

Harnessing Wave Energy



Harnessing wave energy efficiently has proved an elusive challenge to engineers. Stormy offshore weather conditions and saltwater corrosion are two important obstacles. They can cause damage to wave energy equipment, increasing maintenance and repair costs and making the electricity they produce more expensive than traditional sources of power. Now a new device developed by AWS Ocean Energy, a Scottish technology company, offers the hope of a simple, low-maintenance wave energy system that could tap this abundant, clean source of renewable energy more cheaply.

Most marine energy devices float on the surface, generating power by moving with the waves, or lie on the coast and channel shore-breaking waves to operate generators. The new system, called the Archimedes Waveswing, floats a few metres below the surface and is linked to an anchor on the seabed by an articulated leg. Resembling a large buoy about the size of a London bus, the device consists of a fixed cylinder with a moveable cap sitting on top like an upturned cup. A watertight seal made from Kevlar and rubber connects the two. As waves pass overhead, the weight of the water forces the air-filled cap down over the cylinder, compressing the gas inside. The force on the cap drives a hydraulic system and generator to produce electricity.

With only one main moving part, the Waveswing is easier to maintain than traditional surface-based systems, whose many moving components, like ball bearings, corrode in saltwater. Because it is fully submerged, it is not exposed to the harsh weather conditions above water, cutting the risk of storm damage.

The machine can be serviced by remote-control submarines in most sea conditions, speeding repairs. By contrast, many surface systems can be down for weeks if they fail, because some government safety regulations prohibit work at sea in high waves. Because each unit is fully submerged, they are invisible from land and won't spoil anybody's ocean view.

Trials of early models off the coast of Portugal in 2004 successfully supplied power to the country's electricity grid. Design improvements since then, partly financed with the help of a GBP2.1 million grant from the Scottish government, have reduced the size and weight of the Waveswing, helping cut costs further.

In February 2008, AWS attracted more investment and business development support from Shell Technology Ventures Fund 1. With the additional funds and advisory help the company plans to test a 250-kilowatt prototype in 2009 and expects to launch a commercial demonstration wave energy farm in 2011 that could eventually supply enough power for about 27,000 homes.