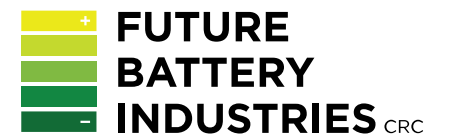




State of Play

Dr Chris Vernon, CSIRO



11 March 2020



State of Play

Purpose: Measure the baseline of activity in the industry as at the start of the CRC.

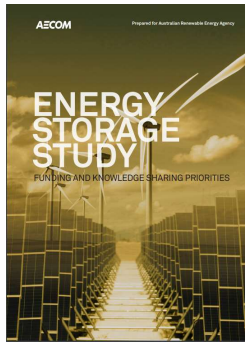
Repeat at 3y and 6y to demonstrate progress.

Not a forecasting or research planning tool.
(It may occasionally look that way,
but that's for others to do.)

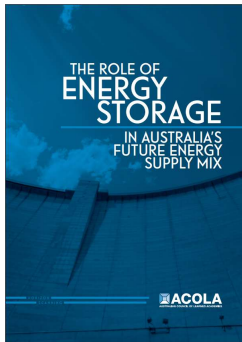




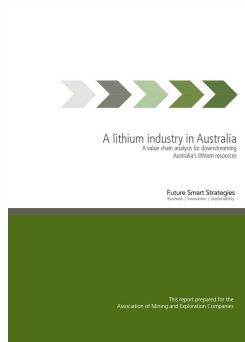
Others have considered the potential



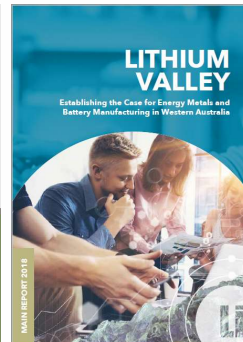
AREA/AECOM
2015



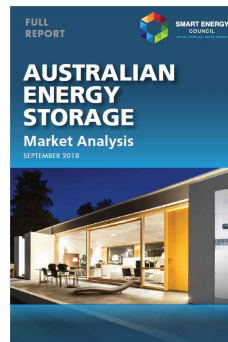
ACOLA
2017



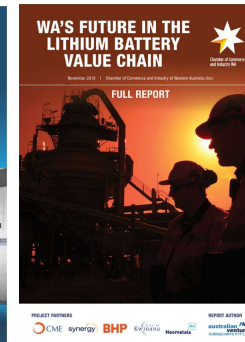
AMEC
2018



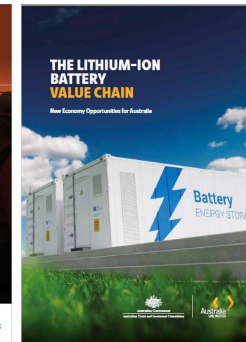
Regional
Development
Australia
2018



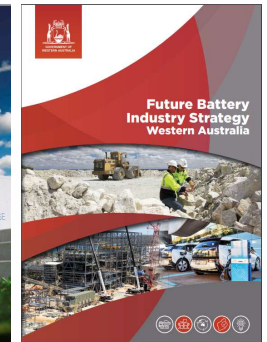
Smart Energy
Council
2018



CCIWA
2018



Austrade 2018



WA Govt. 2019



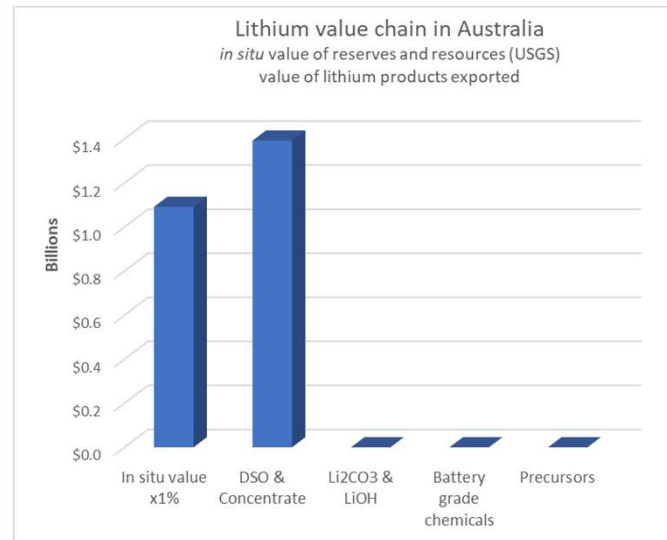
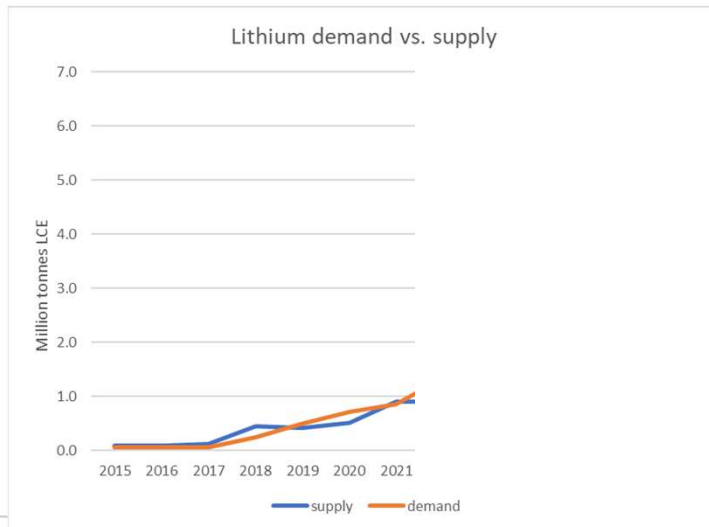
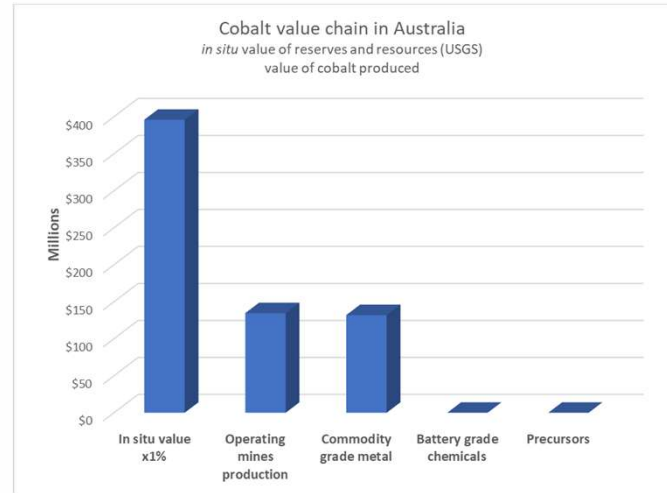
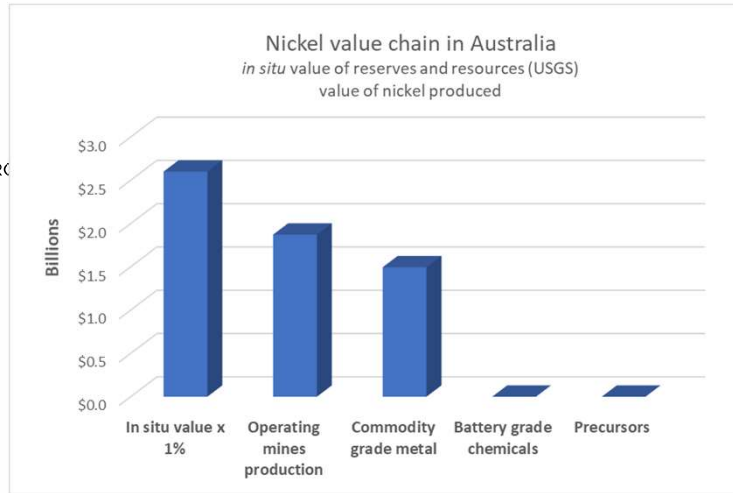
Australia has the resources but does not yet take advantage of them.

Beyond basic refining it's still dig and ship.

Ni and Co are at least refined to metal.

Untapped opportunities:

- HPA
- Graphite
- Vanadium
- Manganese





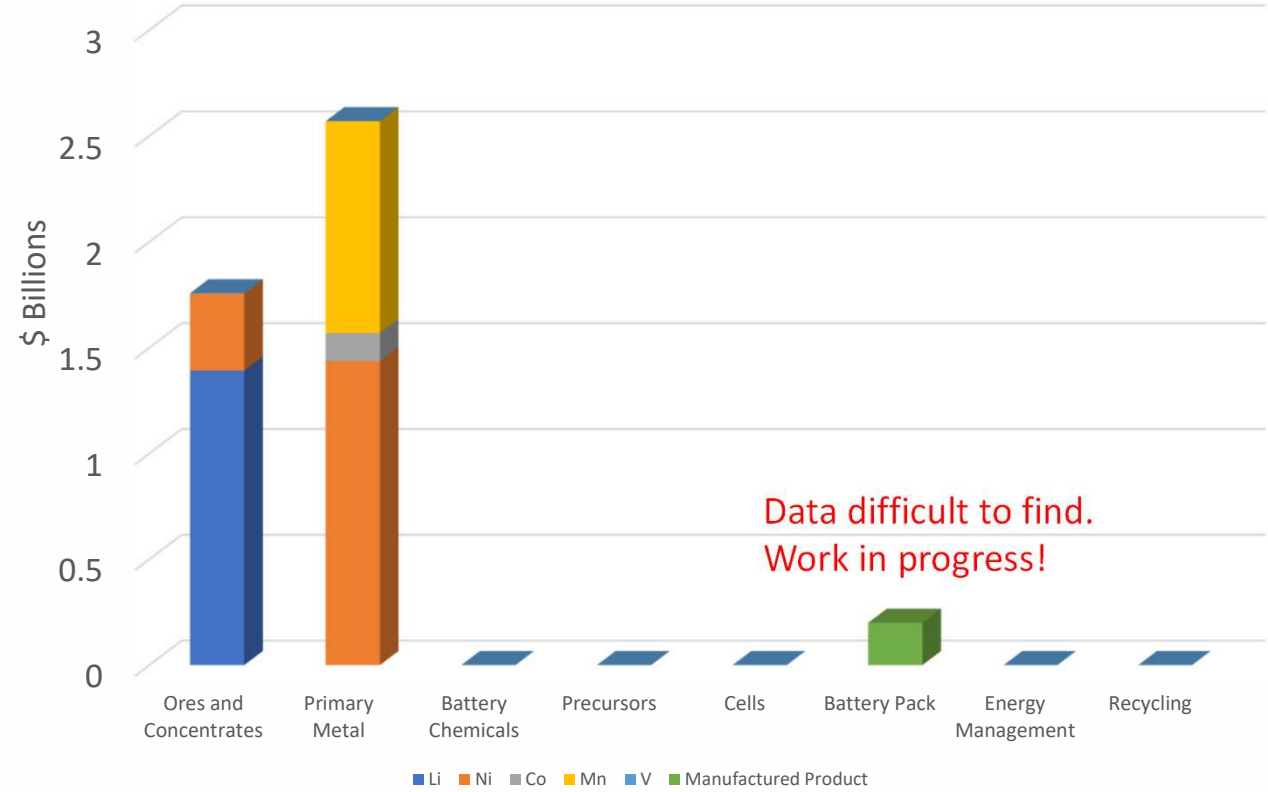
Battery industry in Australia
transaction value, battery metals

Ores/concentrates
dominated by spodumene
concentrates.

Primary metal dominated
by manganese and nickel.

A little cobalt too.

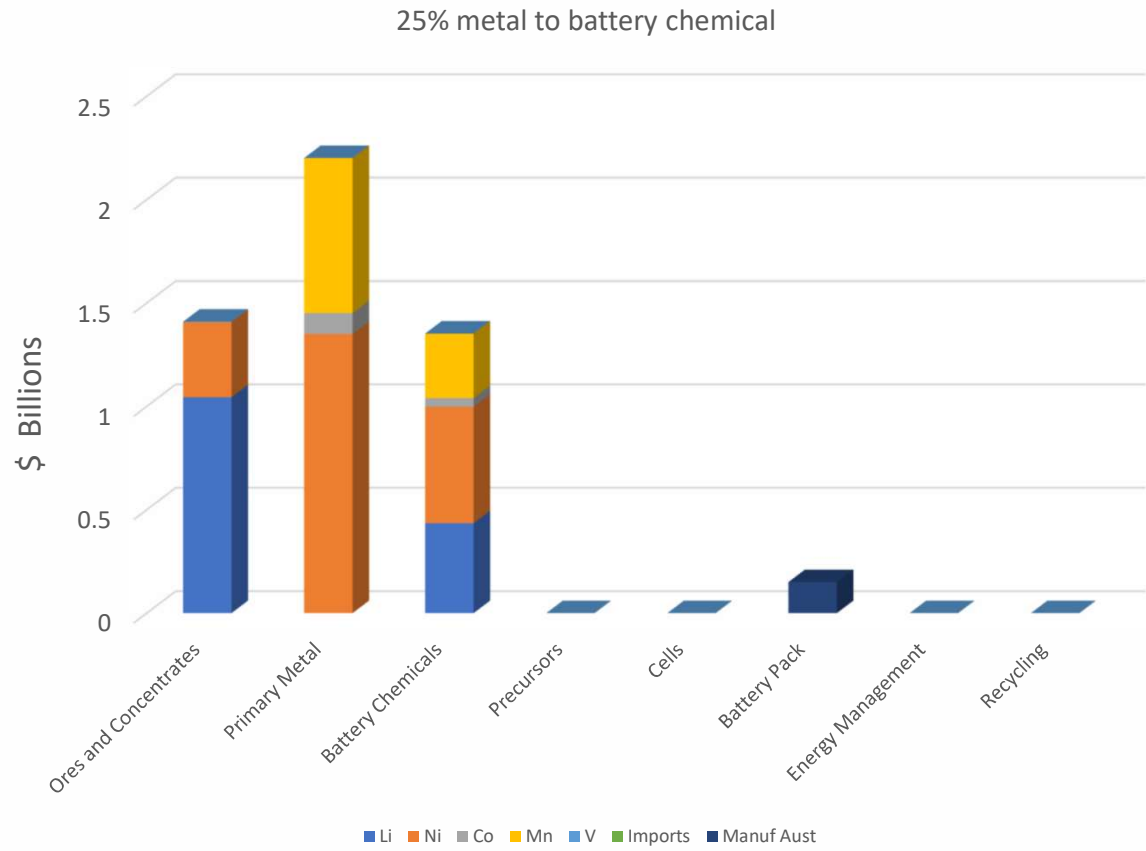
A \$4.4b export industry





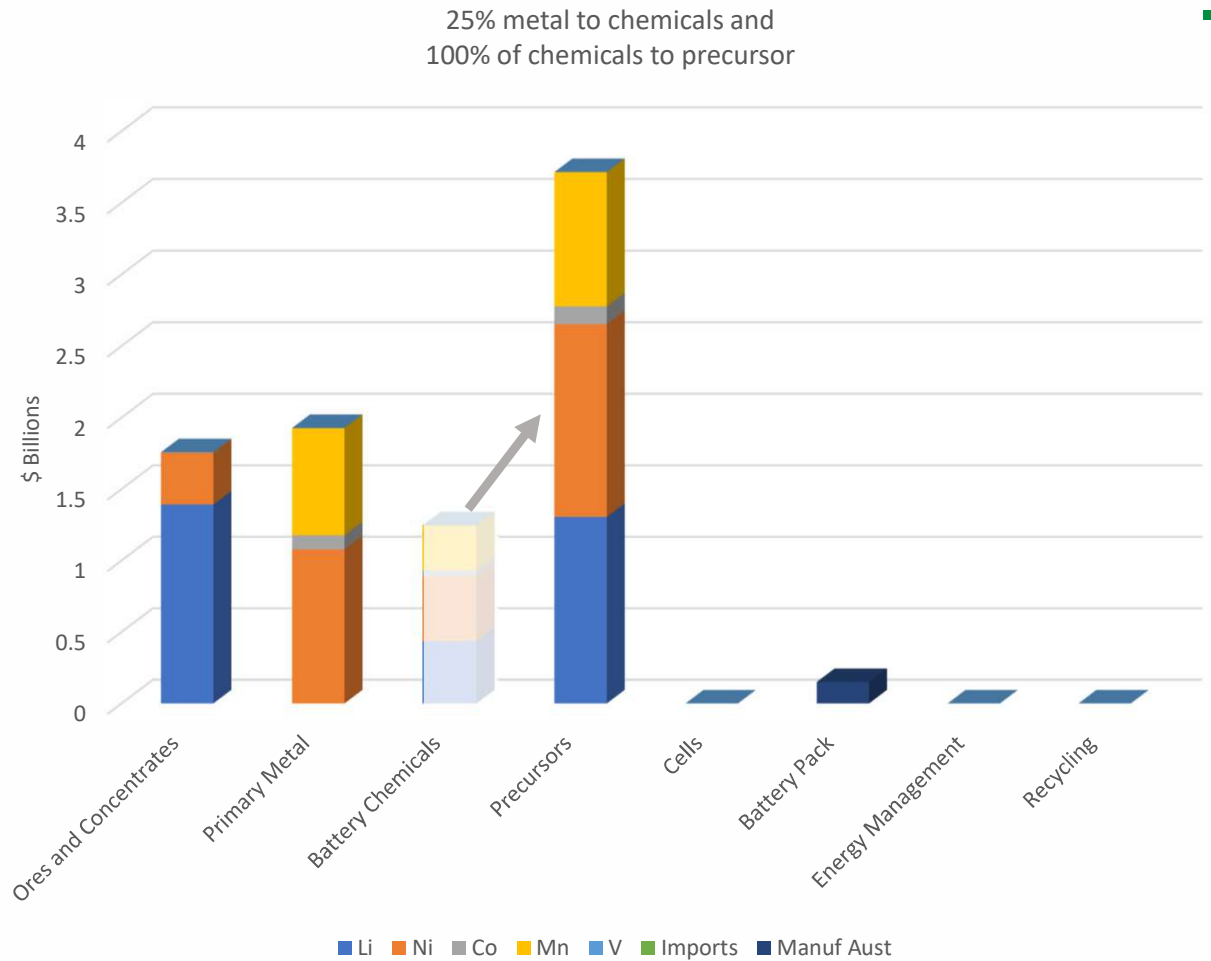
Converting just 25% of our *current* output to battery grade chemicals would add ~\$0.65 billion nett to the economy.

Total exports ⇨ ~\$5b



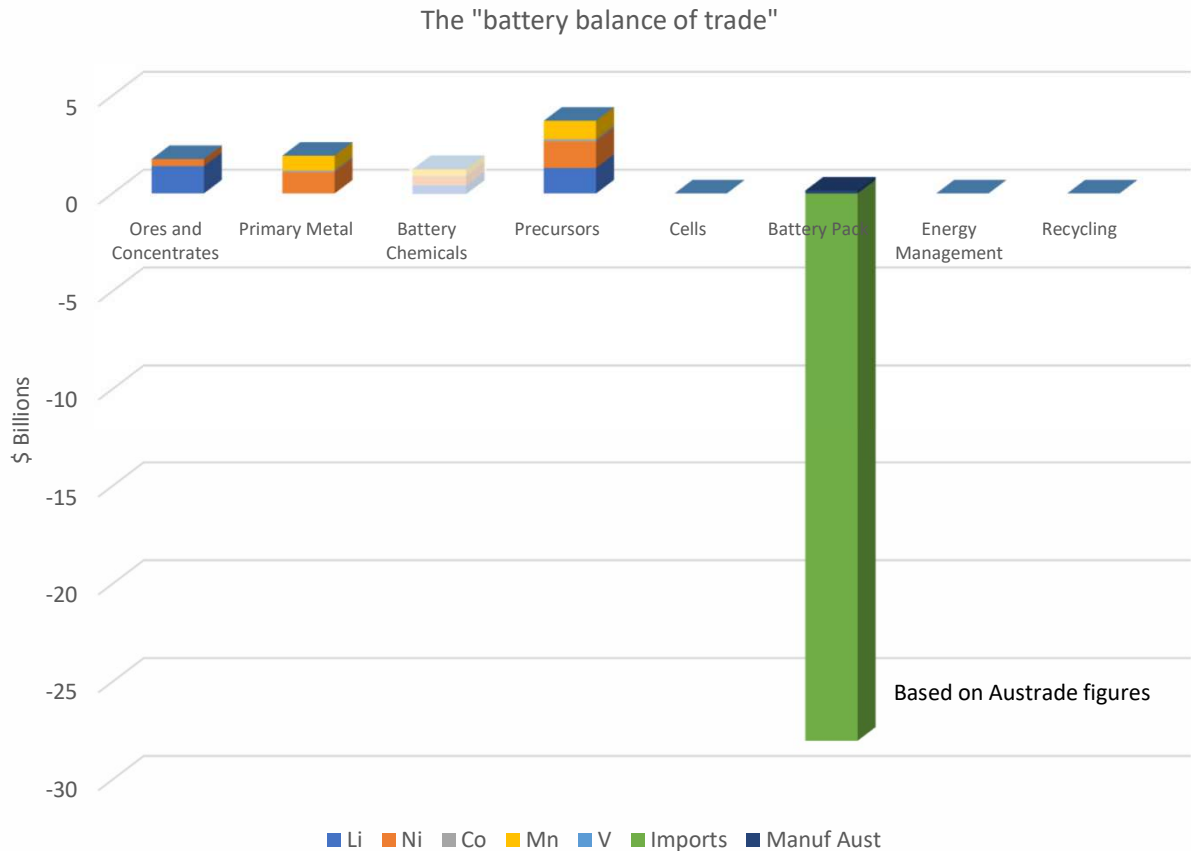
Converting that 25% at battery grade all to cathode precursor would add ~\$3.1b nett to the economy.

Total value ~\$8.6b



Even going to precursors, we still miss out on a lot.

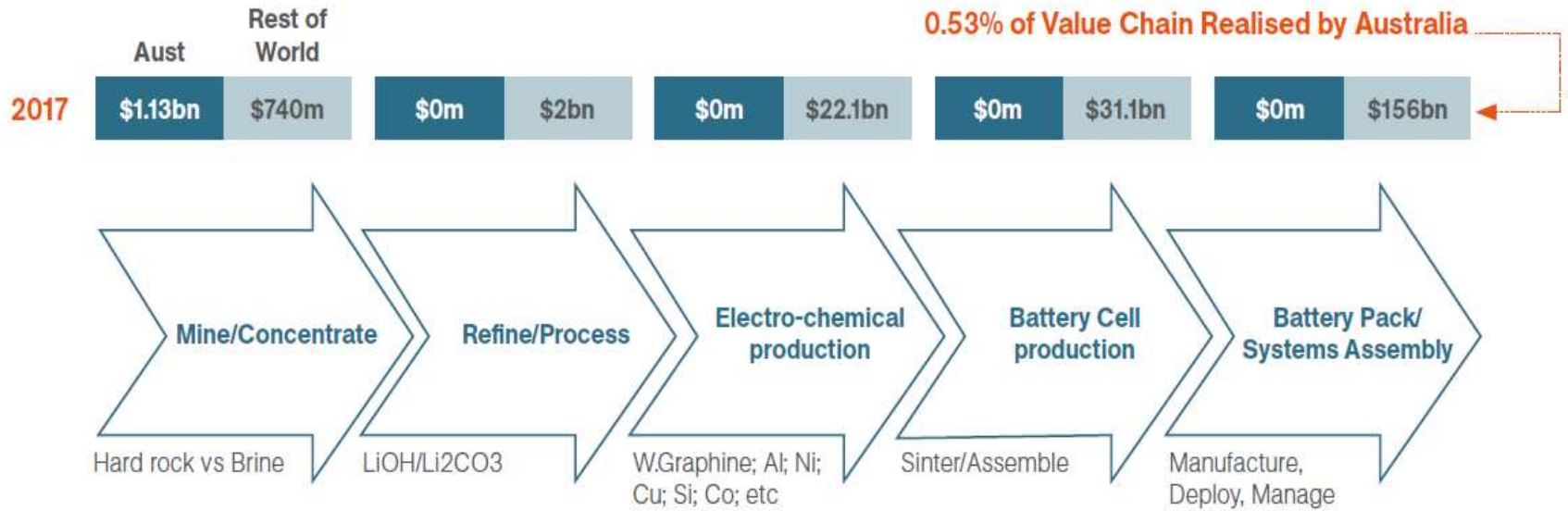
We would have nearly \$9b of exports vs. \$28b of battery imports





FUTURE BATTERY INDUSTRIES CRC

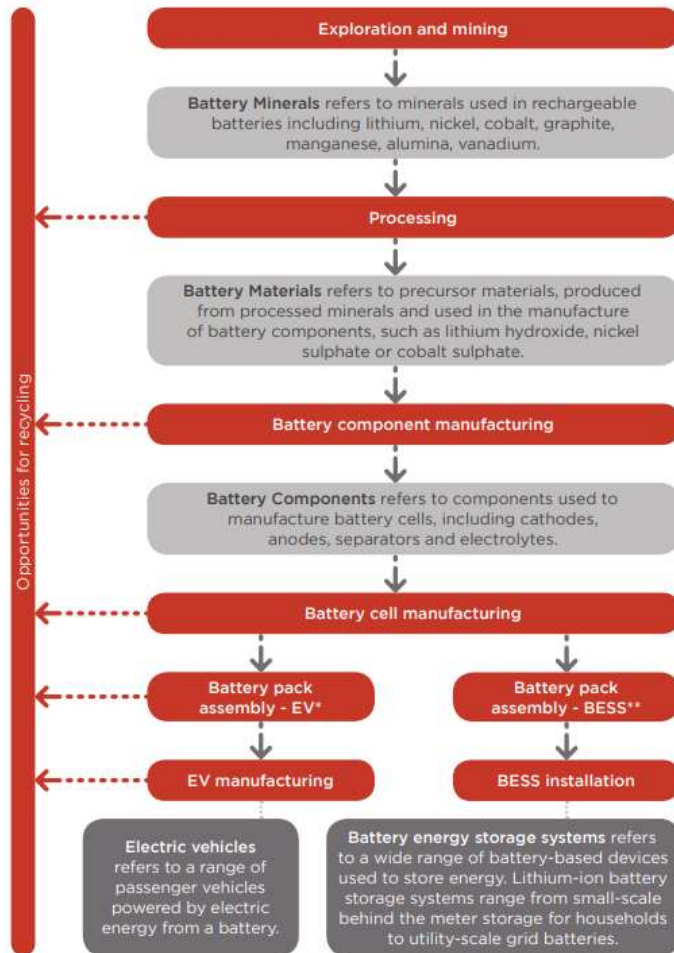
These are large multipliers



Source: Future Smart Strategies (2018)



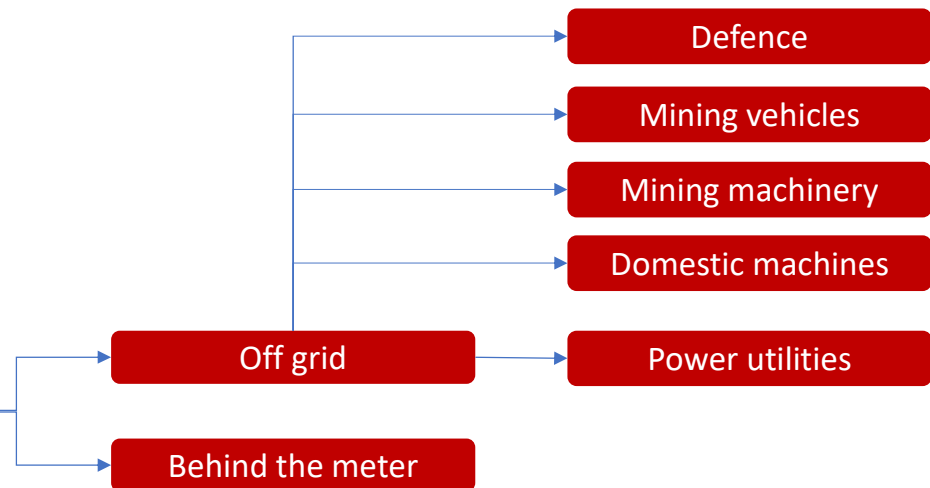
Lithium-ion Battery Value Chain



The value chain splits again after cell manufacturing.

Battery pack use is varied and there is value differentiation in this part of the chain.

e.g. mining and defence – performance & safety are paramount
 power utilities – storage cost & reliability
 domestic machines – safety & cost are the main consideration



Not surprisingly, value is created at each step in the chain.

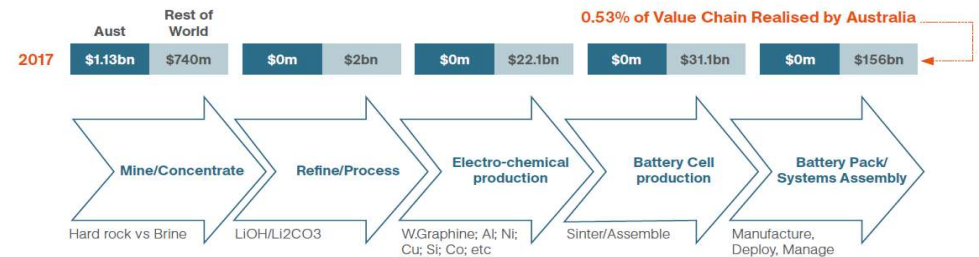
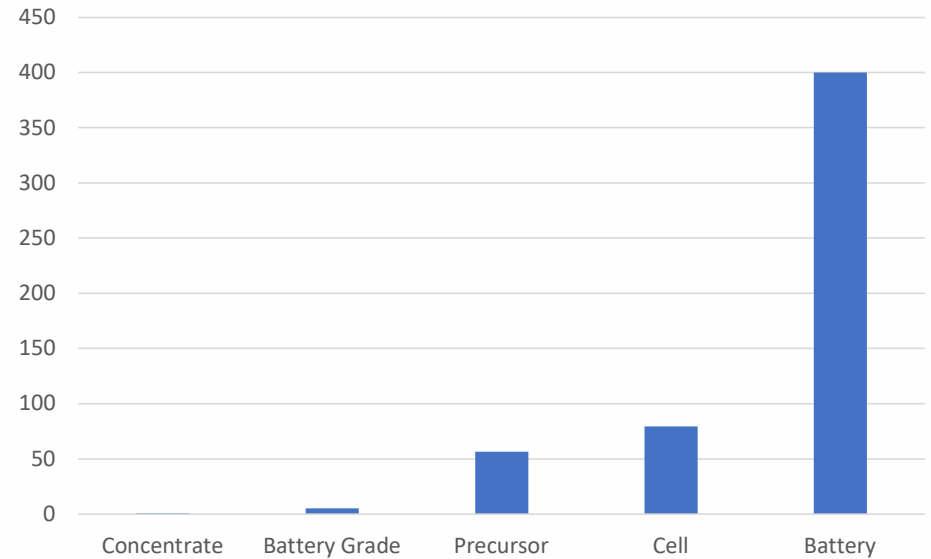
Chemicals to precursor is a 10-fold increase.

The major value arises in battery system production.

If we turned just 25% of our Li, Ni, Co, Mn exports into batteries, it would be worth >\$400b

Multiplier

Source: Future Smart Strategies 2018



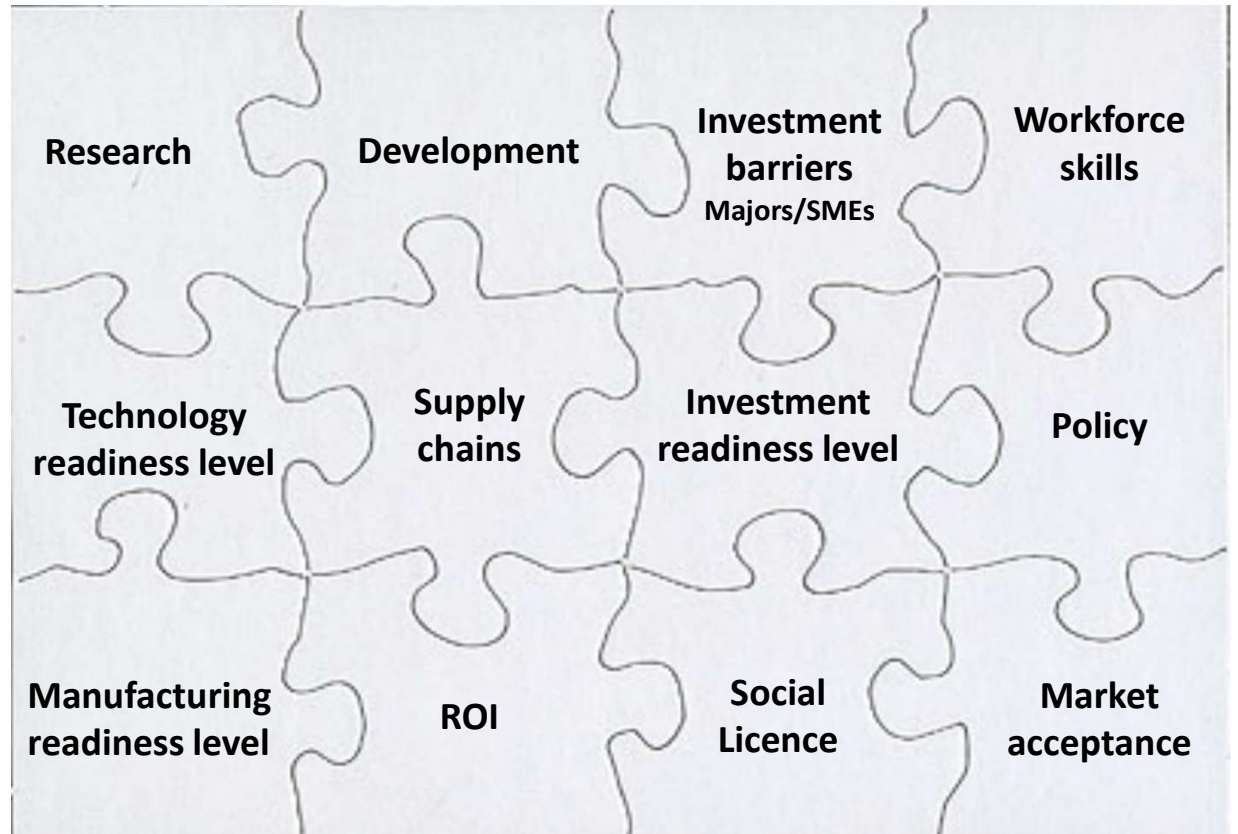
Source: Future Smart Strategies (2018)



We can identify the gaps but R&D is only a small part of the answer.

A major gap in investment for SMEs:
Can SMEs afford to participate?
Supply chains are not built yet.
Manufacturing industries not ready.

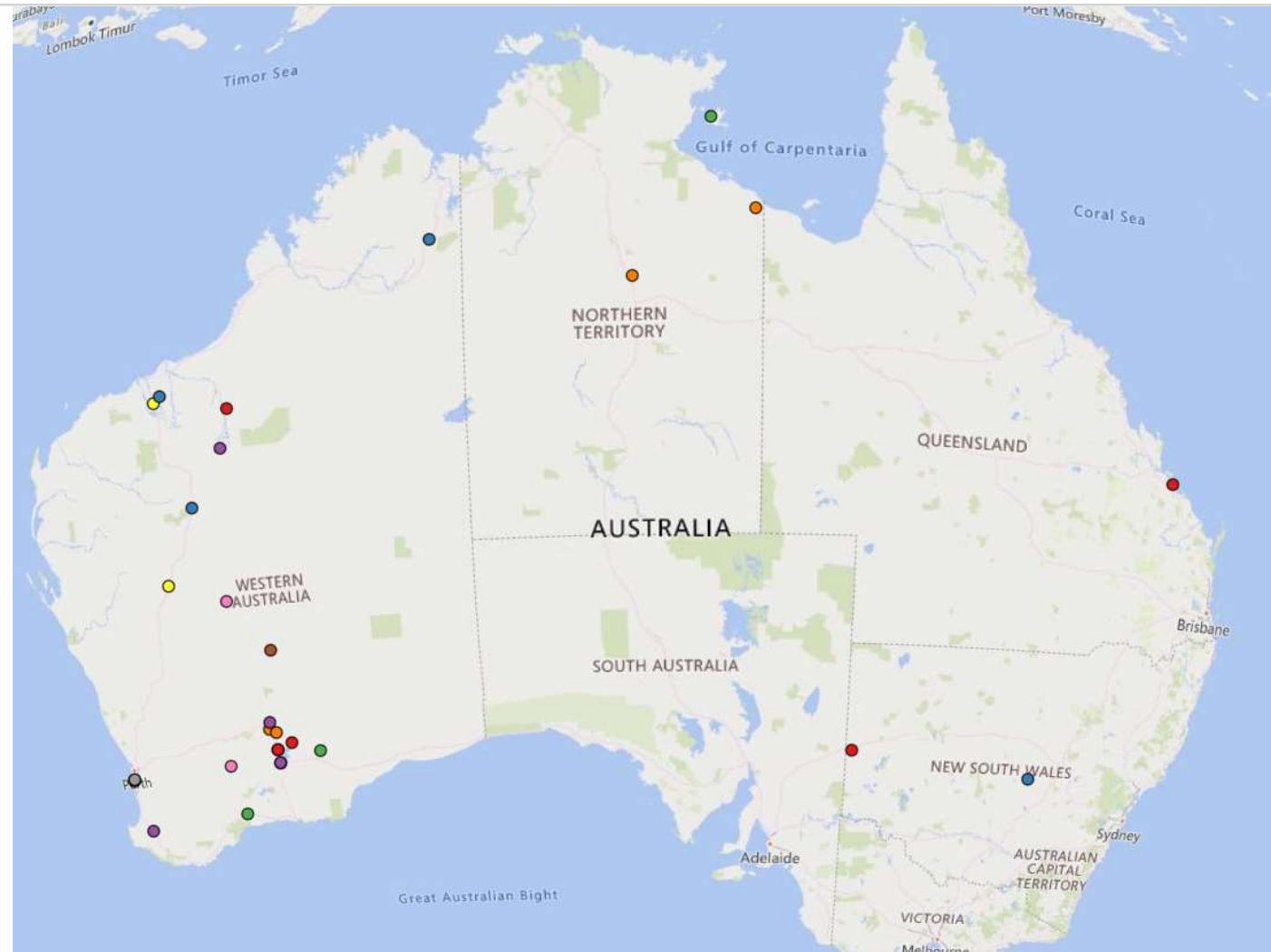
Access to funding is critical.



Living map project

Creating an interactive geo-tagged database of Australian battery activity.

Updated over time to show evolution of the industry.

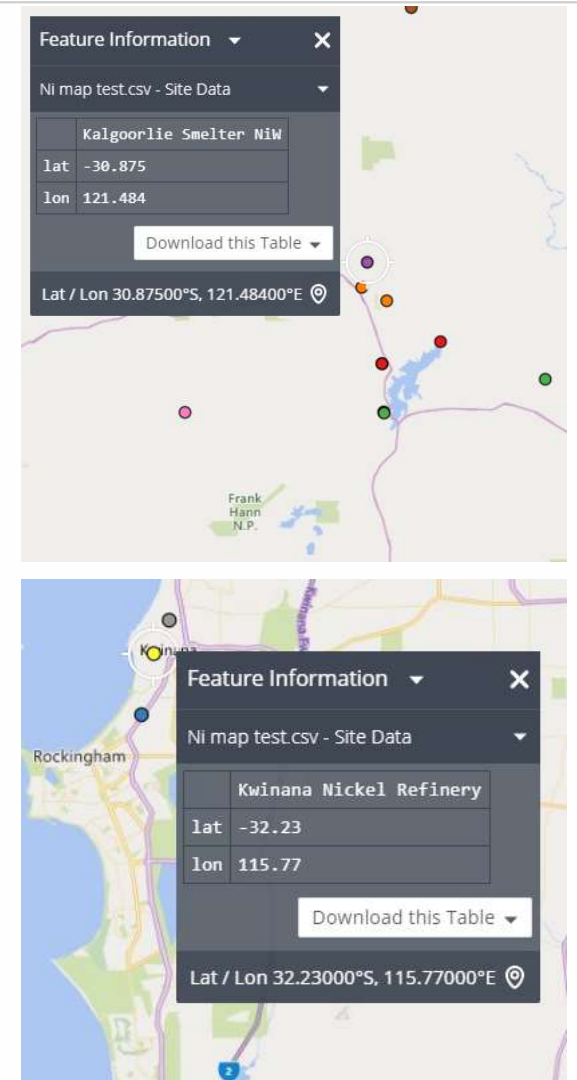
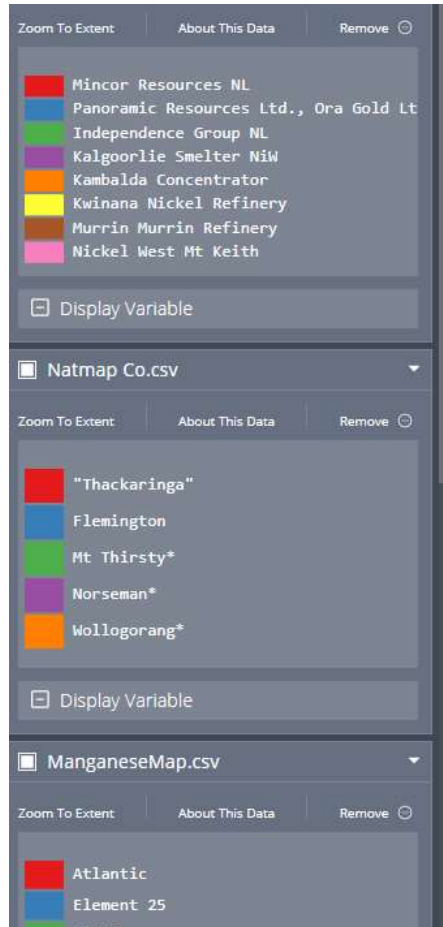


Living map project

Ability to click on a spot to reveal database information

Sort on commodity/business, size of business, location etc

(under development)





Thankyou

