



Carnegie Wave Energy Limited

*Bermuda Energy Forum
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Company Highlights

- Owner and developer of world leading “CETO” wave energy technology
- Dual market focus -
 1. Wave energy farms: scaling to 100’s MW in early markets, similar to the emergence of offshore wind (UK/EU).
 2. Islands microgrids: design, financing, EPC and O&M of bankable renewable microgrids. Later integration of wave to take advantage of wave’s consistency and lack of footprint.
- Team of 45 focused on wave technology and project origination, financing and delivery
- 35% stake & strategic alliance with Energy Made Clean, leading Australian solar/battery microgrid EPC.
- EMC team of 55 focused on microgrid EPC and O&M
- Well capitalised: £10 million cash, £7.5m million in undrawn Government grants, £11 million undrawn debt facility (March 2016)



L-R: Kieran O’Brien (ex ESB), Mike Fitzpatrick (ex Hastings), John Leggate (ex BP), Jeffrey Harding (Chairman, ex Pacific Hydro), Michael Ottaviano (MD & CEO), Grant Mooney (NED, Joint Company Secretary)



Carnegie Team

Carnegie recognised as an innovator



Innovation Excellence Winner,
2014



Top 100 Global Sustainable
Solutions, 2016



Top 50 Most Innovative
Companies in Australia, 2016



BANKSIA
SUSTAINABILITY
AWARDS 2015
CATEGORY FINALIST

Banksia Sustainability Awards,
Innovation Category Finalist,
2016



Program Innovation Winner,
2014



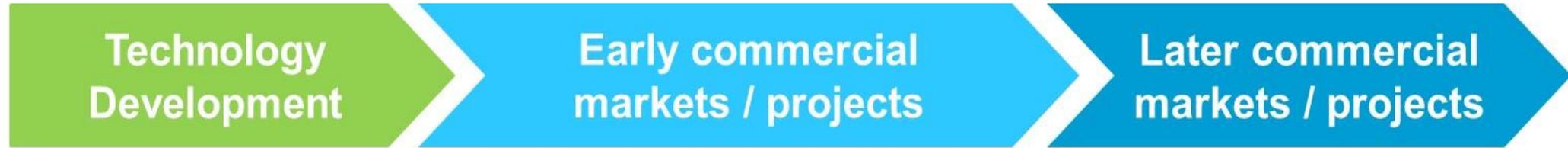
Clean Energy Council

Innovation Award Winner, 2016



The Australian Innovation Challenge, Finalist,
Minerals & Energy, 2016

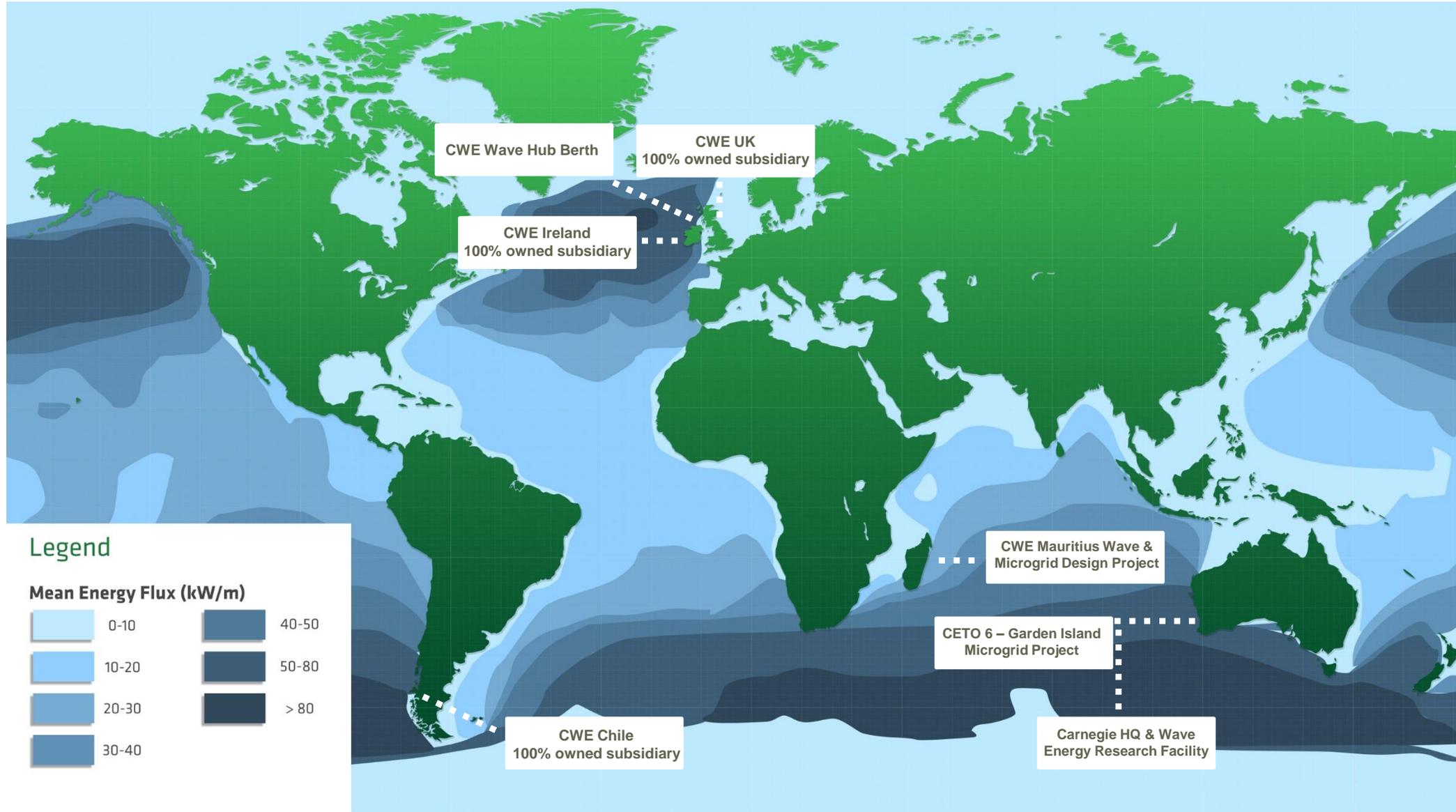
Carnegie dual market focus - Wave & Microgrids



Commercialisation in two key initial markets:

- Wave energy farms: 100's MW in early markets similar to the emergence of offshore wind (UK/EU), then islands.
- Island microgrids: deliver mixed, proven renewable microgrids (solar, battery, desal, wind etc) now and then integrate wave later to take advantage of its consistency (particularly for high RE penetration) and lack of footprint.

Global Reach

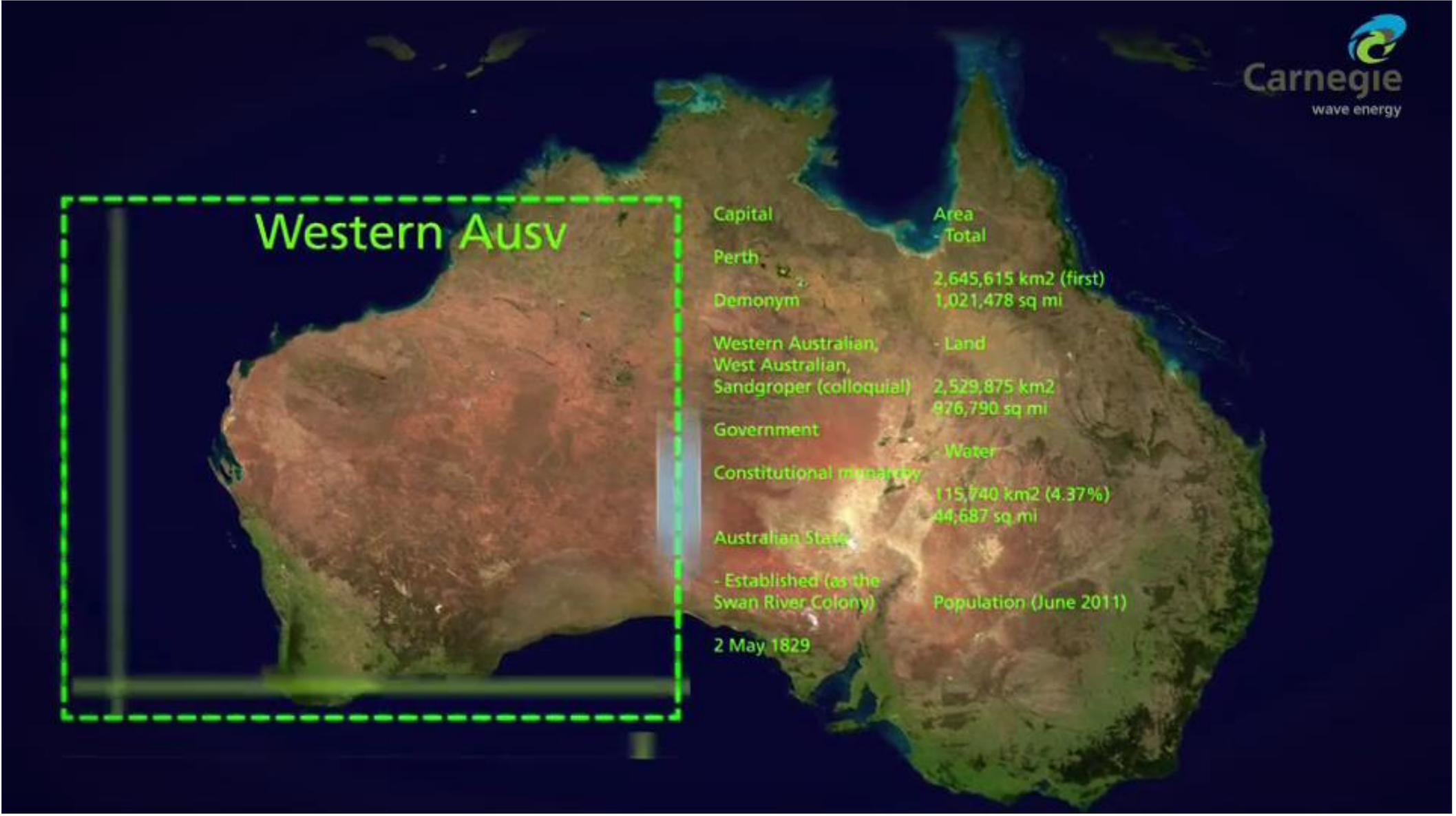


An aerial photograph showing three wave energy converters (WECs) in the ocean. Each WEC consists of a central vertical post with a red and white structure on top, surrounded by a circular green buoy. The ocean is dark blue with small, choppy waves. The text "The Perth Wave Energy Project" and "CETO 5" is overlaid in the bottom left corner.

The Perth Wave Energy Project

CETO 5

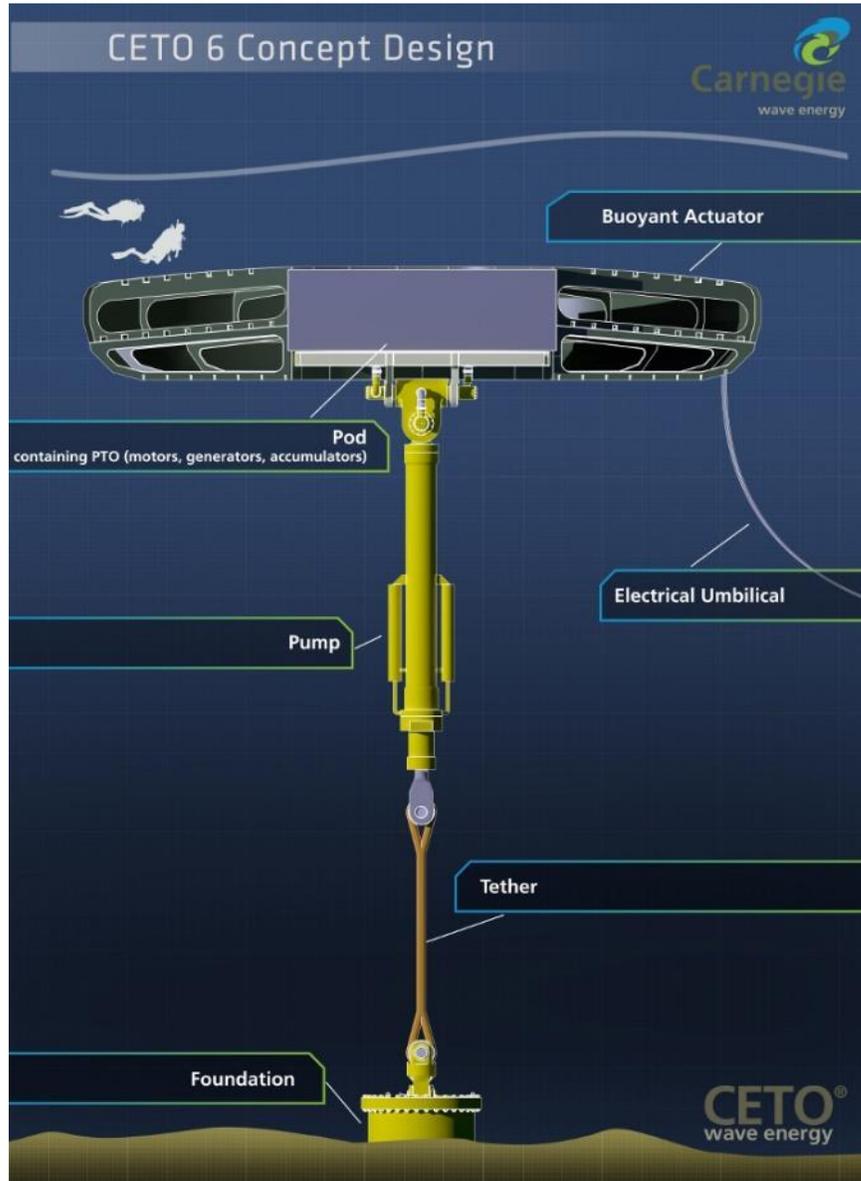
Perth Wave Energy Project – Operation



Perth Wave Energy Project – CETO 5 generation successfully demonstrated



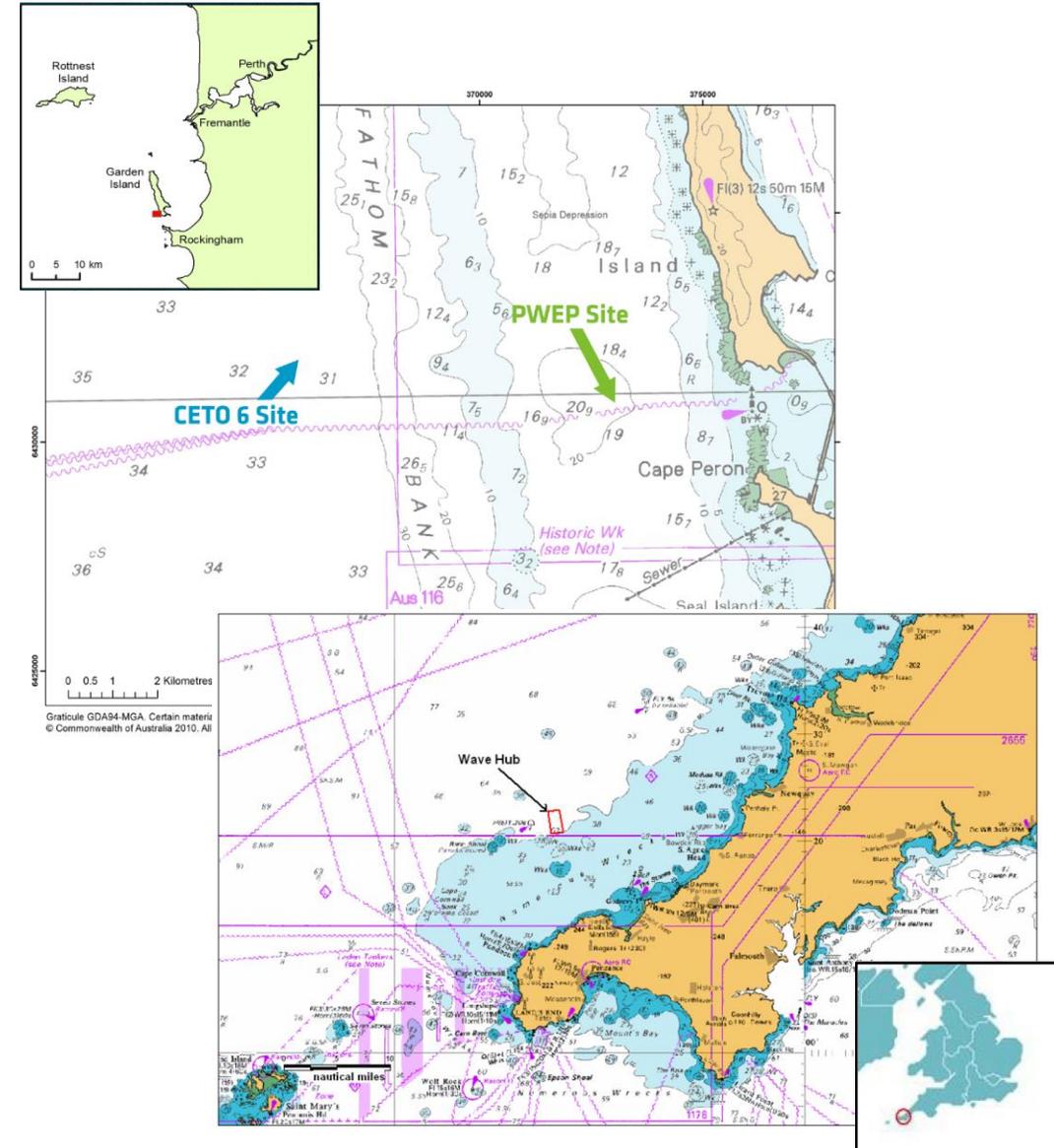
- Garden Island, Western Australia
- Demonstrated CETO 5 technology including:
 - Three WECs
 - Power delivery to grid
 - Wave powered, reverse osmosis desalination
 - <1 day CETO WEC installation
- >14,000 operational hours over 12 months
- Designed and delivered by Carnegie
- Measured CETO 5 results confirmed modelled forecasts
- Measured results confirm CETO 6 forecasts



- Development based on:
 - CETO 5's in-ocean operational hours and data analysis
 - CETO 6 wave tank testing, including University of Plymouth
 - Internal modelling and design development
 - Engagement with European and Australian supply chain.
- Approx. four times the output of CETO 5
- 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.

CETO 6 – Demonstration Projects

- Garden Island, Western Australia
 - Funded by CWE, £11m CBA debt funding and £ 5.5m ARENA grant
 - Commissioning 2017
 - Offtake to Australian Department of Defence
- Wave Hub, Cornwall, UK
 - Stage 1 Commissioning 2018
 - 30MW export capacity, upgradeable to 48MW
 - Tariff support and Government grants/debt available
 - CWE & Government Funding

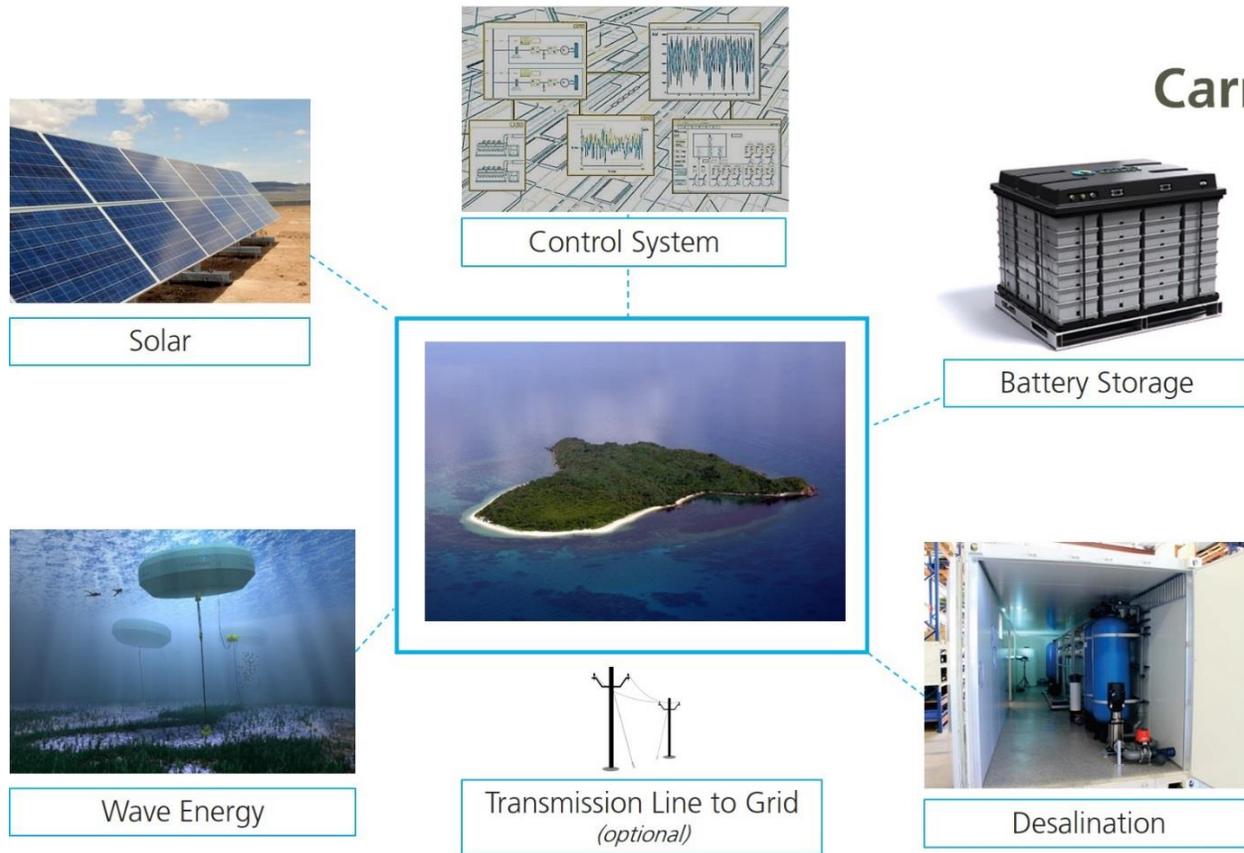


International Market – Bermuda

- Heavy reliance on diesel generation
- Renewable energy targets
- Untapped wave energy resource
- CWE and Triton MoU since 2009
- Completed pre-feasibility & environmental scoping study
- In 2012 deployed a wave monitoring buoy
- Longer term goal of 15-20MW CETO wave energy & desalination project



Wave-Integrated Microgrids – Expanding Our Capability



- Multiple energy generation sources
- Sophisticated control systems and storage
- Takes advantage of temporal variation, reducing energy storage and diesel generation.
- Desalination allows higher levels of renewables, as a form of energy storage
- Garden Island Microgrid (GIMG) will be the world's first wave integrated renewable microgrid project.
- Delivering Mauritian wave and microgrid design project
- 35% stake in and strategic alliance with leading Australia microgrid EPC, Energy Made Clean.



Key Achievements & Upcoming Wave Developments

CETO 5 Perth Wave Energy Project

- ✓ 3 units, 14,000 hours, computational models validated
- ✓ Exported power and water to the Australian Department of Defence

CETO 6 Project, Western Australia

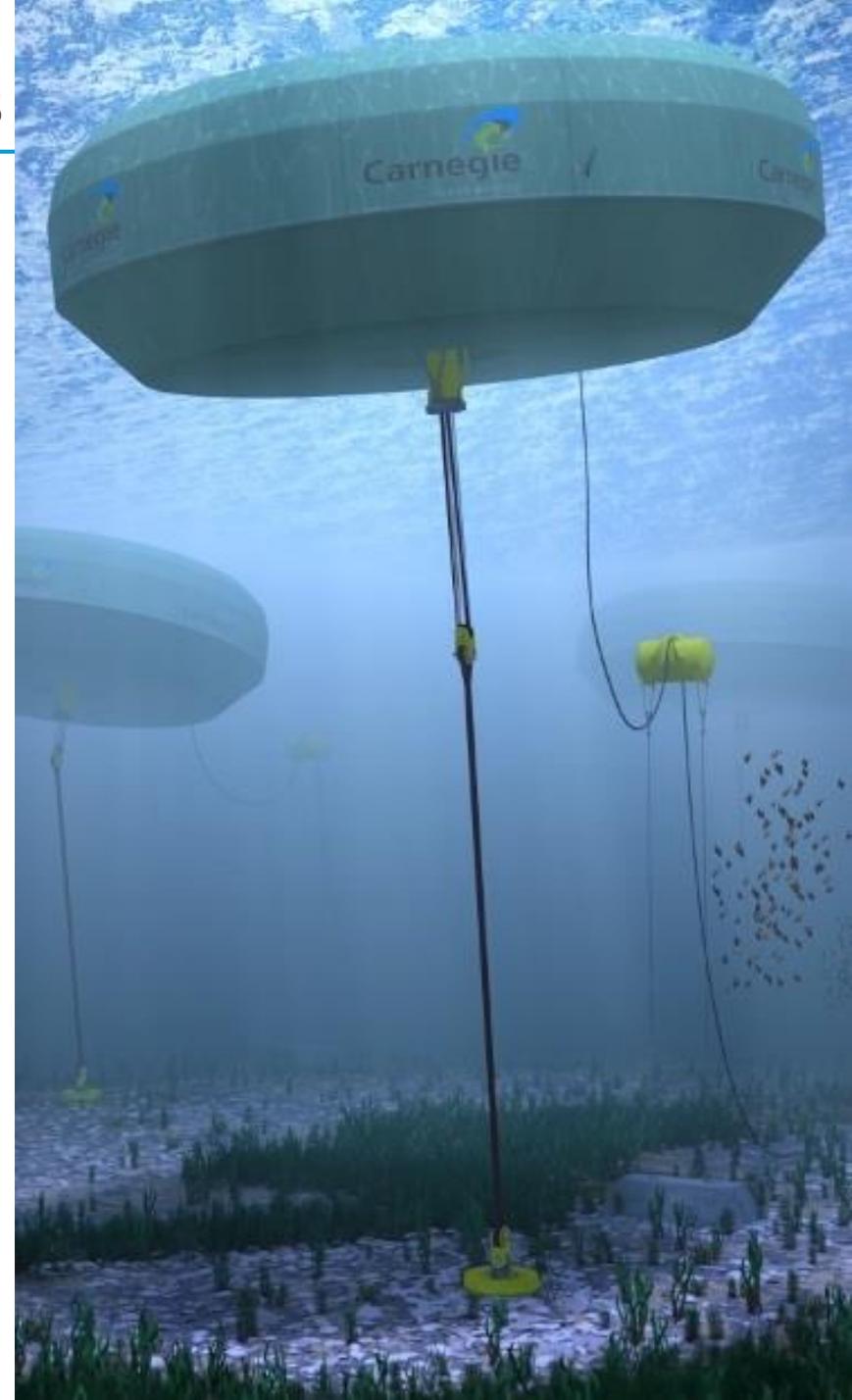
- ✓ CETO 6 concept design complete
- Construction to start 2016.

CETO 6 Project, UK

- ✓ Development started 2015, Construction 2018
- Funding progress expected in coming months

Microgrids

- Mauritian project delivery
- Garden Island project delivery





Questions?

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