PELAMIS WAVE POWER P2 DEMONSTRATION AT EMEC

Name of person filing the form

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Project name: Pelamis Wave Power P2 Demonstration at EMEC

Project description
Project Developer: E. ON, Scottish Power Renewables

Technology type: Attenuating line absorber

*Resource: MHK (*wave)

Project scale: Two full-scale devices

Installed capacity (MW): 0.75 MW each (1.5 MW total)

Additional Description: The Pelamis WEC is a semi submerged, articulated structure composed of cylindrical sections linked by hinged joints. Motion from the waves is resisted by hydraulic rams, which pump high-pressured oil through a system of hydraulic motors via smoothing accumulators. The hydraulic motors drive electrical generators to form electricity. The device is moored to a fixed location but can weathervane to face incoming waves for maximum power generation. The joints used to connect each tubular section are configured to induce wave power from small sea states. The movement in the joints can be actively controlled to make use of the phenomenon of resonance, allowing generation to be maximized in small seas, and the machine response to be minimized in storms. Generated power is fed back to shore using standard subsea cables. The Pelamis is moored to the seabed using standard embedment anchors.

Project Website: http://www.pelamiswave.com/our-projects

Location: The Billia Croo wave test site is currently 2km off the Orkney coast at a depth of approximately 50m.

E.ON Coordinates: 58°58.906'N, 3°23.683'W

Scottish Power Renewable Coordinates: 58°58.586'N, 3°23.335'W

Process status: In 2004, Pelamis Wave Power (formerly Ocean Power Delivery) created a full scale WEC prototype for testing at the Orkney site of Billia Croo at EMEC. This Pelamis machine was the first WEC to supply electricity to the national grid from offshore wave power. After implementing design improvements to the prototype, Pelamis returned to the Orkney test site in 2007 in advance of deploying three P1 machines in Portugal in 2008. In 2010, E.ON UK began testing of the Pelamis P2 (2010 onwards), a second-generation device developed, manufactured, and operated by Pelamis Wave Power.

Launch Date: E.ON installed October 10th, 2010; Scottish Power Renewables installed May 19th, 2012

Licensing information: E.ON awarded a contract to Aquatera in 2008 to recommend a suitable location for the Pelamis device around the Pentland Firth Strategic area. The conclusion was based on spatial distribution of resources, infrastructure and planning constraints. Based on the following decisions, E.ON submitted a single application package to Marine Scotland's Licensing Operations Team for consents of relevant bodies (Marine Scotland, Section 36 consent under the Electricity Act 1989, Section 21 of the Marine (Scotland) Act 2010, Environmental impact assessment regulations) along with comments from the MRFG and from the public. E.ON was awarded two demonstration blocks. (Revised Text Coming soon…)

Environmental survey issues: The site at Orkney is home to seabirds, seals, cetaceans and basking sharks in the summer months; therefore the environment is crucial for the survival of these species. Currently EMEC, the European Marine Energy Centre is carrying out extensive observations on the effects the Pelamis WEC has on such species. The site currently observes and monitors any wildlife that inhabits the site; this enables a clear understanding of which species use the site. Surrounding noises that dominate the site are crashing waves and shipping activities. For a device to cause harm to surrounding ecology such as cetaceans, the device must exceed the natural soundscape. Hydraulic motors within the Pelamis device are considered to emit the most sound, but cooling fans may contribute to the frequencies emitted. The hydraulic motor produces discrete tones, and therefore will not exceed the natural frequencies of the ocean.

Environmental Website: www.pelamiswave.com/environmental-impact

Baseline and project effects studies: Pelamis Wave Power P2 Demonstration at EMEC				
General description	Studies conducted prior to deployment.			
Receptor	**Study description**	**Design and methods**	**Results**	**Status**
Physical environment	Impact of wave energy farms in the shoreline wave climate.	Prototypes where used to create the effect of wave extraction by wave farms.	Results show that energy extraction does not exceed 9.3%, 23% and 14% of the incident energy in the wave farms, respectively for January, July and October.	Completed (Portugal)
Acoustic environment	Underwater Noise Study. A desktop study of underwater noise has been carried out in support of the Scottish Executive's strategic environmental assessment for marine renewables.	A desk based study, which analyses the potential impact of device noises on receptors on the marine environment. The results have been compared to the expected ambient noise levels.	With Limited data, the report concludes there is no significant harm to the surrounding environment.	Completed (Orkney)
Benthos	A study to investigate the	Desk and field study.	Cable laying and anchoring will cause temporary and	Completed

	environmental impact of marine renewables.		minor disturbances to seabed habitats.	
Large vertebrates	Environmental assessment Orkney.	Desk and field study.	Under water noises from cables will be of no disturbance to cetaceans and pinnipeds. Seals are native to the Orkney site and are likely to be intrigued and habitat the Pelamis device over time.	Completed
Birds	Environmental assessment Orkney.	Desk and field study.	It is considered the shear presences of the device will deterrent avian.	Completed
Marine Uses / Users	Environmental assessment Orkney.	Desk and field study.	Trawling activities regular take place around the Orkney islands in depths of around 58m. It is recognized that during installation of the Pelamis device an increase of traffic was caused. However with a 500m-radius exclusion zone surround the device granted by the Scottish Government, therefore mitigating risk of collision.	Completed
Archaeological impact	Environmental assessment Orkney.	Desk and field study.	Orkney not considered for its archaeological heritage but is regarded for local culture. The greatest impact would be on unknown archaeology; though known archaeology artifacts are not at risk from works.	Completed
Reports or Papers	Carl Bro. (2002). Marine Energy Test Centre, Orkney Environmental Statement. *Marine Energy Test Centre*. 1 (36) (available at ftp://website:website@emec.ftpstream.com/Billia%20Croo%20ES%20(CarlBro)%202002.pdf)			
Research Projects	http://www.emec.org.uk/research/			

Monitoring and adaptive management: Pelamis Wave Power P2 Demonstration at EMEC				
General description	Post-license monitoring plans			
Receptor	**Study description**	**Design and methods**	**Results**	**Status**
Physical	Surface	To monitor specific interactions between	N/A	Ongoing

environment	Interactions with Wave Devices.	surface- piercing parts of devices and wildlife, using high magnification cameras.		
	Acoustic Characterization.	Orkney is home to cetaceans, which rely on echolocation for predation and communication. Underwater surveys are carried out to test the noise emitted from WEC compared.	N/A	Surveys ongoing
Reports or papers	N/A			
Research projects	• http://www.eon-uk.com/ • http://www.smi.ac.uk/			