Supergen ORE Hub Assembly 2022
BEIS Presentation

19th January 2022

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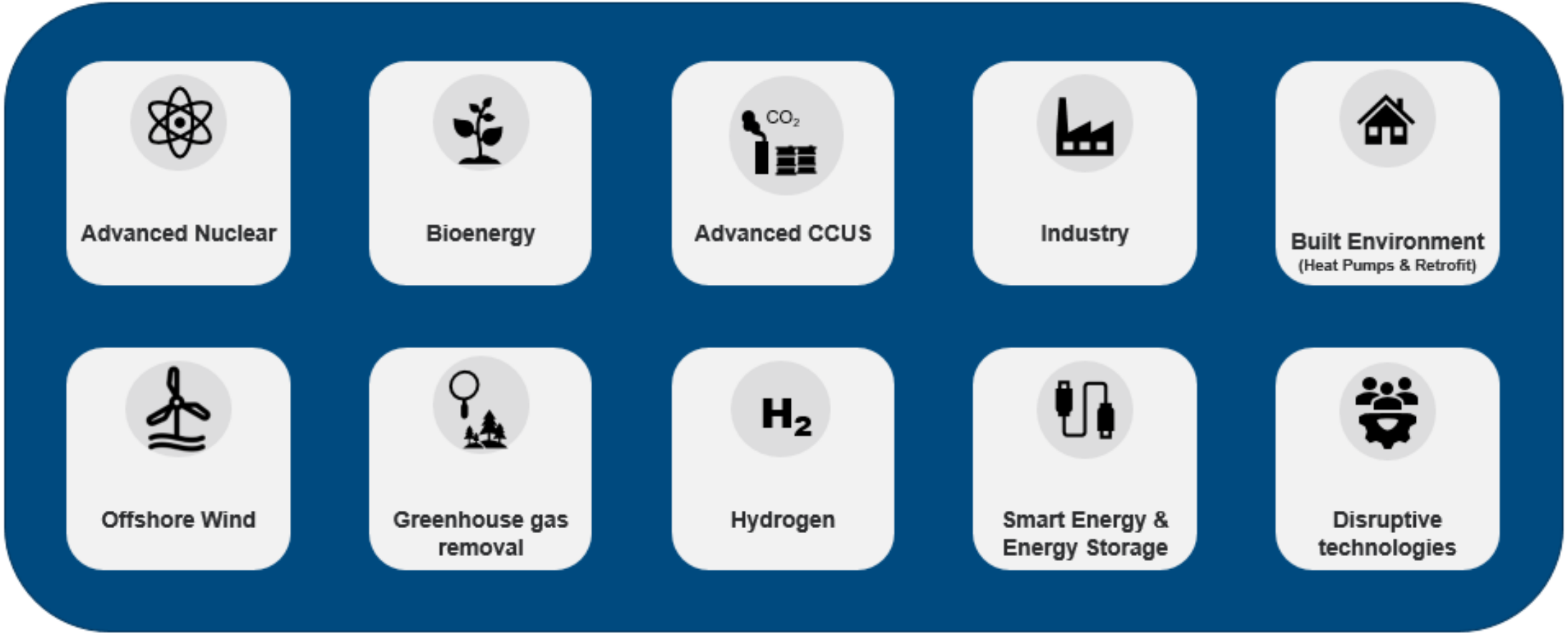
Renewable Energy Innovation Delivery

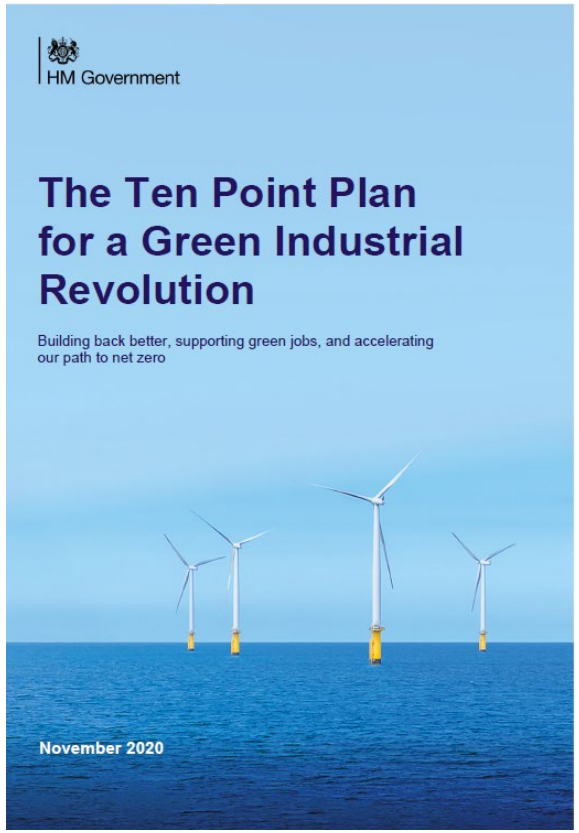
BEIS - Science and Innovation for Climate and Energy Directorate

Department for Business, Energy & Industrial Strategy

Net Zero Innovation Portfolio (NZIP)



Prime Minister's 10 Point Plan



10 Point Plan:

- 10 priority areas
- Point 1: Advancing Offshore Wind
- Critical source of renewable energy
- Current capacity at approx. 10GW
- **40GW** of offshore wind by 2030 (incl. **1GW** of Floating offshore wind)
- Encourage private investment in UK
- Create UK jobs in the sector
- Increase of UK content

Key Programmes:

- Floating Offshore Wind
- Windfarm Mitigation for UK Air Defence: Phase 2
- UK Manufacturing Technology for Next generation Wind Turbines: Composites Phase 2

- At least £17.5m in Grants for projects
- Supports the development of innovative floating offshore wind technologies
- Key tech areas: a) Moorings b) Foundations c) Dynamic cables
- Announcement will follow

- £2m over 4 years
- Industry – stakeholder - academic and supply chain partnerships
- Accelerating the commercialisation of Floating Offshore Wind – to deliver net zero and drive economic growth
- https://ore.catapult.org.uk/what-we-do/innovation/fowcoe/

Windfarm Mitigation for UK Air Defence

CHALLENGE

- 40GW offshore wind in 2030
- Wind turbines affect MoD's air defence radar capability
- Windfarm Mitigation key risk to accelerating deployment
- Solution to enable co-existence of radar and windfarms

Windfarm Mitigation for UK Air Defence

BEIS APPROACH

- Joint Windfarm Mitigation Task Force (MoD/Industry/BEIS)

Ministry of Defence

OffshoreWind Industry Council

- SICE Innovation challenge
  - Defence and Security Accelerator (DASA)

Defence and Security Accelerator

  - Defence Science and Technology Laboratory (dstl)

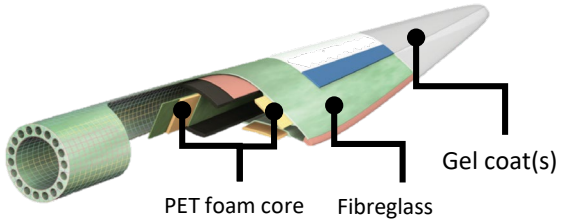
[dstl] The Science Inside

Windfarm Mitigation for UK Air Defence

PHASE 1 FEASABILITY £2.1M; Oct'20-Mar'21	PHASE 2 DE-RISKING £3.8M; Oct'21-Feb'23	PHASE 3 DEMONSTRATION ???

• Short studies assessing the feasibility of novel methods to allow co-existence of windfarms and radar
• 6 projects from 18
• 4 distinct challenges
	• Build on Ph1; progress the technologies to a higher TRL; inform Ph3
	• 7 projects from 20
	• Overarching challenge: **Maintain effective surveillance of airspace in the presence of larger windfarms**
		• All options on the table
		• Informed by:
		  • Phase 2
		  • Joint Windfarm Mitigation Task Force work
		• Further collaboration with MoD and industry

Organisation	Objective
ADVANCED MATERIAL DEVELOPMENT	To introduce advanced nano-scale Radar Absorbing Material (nRAM) at the manufacturing stage of wind turbines, ensuring RF absorption is integrated into the base materials. • Aiming to develop prototype turbine blade and perform mechanical and radar tests • Partnering with Gurit and University of Sussex
TRELLEBORG	To deliver Frame (Full Radar Absorbing Materials and Equipment) to mitigate wind turbine radar interference. • Trelleborg's proprietary radar absorbing system which can be embedded into a resin and ultimately used to manufacture wind turbine blades • Aiming to manufacture a blade prototype for RCS and mechanical validation testing and mechanical testing • Working with NCC, OREC and University of Loughborough
TWI	A solution to develop a novel metasurface manufacturing method for the mitigation of radar clutter caused by windfarms. • Demonstrated feasibility of reducing RCS in Phase 1 • Aiming to build a metasurface demonstrator • Working with OREC and University of Exeter



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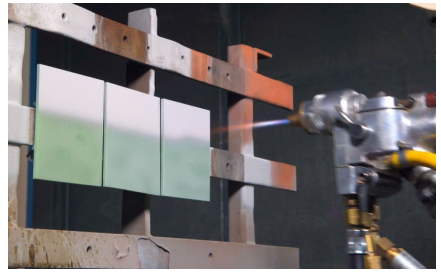
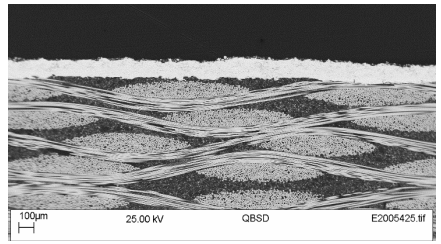
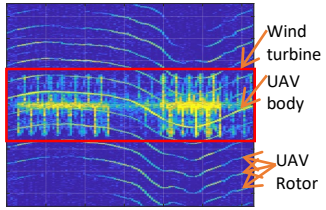




IMAGES COURTESY OF TWI

Organisation	Objective
AVEILLANT A Thales company	To develop a solution to synchronise two remote Holographic radars with which Thales will demonstrate synchronised multi-static staring radar (MSAR). • Builds on Phase 1 and looking to demonstrate a synchronisation of two Aveillant Holographic radars against UAVs or small aircraft
THALES	To design and demonstrate MSAR systems using a validated synthetic environment, to provide continuous all-weather air surveillance in and around windfarms. • Complements the Aveillant project and looking at a different component of the future solution • Aim is to perform system design in a synthetic environment, and develop processing techniques to provide clear guidance on the suitability of different multistatic radar geometries and designs
SAAB	To incorporate Machine Learning (ML) and Artificial Intelligence (AI) techniques into air defence radar, providing a trusted air surveillance picture in noisy and cluttered environments. • Phase 2 builds on Phase 1 and will further develop the ML and AI and demonstrate the algorithm across 2 windfarms in Denmark and Sweden via live flights
LiveLink aerospace	Alternative Surveillance System consisting of RF, acoustic, optical sensors utilising signal processing, particle filter analysis and AI capability to infill MoD Air Surveillance • Aiming to install sensors on wind turbines and conduct flight trials to prove the system capabilities


IMAGE COURTESY OF AVEILLANT



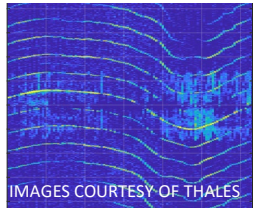
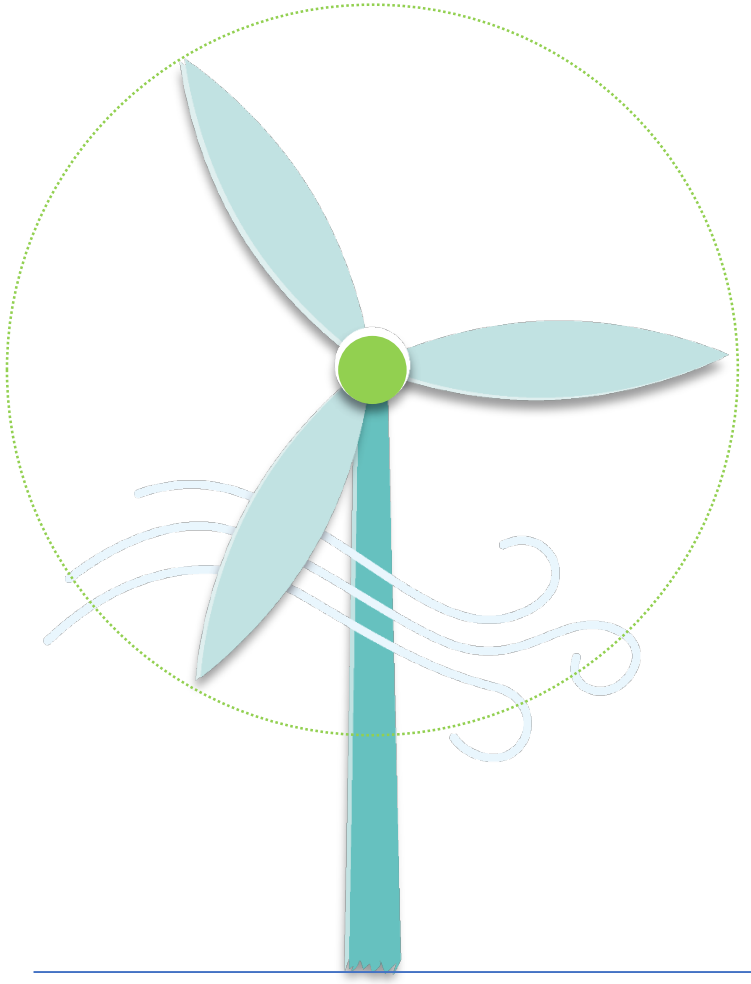
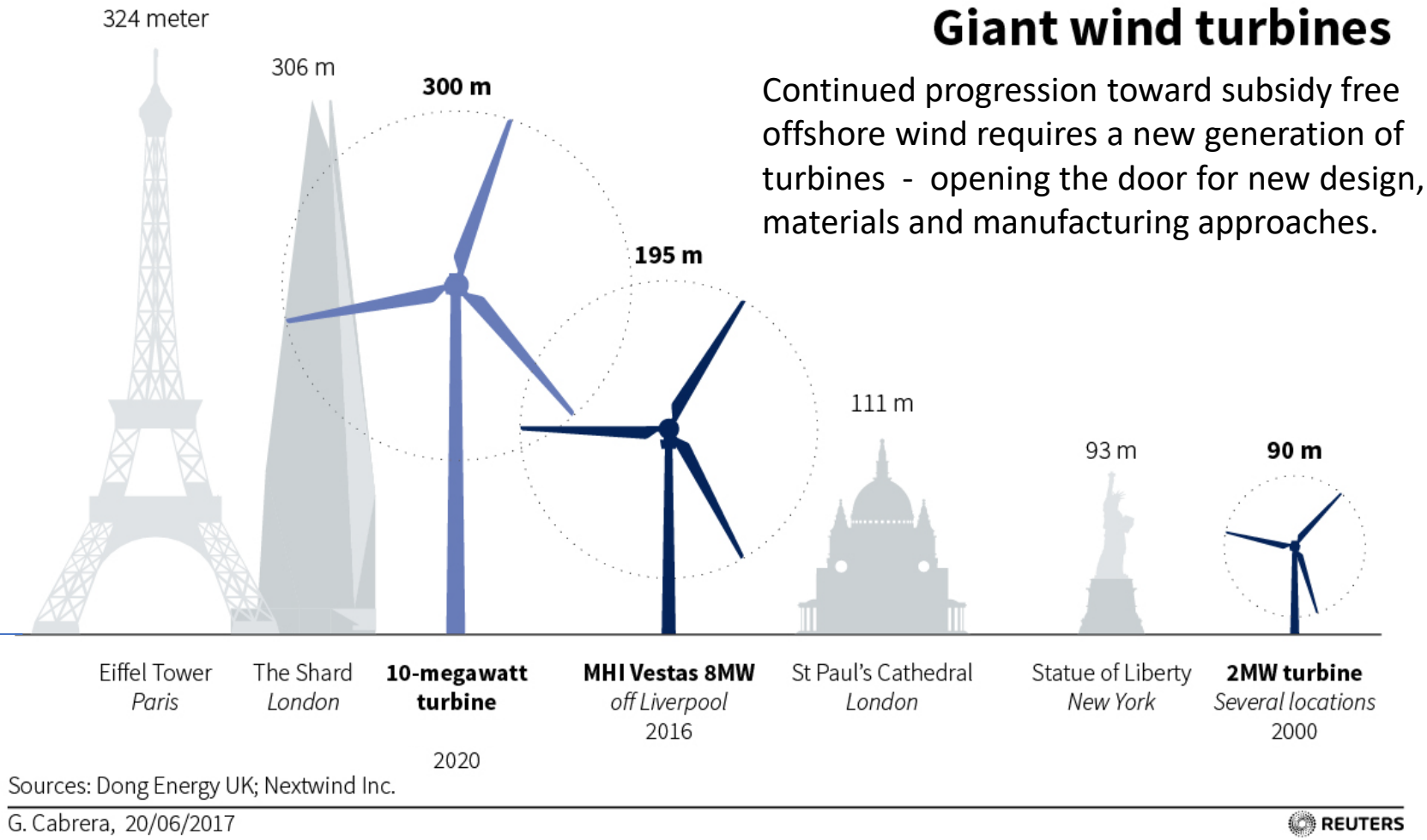

IMAGES COURTESY OF THALES


IMAGE COURTESY OF SAAB

UK Manufacturing Technology for Next generation Wind Turbines: Composites Phase 2



20+ megawatt opportunity



UK Manufacturing Technology for Next generation Wind Turbines: Composites Phase 2

OPPORTUNITY

- Unlock a step change in device capacity by utilising composite materials
- Deliver the next generation wind turbine components in the UK
- Support the growth of the UK manufacturing capacity for offshore wind
- Offshore Renewable Energy (ORE) Catapult and the National Composites Centre (NCC)

UK Manufacturing Technology for Next generation Wind Turbines: Composites Phase 2

Phase 1: Concept and Feasibility	Phase 2: Detailed analysis and design	Phase 3: Design for Manufacture, Prototype and Testing
Scope • Outline requirements for sub-systems and components for 20MW device • High level technical assessment of HVDM opportunity for material and manufacturing changes • Produce detailed business case of specific components • Business case and proposal for Phase 2.	**Scope** • Updated 20MW reference device • Further design and analysis of specific components identified in Phase 1 • Industry and supply chain engagement to support development and delivery • Business case and proposal for Phase 3 • Preliminary plan for validation/testing of components at scale	**Scope** • Manufacturing development for sub-scale components for relevant component work-streams • Manufacturing development for full scale technology demonstrator • Testing and validation of sub-scale components and full-scale demonstrator • Support knowledge transfer and upskilling of UK supply chain to enable adoption of technology
Outputs • Initial reference device parameters (20MW) • Feasibility review of components completed • Component and programme level business cases for further development completed.	**Outputs** • Preliminary design packs for components • Solutions developed for technology gaps. • Component and programme level business case for prototype manufacture produced. • Critical stakeholders engaged	**Outputs** • Prototype components manufactured in the UK (scaled / full scale) • Components validated / tested. • Technology embedded in UK industry & able to commercialise

Q&A