ASX Announcement

Thursday, 10th September, 2015

European Wave & Tidal Conference Presentations

ASX listed (ASX:CWE) wave technology developer, Carnegie Wave Energy is pleased to inform that it was selected to deliver two presentations this week at the European Wave and Tidal Energy Conference (EWTEC) in Nantes, France. The presentations were delivered by Carnegie's Chief Technology Officer, Jonathan Fiévez, and Carnegie's UK CEO, Tim Sawyer. EWTEC is premier technical and scientific conference on wave and tidal energy globally. A combined version of the presentations is attached and the full EWTEC program is available here.

For more information:
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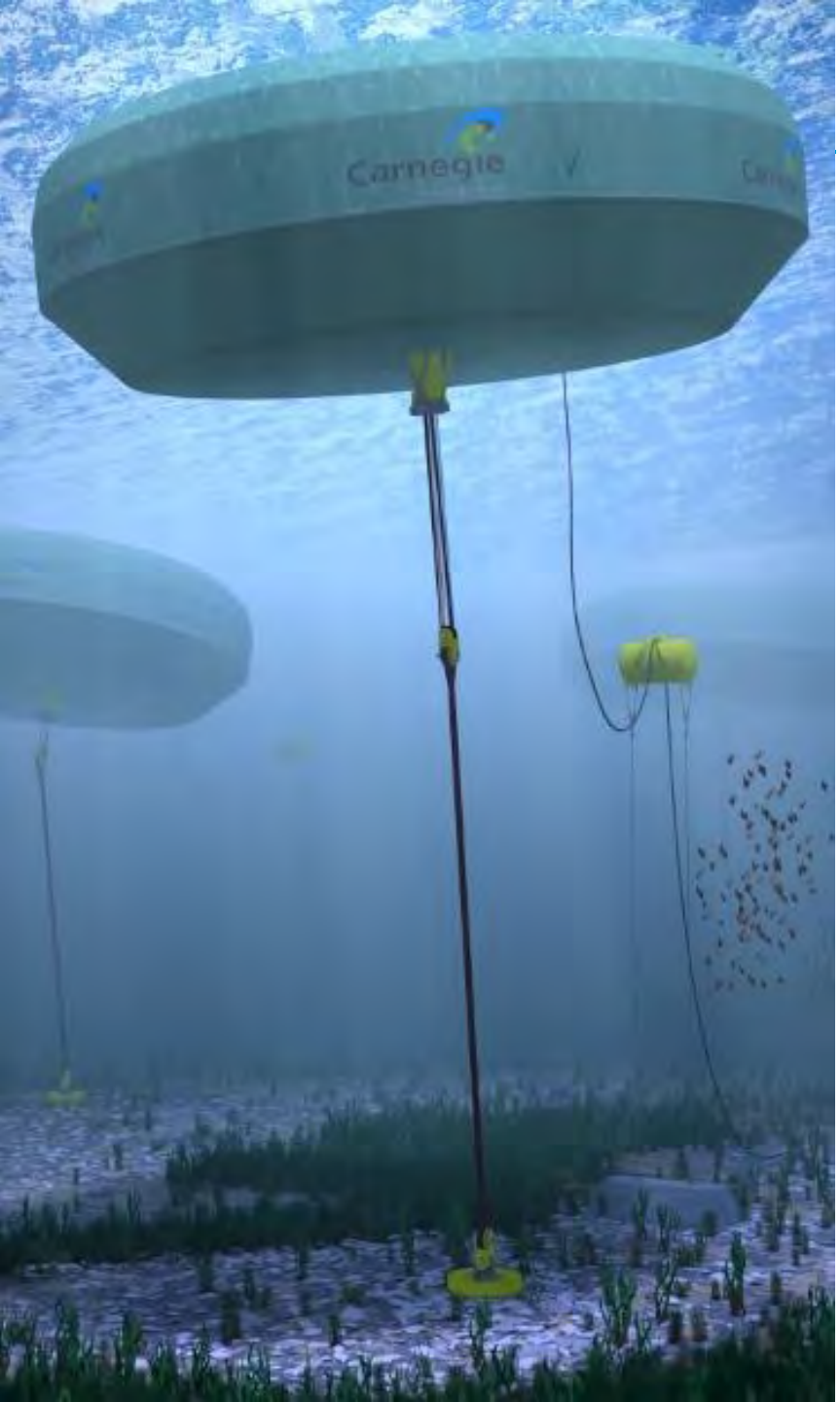

Carnegie Wave Energy Update & Lessons Learned

8th September, 2015

Jonathan Fiévez

Chief Technology Officer

Carnegie
wave energy

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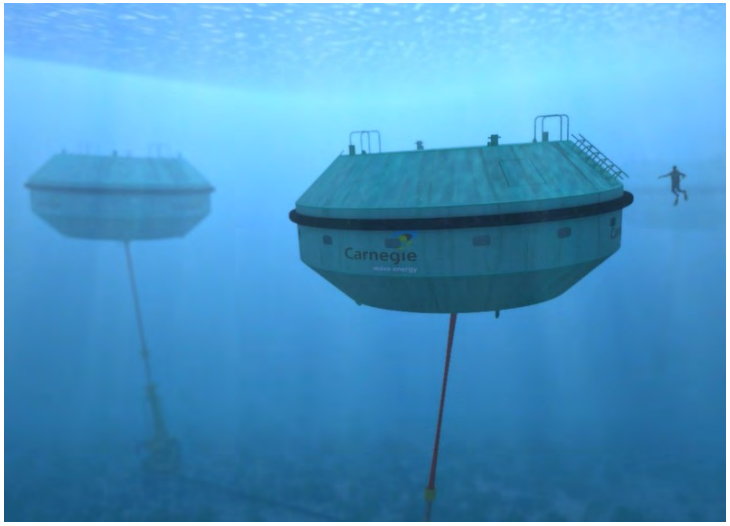
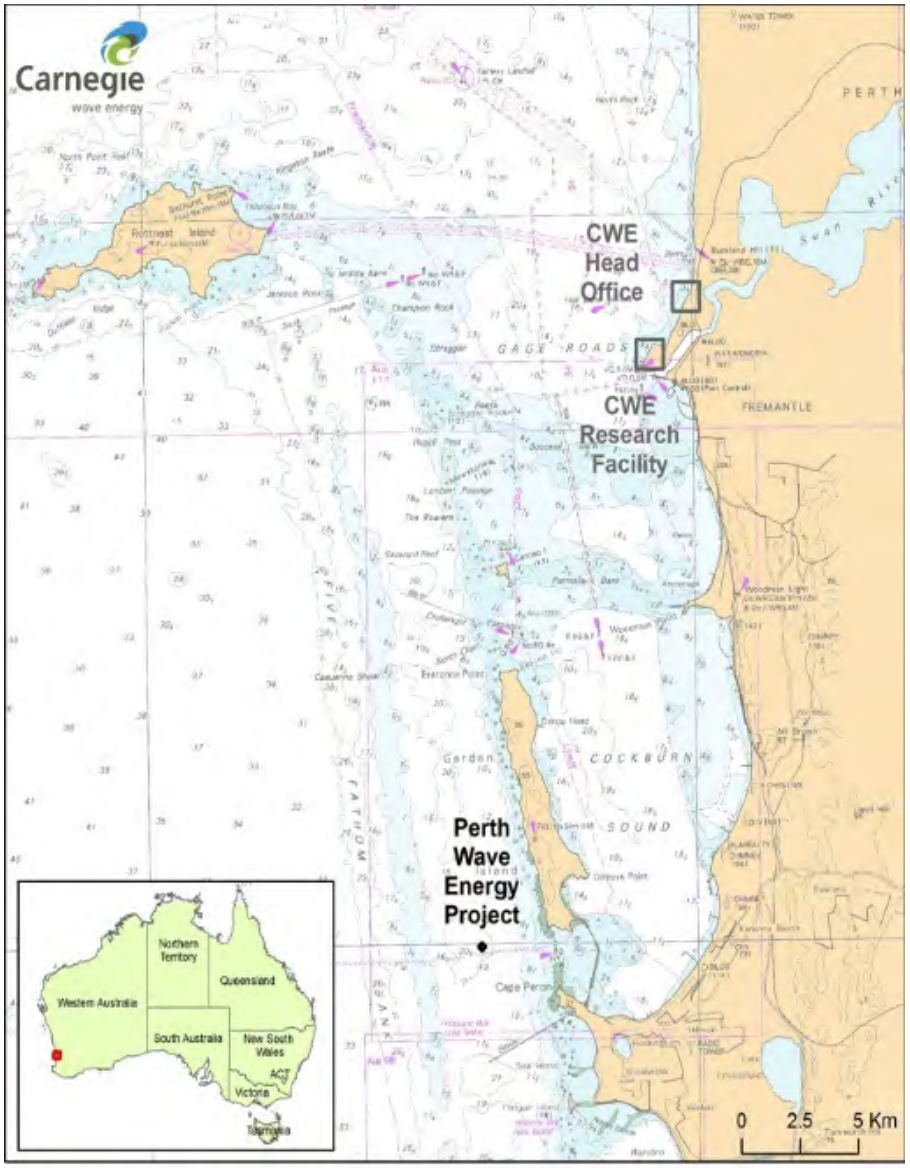
Carnegie Overview

- Owner and developer of “CETO” wave energy technology
- 46 engineering, commercial, administration staff
- ASX listed, based in Fremantle, Western Australia
- 120 Patents or patents pending globally
- $100m spent to date on CETO
- 100% owned subsidiaries in the UK, Ireland and Chile

Perth Wave Energy Project – aims & objectives

- Demonstrate CETO 5 technology including:
  - Multiple WECs
  - Power delivery to grid
  - Wave powered reverse osmosis desalination
  - <1 day CETO WEC installation
- 2014 commissioning
- 12 months operation





Perth Wave Energy Project - formation

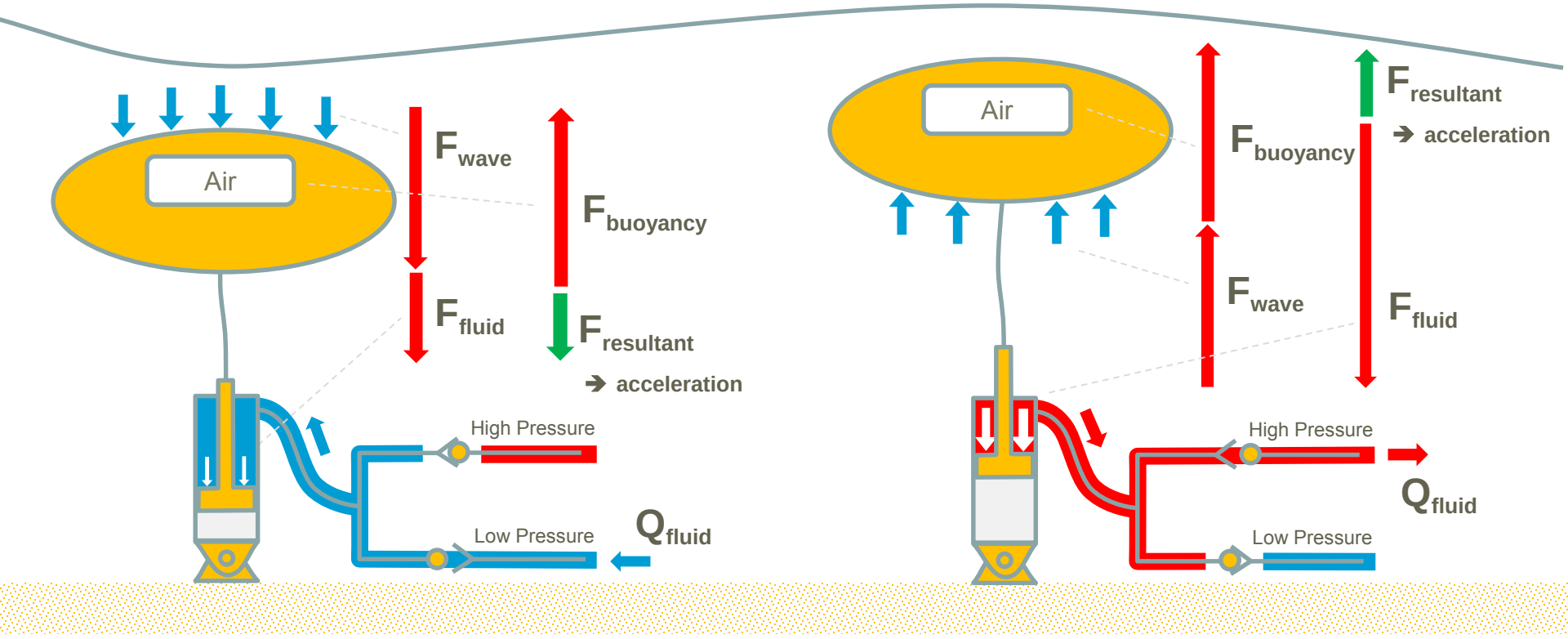
- Funding secured for 3 Unit project ~$30m
  - $22m in Government grant funding
  - Carnegie equity (shareholders)
- Power & Water Offtake to Australian Department of Defence (HMAS Stirling)
- Project team formed
- Approvals received

CETO Fundamentals

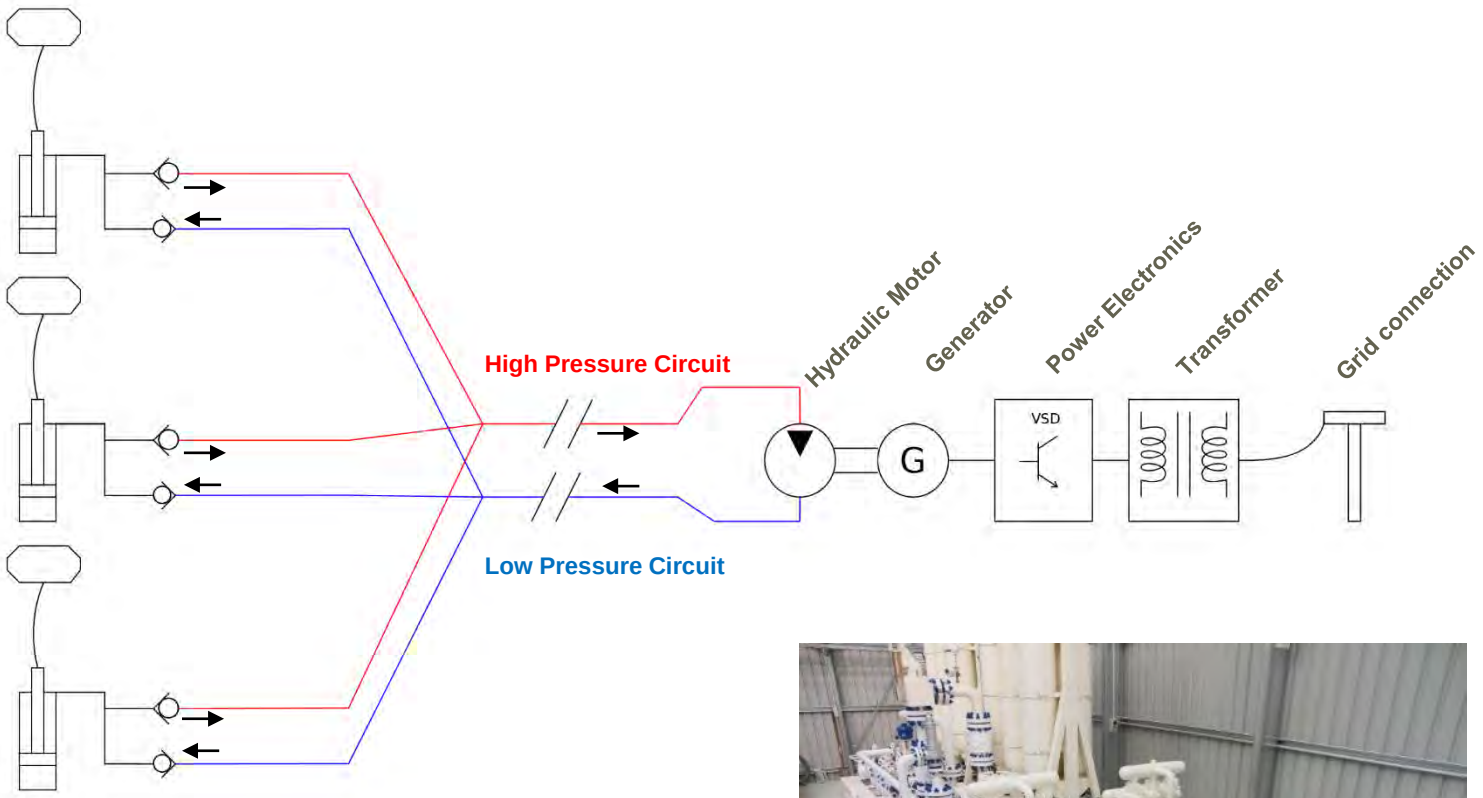
Carnegie wave energy

Waves driving buoy downward – hydraulics assisting

Waves and buoyancy pulling buoy upward – hydraulics resisting

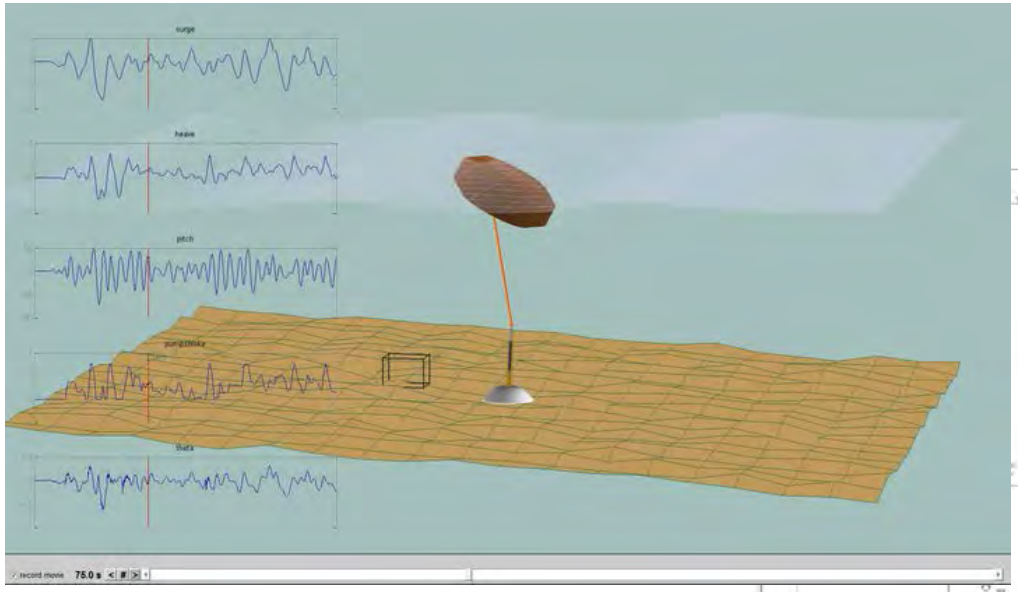


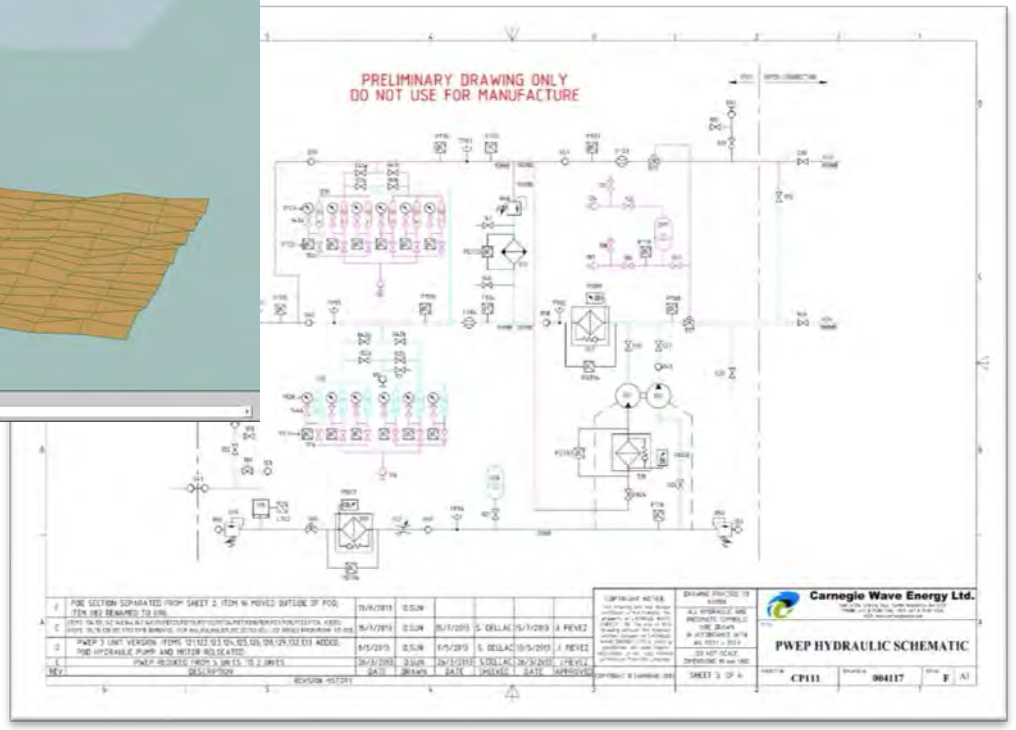
CETO 5 System Architecture



Perth Wave Energy Project – system design

- System design conducted in accordance with Systems Engineering principles
- Modelling techniques developed by Carnegie
- Simulations determined load cases and design limits





Perth Wave Energy Project – CETO WECs

- Designed in-house by Carnegie engineers
- Fabrication and logistics managed by Carnegie engineers and project team

Perth Wave Energy Project – infrastructure

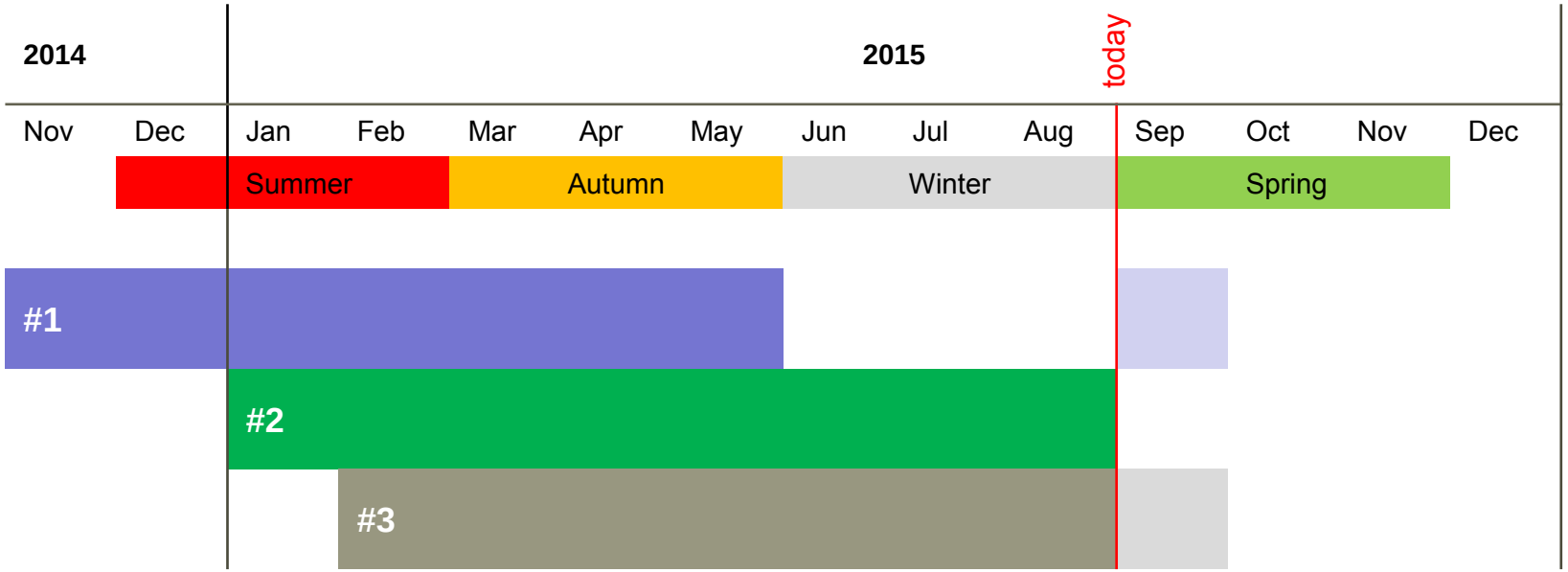
- Pile foundation contract managed by Carnegie Project Team
- Pipe and data cable installation contract managed by Carnegie Offshore Team

Perth Wave Energy Project – WEC installation

- 1st WEC install required 3 days
- 2nd & 3rd WEC installations completed in 1 day
- Retrievals completed in 2 days
- 6 separate WEC install/recovery operations
- Validation of “hot swap” methodology

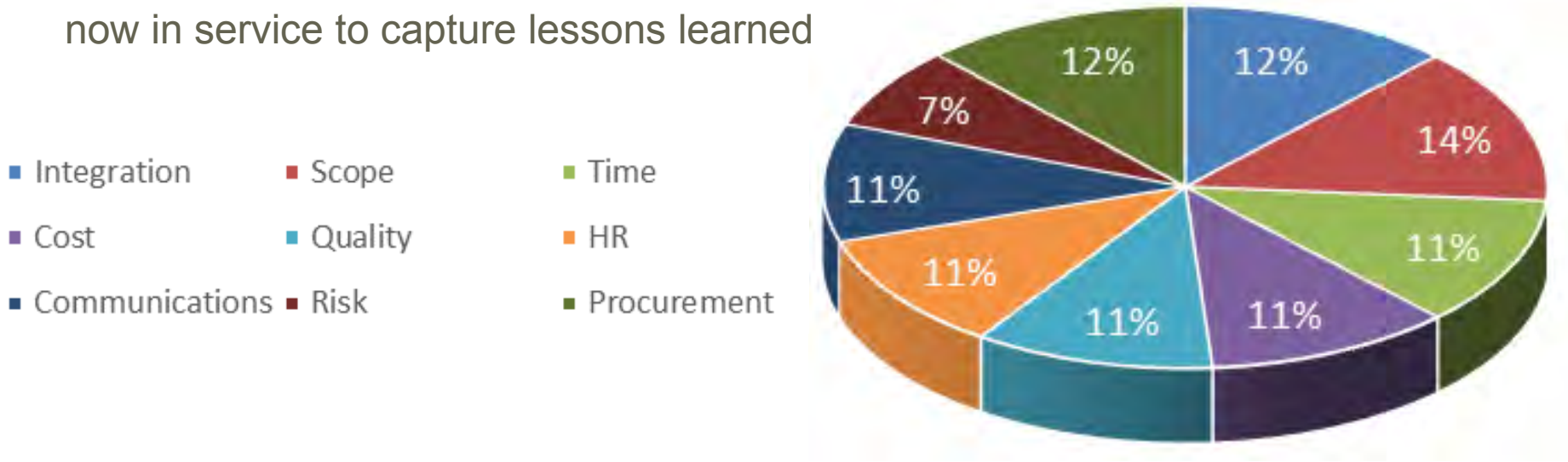
Perth Wave Energy Project - operation

- > 13,500 hours of cumulative operation
- Exporting power to grid and production of desalinated water
- Range of sea states experienced up to ~6m Hmax
- Regular inspection and maintenance
- >600 GB of data captured



Lessons Learned – overview

- Formal lessons learned process followed shortly after commissioning
- Survey conducted with entire Carnegie team
- Over 600 line items analysed
- Very even split between bodies of knowledge (BOKs)
- Continuous Improvement Programme (CIP) now in service to capture lessons learned



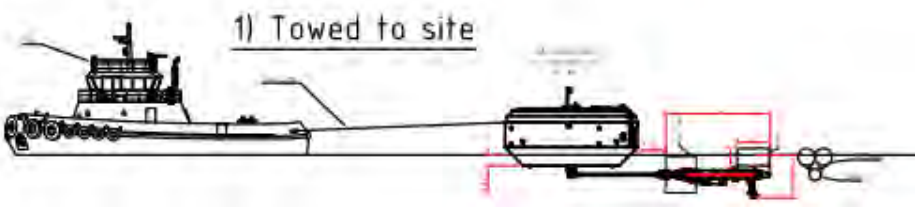
Lessons Learned #1 - value of multiple WECs

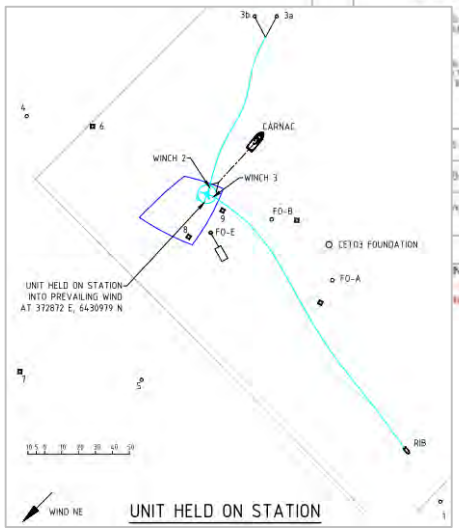
Carnegie wave energy

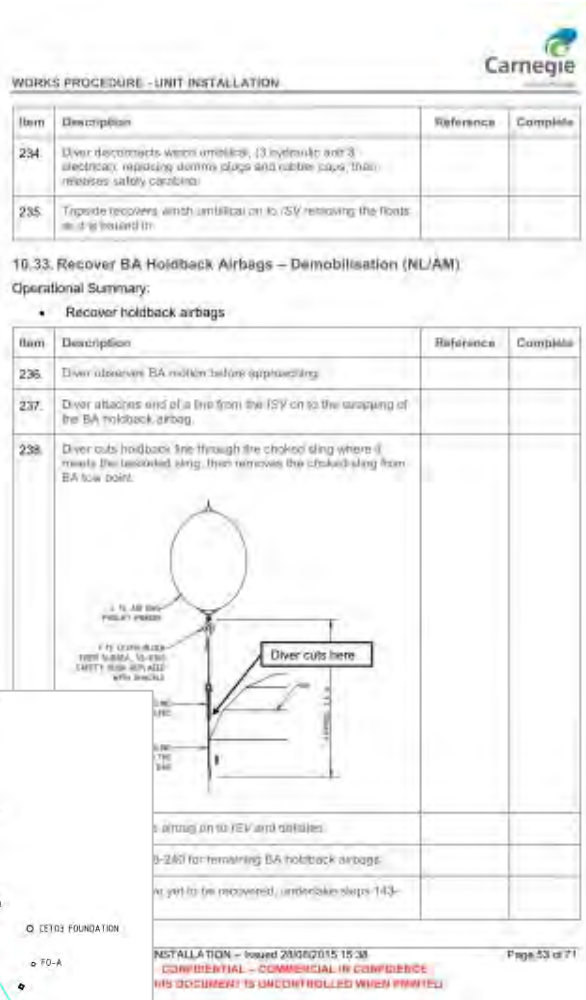
- Having multiple WECs was beneficial
- The inherent redundancy offered:
  - Faster time to ‘first power’ since working components could be robbed from other WECs
  - Some components only testable in-service so subsequent WECs were able to be upgraded with improvements
  - More uptime of the Onshore Plant
- Learnings were transferable with staggered deployment
- Multiple WECs gave more data statistical certainty. Important if data is limited by faults, etc.

Lessons Learned #2 - design for construction early

- Early design work on logistics and WEC installation/recovery resulted in:
  - Simpler procedures
  - Reduced costs for offshore work
  - Reduced risk due to reduced reliance on people/divers
  - Shorter activity durations minimising weather window issues
- In cases where ‘constructability’ was missed, difficulties ensued
- Ensure early design is developed into detailed procedures






Carnegie

WORKS PROCEDURE - UNIT INSTALLATION

Item	Description	Reference	Complete
234.	Diver disconnects vessel umbilicals, (3 hydraulic and 3 electrical), replacing dummy plugs and rubber caps, then releases safety carabiner.		
235.	Topside recovers winch umbilical on to ISV removing the floats as it is heaved in.		

10.33. Recover BA Holdback Airbags – Demobilisation (NL/AM)

Operational Summary:

- Recover holdback airbags

Item	Description	Reference	Complete
236.	Diver observes BA motion before approaching.		
237.	Diver attaches end of a line from the ISV on to the wrapping of the BA holdback airbag.		
238.	Diver cuts holdback line through the chokel sling where it meets the lassoed sling, then removes the chokel-sling from BA tow point.		

Diver cuts here

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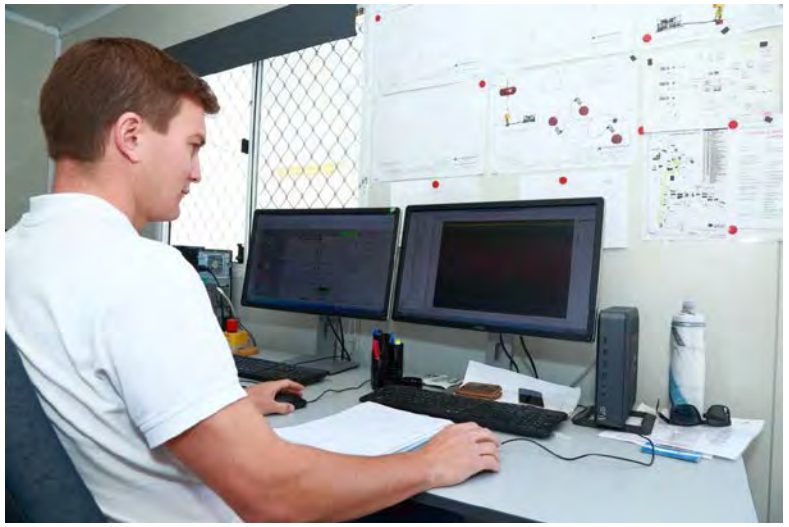
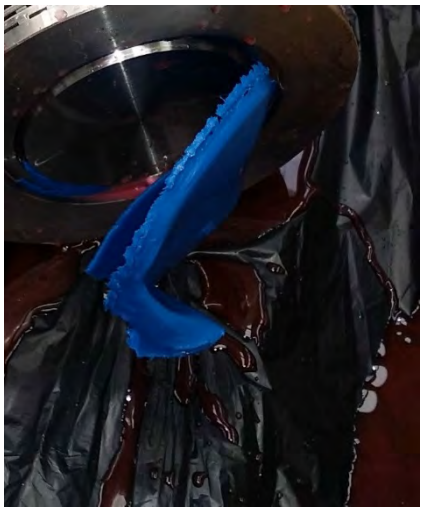
Lessons Learned #3 - recruit dedicated operators

- Wave energy demonstration plants require 24/7 attention
- Initial reliance on engineers and project staff to be plant operators who were tired from commissioning
- Graduate and undergraduate engineers and scientist now trained as operators
- Very good performance and attention to technical detail from operators
- Presents pool of talent for potential engineering positions



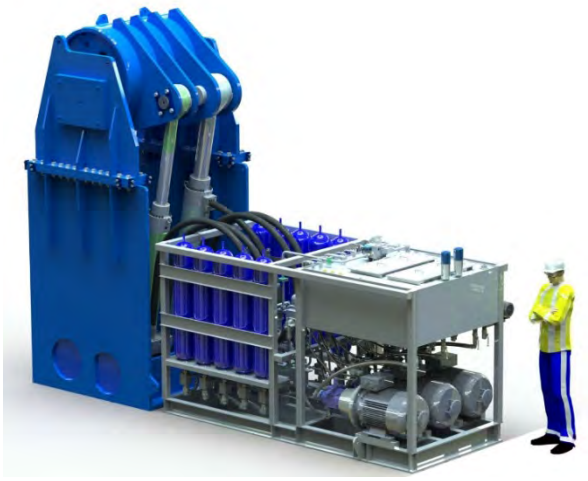
Lesson learned #4 - manage contamination carefully

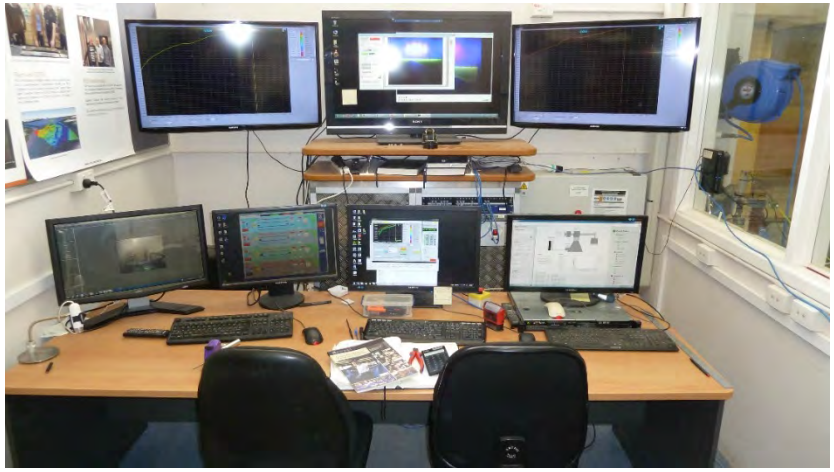
- System cleanliness extremely important for reliability of plant
- Several components susceptible to failure
- Failures due to contamination can lead to further contamination
- Cleanliness important on a micro and macro level
- CANNOT assume suppliers will deliver clean equipment
- CANNOT assume flushing of assembled system will remove contamination entirely
- Mitigation strategies only as good as initial fluid cleanliness



Research – key activities

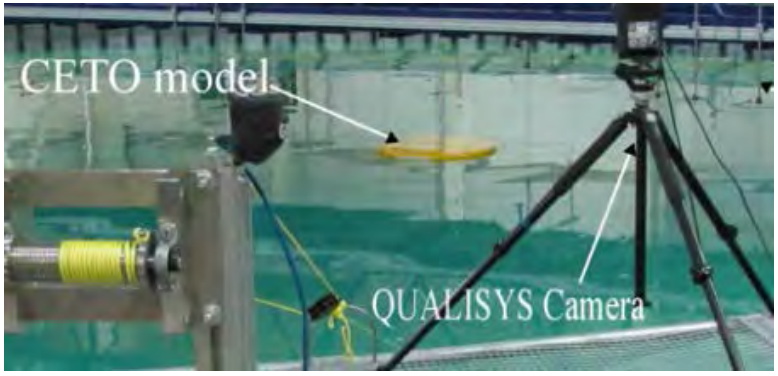
- Significant internal research on system control and hydrodynamics
- External research includes:
  - foundation design with UWA using centrifuge to characterise pile performance and novel non-pile solutions
  - Optimal controller research underway with University of Adelaide
  - High reliability PTO with WavePOD consortium (Carnegie, Aquamarine, Bosch Rexroth) in Scotland





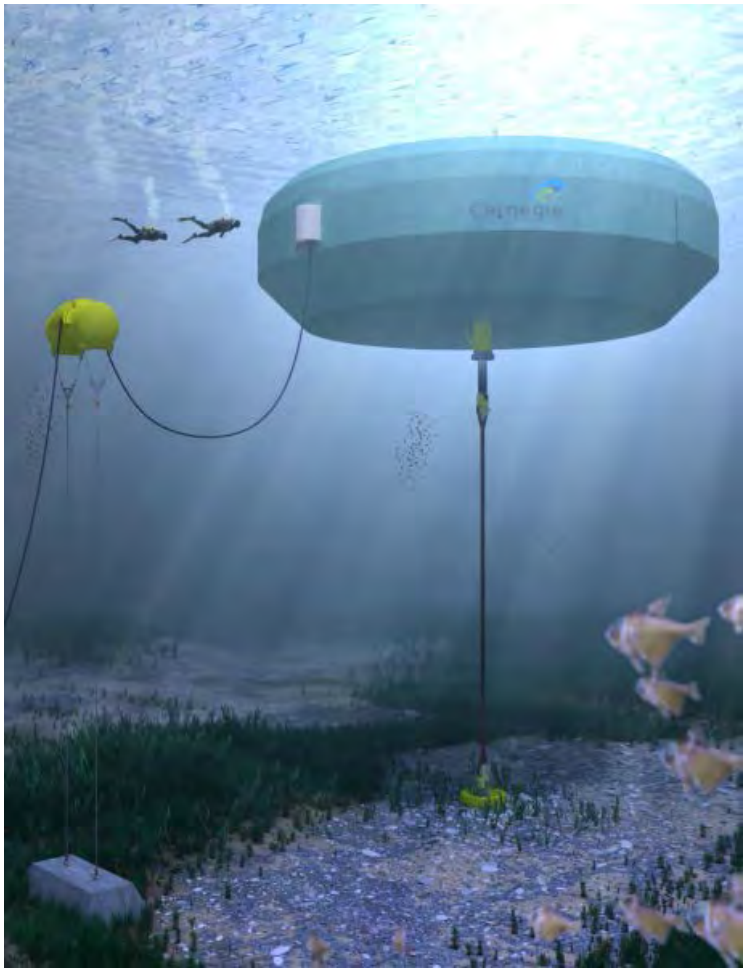
Wave Tank Testing – CETO 6 design development

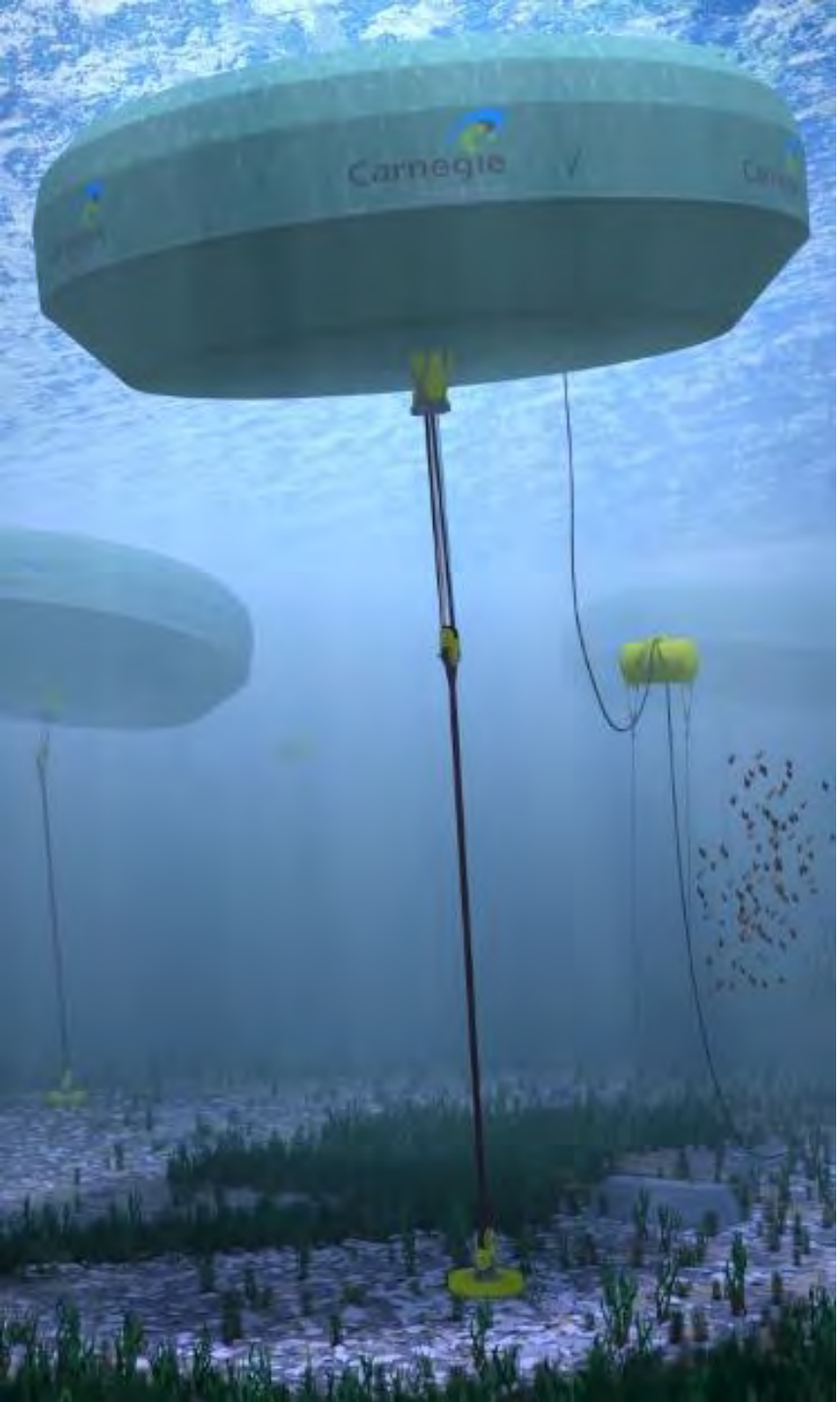
- FloWave Ocean Energy Testing Facility, Edinburgh
- Objectives:
  - Understand the performance of CETO 6 under a range of operational conditions
  - Measure loads under very high energy conditions
  - Validate Carnegie's numerical modelling
- Results showed excellent agreement with numerical modelling, including power output and improved performance through advanced tuning



CETO 6 - next generation

- 1MW capacity target
- 4 x increase in rated capacity vs CETO 5 → ~50% increase in diameter
- On board power generation
- First commercial production design
- CETO 6 Demonstration Project:
  - Garden Island, Western Australia
  - Design start: 2014
  - Project construction: 2016
  - Project commissioning: 2017





Environmental Management & Monitoring

The Perth Wave Energy Project

EWTEC 2015

8 September 2015

Tim Sawyer &

Edwina Davies Ward

Carnegie
wave energy

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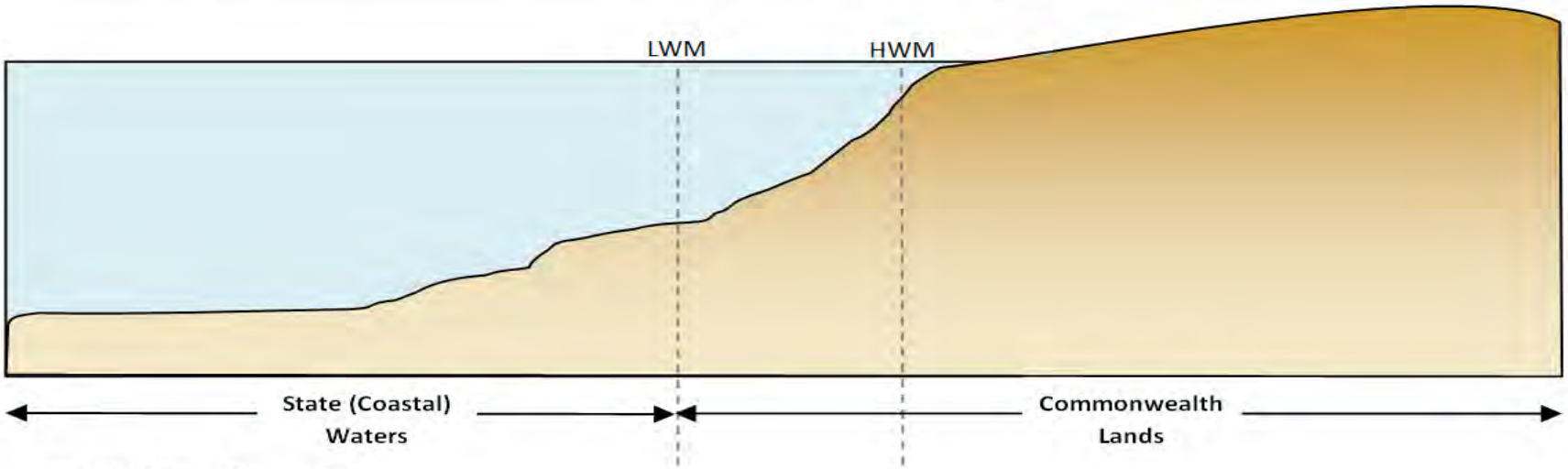
Perth Wave Energy Project (PWEP)

- Garden Island, Western Australia
- 3 x CETO 5 units
- Onshore power plant, reverse osmosis desalination and grid connection
- Power & Water Offtake to Australian Department of Defence (HMAS Stirling)
- Unique test bed globally for monitoring environmental impacts of WEC arrays

PWEP Legislative Framework: Multiple Jurisdictions

Carnegie wave energy

1 - Subsurface CETO Unit Array	2 - Offshore Pipelines	3 - Onshore & Shore Crossing Pipelines	4 - Onshore Generating Facility	5 - Power Offtake



Principal State Approvals

- Land Administration Act 1997
- Navigable Waters Regulations 1958
- Environment Protection Act 1986
- Wildlife Conservation Act 1950
- Conservation and Land Management Act 1984
- Aboriginal Heritage Act 1972
- WA Planning and Development Act 2005

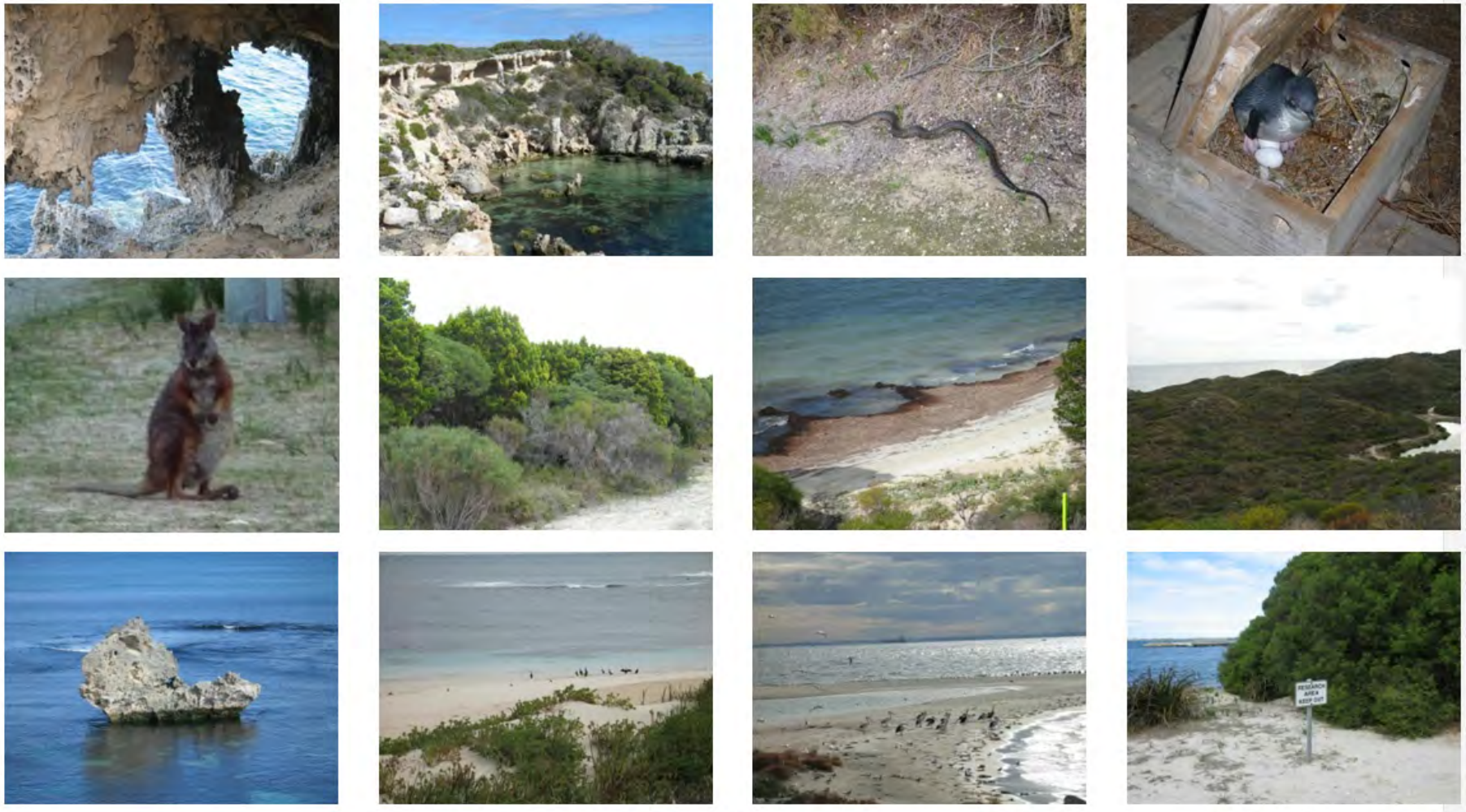
- Lands Acquisition Act 1989
- Defence Act 1903 (inc. Defence Instructions)

Principal Commonwealth Approvals

- Environment Protection and Biodiversity Conservation Act 1999
- Native Title Act 1993 (Note, Native Title has been extinguished over Commonwealth (Defence) lands to the low water mark)

Controlled Naval Waters Act

PWEP Terrestrial & Marine Environment



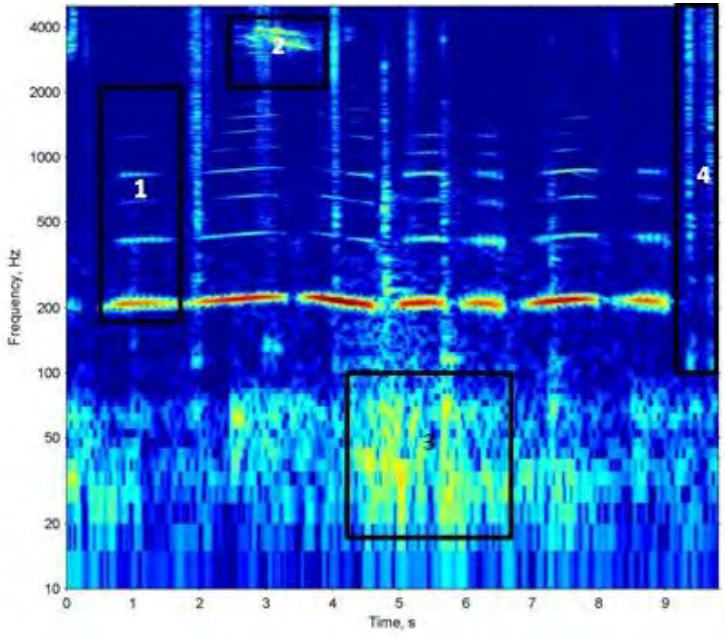
Heritage values of Garden Island, Western Australia
(Department of Defence 2011)

PWEP Environmental Management

- Early and ongoing consultation
- Leveraging international experience
- Working alongside engineers to improve design & delivery
- Comprehensive EIA and effective management measures
- Overall, PWEP assessed with no high or unacceptable risks or potential impacts after management

PWEP Environmental Monitoring & Assessment

- Collaborative approach
- Ongoing monitoring and assessment:
  - Underwater noise
  - Sediment & water quality
  - Coastline impacts
  - Impact on sea users, flora & fauna



PWEP Environmental Monitoring & Assessment




Revegetation June 2014



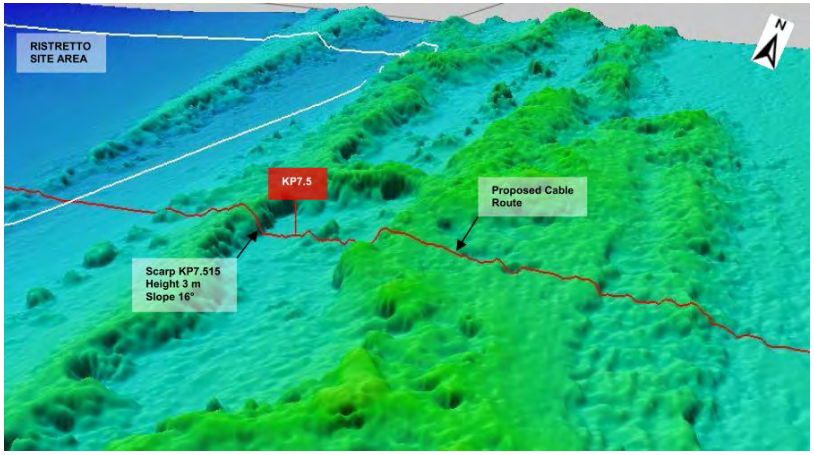

Revegetation June 2015

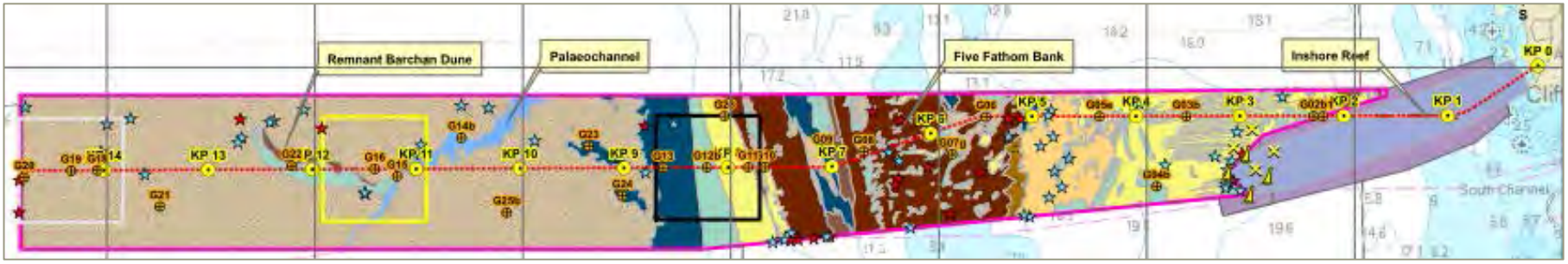
PWEP Operations

- 3 units, > 13,500 hours of cumulative operation
- Exporting power to grid
- Range of sea states experienced
- Regular inspection and maintenance
- CETO unit and system performance in line with expectations
- Proven deployment and retrieval capability
- Within consent conditions and in accordance with our comprehensive Environmental Management System.

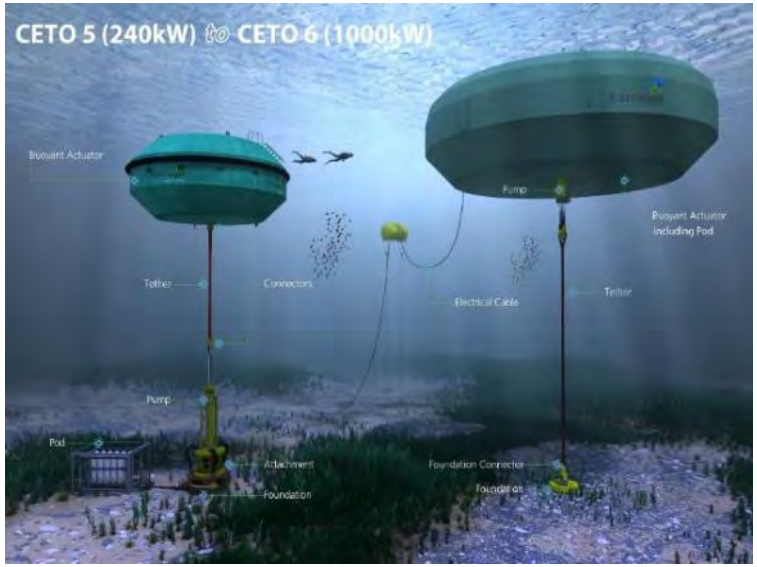
CETO 6 Project – site characterisation

- ✓ Offshore site geophysical and environmental surveys complete
- ✓ Preferred project site identified





Upcoming Milestones



2014:

- ✓ Construction of the Perth Project
- ✓ CETO 6 Project design and funding

2015:

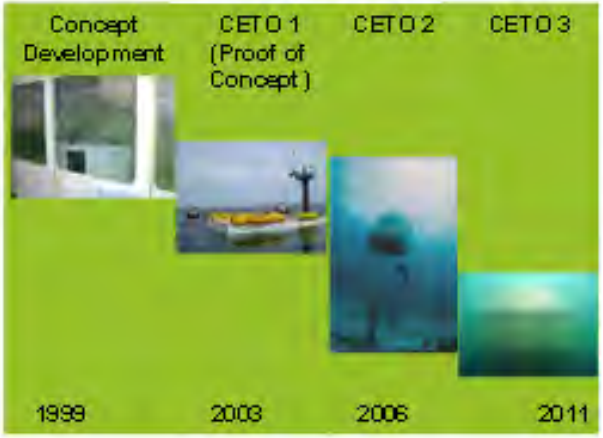
- ✓ Perth Project grid connection & operation
- ✓ 13,500+ hours cumulative operation
- ▪ CETO 6 Project development

2016/17:

- ▪ Construction of CETO 6 Project in Australia
- ▪ Development and construction of CETO 6 Project in the UK

CETO Development Pathway

Completed



Demonstration Projects

CETO5 Perth Wave Energy Project (Australia)

2014/15

CETO6 Projects Australia & UK

2017/18

Commercial Projects

CETO6 >15MW Projects

UK

2020

CETO6 >30MW Projects

Multiple Options

+2020

Development capital

3rd party project funding/finance

Revenues