ASX Announcement

14 May 2018

Shareholder Update Presentation

Carnegie Clean Energy Limited (ASX: CCE) is pleased to release the shareholder update presentation to be delivered today by CEO Michael Ottaviano in Sydney. Further presentations are being held around the country this week as below.

CCE PRESENTATION DETAILS			
SYDNEY	**MELBOURNE**	**BRISBANE**	**PERTH**
14 May 2018	15 May 2018	16 May 2018	17 May 2018
12.30 pm-1.30 pm	12.30 pm-1.30 pm	12.30 pm-1.30 pm	10.00 am-11.00 am
EY Office: 200 George Street Sydney	KPMG Office: Level 37, Tower Two Collins Square 727 Collins Street Docklands	KPMG Office: Level 16 Riparian Plaza 71 Eagle Street Brisbane	Fremantle Sailing Club 151 Marine Terrace Fremantle

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Shareholder Update Presentation

Dr Michael Ottaviano
CEO & Managing Director
Carnegie Clean Energy

Carnegie
CLEAN ENERGY



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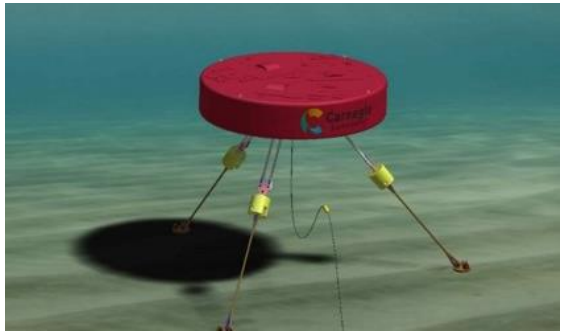
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Carnegie Overview

- ASX-listed developer of utility scale renewable energy projects. Leader in solar, battery, wave and hybrid energy solutions
- 100% owner of Energy Made Clean (EMC). 100% owner of CETO wave energy technology
- Focused on moving both wave and solar/microgrid businesses to profitability as quickly as possible
- Integrator of complex systems – either design and construct (D&C) or build, own & operate (BOO)
- Business model across the full value chain of design, development, finance, construction, operation and maintenance
- $5.2m cash, $31m in grants, $9.8m in R&D & project debt facilities, $6.3m con notes @ 4.0-5.3c.
- 50/50 EMC & Lendlease Services JV to solar and battery EPC nationally with $30m+ order book and $100's million multi-year pipeline







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Carnegie Competitive Advantage

- Carnegie is focused building competitive advantage in specific areas of the renewables market and value chain in order to build a financial sustainable business. We focus on three business areas:

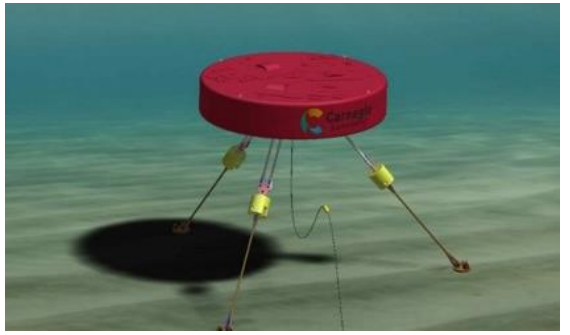
  - Engineering, Procurement and Construction (EPC) – via EMC with a focus on ca. $2m - $20m projects that involve a level of complexity either technically (e.g. microgrids) or commercially (e.g. development risk).

  - Build, Own and Operate Projects – via in house development team from greenfields site to financial close including site acquisition, approvals, design, grid and finance of $2m - 20m capex projects.

  - Wave energy – commercialisation of proprietary CETO wave energy technology with in-house system development and CFD team working in conjunction with specialist supply chain participants and research organizations and Governments locally, nationally and internationally.

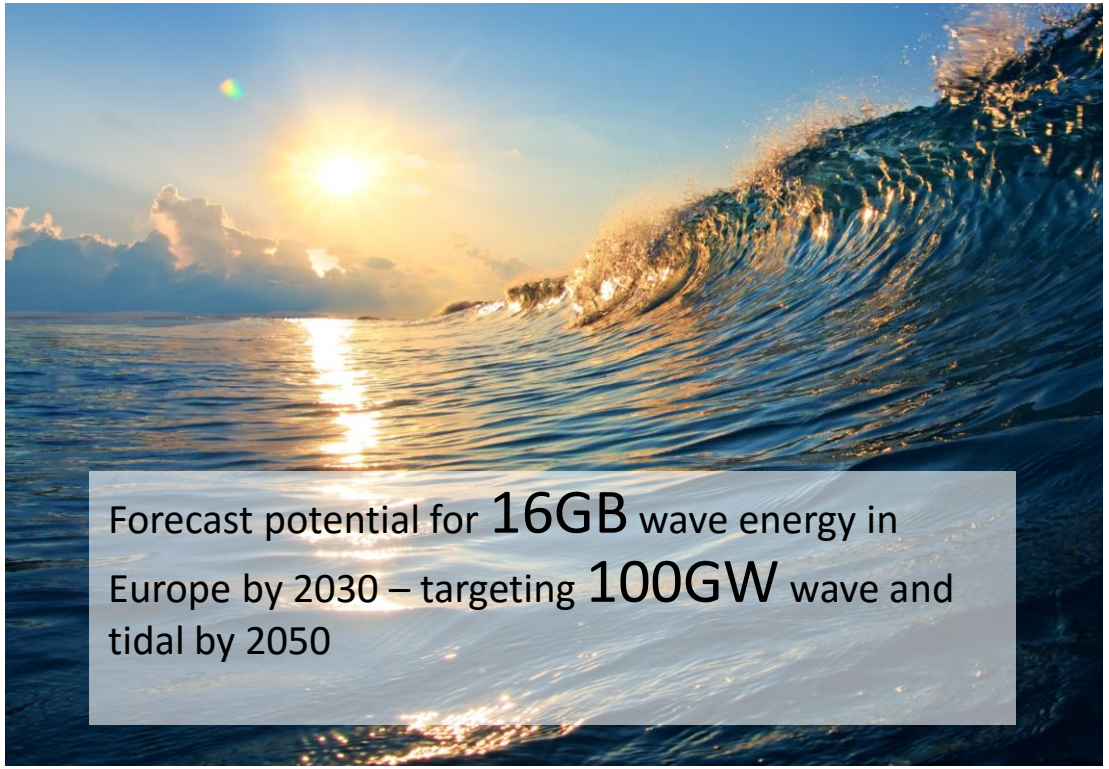






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Market Potential





"Global market for ocean energy could see 337GW of installed capacity by 2050. Of this, around 188GW is expected to be wave energy"

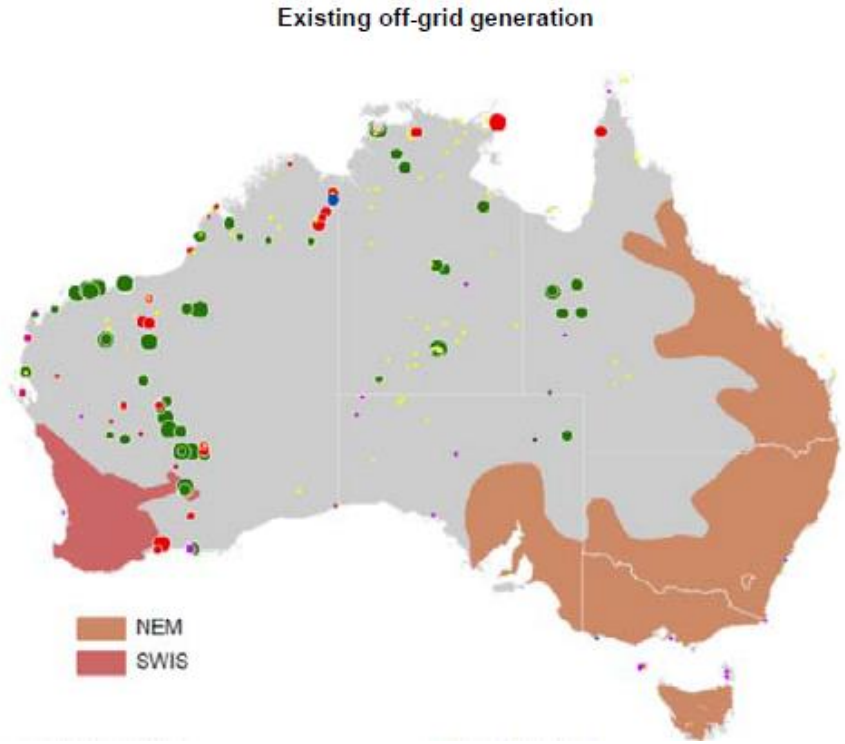
Ocean Energy Europe

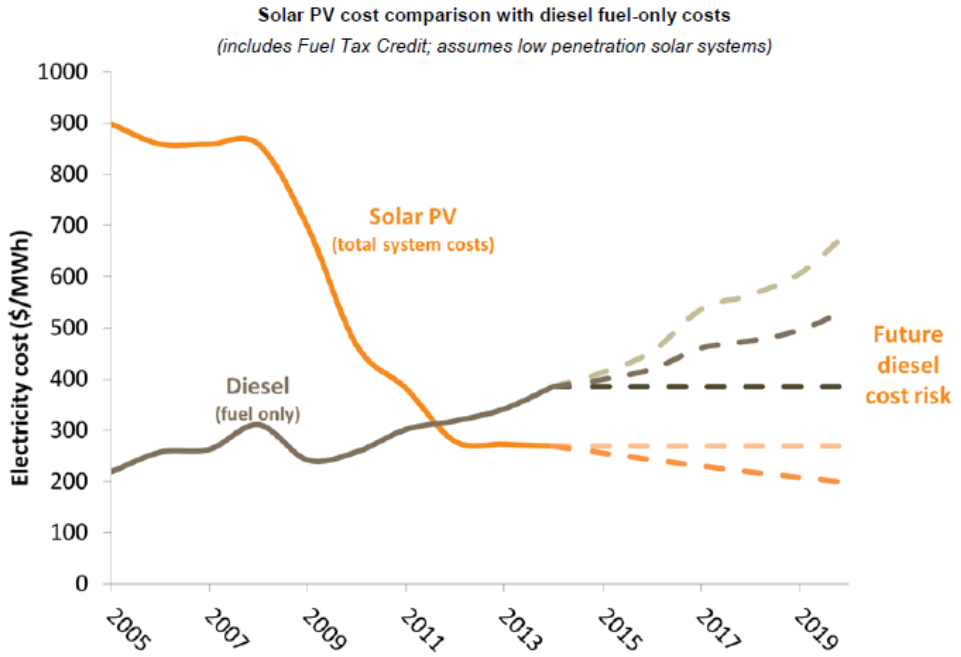
"Global deployment in microgrids had generated an estimated US$4.3bn per annum in 2013, expected to grow to US$40bn per annum by 2020"

Navigant Research

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Market opportunity example – off grid



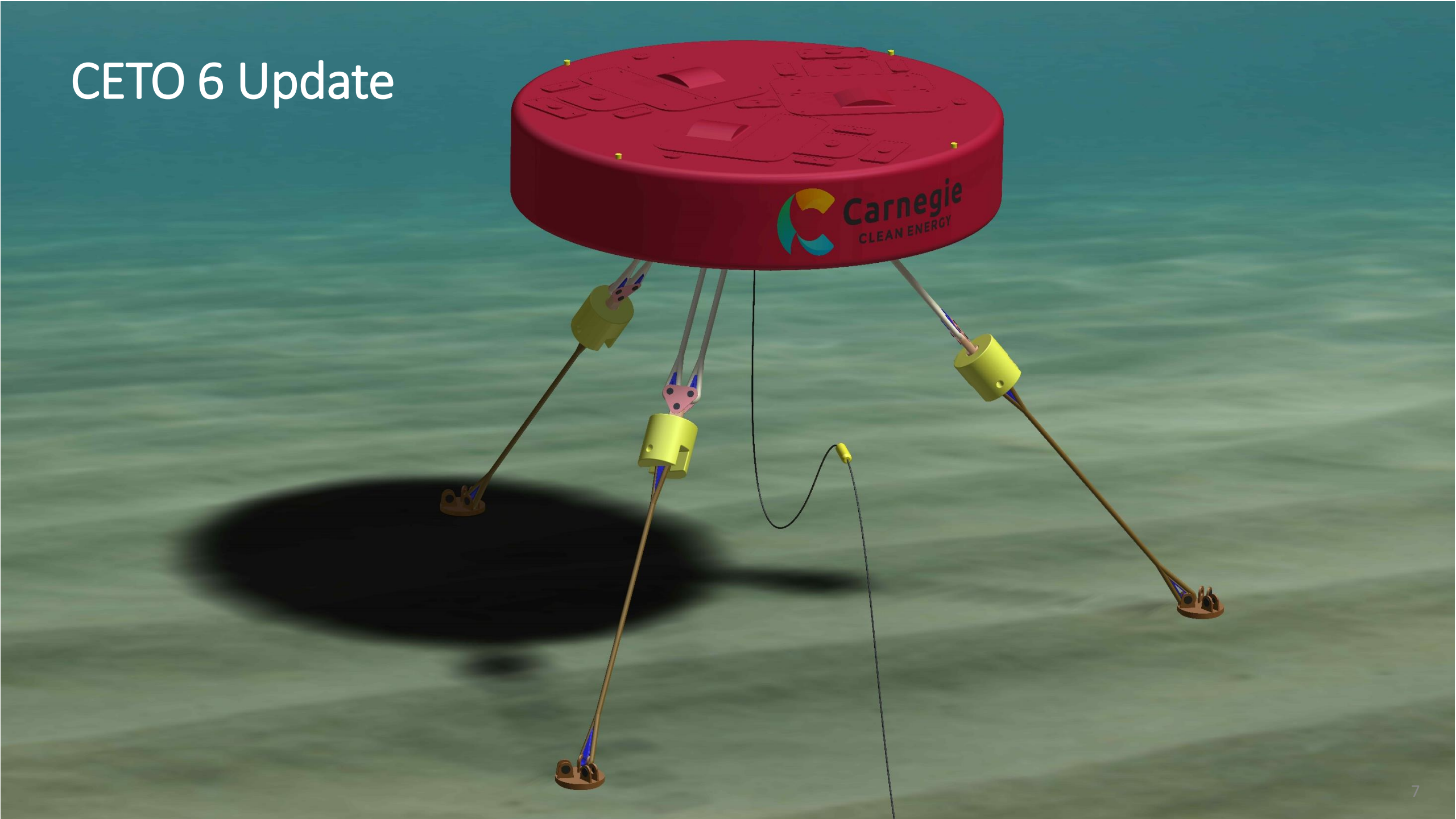


Source: Australian National University Centre for Sustainable Energy Systems, 2014

- >1.2GW of diesel generation installed in off-grid Australia at a cost **of $240-450/MWh in fuel only** (excluding capital costs).
- Costs likely to rise over time and are vulnerable to price shock events or supply chain interruptions in international markets
- Solar PV/diesel systems are already more competitive than the cost of diesel
- Solar/battery/diesel systems now competitive with diesel and more reliable. Customers who value reliability highly will be early adopters e.g. utilities and defence.

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CETO 6 Update





Albany Wave Energy Project

- Objective is to prove in ocean the most competitive commercial CETO unit optimizing the best performance with the lowest direct cost to CCE whilst managing risk.
- Supported by $16m in WA Government grant funding along with $12m in ARENA funding.
- Delivery of world-first CETO 6 commercial prototype off Albany, south-west coast of Western Australia
- Albany wave resource, best in world - 24/7. Adjacent to Synergy wind farm and Western Power SWIS network.
- Design and development underway. Unit manufacture 2019. Installation summer 2019/20.
- Wave Energy Research Centre funded by $3.5m WA Government grant brings additional value.

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Albany Wave Energy Project Update

- completion of a connection feasibility study with Western Power indicating no barriers to grid connection of the project anticipated;
- completion of a site LIDAR survey by Australian Hydrographic Office that gathered detailed bathymetry data to support the site characterisation and metocean modelling;
- award of geophysical survey contract to inform the site characterisation and design of the foundations and shore crossing;
- local supplier briefing and engagement and ongoing stakeholder engagement;
- completion of a metocean modelling study;
- deployment of an acoustic wave and current meter and ongoing monitoring of the previously deployed wave buoy; and
- local site investigations, studies and surveys.



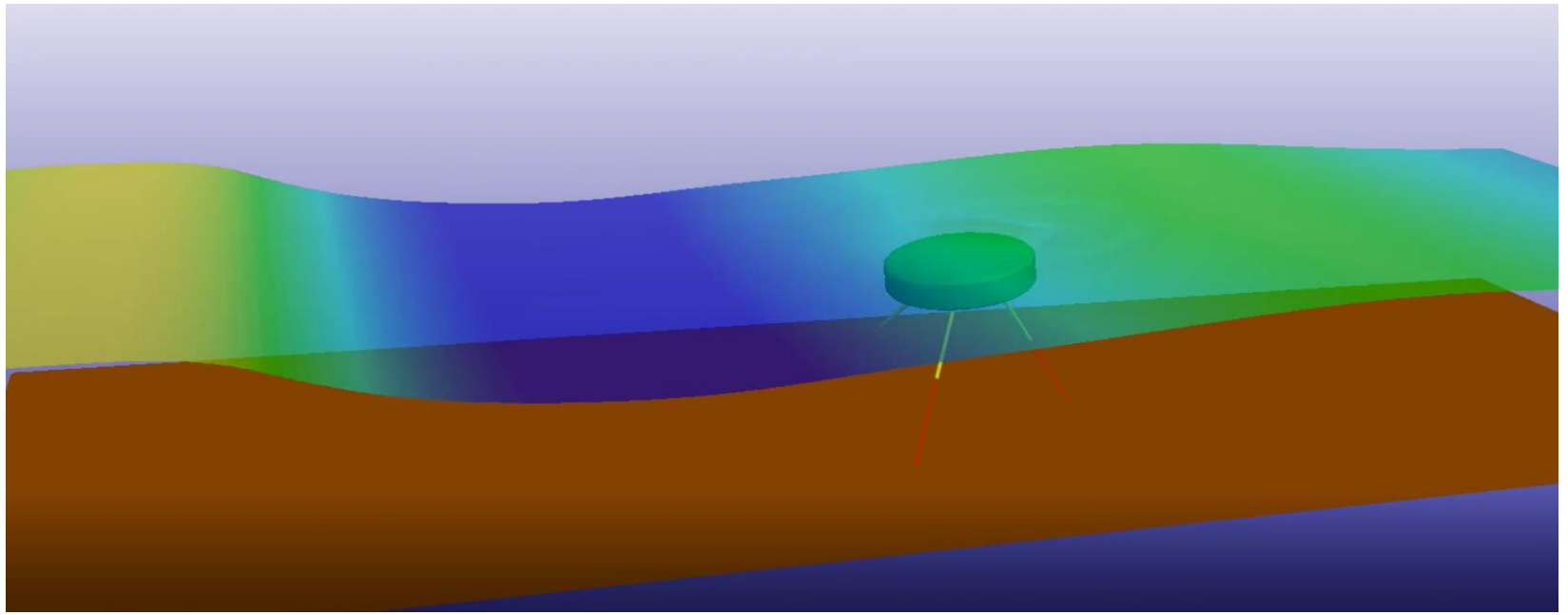




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CETO 6 Update

- Extensive CFD modelling of the CETO 6 unit in the Albany wave resource (utilizing Pawsey super computer)
- >15,000,000,000 simulations, 4,000,000 CPU hours, >500 different configurations tested (unit diameter, aspect ratio, PTO, moorings etc).
- Initial validation in wave tank testing. Final validation in-ocean.



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CETO 6 Update

- Wave tank testing campaign just completed at Plymouth University, UK on 1/20th scale CETO 6 unit.
- 500 test runs performed, 2 different mooring designs, 3 different wave directions, wave heights from 2m to 12m, tests up to 3 hour equivalent full scale for design (extreme) waves, over 600 data points (displacement, load, velocity, motion, elevation etc) for each run.



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Engineering, Procurement and Construction (EPC) business

- EMC is Carnegie's 100% owned EPC subsidiary
- EMC and Lendlease services in 50/50 EPC Joint Venture nationally
- EMC also continues to do some EPC projects independent of the JV
- Total EMC and EMC/LL order book built up from zero 12 months ago to $30m+ and $100's million multi-year pipeline currently.
- Example of current projects:
  - 10MW PV Northam Solar Farm: Client - Carnegie Clean Energy. EPC: EMC/LLS JV
  - 5MW BESS Kalbarri Microgrid: Client - Western Power. EPC: EMC/LLS JV
  - Solar/battery/diesel Delamere Microgrid: Client – Lendlease Buildings on behalf of Department of Defence. EPC: EMC
  - 5MW PV Summerhill: Client – Newcastle City Council. EPC: EMC/LLS JV
  - 2MW Garden Microgrid: Client - Carnegie Clean Energy (PPA to Department of Defence). EPC: EMC

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DOD Delamere Weapons Range Microgrid, Northern Territory

- Customers: Lendlease Buildings on behalf of Department of Defence
- Location: 400km south of Darwin, Northern Territory
- EMC won tender to design and construct microgrid
- Indicative of competitiveness of microgrids in off-grid locations versus diesel generation
- Reflects growing interest from sophisticated customers demanding solutions that delivery on reliability, security of supply, cost and GHG emission outcomes.
- Solar PV + Diesel + BESS to approximately 24/7 reliable power for 200kVA peak load
- Will deliver a 61% diesel consumption saving
- Construction update:
  - Construction of the solar array at site completed
  - Factory acceptance testing and factory successfully completed at EMC Belmont involving rigorous testing of the BESS containers, primary generators, solar invertors and microgrid control system
  - BESS containers now mobilised to the Delamere site for final installation, integration into other site systems

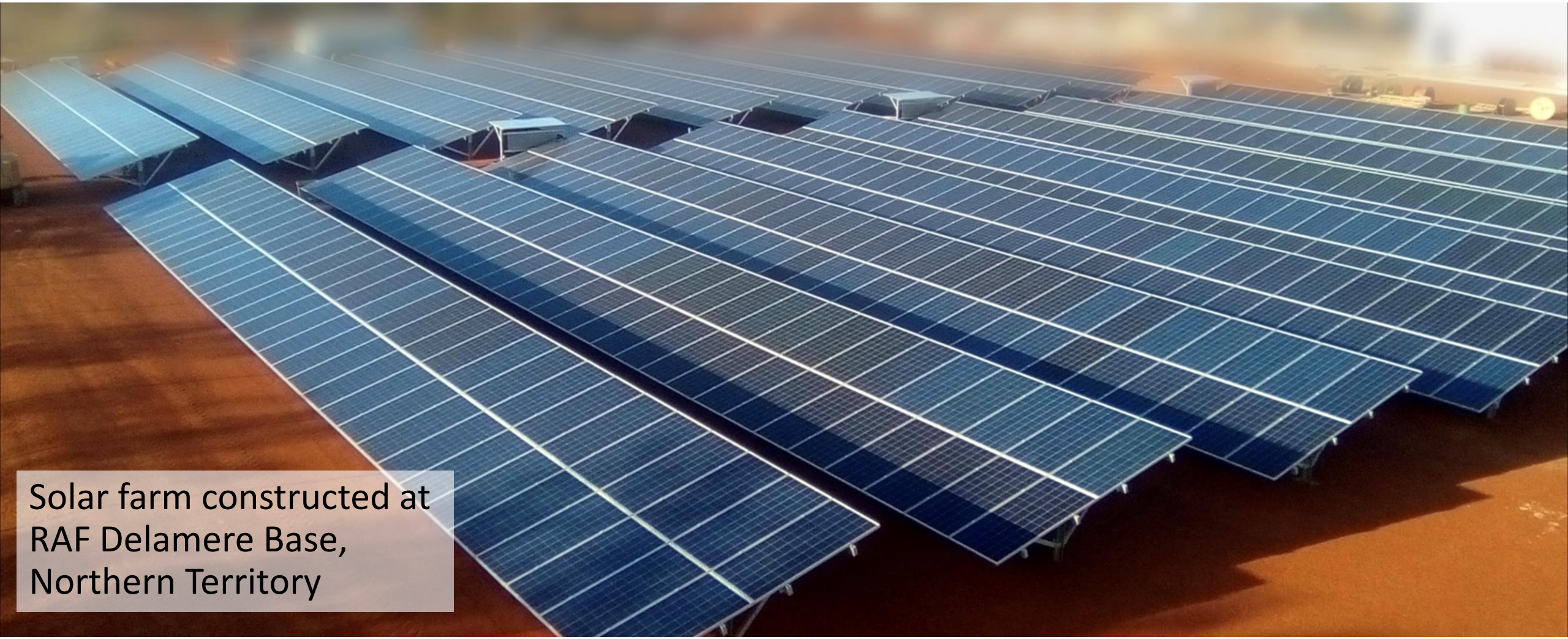
Australian Government
Department of Defence





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DOD Delamere Weapons Range Microgrid, Northern Territory



Solar farm constructed at RAF Delamere Base, Northern Territory

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DOD Delamere Weapons Range Microgrid, Northern Territory



Factory acceptance testing at EMC Belmont, WA



Microgrid system installation on site

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CSIRO Square Kilometre Array - Off-Grid Hybrid System



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Standalone Power Systems - Poles and Wires Replacement

- Customers: Horizon Power and Western Power (WA Government)
- Location: Esperance and Ravensthorpe, ca. 500-700 km south-east of Perth, Western Australia
- Scope: EMC won tender to design and construct cost effective and reliable alternative to replacing poles and wires damaged in bushfires
- Features:
  - Systems between 10-80 kWh Lithium Batteries
  - Systems between 8-20 kW Solar PV ground mounted
  - Fully remote monitored and maintained by EMC
- 12 systems in the field now operating reliably for >18 months
- Opportunity to deliver 1000's of these systems in WA alone and then across Australia and region
- EMC continues to operate and maintain these systems on behalf of Western Power and Horizon Power







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Build, Own and Operate (BOO) business

- Carnegie and EMC use their combined technical and commercial capabilities via its in house development team to develop projects from greenfields site to financial close including site acquisition, approvals, design, grid and finance.
- These projects can provide a development fee at financial close and long term annuity revenues for Carnegie or shorter term capital return via refinancing or sale of asset.
- BOO projects also provide a self originated EPC pipeline for EMC and EMC/LL JV.
- First two BOO projects will enter operational phase in 2018
  - 2MW PV & 2MW BESS Garden Island Microgrid
  - 10MW PV Northam Solar Farm
- Carnegie has been actively building a pipeline of potential BOO sites and are moving these through the development process.

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Garden Island Microgrid

- GIMG integrates:
  - Existing diesel generation and grid infrastructure.
  - Large scale 2MW solar PV farm.
  - 2MW/0.5MWh battery storage and control systems.
  - 150kL/day desalination plant

- Battery funded by AU$2.5m from ARENA
- Wave site for future CETO deployment or industry peer
- Offtake to Department of Defence for power and water

Construction Update

- Commenced August 2017
- Solar farm and BESS construction complete
- Final grid approval now granted by Western Power allowing final cable installation and energisation in coming weeks

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Garden Island Microgrid







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Northam Solar Power Station



Artist Impression

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Northam Solar Power Station

- Carnegie's second build, own and operate project
- First merchant utility solar project in Western Australia
- 10MW solar power station in Northam, Western Australia (Located 100 km east of Perth)
- First large scale solar project to be delivered as part of the Energy Made Clean Lendlease joint venture
- Deliver approximately 24 GWh of electricity p.a., enough to power approximately 4,000 households for 25 year
- 34,000 solar panels will be constructed on 25 hectares of land
- Planned for the addition of utility scale battery storage in future
- Construction debt secured. Equity partner secured - IBA.

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Northam Solar Power Station

Construction Update

- Grid augmentation works largely complete
- Civils commenced e.g. roads, clearing, piling, trenching, fencing etc
- All long lead items procured
- On track for Q4 calendar 2018 commissioning



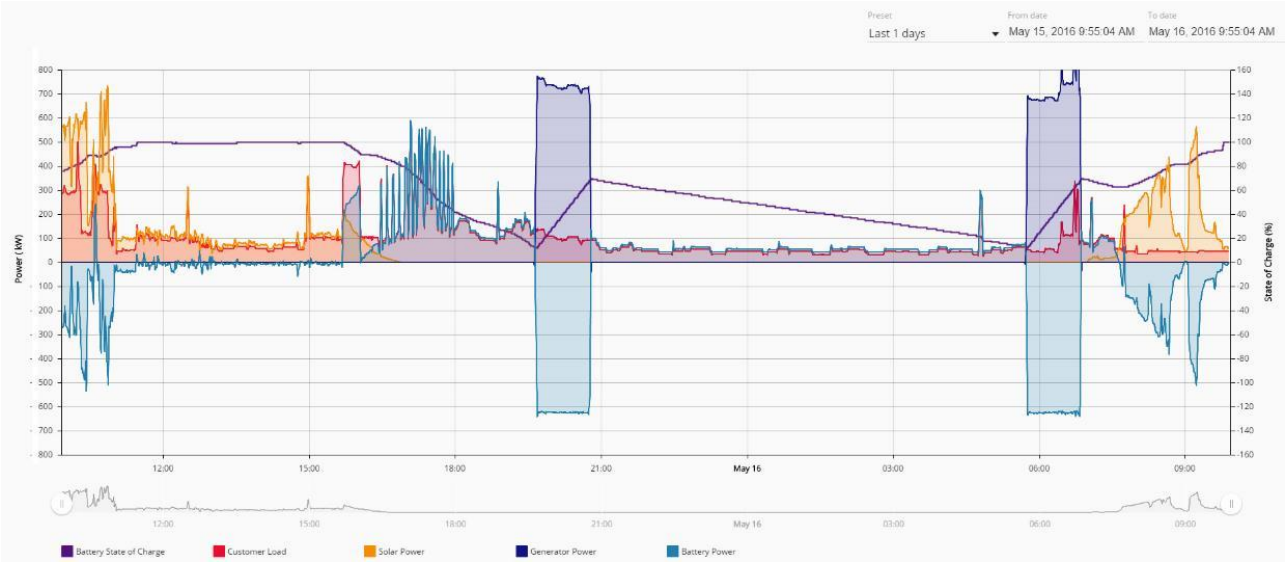
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Operations and Maintenance





- EMC has a dedicated operation and maintenance capability that remotely maintains ca. 30 systems in the field remotely its Belmont facility in WA.



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Looking Forward – 2H 2018



Northam

Construction completion

Commissioning and operations

Power sales

Garden Island

Microgrid Commissioning & Operations

Power sales



EPC

Completion and payments for Delamere & CSIRO microgrids, Summerhill 5MW PV

Kalbarri construction commencement

New project wins



Albany & CETO 6

Design and procurement

Development

Next Solar Build, Own and Operate

Business

Conversion of order book to revenues

Create pathway to profitability

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Thank You

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