

Location, location, location: Ireland's wave energy advantage

IRELAND could have a unique solution to much of its climate change requirements, US Ambassador Tom C. Foley said last week — with a natural resource that's all around us. In a modern take on that old song lyric — “Thank God we're surrounded by water” — the harnessing of ocean energy could help lessen our dependence on fossil fuels while meeting our alternative energy targets.

On a visit to the Marine Institute's headquarters and laboratory facilities at Oranmore, Co Galway, last week for a joint workshop between Irish and US companies and organisations in the ocean energy sector, the Ambassador said: “The US is just as concerned about and actively seeking solutions to climate change as the EU. The only viable long-term solutions will come from technologies that make us more efficient consumers of fossil fuels, and expand old or create new sources of non-fossil fuel-based energy.”

Ireland has the human capital to exploit its natural advantages of latitude weather and Atlantic location, he said.

“I am so interested in ocean energy opportunities in Ireland. I think there is a once-in-a-generation opportunity here to take advantage of an exceptional opportunity that all the money in the world and brilliant policy making couldn't create on their own. I want to see Ireland succeed with this opportunity. I think the US can help Ireland succeed, and benefit itself, too,” said Mr Foley.

The Marine Institute liaises closely with academic institutions, state agencies and trans-national research groups, as well as the renewable energy sector in the development of policy and the targeting of strategic investment. These projects are all part of the national programme, Sea Change — A Marine Knowledge, Research and Innovation Strategy for Ireland 2007-2013, which is being co-ordinated by the Institute.

A National Strategy for Ocean Energy was developed in 2003 to support the introduction of Ocean Energy to the Renewables “portfolio” in Ireland

Our latitude, Atlantic coast and weather permutations are ideal natural resources for the harnessing of the ocean as an alternative energy source, says John Daly

and develop an Irish ocean energy industry sector. This has now been reinforced in the Programme for Government and the Energy White Paper through a commitment to fund the development of the Ocean Energy sector for a three-year period.

“The behaviour of the Gulf Stream and other important Atlantic currents have a direct impact on our weather,” said Dr Peter Heffernan, CEO of the Marine Institute. “This in turn affects food production, both at sea and on the land, as well as extreme oceanic events, such as high waves and tides. This is why we're working with key partners in government, the third-level sector and industry to develop a major flagship initiative to position Ireland as a global leader in the development and use of new technologies such as Smart-bay — which uses wireless aquatic sensor networks to monitor the marine environment — as well as underwater observatory systems to understand and measure the pace and impact of new trends in our ocean environment caused by climate change.”

An example of the application of technology to the challenge of sustainable energy production is currently in evidence with the OE Buoy, a quarter-scale prototype designed and built

by the Cork-based company Ocean Energy Ltd, presently under test at the Galway Bay site. Another device, developed by Wavebob Ltd, has also been tested on the site in recent months. This sustainable energy device generates electricity from the rise and fall of a semi-submerged chamber within a floating collar.

The Marine Institute has undertaken extensive work on the location for a second, grid-connected test site, off the west coast, where full-scale wave energy devices can be tested. Ocean Energy is one of the most advanced wave energy technology companies in the country and has pioneered wave technology over the last five years with the help of UCC, the Irish Marine Institute and Queen's University Belfast.

“Based on the results to date from our OE Buoy, we are very optimistic about the project at this point and feel that we are now moving very close to having a commercially viable proposition in a very short time,” says managing director Michael Whelan.

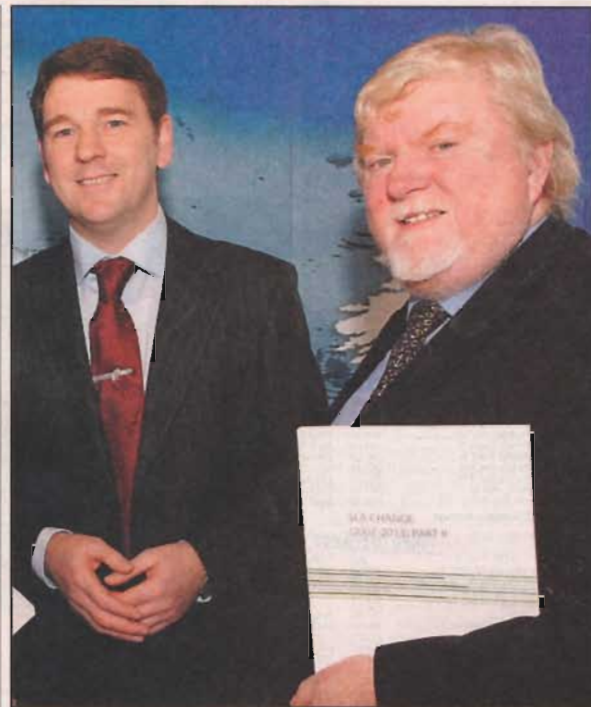
The OE Buoy is a floating system which has high wave energy capture efficiency while maintaining full seaworthiness and good survivability. If the ongoing tests continue to produce the expected results, Ocean Energy has

the potential to create a substantial number of jobs, solve the growing energy problems, and become a world leader in the production of wave energy devices. The results show that the Government's wave energy generation target of 500 megawatts (MW) by 2020, as set out in its Ocean Energy Strategy, is achievable. Also, the interim target of 75 MW by 2012, recently set by the Green Party, is also well on course to be met.

By 2020, wave power generation will contribute over 7% of the country's total 7,000 MW output. “We were invited into the Co-Ordinated Action for Ocean Energy organisation commissioned by the EU and attend regular meetings with associated operators and developers, as well as academic bodies involved in this research,” says Michael Whelan. “It is a continual process of information and ideas exchange where we all help each other. This business is in its infancy — you can't, at present, go out and buy a commercial wave energy device. It's a whole new industry, similar to the car industry when Henry Ford manufactured the first Model T.”

Ireland is located at the centre of one of the most favourable climates for ocean wave energy in the world. The Irish Marine Institute has identified the medium-term practical resource as around 800 MW installed capacity. The Irish Renewable Energy Strategy identified that the “successful development of commercial wave energy converters could satisfy a huge market demand”. To date, there have been a number of developments to harness wave energy at different locations around the world, with the success rate relatively low.

Currently, there are two existing shore-based converters, one in the Azores and one in Islay, but the construction difficulties associated with these devices and the constraints of shoreline geometry indicates the potential for exploiting the resource using this method as extremely limited. “The energy potential along the west



Dr Peter Heffernan, CEO Marine Institute, and Kevin Bonner, chairman of the board, at their Oranmore, Co Galway headquarters. Picture: Andrew Downes

coast of Ireland is capable of providing four times our national requirement if properly harnessed,” says Mr Whelan. A 2002 study by AEA Technologies estimates that the worldwide market for offshore wave energy devices could be between €50 billion and €200bn. One of the biggest problems encountered in harnessing wave energy so far

has been the poor survival rate of the various test devices in extreme climatic conditions. Any device that can limit the forces during these extremes and also have relatively low power conversion efficiency has the best chance of being successful. Based on results to date, the OE Buoy has satisfied all these demands.