

Question 7

How can Wales realise the strategic importance of planned initiatives such as the tidal lagoon projects in West Wales and the Anglesey Energy Island Programme?

Question 8

Please tell us what you think are the key barriers and risks to development of ocean energy and how Wales can help overcome these.

Further information

Please tell us anything else you would like to mention this topic.

I would like to draw the Committee's attention to the existence of the European Marine Energy Centre (EMEC) in Orkney, Scotland.

With more than 12 years' experience in wave and tidal energy technology testing and R&D projects EMEC has built up a great deal of expertise around its facilities.

16 different companies from 9 different countries have tested 25 different technologies at EMEC, which has generated considerable local economic impact (estimated 60m GVA).

The presence of EMEC has created a marine energy cluster in Orkney which might be of interest to the Committee.

We would also advise against duplicating efforts in the arena of technology testing, EMEC would be happy to work with the Welsh Government to identify opportunities for collaboration.

Thank you for contributing to our inquiry

BACKGROUND INFORMATION



Scotland is leading the way in wave and tidal power generation as part of the Scottish Government's target to generate 100% of the country's annual electricity consumption through renewable sources by 2020 (Scottish Government).

The European Marine Energy Centre (EMEC) in Orkney is playing a key role in proving to the world the value of wave and tidal power as a sustainable source of renewable energy.

Founded in 2003, EMEC is the first centre of its kind to offer developers of both wave and tidal energy converters the opportunity to test in the world class marine conditions around Orkney, Scotland.

The Centre was established with around £36 million of funding from the Scottish Government, Highlands and Islands Enterprise, the Carbon Trust, UK Government, Scottish Enterprise, the European Union and Orkney Islands Council. In 2011, EMEC became financially self-sufficient, largely due to the heightened activity on site during the previous year.

EMEC is the only accredited wave and tidal test centre for marine renewable energy in the world, suitable for testing a number of full-scale devices simultaneously in some of the harshest weather conditions while producing electricity to the national grid through the company's infrastructure. All monies generated by the sale of electricity are fed back to the developers, increasing the funds for future industry investment.

Completed in 2003, the Billia Croo test site is located on the western edge of the Orkney mainland in an area with some of the highest wave energy potential in Europe - with an average significant wave height of 2 – 3 metres, and the highest wave on record reaching 19 metres. The site consists of five cabled test berths in up to 70 metres of water, located approximately 2km offshore, as well as a near shore berth for shallow water projects.

EMEC's tidal test site at the Fall of Warness, located to the west of the island Eday, was chosen for its high velocity marine currents which reach almost 4 m/s (8 knots) in spring tides. The facility offers eight test berths at depths ranging from 12m to 50m in an area 2km across and approximately 4km in length.

EMEC's test sites attract developers from all around the globe with more devices having been tested at EMEC than any other single site in the world. To date, EMEC has hosted 16 wave and tidal energy clients (with 25 marine energy devices) spanning 9 countries. These developers use the facilities to prove what is achievable in some of the harshest marine environments, whilst in close proximity to sheltered waters and harbours.

Clients that have tested at the centre include Aquamarine Power, Pelamis Wave Power, E.ON, ScottishPower Renewables, Seatricity, Wello and AW Energy on the wave site, and Alstom (formerly Tidal Generation Ltd), ANDRITZ HYDRO Hammerfest, Atlantis Resources Corporation, OpenHydro, Scotrenewables Tidal Power, Voith, Flumill, Nautricity and Magallanes on the tidal site.

Accredited by the United Kingdom Accreditation Service (UKAS), EMEC operates to relevant test laboratory standards (ISO17025), enabling the Centre to provide another unique service - independently verified performance reports.

EMEC has also worked hard to ease the path to market for marine renewable developers by developing test sites in less challenging conditions, helping to close the gap between testing in a wave or tidal tank and bringing full-scale prototypes to trial in real sea conditions.

These non-grid connected test sites provide a more flexible sea space for use by smaller scale technologies, supply chain companies, and equipment manufacturers. Such accessible real sea testing enables marine energy developers and suppliers to learn lessons more cheaply by reducing the need for big vessels or large plant.

At these sites multi-point anchoring systems provide developers with a fully functional alternative to either bringing their own gravity base or having to drill and install anchor chains and mooring blocks. Bespoke test support buoys allow developers to dissipate the electricity generated by their devices in an environmentally conscious way, while transferring wave and tidal data back to the control centre. An area of seabed is also available for rehearsal of deployment techniques.

In 2014, EMEC expanded its scope attaining the International Standard ISO/IEC 17020 for verification of the performance of new environmental technologies. Open to energy technologies, water treatment and monitoring technologies, and materials, waste and resources, EMEC-ETV (Environmental Technology Verification) can help innovative technologies reach the market via the provision of a Statement of Verification.

Beyond technology testing and verification, EMEC also provides a wide range of consultancy and research services, and is working closely with Marine Scotland to streamline the consenting process. EMEC is at the forefront in the development of international standards for marine energy, and is forging alliances with other countries, exporting its knowledge around the world to stimulate the development of a global marine renewables industry.

Further information available at: www.emec.org.uk

EMEC was founded in 2003 in Orkney, Scotland.

EMEC is the only accredited wave and tidal test centre for marine renewable energy in the world, suitable for testing 14 grid-connected devices simultaneously.

The centre was established with approximately £36 million of funding from the Scottish Government, Highlands and Islands Enterprise, the Carbon Trust, the UK Government, Scottish Enterprise, the European Union and Orkney Islands Council.

EMEC currently has 27 employees: this has doubled since 2009.

Billia Croo wave test site:

- 6 full-scale test berths in up to 70m of water
- 14.3km installed subsea cables
- Average significant wave height of 2-3m
- Extremes of up to 19m waves (highest recorded by EMEC)

Fall of Warness tidal test site:

- 8 full-scale tidal test berths ranging from 12m – 50m depths
- 15.5km installed subsea cables
- Tidal peak of 4 m/s (8 knots) in spring tides

Non-grid connected wave and tidal test sites in less challenging conditions are also available in Scapa Flow (wave) and Shapinsay Sound (tidal):

- 20-25m depth
- Average significant wave height of 0.25-0.75m
- Peak tide of 1.5m m/s

More marine energy devices have been tested at EMEC than at any other single site in the world: EMEC has hosted 16 wave and tidal energy clients (with 25 marine energy devices) spanning 9 countries.

	Country of origin	No of developers	Device name	No of devices
Wave clients	UK	Aquamarine Power	Oyster 1 & Oyster 800	2
	UK	E.ON/Pelamis Wave Power	P2 001	1
	UK	Pelamis Wave Power	P1	1
	UK	Scottish Power Renewables	P2 002	1
	UK	Seatricity	Oceanus	1
	Finland	AW Energy	WaveRoller	1
	Finland	Wello	Penguin	1
Tidal clients	UK/Singapore	Atlantis	AK1000 & AR1000	2
	UK	Nautricity	CoRMaT	1
	UK	Scotrenewables Tidal Power	SR250	1
	France	Alstom (formerly TGL)	DeepGen	2
	Germany	Voith	HyTide	1
	Ireland	OpenHydro	Open Centre Turbine	7
	Norway	Flumill	Flumill	1
	Norway/Austria	ANDRITZ Hydro Hammerfest	HS1000	1
	Spain	Magallanes	ATIR	1

Important note: due to the fact that the industry is at a critical testing stage, devices are not permanently deployed at EMEC's test sites, and their location is dependent on a number of factors including the developers' testing schedules and the weather.

EMEC accreditation status:

- EMEC operates to relevant test laboratory standards (ISO17025) enabling the Centre to provide independently verified performance reports.
- Accredited to ISO/IEC 17020 in 2014, EMEC launched EMEC-ETV (Environmental Technology Verification) helping innovative technologies reach the market via the provision of a Statement of Verification.

Beyond device testing, EMEC:

- provides a wide range of consultancy and research services;
- is at the forefront in the development of international standards for marine energy;
- is forging alliances around the world including Canada, China, Japan, Singapore, South Korea, Taiwan and the USA, and working closely with entities in Chile and New Zealand; and
- has instigated considerable local economic impact in Orkney:
 - EMEC's total local spend has been £10.3 million (50% of all EMEC spend 2005 - 2014);
 - approximately 300 people are currently employed in Orkney in the marine renewables sector in around 40 different local companies;
 - it is estimated that wave and tidal developers spend around £1million per device in the local economy;
 - £23 million has been invested by Orkney Islands Council and Highlands and Islands Enterprise in supporting infrastructure for the marine energy sector in Orkney.

Further information is available at: www.emec.org.uk

EMEC

About us: <http://www.emec.org.uk/about-us/>
Services: <http://www.emec.org.uk/services/>
Facilities: <http://www.emec.org.uk/facilities/>
Research: <http://www.emec.org.uk/research/>

Clients

Wave clients' profiles: <http://www.emec.org.uk/about-us/wave-clients/>
Tidal clients' profiles: <http://www.emec.org.uk/about-us/our-tidal-clients/>
Scale site clients' profiles: <http://www.emec.org.uk/about-us/scale-site-clients/>

Marine energy info

What is marine energy?: <http://www.emec.org.uk/marine-energy/>
Wave device animations: <http://www.emec.org.uk/marine-energy/wave-devices/>
Tidal device animations: <http://www.emec.org.uk/marine-energy/tidal-devices/>
Marine energy in Orkney: <http://www.orkneymarinerenewables.com/>

Media

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