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Technology Feature: Delta Stream Tidal Energy

About Us

GreenTechEurope.com (GTE) is a production of London Research International (LRI), a global research and consulting firm with expertise in the energy, environment, and chemical sectors. GTE is a video-based technology platform showcasing innovative technologies from Europe.

The GTE Newsletter

Our interview-based newsletter features innovative energy technologies and businesses from around the world.

Announcements

GreenTechEurope.com has been uploading footage shot over the summer at the Sustainability Live and Global Offshore Wind exhibitions. Go and check out what makes the companies we interviewed and their technologies unique.

Featuring: Tidal Energy Ltd

In the latest edition of our newsletter, LRI interviewed Martin Murphy, Managing Director at Tidal Energy Ltd. DeltaStream is one of the leading devices in the UK's tidal energy sector. A prototype is due for installation in autumn 2013, which will pave the way for pre-commercial demonstration projects in 2015. Having already secured initial investment from Eco2 Ltd, Tidal Energy Ltd is looking for further investment of £10m from a corporate partner to help fund the prototype and thoroughly demonstrate proof of concept.

Who is Tidal Energy Ltd?

The DeltaStream concept was conceived by Richard Ayre, a Marine Engineer with over 30 years experience managing marine civil projects mainly within Pembrokeshire. Founded in Wales, and originally called Tidal Hydraulic Generators, the company was renamed Tidal Energy Ltd in 2007. The management team is a mix of marine engineering and renewable energy experts. Their aim is to develop the DeltaStream technology to commercial level and generate clean, economical and sustainable tidal stream power with ease and efficiency.

Tidal Energy Ltd is a privately owned company with a number of independent shareholders. The main funder and driving force behind the company is Eco2 Ltd, Wales' largest and most experienced renewable energy project developer.

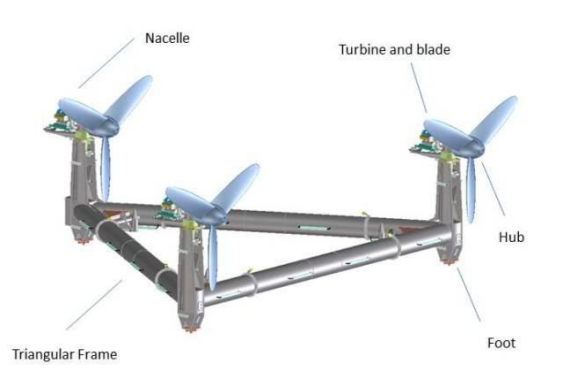

Image courtesy of Tidal Energy Ltd

The Technology

DeltaStream extracts energy from the tidal stream (the flow of water caused by the ebb and flood of the tide) using a turbine. This is similar in principle to the way that wind turbines extract energy from the movement of air.

DeltaStream is primarily designed to be located on the seabed in areas with high tidal stream flows, but could also be installed in suitable rivers and estuaries. When mounted in tidal areas it generates power during both the flow and ebb of the tide. AC power would be brought onshore from the DeltaStream unit through a submarine cable to an onshore sub station.

The DeltaStream unit has the following main features:

- Triangular steel main base frame,
- Three independent, water turbine generators mounted horizontally and enclosed in Fibre Reinforced Plastic (FRP) nacelles,
- Automated hydraulic yaw system, which controls the orientation of the turbine generators in relation to the tidal flow,
- Electrical and control equipment mounted on the main base frame,
- A power conditioning centre located onshore,
- Submarine cable to connect the DeltaStream unit to the power conversion centre.

Competitive Edge

What makes DeltaStream different?

Martin Murphy explains that many of the complexities have been designed out of DeltaStream technology to improve its reliability.

DeltaStream's patented turbine design has limited the thrust that is produced as it rotates (think of the same force that propels a propeller plane). By minimising this force, the structure on which the turbines are located is considerably lighter and does not require any drilling or piling to secure it to the bed. In the marine environment lightness equates to cost-effectiveness during construction, installation and O&M, simply because lighter objects are easier to manoeuvre. Martin Murphy suggests that other tidal technologies on the market are heavier per MW installed, which will ultimately lead to DeltaStream having a commercial advantage through its superior financial performance.

Operating in the near-shore environment also gives the DeltaStream the added advantage of convenience of access to contractors performing O&M, thereby reducing overall project costs. It also means that the electrical equipment required to export electricity to the grid can be sited on land, again providing greater convenience for O&M.

As a result of DeltaStream using turbine technology, Tidal Energy Ltd has been able to use the learning process from the wind industry to help develop the technology. Many of the components for DeltaStream have already been proven in the wind (or another) industry, and so Tidal Energy can either tap into a mass market for those components or amend a pre-existing design to suit their own needs. For example the turbine gear head is a marinised version of a wind turbine, and the generator drive train has been adapted from an application in deep mine pumping.

Timeline

2001 – Marine engineer, Richard Ayre, conceives idea and early version of DeltaStream unit is tested on a small in the Cleddau Estuary off Milford Haven.

2007 - Tidal Hydraulic Generators Ltd is renamed as Tidal Energy Ltd.

2009-12 – Testing of a scaled down version of DeltaStream in France to validate the design for a prototype model.

Autumn 2013 – A 400kW Single nacelle prototype model will be installed and tested, to prove the concept in the tidal environment. This will be called the Ramsey Project, based in Pembrokeshire.

2014-15 – Full-size 1.2MW demonstration model is expected to show commercial scale viability of technology.

2017 – 10MW site (already secured from the crown estate) will be developed into a commercial-scale demonstration tidal energy park.

Markets and Regions

Martin Murphy envisages Tidal Energy Ltd targeting the tidal resources around the coastline of west Wales. This will be realised initially through the 2013 Ramsey project and then lead to the installation of further DeltaStream units in appropriate UK locations as the technology rolls out. The UK government projects that the tidal energy industry will have 300MW of installed capacity by 2020, and Deltastream is expected to be a significant contributor to this.

Image courtesy of Tidal Energy Ltd

Martin Murphy expects Tidal Energy Ltd will have around 25 DeltaStream units Installed by 2020, which will make up 10% of tidal energy capacity in the UK.

In Search of Investment

Martin Murphy confirms that Tidal Energy Ltd is looking for a corporate partner who can provide the investment required to commercialise DeltaStream. Japanese corporates are seen as particularly well suited. They possess capabilities in design, production and device installation that are needed to take pre-commercial technologies to full-scale roll-out. **Investment of £10m** will fully fund the installation and operation of the Ramsey project, after which 2017's full commercial demonstration project will require further backing to secure the full commercialisation of the technology.

The Business Case for DeltaStream

One of the main criticisms of the renewable technologies currently dominating the market is that their supply is intermittent.

The same cannot be said of tidal energy, which is regular, predictable and has relatively little down-time between incoming and outgoing tidal streams. This offers the grid a near continuous supply of renewable energy, a combination that is usually mutually exclusive in UK renewable energy.

Marine energy development companies perceive the cost of offshore wind as the benchmark to achieve competitiveness in the renewable energy industry. Martin Murphy believes that DeltaStream technology will make significant progress down the cost curve to become cost competitive with offshore wind by 2020. This assertion is based on the conservative assumption - used in Tidal Energy's financial projections - that tidal projects will receive the same policy support as offshore wind (currently 2 ROCs) in the latter part of the decade.

TIDAL ENERGY

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- Renewable UK Wave & Tidal 2013

27-28th February 2013 | London

Each year Renewable UK's events provide the UK wave & tidal energy industry with the opportunity to present the latest in research and development, technological innovations, policy, public opinion and any other aspect of the industry which may be topical.

Work with Tidal Energy Ltd

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