

Marine Energy Activity Prioritisation



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Overall approach

The work summarised in this document is broadly a development and expansion of the findings and recommendations of the *UKERC Marine (Wave and Tidal Current) Renewable Energy Technology Roadmap** of 2008, including:

- The identification of potential Marine Energy sector R&D activities for (47 in total); these focus specifically on the development and acceleration of the marine energy sector in the UK
- The grouping of these activities into R&D Themes containing related topics for ease of analysis
- The ranking of these activities in terms of the needs of the UK marine energy sector generically. The assessment criteria and ranking methodology is discussed later...
- An early version of this work, along with preliminary rankings were critiqued by delegates at a European Commission SETIS workshop on Ocean Energy in January 2009. This led to the incorporation of a number of revisions to the prioritisation matrix as presented in this document.

* http://ukerc.rl.ac.uk/Roadmaps/Marine/Tech_roadmap_summary%20HJMWM.pdf

R&D activities and themes

Five R&D themes have been identified with associated activities as follows:

- Device and system demonstrators
- Sub-components
- Guidelines and standards
- Tool development
- Infrastructure and enablers

Assessment criteria, scores and weightings

Assessment criterion	Description
Sector urgency	Is rapid development an urgent priority for the Marine energy sector?
Unique to the Marine energy sector or generic technology	Is the technology unique to the marine energy sector or generic across a number of sectors?
Cost reduction potential - impact on CAPEX	What is the CAPEX cost reduction potential?
Existing funding level	To what degree is development funding already existing and being utilised?
Impact on technical risk and survivability	How much would development funding contribute to overall system risk reduction and survivability?
Level of adaptation required	How readily adaptable is existing technology to the Marine energy sector?
Cost reduction potential – impact on OPEX	What is the OPEX cost reduction potential?

Activities and themes

Device and System Demonstrators	Sub-components	Guidelines & Standards	Tool Development	Infrastructure & Enablers
Performance data collection Installation methods Recovery methods Low-cost O&M techniques 1 st Generation device and array sea trials 2 nd Generation device development 2 nd Generation device and array sea trials	Control systems Power electronics Generators (conventional) Energy extraction technology (e.g. blades, interaction surface) Energy conversion system (e.g. PTO) Device structure Foundations and mooring systems New device & component development (step-change) Offshore umbilical / wet HV connectors	Design guidelines and standards Manufacture, assembly & test standards Health & Safety guidelines Certification rules Development testing guidelines and standards Performance guidelines and technical specifications Resource assessment guidelines and standards Environmental guidelines and standards	Design optimisation tools Device modelling tools Array design and modelling tools Resource analysis tools Techno-economic analysis tools Failure mode and condition monitoring techniques Reliability modelling tools Environmental Impact Assessment tools Site assessment tools	Skills and training (capacity building) Supply chain development Development of open-sea testing facilities Offshore grid system design and demonstration Array electrical system Onshore grid system development Sub-sea electrical system equipment Site consenting / leasing Knowledge transfer networks Strategic environmental assessment Component reliability data sharing Harmonisation of model-scale testing facilities Array interaction analysis Continued long-term market support

Overall activities and theme results, when Ranked against industry need.

1st Generation device & array sea trials	93.48
Resource analysis tools	81.52
Installation methods	78.26
2nd Generation device development	78.26
Foundations & mooring systems	75.54
Array design and modelling tools	75.00
New device & component development (step-change)	75.00
Device modelling tools	75.00
Failure mode and condition monitoring techniques	71.74
Energy conversion system (e.g. PTO)	71.20
Component reliability data sharing	70.65
Knowledge transfer networks	70.65
Device structure	68.48
Recovery methods	67.39
Array interaction analysis	67.39
Low-cost O&M techniques	67.39
Resource assessment guidelines & standards	67.39
Design optimisation tools	64.13
Development of open-sea testing facilities	64.13
Reliability modelling tools	63.04
Sub-sea electrical system equipment	60.87
Design guidelines & standards	60.87
Performance data collection	59.78
2nd Generation device & array sea trials	59.78
Offshore umbilical / wet HV connectors	58.15
Performance guidelines & technical specifications	56.52
Harmonisation of model-scale testing facilities	56.52
Site assessment tools	56.52
Continued long-term market support	56.52
Development testing guidelines & standards	53.26
Supply chain development	53.26
Energy extraction technology (e.g. Blades, interaction surface)	52.72
Control systems	50.00
Environmental guidelines & standards	44.57
Skills and training (capacity building)	44.57
Environmental Impact Assessment tools	44.57
Onshore grid system development	42.39
Certification rules	42.39
Manufacture, assembly & test standards	41.30
Strategic environmental assessment	41.30
Array electrical system	38.04
Site consenting / leasing	34.78
Offshore grid system design & demo	31.52
H&S guidelines	31.52
Techno-economic analysis tools	28.26
Generators (conventional)	10.33
Power electronics	6.52