

Supporting translational research & innovation activity

21 March 2018 | Paul McKeever, Head of Strategic Research

Agenda

- ORE Catapult Overview
- Translational research & innovation 'vehicles'
 - Offshore Wind Innovation Hub (OWIH)
 - Academic Research Hubs
 - ORE Supergen Hub
- Wind & Marine Case Studies
- The Future - Industrial Challenges, Strategic R&I Plans

ORE Catapult

Our Vision:

Abundant, affordable energy from
offshore wind, wave and tide

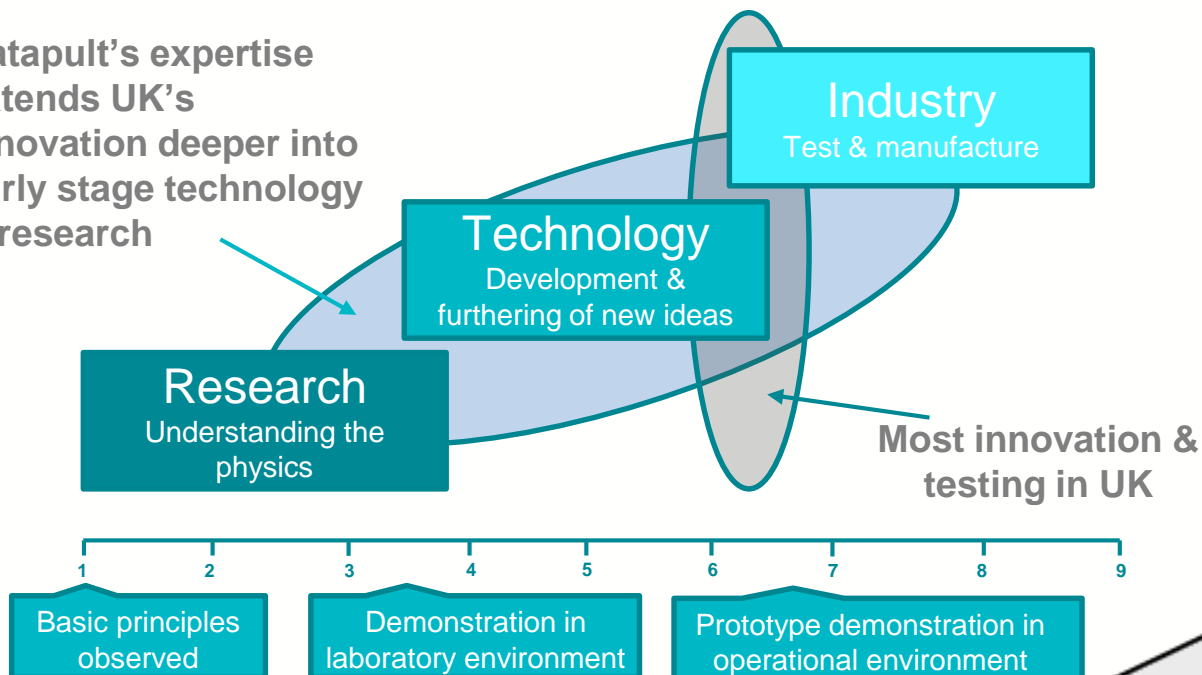
- Reduce the cost of offshore renewable energy
- Deliver UK economic benefit
- Engineering and research experts with deep sector knowledge
- Independent and trusted partner
- Work with industry and academia to commercialise new technologies



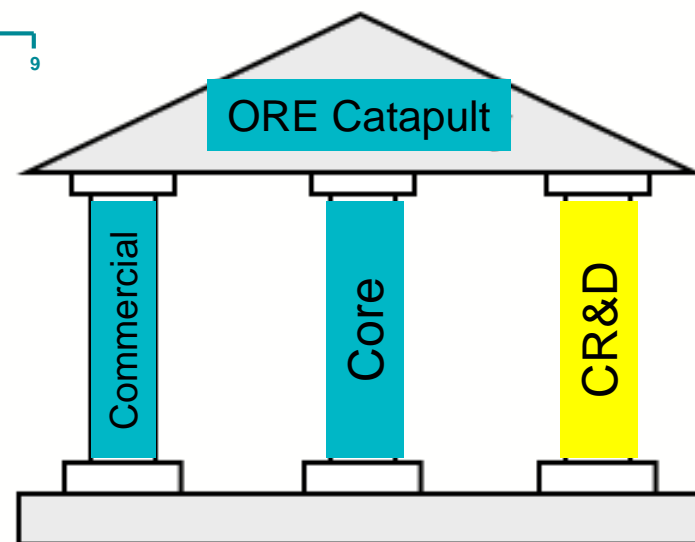
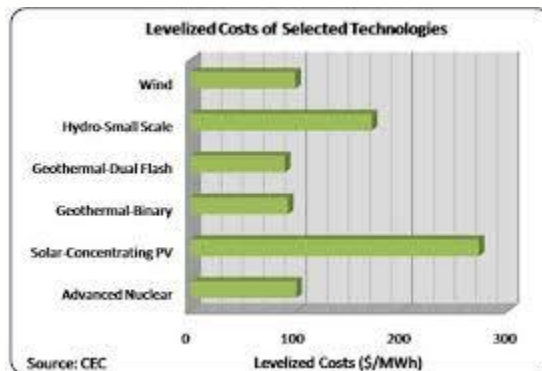
80+ technical experts

How does ORE Catapult operate?

Catapult's expertise extends UK's innovation deeper into early stage technology & research



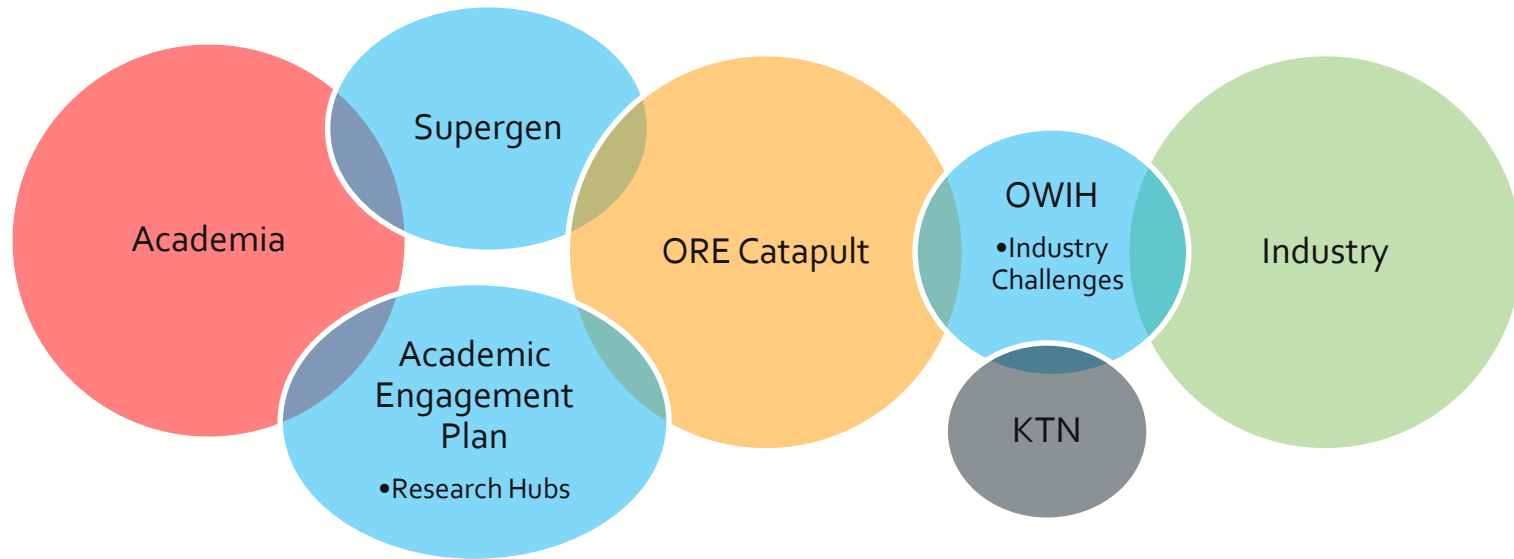
LCOE & UK Impact



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The Wider Pipeline



- Academic, ORE Catapult and Industrial relations are serviced with specific 'vehicles'
- The Offshore Wind Innovation Hub (OWIH) convenes industry challenges
 - Academia has a presence on the OWIH advisory board
- ORE Catapult will align industry challenges with the Supergen research programme
- The Academic Engagement Plan (AEP) collaborates on strategic, advisory and project levels
 - Research Hubs provide strategic partnerships in key research areas/themes

Offshore Wind Innovation Hub (OWIH)

Purpose of the Hub

The Offshore Wind Innovation Hub provides a coordinated approach to offshore wind innovation in the UK.

It will;

- Impartially identify the innovation needs of the sector,
- Sign post to funding calls and help identify opportunities for the UK supply chain to address the needs of the sector
- Undertake targeted R&D project brokering in response to funding calls

<http://offshorewindinnovationhub.com>

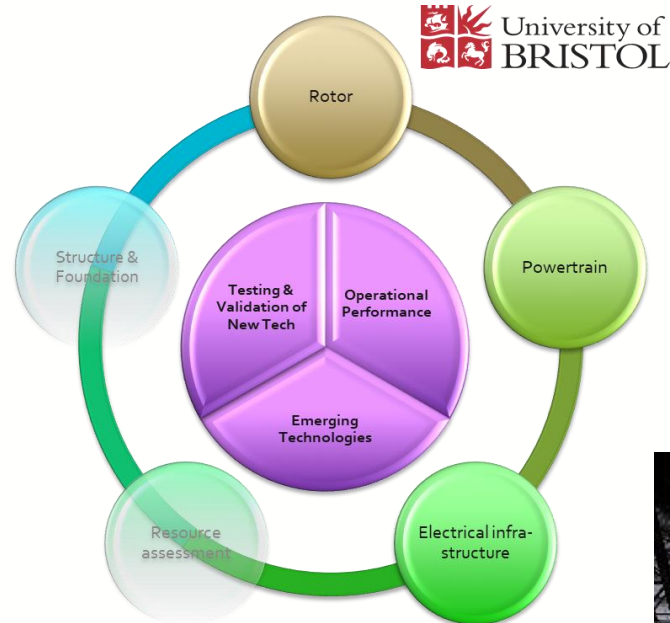


ORE Catapult Research: Academic Research Hubs

ORE Catapult is building a network of Research Hubs with leading universities in key areas.

Objectives:

- Enhance internal capability and knowhow for commercial clients
- Provide industry with access to highly relevant expertise today
- Progress understanding in key areas for future problem areas



Future Research Hubs

Electrical Infrastructures

O&M (multi-University)

Powertrains

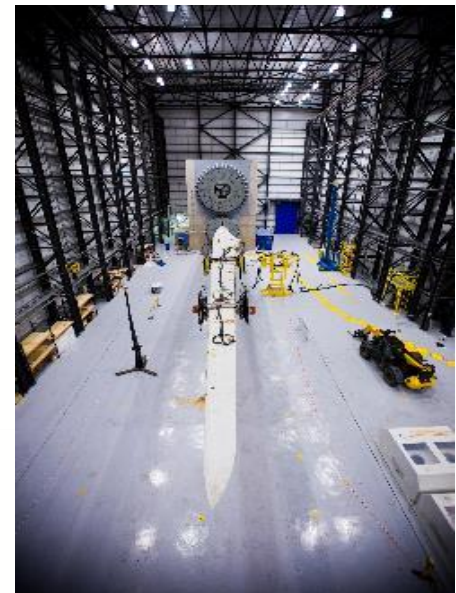
Foundations/Structures

Wind Blade Research Hub

Partnering with University of Bristol (5-year programme)

Tackling blade design, manufacture and integrity (materials, NDT, condition monitoring and aero-elastic properties)

£2.3million budget secured; £700k provided by ORE Catapult



LM Testing in Blade Test 2

- Due to test LM 88m blade in Blade Test 2 in 2018
- Part of XL-Blade DemoWind project scope
- Test programme involved the demonstration of dual axis test methodology
- Builds on previous research activity carried out in Blade Test 1 (see video)
 - Involved the use of a LM 40.2m blade



ORE Supergen Hub

- Will launch in 2018
 - Circa £5million over four years
- Succeeds existing SUPERGEN Wind Hub and SUPERGEN UKCMER
 - UKCMER finishes in 2018
 - Wind Hub finishes in 2019

Hubs are EPSRC-backed research programmes

- Maintains important academic, industrial and policy linkages
- Executes research programme informed by industry challenges



SUPERGEN

ORE Supergen



Transformative energy research
for a secure lower-carbon future



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Blyth Offshore Demonstrator Wind farm

- 5x 8.3MW turbines
- 6.5km off the coast of Blyth
- 191.5m Tip Height (AOD)
- Approx 40m Water Depth



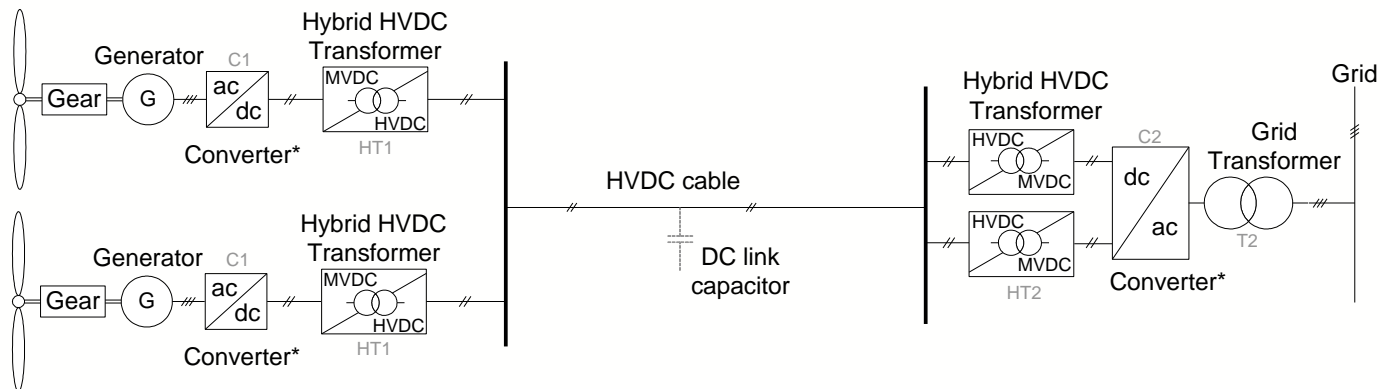
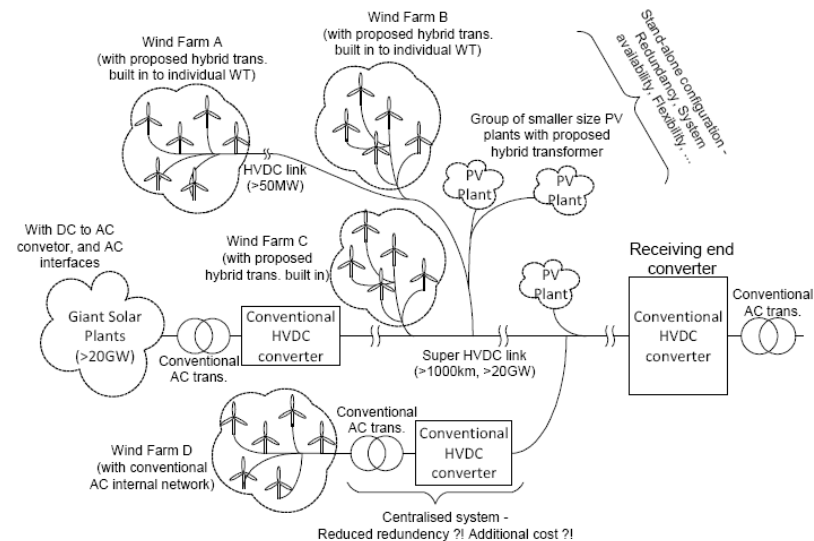
Image for illustrative purposes only.

From EDF Renewables



HD-MMC – IRPWind Project

- HVDC power transmission from the point of generation
 - Reduce losses and components (i.e. make use of Turbine MV converter and availability of HVDC grid)
- Multi-terminal HVDC system
 - Increase availability
 - Offers flexibility and redundancy
 - Reduce cost
 - Removal of/minimise offshore substation
 - Reduced cable losses (HV operation)

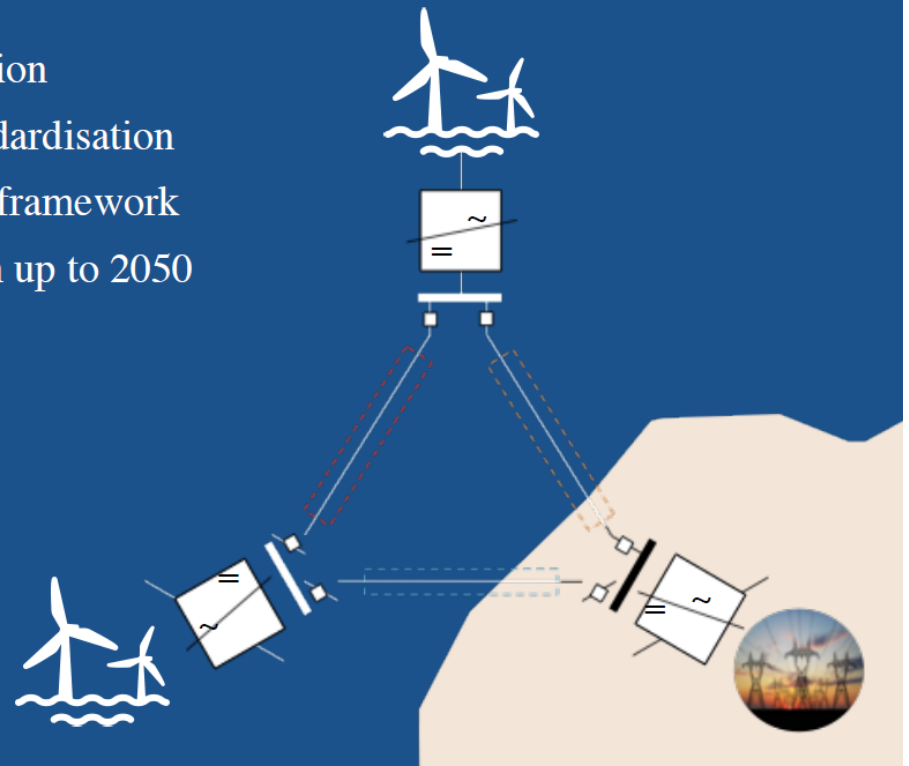


Complexities and capabilities

Progress on Meshed HVDC Offshore Transmission Networks

Enabling the North Sea power house

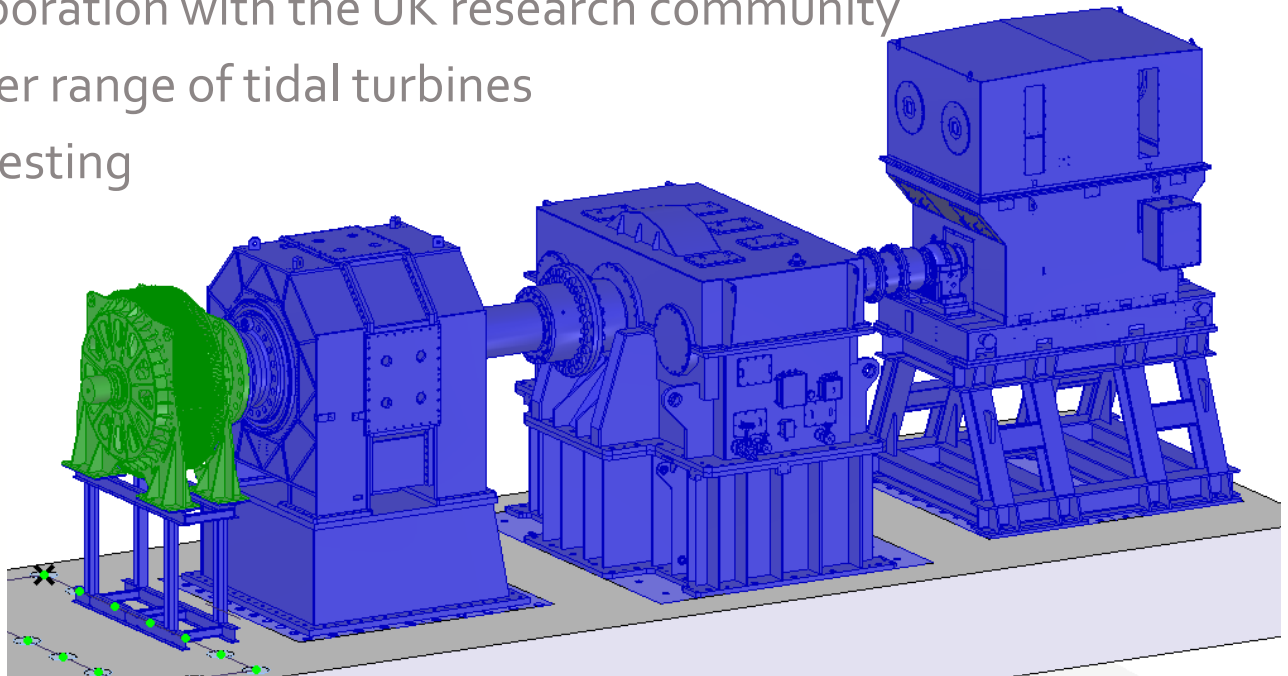
- Develop interoperable & reliable network protection
- Work towards technology interoperability & standardisation
- Recommendations for EU regulatory & financial framework
- Deployment plan & Roadmap for implementation up to 2050
- Full scale technology demonstrations of:
 - HVDC control & protection systems
 - Converter harmonic model validation
 - HVDC gas insulated switchgear
 - HVDC circuit breakers



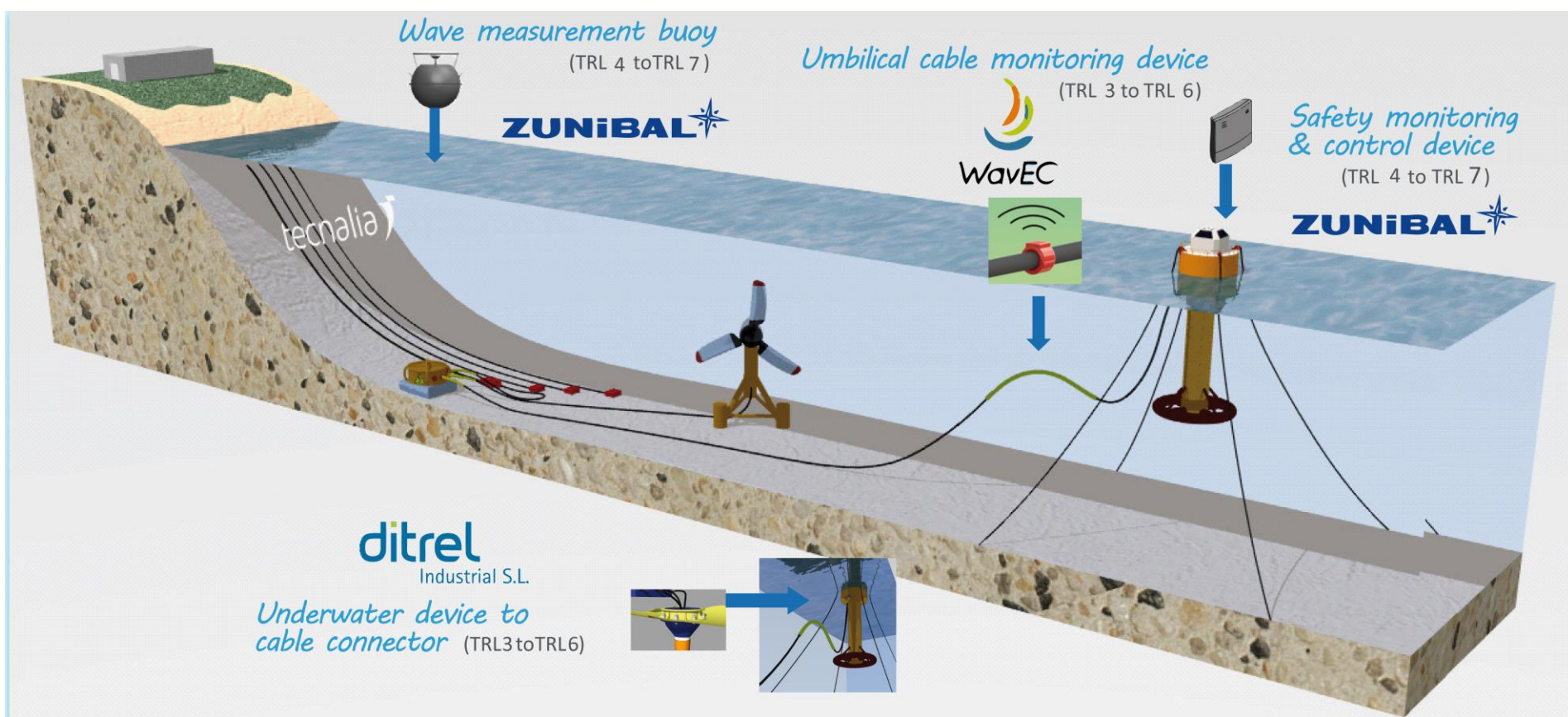
© PROMOTiON – Progress on Meshed HVDC Offshore Transmission Networks
This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 691714.

Tidal-EC

- FP7 R4SME project completed in February 2017
- Tested Tocardo T2 tidal turbine technology at ORE Catapult
- Project allowed ORE Catapult to build a 1MW test rig
- Now well-positioned for:
 - Deeper collaboration with the UK research community
 - Testing a wider range of tidal turbines
 - Component testing



Technologies of the RECODE project



- NOVA INNOVATION-led €20m H2020 funded project
- Nine European partners
- Four Scotland-based partners
- Five year project running until June 2022
- Builds on existing Shetland Array
- Six turbines moved into different configurations to optimise array layouts

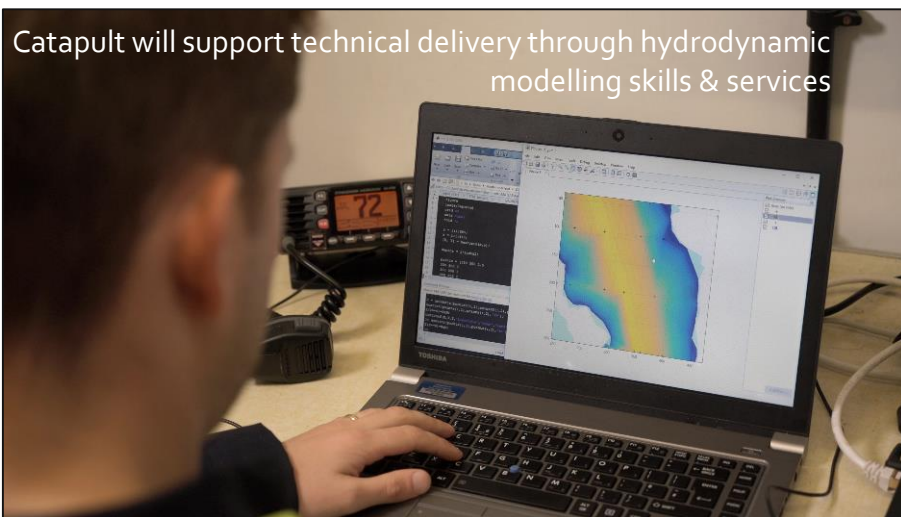


This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement number 745862.





Catapult will support technical delivery through hydrodynamic modelling skills & services



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INNOVATION
Nova Innovation Ltd

CATAPULT
Offshore Renewable Energy



mojomaritime



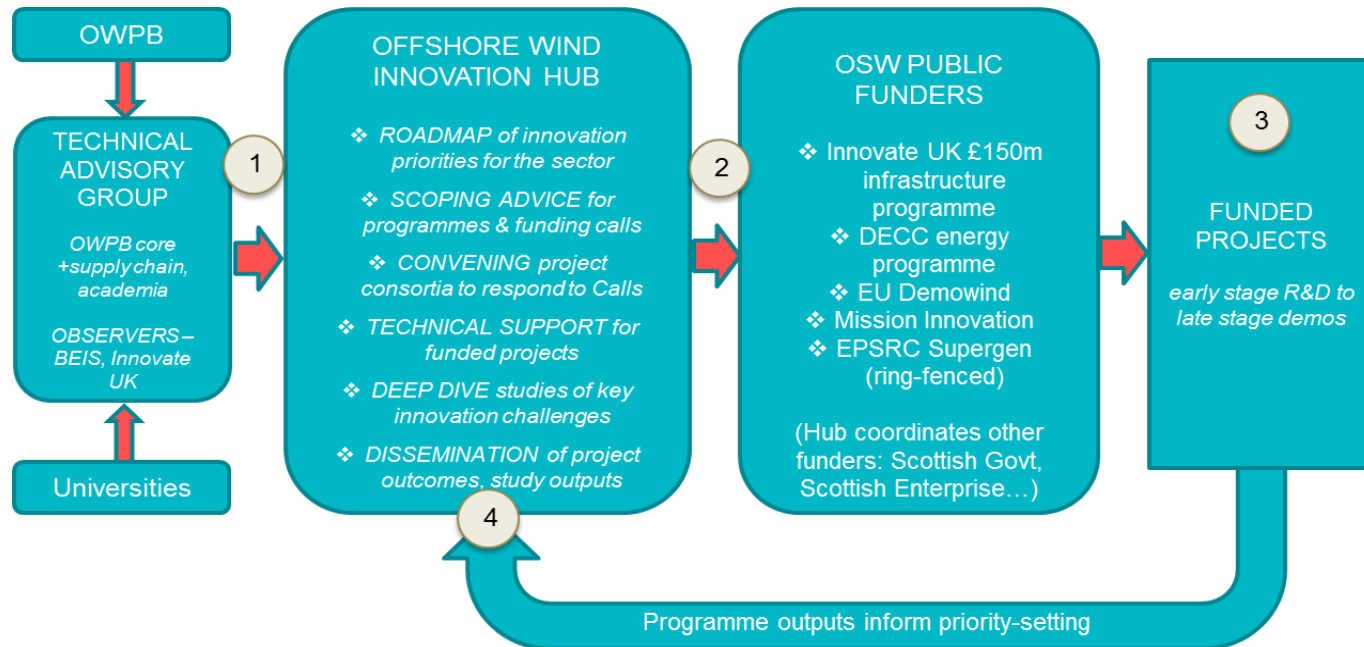
SKF



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The Future - Industrial Challenges, Strategic R&I Plans

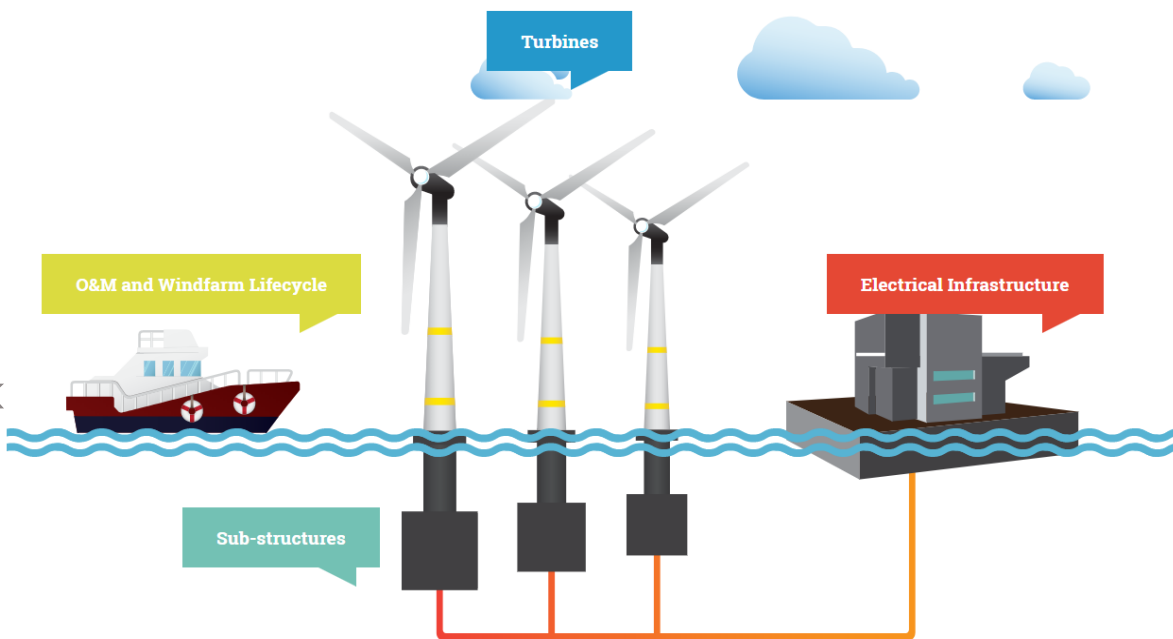


- 1 **The IH agrees industry's priorities** drawing on the advice of the Advisory Group and its internal capacity.
- 2 **The IH offers strategic support to government** to ensure coherence and alignment across the UK and internationally.

- 3 **The IH offers delivery support to industry** by helping it prepare for funding calls, convening consortia, and disseminating and showcasing its work.
- 4 **The IH maintains technology roadmaps** by integrating project outcomes into innovation plans.

OWIH Innovation Roadmaps

- Innovation Roadmaps focus around four themes
- Identity innovation needs of the offshore wind sector
- Built in collaboration with industry and academia
 - Build on CRMF work
 - Backed by TAG
- Reviewed/updated every six months



The Future - Industrial Challenges, Strategic R&I Plans



EUROPEAN TECHNOLOGY & INNOVATION
PLATFORM ON WIND ENERGY



Reduce costs



Facilitate system
integration



Reinforce European
technological
leadership



Ensure first-class
human resources

- ETIPWind produced SRIA in 2016
- Based around four objectives
- Contains 5 pillars of R&I for wind energy
- ETIPWind defining priorities to 2030 following recent workshop in February



GRIDS SYSTEMS, INTEGRATION AND INFRASTRUCTURE

Developing wind energy capabilities to fit in a grid with significant shares of renewable energy.



OPERATION AND MAINTENANCE

More and further enhanced sensors enabling more reliable and efficient operation and maintenance of turbines, improving yields and optimising lifetime.



INDUSTRIALISATION

Developing the value chain and facilitating the interaction between stakeholders notably through standardisation to achieve economies of scale and faster production.



OFFSHORE BALANCE OF PLANT

Exploring new areas for offshore wind and making it competitive with conventional generation through the improvement of substructures and foundations, site access, offshore grid infrastructure, assembly and installation.



NEXT GENERATION TECHNOLOGIES

Consolidating the scientific base for wind research and enabling pioneering research to lead to breakthroughs.

Contact us

GLASGOW

Inovo

121 George Street
Glasgow
G1 1RD

T +44 (0)333 004 1400



BLYTH

National Renewable Energy Centre

Offshore House
Albert Street
Blyth, Northumberland
NE24 1LZ

T +44 (0)1670 359 555



LEVENMOUTH

Fife Renewables Innovation Centre (FRIC)

Ajax Way
Leven
KY8 3RS

T +44 (0)1670 359 555



HULL

O&M Centre of Excellence

Room 241, 2nd Floor
Wilberforce Building
University of Hull
HU6 7RX

