

3.5 HSE database

- requirements for industry sector data, and analyses, end uses and data acquisition by regulatory authorities. Developing experiences from the offshore petroleum sector, commercial sensitivities etc.

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Report

Workpackage report updated regularly to reflect new work

Publications

Workshop

Workshop/seminar for discussion of data, and means of acquisition

Recommendations for future studies

Seminar

Informal Networking

Conference

Published conference proceedings

WORKPACKAGE 4: HYDRODYNAMICS, MOORINGS AND FOUNDATIONS

4.1 Effects of wave and currents (particle kinematics) on MEC efficiency

strand underway: Total funded PhD 'Long-term data time series analysis of waves, tides and currents at a MEC site', study involves the hydrodynamics of wave current interaction, the effects on wave spectra, the energy distribution, fluid particle kinematics, non-linear wave analysis, field data monitoring and analysis with emphasis on evaluation for TEC developer needs.

4.2 Wide spatial-scale measurement of wave and currents (springboard proposal - RASCAL Pentland Firth)

springboard proposal (RASCAL PF for the Pentland Firth), study aims to improve on conventional ADCP methods (and wave data buoys in strong currents) which are impractical on the scale of our study area, the Pentland Firth. Instead, dedicated HF radar systems will provide data for site assessment and appraisal prior to tidal device installation, and subsequently continuous data for use by developers and for more general use in oceanographic and modelling studies. *A further strand*, the application of the Stanford University 3D wave and tidal modelling software, SUNTANS, is seen as an integral part of this study

4.3 Storm Surge Modelling

theoretical simulations, again utilising the SUNTANS software, to determine long term estimates of storm surge effects at Orkney sites, with associated implications for MEC mooring design

4.4 Mooring Requirements

strands proposed and underway: studies relating to TEC device design, mooring systems, conventional catenary, hybrid (material), semi-taut and mooring mechanisms. Navigational buoy/mooring design for TEC sites. Studies to date include DTI and Carbon Trust work on dynamic assessment for TEC devices and collaborative work with Supergen II mooring arrays for MEC devices involving Brian Linfoot (HWU).

4.5 Foundations requirements and options

the application of anchoring techniques applicable to MEC systems requires consideration of cost, environmental effects and performance with specialist knowledge of seabed geotechnics, piling, anchoring and dynamic performance.

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5.1 Collation and presentation of all findings from completed studies and those presently underway (SRDG) There is already a significant amount of research being undertaken on the environmental effects of marine energy convertors (MECs). The above studies have sought for example not to duplicate relevant work undertaken in the COWRIE programme for offshore wind, or in the EMEC monitoring programme

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WORKPACKAGE 5: ENVIRONMENTAL AND ECOLOGICAL IMPACTS

5.2 Consideration of regime change in the coastal waters of the North of Scotland Regime shift in these ecosystems has been postulated. Certainly recent years have seen ecosystem impacts of climate change and dramatic fluctuations in the fortunes for example of the sandeel fishery and of the breeding success in nesting seabirds. Clarity and a comprehensive understanding is required in all considerations relating to the monitoring of environmental and ecosystem impacts of MEC deployment. For example the loss of high-energy sentinel species (such as *Fucus distichus*) may be a result of increases in coastal sea temperatures rather than simply a consequence of the extraction of energy

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5.3 New PhD scholarships designed to support outstanding students in one or more of the following themes: water column ecological effects, ecological/environmental models of change in energy regime, marine protected areas (MPA)/fishery impact modelling (e.g. effects on commercial fisheries/marine conservation), acoustic and remote sensing methods and monitoring, cost effective technologies and methods for detecting ecological change, wave energy convertors (WEC) effects on coastal processes.

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WORKPACKAGE 6: SOCIO-ECONOMIC VALUES AND RESPONSES

6.1 Value conflict assessment using AGORA using the AGORA methodology capture the values of marine stakeholders and identify where these values are likely to conflict in the context of marine energy development. This technique identifies the underlying conflict of values that is present in any stakeholder dispute. It will identify the root concerns about renewable energy development in the marine environment

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6.2 Assessment of the economic impact on fisheries

Closed areas for marine energy converters will reduce the sea area available for fishers. At the same time closed areas may act as sanctuaries (No Take Zones) for commercial species. The economic and social impacts of this are likely to be complex and uneven depending on location, the nature of the fishery and fish species involved. This strand shall model these impacts and examine how costs and benefits will be disputed amongst fishing communities

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6.3 Community Involvement

Community involvement in renewable energy project (through ownership or payments) is recognised as having two benefits (i) overcoming public resistance to renewable energy development and (ii) a potential economic development opportunity for rural economies. This strand shall examine both the mechanisms to achieve this and the capacity of communities to engage with marine projects

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6.4 Marine planning and allocation of resource

this strand will examine how different licensing arrangements would impact upon the development of marine renewables. In particular it will draw on recent experience from onshore wind energy and the expansion of aquaculture, where planning mechanism, arguably, failed to accommodate the rapid expansion in development leading to stakeholder conflict; and developments in marine spatial planning, including legislation in Scotland/UK and Europe

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