Scottish Renewables BRIEFING

Scottish Renewables: The Forum for Scotland's Renewable Energy Industry

December 2006

Marine Energy: Scotland must act now to lead the way

Introduction

The surrounding waters and coastline of Scotland possess a huge marine energy resource due to the powerful waves and tidal currents that exist in areas such as the north and west coast of the Scottish mainland, Orkney, Shetland, the Western Isles and the Pentland Firth. Scotland's vast marine resource compares very well with wave and tidal regimes in other parts of the world, including Portugal, the USA and Australia (see Figures 1, 2 and 3 below and overleaf). In 2001, the report *Scotland's Renewable Resource* found that up to 21.5 gigawatts of wave and tidal energy capacity could be produced in the waters around Scotland. The two sources could provide 79.2 Terawatt hours per year, which is equivalent to 22% of total UK consumption (see Table 1 overleaf for Scottish tidal energy potential).

The wave and tidal energy sectors are often discussed together as they are both emerging technologies in early stages of development, and they both involve coastline and offshore installations so face similar issues and challenges. However there is a clear distinction between the two energy types: waves are created through the action of wind over water; tides are caused by the gravitational pull of the moon (and, to a lesser extent, the sun) on the seas. Generally speaking then, waves are a form of solar energy, with tides being a form of lunar energy.

Snapshot of Marine Development

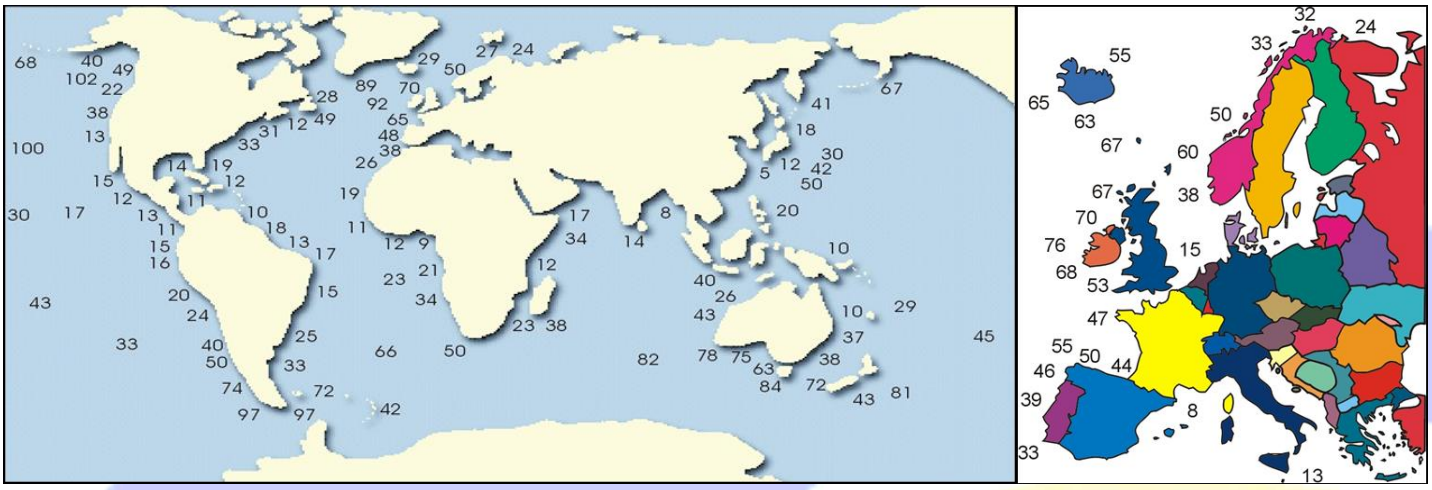
Various different devices are being developed to harness marine energy and convert it into electricity. Some of these are being tested at the European Marine Energy Centre (EMEC) in Orkney, which offers test facilities and has developed accreditation standards that are internationally recognised. According to the Forum for Renewable Energy Development in Scotland (FREDS) marine energy report, the availability of these facilities at EMEC "provides a huge opportunity for Scotland and the UK to lead in the development of testing and accreditation standards that will be vital to the progress of marine energy technologies worldwide".

There is also one grid-connected onshore wave energy device operating in Scotland, namely the Limpet shoreline device on the Isle of Islay, which has an installed capacity of 270 kilowatts.

Potential for Marine Energy

The FREDS Marine Energy Group (MEG) proposes that by 2020:

- 10% of Scotland's electricity production can come from marine resources;
- 1,300 megawatts of marine energy capacity could be installed in Scottish waters, increasing at a rate of 100 MW per year;



Figures 1 & 2: Worldwide and European Wave Power Resource charts

- Scottish-based marine energy companies could be supplying major international export markets;
- 7000 direct jobs could be created in a diverse marine industry in Scotland, supported by sustainable research development and skills bases

In 2006, Scottish Renewables reported that 0.16 GW of wave and tidal energy could be operational by the end of 2010 provided that the right support is in place.

But despite this wealth of resource and promising future, if the current pace of marine development and deployment is not accelerated, Scotland could rue the loss of another massive economic opportunity, similar to the way it lost out to Denmark in wind power technology, right at the point where we have the chance to become a major player in the export of renewables technology. The Danes are now world leaders in wind power, employing around 55,000 people in an industry earning the country £10bn per annum, with growth forecast to be around 30% per year.

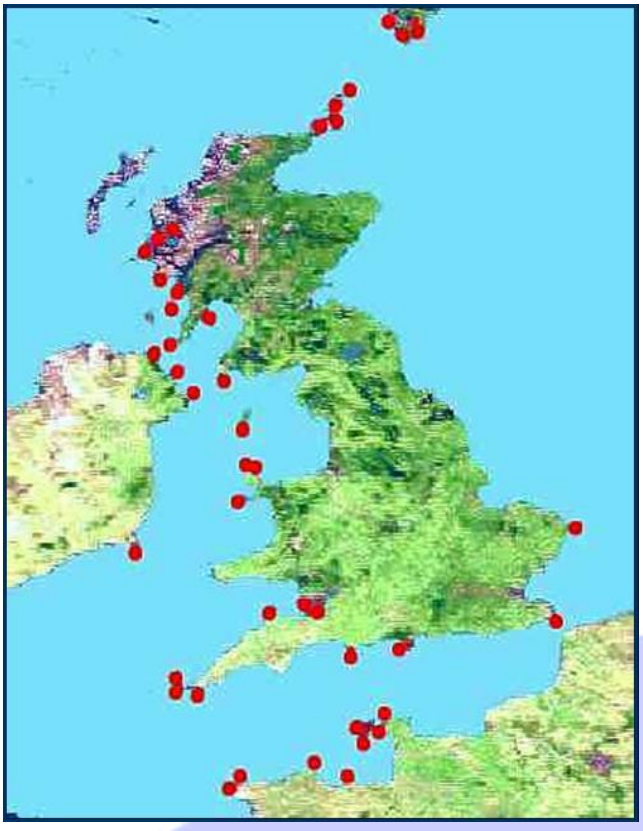


Figure 3: Leading Potential UK Tidal Sites

It is arguable that Scotland is leading the world in development of marine renewables, with Scottish companies such as Ocean Power Delivery and Wavegen active in development of new technologies (see Figure 4 overleaf).

Location	Potential installed capacity (MW)	Potential energy delivered (TWh/yr)
Hoy, Pentland Firth	1083	3.7
South Ronaldsay, Pentland Firth	1057	3.6
Stroma, Pentland Firth	2213	7.5
Pentland Skerries	5698	19.4
Total from selected locations	10051	34.2

Table 1: Key Scottish tidal locations and energy potential

Marine Energy Support

The Renewables Obligation (Scotland), or ROS, support scheme is currently technology-blind, meaning that mature technologies, such as wind and hydro, are favoured over emerging technologies. At the end of 2006 the Scottish Executive consulted on amending the ROS to support wave and tidal generators, and encourage project development within Scotland.

Once decided, the new arrangements will commence on 1st April 2007. The Executive is proposing to create a banded obligation on suppliers, specifying that a minimum amount of electricity generated as part of the overall ROS must come from wave and tidal sources.

Scottish Renewables has been working constructively with the Executive to ensure that any new scheme works to deliver marine energy projects, while avoiding any significant impact on the wider renewables market.

Key, however, is the simple fact that the Executive cannot see a way to support marine energy from its own budgetary resources, so has taken this decision in light of significant political pressure from the Scottish Parliament.

Power projects take a minimum of 2 to 3 years to plan, permit, arrange, insure and finance. Their commercial partners need a clear indication of

ongoing policy commitment and financial support to marine technologies. The announcement of the Executive to press ahead with developing a support scheme is welcome for this reason.

Figure 4: Scottish wave and tidal devices

Top: Wavegen's Limpet on Islay, the world's first commercial wave power station.
Middle: Visualisation of proposed Ocean Power Delivery wave farm of Pelamis converters.
Bottom: Visualisation of Lunar Energy's Rotech Tidal Turbine

Already other European countries are developing market support mechanisms. Portugal has allocated 23 Eurocents per kilowatt hour (14.5 p/kWh), index linked, for the first 20 MW of wave power constructed. The Portuguese funding, compared to support available under the ROS is equivalent to additional support of approximately £6m per year.

In 2005 Scottish firm Ocean Power Delivery signed an order with a Portuguese consortium, led by Enersis, to build the initial phase of the world's first commercial wave farm. This phase consists of three 'Pelamis' wave energy converters (see Figure 4) located off the north coast of Portugal. The €8m project will have an installed capacity of 2.25 MW, and is expected to meet the average electricity demand of more than 1500 Portuguese households. Scottish firms in the North-East, Western Isles, Orkney and Fife have led the manufacturing of these devices, proving that Scottish companies have the skills needed for marine manufacturing.

However, the danger for Scotland is that if the first markets are created overseas then the technology will be developed elsewhere. If overseas support takes off while a UK or Scottish market remains flat, then it is realistic to say that Scottish companies will shift to where the market is greatest.

Similarly for tidal, while Scotland is the focus of considerable effort in tidal energy, this will not guarantee that the first commercial projects and resultant manufacturing comes to Scotland.

Barriers to Grid Connection

The FREDS marine energy report noted that:

"*A problem facing all renewables generators in Scotland is the constrained nature of the transmission and distribution network. Substantial development of marine energy will only occur if developers have access to an electricity market at a national, rather than local level. MEG is seriously concerned that a lack of national and local grid capacity remains one of the key barriers and risks to developing a successful marine energy industry in the UK.*"

Scottish Renewables shares this concern. It is of the view that active management of key distribution areas such as the Orkney Islands, could open up sufficient capacity to allow the required connection of first generation wave and tidal devices.

However, longer term there is a need for new thinking on managing connections, both for distribution and transmission, to ensure that future capacity is not frozen out of the networks.

Scottish Renewables is compiling a Network Blueprint, which pulls together the main issues affecting grid connections for all renewables. This document will be circulated to the Scottish Executive, DTI and members of Scottish Renewables once complete.

Planning Delays

There are currently significant delays in the Scottish planning system whereby other renewables, such as onshore wind and hydropower developments, have been subject to an average determination time of over 20 months for Section 36 consents. Part of the problem is a lack of resources within the Scottish Executive consents department. Until this is resolved, it is likely that future marine energy developments will suffer similar planning delays.

FREDS called for absolute clarity on the ownership and operation of the consents regime for offshore renewable energy developments. The Crown Estate should ensure that a workable leasing arrangement is in place for the licensing of marine renewables. Scottish Renewables is working closely with the Executive on this issue, calling for a 'one-stop-shop' on planning and consents for offshore renewables projects.

The Scottish Executive is currently undertaking a Strategic Environmental Assessment (SEA) to examine the environmental impacts of harnessing energy from the marine environment. Focussing on the west coast of Scotland, Orkney, Shetland and the Pentland Firth, the SEA will be used to inform national and local decisions on marine renewable energy policy. This in turn will form a foundation on which the environmental assessment, planning, and development of individual projects will be based. The schedule is now to release a draft Environmental Report in February with a completion date in April.

For the remainder of the Scottish waters, a separate SEA is likely to be commissioned, but won't commence until after the present one is completed.

FREDS Marine Energy Network

Scottish Renewables has now established a Network to take forward coordination of marine energy work. Funded by the Scottish Executive, Highlands & Islands Enterprise and Scottish Enterprise, this Network aims to link all relevant organisations and stakeholders within the Scottish marine energy industry.

Regular Stakeholder Briefing events provide information on this developing sector, promoting discussion on issues of common interest and concern. Information is fed to the Network via regular bulletins. To involve the wider Network of stakeholders and showcase the Scottish marine industry to the broader community, Scottish Renewables hosts an annual Marine Energy Seminar.

If you would like further information about the work of the Marine Energy Network, please contact Scottish Renewables.

Further information

www.scottishrenewables.com/reports.asp#Briefings – *Delivering the New Generation of Energy: Route Map to Scotland's Renewable Future*, Scottish Renewables
www.scotland.gov.uk/Publications/2003/09/18271/27259 - *Scotland's Renewable Resource*, Garrad Hassan
www.scotland.gov.uk/library5/enterprise/hsmep-00.asp *Harnessing Scotland's Marine Energy Potential*, FREDS
www.thecarbontrust.co.uk/publications - *Future Marine Energy*, The Carbon Trust
www.defra.gov.uk/environment/water/marine/uk/policy/marine-bill/index.htm - UK Marine Bill - DEFRA
www.scotland.gov.uk/Publications/2006/09/ros-consultation - Marine ROS consultation document

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