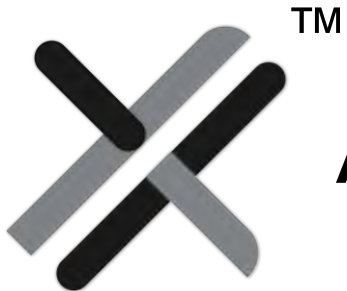


# Great opportunities for utility-scale storage down under

*Thomas Nann & team*



**Allegro Energy**

Contact: [thomas@allegro.energy](mailto:thomas@allegro.energy)



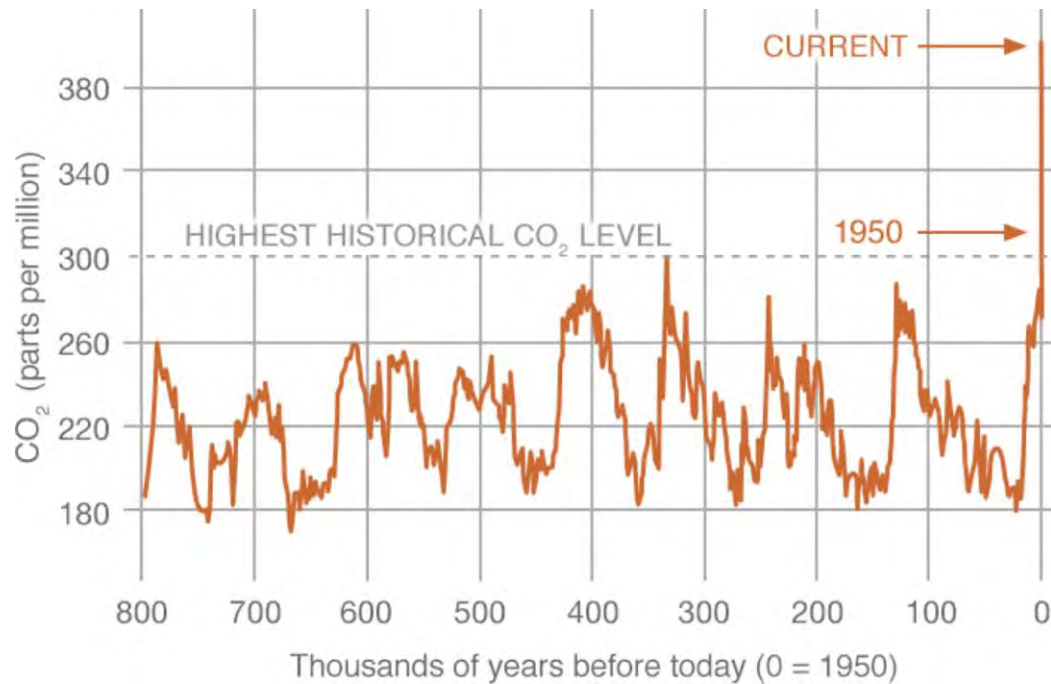




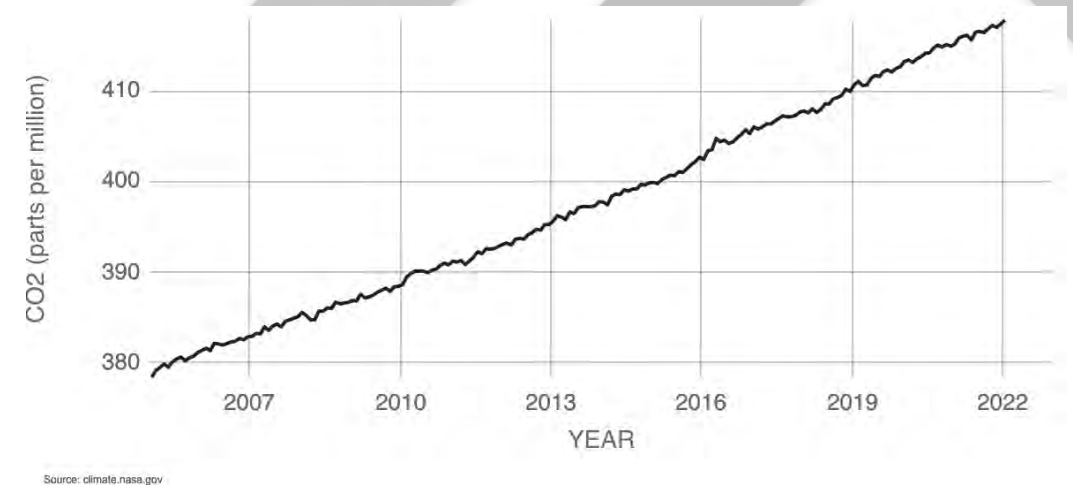


# Global warming

CO<sub>2</sub> concentration in the atmosphere



January 2022: 418 ppm



Source: NASA

### Australia's top 10 exports in 2019:

1. Mineral fuels including oil: US\$88.9 billion (32.6% of total exports)
2. Ores, slag, ash: \$78.6 billion (28.9%)
3. Gems, precious metals: \$18 billion (6.6%)
4. Meat: \$11.5 billion (4.2%)
5. Inorganic chemicals: \$6.3 billion (2.3%)
6. Machinery including computers: \$4.8 billion (1.8%)
7. Pharmaceuticals: \$3.8 billion (1.4%)
8. Electrical machinery, equipment: \$3.5 billion (1.3%)
9. Cereals: \$3.5 billion (1.3%)
10. Optical, technical, medical apparatus: \$3.3 billion (1.2%)

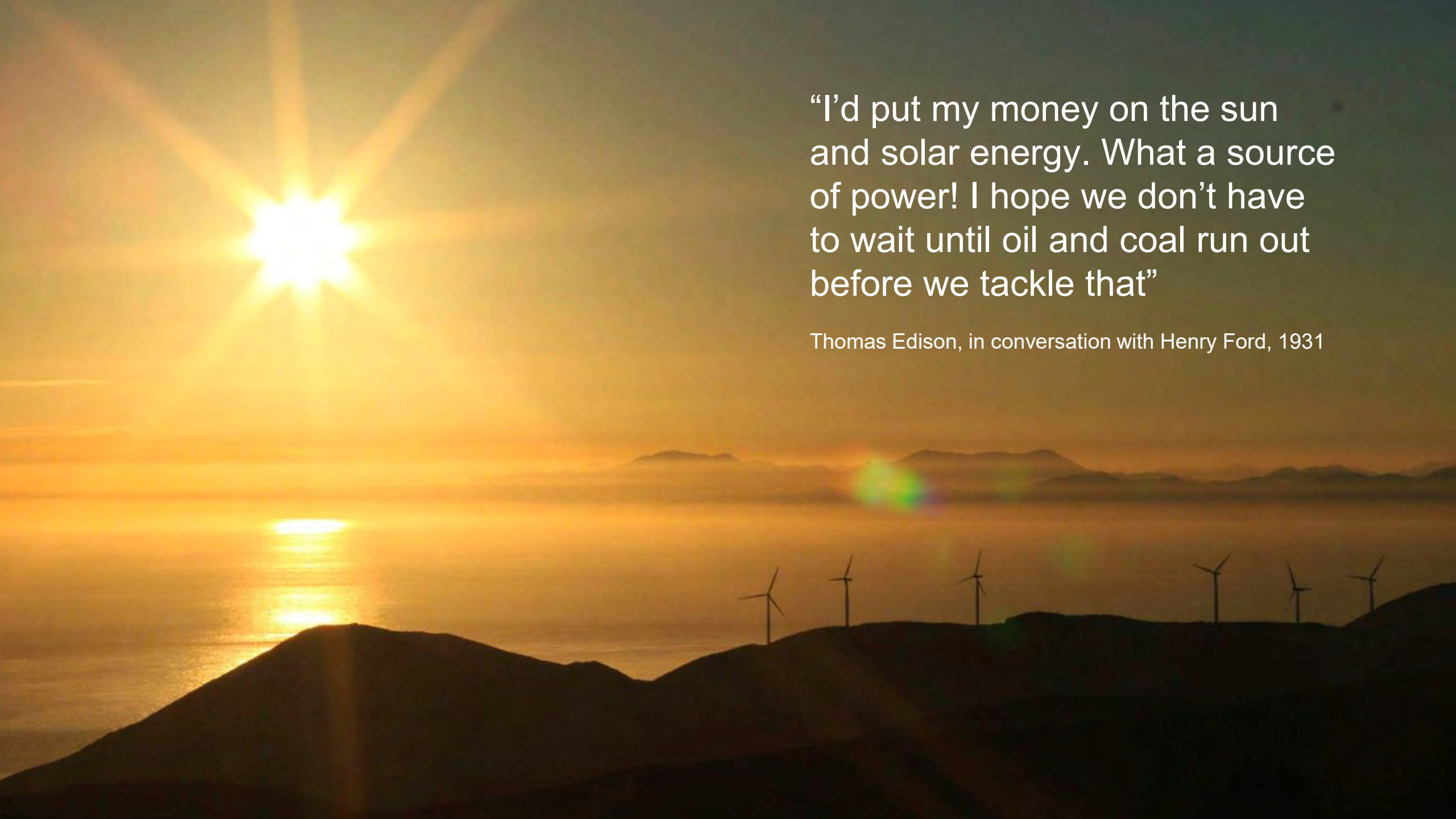
PM of Australia: Scott Morrison

Lump of coal



Deputy PM of Australia: Barnaby Joyce





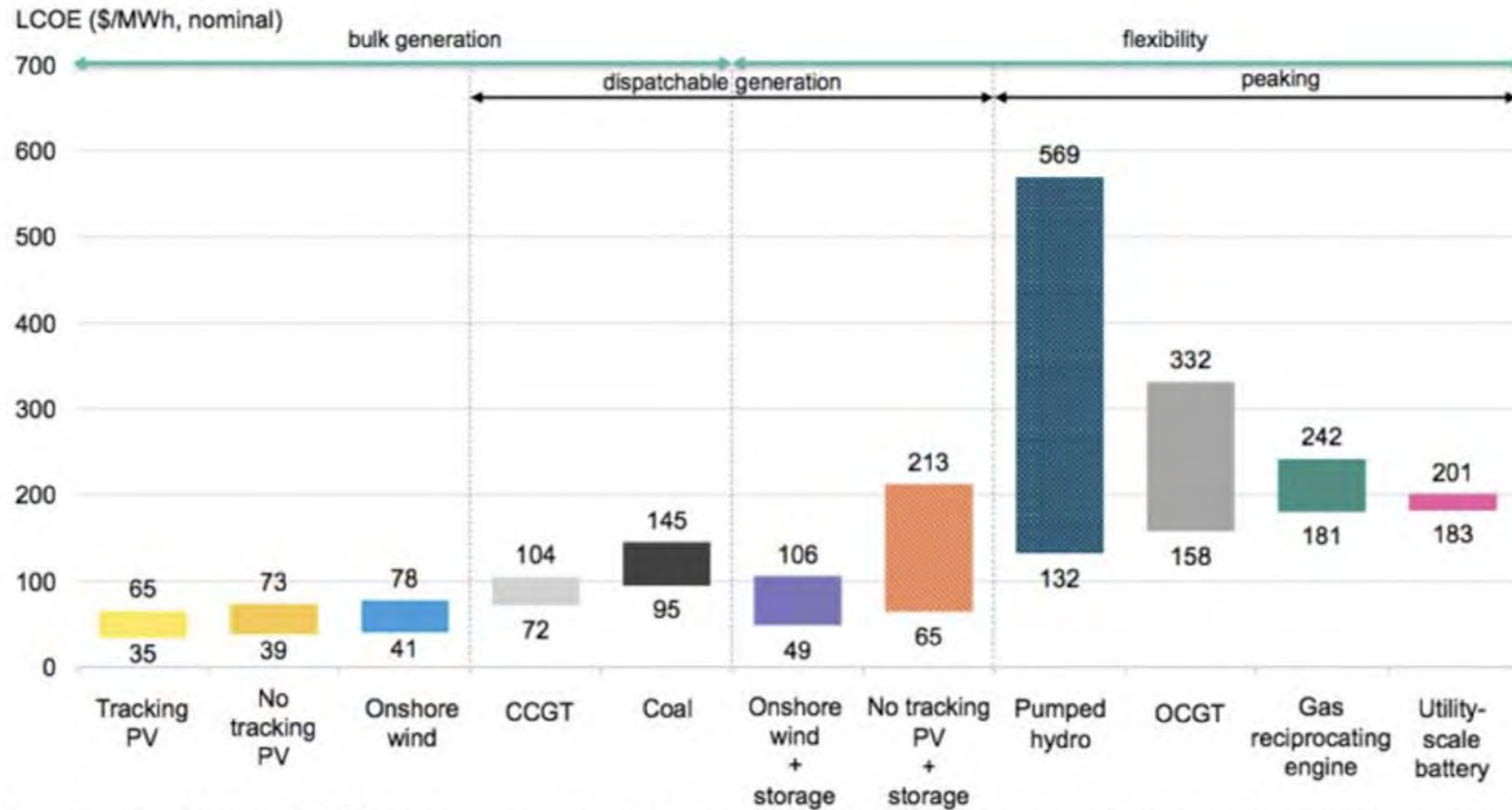
“I’d put my money on the sun  
and solar energy. What a source  
of power! I hope we don’t have  
to wait until oil and coal run out  
before we tackle that”

Thomas Edison, in conversation with Henry Ford, 1931

# Ford Model T (1908)



# Levelized cost of electricity

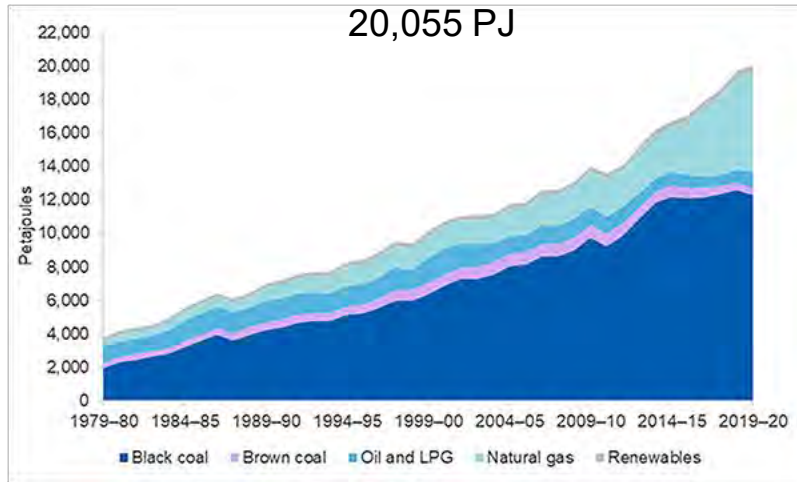


Source: BloombergNEF. Note: The LCOE range represents a range of costs and capacity factors. Battery storage systems (co-located and stand-alone) presented here have four-hour storage. In the case of solar- and wind-plus-battery systems, the range is a combination of capacity factors and size of the battery relative to the power generating asset (25% to 100% of total installed capacity). All LCOE calculations are unsubsidized. Categorization of technologies is based on their primary use case.



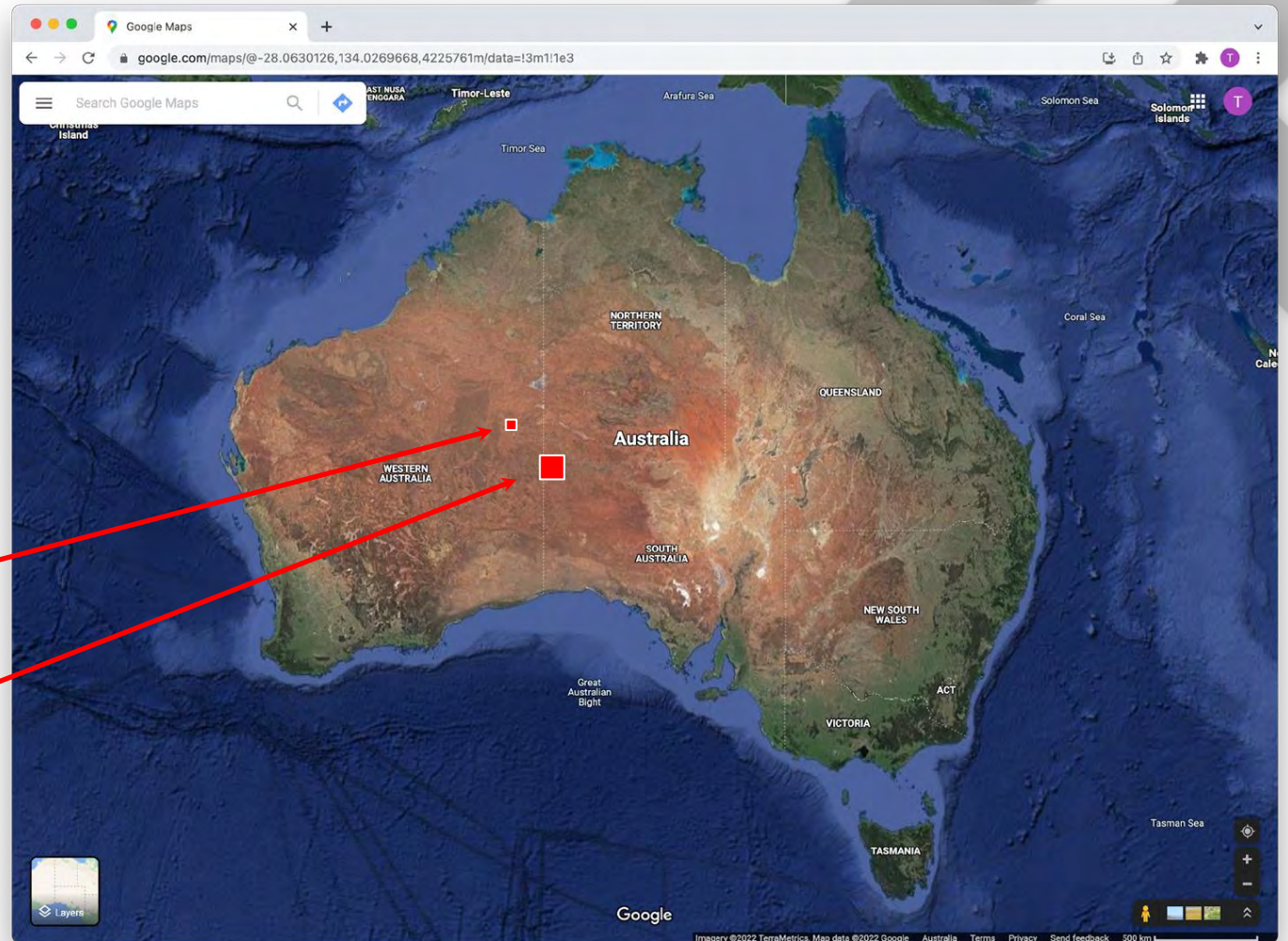
# The land of plenty

Australia energy production (19-20)



100% efficiency

18% efficiency





# Two Problems

1



**Renewable energy sources are intermittent**

**Current storage technologies are flammable, unsustainable, ...**

2



# From coal to renewable energy

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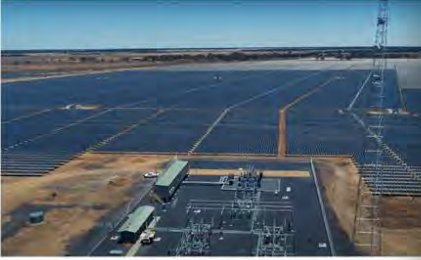
## NSW councils sign \$180m renewable energy supply

A cohort of 25 New South Wales councils has signed a renewable energy supply deal worth an estimated \$180 million that the local government associations supplied with electricity sourced from three of the state's large-scale solar farms.

FEBRUARY 24, 2022 DAVID CARROLL

MARKETS MARKETS & POLICY POLICY STRATEGIC ALLIANCES UTILITY SCALE

AUSTRALIA NEW SOUTH WALES



The 132MW Nevertire Solar Farm is among those included in the deal.

Image: HSC

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## Australia's energy storage installed base to grow more than five times by 2030

In its latest report, IHS Markit predicts that energy storage installations in Australia will grow from 500 MW to more than 12.8 GW by 2030. Today, Australia makes up less than 3% of total global installations for battery energy storage and is the seventh largest market globally. By 2030, it is forecast to comprise 7% of global installations and become the third largest market. This growth will be largely driven by three distinct market segments: residential, standalone front-of-the-meter, and collocated with utility-scale renewables.

MAY 31, 2021 OLIVER FORSYTH, ANALYST, BATTERIES AND ENERGY STORAGE, IHS MARKIT

OPINION & ANALYSIS AUSTRALIA



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# Figure 1: Volume-weighted average pack and cell price split

real 2021 \$/kWh



Source: BloombergNEF.

# Why RFBs over LIBs?

- Separation of power and energy
- Potentially cheaper on scale (low power/high energy)
- Some chemistries safer (non-flammable, non-toxic, ...)
- Abundant raw materials?
- Flexible (easy to scale up and down)

**BUT: ... only if the cost is competitive!**

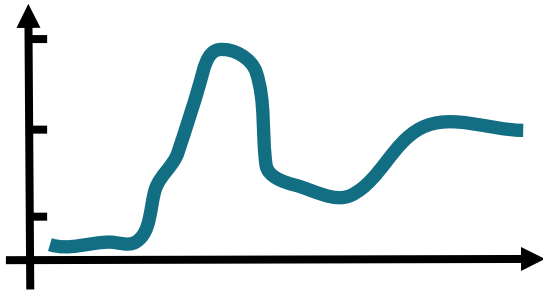


# The *Very Best* of Both Worlds:

*Allegro Supercapacitors*



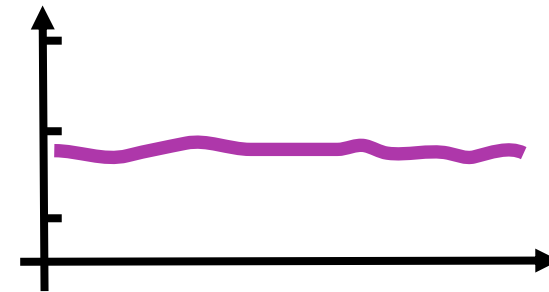
Short term – High power



*Allegro Redox Flow Batteries*



Long term – High energy

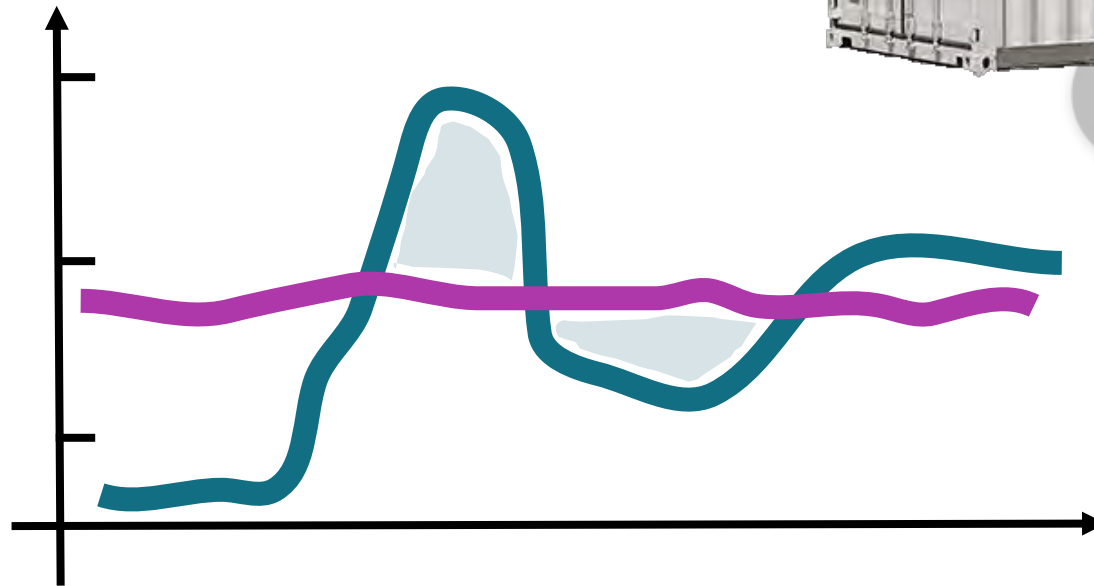


# Allegro Supercapacitors & Flow Batteries

Clean, green and cheap: **Super-fast power** for FCAS, FFR combined with **utility-scale energy storage**



+







The End

