Opportunities in the Australian renewables industry – today and into the future

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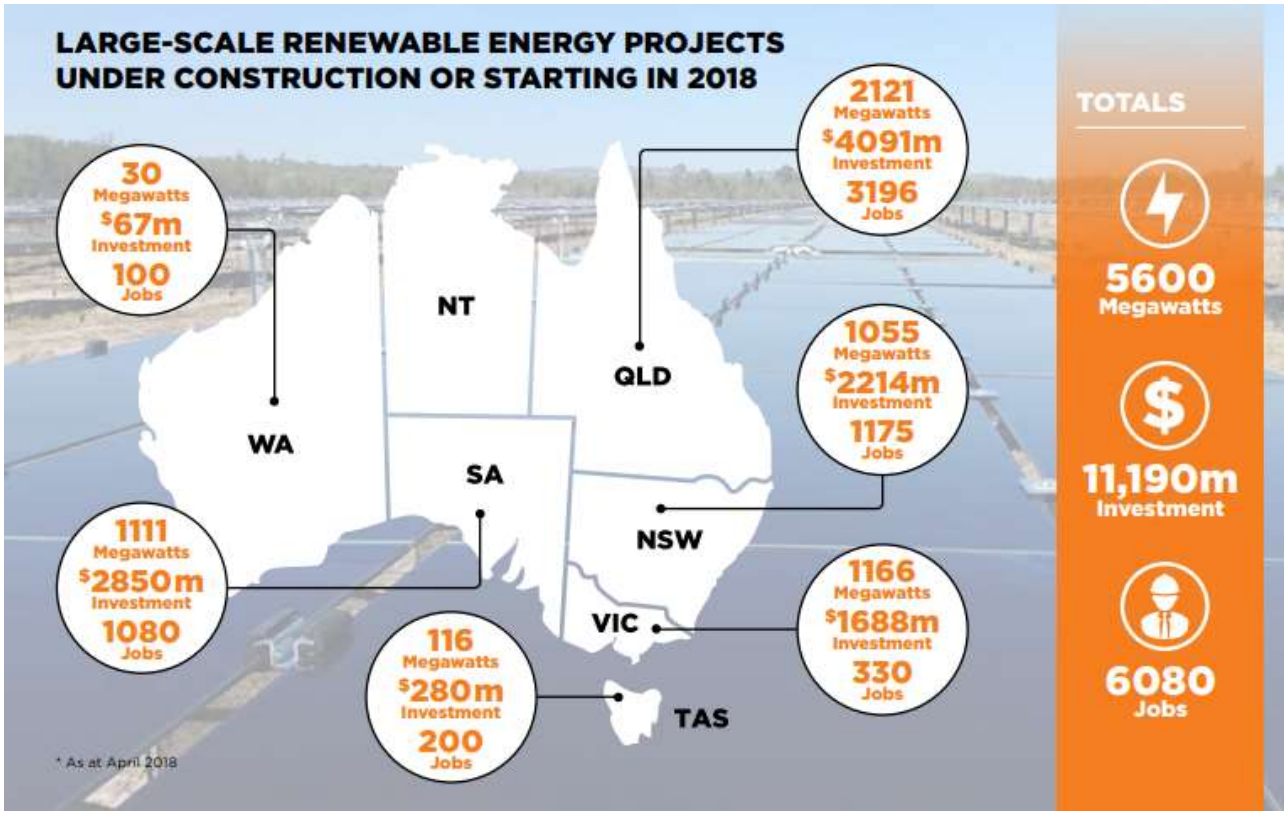
Australian Government
Austrade

Australia UNLIMITED

AGENDA

- Snapshot in 2018
- Resources
- Energy Storage
- Opportunities for today
- Opportunities for tomorrow
- Austrade’s role

Snapshot in 2018



US$9B

investment in large-scale wind and solar projects in Australia – a new record

150%

increase in investment in 2017

- *The renewable energy sector is experiencing unprecedented activity, with at least 58 projects under construction, committed or completed in 2018.*

RESOURCES

WIND ENERGY

33.8%
of total clean energy generated in Australia in 2017

5.7%
of total Australian electricity generated in 2017

15
new wind farms under construction or financially committed at the end of 2017

4816
megawatts of generating capacity now installed across the country

- Australia has some of the world's best wind resources
- Over 70 wind farms in Australia
- Almost 2.5 GW of large-scale wind generation under construction during 2018
- In 2017: 664 MW of new large scale wind capacity was commissioned and five new wind farms came online

SOLAR ENERGY

20.3%
of total clean energy generated in Australia in 2017

3.4%
of total Australian electricity generated in 2017

- Australia - the world's highest solar irradiation & highest per capita take-up of rooftop solar photovoltaic capacity in the world
- The fastest-growing technology in the renewable energy sector in the past ten years.
- In 2017: over 300 MW of large-scale solar capacity registered in the National Electricity Market
- Over 2 GW of solar large scale capacity under construction during 2018

HYDRO

33.9%
of total clean energy generated in Australia in 2017

5.7%
of total Australian electricity generated in 2017

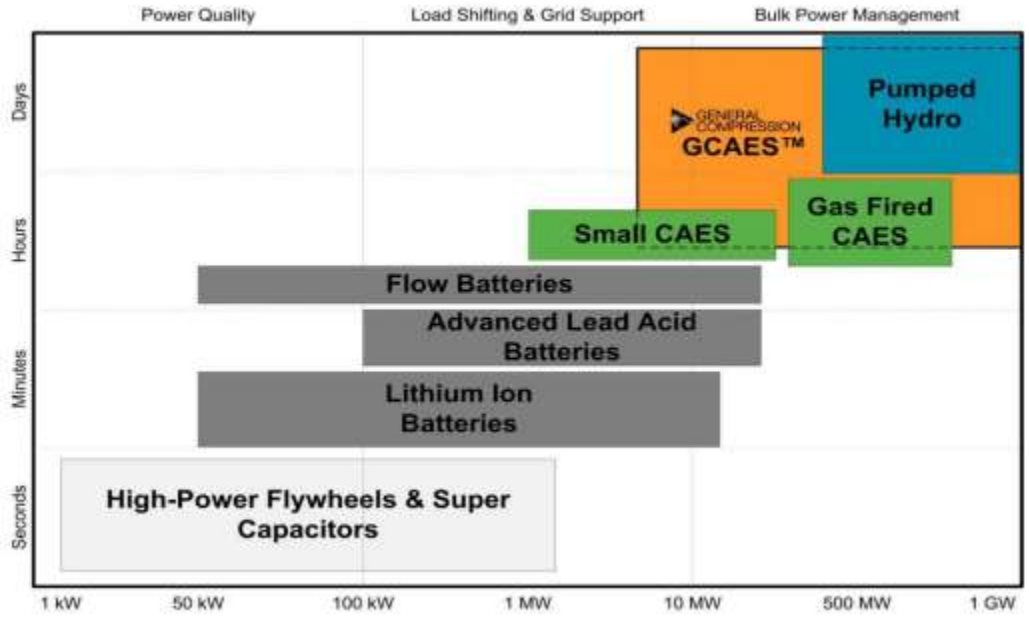
22,000
number of potential pumped hydro sites across Australia

2500
potential pumped hydro potential, in megawatts, in Tasmania

- Mature technology in Australia. More than 8 GW of total installed hydro energy capacity
- More than 100 operating hydroelectric power stations with total installed capacity of about 7,800 MW
- The Snowy Mountains Scheme - Australia's largest hydroelectricity scheme with a capacity of 4100 MW
- The Tasmanian integrated hydroelectricity scheme: total capacity of more than 2280 MW

ENERGY STORAGE

ENERGY STORAGE



Energy storage technologies, applications and scale, CEC

- Australia is emerging as a hot spot for energy storage and for battery sales globally
- In 2016, a record 11MWh of major storage projects were installed
- Significant opportunities exist for new and expanded off-river and pumped hydro generation

6750
battery installations in 2016

13x
increase in installations in 2016 compared to 2015

ENERGY STORAGE – CASE STUDY

HORNSDALE
POWER RESERVE

Government of South Australia

SOUTH AUSTRALIA

NEOEN

TESLA

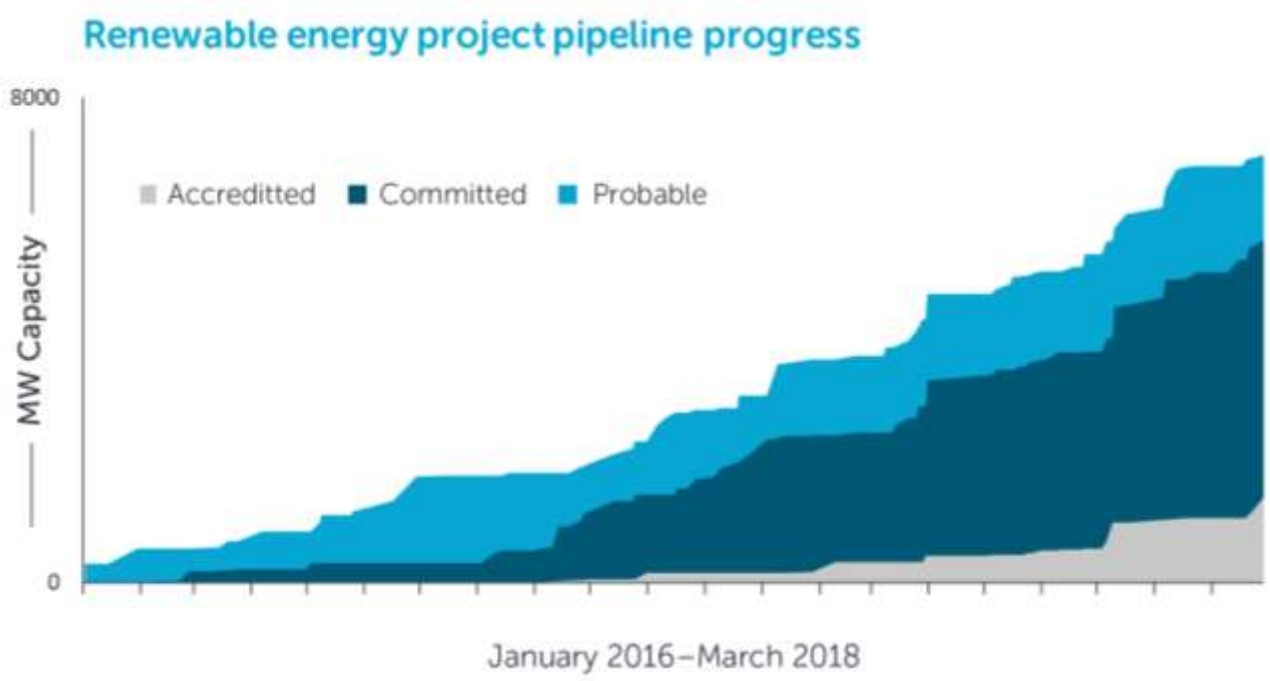
- At **100MW** of total generation capacity and **129MWh** of energy storage, the Hornsdale Power Reserve is the largest lithium-ion battery in the world

- Operational since December 1, 2017

OPPORTUNITIES FOR TODAY

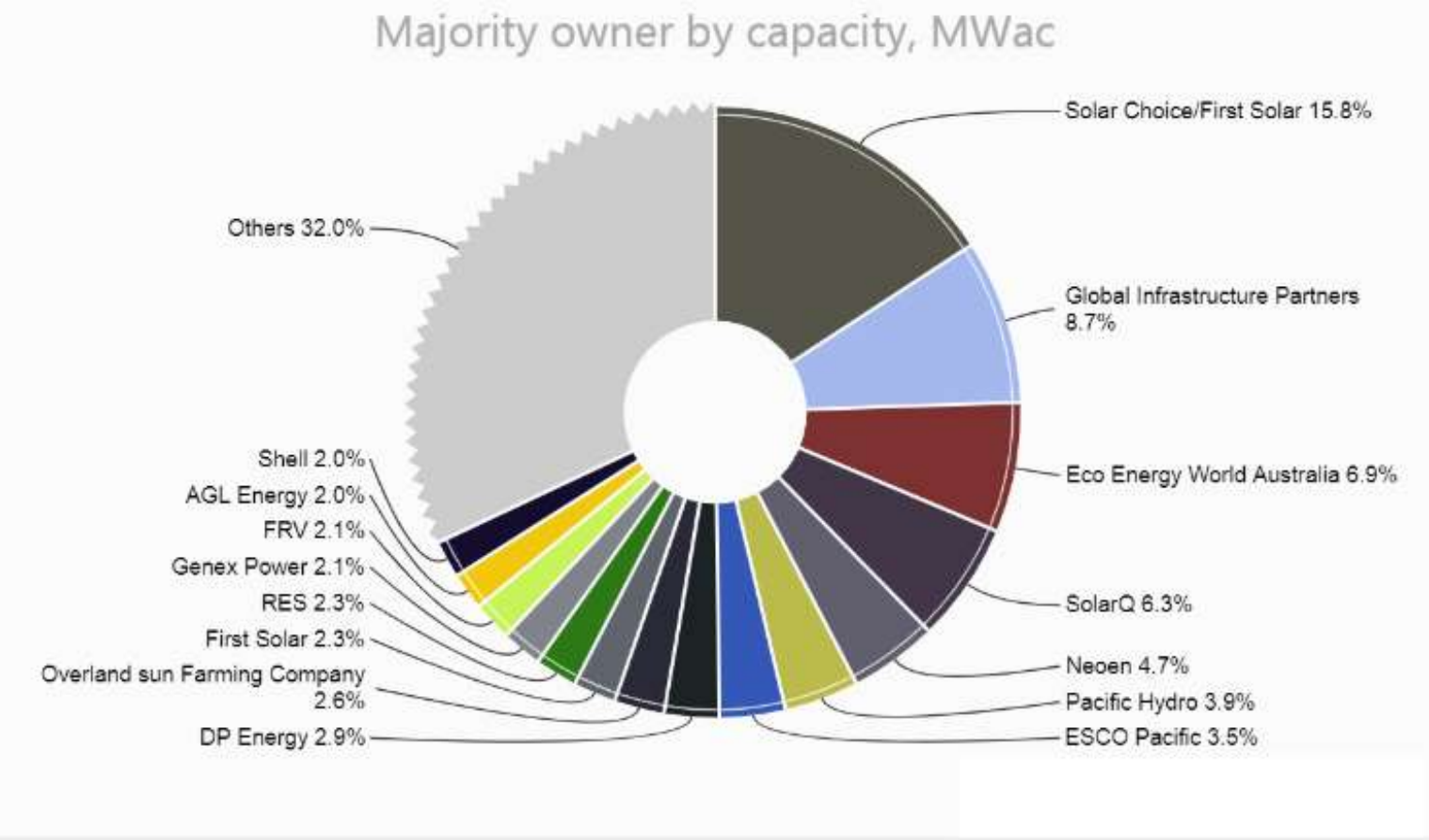
NATIONAL ENERGY GUARANTEE – OPPORTUNITIES

- Renewables' share of the National Electricity Market (NEM) to continue to rise
- Despatchable power requirements mean opportunities for energy sources that can satisfy reliability and emissions objectives - such as pumped hydro
- New opportunities in energy storage (batteries) given despatchable power focus



SOLAR PROJECT PIPELINE

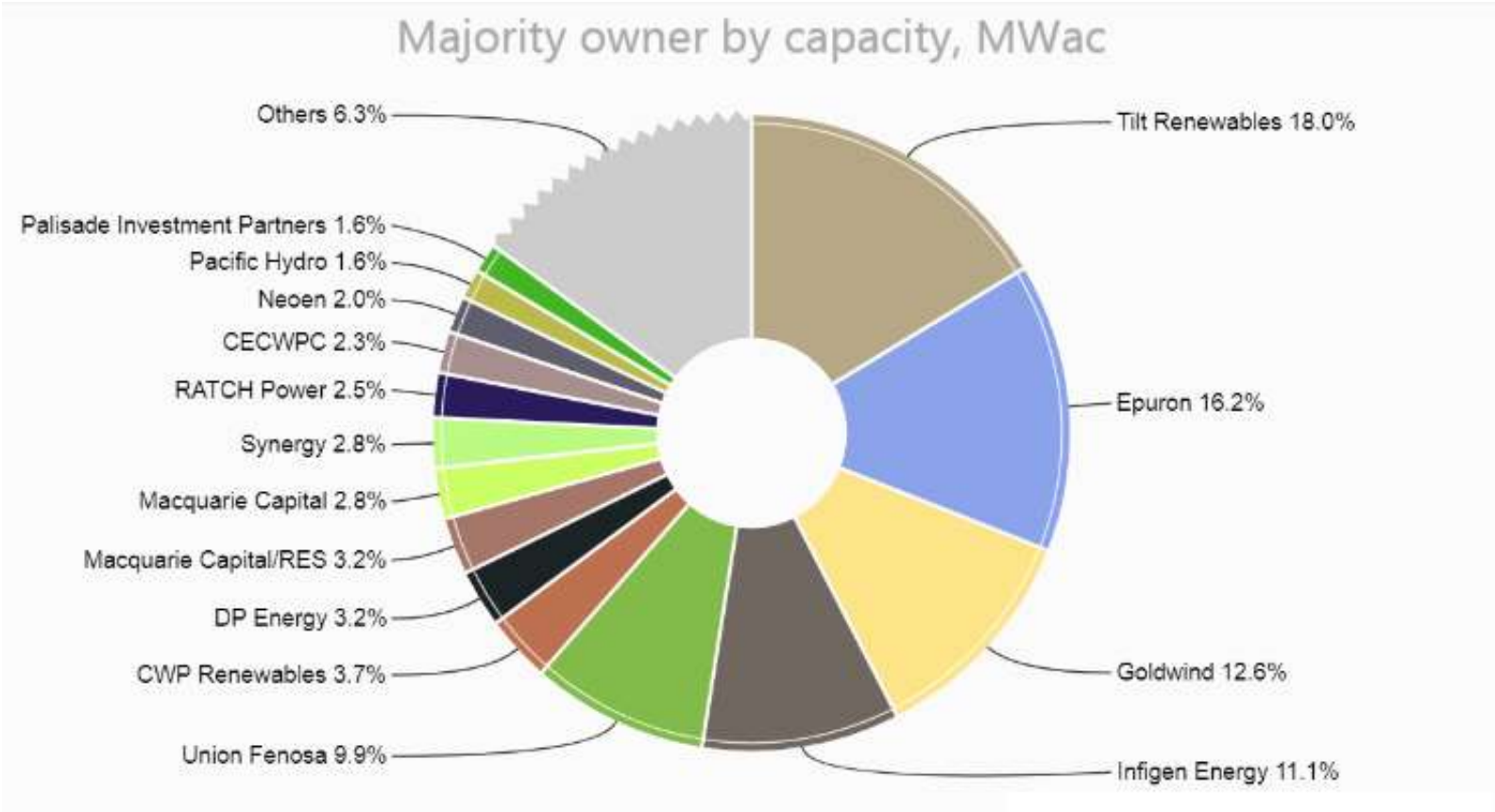
78 assets | 53 companies | 16.6 GW



Source: Rystad Energy

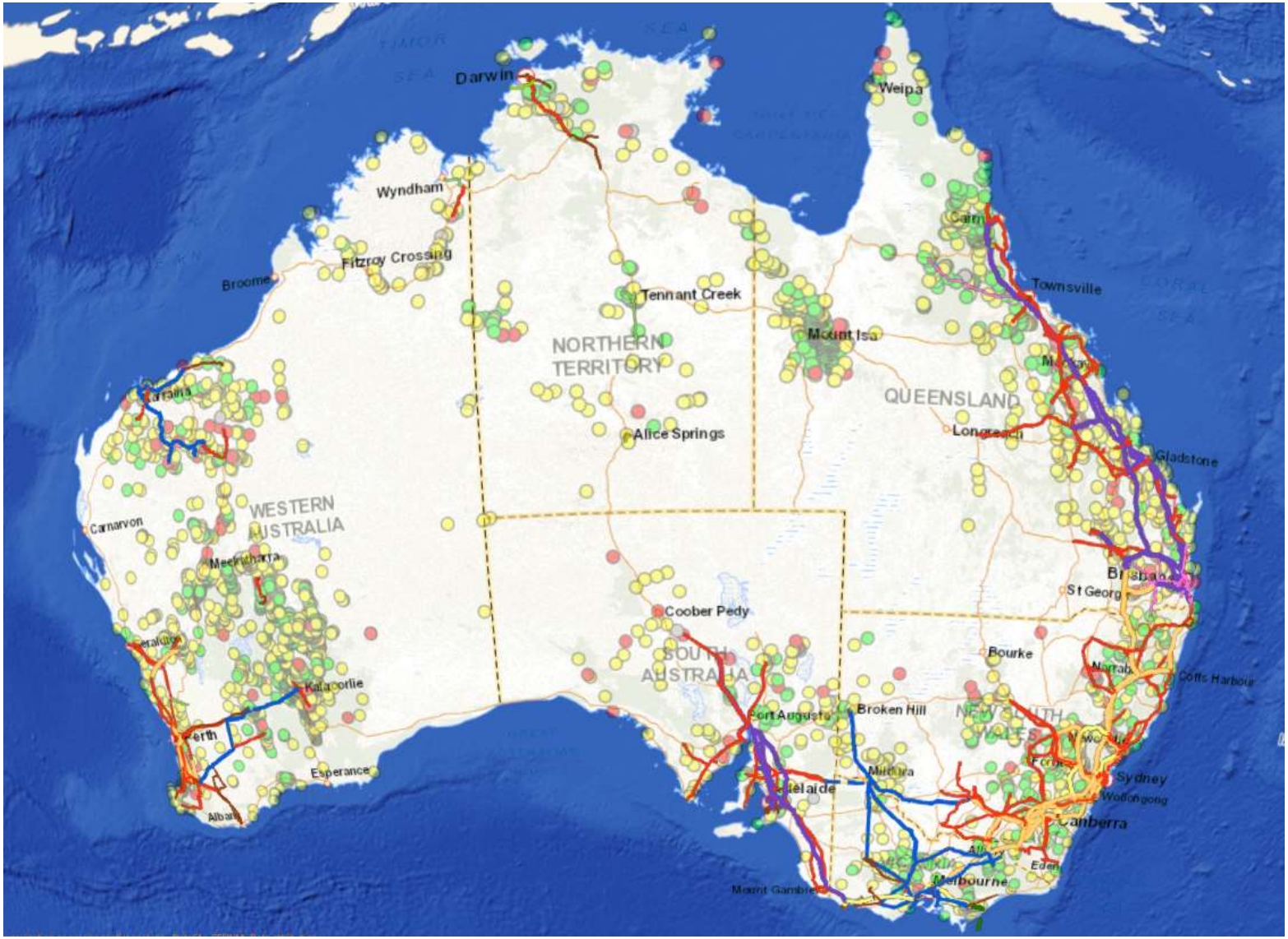
WIND PROJECT PIPELINE

35 assets | 22 companies | 6.3 GW



Source: Rystad Energy

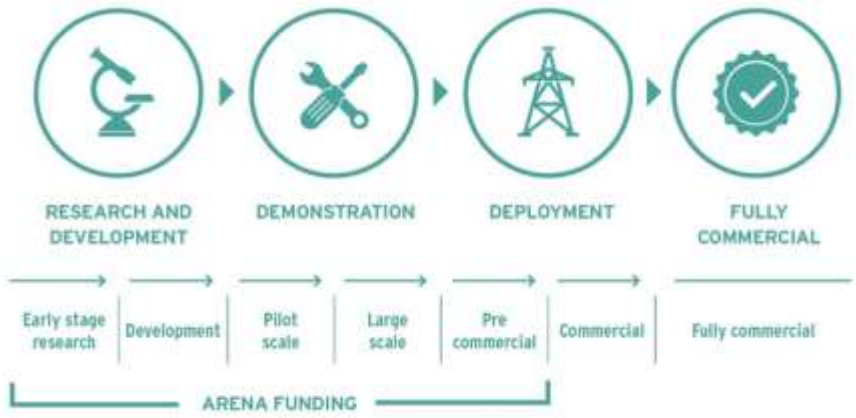
OFFGRID


Darwin
Weipa
Wyndham
Fitzroy Crossing
Broome
Tennant Creek
NORTHERN TERRITORY
Mount Isa
Townsville
QUEENSLAND
Longreach
Alice Springs
Gladstone
WESTERN AUSTRALIA
Carnarvon
Meekatharra
Coober Pedy
SOUTH AUSTRALIA
Bourke
Kalgoorlie
Port Augusta
Broken Hill
Esperance
Adelaide
Sydney
Canberra
Melbourne

THE AUSTRALIAN RENEWABLE ENERGY AGENCY (ARENA)

- ARENA has approximately $2 billion in funding, which is legislated and extends until 2022.

- **Funding areas**



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- **Funding priorities**

- Large-scale solar photovoltaics
- Integrating renewables and grids
- Renewables for industrial processes
- Fringe-of-grid and network-constrained areas
- Off-grid areas

THE CLEAN ENERGY FINANCE CORPORATION (CEFC)

- Investment strategy focuses on cleaner power solutions, including large and small-scale solar, wind and bioenergy; and a better built environment, with investments to drive more energy efficient property, vehicles, infrastructure and industry.

- Invests with co-financiers to develop new sources of capital for the clean energy sector, including climate bonds, equity funds, aggregation facilities and other financial solutions.

- The CEFC operates under the Clean Energy Finance Corporation Act 2012.

OPPORTUNITIES FOR TOMORROW

HYDROGEN

Rationale: Japan and Korea > Government policy has created a demand and now seeking supply - power generation (2020 Olympics) and fuel cells

Global Factors

- Project development costs have dropped
- Advancement in fuel cell technology
- Positive hydrogen vehicle forecasts
- New uses for Hydrogen being developed
- Global oil and gas companies expanding broader into energy companies in decarbonised world
- Future opportunity to provide Australia with alternative power generation source

Australian Opportunity

Infrastructure and Land Availability
- Darwin
- Gladstone
- Pilbara
- South Australia
- Latrobe Valley

Natural Resource
- Renewable (solar, wind)
- Fossil Fuel (coal, gas)

Policy & Programs
- Development of Northern Australia
- Innovation 2030 statement
- SA Hydrogen Roadmap and Technology Fund
- ARENA $20m hydrogen grant
- CSIRO National Hydrogen Roadmap

Technology and Buyers in Australia
- CSIRO Cracker tech
- PEM suppliers - Siemens
- Hydrogen Council members in Australia

Proximity and Relationships
- Trade relationships with Korea and Japan (coal, LNG)
- Diplomatic and strategic relationships)
- Proximity to Korean and Japanese receiving terminals

Current Australian Landscape

- Japan Hydrogen Energy Supply Chain project developing in Victoria
- Trials and pilots – Yara, H2U
- SA Government Hydrogen Roadmap
- PM Turnbull and Abe Joint Communique

Role of Austrade

- Engage with Japan and Korean Governments and industry to promote Australia as partner to supply hydrogen
- Promote Australia to global energy and technology companies as a destination to invest
- Advocate for the economic opportunity Hydrogen provides Australia

AUSTRALIAN RENEWABLE ENERGY MAPPING INFRASTRUCTURE (AREMI)

AUSTRADE'S ROLE

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AUSTRALIAN EVENTS

MAJOR RENEWABLE ENERGY EVENTS IN FY17-18

- 19-21 June **Energy, Mines and Money** – Brisbane
- 27-28 June **Energy and Mines Australia Summit** - Perth
- 31 July -1 August **Australian Clean Energy Summit** - Sydney
- 3-4 Oct 2018 **All Energy Conference –** Melbourne
- 29 Oct – 1 Nov **IMARC** – Melbourne
- 13-14 Nov **Technology and Low Emissions Minerals Conference** – Perth
- 21-22 Nov **Australian Utility Week** – Melbourne

SUMMARY

World class resources

Pipeline of opportunities

Work with Deborah

See you in Australia soon