**West Australian, Perth**
03 Aug 2015

Supplements, page 12 - 769.00 cm²
Capital City Daily - circulation 160,197 (MTWTF--)

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**RENEWABLE ENERGY ENGINEERING**

# Reaping power from the big blue

A group of WA engineers have created a wave power plant that the Federal Government believes may be key to unlocking the Holy Grail of base-load renewable energy.

Carnegie's demonstration project at Garden Island is the world's only operating wave power plant, providing enough electricity to run up to 2000 households.

Since flicking the switch to the South West energy grid in February, the Perth Wave Energy Project has met up to 4 per cent of the Department of Defence's peak energy demand needs on Garden Island, clocking a record 10,000 continuous operational hours across its three units.

And just as importantly, it has done so without the associated greenhouse gas emissions that would come with coal or gas-fired energy.

Carnegie chief executive Michael Ottaviano said CETO 6, the company's commercial facility,would be up to four times more powerful than the existing CETO 5 pilot unit.

Although its energy will be consumed entirely by the Department of Defence, it would be capable of powering coastal towns, islands and big industrial sites.

"For Australia 24/7 wave power is possible for most of the population. It's not unreasonable to forecast that 5 to 10 per cent of the world's energy could come from ocean waves within 50 years," Dr Ottaviano said.

"That's a significant amount of power. What is of most significance for Carnegie and for WA is that right now the only operating wave farm in the world is the one at Garden Island."

The $30 million demonstration project, funded by the State and Federal governments and investor capital, uses ground-breaking technology to build submerged buoys that are tethered to seabed pump units.

Passing waves heave the 11m-wide buoys up to 3m-4m, driving the pumps.

The pumps pressurise water, which is piped ashore to drive hydroelectric turbines.

The CETO 5 units, 3km off Garden Island, are 240 kilowatt rated while the upcoming CETO 6 technology will be fixed to the seabed about 8km offshore, and will target a one megawatt rating.

Carnegie is not the first wave power plant in the world, but it is the only one

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operating. Other projects have been offline for long periods so maintenance can be done on units knocked about by nature's fierce swells.

Chief operating officer Greg Allen said Carnegie's success in achieving a global record for continuous operational hours was because of the unit's robust design.

He said Carnegie's team of 42 people, including about 30 engineers, had engineered a solution to a wave power facility created by Perth inventor Alan Burns a decade ago.

"He was the first in the wave energy industry who has come at the problem from two perspectives: the theoretical end, which is mostly born out of universities and the like, which is, how do we extract the most energy possible out of the ocean with a particular device," Mr Allen said.

"And then there was a practical sense of considering how do we build something that is going to survive, and then, how do we get some energy out of it.

"You have to strike a balance between what energy you want to extract and what conditions you want it to survive in, and from our perspective, it has to be able to survive through every possible condition."

Mr Allen said the key to unlocking the technology's commercial potential was to strike the right balance between these two features, and between price and scale.

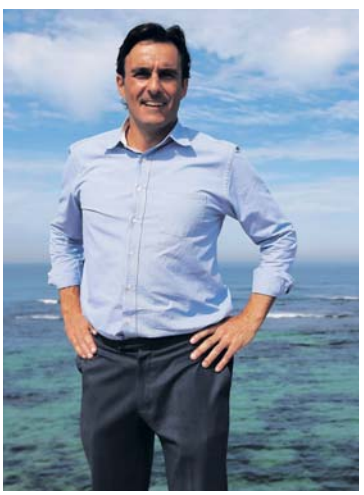
The three existing units in the project cost about $30 million.

CETO 6 will have a similar price tag, albeit with a more powerful impact.

But the hefty costs mean the buoys cannot be easily removed or replaced once put in position.

Federal Energy Minister Ian Macfarlane declared wave power the "Holy Grail" of base-load renewable energy earlier this year, claiming it was a step closer after Carnegie switched on its pilot project.

**Kim Macdonald**



**Carnegie boss: Michael Ottaviano**

**Technology: Flood cavity**

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**Wave power: Waves heave buoys up to 4m, which then drive the pumps.**