

PRIMaRE OVERVIEW



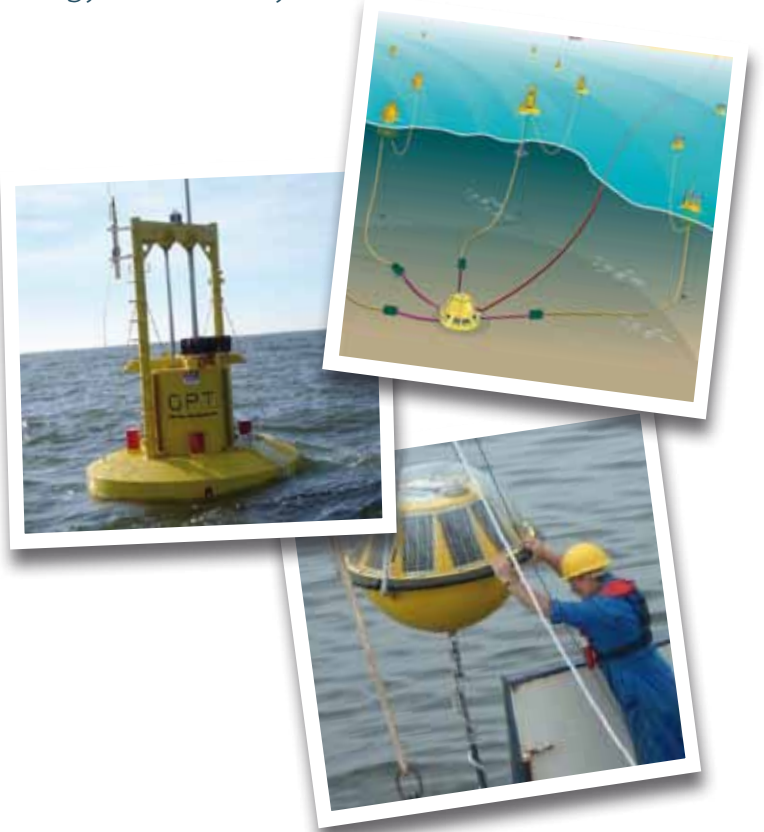
The Peninsula Research Institute for Marine Renewable Energy (PRIMaRE) is a response from the Universities of Exeter and Plymouth to the challenges facing businesses involved in marine renewable energy and in support of Wave Hub, the South West of England's £42 million development centre for testing of wave energy device arrays.

PRIMaRE has brought together a team of international researchers and world class facilities to accelerate the development of technology and address the most critical challenges facing the marine renewable energy industry.

PRIMaRE collaborates with industry to support research and development activity across a number of areas, for example, design, engineering, environmental impact and grid connection, and conducts research in six main areas, which are outlined throughout this overview document.

To find out more:

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PRIMaRE is funded by the South West Regional Development Agency and ERDF Competitiveness and Convergence Programmes

PRIMaRE conducts research in six areas

Resource Characterisation

Wave and tidal resource characterisation enables the detailed assessment of the economic viability of potential sites. For example, PRIMaRE is using wave buoys, computational simulation and land based radar to quantify the wave energy resource available at the Wave Hub site off the North Cornwall coast.

Research capabilities include;

- High performance computing cluster
- Wave Tank with programmable wave maker (18m long x 1m deep)
- Recirculating Flume (18m long x 0.5m deep)
- Computational Fluid Dynamics software

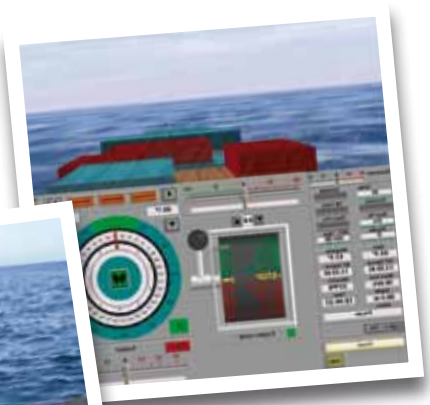
Marine Renewable Energy Systems

Research in this area focuses on the considerable engineering challenges associated with marine renewable energy. PRIMaRE's research is assisting the development of mooring systems, umbilical connections and the installation and maintenance infrastructure.

The South-West Moorings Test Facility (SWMTF) includes a buoy incorporating motion sensors, a patented tri-axial load cell and structural stress measurement equipment. This allows for detailed understanding of conventional and novel mooring arrangements for wave energy devices. Which intern, is complemented by theoretical and numerical studies of wave-structure interactions, which are being used to accelerate device development. Device optimisation, reliability and availability are also the subjects of on-going research projects.

The Dynamic Marine Component Test Facility (DMAC) allows wear and fatigue analysis of marine renewable energy components under dynamic load conditions.





Environmental & Biodiversity Impacts

PRIMaRE researchers are working to understand, quantify and mitigate the environmental and biodiversity impacts of marine renewable energy extraction, which are key considerations in gaining consent for marine energy projects. For example, baseline studies at the Wave Hub site will provide detailed impact assessment data for developers.

Research capabilities include;

- Passive acoustic cetacean monitoring
- Water column and plankton sampling
- Seabird census techniques
- Aerial surveying for large pelagic fish species and pinnipeds
- Satellite tracking to establish behaviours and movements of individuals
- Ecological modelling

Safe Operations & Navigational Risk

PRIMaRE is developing cost-effective and reliable systems to mitigate the risk of collision and to manage the interaction between water space users and wave energy device arrays.

For example, a fully-operational simulation of the Wave Hub site is being used to investigate the response of navigators under various weather conditions and the results of this work will inform the design of AIS-based automated monitoring systems.

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Underwater & Surface Electrical Systems

The variability of the energy resource is a key consideration in the design of marine electrical generation systems and output from marine energy converters has to be carefully conditioned before it can be exported.

PRIMaRE is investigating issues around grid compliance, power quality and system protection issues including fault prediction and fault tolerant operation. Solutions are also being sought to problems unique to marine renewable energy such as connections between devices and export cables, the siting of switchgear afloat or on the seabed, and power transmission losses.

Research capabilities include;

- Opal RT real time simulator, dSPACE DS 1103, PXI PC-based platform for test, measurement, and control, Power Factor Control Unit, Wind Mill Control Unit, different AC and DC machines, and measuring instruments
- MATLAB, PSpice, PSCAD, EMTP-RV, ATP, PLECS, LabView, Tecplot, ETAP, VisSim, Xilinx, and PSLF

Socio-Economic Factors

Research in this theme is being used to inform policy on energy and sustainability, with specific regard to the transition to a sustainable energy ecology.

PRIMaRE's research into the management of marine stakeholders will help to form the basis of the consulting and consenting processes for marine renewable energy projects.

