



Bringing wave power to the Faroe Islands

A GROUNDBREAKING venture looks set to confirm Scotland's reputation as the world leader in wave energy with the development of a wave power station built into a tunnel on a cliff face.

Inverness-based Wavegen has joined forces with SEV, the Faroese electricity company, to bring wave energy to the Faroe Islands, a self-governing region of the Kingdom of Denmark situated in the Atlantic, north west of Scotland and halfway between Iceland and Norway.

Following an initial feasibility study, the Boards of both companies have formed a joint venture company to oversee the initial design and engineering phase of the project.

The next phase will see the construction of a pre-commercial wave power plant using a series of Wavegen's air turbine power generation modules. This will form the blueprint for wave power stations in similar locations both in the Faroes and other parts of the world.

George Lane, Wavegen's Chairman, said: "We're delighted this venture has taken off as it brings together world-class expertise in wave energy from Scotland and the tunnelling experience of the Faroese. The combination of these two technologies is a logical and powerful next step in the commercialisation of Wavegen's shoreline wave energy converters."

The Faroese device will be based on the existing oscillating water column technology utilised in the Islay plant. The key innovative feature will be the use of tunnels cut into the cliffs on the shoreline to form the chamber which captures the energy.

The new design offers a novel and complementary approach to shoreline devices that is completely unobtrusive and well protected.

The Faroese currently meet their electricity needs through a mixture of diesel-powered generators, hydro electricity and wind power.

They are keen to develop other green energy sources but face particular challenges with on-shore wave power due to the high cliffs which surround the islands.

Reducing diesel imports to Pacific

PEOPLE in the French Polynesian islands could soon have their own wave power stations in a move that will reduce both their impact on the environment and consumption of fossil fuels.

French Polynesia is the largest territory in the Pacific Ocean. Covering around five million km², half the area of Europe, it comprises five archipelagos with 118 islands and atolls.

Many of the small isolated islands have no way of producing energy and have to rely on imported diesel. But the combination of a good wave resource and low consumption make the area well suited to shoreline wave energy plants.

One company in the vast territory has been working to increase the use of renewable energy.

SEDEP is partnering Wavegen to provide energy to some of the more isolated communities. SEDEP, a multi-disciplined engineering and design company, has built

around 42 MW of hydro — this produces around 45 per cent of Tahiti's power.

In 2003, Wavegen and SEDEP embarked on a study that has concluded that shoreline wave energy stations in French Polynesia are indeed viable.

With the help of ADEME, the French Environment and Energy Management Agency, SEDEP and Wavegen have completed the Wave Resource Assessment and Feasibility Study which includes initial site selection for a pilot plant.

"I'm very excited by this Project. Many of the islands in French Polynesia are either short of power or currently rely on diesel. The Limpet shoreline wave power generator can help these islands by providing a simple method of producing sustainable energy and reducing the reliance on imported diesel fuel.

"That's good for the environment and good for the economy," said David Langston, Business Development Manager.

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WaveNews

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Men at the top:

Jimmy Ferguson (right), the new Managing Director of Wavegen, with George Lane — now Chairman of the company. The Inverness firm has become a market leader in the wave energy market. Ferguson has a background in civil engineering and brings an eclectic and distinguished mix of project management, business development and engineering to his role at Wavegen. Allan Thomson, founder and previous chairman, continues as a Non-Executive Director of the company.



New man at helm of leading wave energy firm

On the crest of a wave

THE new man taking the helm at Inverness-based wave energy market leader, Wavegen can point to a long track record of support for renewable energy, having campaigned for a commercial wind farm in Lewis 20 years ago.

Well-travelled and commercially astute, Jimmy Ferguson (43), the new Managing Director of Wavegen, wants to re-focus the efforts of the company which has been the driving force behind the UK's first commercial wave power station — turning research and development into a saleable reality.

"Up until now, Wavegen has been a company focussed on research and development," explains Stornoway-born Ferguson. "The wave energy industry has now got to move forward and evolve by starting to deliver products which will win commercial buy-in from the power and utility companies.

"Power from the waves and tides has to be commercially attractive. There are fantastic opportunities ahead, and Wavegen, despite being quite a young company, is already at the front end of technology development. We now need to support and fine tune our proven expertise and work as an industry to drive the market for wave energy forward."

Ferguson takes over from George Lane who has been interim Managing Director since January 2003.

George Lane, now Wavegen Chairman, welcomed Mr Ferguson's appointment, saying: "Jimmy has long supported renewable energy and this enthusiasm, combined with exceptional engineering and business experience, made him the perfect man for the job."

Ferguson's civil engineering-based background brings an eclectic and distinguished mix of project management, business development and engineering to the Wavegen post.

A graduate in Civil Engineering from the University of Paisley, he studied Metallurgy and Welding Technology at Cranfield and gained an MBA from The Robert Gordon

University. Starting work as a graduate trainee with Wimpey, his career has taken him around the world, and along the cutting edge of offshore technology and design, working with Lewis Offshore, Heerema, Brown & Root, AMEC, BARMAC and KBR/Halliburton.

The move back into his early passion for renewable energy began with his work on the Scroby Sands Offshore Wind Farm in Norfolk.

Ferguson also sees partnership working with the education sector as crucial to the ongoing development of wave power projects — and getting the right type of graduates into such a specialised area.

"There is a shortage of technical specialists who understand the work we do," he explains. "We are dependant on working and developing technology with the education sector as well as the rest of the industry — and that's why we have recently made our wavelab facilities available so a wider cross-section of marine-based expertise can benefit from our state-of-the-art facilities.

Jimmy Ferguson, who lives in Nairn with his wife Corinne and three children, took up his post as Managing Director of Wavegen on Monday 3 May.

'Wavegen is at the front end of technology development.'

Let's hear it for the buoy

WAVEGEN'S directional wave rider buoy is currently moored 10km off the west coast off Lewis where it has been located for the past two years, measuring wave data, throughout the winter storms.

A maximum wave of 50ft was recorded on the 15th January 2003. The buoy provides valuable site-specific wave data, which can be used to aid the design of wave power systems and estimate resource levels. The buoy records wave height, wave period and direction. Data recorded by the buoy is sent to a land base in the village of Valtos, Uig, Lewis via a radio link. Measured wave data has been simulated in the wave tank to assess model performance and response in "real seas".

Wavegen has been operating waverider buoys for over 12 years. Site-specific wave data provides the marine energy developer with important information. In terms of field developments, access to "real site data" will benefit the planning of marine operations, while enabling the assessment of plant uptime and accessibility. A continued programme of on-site monitoring will allow the developer to effectively optimise field-operating costs and reduce plant downtime.



● For more information on Wavegen's wave monitoring services, please contact: ben.yeats@wavegen.com



All at sea:
A row of eight paddles lie at the heart of Wavegen's wave tank. They can produce regular, irregular and multi-directional seas.

Stepping stone to the ocean . . .

WAVEGEN is best known for its core business: marine renewable energy. The company's new strategy includes making its resources and expertise available to the broader marine industry, while continuing its commitment

to wave energy development

"Ultimately all marine developers face the same issues and we have some of the industry's latest data collection equipment, software and modelling facilities. Wavegen's facilities are supported by a skilled team of naval architects and engineers who have designed and installed wave plant to operate in the severest of environments," said Ben Yeats, Project Manager.

Specialist areas of R&D include the operation and survivability of coastal, nearshore and floating structures. "Our facilities can be used for a broad range of applications across the industry sector, from modelling scour on an offshore wind farm to measuring mooring loads on a floating structure," explained Mr Yeats.

Wavegen has been operating its own wave tanks for over 12 years. At the latest facility a row of eight paddles lie at the heart of the wave tank, which can produce regular, irregular and multi-directional seas. The wave making paddles have a novel force feedback mechanism which senses any reflections

back from the beach or model, ensuring highly repeatable and stable wave conditions. The wave tank is complimented by Wavegen's wave monitoring equipment, turbine test rig and a suite of industry standard software.

Together with physical modelling, numerical modelling is an important service offered by Wavegen. Numerical modelling software has been developed in-house to enhance the full range of industry standard software packages. Specialised numerical analysis includes turbine optimisation, mooring and structural analysis. A key component of software development is the cross validation of results with physical models in the wave tank.

Jimmy Ferguson, Managing Director, explained Wavegen's new service strategy: "To allow the industry to develop with confidence, the best knowledge and information should be available to any party

involved in marine project development. "We aspire to developing further our capability and expertise to enable us to deliver a state of the art service to industry. Also we will help and support our peers in the development of the wave, wind, current and tidal sectors to reduce design, execution and performance risk by modelling and predicting outcomes with greater assurance."

'Ultimately all marine developers face the same issues and we have some of the industry's latest data collection equipment, software and modelling facilities.'

'We aspire to developing further our capability and expertise to enable us to deliver a state of the art service to industry.'

Howden to build 'Breakwater' turbine

WAVEGEN'S newly designed small turbine is to be built by Glasgow based market leader in fan and compressor systems, Howden Industrial. This supply agreement signifies a massive leap forward in wave energy — mass production is just around the corner for Wavegen.

Tom Heath, Wavegen's Principal Engineer, explains: "Our small turbine was born out of a desire to build a turbo generator system for mass production that we could apply to existing or proposed marine structures, such as breakwaters and oil related marine installations."

A number of possible projects have been identified, particularly in Spanish territorial waters, with discussions now progressing with potential clients. A number of these breakwater projects involve the placement of concrete caissons in deep-water locations exposed to a long ocean fetch. Wavegen has performed tank testing and even without significant modifications to a typical breakwater the energy capture potential is very promising.

Both Howden and Wavegen believe this agreement makes them the first in wave energy to move from demonstration models to mass



manufacturing. Stephen Rogers, Marketing Manager at Howden, said: "Howden is pleased that its expertise in air and gas handling, built up over the last 150 years, has been called upon to help develop and manufacture Wavegen's innovative air turbine. With its potential to harness a benign energy resource the air turbine is well placed to become another useful power generation technology."

The Islay LIMPET facility will be utilised as a platform for proving runs on the new turbine during 2004.

Upgrading 'world-first' device in wave power

WAVEGEN is moving closer to making wave energy a commercial reality through the knowledge gained from more than three years of operating its LIMPET wave energy plant.

LIMPET, the world's first commercial scale grid connected wave power device, was originally constructed in 2000 as a research tool in partnership with Queens University Belfast. Over the years data collected from the site off the coast of Islay has allowed Wavegen to continually upgrade LIMPET to increase efficiency and lower costs. The most dramatic changes will come this summer when the turbine will be reconfigured to take the industry significantly closer to commercial production.

Graeme Mackie, Wavegen's Engineering Director, explains the lessons the company has learnt: "Our research so far has confirmed to us that the OWC wave energy system works. But it has also shown us ways in which we can improve the efficiency of the LIMPET and reduce the cost of producing power. We are now confident that OWC technology will be commercially viable in the very near future. We know that the turbine on LIMPET is not ideally sized for the location."

To increase efficiency Wavegen is therefore scaling down from two 250kW counter-rotating turbines to just one. "By retooling with a new turbine and single generator we are confirming that we can use the measured performance to apply the same device to future projects such as the Faroese joint venture. The use of one rather than two turbines with greater efficiency also drives down costs."

The new version of LIMPET will become active during the summer months of this year, when Wavegen is confident of improving its current 30 per cent efficiency. "As well as using a improved turbine for power generation we are benefiting from a strengthened grid and are improving air flow with a modified acoustic attenuator, which will increase turbine efficiency," explained Mr Mackie.

With years of research based on real data under its belt,

Wavegen is confident it is now just a few steps from commercialisation. "We have developed mathematical models to predict the conversion of wave power to electricity on Islay. The results have demonstrated such promise that we are committed to retooling the LIMPET plant. I am absolutely confident that, as a result of the lessons learnt on Islay, we will be the first to move from demonstration plants to mass manufacturing." During 2004 the Islay facility will also be used as a live test bed for the 'Breakwater' turbine being developed by Wavegen.

