SuperGen 3 UK Centre for Marine Energy Research
Mission

SuperGen Marine Phase 3 is the **UK Centre for Marine Energy Research** whose core membership and management team will ensure joined-up regional, disciplinary and thematic effort to meet the challenges in accelerating deployment towards and through 2020 targets.
Rationale and Vision

Within this landscape UKCMER will

• Conduct world-class **fundamental and applied research** that assists the marine energy sector to accelerate deployment and ensure growth in generating capacity through 2020 targets.

• Expand and operate an inclusive **marine network** of academic researchers, industry partners and international collaborators.

• Continue to provide the highest quality of **doctoral training and knowledge transfer** in partnership with industry to build intellectual and human capacity for the sector.
Research Themes

• Arrays and farms

• Extreme loadings and survival

• Novel Marine Energy Systems, Components and Reliability

• Environmental Interaction

• Mooring and Foundations
Arrays and Farms

Optimise design, hydrodynamic processes and nature of interactions between waves, currents, devices and network.

Extreme Loadings & Survival

Develop means to predict, economically design for and survive extreme loadings, reduce the need for over-design against fatigue, increase reliability, power quality and affordability

*The Effects of Realistic Tidal Flows on the Performance and Structural Integrity of Tidal Stream Turbines:*

**Cardiff**, Liverpool, Swansea, Bangor, Cranfield

*Extreme Loading of Marine Energy Devices due to Waves, Currents, Flotsam and Mammal Impact:*

**Manchester**, Edinburgh, Plymouth, SAMS
Extreme Loadings & Survival

Develop means to predict, economically design for and survive extreme loadings, reduce the need for over-design against fatigue, increase reliability, power quality and affordability.

*Modelling Marine Renewable Energy Devices - Designing for Survivability:*

**Imperial**, Queens, Manchester Metropolitan

**Reducing the Costs of Marine Renewables via Advanced Structural Materials.**

**Strathclyde**, Southampton, Newcastle,

*SuperGen Marine Technology Challenge:*

**Oxford**, UCL, Bath
Novel Marine Energy Systems, Components and Reliability

Improve reliability and increase ability to predict wear and fatigue life of components & devices operating well away from design conditions

_Increasing the life of Marine Turbines by Design and Innovation: Cambridge, Cranfield_

_Accelerated lifetime testing. Exeter_
Novel Marine Energy Systems, Components and Reliability

Improve reliability and increase ability to predict wear and fatigue life of components & devices operating well away from design conditions

Step Change for Wave Energy Conversion Through Floating Multi-Body Multi-Mode Systems In Swell

Manchester, Oxford, Bath

The hydrodynamics of deformable flexible fabric structures for wave energy conversion.

Plymouth
Environmental Interaction

Understand and quantify the effects of energy extraction and modifications of flow on marine mammals, flora, fauna and sediment

*Interactions of Flow, Tidal Stream Turbines and Local Sediment Bed under Combined Waves and Tidal Conditions:*
  *Dundee*, Hull, Liverpool, Strathclyde

*Large-scale Interactive Coupled 3D Modelling for Wave and Tidal Energy Resource and Environmental Impact:*
  *Heriot-Watt*, Edinburgh, Strathclyde
Environmental Interaction

Understand and quantify the effects of energy extraction and modifications of flow on marine mammals, flora, fauna and sediment

EcoWatt 2050

Heriot-Watt, Edinburgh, Aberdeen, Strathclyde, Swansea

Large scale interactive coupled modelling of environmental impacts of marine renewable energy farms;

Queens, Imperial, CEFAS
Doctoral Training

Continuing demand for trained marine energy researchers to supply both the industrial and research sectors.

UKCMER proposes to continue doctoral training courses but to include industrial, CPD, participants.

PhD students will be allocated in year 1 to core and associate universities in response to the evolving research landscape.

Studentships will be supplemented by knowledge transfer partnership (KTP) associates working on industry led EngD projects directly addressing industrial challenges from the network.
Industry Network

Aquamarine; Pelamis Wave Power; MCT; TGL; ScotRenewables; Nautricity;
Rolls Royce; Tidal Energy Ltd; GreenTide Turbines Ltd.
WaveHub; EMEC; NaREC
EdF; Converteam; SKF; Edinburgh Designs; DHI; Mabey Bridge Ltd;
Arup; TATA; Bosch Rexroth; EWF energy Ltd; Power Units M&E Engineering Ltd; SKF, NGenTec
International Network

HMRC Cork - Ireland, TU Delft-Netherlands, ECN - Nantes-France. 
Dalhousie University-Canada, Oregon State University, Florida Atlantic University,
UMass – USA. Universities of Osaka City and Hokkaido–Japan.
Harbin Engineering University and Dalian University of Technology–China.
National Taiwan University, National Taiwan Ocean University, National Chen Kung
University-Taiwan
International Network

RCUK: MOST Call
New Test Facilities
CoAST Laboratory – Plymouth University
New Test Facilities

FloWave TT – University of Edinburgh
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