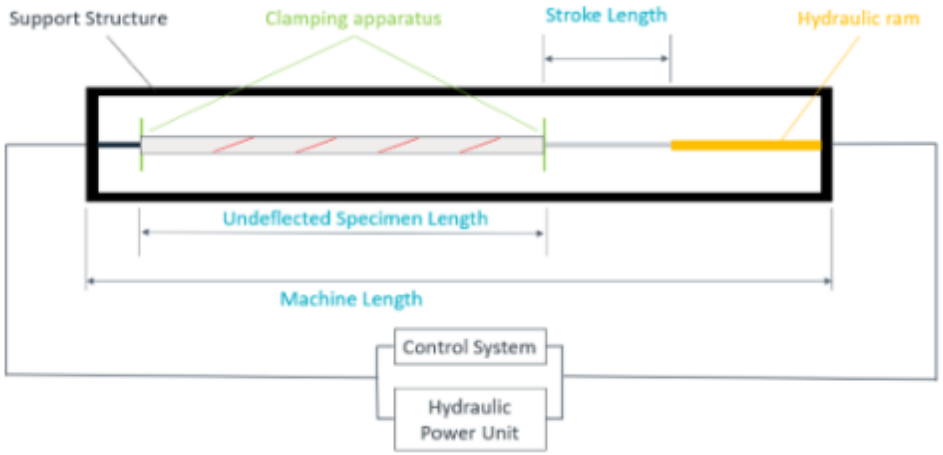
SCALE MOORING LINE TEST RIG

- Simulate tensile loading at the sub-rope level
  - Much of the research required on rope design, performance, degradation, heating, environmental interaction can be done at the sub-rope level;
  - Cost effective
  - Time efficient
  - Repeatable
- Simple and Versatile Rig
  - Can test mooring components including synthetic fibre rope, chain, steel spiral rope and load reduction devices;
  - The primary loading mechanism of these components is pure tension, and these components often have very high breaking loads (circa 10,000kN or more). As such, fundamental product development or research is often done on a 'sub-component' level at lower loads and sizes.
  - Detailed design expected to be complete late August 2023.



Schematic View – Scale Mooring Line Test Rig

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LARGE SCALE MOORING LINE TEST RIG

- Simulate working and extreme tensile loads for large / full scale FOW mooring lines;
  - Required as part of quality control / classification;
  - Cost effective
  - Time efficient
  - Repeatable
- Large rig applying very high tensile loads, only a few exist in the world;
  - Access to rigs already a challenge (O&G only) with access for FOW anticipated to be bottle neck for FOW projects;
  - High-capacity mechanical testing of full-scale FOW mooring lines – between 250-400mm in diameter;
  - Static and fatigue testing – new product development, quality control;
  - Able to test other mooring / rigging lines and components

Image Credit: DNV

Image Credit: Instituto de Pesquisas Tecnológicas

Courtesy: Ocean Energy Resources

Image Credit: of Bridon-Bekaert

Image courtesy of Wirop Industrial

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SUPPLY CHAIN PROGRAMMES

- Engaging with industry & government to build a thriving UK ORE supply chain
- Connecting companies to investors, industry and export opportunities
- Articulating technology priorities.
- Skills, innovation infrastructure and investment opportunities
- Improve competitiveness and capability in the UK supply chain

F4OR Fit For Offshore Renewables

LAUNCH ACADEMY

Offshore Wind Growth Partnership

Grant Funding

WEST

SHARING IN GROWTH

F4OR Fit For Offshore Renewables | Delivered by CATAPULT Offshore Renewable Energy

F4OR
Fit For Offshore Renewables

"To increase the **competence**, **capacity** *and* **competitiveness** *of the UK offshore renewable energy supply chain,* **maximising opportunity** *for the UK businesses, both domestically and globally."*

- **Grow the Supply Chain** - supporting the transition of companies from other sectors into offshore wind, by developing sector specific capability and competence;
- **Increase Competitiveness** - supporting companies to improve competitiveness through innovation, continuous improvement and fundamental business principles;
- **Raise Awareness** – promoting "high potential" supply chain organisations within the industry;

OUR IMPACT

275% average demand for each programme place

12% average increase business excellence score
27% average increase in sector specific score

100+ companies supported

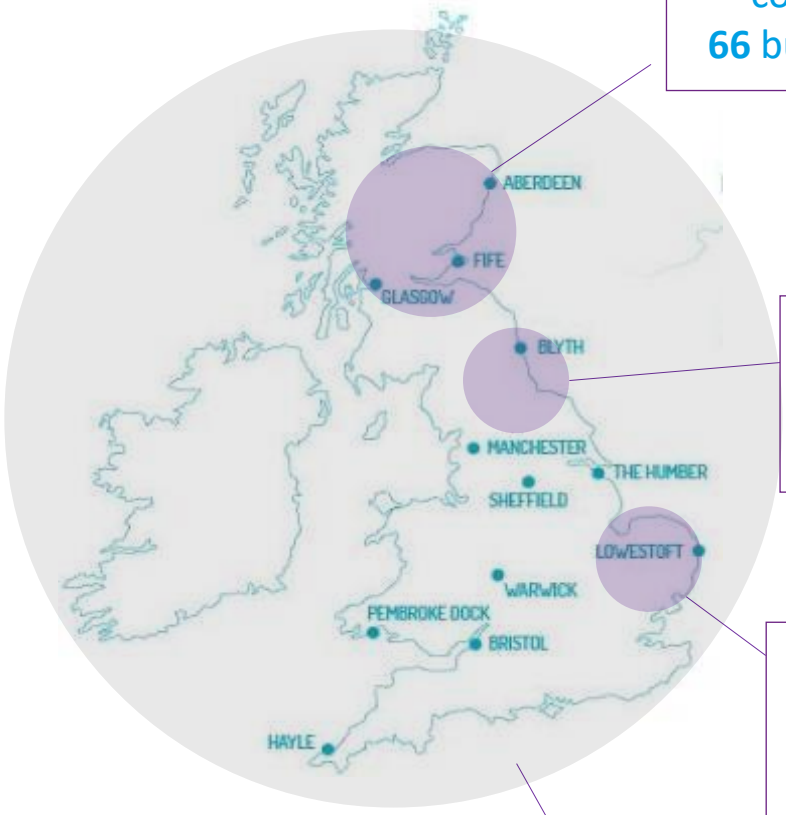
3 company acquisitions

28% average growth in turnover
13% average growth in no. jobs

30+ contract wins supported

100+
businesses supported

56
successfully granted



X4 Scottish cohorts:
66 businesses

NE England:
12 businesses

East Anglia:
15 businesses

National cohort:
14 businesses

F4OR Fit For Offshore Renewables | Delivered by CATAPULT Offshore Renewable Energy

TESTIMONIALS

"…Balmoral's move towards the energy transition ***was enhanced when we joined the Fit 4 Offshore Renewables programme****. Over the past 20 months we have achieved granted status for F4OR* ***and secured several contracts*** *for offshore wind, both fixed and floating, while also seeing success in the wave & tidal arena.*

…the programme was ***refreshingly challenging*** *in that it cemented our existing efforts, however, with its audited nature, forced exploration for opportunities of improvement and to fully understand the risks associated with this emerging market…"*

"The F4OR programme has certainly opened our eyes to the opportunities, collaboration available, and general knowledge surrounding the renewables marketplace. With the support of our mentoring team and the weekly modules, ***we feel we are now in a greater position to deal with opportunities and projects within offshore renewables d****ue to the information we have gained. I very much encourage companies that are committed to the future renewables market to get involved in the F4OR programme as it will be rewarding –* ***you certainly get back from what you put in****."*

"The guidance received via the Fit 4 Offshore Renewables programme has helped us focus on the key areas where we have expertise and given us insight into the companies we should engaging with. This has ***undoubtedly helped achieve*** *our impressive year-on-year growth and the* ***securing of over £1million of orders*** *in Offshore Renewables since starting the programme"*

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LAUNCH ACADEMY

“Removing barriers to commercialisation for game-changing companies”

What is Launch Academy?

ORE Catapult’s Flagship Technology Accelerator Programme

- 9-month programme that runs annually
- Specifically designed for the Offshore Wind sector
- Supported and sponsored by leading Offshore Wind developers
- Delivers a range of targeted technology development, business growth and professional services support

Programme Content

A variety of modules delivered by ORE Catapult and leading external partners

- Technology Development Support
- Business Case Analysis
- IP Strategy Support
- Legal Support
- International Export Opportunities
- Investor Readiness & Value Proposition
- Story Accelerator
- ED&I for Start-Ups/SMEs

Programme Partners

Launch Academy 2024 Programme Partners

LAUNCH ACADEMY 2024 TECHNOLOGY THEMES

Eligibility:
- Start-ups and early-stage companies
- Seeking to commercialise new products/services into offshore wind

Project Pipeline

Installation
(Impact Reduction)

-

Operational
(Impact Reduction)

Future Energy Systems

Electrification & Decarbonisation of Vessel Operations

-

Shore Charging & Grid Maximisation

Smart O&M

Condition Monitoring

-

Surface Coating & Protection

-

HSE

Open Call:

Any technology, product or service relevant to Offshore Wind

[Launch Academy 2024 | ORE Catapult]

Applications Open: 06/11/2023

Applications Close: 08/12/2023

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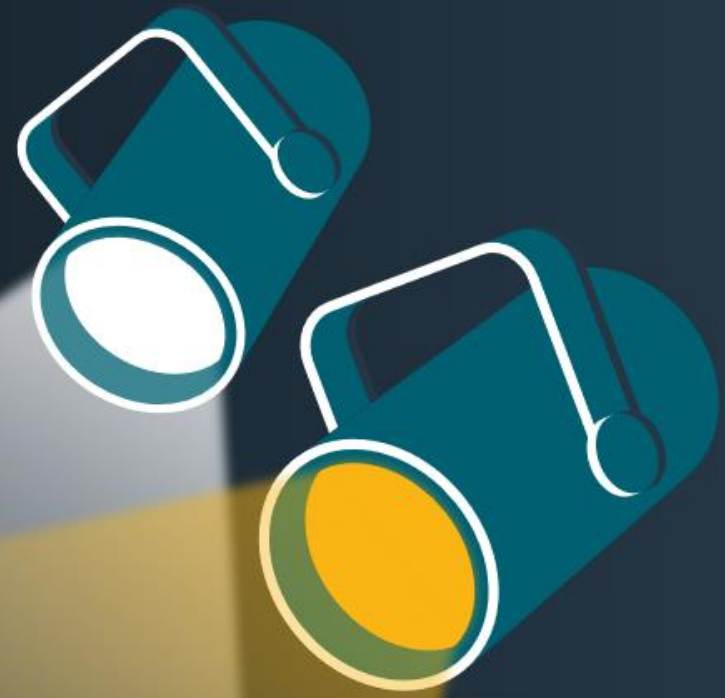
Offshore Wind Growth Partnership

UK OFFSHORE WIND SUPPLY CHAIN SPOTLIGHT

Showcasing UK Innovation & Excellence



EDINBURGH
12.12.2023

F4OR
Fit For Offshore Renewables

LAUNCH ACADEMY

UK OFFSHORE WIND SUPPLY CHAIN SPOTLIGHT

- 12th December, Edinburgh International Conference Centre
- Delivered in partnership with OWGP
- High profile conference and exhibition showcasing ORE Catapult's and OWGP's supply chain support programmes
- Includes Launch Academy, Fit 4 Offshore Renewable Energy and TIGGOR companies

UK OFFSHORE WIND SUPPLY CHAIN SPOTLIGHT

Showcasing UK Innovation & Excellence

CONTACT US

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ENGAGE WITH US

F4OR
Fit For Offshore Renewables

GLASGOW

BLYTH

LEVENMOUTH

GRIMSBY

ABERDEEN

CHINA

LOWESTOFT

PEMBROKESHIRE

CORNWALL

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