



CETO, named after a Greek sea goddess, is a wave power generation system which has the potential to revolutionise power production globally. The system consists of a series of buoys tethered to a pump unit; wave motions move the buoys, generating power for the pumps to deliver pressurised sea water to shore which is then used to generate electricity.

Unlike other wave power systems, CETO works with the sea's natural motion, rather than against it, negating the need for steel and concrete structures which may disrupt natural eco systems. The system operates without the use of oils, lubricants or offshore electrical components, which further minimises the risk of damage to natural sea life.

The system is constructed from materials proven to withstand submersion in sea water for more than 20 years, which makes CETO's installation economically viable long term.

In the past, other wave power designs have been criticised for their visibility from shore, but the CETO system bypasses this problem by being completely submerged and therefore invisible from land.

With 60 per cent of the world's population living within 60 kilometres of a coast, wave power is an efficient energy source free from transmission issues. Wave power generation is completely emissions free, and because wave patterns can be predicted days in advance it is a viable base load power source – available 24 hours a day, 365 days a year – unlike energy sources such as wind power, which can only be predicted hours in advance at best.

CASE STUDY

The power of the deep blue sea

OVER TIME, ENERGY HAS BEEN SOURCED IN MANY DIFFERENT WAYS FROM NATURE – FIRST FROM THE EARTH, THEN AIR AND NOW WATER. CARNEGIE CORPORATION IS A WEST PERTH-BASED COMPANY FOCUSED ON THE DEVELOPMENT OF 'CLEAN TECHNOLOGIES' AND THEIR FLAGSHIP PROJECT IS HARNESSING THE POTENTIAL OF THE OCEAN AS A ZERO-EMISSIONS POWER SOURCE.



Carnegie Corporation chief operating officer Greg Allen says Australia has some of the world's best wave energy resources in the oceans off its coastline and it makes sense to explore how they can best be utilised. "The CETO project prototypes are so important because we need to illustrate what a viable power source wave energy is for Australia," he says.

Mr. Allen explains the CETO design is a market leader due in large part to its simplicity. "Many of the other wave power generation designs on the market include generators off shore – which have high maintenance and installation costs," he says. "CETO is by far a more streamlined design – its pumps are placed off shore and don't need to be touched, while the electricity generation takes place on shore making it easy to manage."

Mr. Allen adds while most other designs on the market employ hydraulic oils in their systems, CETO is run using only water; this makes the system completely environmentally benign and non-polluting should a leak occur at sea.

The added benefit of the CETO units is their dual ability – as well as a source of power generation the units can be used to desalinate sea water, making them a large-scale drinking water production method. This point is of vital importance

at a time when the world is increasingly facing a drinking water crisis – the ability to create safe drinking water on a large scale is essential.

It has taken time for wave energy to gain momentum; originally designed by Carnegie Chairman Alan Burns in the 1970s, the first generation prototype of the system was not produced until 2006.

In 2008 the second CETO prototype produced both energy and water at Carnegie's test site at Fremantle and the company was awarded a license to investigate wave energy potential off the coast of south-west WA.

The importance of the CETO system was recognised in February of this year, when Carnegie was awarded a grant of \$12.5 million by the West Australian State Government's Low Emissions Energy Development fund.

Carnegie has also signed a Memorandum of Understanding with Western Australia's Electricity Retail Corporation, Synergy. As the State's largest energy retailer, Synergy's recognition of Carnegie Corporation's work is a milestone for the company and illustrates faith in the long-term potential of wave generated power.

The Memorandum between Synergy and Carnegie Corporation sets out the initial obligations of the two

companies in relation to the purchase of energy from the first of Carnegie's wave generation projects off the coast of Western Australia.

Although Carnegie focuses most of its research the CETO wave technology project, the company also owns a number of other clean energy technologies, most of which are still in research and development stages. These include solar thermal, geothermal and aerofoil power generation projects – all of which are low-emissions alternative power sources.

Carnegie also owns a green heat exchange technology project; the project aims to develop a system that would allow flue gasses to re-heat incoming combustion air at coal fired powered power stations, a valuable energy recovery method. The technology could be applied to other fossil fuel power generators – allowing the systems to run far more efficiently while potentially saving costs and reducing greenhouse gas emissions.

In April 2009, Carnegie was awarded a \$156,567 Climate Ready grant from the Australian Federal Government to use toward feasibility testing for the green heat exchange project.