

## nursery facilities for **scale testing**



The European Marine Energy Centre's scale test facilities provide the opportunity for prototype marine energy technologies to undergo sea trials in more gentle conditions than those experienced at the main wave and tidal test sites.

The new facilities make it as easy as possible for developers to bring concepts and test them in real sea conditions, without the need for the big vessels or large plant used in the deployment of full-scale machines.

Funding from the UK Department for Energy and Climate Change (DECC) supported the creation of berths with moorings foundations and bespoke test support buoys, plus an area of seabed for rehearsal of deployment techniques.

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# Nursery facilities for scale testing

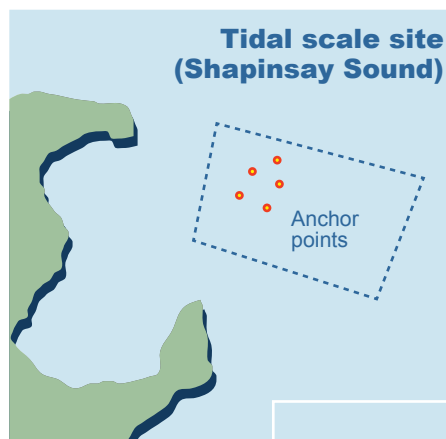
**The EMEC scale test sites are situated adjacent to the Orkney mainland.**

## Site characteristics

Data collection is in process, and initial findings suggest:

### Tidal scale site (Shapinsay Sound)

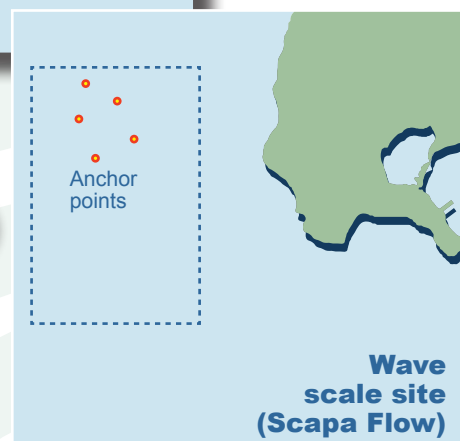
In the Shapinsay Sound, to the North-East of Kirkwall, fairly benign velocity marine currents which reach almost 2m/sec (3.9 knots) at spring tides. A full tidal regime in 21m-25m water in an area 0.4km across and approximately 0.9km in length.



*(please note this data is approximate - measurements are currently being taken to generate a more accurate picture of these sites; further information can be obtained by contacting EMEC).*

### Wave scale site (Scapa Flow)

The site in Scapa Flow, to the South of Kirkwall, was chosen for its relatively benign waves which reach almost 0.4m significant wave height. A predominantly Westerly wave regime in 21m-25m water in an area 0.4km across and approximately 0.9km in length.



## Berth and lay-down area

Each scale test site comprises one berth with pre-laid foundation and attachment points, and adjacent blank test area. The pre-laid foundations on each berth comprise 5 of 5m x 5m x 2m gravity-base frames loaded with densecrete blocks for equipment moorings. If required, the device under test will be connected to the test support buoy via two umbilical cables; one for power transmission and the other for control and communications.

## Test support buoys

At each of its scale test sites, EMEC offers developers the use of a test support buoy. The unique design of these new platforms incorporates state-of-the-art technology. The buoy can relay data by wireless technology, as well as dumping the measured generated power as heat. The buoys are also equipped to supply the marine energy devices on test with power and act as navigational aids.

## The test support buoy provides:

- subsea control and power cable
- measurement and dissipation of peak load of 75KW via switchable power resistors in steps of 25KW
- connection of three-phase four wire generators whether the prime mover is sub-sea or surface mounted
- back up power to allow anything from 12 volts DC to 240 AC for controlling off-base excitation, servo-motors or electronic signalling
- modern and robust UPS and fuel cells capable of supplying back-up power for many days
- electrical protection incorporated within the main switchboard (adjustable to suit within defined safe limits)
- telecommunications to an onshore receiver which relays information to EMEC's SCADA system

## Device characterisation

Individual device dimensions and weights will vary, and will require hydrodynamic and mechanical modelling studies to determine if the loads on the berth moorings are acceptable. However, based on designs being constructed to withstand the 50-year wave height at each site, the following maximum 'envelope' of device characteristics can be described:

	EMEC Scale Site	Mass in air	Length	Draft/Height
Wave	Scapa Flow	250t	50m	5m
Tidal	Shapinsay Sound (floating)	250t	50m	5m
Tidal	Shapinsay Sound (non-floating)	10t	10m	4m (from seabed)

Devices whose dimensions exceed the constraints imposed by the moorings provided by EMEC may have access to the deployment rehearsal area.