# Sound of Islay Tidal Energy Project

## *Frequently Asked Questions*

## Summary

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| Developer: | ScottishPower Renewables | Size: | Ten 1MW tidal devices |
| Candidate Technology: | Hammerfest Strøm | Location: | Sound of Islay, Argyll, UK |
| Local Partner: | Islay Energy Trust | Timescale: | Installation 2013 |

### What does the project consist of?

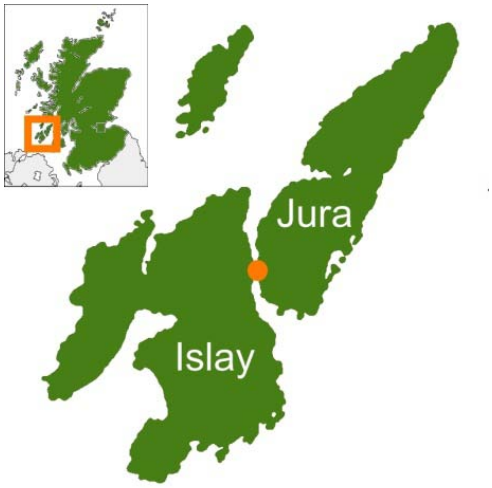
The proposal is for a demonstration tidal array of ten 1MW tidal devices to be placed in the Sound of Islay. The tidal devices convert the energy from the fast-flowing tidal stream into electricity. The tidal devices would be completely below the water and would not be visible after installation.

### When is the project planned for?

Following the completion of the Environmental Impact Assessment, an application for consent was submitted to Marine Scotland in July 2010. Consent was given by the Scottish Government in March 2011. Further testing is planned for a single device in Orkney in 2011 and if successful the ten devices for the Sound of Islay would be manufactured in 2012 and installed in 2013.

### Where will the tidal array be located?

The devices will be located in the Sound of Islay, just south of Port Askaig. It is most likely that they will be arranged in four rows in the area that is over 50m deep towards the Islay side of the Sound.




### How much electricity will the array generate?

The proposal is for ten 1MW tidal devices to be installed. If these operate as expected, the demonstration array will generate around 30GWh per year. This is equivalent to the annual electricity consumption of Islay or the electricity used by 5000 average UK homes.

## The Tidal Device

### What do the tidal devices look like?

This picture shows a computer generated image of the Hammerfest Strøm tidal device.

### How high are the tidal devices?

The base of the device is about 22 metres high to the hub and the blades are about 11.5 metres long. The total height from the seabed to the top of the blade tip is approximately 33.5 metres.

### What speed do the devices turn at?

During peak flow the blades will rotate at about 10 times per minute. The tip of the blade would therefore move at about 10 metres per second.

### Do the devices turn around to face into the tide?

No. Unlike wind turbines that rotate to face into the wind, the tidal devices do not turn to face into the tidal flow. Instead the individual blades of the tidal devices turn around to face the flow. Rotation of the whole device is not needed as unlike wind, the tidal flow is bidirectional.

### Who designed the tidal devices?

The devices are designed by Hammerfest Strøm AS who were the first company in the world to develop a tidal stream device and connect it to a national electricity grid.

### Where will the devices be manufactured?

It is hoped that the majority of the parts for the Sound of Islay project will be manufactured in Scotland. The sub-structure of the single 1MW device that will be tested in Orkney in 2011 will be manufactured by BiFab in Lewis.

### How robust are the devices?

A smaller (300kW) version of the tidal device was installed in Kvalsund, Norway in 2003. It operated successfully for almost four years before it was voluntarily taken out of the water for inspection. The inspection showed no major problems and the device was reinstalled in August 2009.

It is expected that the tidal devices in the Sound of Islay would be able to operate for at least five years without maintenance.

# Installation and Operation

## How will the devices be installed?

The exact installation procedure is still being designed but the prototype was installed from a large barge as shown in this picture taken during the reinstallation in August 2009 in Kvalsund, Norway.

## What keeps the devices in place?

The tidal devices are very heavy and will not need any additional fixing other than gravity.

## What is the layout of the devices?

The layout of the array is also still being determined. Computer modeling of the tidal flow will show the optimum distance between the devices. It's likely that the array will be made up of four rows of tidal devices.

## Will boats be able to sail above the tidal devices?

There is certainly enough clearance above the tidal array to allow even large vessels to pass above them. However, this is a new technology and a formal assessment and decision will be made by the Maritime and Coastguard Agency (MCA).

## How will the project affect fishing?

The tidal devices are a potential hazard to crab and lobster fishing in the direct area of the tidal array. Consultations have taken place with the fishermen and the impact of the project was part of the Environmental Impact Assessment (EIA) and the Navigational Safety Risk Assessment (NSRA) for the Maritime and Coastguard Agency (MCA).

## Will the tidal devices be visible?

No. The tidal devices are approximately 33.5 metres from the seabed to the blade tip but will be placed in 50 metres of water. This will give over 16.5 metres of clearance between the tip of the blades and the sea surface.

## Are the devices dangerous for sea-life?

The Environmental Impact Assessment studied the potential impacts to sea-life. This covered all aspects from physical movement to noise and electromagnetic interference. Based on other projects and the prototype Hammerfest device in Norway, it is not expected that there will be any impact. The blade rotation is relatively slow (about 10 times per minute) and we are fortunate that we can monitor the prototype tidal device in Norway to ascertain any potential impacts.

## Will barnacles and seaweed stick to the blades?

Special coatings will be used on the blades to prevent the build up of sea life.

# Electricity

## How much electricity will the project generate?

The proposal is for ten 1MW tidal devices to be installed. As with all energy equipment the power rating is the maximum power level that the device can convert during full operation.

The actual amount of electricity generated will vary depending on the strength of the tidal flow; generating about 1MW during peak flow and no electricity during slack water. On average, the output is likely to be about a third of the power rating. i.e. a 1MW tidal device will produce an average of about 333kWh of electricity every hour.

## How many homes could the tidal array provide electricity for?

The annual electricity consumption for Islay based on the 2002 NIFES report is around 30GWh. So the proposed array will generate the equivalent of the electricity that Islay consumes in a year.

Note that the consumption for Islay includes both industrial and domestic use. Domestic electricity consumption on Islay is approximately 14GWh.

Based on an average annual UK household consumption of 4,700 kWh, the tidal array could supply the equivalent of over 5000 homes.

## Where will the electricity go?

Islay and Jura are connected to the national electricity grid and currently imports the vast majority of electricity requirements from the mainland via the subsea cables.

The tidal array would be connected to the national electricity grid. During full tidal flow, the array will generate more electricity than is used on Islay and Jura and the excess would be exported to the mainland. During slack tidal periods, Islay and Jura would continue to import electricity from the mainland.

## Will the project provide cheap electricity for Islay and Jura?

The tidal array is connected to the national electricity grid and so electricity generated is not 'reserved' for Islay or Jura. As such, consumers on Islay and Jura would continue to buy electricity from their existing suppliers.

## Will the project improve the stability of the electricity supply on Islay and Jura?

This will depend on the configuration of the electrical connection from the tidal array to the electricity grid. In theory, the provision of electricity generated could help if there is a failure between to the mainland. However, since the tidal array has periods during slack water when no electricity is generated, this is not what's known as a 'baseload' supply.

# Environmental

## What is the process for assessing the environmental impact?

The project completed an Environmental Impact Assessment (EIA) and the findings were submitted in an Environmental Statement (ES) along with the application for consent to Marine Scotland (part of the Scottish Government) in July 2010. Marine Scotland took advice from all of the statutory consultees before the decision was made to give consent for the project in March 2011

## Does the project help to prevent climate change?

Because the tidal devices simply convert the energy from the tidal stream to produce electricity, they do not produce any carbon dioxide emissions. The emission of carbon dioxide and other greenhouse gases is thought to be the main cause of climate change.

It is estimated that each Kilowatt Hour (kWh) of electricity generated by a renewable energy source in the UK will reduce carbon dioxide emissions by 430g. If the tidal energy project generates 30GWh per year then it would reduce carbon dioxide emissions by about 13,000 tonnes. To put this in context Islay is estimated to emit about 65,000 tonnes of carbon dioxide per year and Scotland emits about 57 million tonnes of carbon dioxide per year.

# Legislation and Regulation

## What is the legislation governing the consent process?

Applications to construct and operate power stations of a certain capacity are made to Scottish Ministers under section 36 of the Electricity Act 1989.

The EIA process is defined in accordance with The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2000.

## What other regulations are involved?

The project is subject to the regulatory requirements of the Food and Environment Protection Act 1985 (FEPA) and the Coastal Protections Act 1949 (CPA).

There is also a requirement for an assessment of the navigational safety issues. This is in accordance with the Maritime and Coastguard Agency's (MCA) Marine General Notice MGN 371(M+F). A Navigational Safety Risk Assessment (NSRA) will be submitted to the MCA.

# Tidal Energy

## What is tidal energy?

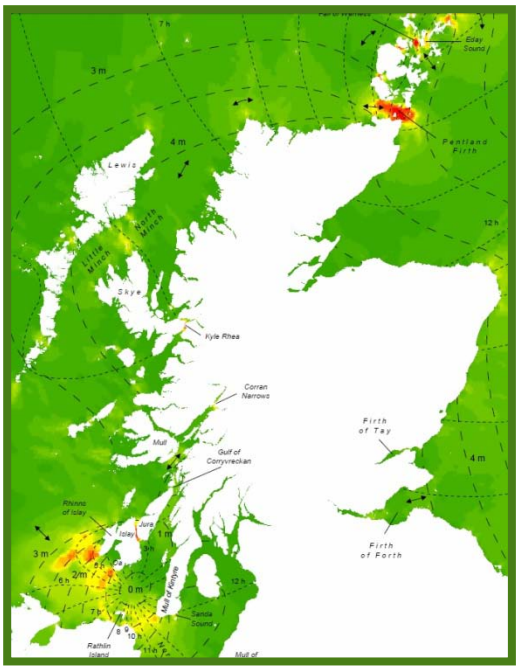
The gravitational effects of the moon and the sun cause the water in the oceans to move as the earth rotates. In the UK high and low tides occur twice every day and the height of the tide changes on a 14 day cycle creating higher spring tides and lower neap tides.

The flow of the water caused by the tides is called a tidal stream and this can be used to turn turbines that generate electricity. Although variable, tidal energy has a distinct advantage over other forms of renewable energy – it is predictable.

## Tidal Resource in Scotland

Scotland has approximately 25% of the tidal energy resource in Europe. The tidal energy resource was mapped for the Scottish Government and the map shows the significant areas of tidal energy in the Pentland Firth and around Islay.

Detailed surveys identified the Sound of Islay as being particularly suitable as a demonstration site due to the fast-flowing current in an area that is relatively sheltered from high winds and waves.




Map from Scottish Government report 'Matching Renewable Electricity Generation With Demand'

# Community Involvement

## How will the local community benefit?

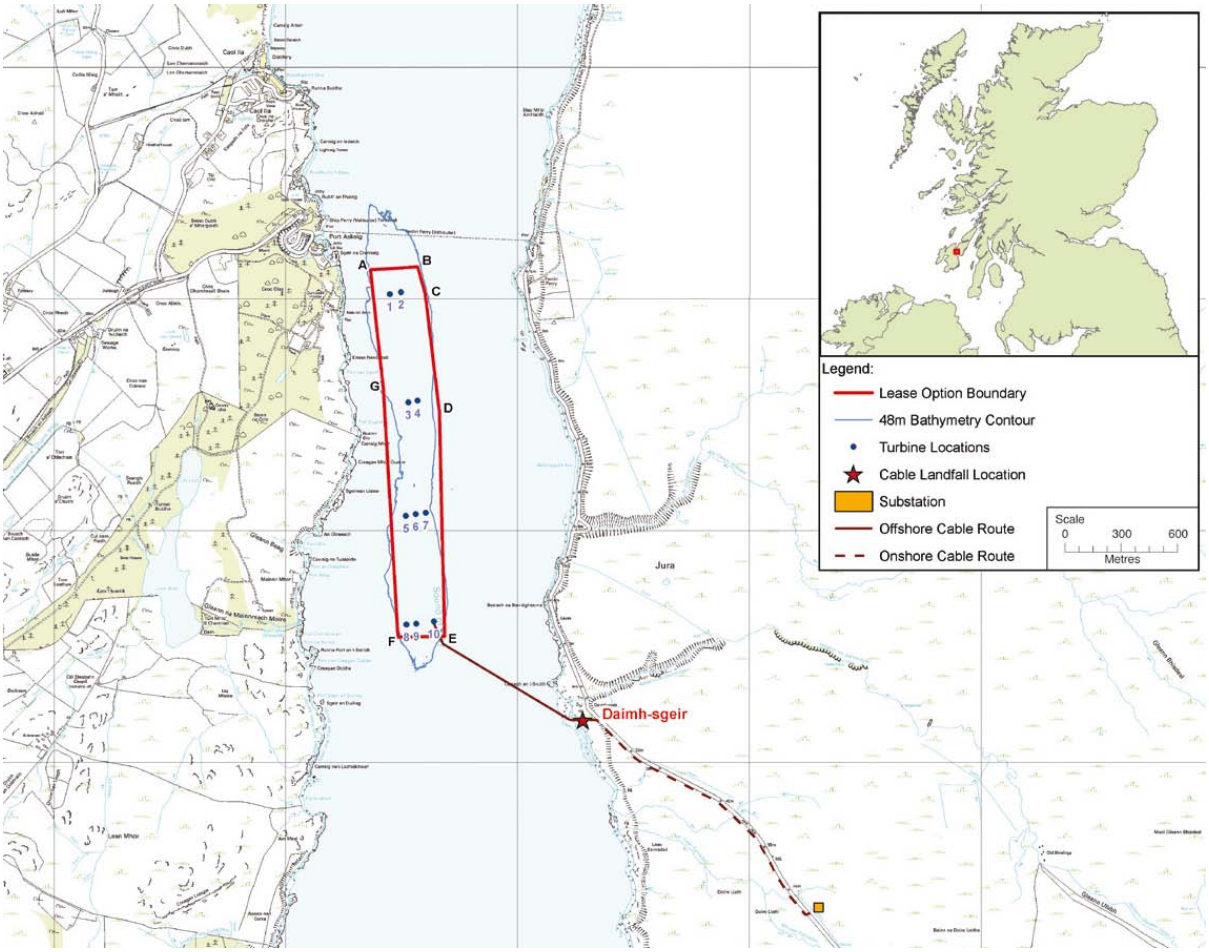
A Memorandum of Understanding has been signed between ScottishPower Renewables and the Islay Energy Trust (IET) to work together on the project and for IET to provide local project support and community liaison.

The project benefits from local knowledge and experience and the local community benefits from employment and income to local service providers. The project is likely to require the following services:

- Harbour facilities, boat hire, diving services
- Accommodation, catering and transport
- Building and construction services
- Device assembly
- Environmental monitoring

Further discussions are ongoing between IET and SPR regarding community investment and benefits from the project.

## Location




## Useful Websites

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|---|---|
| ScottishPower Renewables | www.scottishpowerrenewables.com |
| Hammerfest Strøm AS | www.hammerfeststrom.com |
| Scottish Government | www.scotland.gov.uk<br>Marine Renewables Action Plan (published 1/7/09)<br>Marine Scotland (established 1/4/09)<br>Scottish Energy Advisory Board (established 13/5/09) |
| RenewableUK | www.bwea.com |
| Scottish Renewables | www.scottishrenewables.com |
| The Crown Estate | www.crownestate.co.uk |

## Photos

Port Askaig from the Sound of Islay

Jura and the Sound of Islay

## Latest Information

Further information and the latest updates can be found at:

www.islayenergytrust.org.uk

## Contact

If you have any questions, you can contact:

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