

Celebrating 10 years of extraordinary change

BY KEN ROSS, OREF CHAIRMAN

What a difference a decade makes! At OREF we're celebrating our 10th anniversary – 10 remarkable years that have seen Orkney embrace renewables with a passion that now gives us a worldwide lead in the race to capture commercial-scale energy from the seas around us.

I'm proud of our achievements over the past decade. OREF has been a force for good, encouraging innovation in all forms of sustainable energy generation, pushing hard to improve the energy efficiency of our homes and businesses – and, above all, championing Orkney itself.

After all, our islands are blessed not only with wonderful natural resources, but with people who're always up for new challenges, who embrace new ideas and technologies that benefit our forward-looking community.

My own lifetime encompasses the renewables revolution our islands have witnessed. As a five-year-old, I was taken in the early 1950s on a visit to the North of Scotland Hydro Board's large-scale wind turbine at Costa Head. An impressive sight for a boy wearing his Kirkwall infants school uniform, this was the machine that started Orkney's renewable energy industry. I was lucky to see it, as it was blown down two years later when hurricane force winds touched 120 mph.

As I said, there's no shortage of sustainable energy in these islands of ours! And no shortage of challenges either.

Like those early wind pioneers – trying to build technology to withstand everything the elements could throw at them – today's wave and tidal developers have been set quite a task as well. Imagine the effort that'll be required to harness enough power to supply three quarters of a million homes from Orkney waters and the Pentland Firth.

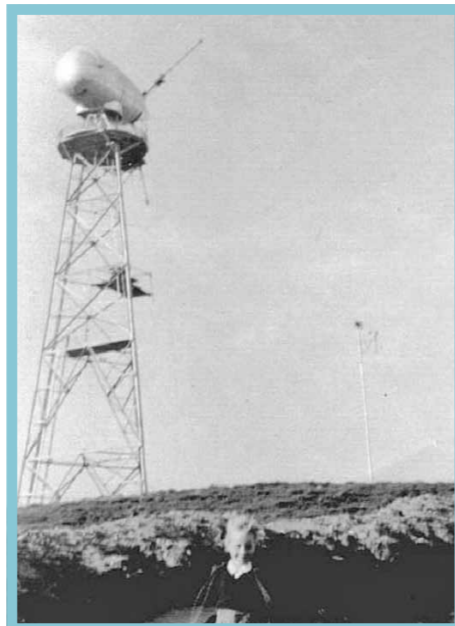
That's the target set in the world's first leasing round for commercial wave and tidal projects. The deadline is 2020 – so OREF's second decade is all set to be pretty interesting as well. And, of course, OREF – and the many businesses and organisations we represent – will be hard at work too, with a shared determination to get these marine energy projects on stream.

So what led to the formation of the Orkney Renewable Energy Forum? Its roots lie in the Orkney Energy Agency I established in 1995 (along with Orkney's first energy advice centre). Five years later OREF itself was born, with a mission to "promote all forms of renewable energy, and energy efficiency, and encourage such activities to be of benefit to the Orkney community."

Since our foundation in 2000, we've lobbied to keep our islands at the forefront of sustainable energy – and energy efficiency – developments. We've seen the creation of EMEC, the European Marine Energy Centre, and the generation of electricity for the grid from an offshore wave device – a world first.

We've witnessed innovation in onshore wind and in the management of the grid in Orkney. We've seen cars run on waste cooking oil, pioneered the growth of energy crops, and seen North Ronaldsay recognised as the finest location in the UK for small-scale wind generation.

We've encouraged our school children to become advocates of energy efficiency, lobbying their parents and schools to save electricity and cut costs. Our communities suffer from some of the highest energy charges in the country – and often have homes that are difficult to keep warm. So it's great, as you'll read in this newsletter, to see three small islands take the initiative in tackling affordable warmth. It's something I'm particularly proud of, both as OREF chairman and as the (recently retired) head of the present day Orkney Energy Agency. And it's something other communities across our islands are embracing as well.



A young Ken Ross gets his first taste of renewables at Costa Head.

I'm pleased that a decade after our foundation, renewable and energy efficiency are still seen together, hand in glove, as we face a future where alternative forms of fuel will become increasingly important. I'm delighted to be chairing OREF as we celebrate 10 years of tremendous advances ... and look forward to the challenges of the decade ahead.

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ASSOCIATE MEMBERS: AWS Ocean Energy Ltd, I & H Brown, OpenHydro, Pelamis Wave Power, Ross Deeptech Initiatives, ScottishPower Renewables.



For further information and contact details please visit the OREF website:

www.oref.co.uk

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Orkney – global energy focus

BY GARETH DAVIES, OREF CHAIRMAN 2007-2009

For 10 years OREF and our wider community have been on a journey, driven by a vision to establish Orkney as a leading centre for the development and commercialisation of marine renewables.

Turning that vision into reality has required a great deal of energy, passion, commitment and determination of those who sparked and then nurtured the renewables revolution these islands have witnessed.

Today Orkney stands, quite literally, centre stage. Of the 10 wave and tidal energy projects announced in the world's first leasing round for commercial marine energy projects, eight will be developed in Orkney waters.

Orkney is also home to EMEC, the European Marine Energy Centre, where the world's leading ocean energy developers are pioneering, developing and perfecting technologies to harness power from the toughest of all environments.

That at-sea, grid-connected test experience will be crucial as the marine renewables sector moves to the next stage – the deployment of the first commercial arrays.

This year we're marking the 10th anniversary of the founding of OREF, the Orkney Renewable Energy Forum. For 10 years OREF has championed Orkney's drive to make best use of superb natural resources – wave, wind, tide and biomass – along with seeking ways of reducing energy demand, for the good of our community and the wider world around us.

Today international attention is focussed on our islands. The successful bidders in the first leasing round for the Pentland Firth and Orkney waters have been set the task of harnessing 1.2 gigawatts (GS) of wave and tidal-generated energy by 2020.

That's sufficient electricity to meet the needs of up to three quarters of a million homes. This is one of the most exciting and challenging technological enterprises in the world today, up there with the Three Gorges Dam in China and the drive to develop carbon capture technology.

Making it happen will require a multi-disciplinary effort from wave and tidal developers, engineers, mariners, environmental specialists and regulators – and strong support from our local community.

Each of us will be required to deliver pragmatic, innovative and effective solutions for the many challenges that lie ahead. These solutions will be rolled out not just



Going global ... from wave energy to community innovation.

in the waters around our islands, but in support of other ocean energy initiatives elsewhere in the UK and around the world.

Creative thinking, problem solving and a can-do attitude. All characteristics of a community with a passion for renewables, as you'll discover on the pages of this newsletter.

From prototype marine energy devices getting their first taste of the sea, to new insight on community involvement in onshore wind farms, to growing farmland grasses as energy crops of the future. We're leading the way in energy efficient building techniques and our university campus is a springboard to work in the renewables sector. Orkney is a mecca for visitors from around the world with an interest in sustainable energy and finding solutions for a low carbon economy.

In our islands you'll find industry and the wider community working together to deliver success. You'll find a pro-active local authority investing in the harbour

and pier upgrades needed for a big rise in renewables linked activity in the seas around us.

This pioneering approach provides further opportunities for Orkney to act as a pilot community for the introduction of novel systems for the generation, distribution and storage of energy – systems of relevance to us and to communities internationally as well.

Looking back over the past decade, all of this endeavour has been matched by a determination to safeguard our islands' heritage and natural environment. After all, the whole purpose of renewables is to make the world a better place.

Today Orkney has a world leading role, with international recognition of our importance as a hub for marine renewables. This is a position that has been worked for long and hard, is held with pride and which confers a responsibility that OREF is ready to play its part in taking. This is our destiny - what better way to celebrate OREF's 10th anniversary.

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OREF 10TH ANNIVERSARY OREF 10TH ANNIVERSARY OREF 10TH ANNIVERSARY

Historic day puts Orkney at the heart of worldwide energy challenge

A major landmark in the drive to harness energy from the sea saw Orkney placed centre stage in the world's first leasing round for commercial wave and tidal projects.

Eight out of 10 marine energy sites selected by the Crown Estate are in Orkney waters.

With two more sites, off Duncansby Head in Caithness and Armadale in Sutherland, the Crown Estate has set developers the "globally significant" challenge of generating 1.2 gigawatts (GW) of electricity by 2020 – sufficient for around 750,000 homes.

Described as an historic day by Orkney Islands Council, the long awaited announcement will result in a range of wave and tidal technologies being deployed in arrays throughout the islands.

Initially developers and support companies will be involved in the consenting process, in environmental assessments and in community engagement.

At the same time wave and tidal devices in increasing numbers will be tested at EMEC, the European Marine Energy Centre, as they evolve towards

full commercial deployment at the Crown Estate sites.

In this first leasing round for the Pentland Firth and Orkney waters, developers have signed 10 agreements for lease for seabed sites.

The successful bidders are a mix of major utilities and leading wave and tidal technology pioneers.

The power generation target – 600 megawatts (MW) each from wave and tidal projects – is the equivalent of four times the electricity produced by the Dounreay nuclear power station in its heyday.

"This shows the world that marine energy can produce significant electrical power and offer a real alternative to conventional power production," said Crown Estate chief executive Roger Bright.

Council convener Councillor Stephen Hagan added: "Orkney boasts an ideal combination of natural resources and centuries of maritime expertise.

"We continue to invest in our maritime facilities and skills and look forward to expanding the expertise and knowledge in the islands in support of this new industry and energy source."



Hammerfest Strøm's tidal turbine (above) and the Pelamis wave device.

Why did man reach the moon before harnessing energy out at sea?

One answer is that he did the simple things first!

This premise underpins a belief, borne out of experiences to date, that undertaking work in areas suitable for wave and tidal energy development is particularly challenging.

To help that process, Stromness-based Aquatera has combined with a group of local associate businesses and maritime specialists.

By sharing their expertise, this group combines a detailed understanding of wave and tidal developers' needs with the seamanship and engineering required to successfully complete operations in Orkney waters and beyond.

"It's all about providing a turnkey service," said Aquatera managing director Gareth Davies.

"Our philosophy over the past 10 years has been to take a multi-dimensional approach to projects. So, alongside considering the impacts developments may have on the environment, we've also looked at how the environment can affect a range of operations and activities.

"This 360-degree focus is standing us in good stead in providing operational support and advice to marine energy developers building wave and tidal projects in local waters and elsewhere around the world."

Aquatera and its partners have previously supported Dublin-based OpenHydro, which has deployed a succession of turbines at EMEC's tidal test site off the island of Eday.

Some of the individual businesses have also supported Pelamis, TGL and Aquamarine during their deployment activities.

This group is now supporting German engineering firm Voith Hydro, which is starting to deploy its tidal turbine at the Falls of Warness this summer.

"We have built considerable expertise in the marine energy sector, in Orkney, elsewhere in Scotland and internationally," said Dr Davies.

"We work closely with mariners and maritime specialists with decades of experience of Orkney waters, as well as locally-based companies offering everything from diving and construction to safety engineering and surveying.

"Alongside our core environmental services it means we can provide developers with a bespoke service for the installation, operation and maintenance of wave and tidal devices, underpinned by years of maritime know-how."

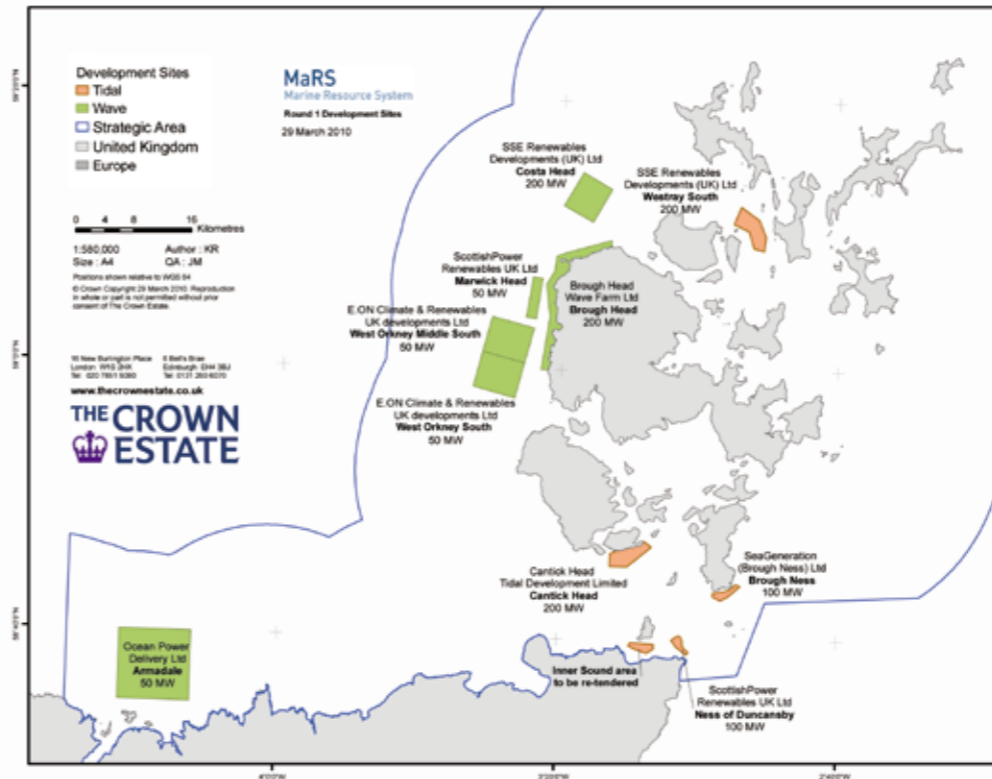
He added: "In Orkney, marine energy projects are being developed in some of the harshest sea conditions to be found anywhere in the world.

"Local expertise is ensuring that the projects are safe, successful and effective – and the level and range of support we can provide is growing as the industry itself develops."

An example of the breadth of this support is a new service from Aquatera – operational conditions data on the company's website.

Up to the minute information on wind, wave and tidal conditions, shipping activity, wildlife sightings and latest local news, is available for Orkney, Shetland, the Western Isles and Oregon (so far) at www.aquatera.co.uk

Wave and tidal ... the first Pentland Firth and Orkney waters development sites



Ocean power ... Oyster (right), SeaGen (top) and OpenHydro.

RUNNERS AND RIDERS

Who's going where in the first Pentland Firth and Orkney Waters leasing round

ORKNEY

- **Brough Head**
Aquamarine Power and SSE Renewables
Output: 200 MW
Technology: Oyster
- **Costa Head**
Developer: SSE Renewables
Output: 200 MW
Technology: Still to be decided
- **Marwick Head**
Developer: Scottish Power Renewables
Output: 50 MW
Technology: Pelamis
- **West Orkney Middle South**
Developer: E.ON Climate and Renewables
Output: 50 MW
Technology: Still to be decided
- **West Orkney South**
Developer: E.ON Climate and Renewables
Output: 50 MW
Technology: Pelamis
- **Cantick Head**
Developer: SSE Renewables and OpenHydro
Output: 200 MW
Technology: OpenHydro
- **Brough Ness**
Developer: Marine Current Turbines
Output: 100 MW
Technology: SeaGen
- **Westray South**
Developer: SSE Renewables
Output: 200 MW
Technology: Still to be decided

PENTLAND FIRTH

- **Ness of Duncansby**
Developer: Scottish Power Renewables
Output: 100 MW
Technology: Hammerfest Strøm
- **Armadale**
Developer: Pelamis Wave Power
Output: 50MW
Technology: Pelamis

An ocean of opportunities

Following a busy year around the Pacific, Orkney consultancy Aquatera is strengthening its links in 2010 with countries surrounding the world's largest ocean.

The company is already guiding the development of marine energy projects in the USA, Taiwan and Chile and is hoping to expand its geographic spread during the year to encompass South Korea, China, Japan, Canada and Ecuador.

In Taiwan, Aquatera is working with the Industrial Technology Research Institute (ITRI) to advise the Government on options for harnessing wave energy from Taiwanese waters.

"It's hoped that prototype technology could be deployed in Taiwan later this year," said Ian Hutchison, who is managing the project

"Our relationship with ITRI has strengthened and could serve as a bridgehead to other business opportunities in the region, as well as in Taiwan itself."

In Chile, a relationship established during a mission led by Scottish Development International (SDI) has led to Aquatera being asked to carry out a feasibility study on the potential for wave energy to support a major industrial site.

Aquatera managing director Gareth Davies is due to visit Chile in July to evaluate detailed plans and discuss development options with various agencies.

The company is also advising the Oregon Wave Energy Trust on the best way to manage marine renewables development along the coast of a state with superb ocean resources.

Ian Hutchison, who has also been deeply involved in this project, said: "This work looks set to continue and expand through 2010 and beyond. We've created a cumulative effects analysis framework, which will be rolled out to stakeholders, regulators and developers."

The aim is to inform the strategic decision making process on issues such as the types of technology to be deployed, the optimum sites and the scale of development that would best suit an area with a rich natural environment.

Aquatera has recently returned from a conference in Seattle, where there was a considerable buzz around the cumulative effects work the company has been carrying out in Oregon.

"It's exciting to see a state like Oregon, with such fantastic wave resources, take such an informed approach," said Dr Davies. "There are lessons to be learned from Oregon that could be of great relevance in Scotland and which could help our own strategic planning processes."

New wind farm draws on the talents of team Orkney



Richard Jenkins at Hammars Hill.

A new wind farm created with substantial financial backing from within the Orkney community is set to start generating power later this year.

The company behind the project, Hammars Hill Energy Ltd, is confident it will be highly productive - with Orkney enjoying one of the best wind resources in Europe.

Five Enercon E44 turbines, each with an output of 900 kilowatts (kW), are due to be delivered in July and were selected for their efficiency and robust construction.

"The site experiences high wind conditions," said company chairman Richard Jenkins. "The turbines' storm control technology will ensure they are still generating electricity when others have shut down."

A share issue last year raised half of the capital required for the £8 million project, with 90 per cent of the shareholders based in Orkney.

"It means that 90 per cent of the dividends will be distributed within Orkney," Mr Jenkins said. "This is a unique project in many ways. It will be the largest wind farm in Orkney in the ownership of a single company and, with so many of the shareholders based locally, substantial benefits will flow out to the wider community."

The wind farm, which will stand on Hammars Hill in Evie, has been designed by Richard Gauld, of Orkney Sustainable Energy.

Locally-based construction firm DS Nicolson Ltd has created access roads and hard standings, with Kirkwall company Heddle Construction building the foundations for the turbines.

Another Orkney company, Brian Rendall (Electrical) Ltd, is in charge of connecting the turbines to the grid - with the five directors of Hammars Hill Energy all residents of the islands.

"It's extraordinary to think that all the expertise required for a project of this complexity can be sourced within Orkney," said Mr Jenkins. "It is also remarkable that the companies involved can carry out this highly skilled work to the certified standards required by the industry and by the banks."

The project has taken five years to come to fruition, with sensitive design work required for a wind farm standing in a prominent position in the Orkney countryside.

"The new road up to the wind farm, and the sites chosen for the five turbines, follow the natural curvature of the hill," he said. "From below the road can barely be seen, while the turbines themselves will rise cleanly from the hill, with only the towers and the rotors visible."

"A huge amount of work has gone into replacing the natural peat vegetation alongside the road and the hard standings. We are very proud of this development and how it will fit in to the local landscape."

The electrical switch gear for the station will be housed in a stone building once used by the local blacksmith, the late Bill Aim, with renovation work carried out by another local building firm, Raymond Stanger Ltd.

"I think Bill would have been tickled pink to think of all those megawatts passing through his old smithy," added Mr Jenkins.

GETTING INVOLVED ... communities benefit by joining wind farm venture

An Orkney company is helping develop a unique method of community involvement in a wind farm project.

Two communities in a remote area of the Highlands are joining forces to take ownership of one of the wind generators in the five-turbine development.

"It's an innovative way for people in the area to get involved and to benefit from a substantial revenue stream for many years to come," said Richard Gauld, from Orkney Sustainable Energy, which is designing the wind farm at Corrimony at the head of Glenurquhart.

"There's been strong support for the idea of the communities having ownership of one of the machines."

This will be the first initiative of its kind in the Highlands and Islands where a community-owned turbine forms part of a commercial wind farm.

The five 2 megawatt (MW) turbines will stand on moorland close to the RSPB's Corrimony reserve, so sensitive environmental planning has been required as well to ensure there is no disturbance to the black grouse it supports.

"It's a fascinating project in many ways," added Mr Gauld. "A big challenge has been to find the mechanism needed for the unique form of community involvement that's being developed here."

The team behind the Glenurquhart and Strathglass Wind Energy Project are landowners Lindsay and Mamie Girvan, Lindsay's brother Mike and Mike's wife Linda.



Richard Gauld ... innovative project.

Mike Girvan, an agricultural consultant based in Orkney, said: "I grew up in the area and my brother and his wife are very involved with the local communities in Strathglass and Glenurquhart."

"From the start we wanted people from the area to benefit from the wind farm - their own turbine should generate an income of around £150,000 a year."

Eighty people turned up at the first public meeting to discuss the proposals. Seventy five were in favour, with no objections.

"The turbine will give people a sense of ownership and pride in the project," added Mr Girvan. "It will allow the communities to take control of their own destinies. We think it's a template for wind farm developments that other communities may well want to follow."

Developer calls in Orkney expertise for Shetland wave venture

A leading marine energy company has recruited Orkney-based environmental consultants as it develops its first wave power project in Shetland.

Pelamis Wave Power (PWP) plans to build the wave farm as a joint venture with Swedish company Vattenfall, one of the biggest utilities in Europe.

The project, off the west coast of the Shetland Mainland, will be up to 20 megawatts (MW) in size and potentially use around 25 Pelamis P2 machines. The joint venture is called Aegir Wave Power Ltd.

Stromness-based Xodus AURORA have been brought in to assist in the early stages of the project consenting process. The work awarded includes identification of the issues to be addressed by the Environmental Impact Assessment (EIA) and development of a stakeholder consultation plan.

"It's great that such high profile companies recognise our experience and expertise," said Liz Foubister, Xodus' Alternative Energy Director.

"Much of that has been gained in and around Orkney, so we're delighted to be working with PWP and Vattenfall on this groundbreaking project in Shetland."

Aegir was set up to explore wave power development opportunities in Scottish waters. Neels Kriek, PWP's chief executive officer, said: "We anticipate this project will be a leading candidate for the Scottish Government's Saltire Prize for commercially proven wave power technology."

Dr Helmar Rendez, from Vattenfall, added: "We intend to make electricity clean by 2050 and halve its carbon emissions by 2030. This means we must invest in the green energy technologies of today and tomorrow."

"The partnership with Pelamis allows us to work on developing a site that will prove very productive when we make wave power a commercial reality. We are pleased to tie up with Pelamis and take this project forward as we have big hopes for the future of wave power and see Scotland as a good place to do this."

The aim is to install a multi-machine array of P2 devices by 2014 if planning consent is gained and the planned subsea cable between Shetland and mainland Scotland is constructed.

Aegir is a sea god, or king of the sea, in Norse mythology.



Pelamis ... heading for Shetland.

Landmark turbine delivers big boost for energy firm

An Orkney businessman plans to use the income from a new wind turbine to invest in further renewable energy projects.

Barry Johnston established Scotrenewables in 2002 and came up with the idea of using a wind turbine to sustain and develop the company at around the same time.

A series of delays held up the project over the years, so he is delighted to see the 2.3 MW Enercon machine finally under construction on the island of Flotta.

"It shows that you should never give up on things you believe in," he said. "It's a proud moment, particularly as I've been able to maintain 100 per cent ownership

of this landmark project."

Stromness-based Mr Johnston is personally involved in a range of ventures focussed on renewable energy.

"The wind turbine will be a huge boost for the company, providing us with a long-term funding stream that will allow us to develop new renewables projects in Orkney," he added.

Costing just under £3 million, the turbine stands on one of the best sites in Europe for generating energy from the wind.

Constructed next to the Flotta oil terminal - it emphasises the island's important role in both traditional and now renewable energy production.



On dry land ... the new turbine arrives at Flotta.

EMEC portfolio expands to meet industry needs

New test berths are being created at the wave and tidal sites operated by EMEC, the European Marine Energy Centre.

The move reflects growing international demand for EMEC's world leading test facilities.

Three new seabed cables are to be installed, two at the tidal test site off Eday, the other at the wave site at Billia Croo.

In addition, EMEC is creating two new nursery sites, one for tidal and one for wave machines.

These will allow developers to trial smaller scale marine energy devices in less challenging sea conditions than those experienced at the main test sites.

Funding worth £8 million from DECC, the UK Government's Department for Energy and Climate Change, is underpinning the creation of the new facilities.

"It's good to see the Government backing our ambition to provide additional facilities for wave and tidal energy developers," said EMEC managing director Neil Kermode.

EMEC provides the world's

first at-sea grid-connected marine laboratories for machines that can harvest the power of waves and tidal currents.

"As this new industry evolves, it's become apparent that expanding our portfolio of test sites will bring real benefits for the developers we are here to support," Mr Kermode said.

"Some developers are keen to subject their prototype technologies to the full force of the sea at our main wave and tidal test sites.

"Others would prefer the sort of half-way house our new nursery sites will provide – enabling them to conduct sea trials in less rigorous conditions using scaled down machines."

Five of the six most promising technologies selected by the Carbon Trust to share £22 million of new funding will undergo test programmes at EMEC.

The Marine Renewable Proving Fund (MRPF), financed by DECC, is designed to speed up the deployment of full scale prototypes and accelerate the first commercial wave and tidal projects in UK waters.

After a rigorous selection

process, Atlantis Resources, Aquamarine Power, Hammerfest Strøm UK, Pelamis Wave Power and Voith Hydro were successful in winning funding.

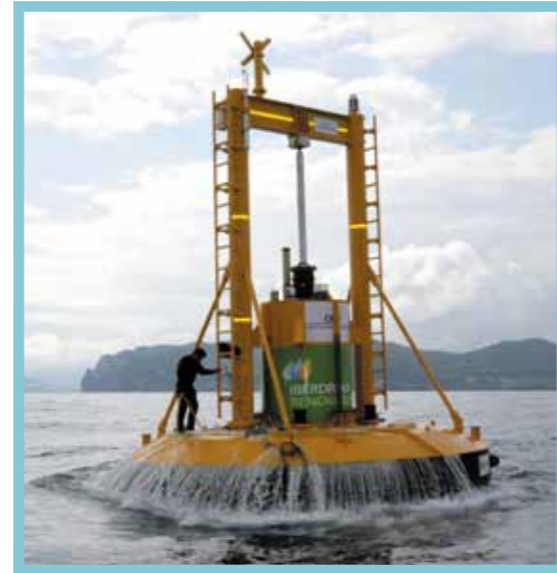
Aquamarine is already testing its Oyster device at EMEC and the other developers are scheduled to use EMEC's facilities in future.

"It's very gratifying that so many of the leading wave and tidal companies are choosing to use our facilities to develop and prove the commercial potential of five radically different technologies," said Mr Kermode.

"Demonstrating full scale devices at sea is central to realising the full potential of marine energy. We are proud to be playing such an important role at the start of a new industry that will generate jobs and wealth across the UK."

The sixth company to receive MRPF funding, Marine Current Turbines, is also due to deploy its technology in Orkney, as one of the successful bidders in the Crown Estate's first leasing round for commercial wave and tidal projects.

Three of machines already trialled at EMEC - Aquamarine



Ocean Power Technology's PowerBuoy ... a far larger version is being built for testing at EMEC.

Power's Oyster, Pelamis Wave Power's "sea snake" and OpenHydro's tidal turbine – also feature in the Crown Estate's plans for commercial scale power generation in Orkney waters and the Pentland Firth.

"Although not involved in the Crown Estate's decisions, EMEC is in a privileged position in this developing industry – with much of our work so far geared towards helping developers get prototype machines into the water," added Mr Kermode.

"We are delighted that three machines tested at EMEC feature in proposals from wave

and tidal energy developers to harness power from the sea at sites selected by The Crown Estate.

"For this to happen successfully, the technology needs to continue to evolve. So we are pleased that alongside machines new to EMEC, we will see next generation Oyster and Pelamis devices under test in the months and years ahead."

A 150 kilowatt (kW) PowerBuoy device, being built for Ocean Power Technologies (OPT), will also be trialled at EMEC's wave site, while Tidal Generation Ltd (TGL) is preparing to deploy a prototype turbine at the tidal test site.

Tidal trials deliver impressive results

An Orkney company is to build its first full-size tidal turbine after successful sea trials of a fifth-scale prototype.

Scottrenewables (Marine Power) Ltd plans to test the device at the tidal test site operated by EMEC, the European Marine Energy Centre, in 2011.

The team involved in developing the technology is delighted with the way the current prototype has performed during trials in Burra Sound, between the islands of Hoy and Graemsay.

"We've tested it in progressively rougher conditions, in both summer and winter, and we're pleased with its stability and with its power generating capabilities," said managing director Barry Johnston.

"The fifth-scale prototype has clocked up almost 30 days at sea. If anything it has performed better than we anticipated. The results are very encouraging as we look ahead to building our first full-size prototype."

The Stromness company's marine energy device is designed as a cheap-to-build, easy-to-maintain system for harnessing energy from tidal currents.

The current prototype weighs two tonnes and is eight metres in length. The larger version to be trialled at EMEC will have a length of 30 metres, a weight of 80 tonnes, twin eight metre rotors, and a power output of 250 kilowatts (kW).

Due to be completed by the end of 2010, it will

be connected to the National Grid via a seabed cable during the test programme in relatively sheltered waters off the island of Eday.

"This is an intermediate stage as we move towards developing a commercial-scale machine," added Mr Johnston. "We've always taken a step-by-step approach and it's great that our backers support us in this."

"Our aim is to develop technology that is competitive with offshore wind turbines – and we're convinced it will be the most cost-effective tidal power machine on the market."

The company has attracted substantial backing from energy giant Total and from Fred Olsen Renewables, which has invested £6.2 million in the project.

Fred Olsen Renewables looked at a number of marine energy projects before deciding that the Scottrenewables turbine stood the best chance of success.

The shipping magnate is in regular contact with the Orkney company and is keen to encourage their efforts as they tackle the many challenges involved in harnessing energy from the sea.

"Barry has built a good team, who are trying to cover every eventuality," Mr Olsen said. "It is important they take the time needed to overcome those challenges – and that they do this for as long as possible."



Flying high ... the Scottrenewables team and their fifth-scale turbine.

Aquamarine looks ahead to Oyster 2

A winter of sea trials in Atlantic waters has given wave energy company Aquamarine Power a major confidence boost as it looks forward to building its second-generation Oyster device.

The first seagoing Oyster prototype was officially switched on by First Minister Alex Salmond and is undergoing a test programme at EMEC, the European Marine Energy Centre.

The Edinburgh-based company is delighted with

the performance of the key component – the "flap" at the heart of the Oyster design.

This is the section that moves with passing waves, absorbing energy that pumps water under high pressure to an onshore hydro-electric station.

Aquamarine chief executive officer Martin McAdam enjoyed a close-up view of Oyster in action in a heavy swell on the day of the switch-on ceremony.

"This is a fantastic day for us," he said aboard the Stromness dive boat Jean

Elaine. "We have proved what we always believed – that wave energy can produce sustainable zero-emission electricity to power our homes and create a new industry in the process."

Reaching this landmark in the global race to harness energy from the sea took four years of effort and a budget in the millions.

Since then the machine has shown it can survive in winter conditions off the west coast of Orkney, with its performance in near-shore waters at Billia Croo

strongly influencing the design of Oyster Two.

The next generation device, also to be tested at EMEC, will have three flaps, each capable of generating 800 kilowatts (kW) of electricity.

"That's a big breakthrough," said Mr McAdam. "We're changing the shape of the flap and making each new machine 50 per cent bigger. And by doing that, each will have a power output nearly three times greater than the original prototype that's operating in

Orkney at the moment.

"We regard Oyster Two as an important step forward as we work towards a commercially viable product we can take to the market place.

"Our goal is to be more cost effective than off-shore wind and we aim to achieve that in four years' time. The challenge now is to reduce the cost of manufacture and the cost of installing the machines and we'll be tackling that as we move from Oyster Two to Oyster Three."

Pelamis backing from energy giants

Two second generation Pelamis wave energy converters will undergo test programmes in Orkney as the technology moves towards full commercialisation in local waters.

The first, commissioned by energy giant E.ON, was recently completed at Pelamis Wave Power's Leith facility and is expected to be deployed at the European Marine Energy Centre (EMEC) later this year.

Pelamis Wave Power (PWP) has also announced that a second P2 machine is to be built for ScottishPower Renewables (SPR), part of Iberdrola Renovables, the largest wind energy company in the world.

Both SPR and E.ON were successful in the Crown's Estate's first leasing round for commercial wave and tidal projects.

The two utilities are each planning 50 megawatt (MW) wave farms off the west coast of Orkney using Pelamis P2 technology.

PWP itself will develop another 50 MW marine site off the north coast of mainland Scotland.

The company's chief executive officer,



Sea giant ... the Pelamis team with a section of the P2 machine built for E.ON.

Neels Kriek, said the combined capacity – 150 MW when fully developed – was the equivalent of 200 P2 machines.

The machines to be tested at EMEC would provide valuable experience and data to expedite the early development

and commercialisation of the three projects, he said.

"The order from SPR will allow us to operate and maintain a mini array of P2 machines at EMEC," added Mr Kriek.

"This will create the impetus for the commercialisation of the Crown Estate sea-bed leases awarded to SPR, E.ON and PWP.

These and other projects under development in Scotland will result in orders in excess of £500 million when fully developed.

"This is a unique opportunity for PWP and our Scottish and UK supply chain partners to stimulate significant local economic benefits and, importantly, to create many more high-tech jobs in Scotland."

The second generation P2 machine is based on over 10 years of research and development work and the experience gained in building and operating prototype P1 devices.

The first P1 was also tested at EMEC – and generated the first electricity for the UK National Grid from an offshore wave energy device.



Harnessing the seas ... Oyster 1 at Billia Croo.



Big day for wave energy ... First Minister Alex Salmond joins Aquamarine Power's Martin MacAdam at the switch-on ceremony. "This is a key milestone for Aquamarine Power and for Scotland's marine renewables sector", Mr Salmond said. "Our waters hold around 10 per cent of Europe's wave power potential and as much as a quarter of its tidal power potential. EMEC provides world-leading test facilities for Aquamarine and other companies to develop the technology needed to harness this huge untapped potential."

ORKNEY RENEWABLES – *making the difference*

SKILLS & EXPERIENCE

WILLOW RESEARCHER
 AGRONOMY RESEARCHER
 AGRONOMY TECHNICIAN
 ACCOUNTANT
 BUSINESS BANKER
 FINANCE ADVISOR
 PLANNER
 FERRY OPERATOR
 PILOT
 CONSERVATION CONSULTANT
 SURVEY MANAGER
 BOOKKEEPER
 TECHNOLOGY CONSULTANT
 SUSTAINABLE ENERGY CONSULTANT
 MARINE BIOLOGIST
 EIA CONSULTANT
 ORNITHOLOGIST
 WEBSITE ADMINISTRATOR
 WEBSITE DESIGNER
 ECOLOGIST
 ADMINISTRATOR
 SAFETY SYSTEMS
 SALES
 ELECTRICAL ENGINEER
 ENERGY CONSULTANT
 MARINE SERVICES SUPPLIER
 COMMUNICATION ENGINEER
 PROJECT MANAGER
 OPERATIONS MANAGER
 PERMITTING MANAGER
 HYDRODYNAMISIST
 RESEARACH MANAGER
 STRATEGIC ADVISOR
 COMMERCIAL DIRECTOR
 RENEWABLES TECHNICIAN
 MARINE OPERATIONS DIRECTOR
 LANDOWNER
 BIRD CONSERVATION ADVISOR
 SUPPLY BASE MANAGER
 CONSERVATION MANAGER
 ECONOMIC DEVELOPMENT DIRECTOR
 COUNCILLOR
 CHAIR OF PLANNING
 CHAIR OF DEVELOPMENT
 CHAIR OF TRANSPORT
 CONVENOR
 VICE CONVENOR
 RENEWABLES DEVELOPMENT OFFICER
 GEOGRAPHIC INFORMATION
 SYSTEM SPECIALIST



SKILLS & EXPERIENCE

ENVIRONMENTAL MODELLER
 FISHERIES SCIENTIST
 ENVIRONMENTAL ECONOMIST
 ENERGY TECHNOLOGY RESEARCHER
 ACADEMIC STUDY MANAGER
 RESEARCH PROGRAMME MANAGER
 CONSULTATION ADVISOR
 MEMBER OF HOUSE OF LORDS
 GEOLOGIST
 TEACHER
 COMMUNITY ENERGY ADVISOR
 ROV PILOT
 ENERGY INVESTOR
 EQUIPMENT PURCHASE
 VESSEL CAPTAIN
 MARINE SERVICES MANAGER
 FERRY SERVICES MANAGER
 HARBOUR FACILITIES ENGINEER
 MARINE SERVICES DIRECTOR
 VESSEL TRAFFIC SERVICES OFFICER
 ENVIRONMENTAL ENGINEER
 TOXICOLOGIST
 ENVIRONMENTAL CHEMIST
 ARCHAEOLOGIST
 COLLEGE MANAGER
 NAVIGATION SCHOOL MANAGER
 WIND FARM DESIGNER
 DECK HAND
 VESSEL ENGINEER
 VESSEL SKIPPER
 CIVIL ENGINEER
 STRUCTURAL ENGINEER
 FLUID DYNAMICS SPECIALIST
 ELECTRONICS ENGINEER
 INVENTOR
 TECHNOLOGY DEVELOPMENT MANAGER
 MSC STUDENT
 PDH STUDENT
 SCIENTIFIC DIVER
 DIVER
 ACDP DEPLOYMENT SPECIALIST
 SURVEY TECHNOLOGY SPECIALIST
 INDIVIDUAL ENERGY ENTHUSIAST
 MP AT WESTMINSTER
 MSP AT HOLYROOD
 BIOGAS ENGINEER
 ECONOMICS CONSULTANT
 TECHNOLOGY DEVELOPER
 STRUCTURAL ENGINEERING RESEARCHER
 COMMUNICATIONS CONSULTANT

Over the last 10 years OREF has worked tirelessly to develop a more sustainable energy future for Orkney and indeed the world. Many people have been involved and the islands now have over 200 people working, in some way, in the renewables sector. The success that has been achieved has also involved a cast of people from outwith Orkney.

Here we celebrate what has been achieved and some of the people who helped to make it happen – because in the end it's people who make the difference. To get involved in the Orkney Renewable Energy Forum, send an email to info@oref.co.uk



Pier pressure ... as islands gear up for wave and tidal

A major review is underway to assess the key role piers and harbours throughout Orkney will play in the development of marine renewables.

The former wartime naval base at Lyness on the island of Hoy is being transformed into a centre for the maintenance and assembly of wave and tidal devices, with a £3 million redevelopment due to begin in June.

Orkney Islands Council is also developing plans for a substantial extension to the pier at Hatston near Kirkwall, which is well placed to serve developers using the Fall of Warness tidal test site operated by EMEC, the European Marine Energy Centre.

An expansion of harbour facilities is also proposed for Stromness, close to EMEC's wave test site at Billia Croo to the west of Orkney Mainland.

"Gearing up for a big increase in marine renewables activity is a key priority," said Michael Morrison, business development manager with the council's Marine Services department.

"We have a network of 29 piers and harbours and we're looking long term at how these key locations can underpin the development of this emerging industry."

The first phase of the Lyness redevelopment involves the refurbishment of 265 metres of the harbour's quay, the creation of 4000 square metres of quayside hard standing, and upgrading power, lighting and water supplies.

"The result will be a dedicated area where developers can carry out assembly and maintenance work on their machines," said Mr Morrison. "As a deepwater harbour in Scapa Flow, Lyness is ideally placed and there's considerable interest from developers in using the facilities."

Forty per cent of the funding is being provided by the European ERDF fund, with further phases to be planned as the industry develops, both at EMEC and at the commercial sites identified in the Crown Estate's leasing round for Orkney waters and the Pentland Firth.

"Every wave and tidal device is different in shape, draft and in its support requirements," added Mr Morrison. "Our aim is to work closely with developers in providing facilities that meet their specific needs."

The proposals for Hatston involve extending the 225-metre pier by a further 150 metres, with the council looking at providing an extra 100 metres of quayside berthing space in Stromness.

Orkney's port information systems are also set for a boost, with an upgrade planned for the VTS (Vessel Traffic Services) software and equipment used at Marine Service's base at Scapa.

In future, extra radar sites could be used to expand VTS coverage and ensure Orkney is well equipped to support growing marine renewable activity in the years ahead.

PICTURE: Transformed ... computer generated image of how the Lyness marine energy base could look in future.



A prestigious new office and workshop complex is to be built in Orkney for the renewables sector.

The Orkney Energy Gateway at Hatston will have its own income stream generated by a 900 kilowatt (kW) Enercon wind turbine.

"Our vision is to build a centre of excellence to support Orkney's expanding renewables sector," said Gina Penwarden, project manager for Orkney Energy Gateway Ltd.

"We're creating a flagship building where a wide selection of energy businesses and organisations can be housed under one roof – an ideal environment to stimulate growth and new ideas."

Due to be installed later this year, the turbine has a key role to play in ensuring the success of the venture.

"It's an innovative project and, from the start, the turbine will produce an important source of income and provide long-term sustainability for the centre," she added.

"Having it on the same site will highlight Orkney's commitment to renewables – and deliver a dramatic 'wow factor' for the energy gateway itself."

A turf roof will insulate the energy-efficient building, further enhancing its own green credentials.

Due to open next year, the complex will offer meeting facilities, as well as office and workshop space. It will also house a visitor information centre where Orkney's prominent role in the development a range of renewable energy technologies will be highlighted.

For more information visit www.orkneyenergygateway.co.uk

Oyster generates £1 million plus local spend

Wave energy pioneers Aquamarine Power called on home-grown expertise during the complex operation to install its Oyster device in Orkney waters.

With the machine currently undergoing a test programme at the European Marine Energy Centre (EMEC), the company has so far worked with 30 local companies, generating more than £1 million in expenditure for the islands' economy.

Chief executive officer Martin McAdam said: "As well as having seven of our own staff directly employed in Orkney during the installation process, the success of the operation depended on the talents of more than 70 people from the local community."

"Many are from specialist companies who offered the experience and skills we needed to get Oyster into the water for its first sea trials – a challenging task for our own team and the many sub-contractors we've worked with."

They ranged from engineering and construction contractors to firms providing boats, divers and other services.

As Aquamarine looks ahead to the installation of a larger, more powerful Oyster 2 at EMEC, Mr McAdam said there will be many more opportunities for local companies to get involved.

"We need their support and, as guests of the community, I'm delighted that in using their talents we can give something back to the community as well," he said.

Stromness-based environmental consultants Xodus AURORA act as environmental consultants to Aquamarine for their ongoing Orkney projects.

"Achieving success in marine renewables requires not just engineering excellence but expertise across the board," added Mr McAdam. "Xodus provided us with invaluable support in consenting Oyster 1."

Liz Foubister, the Xodus Group's

alternative energy director, has worked with Aquamarine since 2005, when the Edinburgh-based company was going through the consenting process for the device to be deployed in near shore waters at Billia Croo.

"It's been great to be involved from the early days of such a unique and challenging project," she said. "We've built an excellent working relationship and I'm delighted that Aquamarine recognise the value of our contribution and have retained our services for the Oyster 2 project."

She added: "The involvement of so many local companies demonstrates the breadth of skills and expertise available in Orkney."

"As we look forward to the commercial deployment of machines like Oyster in the years ahead, it provides a real motivation for local firms to work together and build an even broader supply chain to support the industry as it expands and develops."



Oyster 1 at EMEC's wave test site.

Leading the way with new alternative energy drive

A global energy consultancy has appointed Orkney-based Liz Foubister as its new alternative energy director.

Her task is to spearhead a drive by the Xodus Group to increase the worldwide services it provides for the growing onshore wind, wave and tidal energy sectors, and the emerging carbon capture and storage market.

Mrs Foubister has extensive experience in the alternative energy field and has worked as a leading consultant with Xodus Group for four years. Prior to this she was co-director of Orkney based environmental consultancy AURORA Environmental Limited.

Recently she has overseen the expansion of the group's capabilities – which combine environmental experience with engineering expertise – into the marine renewables sector.

Her wealth of experience goes back to the early 1990s, when she worked on the environmental impact assessment (EIA) for the Osprey wave energy device installed off Dounreay.

Xodus has developed a close working relationship with Aquamarine Power and other wet renewables pioneers testing prototype technologies at EMEC, the Orkney-based European Marine Energy Centre.

The company also provided support to a number of the successful applicants during the Crown Estate's first wave and tidal leasing round.

Mrs Foubister's new appointment comes at a time when the wave and tidal sectors are gearing up for major expansion in Scotland.

This follows the announcement of the companies selected by the Crown Estate to develop commercial wave and tidal projects in Orkney waters and the Pentland Firth.

"These are the early stages in the evolution of a new industry, making the wave and tidal sector an exciting place to be right now," she said.

The announcement of the sites – and the successful bidders in the world's first commercial wave and tidal leasing round – drew international attention to Orkney and the potential for marine renewables to harness substantial amounts of power in the years ahead.

"A lot of people's minds are focused on what the sea can deliver," Mrs Foubister said. "But there's some way to go and, as with any new industry, developers and governments face steep learning curves in building viable, commercial projects in a highly challenging environment."

She believes companies like Xodus, with a wide portfolio of expertise in the oil and gas industry, will play a key role as the marine renewables industry moves from the testing of prototypes into the commercial energy market.

"Many different disciplines need to work together to create successful wave and tidal developments," she added.

"By combining a broad range of highly specialised skills within a single team – from research and development to engineers and environmental consultants – the challenges developers face can be overcome by clever thinking and responsive problem solving."

In her new role, Mrs Foubister will be supported by Eric Doyle, Xodus Group's new alternative energy manager.

Going deep with subsea technology

An Orkney firm has invested in new underwater technology as it gears up to meet growing demand from the marine renewables sector.

Subsea survey specialists Roving Eye Enterprises can now offer a second ROV (remotely operated vehicle), after the first proved its worth in a range of sea conditions, including waters with strong tidal conditions.

Purchased at a cost of £90,000, the new SeaEye Falcon is equipped with a four-function manipulator – a rugged robotic arm that increases its versatility.

The company has been closely involved with the evolution of marine renewables in Orkney.

It has aided the development of facilities at the European Marine Energy Centre, worked with developers using EMEC's test sites, and helped in the survey work that led to the selection of sites for commercial marine energy projects in Orkney waters and the Pentland Firth.

Roving Eye Enterprises' first ROV has been used successfully for a range of tasks, including cable, pipeline and seabed surveys.

"With its manipulator arm, the new ROV has even more capabilities," said Keith Bichan, who runs the company with his wife Kathy.

The heavy duty unit can cut rope up to 19mm thick, clear debris, open valves and hatches, and has a lifting capacity of 40kg.

It can be used to aid the recovery of anchors and cable ends and, like the ROV itself, operate in situations that would be hazardous or too deep for divers.

"The ROVs are powerful machines that have proved their capabilities in some challenging sea conditions," Mr Bichan said.

"They have an operational depth of 300 metres and their versatility means they can be used as a cost-effective alternative to chartering specialist vessels with dynamic positioning capabilities."

Specially trained ROV pilots operate the two undersea machines from the Lodesman, the all-weather pilot boat purchased by Roving Eye Enterprises as an ideal vessel to operate in the waters around the islands.

A powerful crane has recently been installed aboard the Lodesman, easing the workload for the crew and for clients who charter the multi-purpose support vessel.

"We're proud that our knowledge of local waters and sea conditions, and the equipment we provide, are all helping the development of wave and tidal energy projects," he added.

Building on work with the oil and gas industry from the late 1990s, and 10 years' experience as a scallop diver, Mr Bichan first became involved with the marine renewable sector in 2004.

Clients include tidal developers OpenHydro and TGL, and Aquamarine Power and SSE Renewables, one of the successful bidders in the Crown Estate's Pentland Firth and Orkney Waters marine energy leasing round.



Over the side ... launching the ROV.

Building a picture of ocean life

New methods are being developed to assess the potential impact of wave and tidal devices on the local environment.

With more prototype and "next generation" devices due to be tested at EMEC, the European Marine Energy Centre, the aim is to ease the workload and reduce costs for developers, assist regulators and help protect the marine environment.

Offering the world's first grid-connected at-sea test sites for marine renewables, EMEC is playing a pivotal role in the development of machines that can convert energy from waves and tidal currents into electricity.

"Just as importantly, we need to understand how these technologies interact with wildlife and the wider marine environment," said managing director Neil Kermede.

"So in tandem with our test programmes, we are developing new and innovative methods of monitoring our sites and any impact – both positive and negative – the machines have on life in the seas around them."

The research work involves monitoring bird and marine mammal activity at the wave and tidal sites and listening in to the undersea world using hydrophones and other acoustic devices.

"We're attempting to piece together a detailed picture of the marine life to be found from the surface to the seabed, and any changes that can be linked to machines that harness energy from the sea," said Mr Kermede.

EMEC is also involved in a unique project that aims to demonstrate that the emerging wave energy industry and the local inshore fishing community can co-exist in harmony – with mutual benefits as well.

The project will investigate the possible effects of marine energy technologies on crab and lobster populations, and monitor the impact of a no-take zone established around the wave energy test site at Billia Croo.

Working with Orkney Fishermen's Society, EMEC will release hatchery reared juvenile lobsters into the area, with the population then monitored during an annual catch and release programme.

Jennifer Norris, research and consents manager at EMEC, said: "This is a very exciting project that has been funded by the Scottish Government with support from Marine Scotland Science."

"The production of electricity by clean and sustainable methods is crucial, and I firmly believe that there is a way forward for the marine energy and fisheries industries to co-exist."

"If this local project can contribute to our understanding of any effects, including positive ones, of these devices on fisheries, then we will be delighted to have played a part in establishing a co-operative way forward for the two industries."

Orkney Fishermen's Society general manager Stewart Crichton said: "The Scottish Government has made a



Hatchery reared juvenile lobsters will be released at EMEC's wave site.

major commitment to marine renewable energy and it is great that Orkney is at the centre of this.

"We also have a thriving and long established inshore fisheries sector, with two of the UK's foremost brown crab processing factories in Stromness and Westray."

"Marine energy devices will undoubtedly have an impact on inshore fisheries, and will in some areas restrict the ability of fishermen to work historic grounds."

"By taking a pro-active role with regard to sustainable fisheries management and practices, we hope this project will demonstrate that the industries can work together."

College is **growing green** with energy grass

A grass usually sown as cover for game birds is showing promise as a potential fuel for the future.

Reed canary grass has impressed experts at Orkney College UHI's Agronomy Institute with its impressive growth during trials to assess its energy potential.

Standing 6ft tall when harvested, the aim is to assess whether it could be grown commercially by farmers, at the very least as an abundant source of straw.

"We're evaluating its potential as an energy crop and we're very encouraged by the results so far from our trial plots," said Geoff Sellers, the research fellow at the institute.

The groundbreaking initiative is part of the European PELLETtime project, which is investigating the practicalities of growing plants as a source of renewable energy.

Spanning Scotland, Sweden, Finland and Iceland, the goal is to find the plants best suited once harvested for conversion into small pellets used in boilers for hot water and heating.

Three reed canary grass varieties sourced from Finland, Sweden and the UK are being grown in Orkney by the Agronomy Institute, which is running a further trial in Shetland as well.

The institute is also conducting the biggest biomass investigation of its kind in the Northern Isles, with 13 varieties of willow under cultivation in a comprehensive study of their potential as a source of sustainable energy.

"We feel willow has a strong future in Orkney as an energy crop," said Dr Sellers. "We are looking at a number of potential markets, some on a commercial scale, others based around individual homes."

Harvested after three years' growth, the willow is stacked in bundles and dried in the wind for between three to six months.

During this time the moisture content drops from 50-60 per cent to under 30 per cent – and the wood is ready to be burnt.

Fay McKenzie, the post graduate student involved in the willow trials, will publish her results next year of the varieties best suited to Orkney conditions.

With some producing more than three metres of growth before being coppiced, there is already strong interest from people interested in growing their own fuel.

It is estimated that a one hectare (2.5 acre) plot of willows could provide sufficient wood for the heat and hot water needs of an individual home.

showing promise as a potential fuel for the future

Other potential uses for short rotation coppiced willow were investigated during a fact-finding visit to Northern Ireland, where the crop is grown widely on a commercial scale.

A return visit will be made later this year, when Dr Alistair McCracken from the Belfast-based Agri-Food and Biosciences Institute (AFBI) will talk at the Orkney Science Festival about the province's biomass experiences.

Part of Fay's research involves assessing the impact of growing willow on Orkney's biodiversity. This year she has found evidence that Orkney voles are present in considerable numbers at the institute's willow plantations.

"The willow crop is teeming with voles," she added. "And as a result we often see birds of prey hunting overhead when we're working there."



Student Amélie Viard with the reed canary grass grown by the Agronomy Institute.

Pellet pioneers welcome new heat incentive

A new Government support scheme is expected to bring a big increase in the number of people using wood pellets to heat their homes in Orkney.

The islands' pellet pioneers reckon that wood-fired heating is currently competitive with oil – with the added advantage that the fuel is from a sustainable source.

But the Renewable Heat Incentive initiative is due to be introduced in 2011 – with the proposal that owners of a typical three-bedroom house should be given an annual payment of around £1200 for 15 years if they use wood pellets for heating.

"Those of us already using pellets are delighted with the results," said Richard Gauld, from Orkney Sustainable Energy, who set up a demonstration

project at his family's home in Stromness.

"We've just come through the coldest winter in living memory and we've all been warm and cosy in our homes.

"There's the extra satisfaction of using a renewable source of fuel – and the new incentive scheme will encourage a lot more people to switch to wood pellets as an affordable alternative to oil."

A 15kW Woodpecker boiler installed in the garage is running the central heating – and providing hot water – at Mike and Linda Girvan's home in Kirkwall.

"It's a simple system," Mr Girvan said. "Every morning you pop in that day's supply of pellets and then the boiler virtually runs itself."

The pellets are brought to Orkney from the

Scottish mainland 20 tonnes at a time.

Customers like the Girvans pay around £240 a tonne, and for a large four-bedroom old house, need around seven tonnes a year to run the system.

The couple, who are involved in a wind farm project in the Highlands (see page 4), are pleased they took the decision to replace their old oil-fired heating system with their new wood-powered boiler.

"As we're involved with renewable energy we felt we should use a sustainable source of fuel for our heating and hot water," Mr Girvan added.

"The wood pellet boiler is very controllable and very satisfying to use. The new Renewable Heat Incentive will mean we have very low fuel costs for years ahead as well."

Winds of change bring top award for Westray

Spinning in the breeze, Westray's new wind turbine stands as a monument to hard work – and a symbol of future prosperity for this outlying community.

The machine will eventually deliver an annual income of around £200,000 for its owners, the islands' 600 or so residents.

This is the first time in Scotland that a community has come together to install a brand new, commercial-scale wind turbine.

The project helped earn Westray Development Trust the award for the best community initiative at the Scottish Green Energy Awards – and will serve as a blue print for similar ventures in Orkney and beyond.

"From first concept to getting it up and running has taken six years. It's been quite an effort by the volunteers involved," said David Stephenson, chairman of Westray Renewable Energy, the company set up by the development trust to manage the project.

"From the start community involvement has been crucial to the success of the project. Before going for planning permission people were advised on how to object if they wanted to.

"In the event there were no objections. That doesn't mean that everyone in the island likes big wind turbines. But it does mean that

there's widespread support for a turbine that puts a substantial income back into the local community."

In all, the project cost around £1.6 million, which included £761,000 secured from the Big Lottery fund.

"It's been a hugely complex process with lots of obstacles to overcome," said Mr Stephenson. "It's involved a huge amount of hard work. But it's amazing what happens when a community like Westray puts its heart into a project like this."

Islanders will now be consulted again, this time on the best ways to use the income from the machine to boost the prosperity of their community.

"Our turbine has the potential to make a real difference – to have a hugely positive impact on life in Westray," he added.

"It is already a landmark for the island. We've had a lot of encouraging comments from people here who think it looks fine and are enjoying seeing it turning in the wind.

"We're also aware that this is the first project of its kind in Scotland and, with that in mind, we're helping Community Energy Scotland to put together a tool kit – based on our experiences – that should help other communities get similar initiatives off the ground."



Westray's new turbine with Pierowall in the background.

Islanders join forces for Lottery windfall

Six islands will generate substantial incomes from commercial-scale wind turbines after securing almost £1.75 million in Lottery funding.

Development trusts serving Shapinsay, Hoy, Stronsay and the three-island group of Rousay, Egilsay and Wyre were praised for their willingness to work together to turn community aspiration into reality.

By sharing a project management team they saved £160,000 in development costs a moved hailed by the Big Lottery fund as an example of best practice in the field.

Once built, each of the four 900 kilowatt (kW) turbines will be connected to the National Grid and produce a vital income stream to be used for the benefit of the communities involved.

The development trusts each aim to build community trust funds of between £2 million and £2.7 million over the next 20 years.

Anne Grieve, from Rousay, Egilsay and Wyre Development Trust, said: "We can use our fund to secure the future of our

small but ambitious three-island community.

"Not only will we be reducing our environmental impact by generating green electricity, we have plans to use some of the money earned to improve public transport and the energy-efficiency of our housing stock."

Terry Thomson, from the Hoy Development Trust, said: "We can look forward to a more sustainable and confident future backed by this great community asset."

"Turbine income will support hard-working voluntary groups across the age range, while the renewable power generated will easily match the islands' electricity use."

Sheila Garson, from Shapinsay Development Trust, said the funds generated would sustain the community on many fronts.

"The challenges we face in taking forward the turbine and subsequent projects will ensure that our most valued community asset, our people, will grow along with the financial assets the wind generator will deliver for us," she

added.

Tony Withers, from Stronsay Development Trust, said: "Our small island community has been identified as fragile and this display of confidence in us will strengthen Stronsay in many ways."

"The long term legacy will result in the implementation of projects designed to improve our economic and social life. It will also show other investors that we are serious about securing our long term sustainability."

The four turbine projects will share £1.74 million in Lottery funding.

Alison Magee, who chairs the Big Lottery Fund Scotland, said: "These awards will have such a positive impact for some of the most remote communities in Britain."

"Six separate islands will reap the benefits of substantial community funds over the next two decades through wind power. This money will make a big difference to people's lives for years to come and I wish them the very best of luck as they take these projects forward."

Island turbine leads the field

Orkney came out on top in a year-long study of the best locations in the UK for small-scale wind turbines.

During field trials by the Energy Saving Trust, the machine that performed best was on the remote island of North Ronaldsay.

The 6 kilowatt (kW) turbine is mounted on a pole near the island's lighthouse and provides power for the accommodation block where the keepers once lived.

This is being converted by the North Ronaldsay Trust to provide holiday cottages and a visitor centre.

In the course of a year, the turbine generated almost 22,000 units of electricity, which equated to a £2,860 saving if electricity cost £0.13 per unit.

The Energy Saving Trust report said the small island represented "an almost perfect site" for the turbine.

With no obstructions and "very clean air" it was, in essence, an off-shore wind turbine mounted on land.

The turbine was supplied and installed by Orkney company Bryan J Rendall (Electrical) Ltd.

The Kirkwall-based business helped develop the machine in partnership with French company Eoltec.

In all, the survey looked at 57 sites across the UK.

The observatory that migrated from Orkney to Shetland



Visitors can look forward to warm and comfortable surroundings on Fair Isle this summer after the delivery by sea of a new bird observatory.

The building is formed from 30 modules built in Orkney and then shipped north ready for assembly in the remote Shetland community.

Kirkwall company Andrew H Wilson (AHW), which constructed the modules at its Hatston factory, incorporated many energy saving measures to reduce running costs and minimise the observatory's carbon footprint.

These include heat recovery systems and high levels of insulation.

The company, together with lead designers Synergie Scotland, is pleased with the outcome – high-quality, environmentally friendly accommodation for visitors and for scientists and students conducting long-term research on Fair Isle's migratory birds.

"For AHW, this was an opportunity to take techniques developed and used in Orkney to another level," said Synergie Scotland managing director Ian MacGillivray.

"This system could be used again to ship eco-friendly buildings in modular form to other remote locations on islands or the mainland. AHW is leading the field in terms of innovation – and people in Orkney should be very proud of that."

Observatory warden Deryk Shaw added: "Watching the new observatory being slotted together, as if made from Lego, has been amazing to watch.

"It's a very exciting project – and it's going to be a fabulous building."

The observatory is due to open in June.

Getting to grips with the grid

Securing suitable grid connections is a core requirement for any renewables project.

Over the last decade an Orkney company has made grid issues a key focus of its work.

Aquatera has engaged on numerous occasions with the National Grid, Scottish Hydro Electric Transmission Limited (SHTL), Ofgem and the Scottish and Westminster Governments.

It has also provided grid connection advice and plans to a number of technology and project developers as well as the local transmission network operators.

information – the best way to provide enduring grid connections.

Grid planning provides a showcase for a number of the systems the company has developed over the years, including resource assessment packages, spatial planning tools, landscape visualisation, and core impact assessment methods.

This integrated toolbox of resources is being applied to the design and permitting of a new HVDC connection for Caithness, incorporating an offshore hub platform and related onshore infrastructure for SHTL.

This work follows on from an earlier study which considered connections between Orkney and Caithness.

It further develops an integrated plan that will hopefully provide enough connectivity to export the 1.2 gigawatts (GW) of marine capacity announced in the recent Crown Estate leasing round, along with planned onshore and offshore wind capacity in the region.

Aquatera managing director Gareth Davies said: "The Orkney and Caithness environment is highly prized, widely used and technically challenging.

"Threading grid infrastructure through such environments requires effort, care, innovation and understanding. This has been a key driver for us to develop state of the art tools and approaches to support the process."

He believes an important benefit of this approach is that people with perhaps different perspectives on grid issues are able to start from one common point of understanding – something that will hopefully lead to better overall decision making.

Islands bid for affordable warmth

Islanders in three communities can look forward to warmer homes and smaller bills thanks to an innovative energy saving project.

The Rousay, Egilsay and Wyre Development Trust attracted just under £40,000 from Scotland's Climate Challenge Fund for its affordable warmth project.

It meant that homes across the three islands could be given a comprehensive energy audit – and surveyed using a special thermal imaging camera that reveals where heat is being lost.

Working with the trust, the Orkney Energy Agency first asked islanders to fill in a questionnaire about their homes and their energy consumption.

There was a high response rate, with over four fifths of those who took part spending more than 10 per cent of their income on heating their properties – and almost all considering that their home energy efficiency could be improved.

Staff from the agency then visited 100 homes, providing each with a detailed energy report and images from the high-tech camera.

"These audits will be fundamental in helping us gain a more affordable warmth, by showing where the heat is being lost from each of our individual homes and what we can do to make them more energy efficient," said Michelle Koster, the islands' community powerdown officer.

"We can save energy and money at the same time as reducing our three islands' carbon footprint, and that is what powerdown is all about – literally turning down the power."

The agency team also advised on energy efficiency grant funding and assistance packages that could be available to

residents. With high fuel costs – and many old, costly-to-heat properties across the three communities – the affordable warmth project is seen as vital in giving islanders a more sustainable future.

"It's been really rewarding and it should mean that a lot of people – and especially the more vulnerable members of our communities – feel a lot warmer in their homes next winter," she added.

This has been a busy year for the Orkney Energy Agency.

The team has visited 142 homes in Orkney and Shetland to advise on whether people qualify for free measures under the Scottish Government's Energy Assistance Package to make their homes more comfortable and cheaper to heat.

Some 269 properties across Orkney have been assessed for the Energy Performance Certificates landlords or people selling homes are required to provide for potential tenants or buyers.

Apart from in Rousay, Egilsay and Wyre, the thermal imaging camera has been used at another 65 properties where owners are looking to reduce drafts and heat loss.

Just under 60 houses have been assessed for the new Orkney Action for Warmer Homes grant, while the plans for 37 new homes have been assessed and given a rating for their energy efficiency.

"A lot of the surveys we're involved with can be quite complex," said energy adviser Jill Spence. "People like the fact that we are based in Orkney and that we take the time to explain what we're looking at and what we find."

"It's very satisfying when we can help people – particularly if it means that their homes end up warmer and they save on their fuel bills."

Islands to offer unique marine energy course

A new postgraduate course will provide students with a springboard to a career in marine renewables – and deliver a world first for Orkney.

The MSc qualification is being developed by the International Centre for Island Technology (ICIT), part of Heriot-Watt University's prestigious Institute of Petroleum Engineering, with the first student intake planned for 2011.

"Orkney is seen internationally as a major hub for wave and tidal energy development," said ICIT lecturer Sandy Kerr.

"With that global focus on the islands it makes perfect sense to build a new marine renewables course in a community at the heart of this emerging industry. As far as we're aware, it'll be the first of its kind to be offered anywhere."

The aim is to provide students with a wide understanding of all aspects of the marine energy sector, at a university campus that prides itself on being a "living laboratory".

"They'll learn about the technologies, the economics of financing wave and tidal projects, and the environment the machines operate in," said Dr Kerr. "We'll look as well at Government energy policies, the marine planning system and the regulatory regime."

"Rather than having a narrow focus, our philosophy is to offer a rounded approach so the students end up with a breadth of skills and knowledge that'll make them indispensable in the marine



Flying high ... former ICIT student Adair Elder gets a bird's eye view of the North Hoyle offshore wind farm in Wales.

renewables jobs market."

ICIT, Heriot-Watt University's campus in Stromness, is based in the same building as EMEC, the European Marine Energy Centre, which operates test sites for prototype wave and tidal energy devices in Orkney waters.

"As well as wonderful wave, tidal and wind resources, we have world class facilities on our door step," added Dr Kerr.

"Orkney is home to some cutting edge research and development work in the marine energy field, as well as an impressive array of renewables companies and consultants happy to share their expertise."

"Being part of a small community, our students soon find they can simply knock on doors and ask for the help

and information they need as they develop projects of real significance to the professionals they're working with."

ICIT was first established 20 years ago and also offers MSc qualifications in Renewable Energy Development and Marine Resource Management.

It is also the base for the MREDS (Marine Renewable Energy Development in Scotland) research programme, a groundbreaking initiative looking at ways to maximise efforts to harness power from the sea.

The centre has an impressive track record, with many former students stepping straight into jobs in the renewable energy sector – or going on to establish their own renewables companies.

Going to sea with safety in mind

A new course promoting safety at sea is on offer to the marine renewables sector in Orkney.

Developed in partnership with the European Marine Energy Centre (EMEC), with funding from power company npower Juice, the course is delivered by Orkney College UHI's Maritime Studies Department in Stromness.

The aim is to provide people with the knowledge they require to work safely on boats involved in wave and tidal energy projects – particularly those deploying equipment on the seabed.

"With a growing number of marine energy companies coming to Orkney, we felt it was important to offer a course of this kind," said Issy Grieve, head of the college's commerce and industry division.

"They and the local firms supporting them are working in often challenging conditions, so it's vital to promote safety – particularly as some of the visiting staff may have only limited experience at sea."

Over the course of four days, the course covers elementary first aid, personal survival techniques – including the use of life rafts during a session at Stromness Swimming Pool – as well as personal safety and social responsibilities.

The final session looks at vessel stability, navigation and health and safety – and gives participants the chance to experience how equipment is deployed from a boat at sea.

During the pilot course – the first of its kind to be offered by the Maritime Studies Department – an acoustic doppler current profiler used to gather data from the marine environment was lowered to the seabed from a locally-based dive boat.

"It gave those involved a practical opportunity to see the techniques used in finding the right location for deployment, in ensuring the equipment remains in place on the seabed, and in finding it again for recovery," said department head, Captain Mohan Samant.

"As with the rest of the course, the key message was all about conducting such operations with safety always in mind."

IF YOU GO DOWN TO THE BEACH TODAY ... you're shore to find something strange!

Looking like creel floats fixed to the rocks, these are Terobuoys – scientific measuring equipment used to assess the coastal impact of wave energy.

The devices are the brainchild of Bob Beharie, who designed and built the Terobuoys for just a few pounds as part of his PhD research at the International Centre for Island Technology (ICIT) in Stromness.

His aim is to assess the possible ecological effects when arrays of wave energy converters are stationed in local waters.

The Terobuoys, which include some recycled materials, are a cost effective way to monitor wave energy levels along Orkney's shoreline, with Mr Beharie checking the devices at sites around the coast at low water during spring tides.

"I'm going to have to access them all every two weeks come rain or shine," he said. "It's certainly going to be a challenge."

As part of the same study, ICIT researcher Andrew Want is undertaking ecological fieldwork surveys in and around the Terobuoy sites.

This involves monitoring of several important shoreline species, including limpets, barnacles, marine snails, and rare polar seaweed.

Scientists currently have to estimate how much wave action there is at a particular site by studying charts and finding what species are evident.

The measurements obtained from the Terobuoys will allow a much more accurate assessment. They could also be used to assess any possible impact that wave energy converter arrays might have on the shoreline ecology.

PICTURE: Bob Beharie with a Terobuoy at Billia Croo.

