ASX Announcement

15 November 2017

Carnegie Presentation at Annual General Meeting in Perth

Please find attached presentation delivered today by Carnegie's Chief Executive Officer Dr Michael Ottaviano at Carnegie's Annual General Meeting, in Perth.

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2017 Annual General Meeting

Dr Michael Ottaviano
CEO & Managing Director
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Carnegie
CLEAN ENERGY



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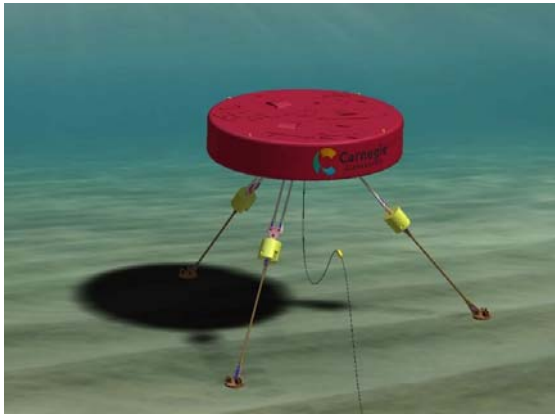
CARNEGIE OVERVIEW

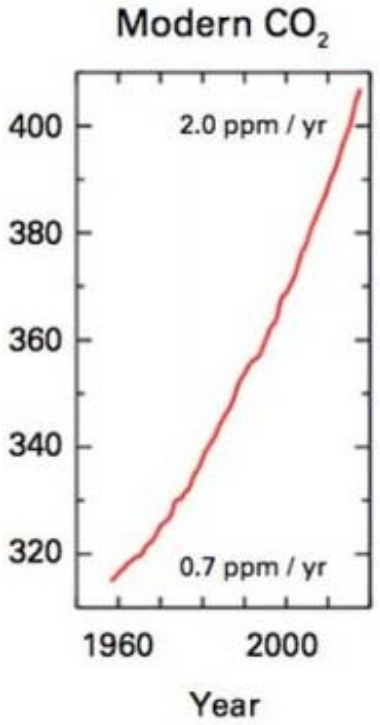
- Carnegie is an ASX-listed developer of utility scale renewable energy projects. It a global leader in the delivery of solar, battery, wave and hybrid energy solutions
- $11m cash, $29m in grants at last Quarter
- Focused on the integration of complex systems – either design and construct (D&C) or build, own & operate (BOO).
- Business model across the full value chain of design, development, finance, construction, operation and maintenance.
- 50/50 joint venture between EMC & Lendlease Services to D&C solar and battery systems nationally

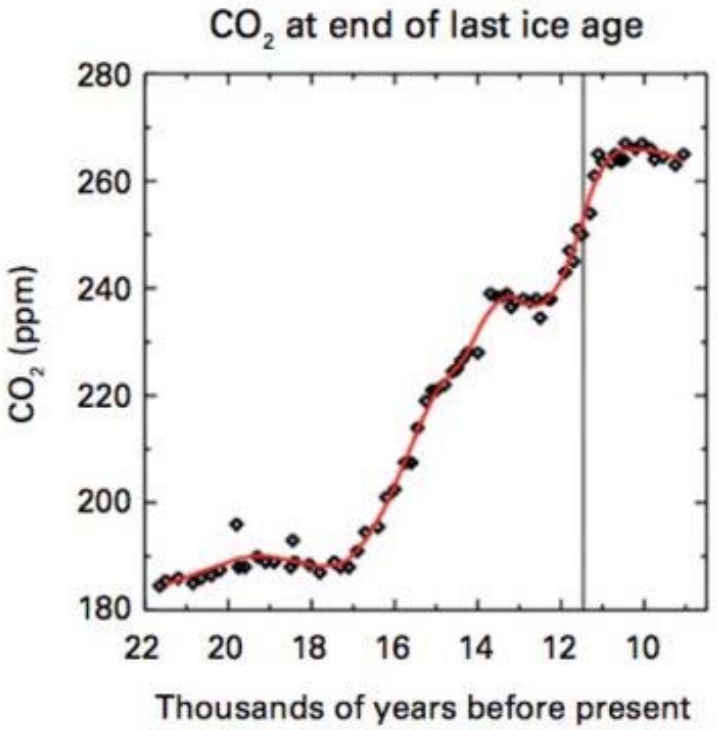






Macro drivers for Carnegie



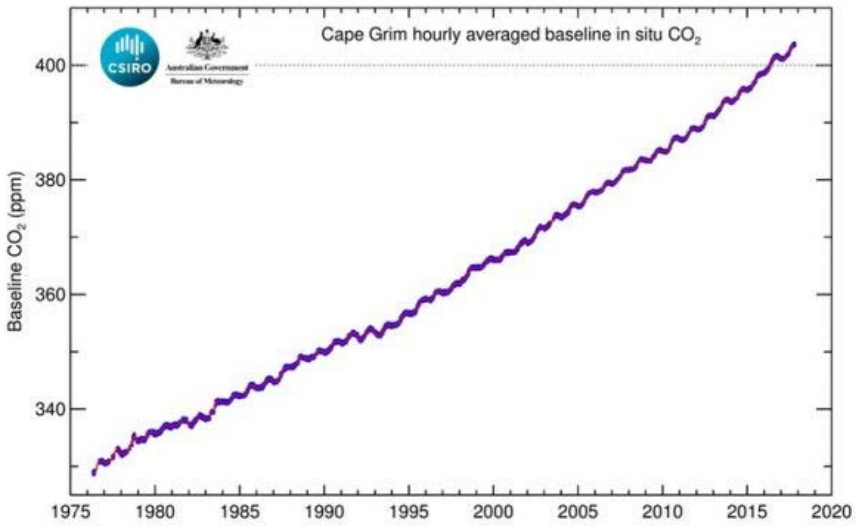


s, 2014

Atmospheric CO_2 concentrations have reached 403.3 parts per million. This is the highest level for at least 3 million years.

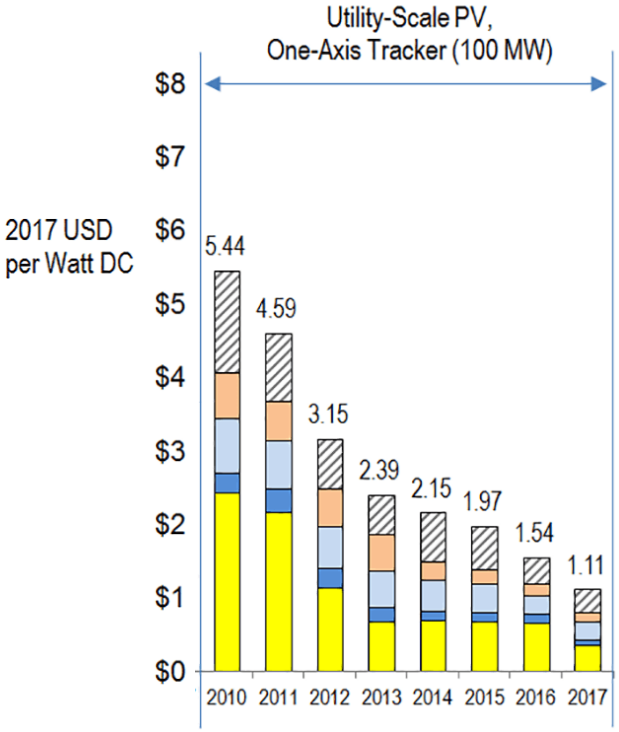
At that time, the climate was 2-3℃ warmer than today's average, and sea levels were 10 to 20 metres higher than current levels.

(World Meteorological Organisation, 2017)

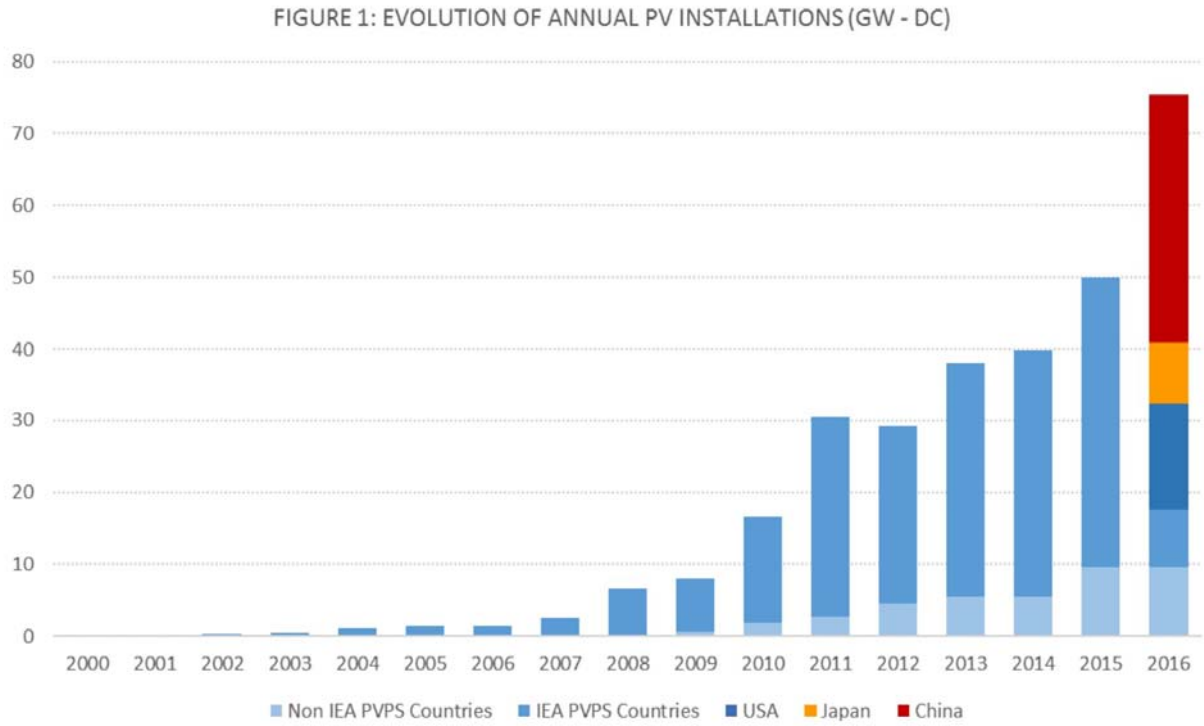


Macro drivers for Carnegie

- Leveraged to exponentially growing solar PV market



Source: Lazard, Unsubsidized Levelized Cost of Energy (LCOE) analysis for the year 2016

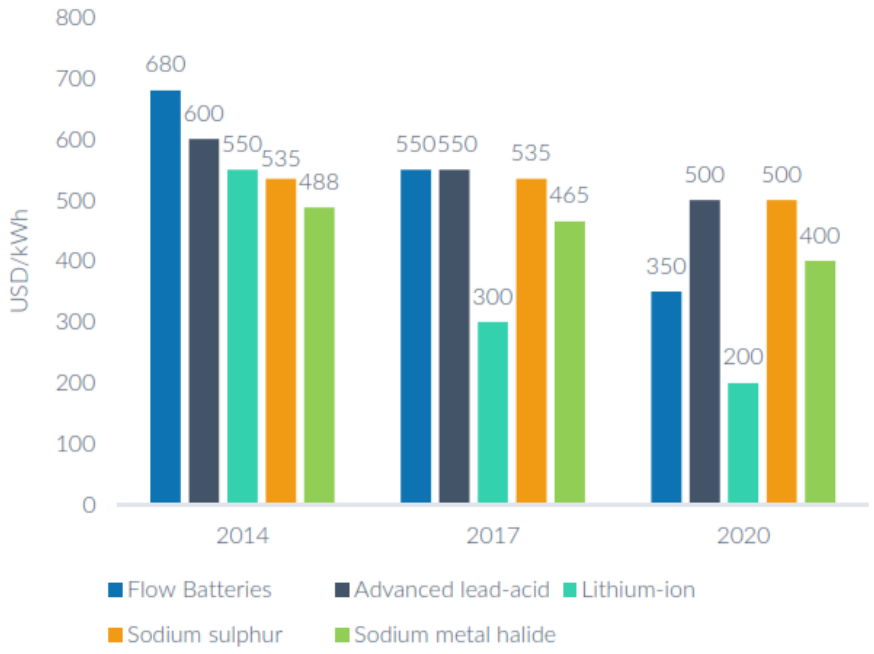


Source: International Energy Agency, 2017

Macro drivers for Carnegie

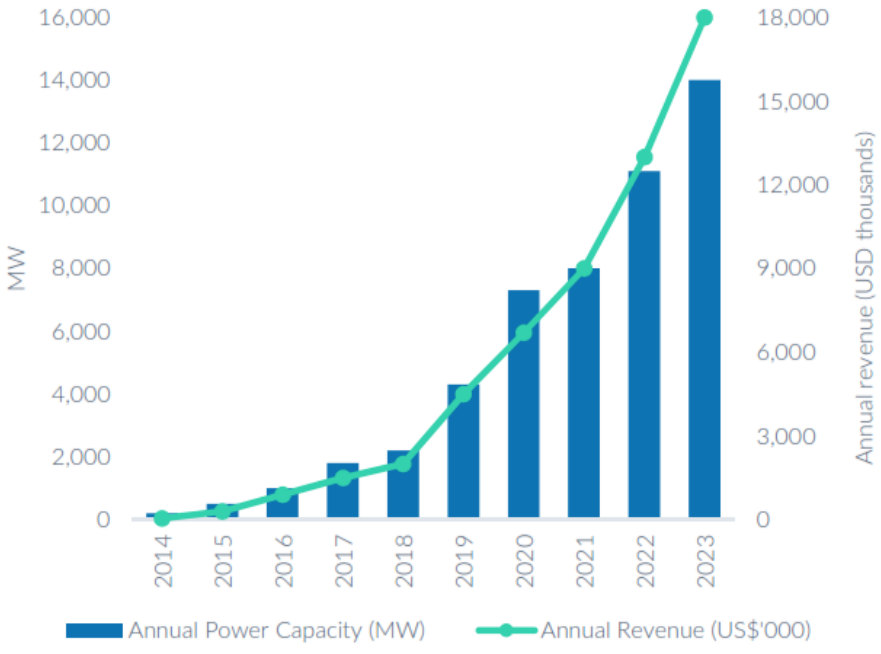
- Leveraged to exponentially growing battery market

Utility-scale battery cell prices are forecast to decline significantly over the medium term...



Source: Navigant Research (Jaffe and Adamson, 2014)

...driving an increase in take-up and strong revenue growth for the battery technology sector

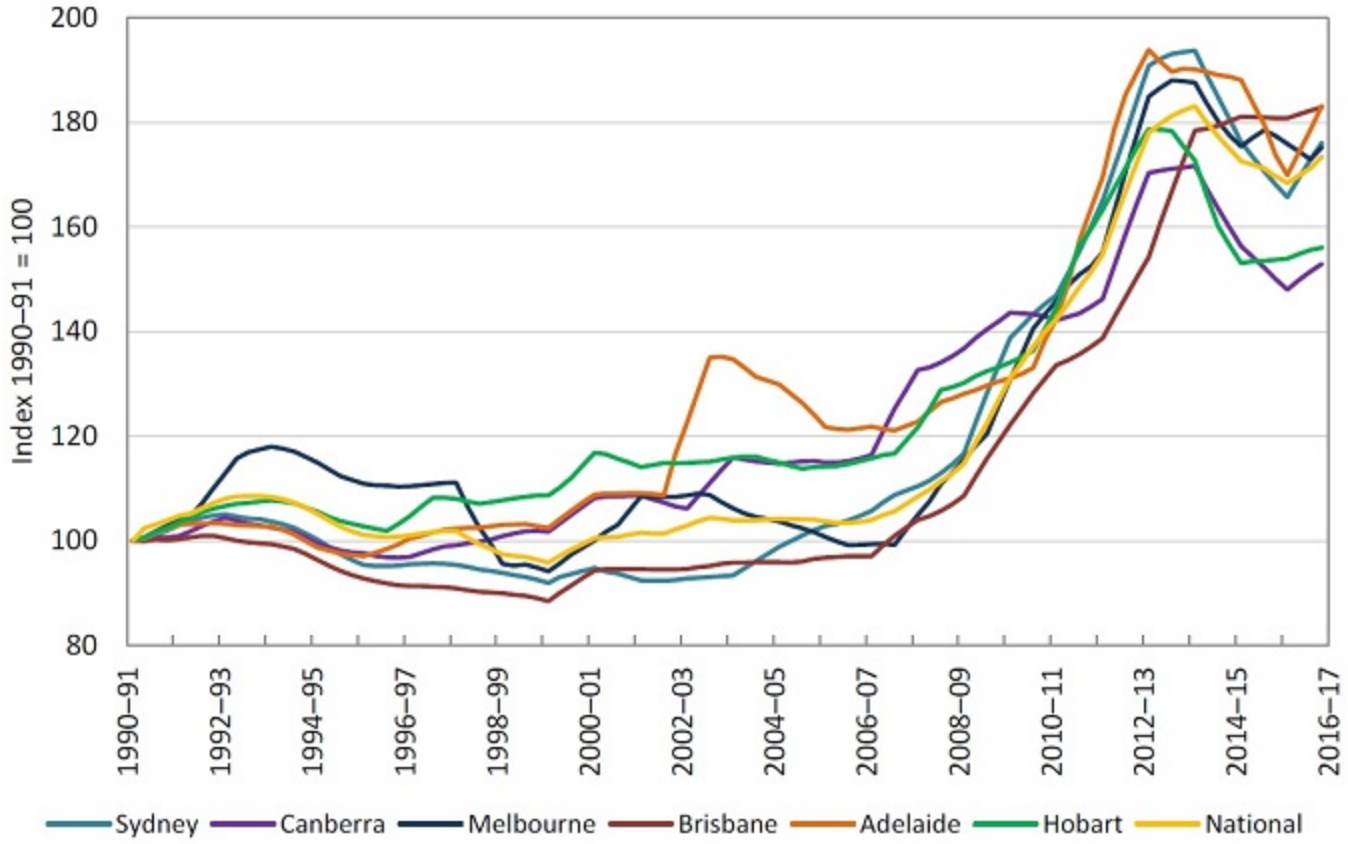


Source: Data from Navigant Research (Jaffe and Adamson, 2014)

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

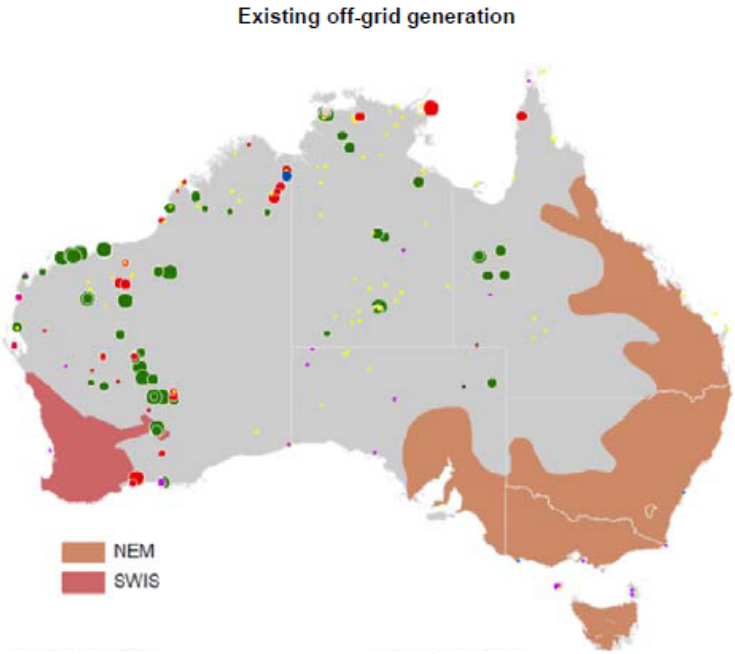
Macro drivers for Carnegie

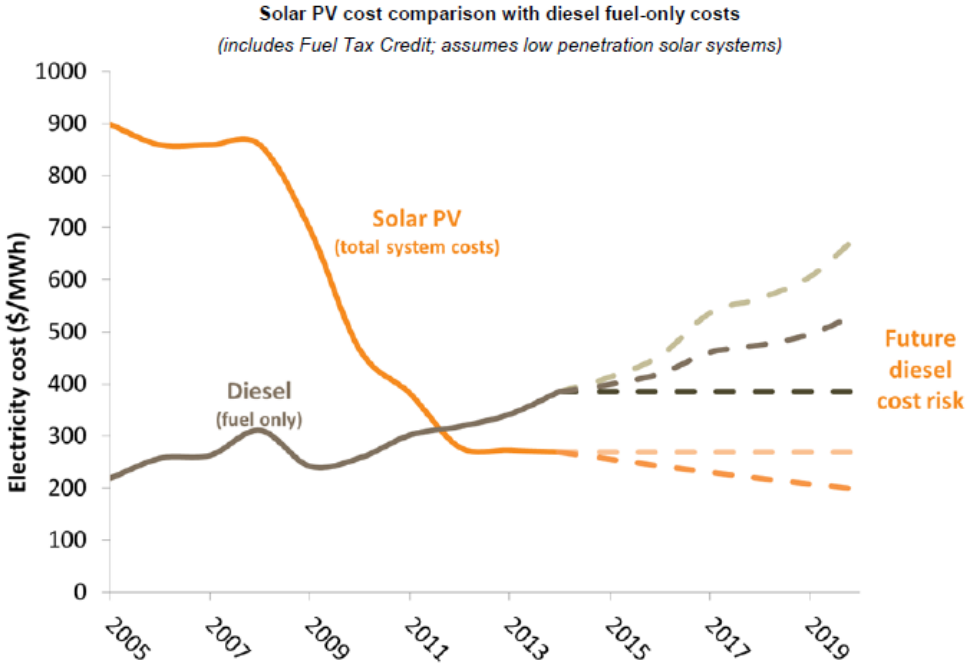
- Retail prices went up by 63 per cent in real terms (after adjustments for inflation).



Source: ACCC, 2017

Macro drivers for Carnegie

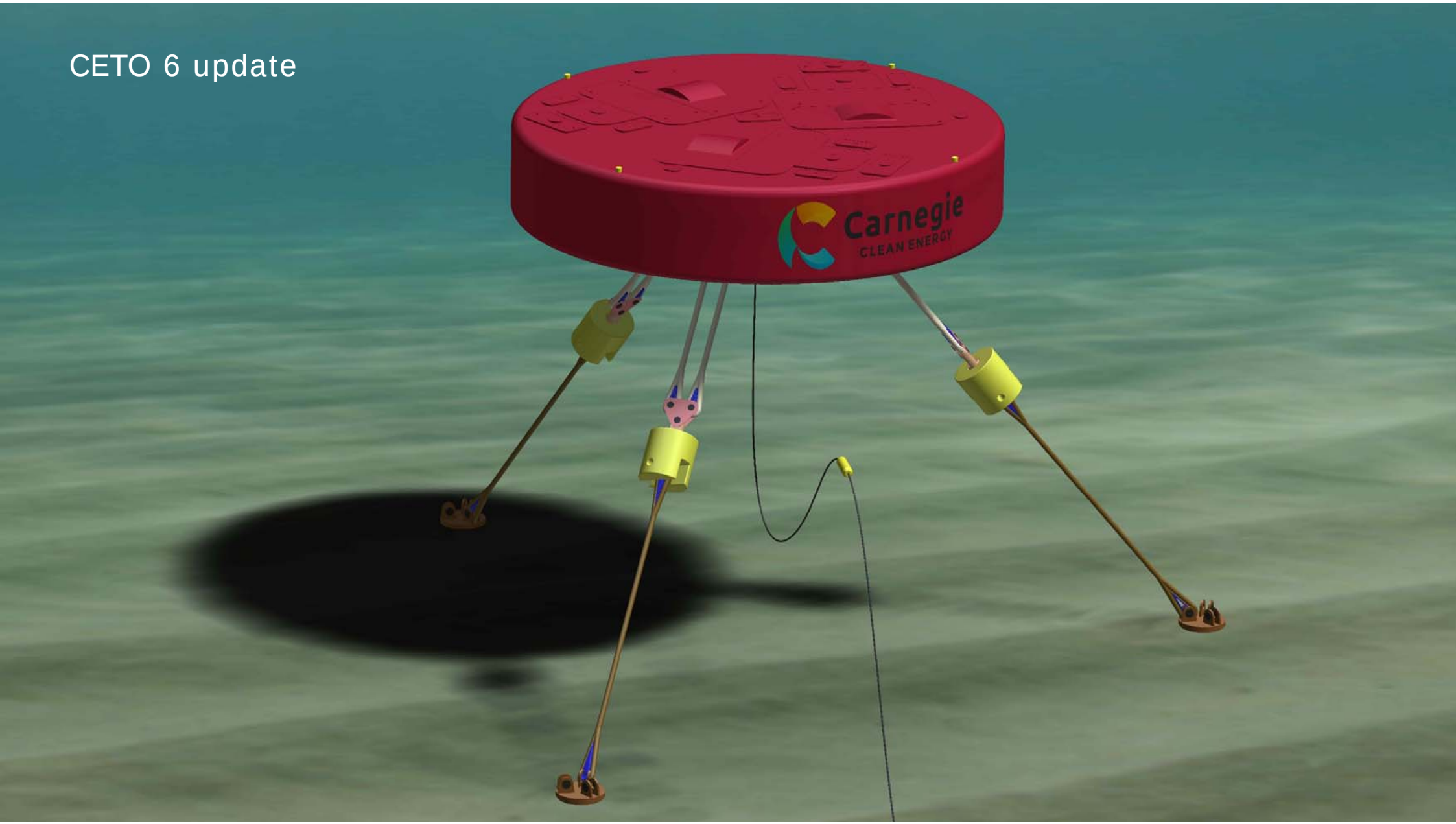




Source: Australian National University Centre for Sustainable Energy Systems, 2014

- >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.

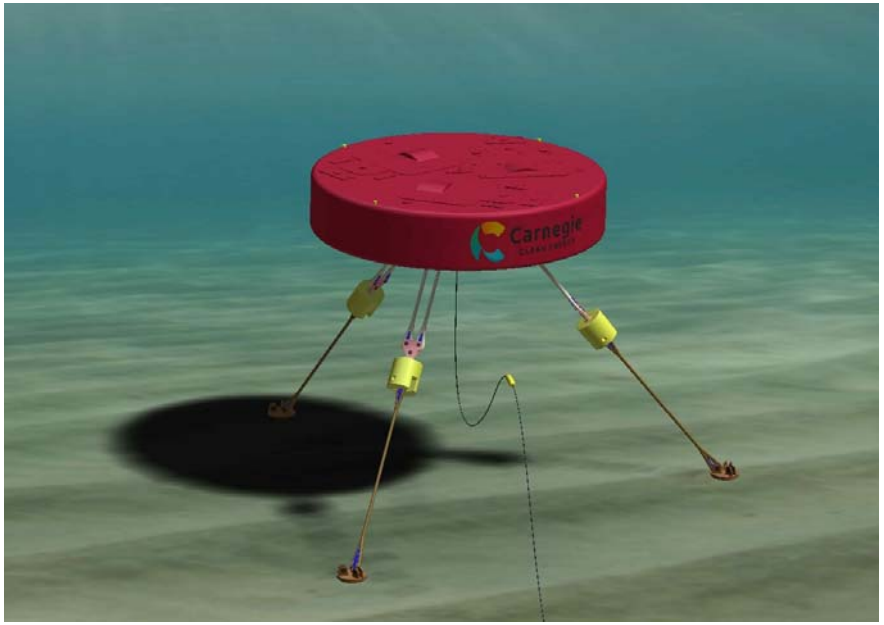
CETO 6 update

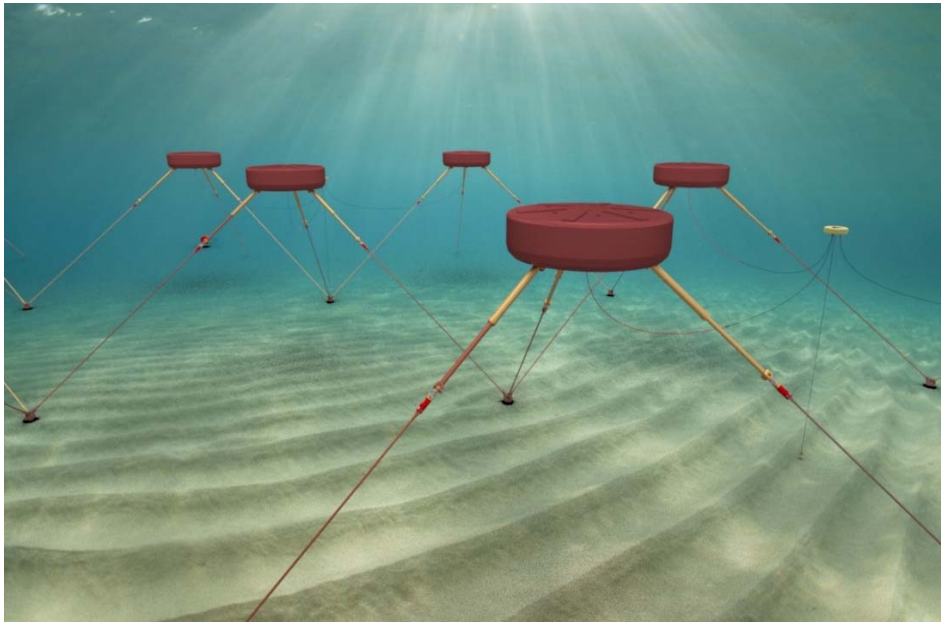


Wave Energy

CETO 6 design update

- Based on IP first lodged in 2013. US Patent granted in 6 November 2017.
- Multi-tether design to capture heave (vertical) plus surge (horizontal) plus pitch (rotational)
- Multiple smaller foundations, shared between units.
- Improved rated capacity from 1MW to 1.5MW.





Wave Energy

Albany Wave Energy Project

- Primary objective is to deploy the most competitive commercial design CETO unit at the site that optimizes the best performance with the lowest direct cost to CCE whilst managing risk.
- Recently awarded $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. Detailed design 2018. Unit manufacture 2019. Installation summer 2019/20.
- Wave Energy Research Centre funded by $3.5m WA Government grant brings additional value.





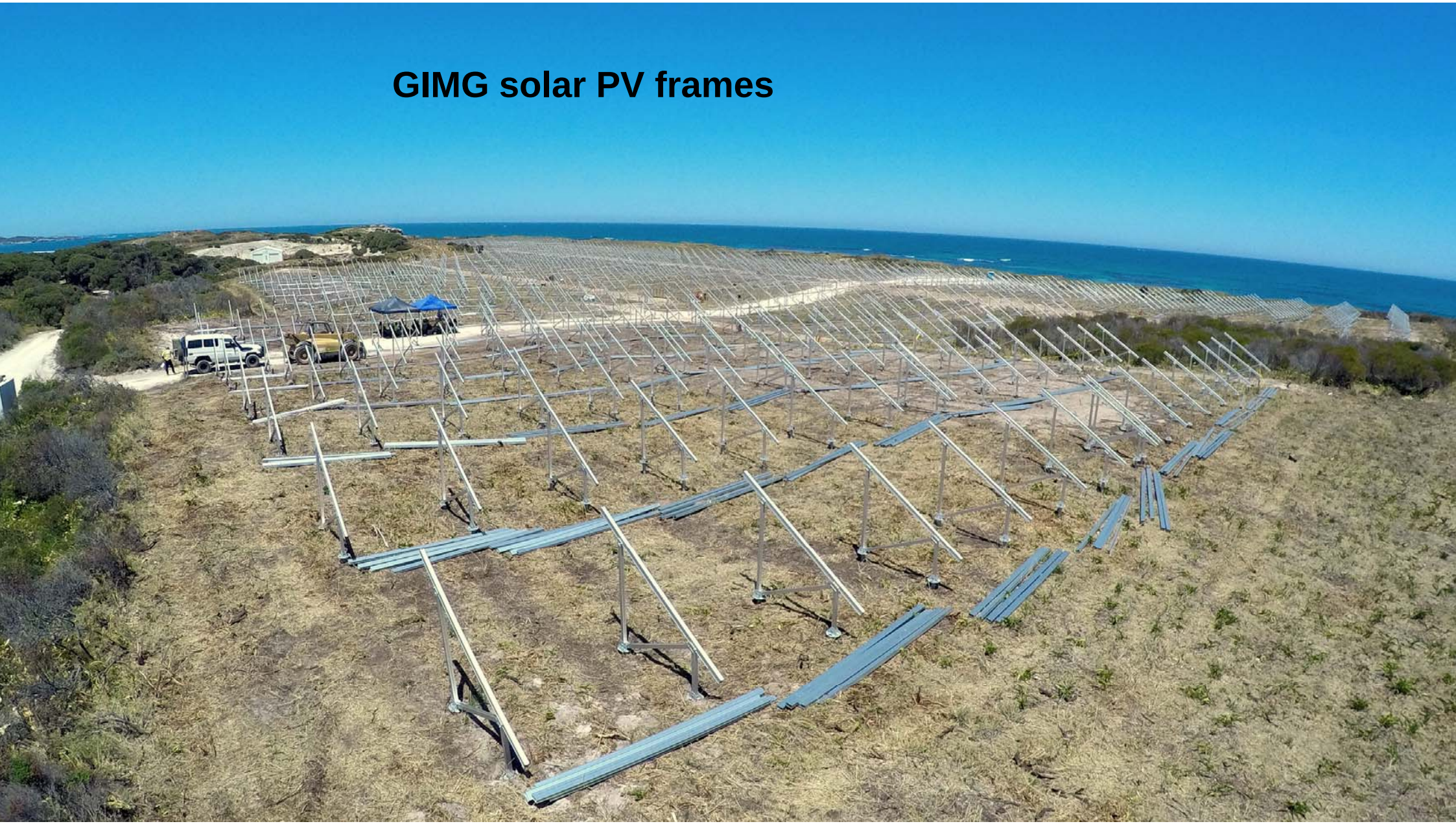
Garden Island Microgrid Project, Western Australia

- Carnegie's first build, own, operate project
- Offtake to Department of Defence for power and water
- 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
- Partnering with Western Power, who provide grid and network expertise and support.
- Solar/battery funded by AU$2.5m from ARENA, $3.7m debt financing agreement and $1.3m CCE equity
- Wave site for future CETO deployment or industry peer
- Construction well advanced. Commissioning in Q1 2018.

GIMG sod-turning event August 2017



GIMG solar PV frames




GIMG Battery Storage System
DANGER
HIGH VOLTAGE
TMC
CAUTION
CAUTION
CAUTION

Northam Solar Power Station



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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 years
- 34,000 solar panels will be constructed on 25 hectares of land
- Planned for the addition of utility scale battery storage in future
- Grid connection offer secured. Debt secured. Equity partner likely.
- Construction to commence end of 2017

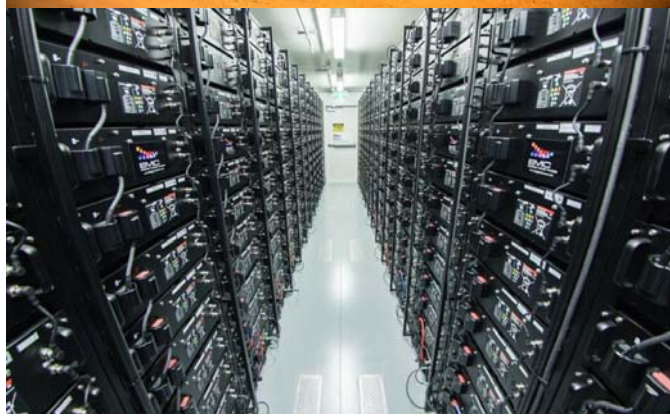


CSIRO Square Kilometre Array - Off-Grid Hybrid System

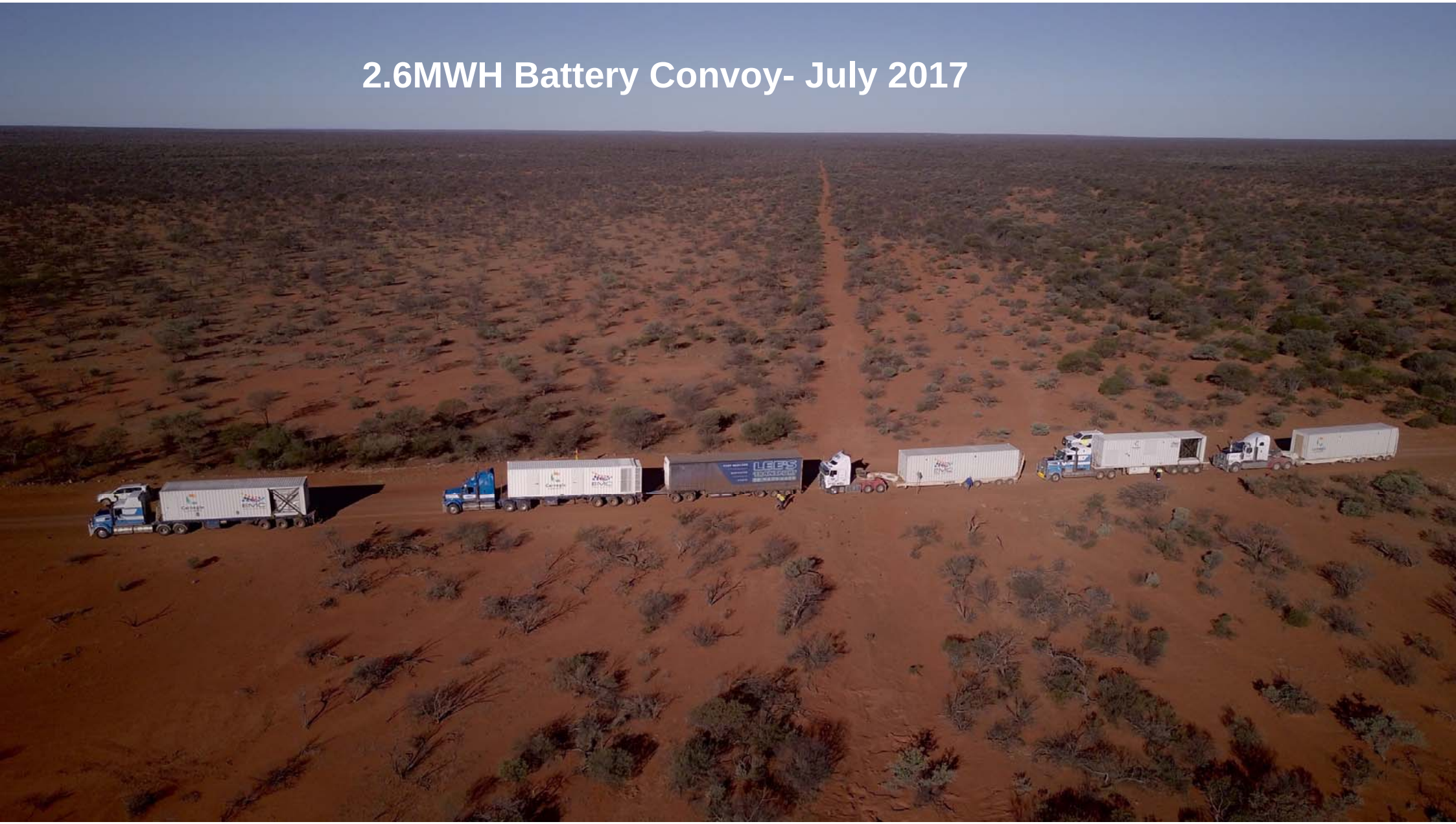
- Customer: CSIRO - world’s most sophisticated antenna system to have the most sophisticated solar/storage/diesel power system in the world.
- Location: Off-grid, 645 km northeast of Perth, Western Australia
- Scope: EMC engaged to design, construct and install 1.6MWp solar facility in combination with 2.6 MWh battery energy storage system capable of diesel off functionality.
- Features:
    - 1.25 MVA microgrid-connected at 6.6 kV
    - 2.6 MWh Samsung SDI Lithium batteries
    - PV central inverters delivered in EMI shielded containers manufactured by EMC in Perth
    - Containerised installation, Fire Suppression / Fire Rated, Centralised HVAC
    - EMC control system (National Instruments)







2.6MWH Battery Convoy- July 2017





Solar array with battery containers in place

Esperance - POD SPS



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 engaged 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
- Opportunity to deliver 100’s of these systems in WA alone and the across Australia and region







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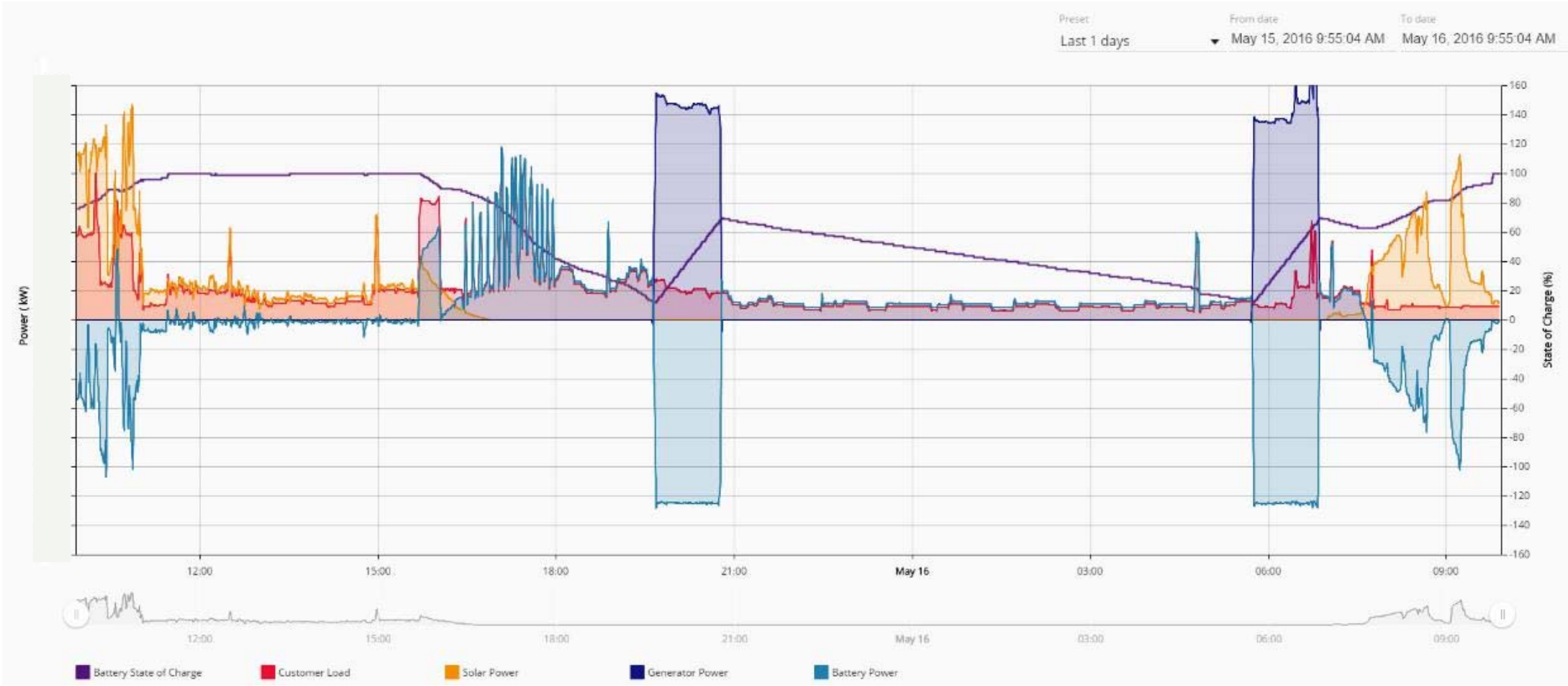
RAAF Delamere - Microgrid

- Customers: Lendlease Buildings (for Department of Defence)
- Location: 400km south of Darwin, Northern Territory
- Scope: EMC engaged 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 200kVA peak load
- Will deliver a 61% diesel consumption saving
- Commissioning mid-2018.



Remote Monitoring & Operating Philosophy (Diesel Off)



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Look forward

- Construction commencement of Northam
- Garden Island Microgrid Commissioning
- CETO 6 detailed design and Albany project delivery
- Commissioning of Northam
- Results of current pipeline tendered D&C work – increasing tenders from utilities, Government and mining companies
- Next Build, Own & Operate project commencement



THANK YOU

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