

New drive to harness wave power

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Meet green monsters of the deep

In a bleakly beautiful island landscape, some strange new sights are emerging.

In the turbulent waters off the shores of Orkney, in the far north of Scotland, an array of bizarre machines is being deployed in a drive to harness the power of the sea.

The European Marine Energy Centre at Stromness is playing host to nearly a dozen experimental devices designed to capture the energy of the tides and the waves.

It is too early to tell if any of them will work on a large scale or ever succeed commercially.

But during lucky breaks in Orkney's fearsome winter weather, I got the chance to see two of the devices in action.

There is the "Oyster", a giant flap twice the height of a double-decker bus which swings back and forth with the waves.

Every time the flap moves, the action compresses hydraulic pumps which force water through a pipe to the shore where it drives a generator.

As we approach through a heavy swell, the bright yellow top of the flap rears up above the surface of the sea before being plunged back down by the next wave.

The machine is the work of the Scottish firm Aquamarine Power. Operations manager Frances Tierney, on board with us, says that its first few weeks have proved it can work.

"It was quite nerve-wracking installing it but we're really pleased with how the Oyster has performed so far."

The company's hope is to set up "farms" of Oysters, with 2MW of electricity being generated for every three machines, according to company officials.

'Huge potential'

Matthias Haag, Aquamarine's chief operating officer, told me that, in theory, 1,500 Oysters could yield one gigawatt (1GW) of electricity - about the output of a typical fossil fuel power station.

"Our studies have identified sites where the waves mean we could generate 5GW of electricity - it's got huge potential."

Another approach is to harness the power of the tides. Between Orkney and the Scottish mainland, the Pentland Firth sees high-speed currents surging from the Atlantic to the North Sea and back again.

These can reach more than eight knots - nearly 10 miles per hour - and the flows last six hours in each direction.

“ There is huge potential - absolutely huge amounts of energy out there ”

Neil Kermodé
European Marine Energy
Centre

In a notoriously fast-flowing channel known as the Fall of Warness, the Irish firm OpenHydro has deployed an enormous undersea turbine - a fan with a diameter of 6m.



The Oyster wave power machine swings back and forth with the waves

Fitted between black stilts, this huge device sits near the sea-bed right in the path of the currents. As the waters surge, the massive blades start spinning and drive a generating system fitted within the machine's frame. The electricity is then piped ashore.

During our visit, the turbine is lifted out of the sea so we can film it. Rising slowly from the choppy grey waters, it looks like something from a Bond film.

Operations manager Sue Barr tells me that this is the company's fourth version of the turbine. The plan is for a 10m-diameter device which could generate 1MW of power.

"We're great fans of all forms of renewable energy but tidal is the only one that's predictable. We predict it with the sun and the moon - that's a very persuasive argument for investment."

Winners and losers

Other marine schemes involve systems of underwater propellers to spin in the tides or giant "snakes" whose joints move with the waves and generate power.

There is no doubting the ambition. But this is a watery, green equivalent to the start of the steam age: lots of clever ideas but the inevitability that there will be winners and losers.

The technologies are in their infancy, the costs at this stage are very high and still unknown are the practical implications of deploying hundreds or thousands of machines at sea.

And unresolved are the costly and controversial challenges of having to run new cables into the National Grid and then onto major population centres.

Neil Kermodé of the European Marine Energy Centre is keen to be realistic about the prospects and not to hype expectations. State funding, relatively meagre until now, is being increased and private funds are being raised too.

"We're at the stage of needing to see which of these technologies works and whether they can be scaled up. That requires steady investment.

"Look what the Danes did with wind: investments year after year paid off and now they earn billions in exports.

"There is huge potential - absolutely huge amounts of energy out there - in fact we don't know how much but it is epic."

Mr Kermodé's concern is that funding remains consistent so that the different systems can be developed - and given a chance to prove themselves - in the UK.

"There is an absolute risk that we could fail to develop the technology that gets the energy out of the sea.

"If we're not careful we could end up buying this technology from overseas later on, which would be silly."

With its island heritage and experience of North Sea oil and gas, Britain should be ideally placed to pioneer marine energy.

As we leave in the dark of mid-afternoon, a storm drives rain across the runway. I think of the waves pounding the brave new machines out at sea.

Are they the first foot-soldiers of an impending energy revolution or costly forays into the deep that may never really succeed? The next few years will tell.



There are many ideas for capturing the power of tides and waves