renewableUK
The voice of wind & marine energy

The Next Steps for Marine Energy

The Industry View on the Marine Energy Action Plan

March 2010

The Next Steps for Marine Energy

The Industry View on the Marine Energy Action Plan

This document is based on contributions that have been made by RenewableUK and the following companies in developing the marine energy action plan.

Scottish Renewables
Scottish Power Renewables
EON
EDF
SSE Renewables
RWE npower renewables
International Power
EMEC
NaREC
Supergen Marine
QinetiQ
BAE Systems
Siemens
Alstom
Rolls Royce
Peel Holdings
VerdErg
Fred Olson
CheckMate SeaEnergy
Voith Hydro
Oceanlinx
Marine Current Turbines
Pelamis Wave Power
Aquamarine Power
Open Hydro
Pulse Tidal
Ocean Power Technologies
Minesto
Atlantis Resource Corporation
Tidal Generation Ltd

Key Recommendations

- On the basis of the level of support required to fund the Danish onshore wind and Japanese solar industries, UK Government will need to commit in the region of £1 billion over the course of the next decade to secure a global market share of the rapidly emerging marine energy industry. To date the UK Government has committed over £150 million to technology development. This document outlines a minimum requirement for the Government to commit additional funds of approximately £220 million for technology development up to 2015.

- It is estimated that this upfront investment will result in an industry with revenue of £0.9 billion per annum by 2020.

- Both the completion of the Strategic Environmental Assessment (SEA) and announcement of leasing rounds by the Crown Estate within England, Wales and Northern Ireland should commence as soon as possible.

- RenewableUK calls for the Marine Renewables Proving Fund (MRPF) to be continued at a scale of £10m–11m per annum, to be reviewed on an annual basis, assessing industry's requirements and capabilities.

- RenewableUK calls for the Energy Technologies Institute (ETI) and Technology Strategy Board (TSB) marine energy programmes to be continued on a long-term basis and to be reviewed on an annual basis, assessing industry's requirements and capabilities, whilst ensuring funding fulfils both TSB and ETI objectives.

- The Government must acknowledge the need to increase the Marine Renewables Deployment Fund (MRDF) allocation on a long-term basis, as failure to do so will indicate a lack of coordination and drive development overseas, rendering all previous funding ineffective.

- RenewableUK calls for the Government to state its long-term commitment to the MRDF, and to review and top up the capital within the fund on an annual basis, with a view to providing a total of £120m over the period up to 2013.

- RenewableUK calls for the Renewable Obligation Certificate (ROC) multiple to be raised for marine renewable projects in England, Wales and Northern Ireland during the next review process (coming to fruition in April 2013), in order to deliver commercially viable projects.

- RenewableUK believes the Department for Business, Innovation and Skills (BIS), and industry should complete an industrial strategy to make the most of the emerging skills and expertise clustered around particular nodes in the value chain.

Introduction

With over 560 corporate members, RenewableUK (formerly BWEA) is the UK's leading representative for the wind, wave and tidal energy industry. RenewableUK is informed by an established and active network of working groups, consisting of leading experts in the offshore wind, wave & tidal industry.

RenewableUK believes Government has taken a significant step by creating the Marine Energy Action Plan (MEAP), for the first time allowing the public and private sectors to discuss the key actions required to develop the UK Marine Energy Industry. This statement complements the MEAP; it outlines additional actions that RenewableUK believes are required to create the right framework to support development of a strong, UK-based marine energy power industry.

The Opportunity

The comparison between the emerging marine energy industry and the onshore wind industry of the early eighties is obvious: a great potential, which requires strong Government leadership to develop a successful industry. Since 1993 the Danes have invested £1.3bn in their wind industry; this has resulted in a 50 per cent global market share, which provides annual revenue in the region of £2.7bn.[1] If the UK was to invest strategically and secure a similar global market share of the marine energy industry, by 2020 it could have installed 2GW (Figure 1) and created 2,000–3,000 jobs.[2] In the long term the potential revenue could reach £4.2bn per annum by 2050.[3] With a practical resource of 29GW,[4] fully exploited the marine energy industry could directly provide up to 43,500 jobs.[5]

In addition to these direct benefits, a recent RenewableUK study concluded that diversifying the renewable energy mix by including a greater proportion of marine energy would reduce requirements for reserve capacity, leading to annual savings of £0.9bn, equal to 3.3 per cent of the annual wholesale cost of electricity.[6]

Potential UK Installed Capacity in 2020

RenewableUK believes that not listing a range of installed capacities for 2015, 2020 and indicative numbers for 2030, places the MEAP at a major disadvantage, as this provides no indication of total investment needed from both public and private sectors.

Discussions with RenewableUK members revealed that if the industry receives sufficient support in the early stages of development, by 2020 the UK could have installed 2GW of marine energy projects, powering 1.4 million homes. Figure 1 provides an illustration of the growth of the marine industry and estimated capacity that would result in the cumulative installed capacities.

The actual level of capacity installed by 2020 and the future domestic market will be strongly dependent on enabling actions and policies that support the development of the marine energy industry.

1. Marine Energy Challenge, Carbon Trust, January 2006.
2. Based on figures in Employment Opportunities and Challenges in the Context of Rapid Industry Growth, BWEA report completed by Bain and Company, October 2008. This report provides an employment ratio of 1.5 jobs/installed MW.
3. Policy Framework for Renewable Energy, L.E.K. Consulting and Carbon Trust, July 2006.
4. Future Marine Energy, Results of the Marine Energy Challenge: Cost Competitiveness and Growth of Wave and Tidal Stream Energy, Carbon Trust, January 2006. N.B. The practical resource allows for practical and economic factors, which combine to make developments commercially attractive. This figure is based on a conservative capacity factor of 30 per cent, which has the potential to rise.
5. BWEA report completed by Bain and Company, October 2008.
6. The Benefits of Marine Technologies within a Diversified Renewables Mix, Redpoint Energy Limited for BWEA, April 2009. An annual saving of £0.9bn is equal to 3.3 per cent of the annual wholesale cost of electricity. These figures are derived from hypothetical years in the future, with annual demands of 400TWh, of which 39 per cent is met by generation of renewables. These savings are derived from a 60/40 percentage split of wind/marine energy.

Current Industry Position

The UK is currently the marine energy world leader, with a capacity of 2.4MW currently installed, 27MW in the planning process, 77.5MW of projects being developed and over 1GW of projects about to be announced by the Crown Estate.[8] The UK also has world-class testing facilities that, combined with some of the best wave and tidal resources in the world, place it in an ideal situation to become 'natural owner' of a world-leading industry, with fantastic export potential.

Currently all of the major utilities are engaged in the industry either by investing in technology or projects, or committing resource to draw up strategies to best support the marine energy industry. They are serious about the development of the UK marine energy industry and recognise that, as the ultimate end customers of marine energy technology, they have a major role to play in early-stage development.

Major manufacturers are also expressing interest in the industry by investing directly in technology development.

Revenue incentives are important; however, they are currently insufficient and will not work in isolation from capital support measures in the early stages of industry growth.

Revenue incentives are powerful where electricity production can be predicted reasonably accurately. When marine energy devices become ready for deployment in small arrays, revenue incentives play an important part in making the projects economically viable, and offset operation and maintenance cost risk.

However, with sufficient revenue incentive, upfront capital grant is also required to de-risk investment for first arrays. Under this scenario, a marine energy project starts to become attractive to utilities. However, to secure investment from utilities, device offerings have to be on a par with alternative options. In particular, device manufacturers have to be able to offer potential utility investors (a) sufficient operating experience to offer guarantees in performance and reliability and (b) involvement of major manufacturers able to underpin these guarantees both technically and financially.

Figure 2 below provides a basic outline of these stages of industry development, showing the transition from capital support to revenue support, from prototypes and next-generation devices through first farms and beyond.

Following these initial small-scale projects, and with sufficient revenue support, it is likely that marine energy projects could start to move towards attracting debt finance, one of the key requirements in facilitating rapid deployment at the large scale. In turn this will deliver associated cost reductions that would reduce the required revenue support.

Figure 1. Potential UK Cumulative Installed Capacity of Marine Energy Projects to 2020 [7]

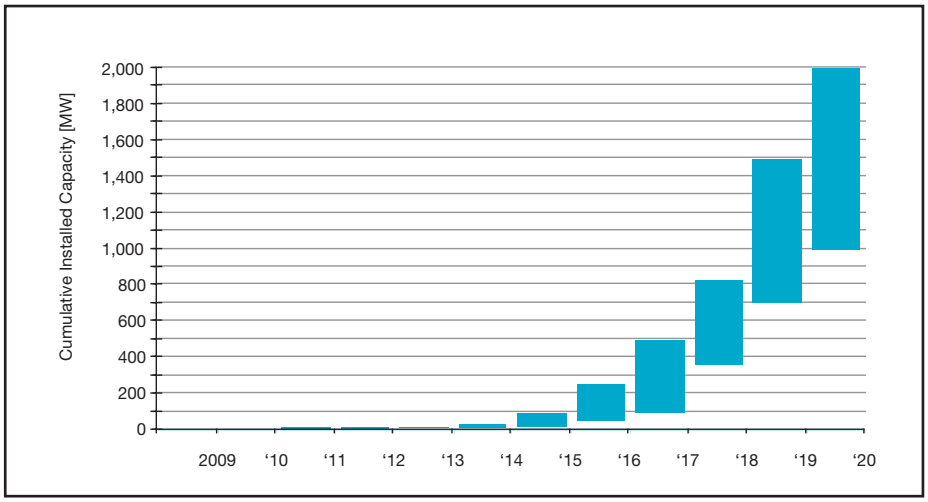
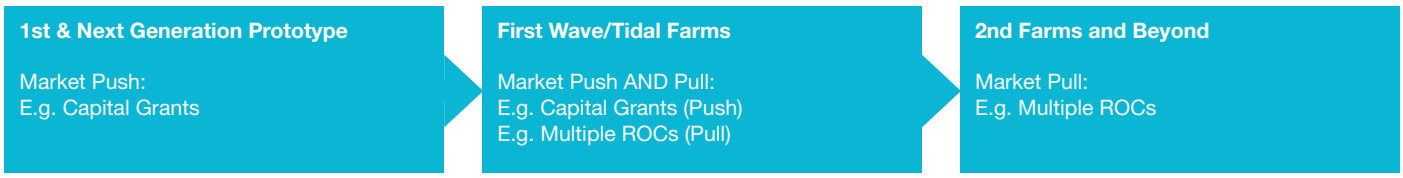


Figure 2: Basic Outline of Industry Stages to Commercialisation and Types of Support Required



7. Marine Renewable Energy – State of the Industry Report, RenewableUK, March 2010. The graph is for illustrative purposes only, to demonstrate the potential growth of the industry needed to reach the estimated targets of 2GW installed capacity by 2020.
8. Marine Renewable Energy – State of the Industry Report, RenewableUK, March 2010.

Because revenue support alone will not drive the industry forward through the first array phase, very few marine energy projects have reached this stage of development to date. As outlined in Figure 2, a capital element is needed in combination with revenue support to drive initial delivery.

Capital support is vital to the industry today.

Very early-stage devices – those that are years away from ocean deployment – require continued support through the existing research and development (R&D) stimulation mechanisms. The primary gap today exists when devices are ready for open ocean deployment; at this point capital needs rise rapidly. It is estimated that the capital expenditure (CAPEX) of deploying a full-scale prototype in real sea conditions is in the region of £10 million. Device developers are generally small and medium enterprises (SMEs) that do not have the financial backing to fund such projects, and the initial risk exposure is too high for utilities to commit investment or for any manufacturer to underwrite performance. Hence, capital support from government is required to de-risk investment in technology development and stimulate the private sector backing.

Once a device is ready for deployment, RenewableUK believes that its commercial potential is determined by a combination of technology and company expertise . This is particularly true in the marine power sector, where ocean operations require specialised skills not normally found in early-stage technology companies, which are typically SMEs with limited resources.

Professional investors are experienced at finding this winning combination of technology and company, and industry should ensure that it uses that market expertise to select the companies that receive support, to deliver match funding for the development of initial projects. The key driver of their investment decisions is a risk–reward balance and investors are currently placing their money into projects that require less capital exposure before revenues are produced.

RenewableUK Supplementary Recommendations to the Marine Energy Action Plan Executive Summary

Technology Road Map

The marine energy industry and the British Standards Institute should progress the important guidelines and standards work that is currently being undertaken, seeking to feed into the development of International Electrotechnical Commission performance standard 62600-100/200, and in turn develop a cost-of-energy benchmark. Bench-marking should in turn to be used for standardised entrance to public sector funding programmes.

RenewableUK stresses that continued and coordinated capital funding for enabling technologies will be vital in facilitating increased reliability and driving cost reductions across the marine energy industry.

Environment, Planning and Consent

The development of a Strategic Environmental Assessment (SEA) for marine energy in England and Wales is essential for the delivery of commercial leasing rounds from the Crown Estate. Both the completion of the SEA and announcement of leasing rounds by the Crown Estate within England, Wales and Northern Ireland should commence as soon as possible, and leasing should continue in Scotland.

The cost of collecting baseline data is far outside the budget of individual developers. Efforts in Scotland to collect strategic baseline data should be applauded and UK Government should seek to replicate these within other strategic areas across the UK.

As noted within the MEAP, RenewableUK supports the development of a 'Deploy and Monitor' strategy. This should be developed by Government, academia, statutory nature conservation bodies and the industry. Efforts should focus upon providing 'off the shelf' monitoring methodologies, monitoring technologies and mitigation measures.

As noted within the MEAP, RenewableUK supports the development of a '"Deploy and Monitor'" strategy. This should be developed by Government, academia, statutory nature conservation bodies and the industry. Efforts should focus upon providing '"off the shelf'" monitoring methodologies, monitoring technologies and mitigation measures.

Finance and Funding

On the basis of the level of support required to fund the Danish onshore wind and Japanese solar industries, UK government will need to commit at least £1 billion over the next decade to secure a global market share of the rapidly emerging marine energy industry. UK Government has committed a total of £115 million to technology development up to 2009 (Table 1).

Table 1 – Capital support provided by public organisations for marine energy technology development up to March 2009 [9]

Funding Body	Public Investment Committed up to March 2009 (£m)
Supergen Marine (EPSRC)	5.5
Energy Technology Institute	6.2
Carbon Trust Marine Energy Accelerator	3.5
Carbon Trust Marine Energy Challenge	3
Technology Strategy Board	20
UK Government	
Marine Renewables Deployment Fund	50
DTI & Research Council	14
Scottish Government WATES	13.5
Total	**115.7**

9. Marine Renewable Energy – State of the Industry Report, RenewableUK, March 2010.

Between March 2009 and March 2010 a total of £48.6 million of coordinated and structured public funding has been announced for technology development (Table 2). This funding has provided excellent stimulation to the sector and has driven both private investment and technology development. Continued Government funding to de-risk the sector must continue to ensure this rate of development is sustained.

This document outlines a minimum requirement for the Government to commit additional funds of approximately £220 million for technology development up to 2015 (Table 3). RenewableUK is committed to delivering additional research that will be required to further define investment and revenue figures. RenewableUK aims to have initial analysis publicly available by November 2010.

Table 2 – Capital support provided by public organisations for marine energy technology development from March 2009 to March 2010 [10]

Funding Body	Public Investment Committed March 2009 to March 2010 (£m)
Energy Technology Institute	4.6
Technology Strategy Board	12
Carbon Trust Marine Renewable Proving Fund	22
Scottish Government WATES II	10
Total	**48.6**

Table 3 – Estimated minimum capital support required from public organisations for marine energy technology development up to 2015

Funding Body	Estimated Minimum Public Investment Required Up to 2015 (£m)
Carbon Trust Marine Renewable Proving Fund	50
Energy Technology Institute	50
Technology Strategy Board	50
UK Government Marine Renewables Deployment Fund	70
Total	**220**

Renewal of the Marine Renewables Proving Fund

RenewableUK wishes to thank the Government for its foresight in awarding the Carbon Trust £22m to run the MRPF (Table 2). This has unblocked a key bottleneck, allowing the development of prototype devices, an activity with exceptionally high project costs due to the harsh operating environment, the need for bespoke engineering solutions and the need for rapid technology scaling.

RenewableUK wishes to point out that 32 applications were received by the Carbon Trust, of which only six applicants were successful (two Wave and four Tidal). The Carbon Trust has acknowledged that many other projects may have been eligible for the funding, as the quality of the applications was so high; however, potentially successful applicants were restricted by timing constraints. RenewableUK believes that there is a real need for the MRPF to be continued, allowing projects already receiving funds from the scheme to complete testing full-scale prototype and to facilitate new project delivery. If the scheme were to be withdrawn, it would create a gap in the UK funding landscape and stall development.

RenewableUK calls for the MRPF to be continued for at least the next five years at a scale of £10m–11m per annum, to be reviewed on an annual basis, assessing industry's requirements and capabilities.

Energy Technology Institute Programme

The ETI has provided funding to the wave and tidal industry for the development of generic technology solutions that can be used by the entire industry. To date £10.8m of public funding has been announced by the ETI (Table 1 and Table 2).[11] This programme should continue to provide a similar l level of support in the medium term, as it will be essential in tying together this developing industry, providing support to enabling technologies to facilitate increased reliability and cost reduction.

RenewableUK calls for the ETI marine energy programme to be continued on a medium-term basis of at least five years, and for the level of funding to be greater or equivalent to the previous round. The programme should be reviewed on an annual basis, assessing industry's requirements and capabilities, whilst ensuring funding fulfils ETI objectives.

10. Marine Renewable Energy – State of the Industry Report, RenewableUK, March 2010.
11. The ETI is funded equally by the public and private sectors. To date, the ETI has driven a committed spend by the private sector of £10.8 million into marine energy.

Technology Strategy Board Programme

RenewableUK welcomes the TSB's recently announced funding calls, totalling £12 million of TSB investment that will focus on technology development (Table 2). This funding is set to complement the MRPF, ensuring successful projects are able to access the MRDF, and supporting early-stage and next-generation technology development. This funding is vital to ensure a coordinated funding landscape for marine energy within the UK.

RenewableUK calls for the TSB marine energy programme to provide annual funding of at least £10 million per annum and to be established on a medium-term basis of at least five years. This programme should be reviewed on an annual basis, assessing industry's requirements and capabilities, whilst ensuring funding fulfils TSB objectives.

Increase of the Marine Renewables Deployment Fund

Deployment of the world's first wave and tidal energy arrays will be the single most important step in industry development and it is widely acknowledged that the country which has the first full-scale arrays deployed in its waters will retain the majority share of the future global market. With other EU governments, such as Sweden, Portugal and Spain, already developing advanced plans to support full-scale arrays, the UK Government currently stands to make a minimal return on the investment made to date if it fails to provide substantial financial backing at this crucial technology development stage.

While the MRDF is perfectly positioned to facilitate the deployment of the first wave and tidal energy arrays, it has some major flaws. Funds are capped at £9m per project and are split at 25 per cent capital grant and seven years of enhanced revenue support.

The Government has funded six projects via the MRPF with the view to access the MRDF. Providing 25 per cent capital support alone to these projects would require £37.5m–75m.[12]

The Government must acknowledge the need to increase the MRDF allocation on a long-term basis, as failure to do so will indicate a lack of coordination and drive development overseas, rendering all previous funding ineffective.

The UK Government should clearly define its intention to secure a majority market share of the wave and tidal industry, and markedly increase the MRDF.

RenewableUK calls for the Government to state its long-term commitment to the MRDF, and to review and top up the capital within the fund on an annual basis, with a view to providing a total of £120m over the period up to 2013. In due course the structure of the scheme should be reviewed to ensure it fits with industry development, particularly in light of the need for a capital support scheme to be provided in combination with revenue support for first arrays as outlined above (Figure 2). The amount of capital within the MRDF should also be reviewed on an annual basis, as well as the percentage of first array eligible costs that could be funded.

Revenue Support Security

In England, Wales and Northern Ireland, energy currently generated from wave and tidal devices receives two Renewable Obligation Certificates (ROCs) per MWh. In Scotland, electricity produced from wave energy receives 5ROCs/MWh and from tidal energy 3ROCs/MWh, giving Scotland a significant advantage. The Forum for Renewable Energy Development in Scotland (FREDS) Marine Energy Group Road Map clearly outlines the need to provide parity between wave and tidal technologies;[13] this view is strongly supported by RenewableUK. If the UK wishes to secure a significant global market share of the marine energy industry it must develop a secure and attractive domestic market across all of the constituent nations and provide a coherent and attractive 'UK-wide' proposition, with parity between technologies.

A long-term market gesture of increased ROC banding will provide a strong signal to initial investors, as early devices and arrays will still have high levels of technology risk, and thus require a high return to justify the high levels of investment involved. Increased ROC banding will provide a prolonged signal that will reduce risk in the long term.

Therefore, RenewableUK believes the banding support required will be dependent upon the level of capital grant support provided, but that the aim should be to move to a ROC-only funding landscape in the medium term and for marine energy to be financially attractive without subsidies in the long term. RenewableUK notes that the proportions of capital and revenue support required can only be attributed once real evidence has been collected and collated.

12. Indicative industry feedback indicates that the primary wave and tidal arrays will have a capital cost of around £5m per MW, resulting in array capital costs of £25m–50m for a 5–10MW project. Providing capital support alone to the successful applicants of the MRPF would require £37.5m–75m.
13. Marine Energy Road Map, FREDS Marine Energy Group, 2009.

RenewableUK calls for the ROC multiple to be raised for marine energy projects in England, Wales and Northern Ireland during the next review process (coming to fruition in April 2013) in order to deliver commercially viable projects.

The current public sector funding landscape is composed of several organisations and, to date, a good level of communication and coordination has been achieved. However, to ensure the future success of the UK marine energy industry, RenewableUK strongly supports the MEAP proposal to develop a coordination group to ensure alignment of public sector funding, whilst ensuring organisations can achieve their respective objectives. RenewableUK believes this group must include industry representation.

Infrastructure

RenewableUK believes BIS and industry should complete an industrial strategy to help the growing marine energy sector to make the most of the emerging skills and expertise clustered around particular nodes in the value chain.

Grid access and transmission charging for marine energy in the Scottish Islands needs be addressed by Ofgem, National Grid, industry and other interested parties. RenewableUK believes work in this area should be a priority for the MAP group once the final MEAP report has been published.

Conclusion

The rapidly developing marine energy industry represents a huge opportunity for the UK in terms of investment, renewable energy generation, security of supply and job creation.

However, without continued Government intervention, the lead the UK presently has within this industry will be lost. Insignificant return will be obtained from the investment made, and UK plc will fail to secure any long-term economic benefits.

Leading marine energy technologies are delivering megawatt hours on to the national grid. Utilities and major manufacturers are serious about the development of the UK marine energy industry and are starting to align with technology developers.

The UK wave and tidal industry now requires Government to deliver continued targeted investment to develop technology, similar to the amount that has been provided in the past year, as the scale of investment needed to overcome the present challenges is insurmountable by industry alone.

This document outlines a minimum requirement for the Government to commit additional funds of approximately £220 million for technology development up to 2015. It is estimated that this upfront investment will result in an industry with revenue of £0.9 billion per annum by 2020. RenewableUK is committed to delivering the additional research that will be required to further define investment and revenue figures.

RenewableUK believes that the MEAP has initiated an excellent dialogue and should be used to develop a national strategy for marine energy.

Representing the voice of the wind and marine energy industry, RenewableUK is keen to continue engagement through the MEAP process and with the Government.

RenewableUK
Greencoat House, Francis DStreet
London SW1P 1DH, United Kingdom

Tel: +44 (0)20 7901 3000
Fax: +44 (0)20 7901 3001

Web: www.renewable-uk.com
Email: info@renewable-uk.com