

ASX Announcement

Friday, 23rd October, 2015

Wave Powered Desalination Plant

- **Wave powered desalination plant operational**
- **First bottle presented to WA Water Minister Hon Mia Davies at AWA Conference**
- **MAK Water agency agreement extended to remote islands, first opportunities underway**

Wave energy developer Carnegie Wave Energy Limited (ASX: CWE) is pleased to announce the world's first wave energy powered seawater reverse osmosis desalination plant is fully integrated and operational.

Carnegie's desalination pilot plant on Garden Island (co-located with the Perth Wave Energy Project) was successfully commissioned off the electricity grid earlier this year, and is now fully integrated with the CETO wave energy power plant, meaning that the desalination plant is capable of running both off the grid and directly off hydraulic power from Carnegie's wave project, or a combination of both.

The first bottle of wave-powered desalinated water produced was presented by Carnegie's Chief Operating Officer, Greg Allen, to the Western Australian Minister for Water the Honourable Mia Davies MLA at the Australian Water Association's (AWA) Annual Western Australian Conference today. Mr Allen presented on wave energy integrated desalination at the Conference timed to coincide with National Water Week (presentation attached). Carnegie's Wave Powered Desalination Project won the 2014 AWA Innovation award.



The Hon. Mia Davies being presented with the first bottle of wave powered bottle desalinated water by Carnegie Chief Operating Officer, Greg Allen

As previously announced, the containerised desalination pilot plant co-located with the Perth Wave Energy Project was manufactured and supplied by MAK Water Industrial Solutions (MAK Water), with Carnegie signing an agency agreement to act as the exclusive agent for MAK Water in South America earlier this year. The agency agreement has now been extended to include remote islands to capitalise on the opportunity for high quality, containerised desalination solutions in these locations.

The first joint Carnegie/MAK Water island opportunity is currently underway with MAK Water's desalination experts already undertaking the first activities of a process of technical review, site upgrades and capital replacement at 4 sites on remote Indian Ocean Islands.

About Carnegie

[Carnegie Wave Energy Limited](#) is an Australian, ASX-listed (ASX:CWE) wave energy technology developer. Carnegie is the 100% owner and developer of the CETO Wave Energy Technology intellectual property. Carnegie is focussed on commercial opportunities in key target markets including UK, Europe and remote islands.

About CETO

The CETO system is different from other wave energy devices as it operates under water where it is safer from large storms and invisible from the shore.

CETO technology characteristics include:

- Converts ocean wave energy into zero-emission electricity and desalinated water.
- Environmentally friendly, has minimal visual impact and attracts marine life.
- Fully-submerged in deep water, away from breaking waves and beachgoers.

For more information:

Dr Michael Ottaviano

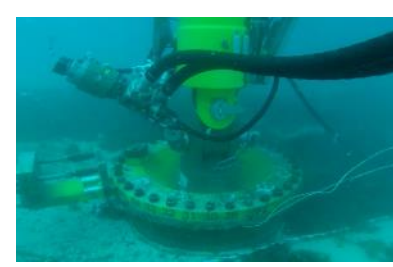
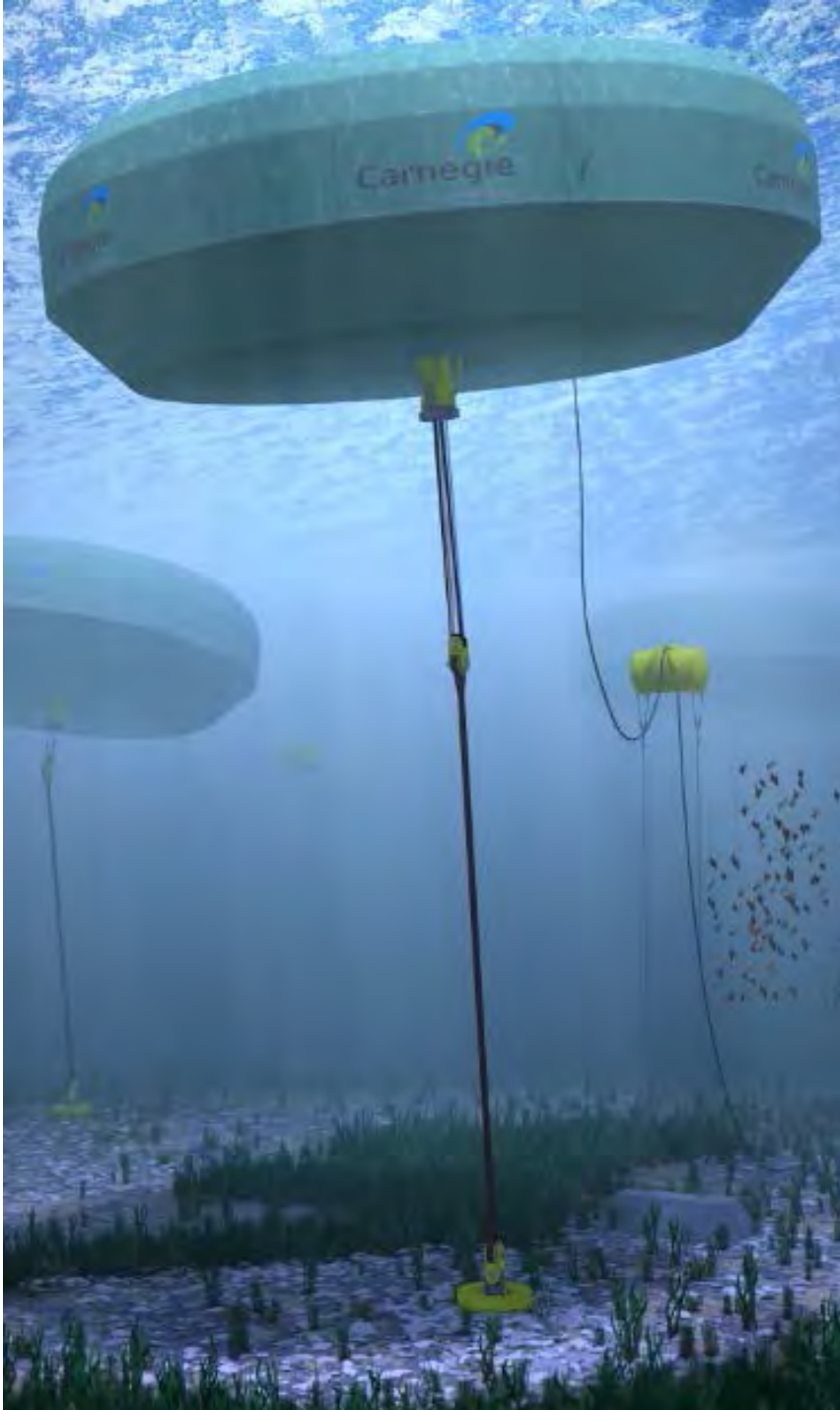
CEO & Managing Director

Carnegie Wave Energy Limited

+61 8 9486 4466

enquiries@carnegiewave.com

Website: www.carnegiewave.com



Wave Energy Integrated Desalination
Australian Water Association Conference
23rd October, 2015

Greg Allen, Chief Operating Officer

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- Owner and developer of “CETO” wave energy technology
- Listed on the Australian Stock Exchange (ASX: CWE)
- 44 engineering, commercial, administration staff
- EDF EN first licensee
- \$118m spent to date on CETO over 6 prototype cycles
- Tens of thousands of in-ocean operating hours
- World first wave to power and freshwater project



CETO commercialisation roadmap

Technology Development

Early commercial markets / projects

Later commercial markets / projects



- **UK/Europe** – multiple grid-connected, pre-consented wave energy sites either operating or in development seeking a viable wave energy technology.
- **Islands** – Existing CWE relationships with a number of islands aimed at making islands “CETO ready” while CWE makes CETO “Island ready”

Perth Wave Energy Project

- Garden Island, Western Australia
- 3 x CETO 5 units
- Onshore power plant and grid connection
- Onshore reverse osmosis desalination pilot plant
- \$22m in Government grant funding
- Power & Water Offtake to Australian Department of Defence (HMAS Stirling)



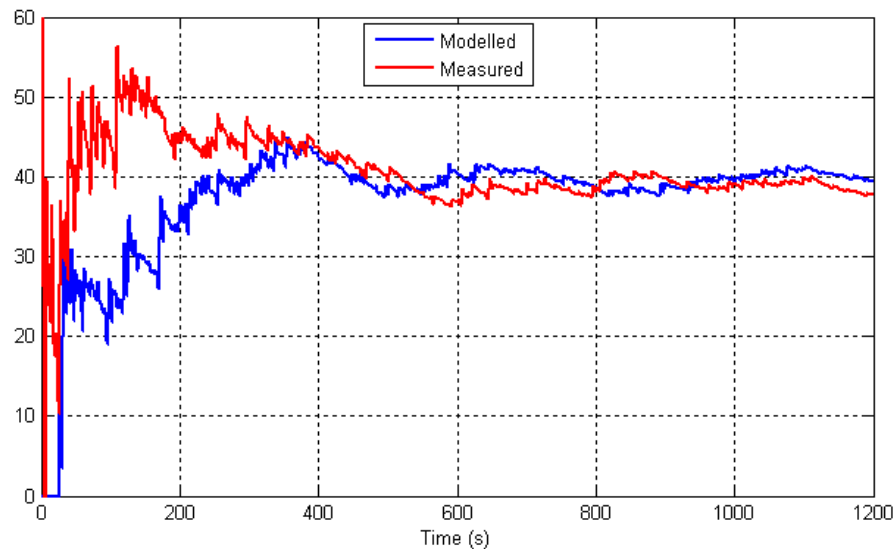
Perth Wave Energy Project – only wave array project in the world



- Demonstrated CETO 5 technology including:
 - Three WECs
 - Power delivery to grid
 - Wave powered, reverse osmosis desalination
 - <1 day CETO WEC installation
- >14,000 operational hours since November 2014
- Designed and delivered by Carnegie
- Measured CETO 5 results confirmed modelled forecasts
- Measured results confirm CETO 6 forecasts

Perth Wave Energy Project – operation, maintenance and performance

- Range of sea states experienced, including waves up to 5.7 metres in height
- 3 unit array, over 14,000 hours of cumulative operation
- Exporting power and water to DoD
- Regular offshore inspections conducted
- CETO Unit retrieved for onshore inspection and maintenance then reinstalled (“hot swap verified”)
- CETO unit and system performance in line with expectations





The Perth Wave Energy Project *Onshore Infrastructure*

Perth Wave Energy Project – desalination pilot plant

- Integrates off-the-shelf reverse osmosis desalination technology with the CETO infrastructure.
- The Perth Project is the first wave project to produce clean power and fresh water anywhere in the world.
- Cooperation agreement with Western Australian Government owned Water Corporation
- The Desalination Pilot Plant is supported by a \$1.27m AusIndustry grant, under the Clean Technology Innovation Program
- Water supply agreement with the Department of Defence
- Desalination plant capable of 150m³/day potable water production off CETO project or off grid

“Carnegie’s wave powered seawater desalination technology offers a novel and promising approach to achieving desalinated freshwater with zero greenhouse gas emissions”

Sue Murphy, CEO, Water Corporation



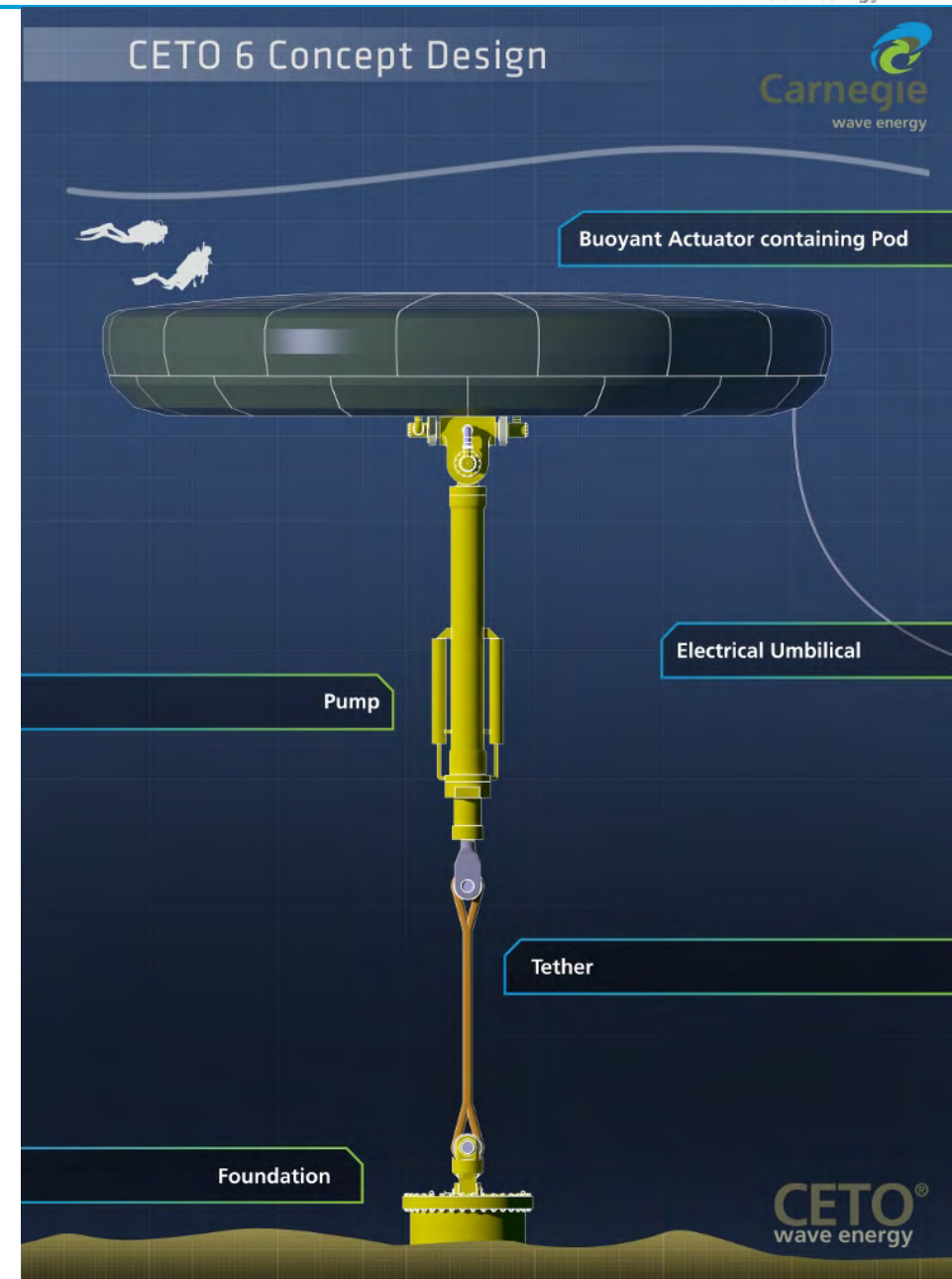
Perth Wave Energy Project – desalination pilot plant

- Containerised seawater reverse osmosis desalination plant supplied by MAK Water (including Re-calcification and Chlorination System)
- Beach bore for seawater intake
- Outfall line for brine discharge, 800m long at 10m water depth
- Potable water storage
- Commissioned off electricity grid in February, 2015 (electricity produced by co-located CETO power plant)
- Fully integrated wave energy desalination pilot plant now operational (i.e. direct mechanical drive of HPP)



CETO 6 Design – commercial product platform

- Development based on:
 - 14,000 CETO 5 in-ocean operational hours and data analysis
 - CETO 6 wave tank testing at FloWave, Edinburgh using scale model
 - Internal modelling and design development
 - Engagement with UK/EU and Australian supply chain
- Approximately 4 times the rated capacity of CETO 5 generation (nominal 1MW)
- Power generation inside the buoyant actuator allows more advanced control capability
- Rapid installation and retrieval (no offshore heavy lifts)
- Electrical export cable delivers power onshore avoids hydraulic transmission losses
- Tidal range compensation
- Nearshore and more distant to shore wave sites suitable



2014/15 Key Achievements & Upcoming Milestones

CETO 5 Perth Wave Energy Project

- ✓ Construction complete
- ✓ 3 units combined total of over 14,000 hours of operation
- ✓ Exporting power and water to DoD
- ✓ Direct mechanical desalination operational

CETO 6 Project

- 1MW CETO 6 concept design complete
- \$20m CETO 6 CEFC debt facility
- \$11m CETO 6 ARENA grant
- Construction to start 2016

