HOSTED BY

UK Trade
& Investment

Innovate UK
Technology Strategy Board

INNOVATE UK 2014

THE GLOBAL SPOTLIGHT ON UK INNOVATION

GREAT
BRITAIN & NORTHERN IRELAND

WHY COLLABORATION WORKED FOR US: ENERGY AND TRANSPORT

ENERGY & TRANSPORT

Phil Sharp

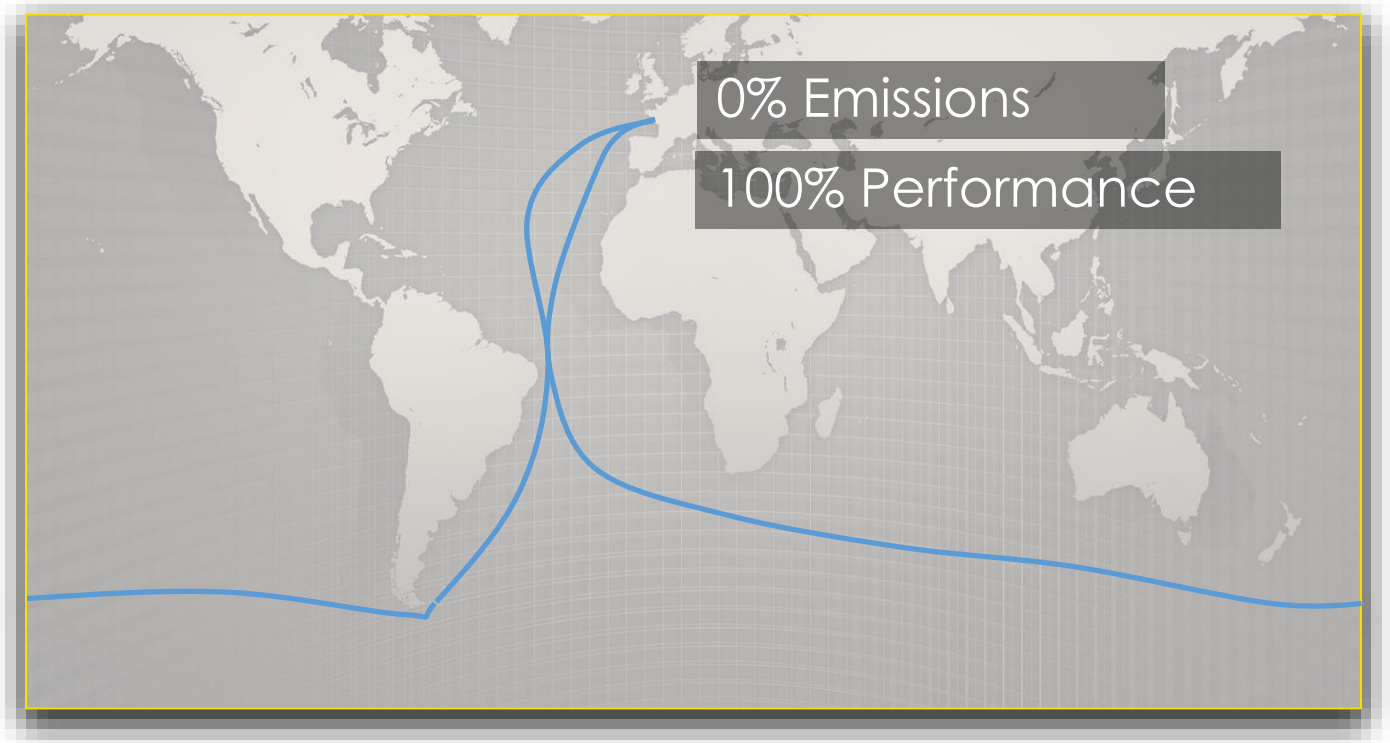
Collaborative Studies for
Ocean Racing Innovations Project

PHIL SHARP RACING

INNOVATE UK 2014
THE GLOBAL SPOTLIGHT ON UK INNOVATION

PROJECT OBJECTIVES

- Be the first British team to win the Vendée Globe solo non-stop round the world race
- Be the first Zero-CO_2 emissions boat to complete a round the world race



INNOVATE UK 2014
THE GLOBAL SPOTLIGHT ON UK INNOVATION

KEY INNOVATION AREAS

Hydrodynamics

- High-lift Foils

Energy System

- Thin-Film Solar PV
- Clean-hydrogen storage system

PHIL SHARP RACING

INNOVATE UK 2014
THE GLOBAL SPOTLIGHT ON UK INNOVATION

R&D COLLABORATION

- Mutually beneficial research projects
- Knowledge share from technical specialists
- Strong industry links
- Access to tools and testing equipment
- Inspire students and staff

Imperial College London

NATIONAL COMPOSITES CENTRE

PHIL SHARP RACING

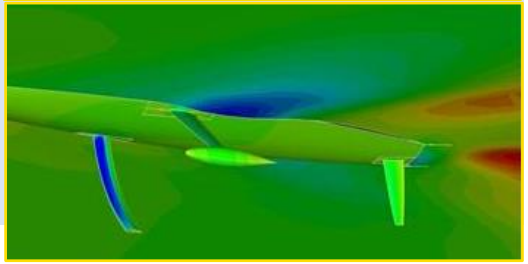
INNOVATE UK 2014
THE GLOBAL SPOTLIGHT ON UK INNOVATION

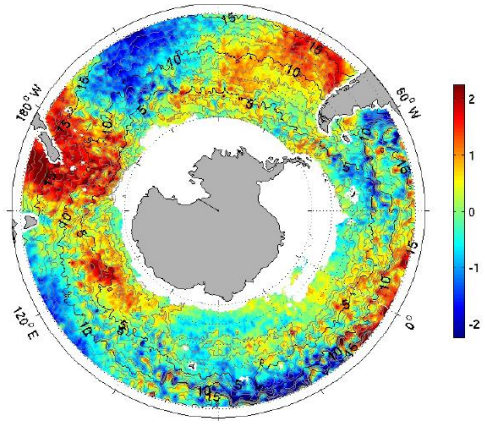
AREAS OF RESEARCH

Imperial College London

PHIL SHARP RACING

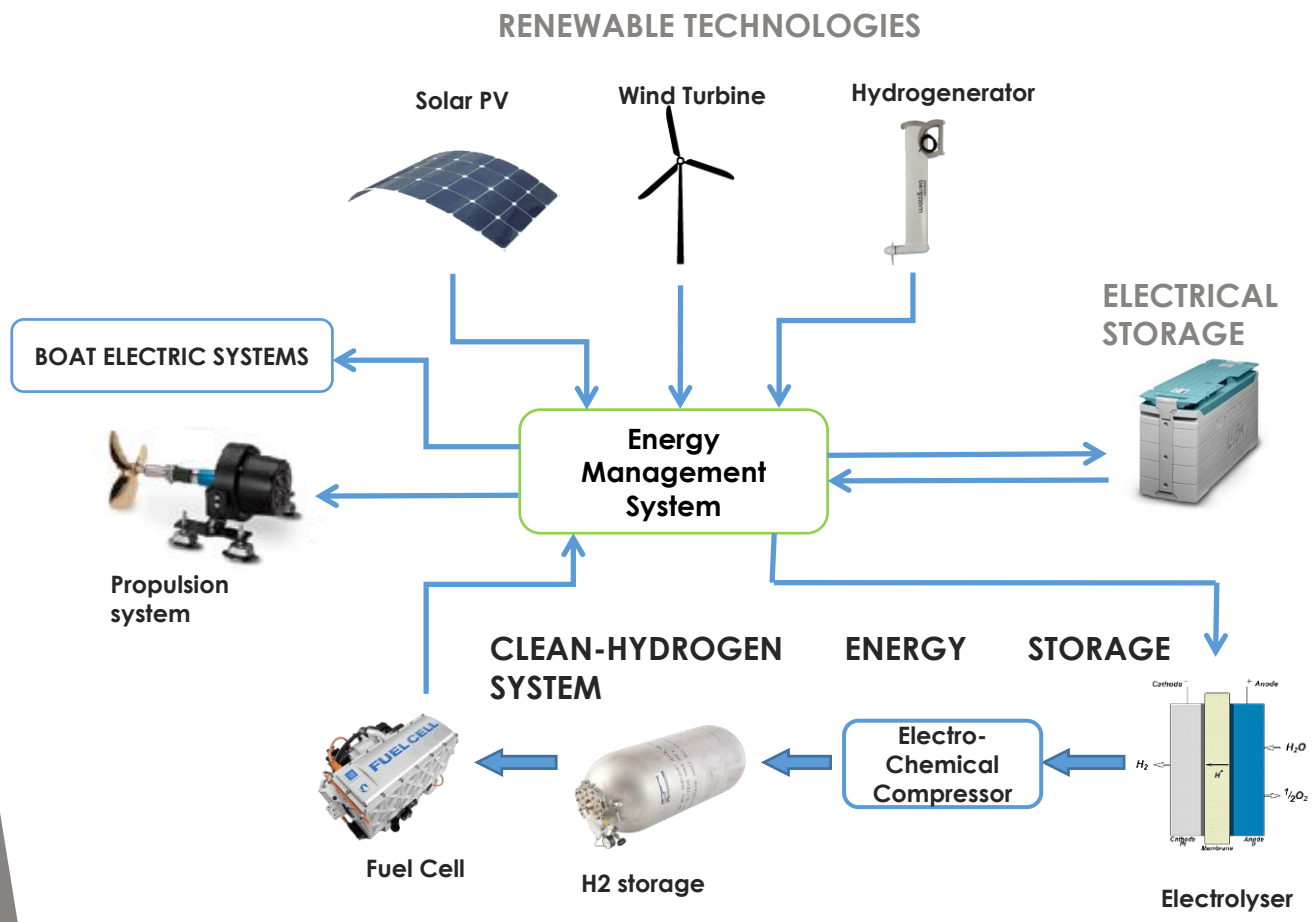
STUDY	DEPARTMENT / GROUP
Energy Systems Development	Energy Futures Lab
Hydrodynamic Foil Studies	Advanced Computational Modelling Group
Feasibility of Recycled Composites	Mechanical Engineering Centre of Environmental Policy
Climate Change Model Development	Grantham Institute of Climate Change





INNOVATE UK 2014
THE GLOBAL SPOTLIGHT ON UK INNOVATION

ENERGY SYSTEM



Requirements

- Zero CO_2
- Highly reliable
- Low weight
- Independence
- Scalability

PHIL SHARP RACING

INNOVATE UK 2014
THE GLOBAL SPOTLIGHT ON UK INNOVATION

CONCLUSIONS

- Intermittency issues of renewable energy can be overcome using multiple capture sources plus energy storage
- Hydrogen innovations can be used to create a low-weight circular, energy independent system for motive applications
- Competitive advantage can be achieved applying latest renewable technologies
- University R&D partnerships can be highly beneficial at early stages of project

CONTACT

Phil Sharp
Team Principal, Skipper

M: +44 7973 378997
E: phil@philsharpracing.com

HOSTED BY

UK Trade
& Investment

Innovate UK
Technology Strategy Board

INNOVATE UK 2014

THE GLOBAL SPOTLIGHT ON UK INNOVATION

GREAT
BRITAIN & NORTHERN IRELAND

WHY COLLABORATION WORKED FOR US: ENERGY AND TRANSPORT

Mairi Wickett

Managing Director,
WITT Energy

MAJOR MILESTONES

o Winner of the 2013 Savannah Ocean Exchange Gulfstream Navigator Award for Innovation

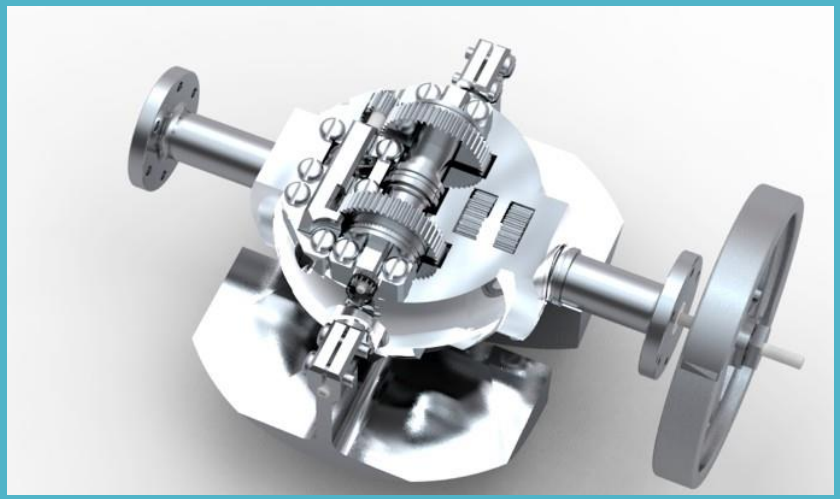
o Winners of 4 UK government awards

o Exclusive Marketing Representative Agreement signed for US Department of Defense, US Department of Homeland Security and US Coast Guard

o Engaging a contract manufacturing partner in the UK

o Initiating the creation of an WITT International Advisory Board, with members from the UK, USA, Canada and Switzerland

The WITT



A new way to generate power from harvesting motional energy that is all around us

WITT's potential:

- Small scale for sensors and personal appliances
- Large scale to generate megawatts at sea

and for everything in between .....
where energy can be harvested from motion

Innovate UK awards

July 2013 TSB Vessel efficiency award
Mar 2014 TSB SMART award to develop WITT for small marine
May 2014 SBRI / TSB Award for light rail energy
June 2014 TSB SMART to develop a Micro device

Other awards and support

Glasgow University, ME, Feasibility study
Glasgow University, Marketing report
Scottish Enterprise, TTom award
Scottish Enterprise, Patent protection for Europe assisted funding
July 2012 and 13 Match funding, European 'Clean Technology' fund
Jan 2013 UK government, MOD Autonomous vessel award
May 2013 Growth Accelerator through Business West
July 2013 Manufacturing Advisory Service part finance prototype
Sept 2013 Strathclyde University, WITT and buoy study
Oct 2013 Ocean Exchange Gulfstream award

Applications for human motion

WITTs attached to a belt for charging personal appliances or within a backpack for charging a number of devices and batteries. For use by students, hikers, soldiers or anywhere where power is limited or not available.

Applications for natural motion

The WITT system’s potential to collect energy from sea, tidal, estuary and river motion is under way with experts already identified in both the academic and commercial spheres.

Applications for sea vessels, etc

WITTs can provide power for floating devices, currently we are building units for trials on boats, marine buoys, autonomous vessels, pontoons, safety lighting, lane markers and utility lighting.

Applications for transportation

WITTs are being investigated to provide power for sensors, logistics, and may other devices used in the rail sector and rough terrain vehicles.

There are many other potential applications in multiple markets

IT'S AS GOOD AS YOUR IMAGINATION

WITT USPs

- Low cost, completely green.
- Can provide power wherever there is motion, not sunlight dependant.
- Housed in a sealed structure, protected from external environments.
- Enables transmission to be continually lubricated reducing maintenance.
- Unique design captures energy from all six degrees of motion .
- No external moving parts
- Can be designed to be ‘fit and forget’

Testing Timelines

2013 | 2014 | 2015

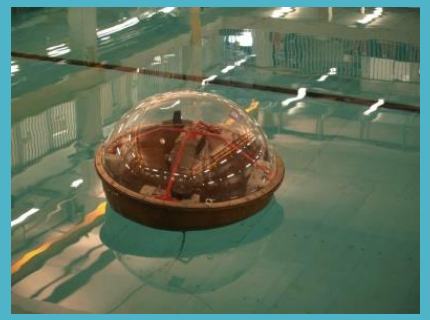
Early Demonstrator

Plymouth wave tank

Power take off DMac, MCT

Validation test to extremes

Field testing
- 40ft Yacht
- Plymouth Marine
- Data Gathering buoys



1st Application – Small Vessels & Buoys

- In excess of 20mn vessels suitable for WITT deployment.
- WITT is potentially an Ideal back up power solution for ocean vessels
- Lloyds Register suggesting WITT deployment in on board lifeboats, powering GPS, SOS.
- US Coast Guard interest to power navigational buoys, WITT working with our U.S agent JGW International.

2nd Application – Personal Power

- Global market - small device to charge personal appliances.
- Many users do not have a power source to regularly recharge their phones.
- Additional market for larger WITT being incorporated into a backpack to recharge batteries.
- Interest from the US Marines, the US Dept of Defence, as well as UK defence entities.
- Range of personal power models could be developed.

Production Capability - Marine

- Working with transmission experts, MCT ReMan, to optimise WITT transmission & create production capability.
- Working with Planet Ocean and Triskel Marine to optimise package for use in small vessels and marine buoys.
- Various sales and distribution routes into the small vessel market.
- Production capability during 2015

MCT Group Credentials

- Supplying to OEM's from 1965
- 102 employees
- Turnover £10m
- Service offerings
  - Contract assembly
  - Supply chain management
  - Offsite corrosion repair
  - Remanufacturing / Component servicing
  - Reverse Engineering / Component Obsolescence

Quality Accreditations

TS16949

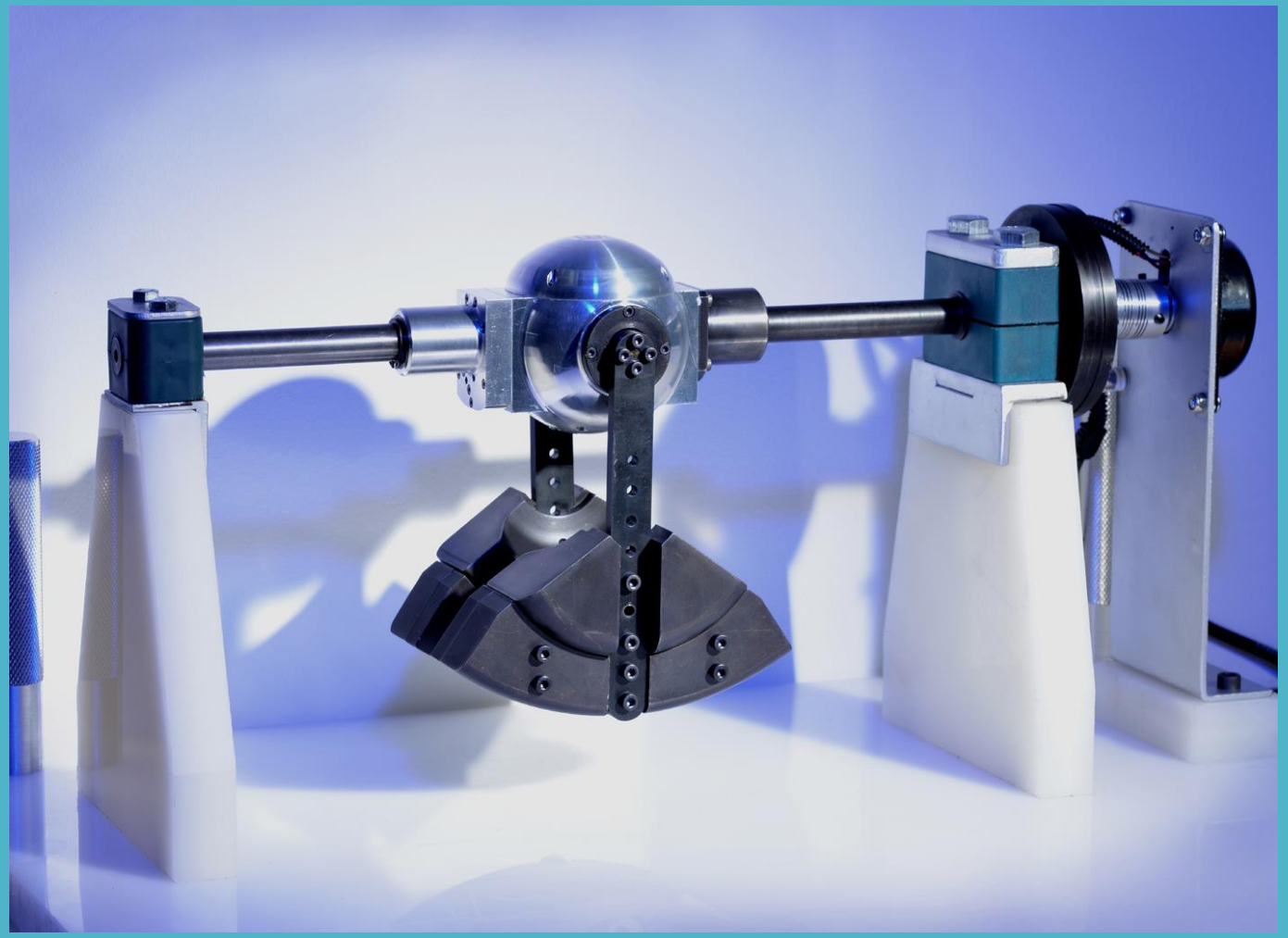
ISO14001

Customer Portfolio

Ford
GM
JAGUAR
LAND ROVER
VOLVO
UNIPART GROUP
BOMBARDIER
the evolution of mobility
WITT ENERGY
OPEL
AshWoods
THE HYBRID PEOPLE
vwheritage
Keeping VWs alive for you to drive
DB SCHENKER

MCT Group Ltd

Pre Production unit



HOSTED BY

UK Trade
& Investment

Innovate UK
Technology Strategy Board

INNOVATE UK 2014

THE GLOBAL SPOTLIGHT ON UK INNOVATION

GREAT
BRITAIN & NORTHERN IRELAND

WHY COLLABORATION WORKED FOR US: ENERGY AND TRANSPORT

Adam Brunton

Strategic Technologist,
M-solv

INNOVATE UK 2014
THE GLOBAL SPOTLIGHT
ON UK INNOVATION

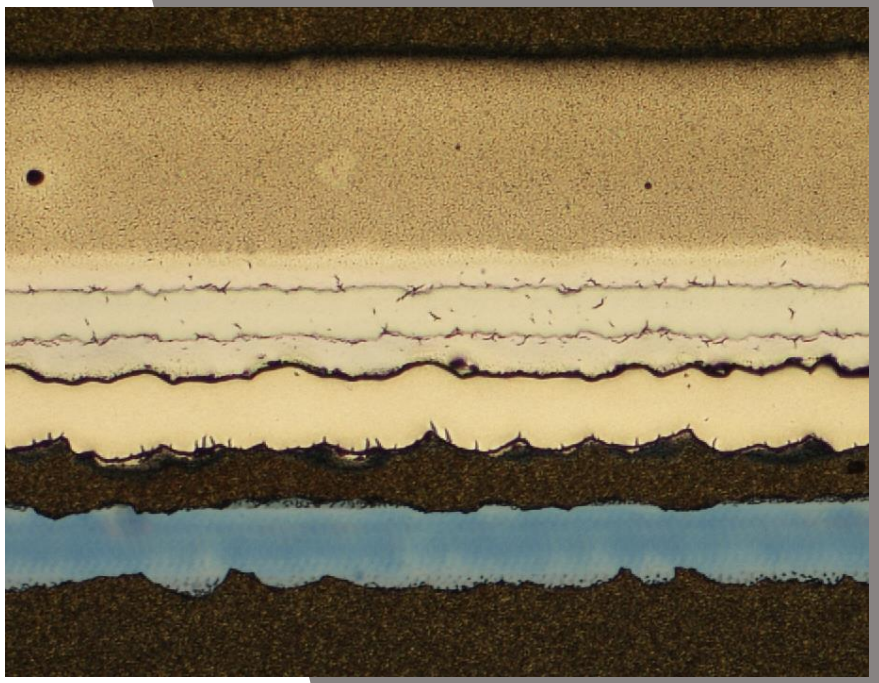
M-SOLV

- Founded 1 Sept 2007
- Major investor is Chung Nam
- Innovations
- UK Technology Centre
  - 3 buildings (24,000ft^2)
  - 37 staff (+ 3 EngD students)
  - R & D activities
  - Operate multiple R&D test rigs
  - Build pilot tools
- HK R&D and Support Centre
  - 6 staff
- Taiwan tool production unit
  - Partner Company
  - Engineering and assembly teams
  - Mass produce tools

M-SOLV: LASER, INKJET, SPRAY

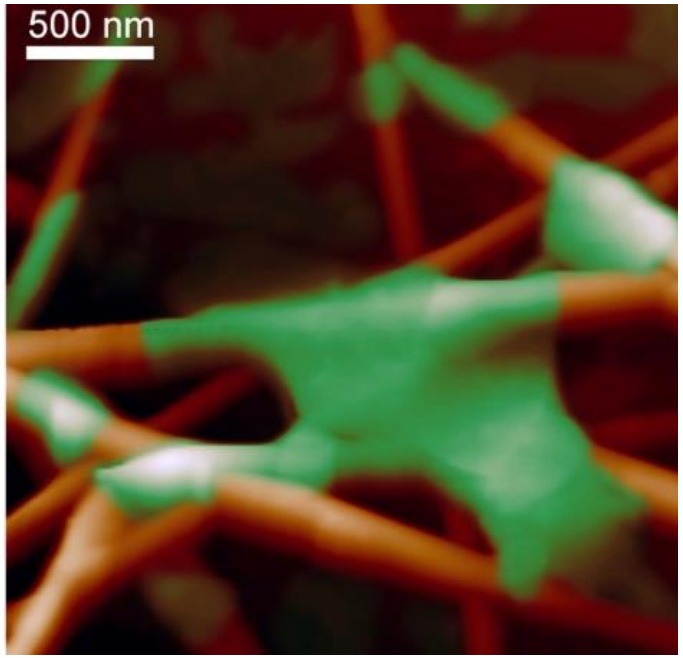
R&D COLLABORATIONS

- IMP/OSI (TSB)
  - New thin film PV interconnect process
  - Collaboration with Lougborough Univ
- LIGHT TOUCH (TSB)
  - Novel capcitive touch sensors
  - Touchnetix
  - Intrinsiq Materials Ltd
- University of Surrey
  - Transparent conductors
  - Silver nanowires
  - Graphene
- ISSUES
  - IP
  - University collaboration agreements



WHAT HAS IT LEAD TO?

- Able to enter PV equipment market
  - Novel processes critical
- In-house capacitive touch sensor fab
  - Niche product: “robust sensor”
  - Low volume/high value
- Significant IP to exploit in the coming years
  - Particularly in PV



HOSTED BY

UK Trade
& Investment

Innovate UK
Technology Strategy Board

INNOVATE UK 2014

THE GLOBAL SPOTLIGHT ON UK INNOVATION

GREAT
BRITAIN & NORTHERN IRELAND

WHY COLLABORATION WORKS

Andrew Jamieson

CEO, ORE Catapult

CATAPULT
Offshore Renewable Energy

INNOVATE UK 2014
THE GLOBAL SPOTLIGHT
ON UK INNOVATION

MULTI-FACETED APPROACH TO DRIVE INNOVATION

CATAPULT
Offshore Renewable Energy

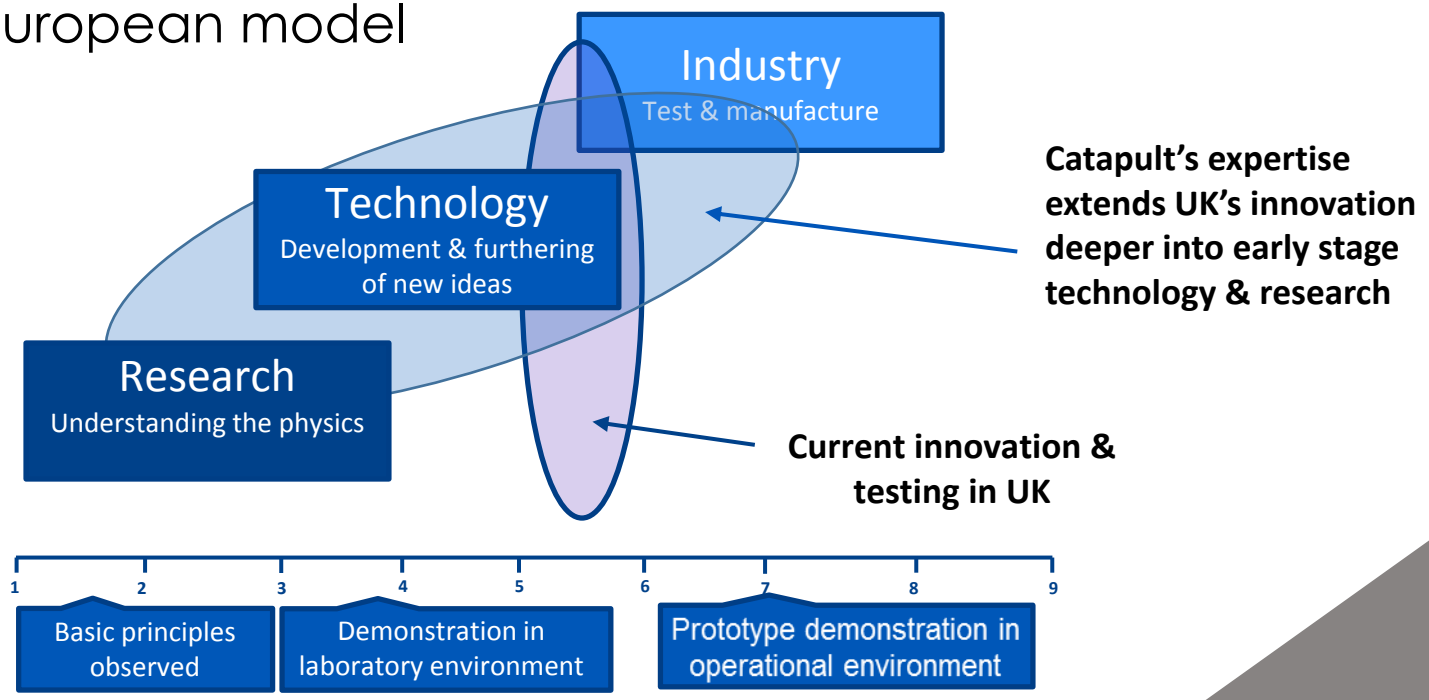
Vision: Abundant, affordable energy from offshore wind, wave and tide

- Building a centre of deep technical expertise
- Identification, development and commercialisation of innovative technology
- Research, development, demonstration, testing and asset assurance
- Driving collaboration between Government, industry and academia
- Market access for SMEs and new technologies
- Leveraged funding model (1:1:1)

WHY DO WE NEED CATAPULTS?

CATAPULT
Offshore Renewable Energy

- UK research sector one of the top performers worldwide, but excellence fails to translate into business opportunities
- Technology & innovation centres proposed by entrepreneur Hermann Hauser in report for Government, March 2010
- Proven European model



INNOVATE UK 2014
THE GLOBAL SPOTLIGHT ON UK INNOVATION

ORE CATAPULT INITIATIVES ARE BOTH DRIVEN AND DELIVERED BY KEY INDUSTRY PARTNERS

CATAPULT Offshore Renewable Energy

Industry Advisory Group
Chair: SPR

Responding to industry need

SSE, EDF ENERGY, edp renewables, DONG energy, RWE The energy to lead, SIEMENS, AREVA, MITSUBISHI POWER SYSTEMS, ALSTOM, FAB, Technip take it further., GLOBAL ENERGY GROUP, subsea 7, RICARDO, SCOTTISHPOWER RENEWABLES, Gamesa, pelamis wave power, Hammerfest STRØM

Research Advisory Group
Chair: Edinburgh University

Access to best research and facilities

Cranfield University, The University of Edinburgh, University of Strathclyde Glasgow, The University Of Sheffield., University of Oxford, Queen's University Belfast, Imperial College London, Loughborough University, University of Exeter, Swansea University Prifysgol Abertawe

Partnerships and strategic alliances

CARBON TRUST, Wave Hub, EMEC ORKNEY The European Marine Energy Centre Ltd, THE CROWN ESTATE, Energy Innovation Centre

INNOVATE UK 2014
THE GLOBAL SPOTLIGHT ON UK INNOVATION

SPARTA

SYSTEM PERFORMANCE AVAILABILITY AND RELIABILITY TREND ANALYSIS

- Joint industry project with The Crown Estate and 8 offshore wind project operators, managed by Steering Group
- Benchmarking tool for offshore wind farms, available to owner operators
- Web-based database system for the collection and presentation of anonymised availability, reliability, and performance data against 70 performance metrics
- Opportunity to expand to further types of data from additional project operators

THE CROWN ESTATE

INNOVATE UK 2014
THE GLOBAL SPOTLIGHT ON UK INNOVATION

MARINE FARM ACCELERATOR

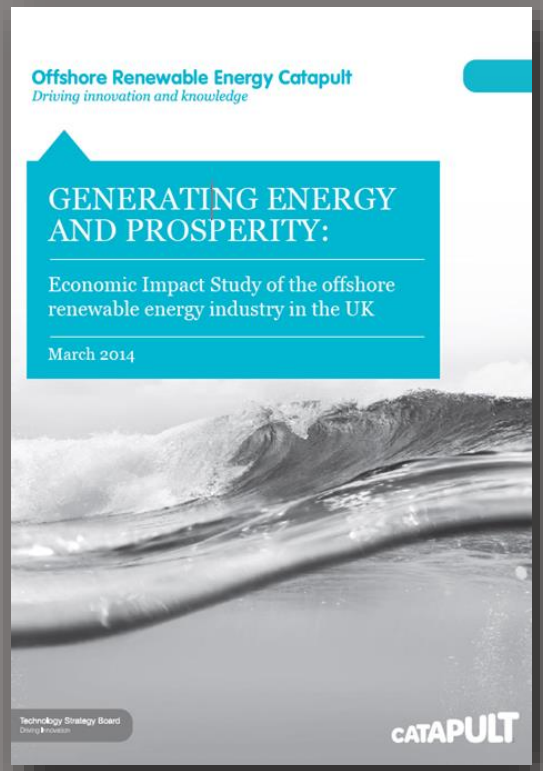
TECHNOLOGY FOR FIRST WAVE AND TIDAL ARRAYS

- ORE Catapult programme delivered with the Carbon Trust
- Modelled on the successful Offshore Wind Accelerator (OWA)
- Phase 1 (2013): six workstreams driving scope for R&D projects:
- Electrical Systems, Yield Optimisation, Installation Methods, O&M, Insurance
- Phase 2 will implement the identified R&D projects

SIGNIFICANT ECONOMIC IMPACT OF INNOVATION FROM OFFSHORE RENEWABLES

Offshore Renewable Energy Industry:

- £6.7bn contribution to UK economy by 2020
- 34k direct jobs, an increase of 25.5k on 2013
- 150,000 jobs in total in the wider UK economy
- Overseas targets provide significant export opportunity for UK from first mover advantages



CONTACT US

ORE Catapult
Inovo
121 George Street
Glasgow
G1 1RD

T +44 (0)333 004 1400
F +44 (0)333 004 1399
info@ore.catapult.org.uk

ORE Catapult
National Renewable Energy Centre
Offshore House, Albert Street
Blyth, Northumberland
NE24 1LZ

T +44 (0)1670 359 555
F +44 (0)1670 359 666
info@ore.catapult.org.uk

ore.catapult.org.uk

HOSTED BY

UK Trade
& Investment

Innovate UK
Technology Strategy Board

INNOVATE UK 2014

THE GLOBAL SPOTLIGHT ON UK INNOVATION

GREAT
BRITAIN & NORTHERN IRELAND