



Perennial Strategic Natural Resources Trust

Bell Potter – Voices 2023

Talented teams,
great opportunities.

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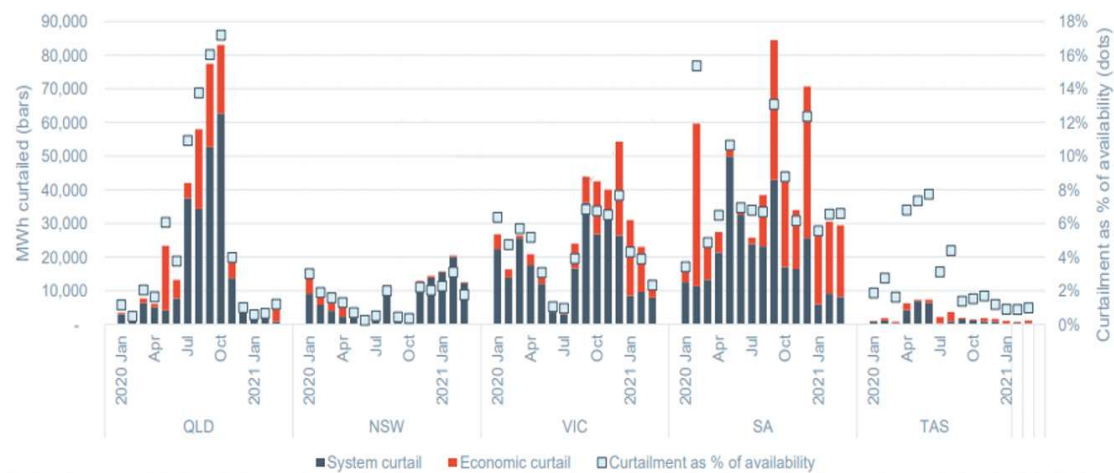
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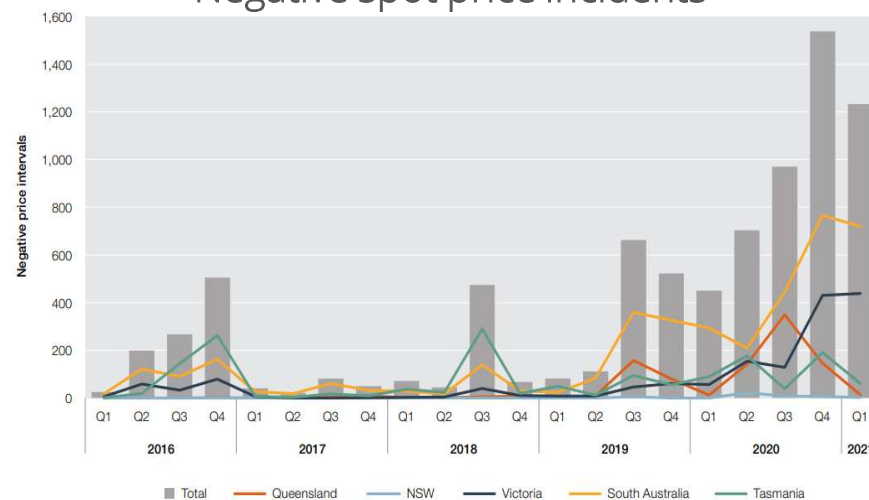
Renewable roll out is running into headwinds...

Higher capex, higher cost of debt, increasing curtailments, connection restrictions are all slowing renewable roll out

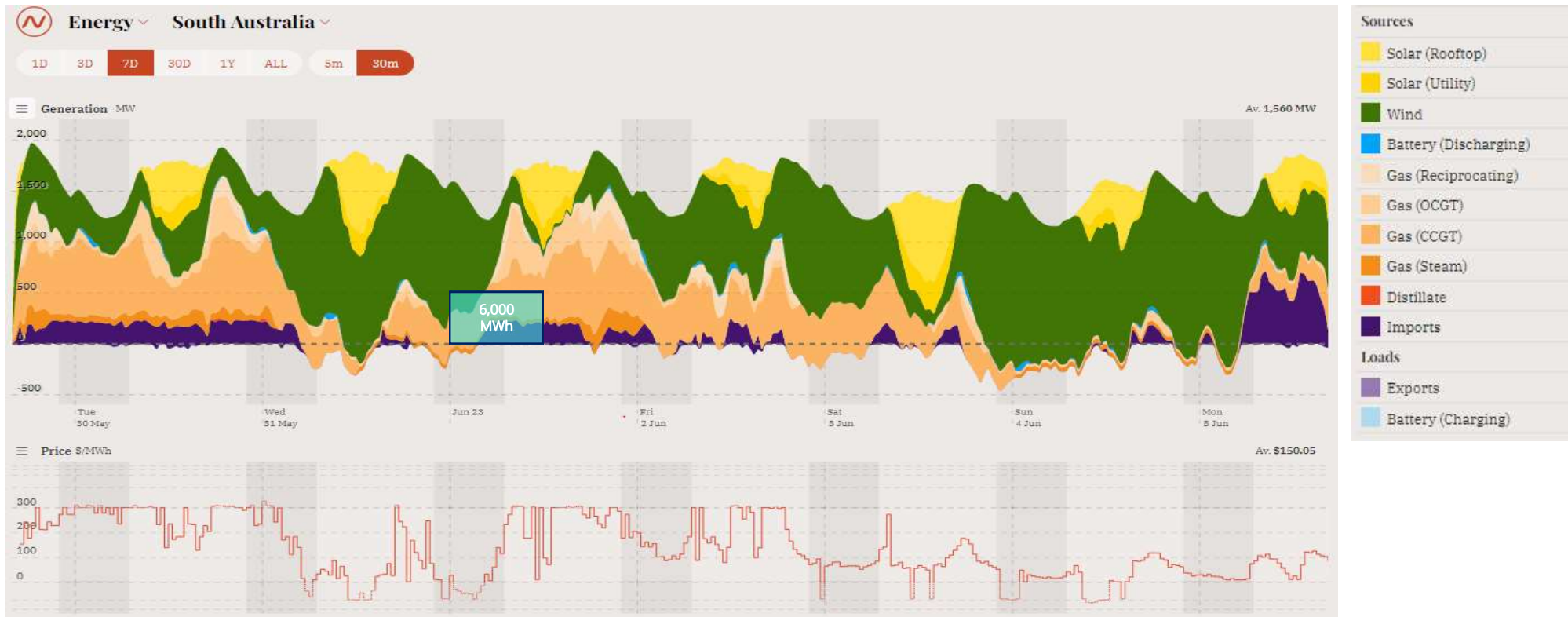
Monthly curtailment of wind and solar by type



Negative spot price incidents



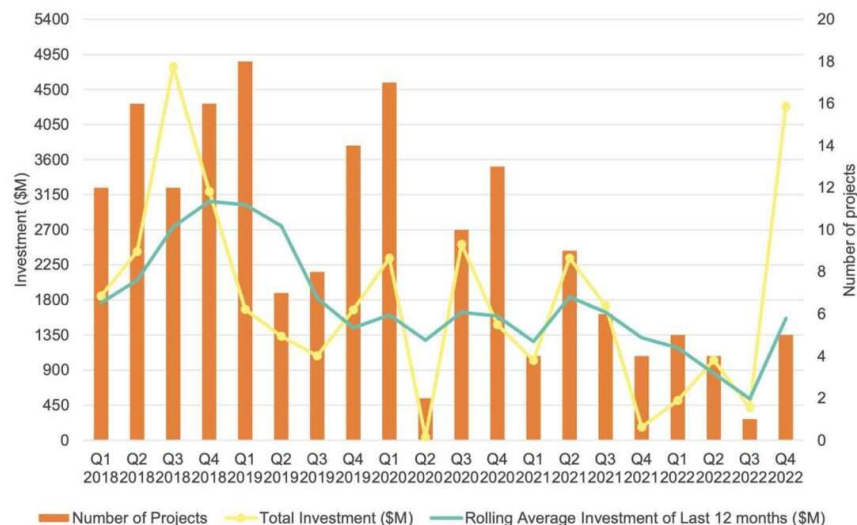
Renewable generation often receives negative prices



Source: Open NEM

Renewable Investment is fading, it needs to be accelerating

Financially committed capacity projects and investment



Cost of debt has increased

Capital costs have increased, especially for wind

Renewables | April 25, 2023

Data insight: the cost of a wind turbine has increased by 38% in two years

The average price of the seven most significant critical minerals for the wind industry has increased by 93% since January 2020.

By Nick Ferris

Achieved prices for renewables are flat to declining despite rising wholesale power prices

- Zero renewable energy projects took FID in March quarter

Source: Renew Economy, Energy Monitor, Clean Energy Council

Gas investment remains frozen while reserves are exhausted

Ukraine invasion was not cause of energy spike last year, shortage of gas and coal generation was

Exxon warns of dwindling Bass Strait gas

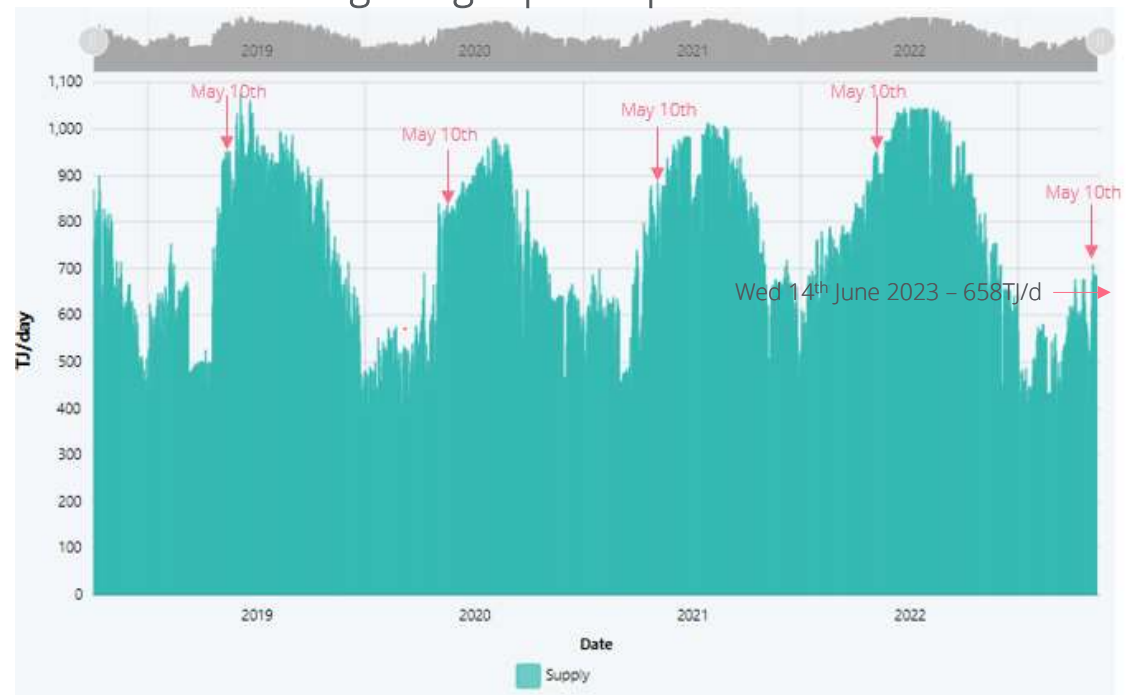
Colin Packham and Angela Macdonald-Smith

Mar 22, 2023 - 5:45pm

ExxonMobil – one of the country's largest producers of domestic gas – said it expects the number of wells it operates in the Bass Strait to almost halve by winter 2024, confirming the risk of a gas shortage on the east coast.

- Gas price cap has been removed for new domestic gas projects
- Indefinite “Reasonable return” policy remains in place
- Gas industry has deferred replacement supply pending clarification from industry

Longford gas plant - production



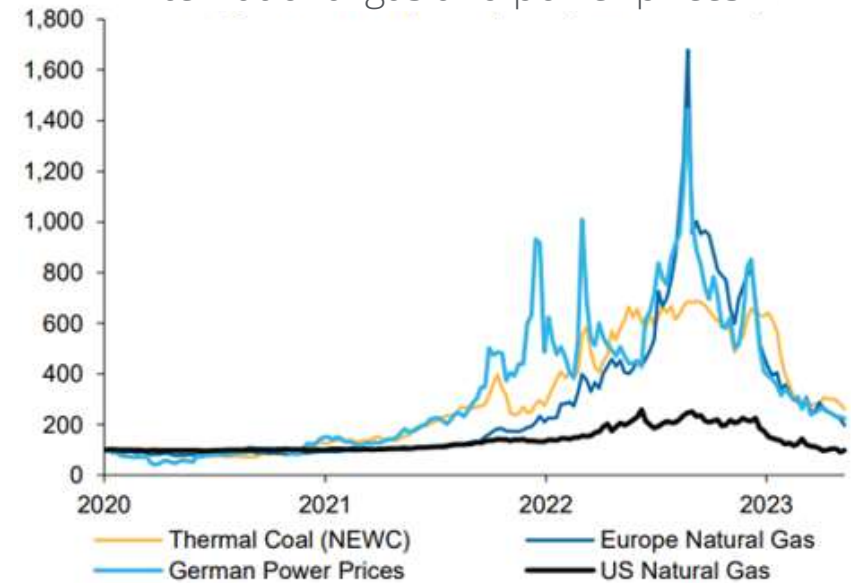
Correlation \neq causation: Australian energy shortage begins at home

Ukraine invasion was not the cause of higher power prices last winter

Australian domestic gas prices (A\$/GJ)



International gas and power prices



Source: Platts, Macquarie, Bloomberg, Australian Energy Regulator

Australian has headwinds of our own making

Australia missing out on falls in energy prices being enjoyed in the rest of the world

| Australian CPI basket | | Weights (%) | | |
|---|---------------------|-------------|-------|---|
| Group | 2019 (pre-Covid) | 2021 | 2022 | |
| Food and non-alcoholic beverages | 15.75 | 16.76 | 17.18 |  |
| Alcohol and tobacco | 7.71 | 9.01 | 7.87 | |
| Clothing and footwear | 3.23 | 3.33 | 3.37 | |
| Housing | 22.93 | 23.24 | 22.24 | |
| Furnishings, household equipment & services | 8.56 | 9.16 | 8.94 | |
| Health | 5.88 | 6.47 | 6.25 | |
| Transport | 10.68 | 10.58 | 10.99 | |
| Communication | 2.41 | 2.41 | 2.31 | |
| Recreation and culture | 12.81 | 8.64 | 10.84 | |
| Education | 4.44 | 4.63 | 4.43 | |
| Insurance and financial services | 5.59 | 5.80 | 5.56 | |

Policy constraints applicable to 58% of the CPI basket

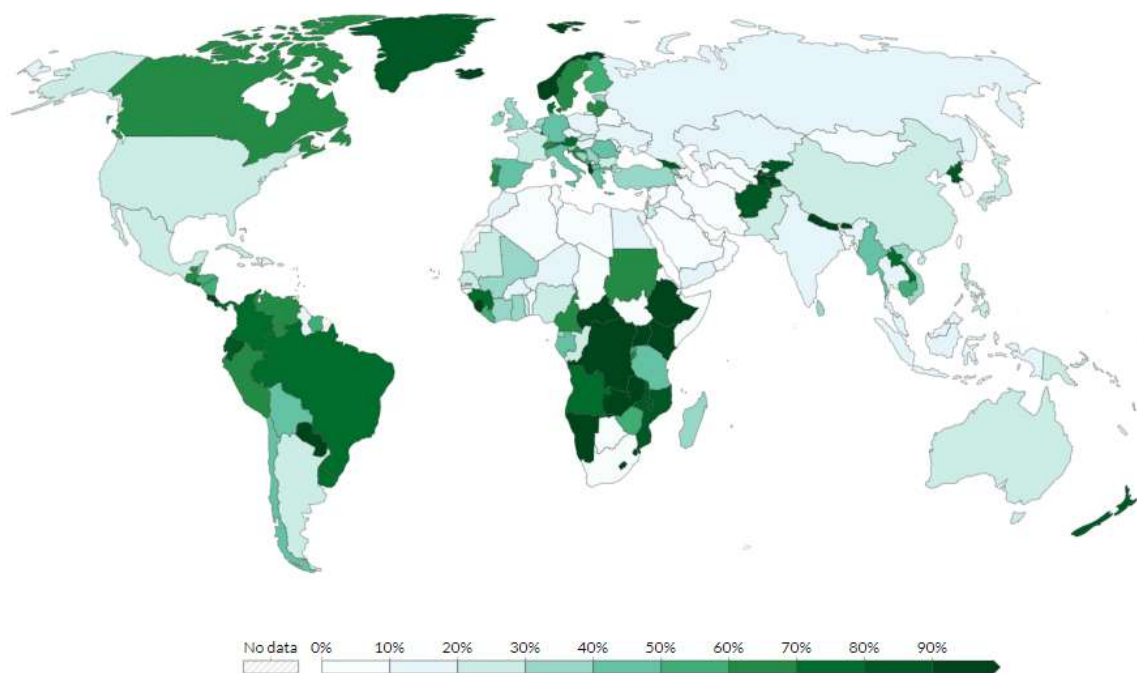
| Housing | Energy |
|--------------------------|------------------------------|
| Land tax increase | Reasonable return margin cap |
| Rent freeze proposals | \$12/GJ price cap |
| Immigration acceleration | Increase in PRRT |

The ex-hydro world is running into intermittency headwinds

More storage is required to facilitate increased intermittent power penetration

Share of electricity production from renewables, 2021

Renewables include electricity production from hydropower, solar, wind, biomass & waste, geothermal, wave, and tidal sources.



Clean Energy News and Analysis

Solar and wind projects fear big delays from new "one at a time" connection rules

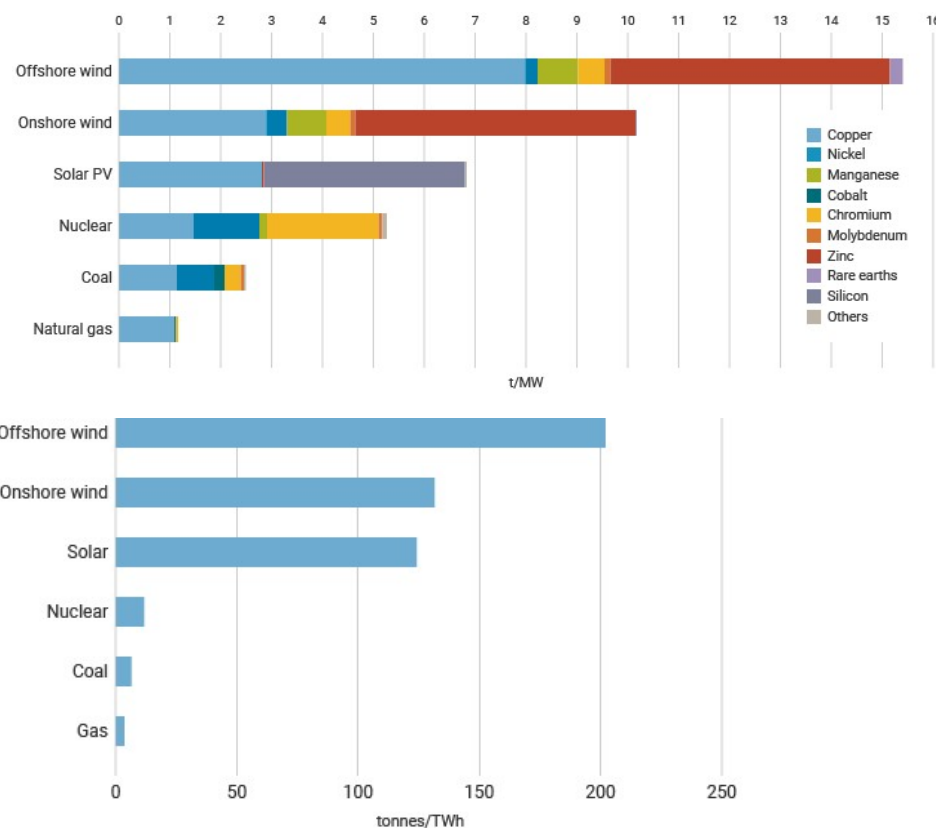
[Giles Parkinson](#) 31 May 2021 41

AEMO suspends new wind and solar projects as it battles to deal with market crisis

[Giles Parkinson](#) 19 June 2022 51

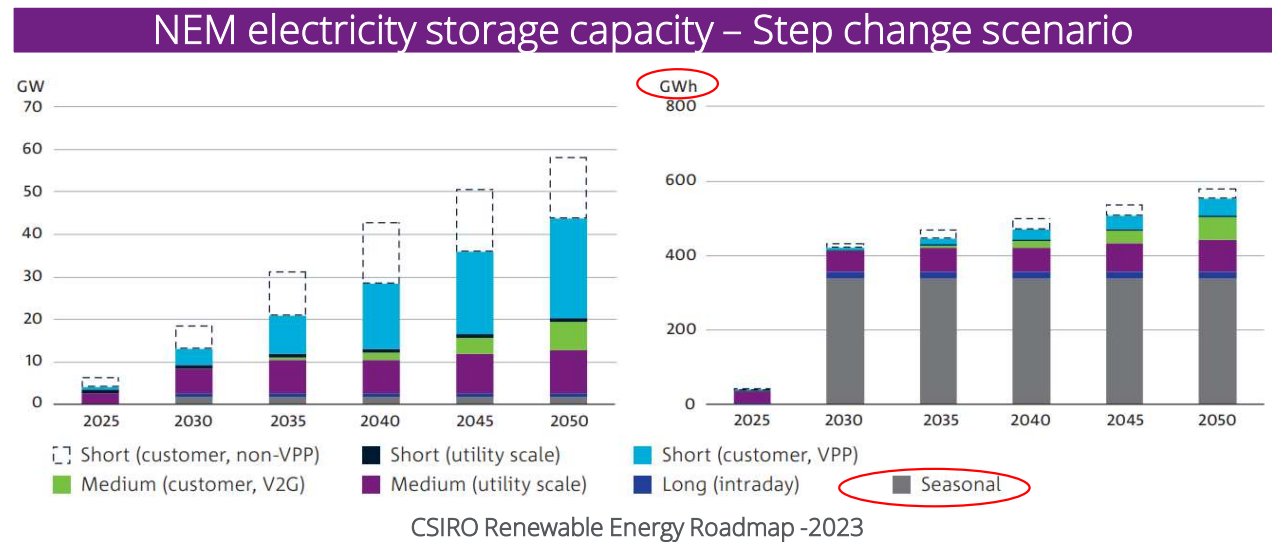
Decarbonisation: an incredibly metal intensive ambition

- 1 Renewable power is 10 – 16x more metal intensive per unit/hr of power produced vs carbon or nuclear generation
- 2 There is an undeniable raw materials constraint to decarbonisation
- 3 Government policies and the world over are raising barriers to additional mine development
- 4 Corporate adoption of a “value over volume” ideology results in a modest capex outlook



Costs of intermittency are acute on a seasonal basis

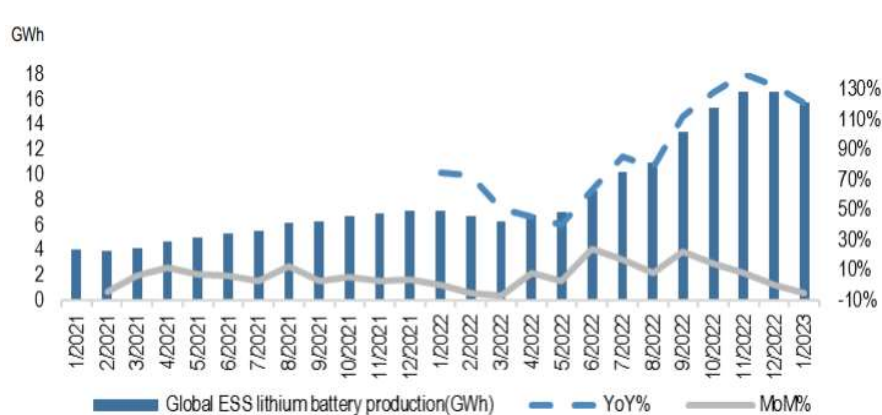
- 1kWh of storage costs \$1000
- 1MWh of storage ~ \$1m
- 1GWh of storage ~\$1bn



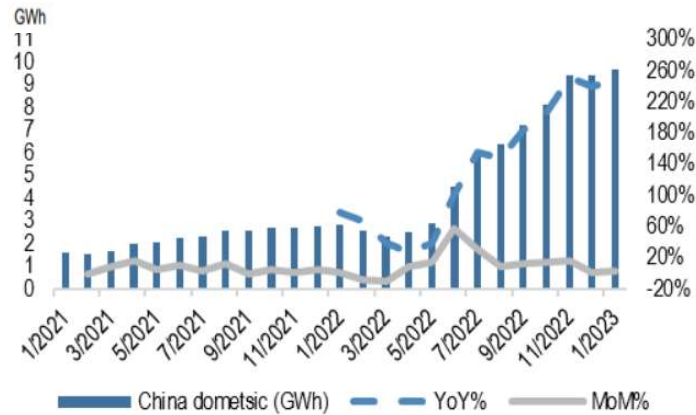
Stationary energy storage is doubling year on year

Implications for commodity supply/demand balances

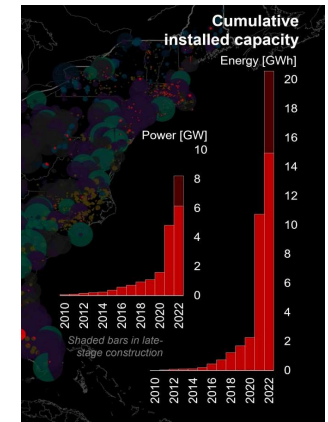
Global Stationary Storage – growing at 130% pa



China domestic Storage – growing at 260% pa



US Stationary Storage - yearly



Stationary storage is moving the needle of battery demand

Roughly 6% of lithium demand in CY22 was attributable to stationary storage

Stationary storage demand doubling year-on-year

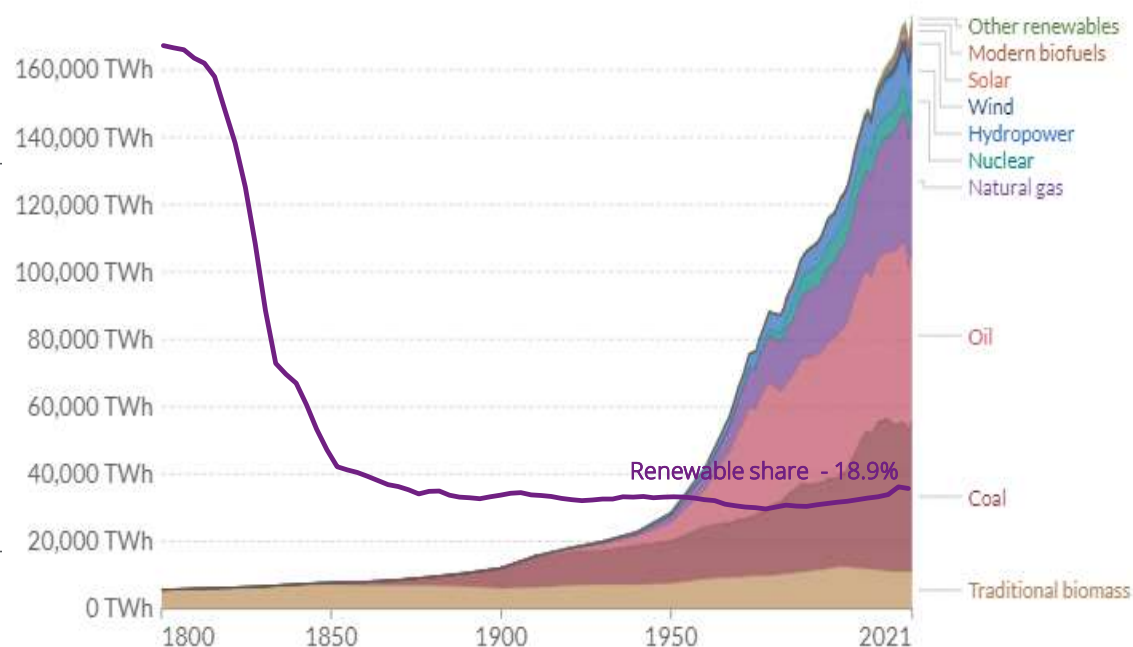
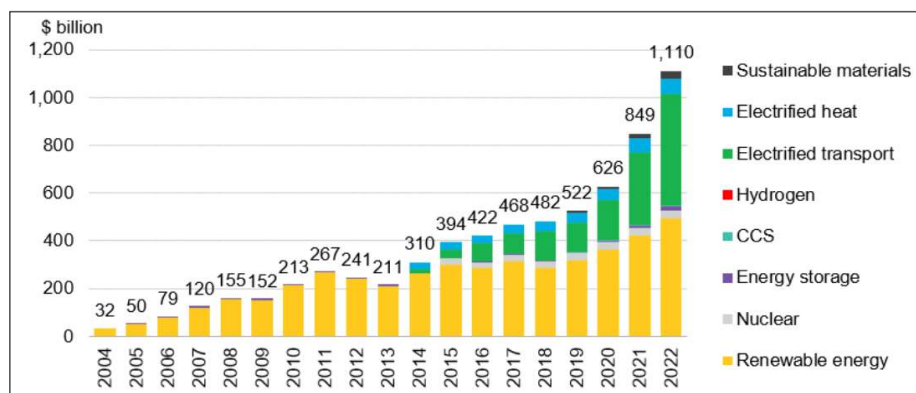
Assuming A\$1000/kWhr of battery storage, each GWhr of battery storage costs

A\$1.0bn

Decarbonisation cost currently ~US\$1trn per 1% of energy share

Regulation and potentially self-interest hobble nuclear development

Global investment in energy transition by sector

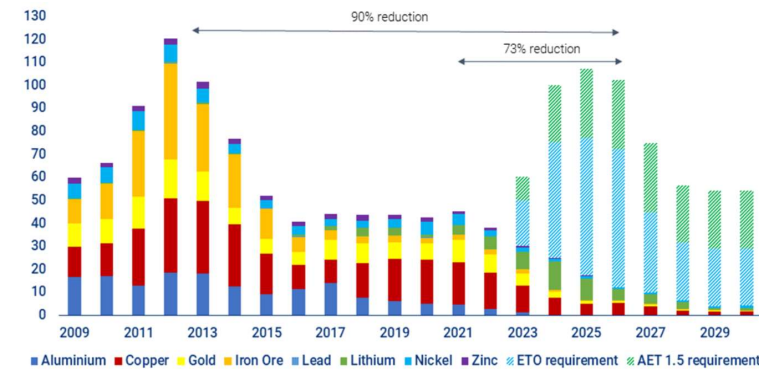


Starved of human and financial capital

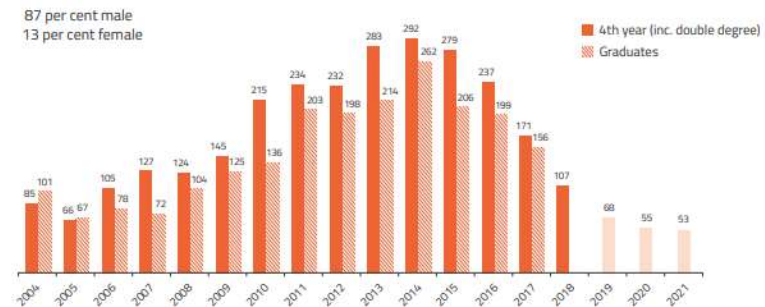
Critical sector starved of capital and expertise

- It is now 10 years since the end of the last commodity boom
- Over supply and wasted capital of the last cycle have cast a long shadow
- The industry has been starved of capital and human resources
- The industry has undergone cultural change

“Value over Volume” – Ivan Glasenberg 2016



Mining engineering MTEC university graduates and 4th year projected enrolments, 2004-2021
(Number of students)



Deficits don't happen overnight, but they will happen

Global in-ground copper inventories are not being replaced...

Quellaveco, largest source of 2023 supply growth

- 1992 - acquired by Anglo American
- drilling, studies, more drilling -
- 2011 - commence consultation process with Peruvian stakeholders

7 years for social license

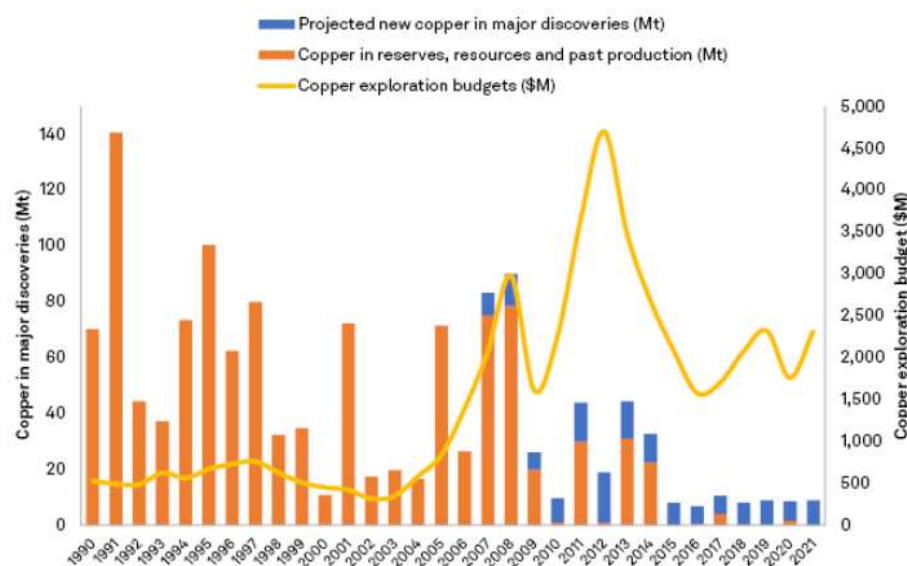
- 2018 - final permits granted, commence construction (US\$5.5bn budget)

4 years for construction

- 2022 - (July) first copper concentrate produced
- 2023 - (October) Anglo expresses concern over potential reversal of water license

30 years for first production

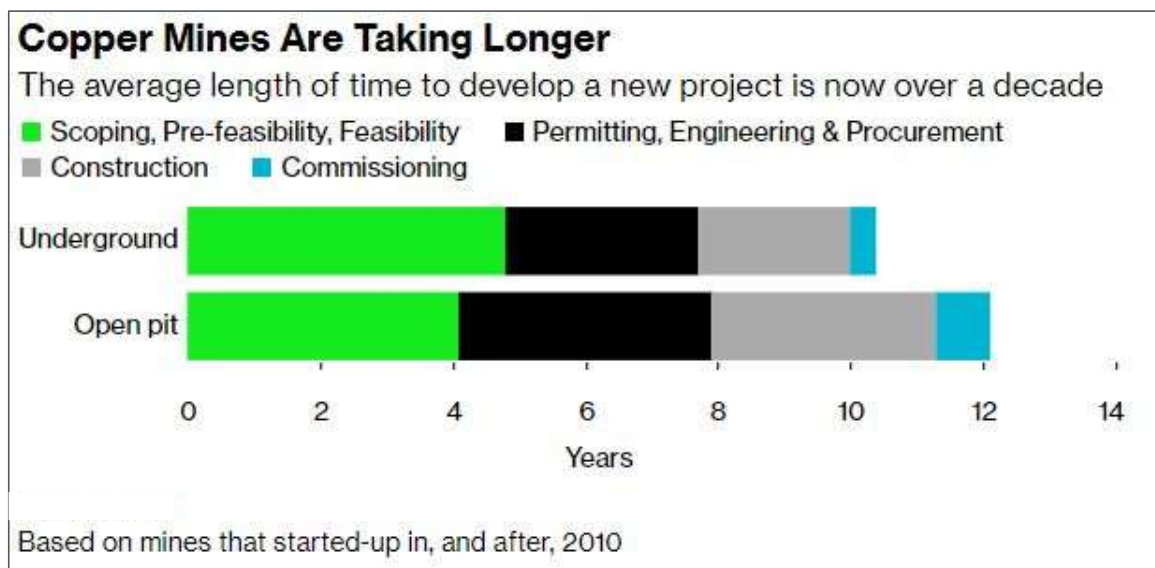
Copper discovery drought continues...



Growth surviving on past glories...

It takes longer to build a copper mine than a nuclear industry

Nuclear power requires <10% of the metal per MWh of generation vs renewables



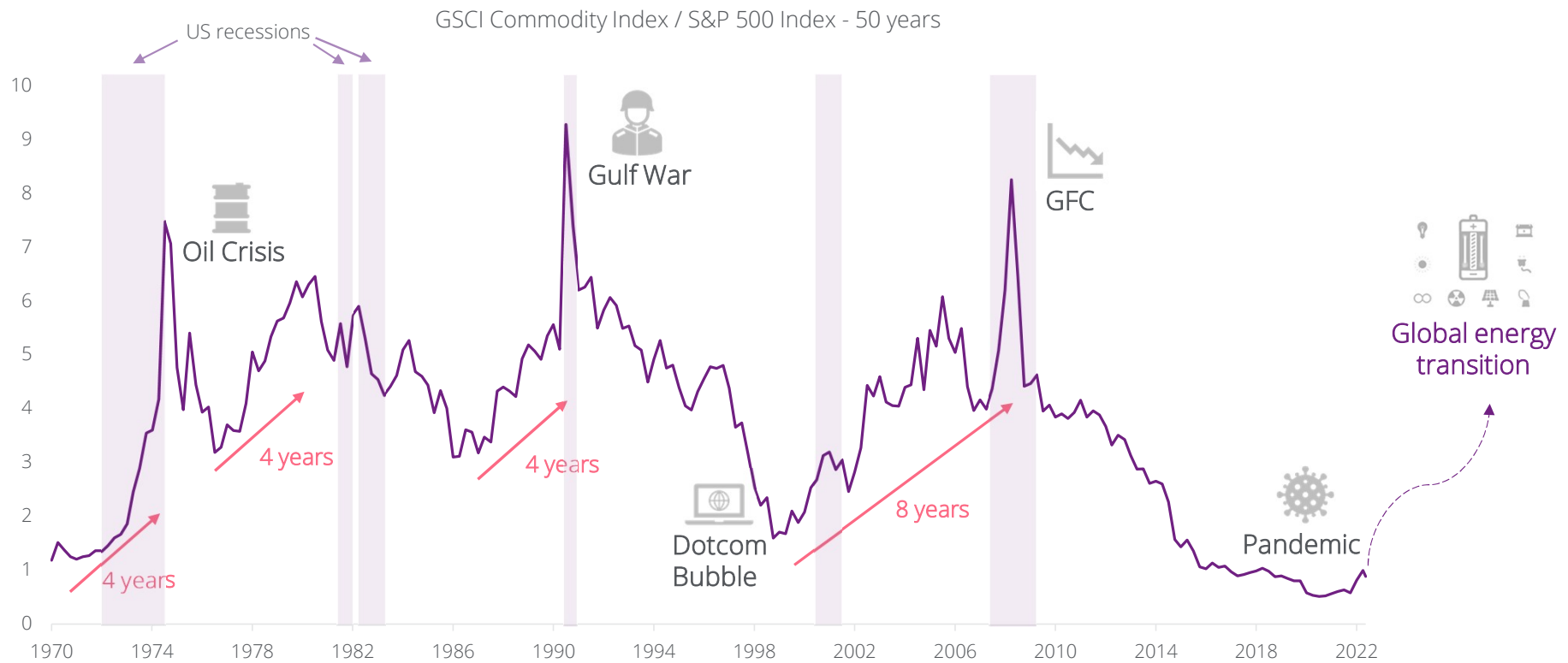
Source: CRU, WNA

Barakah nuclear facility - UAE

Dec 2006: idea
July 2012: start construction
August 2020: reactor 1 online
March 2022: reactor 2 online
Feb 2023: reactor 3 online

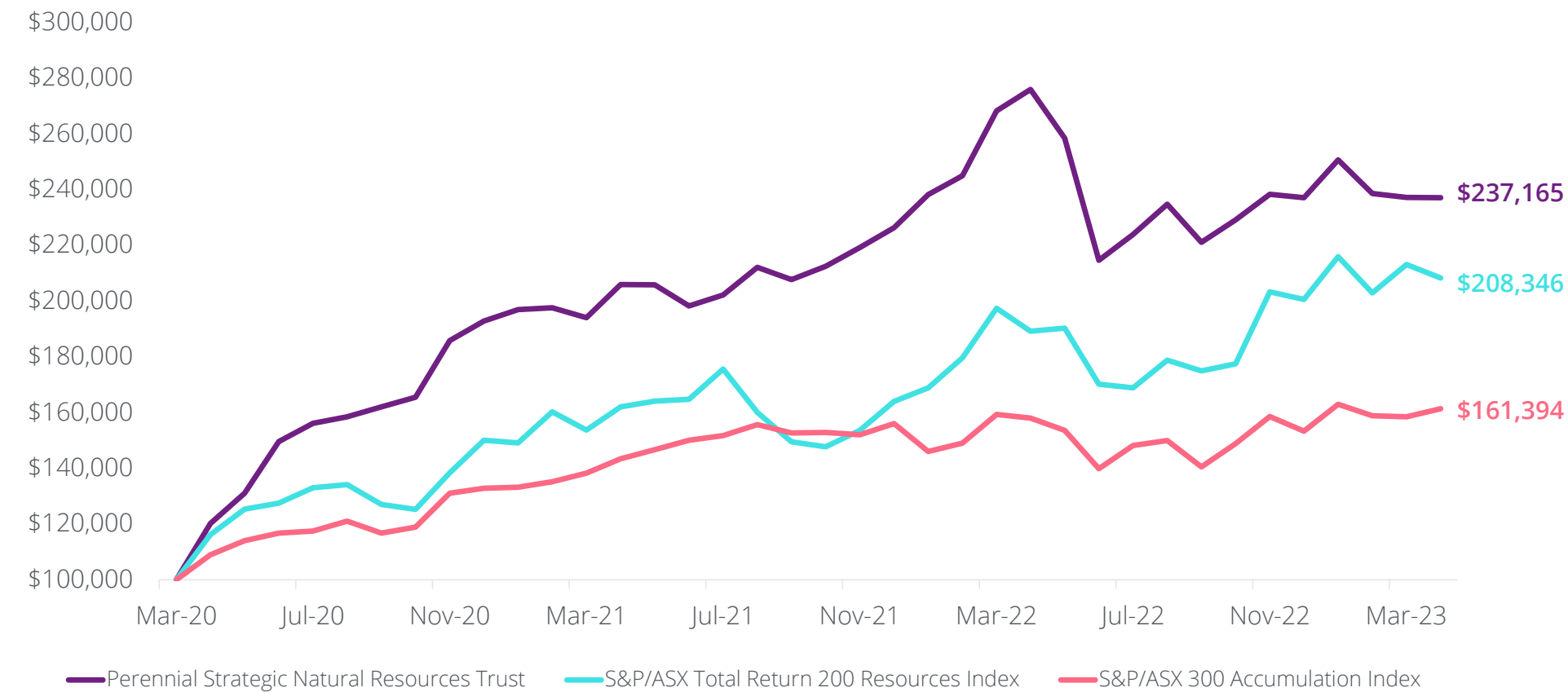


Commodities – Typical Cycle Duration = 4 years



Growth of \$100,000 Since Inception

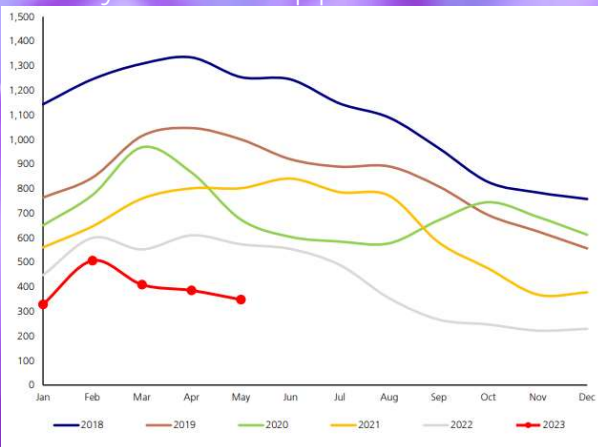
Since Inception on 1 April 2020



Source: Perennial Strategic Natural Resources Trust as at 30 April 2023. Net Returns includes distributions reinvest. Past performance is not a reliable indicator of future performance.

Summary

Five years of copper draw down



The commodity cycle lasts longer than the interest rate cycle



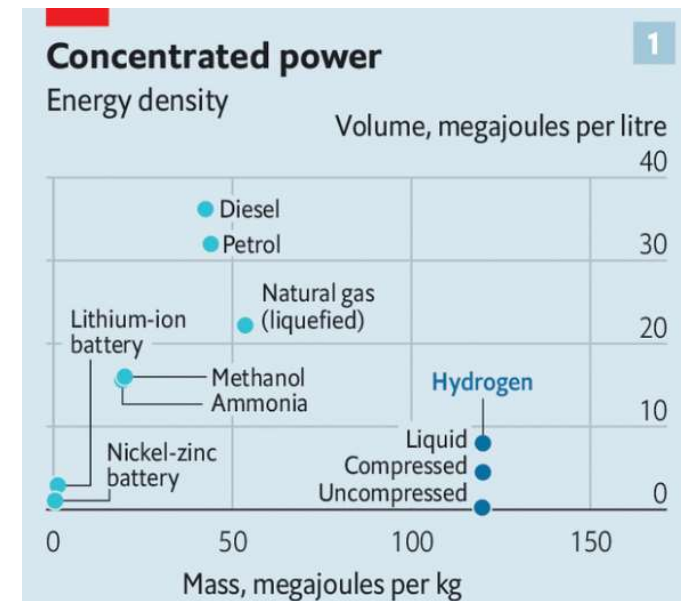
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Appendix

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Choose one: Energy density or Materials Intensity...

Metals intensity of battery storage can not compete with nuclear



Uranium 235 energy density:
3,900,000MJ/kg

Nuclear – SMR tech is tried, tested and proven

Power price volatility increases appeal of energy storage, in cars, at the workplace and at home

First flight, 1903



First man on moon, 1969



First SMR, 1954



SMR popular consensus, 2023

The Nuclear Fallacy: Why Small Modular Reactors Can't Compete With Renewable Energy

Will the small modular nuclear reactor community be able to find an optimized point on the physics vs modularity curve? I don't think so, and discussed it with Bent Flyvbjerg, global megaproject expert.

By Michael Barnard Published January 18, 2023 [f](#) [t](#) [i](#) [e](#) 576 Comments

Virginia Class sub → 210MW SMR



Power storage replacement

| | |
|---|------------|
| Virginia class nuclear sub power generation | 210 MW |
| Nuclear sub cost | 3.6 US\$bn |
| assume half the cost is the reactor | 1.8 US\$bn |

| | |
|-----------------------|-------------|
| 24hr power production | 5,040 MWhr |
| Capital cost of power | \$ 357 kWhr |

| | |
|-----------------------|-------------|
| 48hr power production | 10,080 MWhr |
| Capital cost of power | \$ 179 kWhr |

| | |
|------------------------------|-----------------|
| 33 years of power production | 60,706,800 MWhr |
| Capital cost of power | \$ 0.03 kWhr |

Perennial Strategic Natural Resources Trust

Returns Net of All Fees

| Period to 31 May 2023 | 1 Mth (%) | 3 Mths (%) | 1 Year (%) | 3 Years (% p.a.) | Since Inception (% p.a.) | Cumulative Since Inception (%) |
|--|--------------|---------------|---------------|---------------------|--------------------------------|--------------------------------------|
| Perennial Strategic Natural Resources Trust | -3.9 | -4.5 | -11.9 | 20.2 | 29.7 | 127.8 |
| Benchmark (Absolute return 6.5% p.a.) | 0.5 | 1.6 | 6.5 | 6.5 | 6.5 | 21.9 |
| Value Added | -4.4 | -6.1 | -18.4 | 13.7 | 23.2 | 105.9 |

Source: Perennial Strategic Natural Resources Trust inception date is 1 April 2020. Past performance is not a reliable indicator of future performance. Net of fees shown.