Sea farer

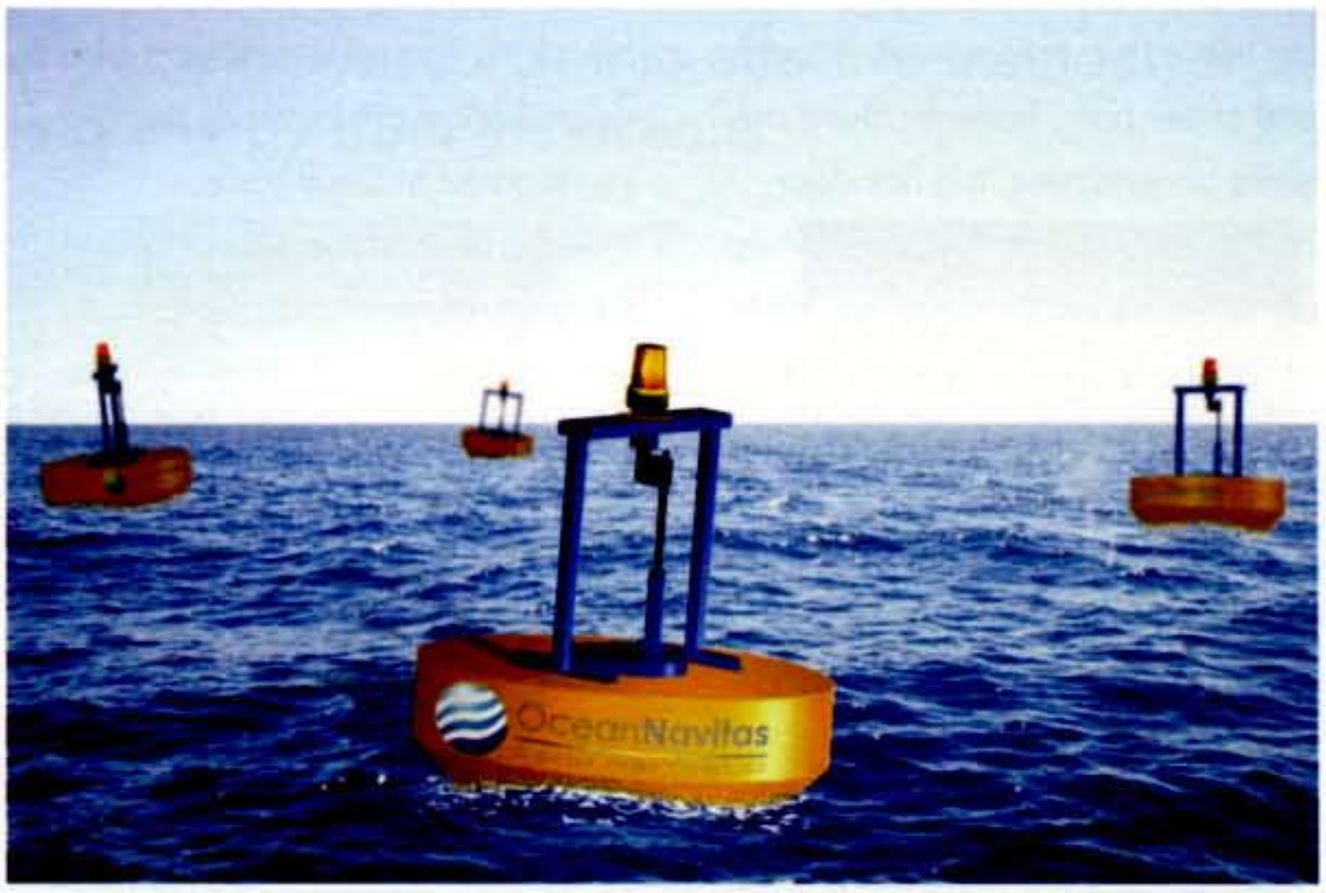
New technology takes more power from the waves

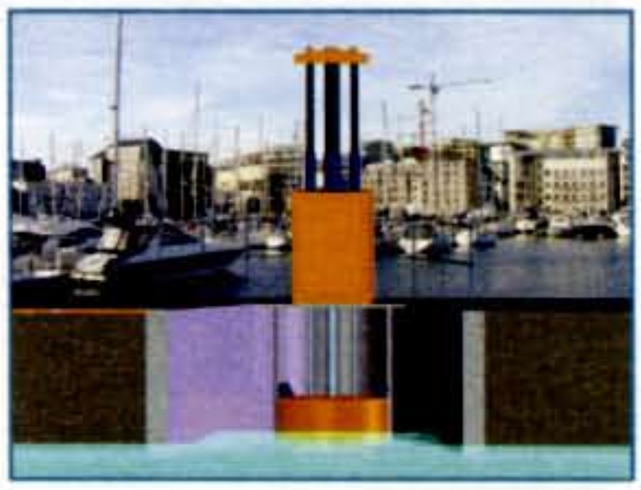
The wave energy industry is poised to become a significant provider of clean renewable energy for the UK, Europe and the rest of the world. Existing technology designed for a similar application can be overly complex and uses energy conversion techniques that by their nature require large, expensive devices with a poor mass to power output ratio.

Ocean Navitas is attempting to mitigate this problem with its Aegir Dynamo wave energy converter, which uses a patented mechanical conversion device to allow more power to be taken from the ocean by smaller machines. This makes the technology – named for the Norse god of the sea 'Ægir' and the definition of a dynamo – 'an electrical generator' – more cost effective to manufacture than many of the alternatives, giving a lower cost per unit of electricity produced.

Prior to the formation of Ocean Navitas as a company, or the commencement of any detailed design work, a study was carried out examining the following fields: possible sources of renewable power generation (wind, tidal, photovoltaic and wave) to identify the efficiency and scope for deployment in each; existing companies whose technology is in the public domain; identification of areas throughout the world with high renewable energy yields; UK and international governmental policies with regard to the renewable energy market; and possible UK Government incentives in the form of grants and ROCs.

Based on this research, engineers James McCague and Simon Condry commenced the computer-aided design of a mechanical energy conversion device for waves and swells that could withstand a tough ocean environment. The completed draft design was then subjected to finite element analysis and re-modelled and animated in 3D.





Ocean Navitas has now successfully manufactured a 2kW Aegir Dynamo prototype, which proves the concept, and confirmed the accuracy of the computer models. The device functions by generating electrical current from the motion of the prime mover in one phase via a direct mechanical conversion and the use of a bespoke buoyancy vessel. Calculations predict that this technology, when scaled up to a 1MWh output, could produce electricity at a cost of only 1.4p per kW.

The company aims to have completed its R&D by 2009, at which point the 1MWh Aegir Dynamo will be connected to the local and national electricity grids in the Orkney Islands in Scotland and off St. Ives in Cornwall. Additional UK coastal installations and sites in Portugal, Spain, Thailand and the Caribbean are also under consideration. The technology could eventually have a life expectancy of more than 20 years and require maintenance every two years. It can be deployed as an array of several devices in order to produce more power from one site and these could be attached to almost any stable structure at sea, including, for example, an oil or gas rig platform leg.

The technology has also been adapted to a 25kW shore-based device to service small coastal and island communities. It has been calculated that a shore-based Aegir Dynamo of this size could produce 25Kw of electricity at a cost of approximately 3p per kW. This could be installed on marina walls, quaysides and any fixed structure that is serviced by waves. Should a power output in excess of 25KW be required, the design is again easily modified to allow an 'array' of multiple devices coupled together. □

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