Cobalt Blue's Ability to Produce High Purity Sulphur Prill and sulphuric acid! from Pyrite Feedstocks

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Meeting of the Mines
Cloncurry, Sept 2024

ASX: COB

CobaltBlue | ReMine+

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Strategic Priorities

ReMine+

Global

Unlocking Value and Positive Impact from Mine Waste

Cobalt–Nickel Refinery

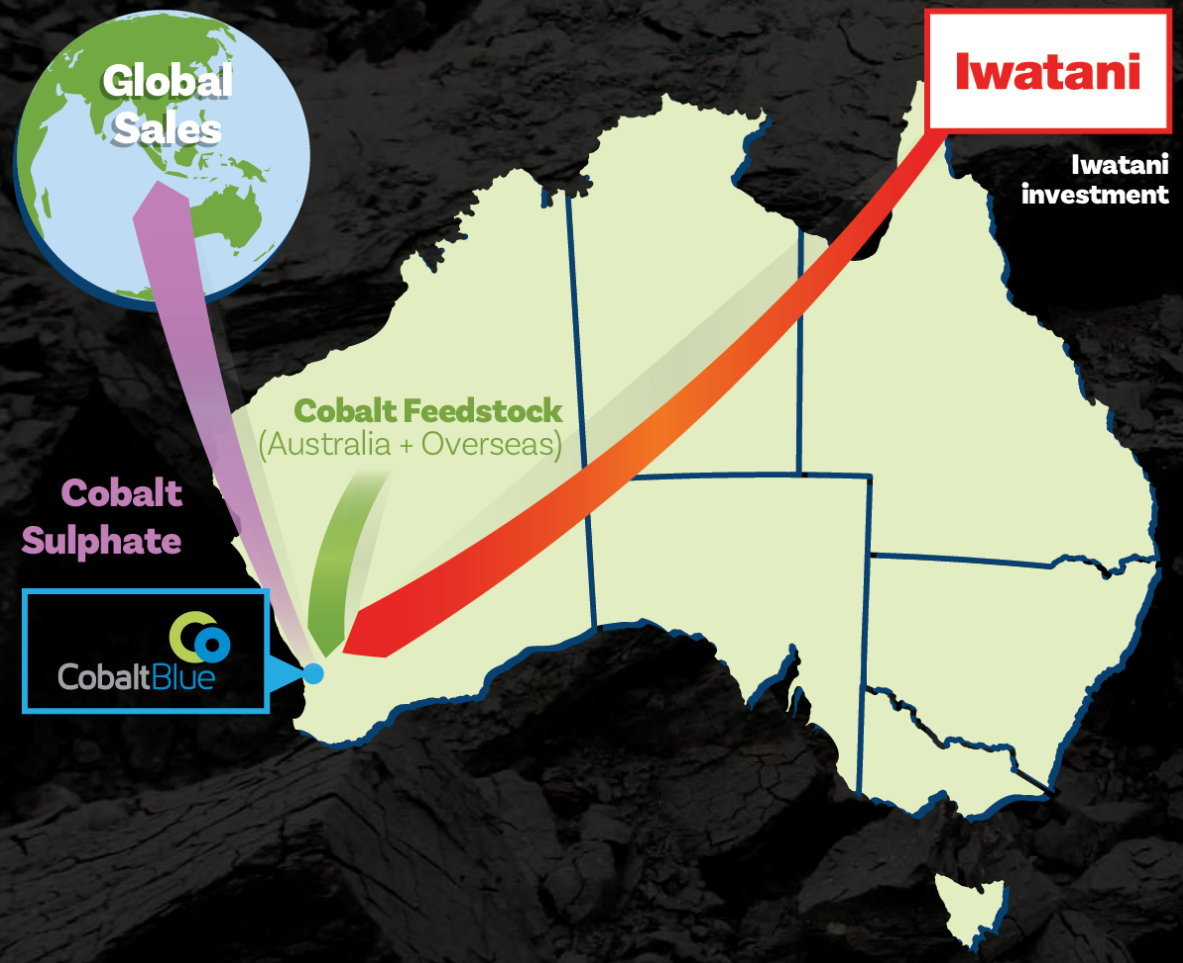
Kwinana, WA

Metal Processing for the Battery Supply Chain

Broken Hill Cobalt Project

Broken Hill, NSW

Responsibly Sourced Cobalt

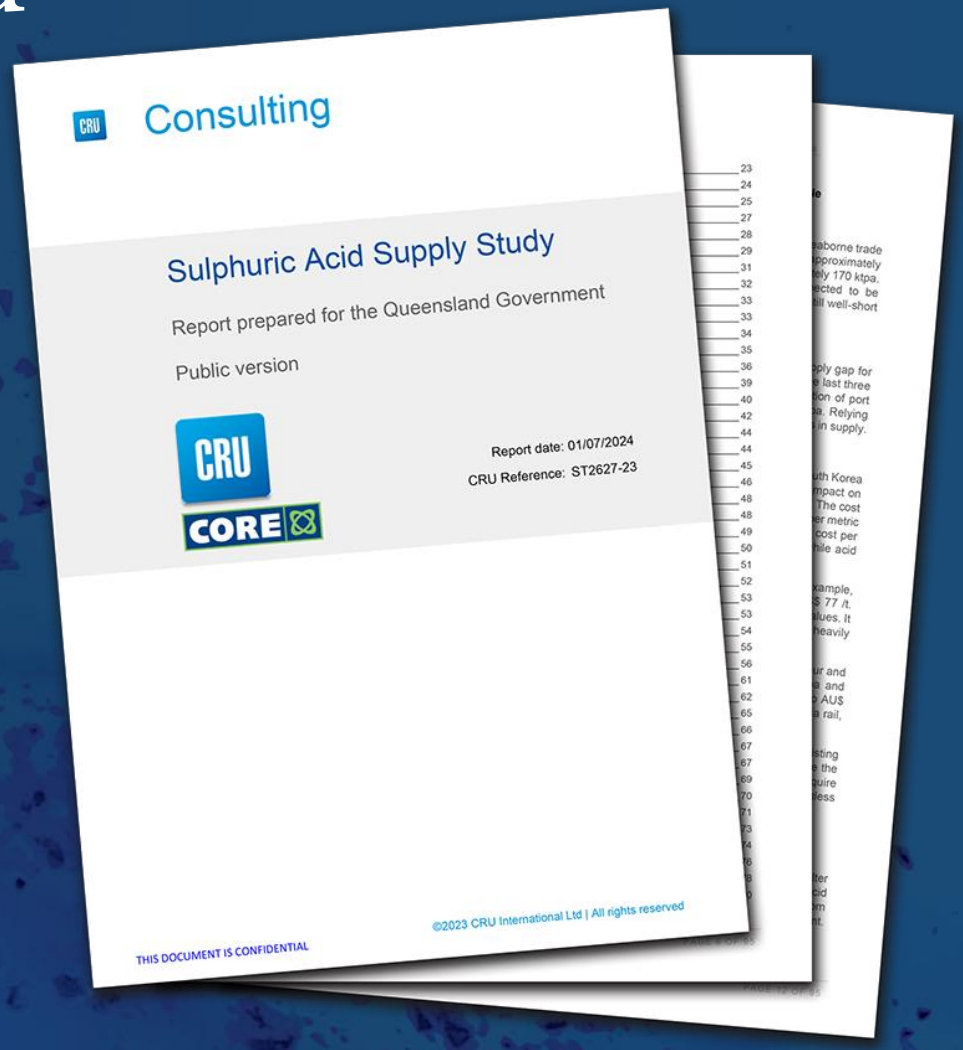


Source: Cobalt Blue Holdings Limited

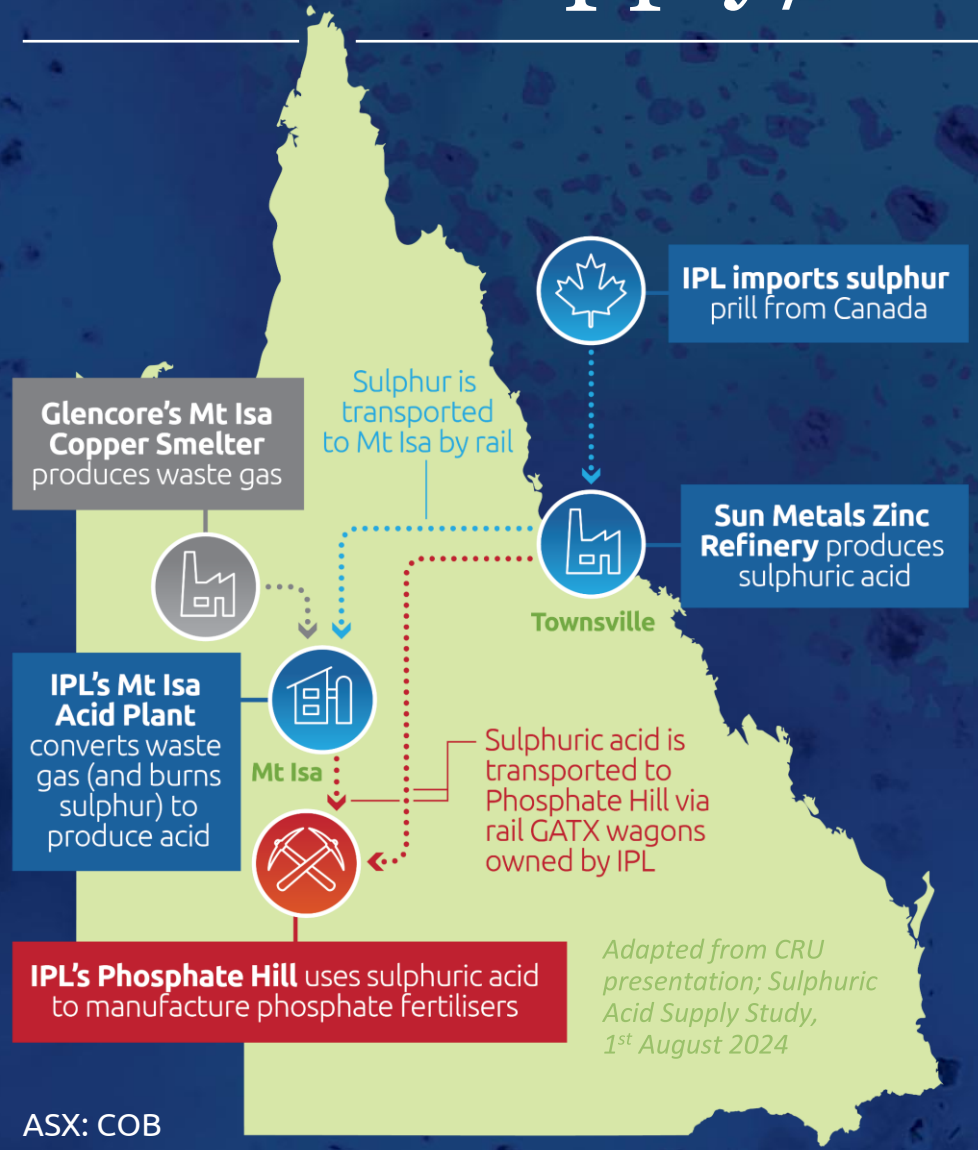
Sulphuric Acid in NW Qld

- Mt Isa Copper smelter closing ~2030
- Smelter supplies sulphur gas to Incitec Pivot acid plant
- Sulphuric acid required by
  - IPL's Phosphate Hill operation
  - Cu heap leach operations
  - Julia Creek vanadium operations
  - And more…
- Significant economic impacts related to acid supply
- DSD commissioned Sulphuric Acid Supply Study in 2023:

  https://www.statedevelopment.qld.gov.au/regions/regional-priorities/a-strong-and-prosperous-north-west-queensland/achievements-and-deliverables



Current Supply/Demand in NW Qld



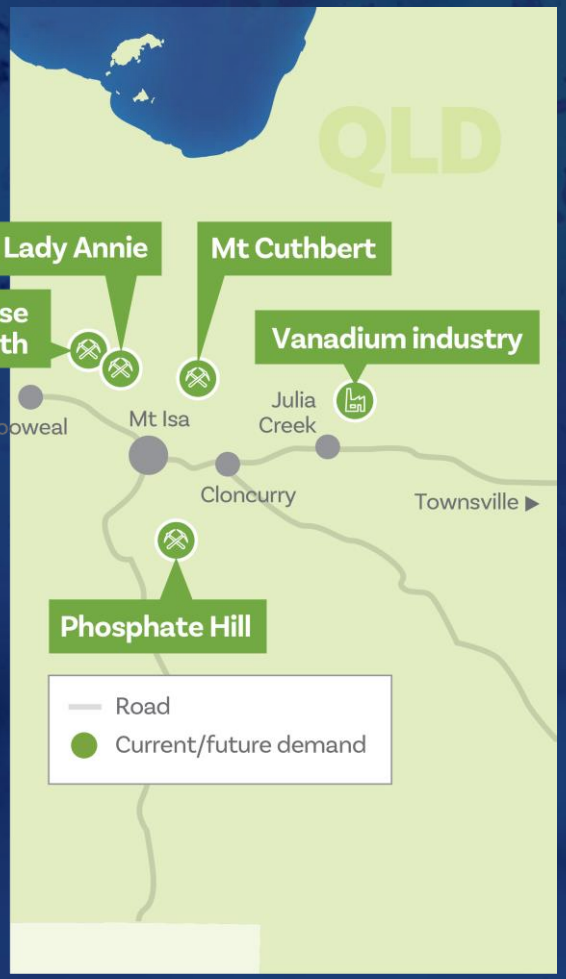
Current Demand: 1.23Mt/yr (2023)

- 95% is Phosphate Hill

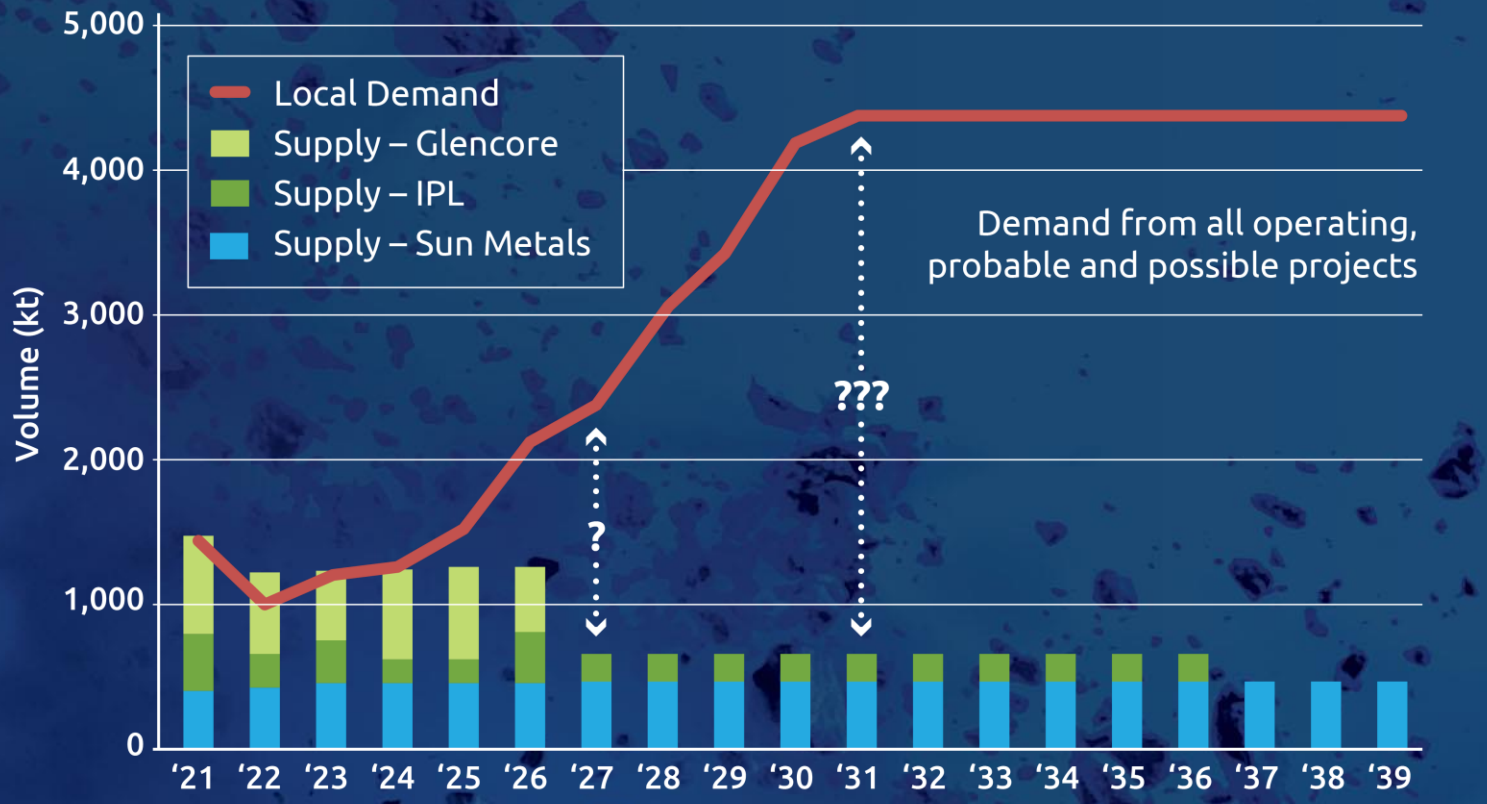
Current Supply:

- Mt Isa Cu Smelter: ~1Mt/yr via metallurgical waste gas to IPL acid plant
- Sun Metals Zinc Refinery (TSV): ~450 kt/yr
- Imported Sulphur Prill: ~330kt/yr acid produced via IPL acid burner

Future Acid Demand – NW Qld



Local supply and demand of sulphuric acid



Adapted from CRU presentation; Sulphuric Acid Supply Study, 1st August 2024

Possible Solutions: Imports or Local Source

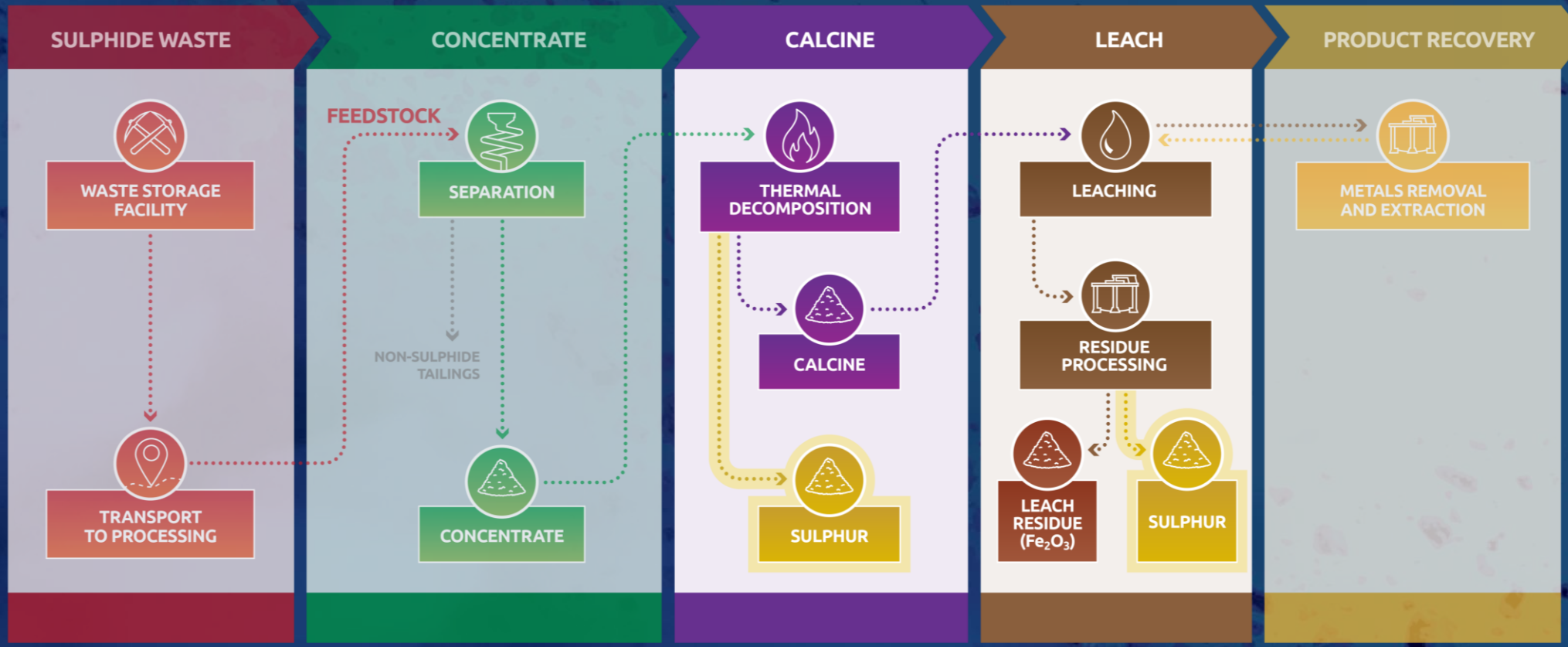
- Import Sulphuric Acid or Sulphur
  - By-passes local supply issues
  - Large infrastructure upgrades required to port facilities
  - Unit cost of acid/sulphur exceeded by transport costs

- Local Source – Reprocess pyrite-rich mine tailings
  - Sufficient pyrite to meet demand
  - Environmental benefit from removing pyrite from tailings/waste stockpiles
  - No port or long-distance transport upgrades required
  - Not affected by global price cycles

Possible Solutions: Local Source

- Roaster + Acid Plant to make Sulphuric Acid:
  - Conventional route – known technology
  - Produces S off-gas for acid plant
  - Metals can be extracted from roaster calcine
  - High toxic emissions (e.g. Pb, As)
  - High capital cost
- **Cobalt Blue process:**
  - No toxic emissions
  - Flexible process – makes sulphur or sulphuric acid plus metals
  - Proven at demonstration scale – risk of unknowns during upscale?
  - Unknown costs… we can answer these questions! (hint: less than a roaster)

The Cobalt Blue flow sheet – sulphur prill



Science of acid reduction

Cobalt Blue's patented process mitigates potential environmental harm and produces saleable elemental sulphur

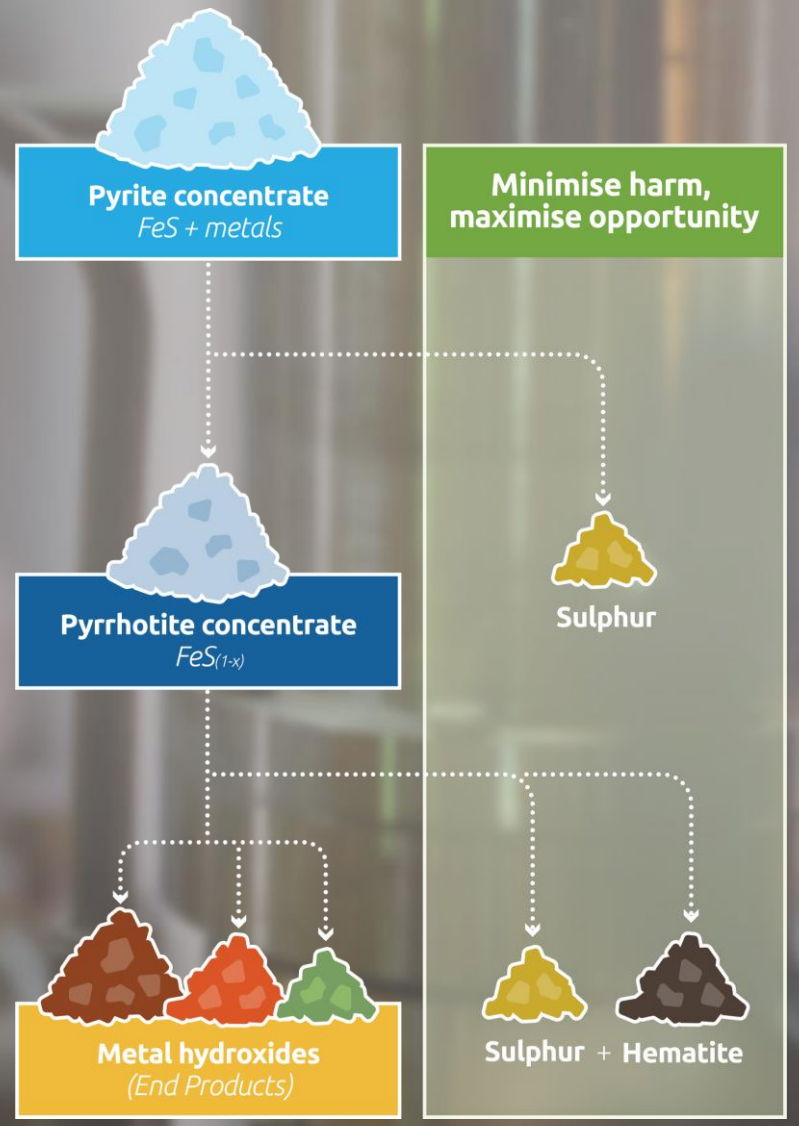
Key step is pyrite (FeS) to pyrrhotite ($FeS_{(1-x)}$) conversion

Sulphur is captured as an off-gas and cooled to form elemental sulphur.

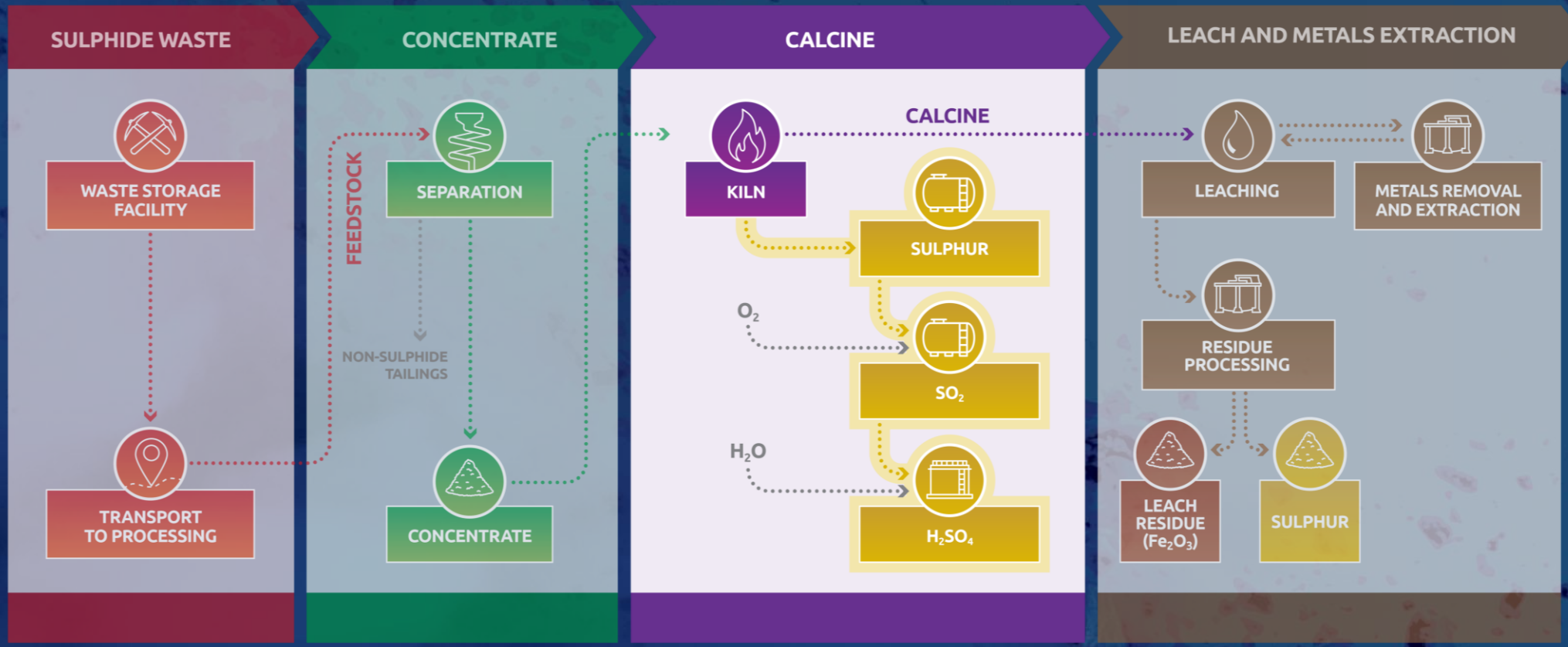
Sulphur is also produced during leaching,

Metals such as Co, Ni, Co, Ag and others are then extracted from the leach solution

New waste is much lower PAF, or even NAF



The Cobalt Blue flow sheet – sulphuric acid



Case Study: Flin Flon tailings project

Estimated >100 million tonnes contained in tailings dam at Flin Flon. Tailings contains Zn, Cu, Ag and Au.

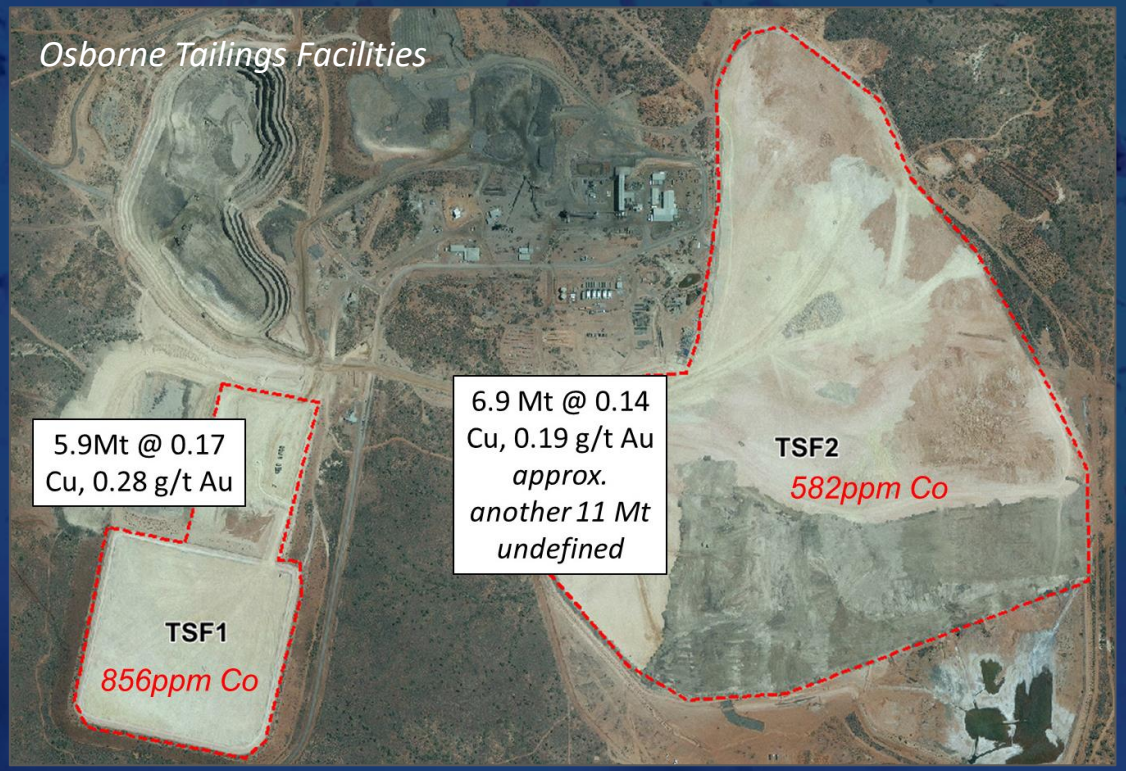
HUDBAY

Cobalt Blue and Hudbay Minerals collaborating to apply Cobalt Blue's processing technology to the Flin Flon tailings facility, Manitoba.

Testwork results to date have achieved >90% conversion of pyrite to pyrrhotite + sulphur.

An overall flowsheet is now being designed for the final step of testwork.

Case Study: Osborne Testwork



Two flowsheets tested:

Tails → float → POX

Tails → kiln → POX (COB Process)

	Float	POX	TOTAL recovery
Cobalt	90%	46%	41.4%
Copper	74%	98%	72.5%

	Kiln	POX	TOTAL recovery
Cobalt	99%	90%	89.1%
Copper	99%	90%	89.1%

Further recovery of cobalt and copper required from leach solutions.

Image credit and sampling data: A. Parbhakar-Fox, University of Queensland.

THE UNIVERSITY OF QUEENSLAND AUSTRALIA

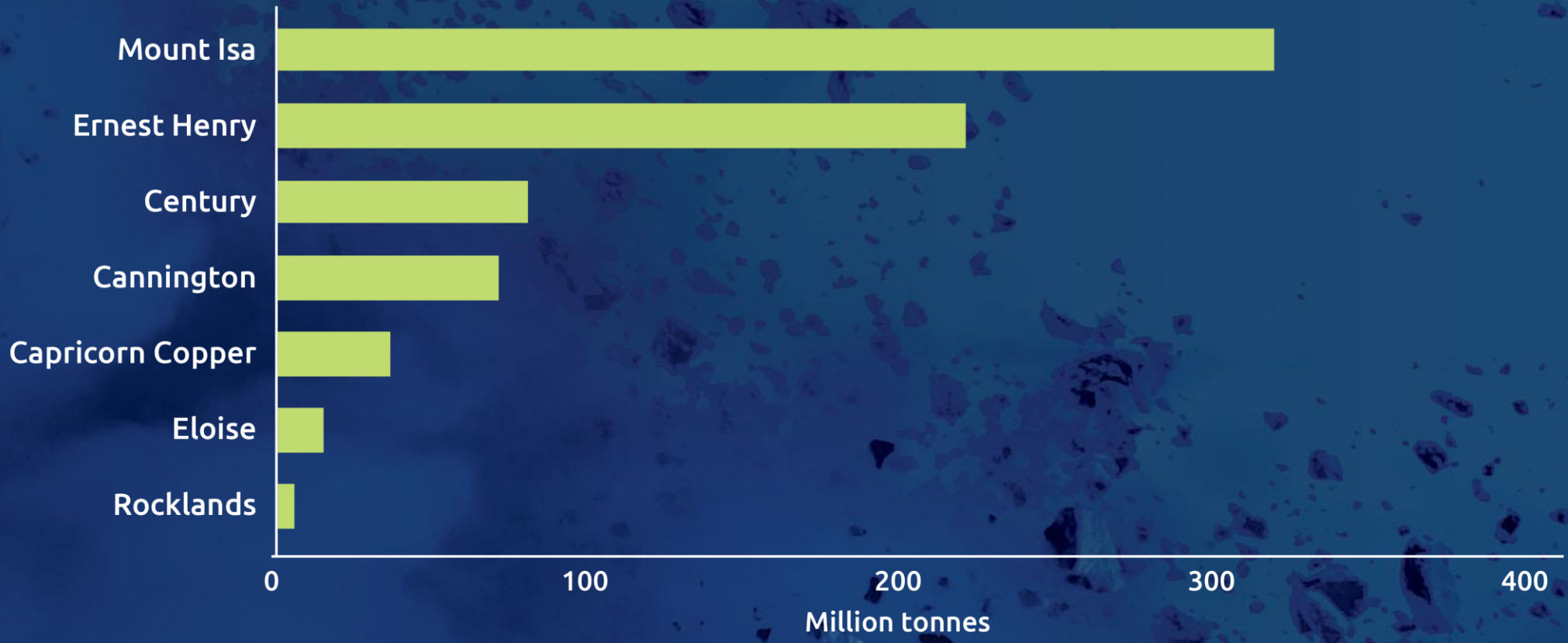
Queensland Government

Pyrite Feedstocks

- Multiple pyrite sources available:
  - Mount Isa
  - Ernest Henry
  - Osborne
  - Capricorn Copper
  - Rocklands
  - Eloise
  - Cannington
  - Century

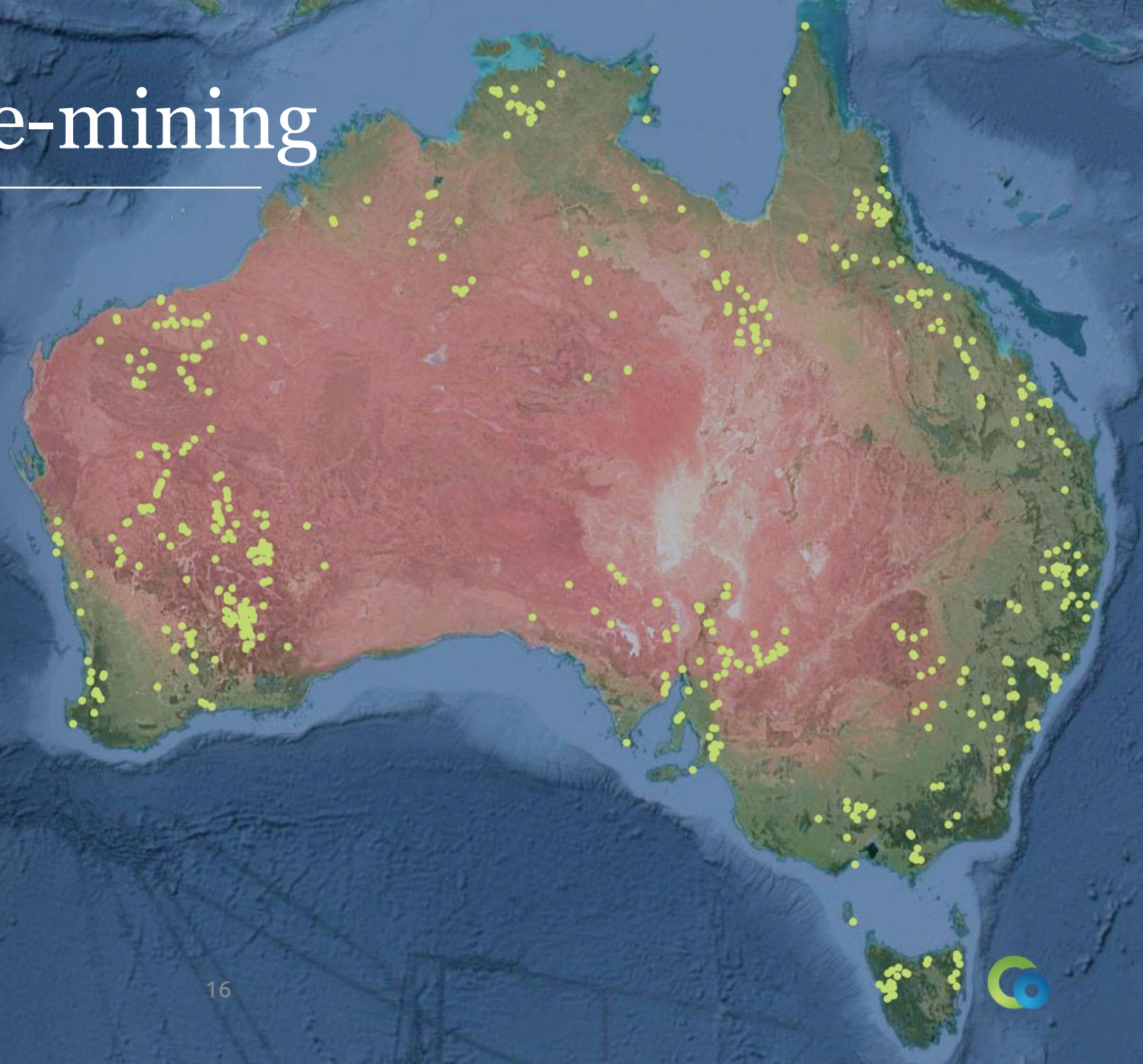
Pyrite Feedstocks

Estimated tailings size comparison



Challenges to re-mining

- Scale of liability for environmental bonds prohibitive for junior companies
- Regulatory frameworks have not kept up with modern desire to re-mine waste, especially at abandoned sites
- Low grades mean traditional economic models don’t work (green premiums)
- Challenging metallurgy



Regulatory environment

Two streams to consider:

Sites currently under a mining lease (a company holds the site)

Company-owned sites:

- (Almost) all permits in place
- May need to expand mining lease footprint and approvals to accommodate new infrastructure
- Existing lease-holder owns the liability
- Existing lease-holder has land access and native title agreements in place

Abandoned sites administered by the state government

Abandoned sites:

- No permits in place
  - Environmental
  - Mine plan
  - Native title
  - Land access
- Recommercialisation entity will have to take on liability (or negotiate with govt)
- Different states have different approaches to imposing/forgiving historical liabilities

ReMine+

- Video goes here

CobaltBlue

ReMine+
Positive impact
from mine waste

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