Strategic Update

CobaltBlue
green energy technology

27 November 2023

Highlights

Cobalt Blue Holdings Limited

A Green Energy Exploration Company

ASX Code: **COB**

Commodity Exposure:

Cobalt & **Sulphur**

Directors & Management:

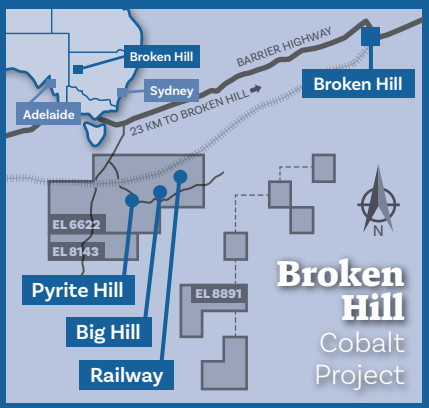
Robert Biancardi	Non-Exec Chairman
Hugh Keller	Non-Exec Director
Robert McDonald	Non-Exec Director
Joe Kaderavek	CEO & Exec Director
Danny Morgan	CFO & Company Secretary

Capital Structure:

Ordinary Shares at 27/11/2023:	**375.4m**
Unlisted options/rights:	**3.4m**
Market Cap (undiluted):	**$106.98m**

Share Price:

Share Price at 27/11/2023:	**$0.28**



Cobalt Blue Holdings Limited

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COB to Progress Cobalt Nickel Refinery Project in 2024

KEY POINTS

- This Strategic Update includes the:
  - Cobalt Nickel Refinery (**Refinery**)
  - Broken Hill Cobalt Project (**BHCP**)
  - Cobalt in Waste Streams Projects (**CWSP**)
- Cobalt Blue Holdings Limited (**COB**) (ASX:COB) is pleased to present the summary outcome of the Cobalt-Nickel Refinery Study (**Study**).
- The Refinery is a proposed large-scale, cobalt-nickel operation representing Australia's first cobalt refinery that will produce high-quality, battery-grade cobalt sulphate that is intended for IRA-compliant markets. It will be among the first large Allied Nation investments in cobalt refining for decades.
- The Refinery is expected to establish COB as an early entrant into the emerging midstream segment of the Allied Battery Supply Chain.
- Stage 1 targets processing third-party feedstock with a capacity of 3,000 tpa cobalt sulphate and 1,000 tpa nickel sulphate. Stage 2 offers optionality for the inclusion of feedstock from the Broken Hill Cobalt Project (**BHCP**).
- The Study presents a compelling evaluation of a cobalt and nickel refining business that is expected to generate stable margins throughout the highs and lows of the cobalt price cycle. On a 100% owned basis, the Refinery has the following financial metrics:
  - Preconstruction costs of A$10m.
  - Stage 1 of the Refinery has an estimated installed capital cost of A$47m + A$7–9m contingency.
  - Stage 1 NPV10 (Long-term Assumptions) = A$118m returning (Post Tax) IRR = 27%
  - Stage 1 NPV10 (Spot Market Assumptions) = A$99m returning (Post Tax) IRR = 25%
- We are engaged with a potential partner that owns a suitable property in the Kwinana district and expect to commence refinery construction next year. The potential partner is further determining an appropriate level of equity ownership in the Cobalt-Nickel Refinery via a funding contribution. COB will likely not own 100% of the project as a result of the partners' ownership. These negotiations are ongoing.
- The advancement of the Cobalt-Nickel Refinery significantly de-risks the downstream portion of the BHCP. BHCP Feasibility Studies are progressing, focussing on finalising/optimising capital and operating estimates, with the Feasibility Study now likely to be delivered in April 2024.
- CWSP projects are progressing with our recent update regarding Flin Flon Mine test work, whilst other targets are being pursued in Queensland and the EU.

As part of this Strategic Update, this announcement contains a summary of key Refinery Study outcomes including.

1. Investment Highlights
2. Project Description
3. Strategic Rationale
4. Cobalt Market Analysis
5. Capital and Operating Cost Estimates
6. Forward Work Plan

This is then followed by updates regarding both BHCP and CWSP projects.

1 Investment Highlights

1.1 Cobalt-Nickel Refinery Project Summary

COB has completed a Study to evaluate the construction and operation of a Cobalt-Nickel Refinery (the '**Refinery**') in the Kwinana Industrial Area located 30 km from the Perth metropolitan area in Western Australia.

The Study presents an evaluation of the proposed business to treat cobalt intermediates and produce battery grade cobalt and nickel sulphates. The investment case is sound, with the potential for robust returns. The Study provides a suitable platform for advancing the project through the next stages of pre-development up to a Financial Investment Decision planned in mid-2024.

The Study summarises the strategic rationale for COB to pursue an Australian refinery, noting:

- COB's strategy is positioned to capitalise on the growing demand for EVs and the increasing requirement for responsibly sourced raw material in an Allied Nations supply chain.
- Analysis of the international cobalt market supply and demand dynamics.
- Feedstock procurement details from major suppliers of cobalt and nickel intermediates.
- The strategic advantages and permitting requirements for locating the refinery location in the Kwinana Industrial Area.
- An existing non-binding agreement with a major Japanese multinational that specialises in the production and trading of commodities.

The base case scenario is described as follows:

- Preconstruction costs of A$10m (of which some has been spent to date).
- Plant capacity set in Stage 1 (sourced from third party feedstock) at 3,000 tpa cobalt and 1,000 tpa nickel, producing respective sulphate salts for use as raw ingredients to supply the precursor cathode material (**pCAM**) industry.
  - Installed capital cost of A$47m + A$7–9m contingency
  - During the commissioning and prequalification period, we expect a positive netoff of post-tax income received against operating and fixed costs.
  - Expansion costs of Stage 2 are appreciably lower than initial establishment costs.
- Expansion potential to increase the size of the plant in Stage 2 to treat cobalt-nickel hydroxide from the Broken Hill Cobalt Project (**BHCP**). This has the potential to bring the total throughput to 6,500 tpa cobalt and 1,800 tpa nickel.
- Fixed processing costs of $14m per annum, and variable processing costs related to quantity and quality of feedstocks.
- Recovery of 98% to final cobalt sulphate heptahydrate and nickel sulphate hexahydrate.
- Near-term cobalt prices of US$18/lb in 2026 progressively building to US$27/lb by 2033 as forecast by our industry consultant Benchmark Minerals Intelligence, a leading industry commentator.
- Prequalification/Commissioning period of six months at half throughput capacity, and 75% of revenue (via sales of technical grade sulphates vs battery grade sulphates) achieved during this period.
- Notional 20-year project life with further life expected.

The financial metrics for the Stage 1 (base case) scenario are given in Table 1 and Table 2.

The project is estimated to generate (on a 100% owned basis):

- Post-tax NPV10 of A$99–118M and IRR of 25–27%
- Average Annual EBITDA of A$30–34m
- Project pay back within <5 years

A further upside case was modelled to evaluate cobalt price premiums associated with Inflation Reduction Act (IRA) compliance for the US market. Premiums modelled varied between 2–10% above the cobalt price, resulting in further uplifts in NPV and IRR (see Tables 6 and 7).

Table 1 – **EBITDA, NPV and IRR versus cobalt price and FX at SPOT and LONG TERM conditions and Benchmark Minerals Intelligence (BMI) forecast profile**

Financials (100% owned)		LONG TERM COBALT METAL PRICE	SPOT COBALT METAL PRICE	BMI METAL PRICE PROFILE
Total Cobalt Revenue	A$ M	4,436	3,008	4,100
Total Nickel Revenue	A$ M	469	505	469
Total EBITDA	A$ M	834	616	675
Total Operating Cash Flow	A$ M	605	518	577
Valuation (100% owned)[1]				
Net Present Value (post tax)	A$ M	118	99	107
Internal Rate of Return (post tax)	%	27	25	25
Total Capital Payback Period	Years	5.3	5.4	5.6
Assumptions (100% owned)				
Cobalt Price	US$/lb	27.00	17.00	Up to US$27.00/lb by 2033
Nickel Price	US$/lb	8.00	8.00	8.00
Exchange Rate	AUD:USD	0.70	0.65	0.70

Table 2 – **Sensitivities of NPV, IRR and EBITDA versus cobalt price and exchange rate**

Sensitivity on Post-Tax NPV_{10} ($M)* for Changes in Cobalt Price and Exchange Rate

			Cobalt Price Spot		LT		
Ex Rate AUD/USD		12.0	**17.0**	22.0	**27.0**	32.0	43.0
	0.60	90	124	136	170	154	186
Spot	**0.65**	68	**99**	110	142	128	157
LT	**0.70**	49	78	89	**118**	105	132
	0.75	33	60	70	98	85	110
	0.80	18	44	53	79	67	91

* *At time of early works*

Sensitivity on Post-Tax IRR* for Changes in Cobalt Price and Exchange Rate

			Cobalt Price Spot		LT		
Ex Rate AUD/USD		12.0	**17.0**	22.0	**27.0**	32.0	43.0
	0.60	25%	29%	29%	33%	300%	31%
Spot	**0.65**	21%	**25%**	26%	30%	27%	29%
LT	**0.70**	19%	23%	23%	**27%**	24%	26%
	0.75	16%	20%	21%	24%	22%	24%
	0.80	13%	18%	19%	22%	20%	22%

* *At time of early works*

1 *Note that contingencies have not been included in the NPV and IRR calculations.*

Sensitivity on Annualised Average* EBITDA ($M) for Changes in Cobalt Price and Exchange Rate							
			Cobalt Price Spot		LT		
Ex Rate AUD/USD		12.0	**17.0**	22.0	**27.0**	32.0	43.0
	0.60	28	34	37	43	41	48
Spot	**0.65**	24	**30**	32	38	36	43
LT	**0.70**	21	26	28	**34**	32	38
	0.75	18	23	25	30	29	34
	0.80	15	20	22	27	25	30

* *At time of early works*

1.2 Cobalt-Nickel Refinery Partner

COB is engaging with a potential partner for the Cobalt-Nickel Refinery, that:

- is a leading Japanese multinational specialising in the production and trading of commodities;
- has a global presence with subsidiaries and affiliates in several countries, with established partnerships and collaborations with companies worldwide, to further advance its expertise in technologies and explore new markets;
- has a large trading arm seeking to supply its Japanese partners in major global Electric Vehicle markets, including the United States; and
- owns a suitable property in the Kwinana district that would support the operation of the Cobalt-Nickel Refinery.

COB believes that partnering with an existing property owner would substantially reduce development time for the Cobalt-Nickel Refinery.[2] Our potential partner is currently considering proposing an appropriate level of equity ownership in the Cobalt-Nickel Refinery via a funding contribution.

1.3 Strategic Rationale

Cobalt has been identified as a critical mineral by key industrialised and developed countries, reflecting its importance as a key raw material used in the global electrification transition. There is also concern about the high level of concentration in extraction and processing and associated risks to supply chains. With cobalt demand forecast to double before the end of the decade,[3] global policy makers are rapidly advancing legislation and incentives to ensure security of supply amid a diversified supply chain.

These initiatives are providing an increasingly supportive environment to increase the supply of critical minerals, through both tangible and intangible assistance. The decisions being made now are shaping the procurement preferences of buyers of battery materials, namely EV makers and manufacturers along the lithium-ion battery (**LiB**) supply chain.

1.4 Market Analysis

The cobalt market is currently undergoing a transition in which global supply growth has outweighed demand growth in 2022 and 2023, and will likely do so again in 2024. However, from 2025 this trend will reverse and demand growth is forecast to outpace supply growth for the next decade, according to Benchmark Minerals Intelligence. When considered through the lens of available capacity for IRA-compliant, battery grade cobalt, there is an immediate shortfall that only grows as IRA restrictions tighten. COB believes battery industry participants will be increasingly willing to pay a premium for responsibility-sourced, IRA-compliant material. COB's refinery strategy is designed to address this growing demand

1.5 Feedstock Availability and Evaluation

The plant has been designed for two stages. In Stage 1, feedstock will be supplied by third-party contracts. COB is in advanced discussions with two major suppliers of intermediates for use as feedstock for the Cobalt-Nickel Refinery. One is domestic and the other international, with both products in discussion standardised products in global sale, specifically Mixed Sulphide Precipitate (MSP) and Mixed Hydroxide Precipitate (**MHP**). Stage 2 will expand the Refinery's capacity with the introduction of BHCP MHP. In the event that BHCP MHP is not available, additional third-party feedstock can be sourced. This may include recycled products from the battery industry such as pCAM, CAM, black mass, etc.

2 *In the event of unsuccessful final negotiations COB will continue to pursue alternative industrial site in Kwinana.*

3 *Benchmark Minerals Intelligence.*

1.6 Metallurgical Processing

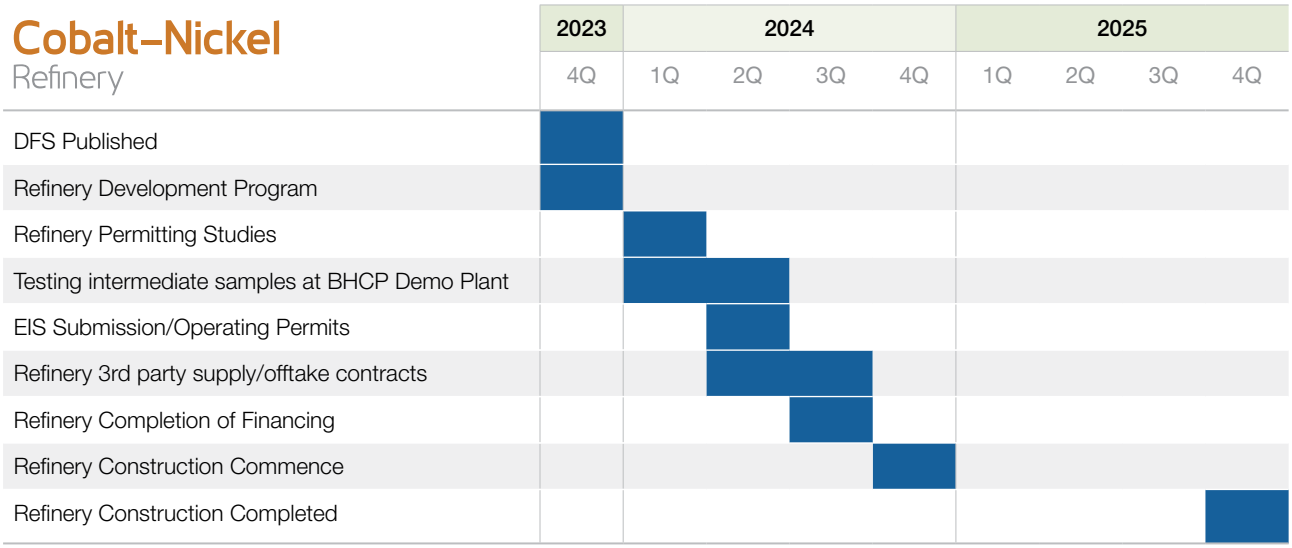
COB's process flowsheet has been developed using samples of BHCP MHP from the laboratory to ultimately a quasi-commercial scale (24/7) demonstration plant, completed between 2017 and 2023, in which we successfully achieved the production of battery-grade cobalt and nickel sulphate. The proposed Cobalt-Nickel Refinery will employ this flowsheet initially to process third-party feedstocks until the BHCP becomes operational. A dedicated refinery section of the demonstration plant has been constructed for metallurgical testing of a variety of third-party feedstocks.

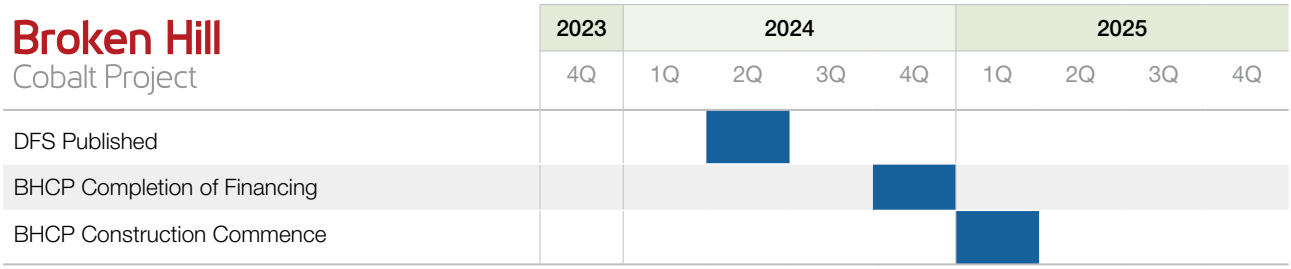
1.7 Path to Production

COB has developed a detailed Forward Work Plan to the commencement of construction. Between December 2023 and June 2024 we plan to:

- Complete testing of feedstock samples;
- Finalise the Refinery's engineering and select engineering partner and construction firm;
- Secure binding feedstock contracts for the first 3–5 years of operation;
- Secure offtake contracts;
- Complete permit application studies; and
- Prepare financial information memorandum, identify sources of funds and close finance.

1.8 Indicative Project Timeline



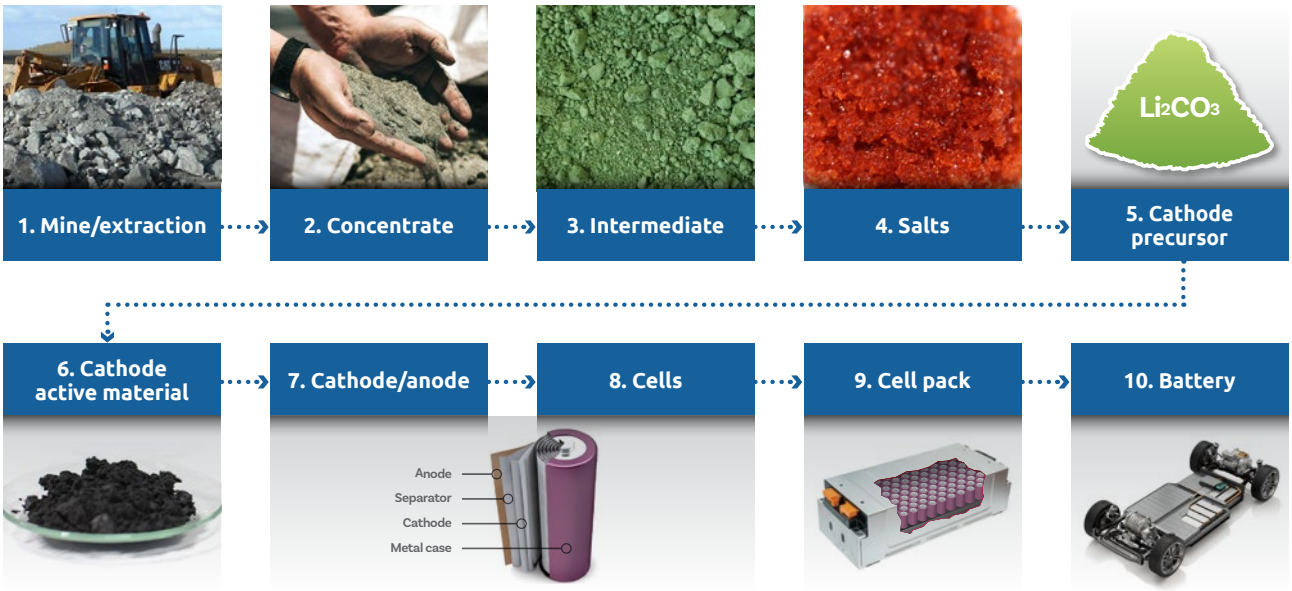


2 Project Description

2.1 Introduction

A key step in the LiB production chain is the manufacturing of high-purity chemical salts. The starting feedstock is metal or metal intermediates, and the conversion/refining represents stage four in the battery production chain (Figure 1).

Figure 1 – **Stages of the lithium-ion battery production chain**



The Refinery aims to produce high purity cobalt and nickel sulphates for use as raw ingredients for precursor cathode material (**pCAM**) businesses. The pCAM is further lithiated into active material for the fabrication of cathodes.

Following market engagement and consultation with Federal and State Governments, COB has determined that the optimum location for a cobalt and nickel refinery is the industrial strip south of Perth in Western Australia, along the Kwinana Industrial zone. The location includes existing and proposed facilities for lithium, nickel and pCAM.

In early 2023, Cobalt Blue executed a non-binding agreement with a leading Japanese multinational company that specialises in the production and trading of commodities for access for the purpose of developing a cobalt and nickel refinery at their industrial minerals processing facility in the Kwinana industrial zone. Good faith negotiations continue with the Japanese partner to enter into a joint venture to advance the refinery business opportunity.

This study outlines the estimated capital and operating costs for Stage 1 of the Refinery with a production capacity of ~3,000 tpa of cobalt and ~1,000 tpa of nickel as their respective sulphate salts. The feedstock is sourced from two sources, one being a Mixed Sulphide Precipitate (**MSP**) and the other a Cobalt Hydroxide Precipitate (**MHP**).

2.2 The Products

The refinery intends to produce two products:

- Cobalt sulphate heptahydrate
- Nickel sulphate hexahydrate

Through extensive market review, COB has confirmed that there is no single industry specification for cobalt sulphate or nickel sulphate entering the battery supply chain. This view is also confirmed by the FBI-CRC publication *"Li-ion battery cathode manufacture in Australia – A Scene Setting Project"* (2020).

For historical reasons, pCAM manufacturing facilities have separately sourced nickel, cobalt and manganese chemicals. Despite obvious benefits in sourcing a mixed metal sulphate (i.e. one containing nickel, cobalt and manganese), the established pCAM producers (mainly in China) continue to request high-purity single metal sulphates. Recently, in our view, BHP has successfully changed the market dynamics, with their nickel sulphate being the first to contain appreciable quantities of cobalt at 50–100 ppm.

There is continuing and significant discussion to merge/integrate refining and pCAM plants. As such, there is likely to be renewed discussion over sulphate specifications.

2.3 Location

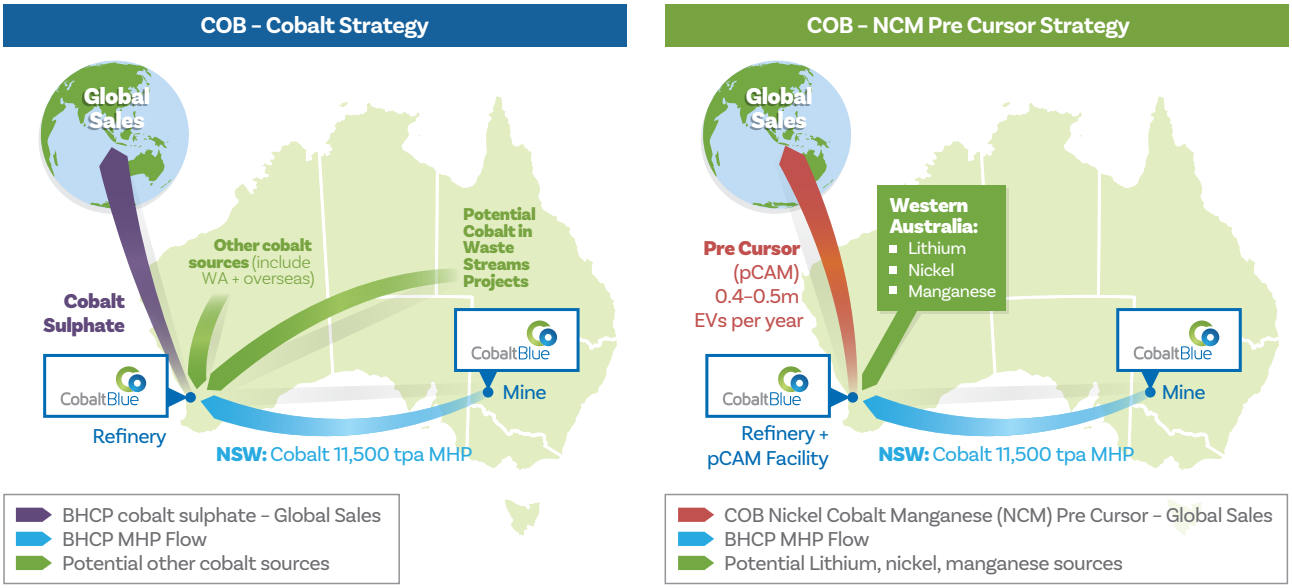
The proposed site for the Refinery is located in East Rockingham WA near the Kwinana Bulk Terminal. The Kwinana district presents strategic advantages for the refinery location:

- Access to export markets: Kwinana has a deep-water port and export facilities. Cobalt sulphate is a fragile product that absorbs water (particularly in hot/humid regional conditions) if left exposed and needs to be stored/shipped carefully. Direct port access provides a meaningful advantage.
- Cost advantage: Kwinana is a major chemicals district. Typically, over 50% of the costs associated with conversion from MHP to cobalt sulphate come from reagent/chemical costs. This location provides ready access to low-cost chemicals.

- Integrated business: Refining is fundamentally an economy of scale business. A single, larger refinery allows COB to process material sourced from third party sources, as well as the BHCP and (in future) other COB owned cobalt projects, rather than build out individual refineries at mine sites dispersed through Australia:
- Critical Minerals availability: Australia is the only global producer all four of the cathode elements. These metals are processed through the Kwinana district and so represent an ideal location to cooperate with battery industry peers to make pCAM or Cathode Active Material (**CAM**) for global markets.

This overall strategy has been condensed into the graphics in Figure 2.

Figure 2 – **Sulphate and precursor strategies**



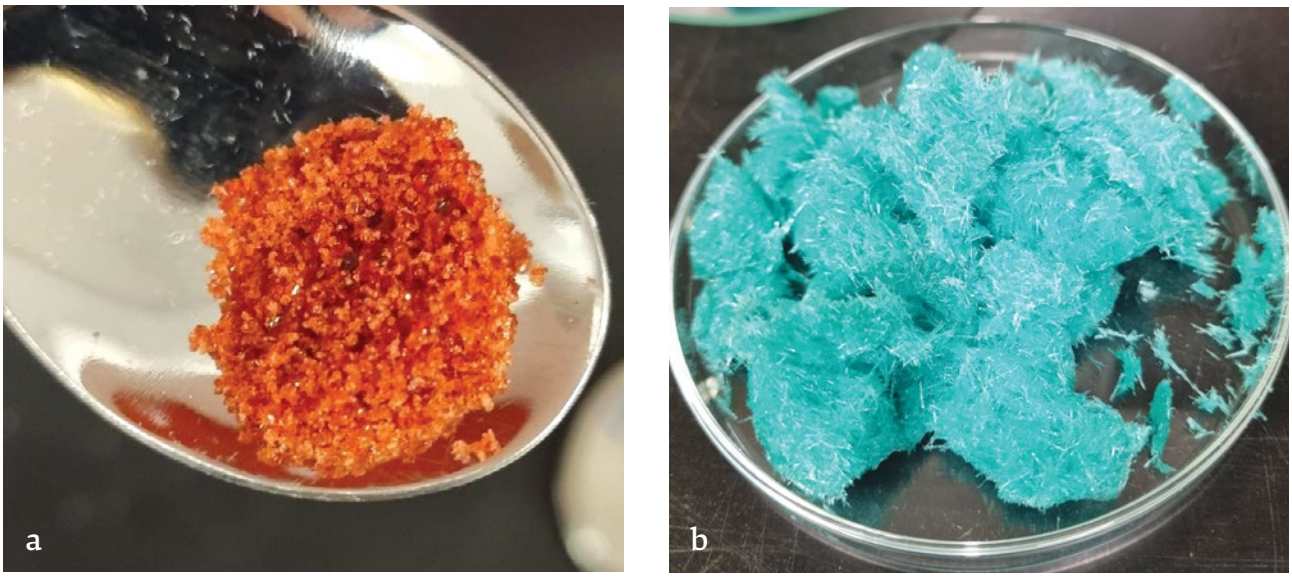
Our potential partner operates an industrial minerals processing facility in the Kwinana industrial zone. This site would potentially provide ready access to established site services and support (e.g. maintenance, offices, power, water, weighbridge, security, etc).

2.4 Metallurgy

The flowsheet adopted in the Study was based on testwork completed by COB at its research facility in Broken Hill. The facility includes a demonstration plant for testing cobalt intermediates, and 2 x 5 t samples are expected to be tested in coming months.

Samples of cobalt sulphate produced from the testwork program compare favourably with Japanese pCAM specifications. Photos of the testwork cobalt and nickel sulphate crystals are shown in Figure 3.

Figure 3 – **Cobalt and nickel sulphate crystals produced in development testwork**



2.5 Feedstock Evaluation

COB is in advanced discussions two suppliers of intermediates for use as feedstock for the Cobalt-Nickel Refinery. One is domestic and the other international, with both products standardised for global sale, specifically MSP and MHP. Beyond existing discussions with intermediate suppliers, we have identified and are monitoring other potential and future sources of supply.

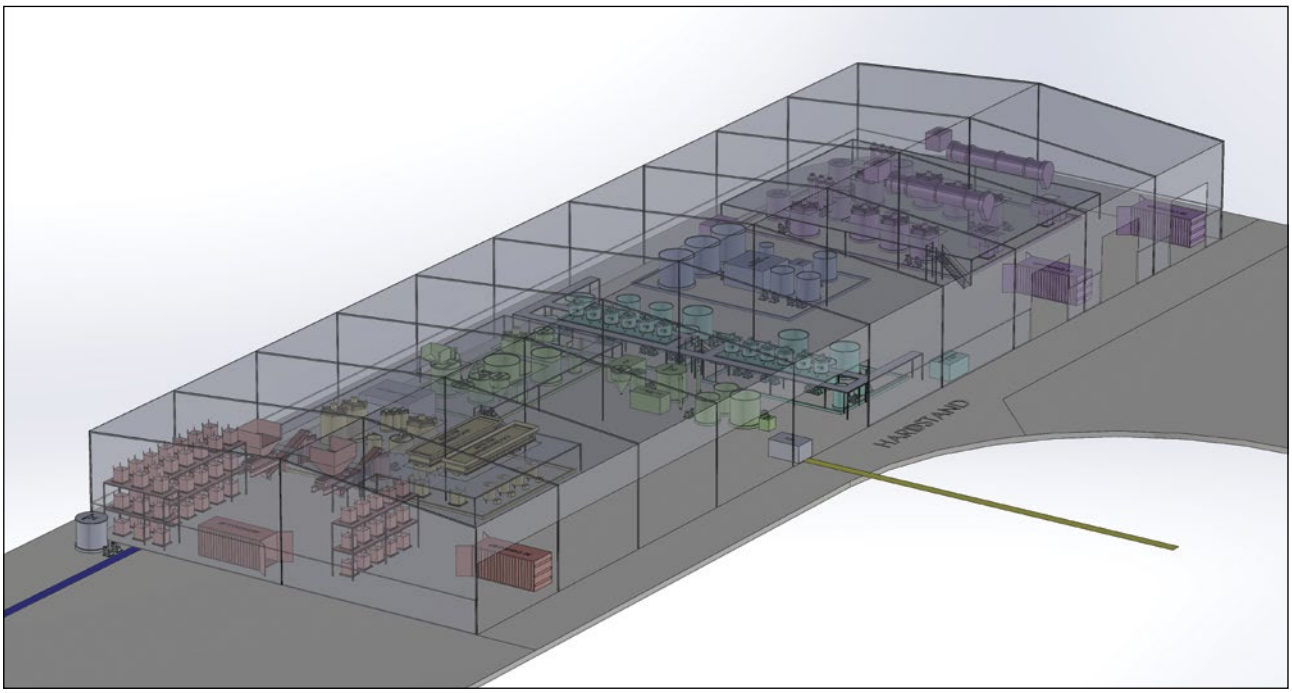
2.6 Plant Layout

The refinery is expected to be situated in the Kwinana Industrial Area located 30 km from the Perth metropolitan area in Western Australia. While having the advantage of being located near other proposed battery manufacturing facilities in Kwinana, the site also has some other advantages including:

- Access to exiting utilities i.e., Power, Water, Fire
- Existing buildings and facilities that can be utilised for admin, lab, workshops, weighbridge, etc.
- Proximity to container port (Fremantle) for import/export
- Favourable industrial zone policy settings and regulatory environment

With growing interest to produce pCAM to minimise reagent transport cost, the land area available at the proposed facility also has the capacity for further expansion of a COB owned pCAM production facility. Based on the mass and energy balance, equipment was selected and sized appropriately. A 3D layout was prepared based on equipment dimensions (Figure 4).

Figure 4 – **3D model of Refinery**



2.7 Size and Timing

The plant has been designed for two stages. In Stage 1, where feedstock will be supplied by third party contracts. The throughput rates are nominally 3,000 tpa of cobalt and 1,000 tpa of nickel. These will be expanded in Stage 2, with the introduction of BHCP MHP. The throughputs will then be expected to increase to 6,500 tpa cobalt and 1,800 tpa of nickel. A summary of the production is given in Figure 5.

Figure 5 – **Cobalt-Nickel Refinery production and timeline**

	Stage 1	Stage 2	TOTAL
Feed Source	Third party	Broken Hill Cobalt Project	CobaltBlue
Feed tpa	8,000	11,500	19,500
Tonnes metal			
Co Content	3,000	3,500	6,500
Ni Content	1,000	800	1,800

The plant is expected to be operational from the second half of 2025. The commencement date of the Stage 2 expansion has been assumed to be from 2027, but is subject to the implementation timeline of the BHCP. In the event that BHCP MHP is not available, additional third-party feedstock can be sourced. This may include recycled products from the battery industry such as pCAM, CAM, black mass, etc.

2.8 Permitting

It is envisaged that the proposed Refinery will be operated by a joint venture arrangement with our potential partner that will utilise the existing facilities and Western Australian permits/licenses. The site is currently licensed by the WA Department of Water and Environmental Regulation for a number of activities including metal smelting ore refining. The License contains standard environmental monitoring, discharge limit and reporting requirements.

3 Strategic Rationale

3.1 Cobalt is a Critical Mineral

Cobalt has been identified as a critical mineral by key industrialised and developed countries. This reflects the industrial importance of cobalt and its application as a key battery material, particularly with the increased growth of Electric Vehicle (EV) production and use of energy storage systems. Demand for these applications is growing rapidly.

There is also concern about the high level of concentration in extraction and processing and associated risks to supply chains. Consequently, an 'Allied Supply Chain' is emerging to include the USA, Japan, South Korea, Canada, European Union and Australia to develop policies and strategies to ensure greater supply chain security. These initiatives are providing a supportive environment to increase the supply of critical minerals, through both tangible and intangible assistance. The decisions being made now are shaping the procurement preferences of buyers of battery materials, namely EV makers and manufacturers along the LiB supply chain.

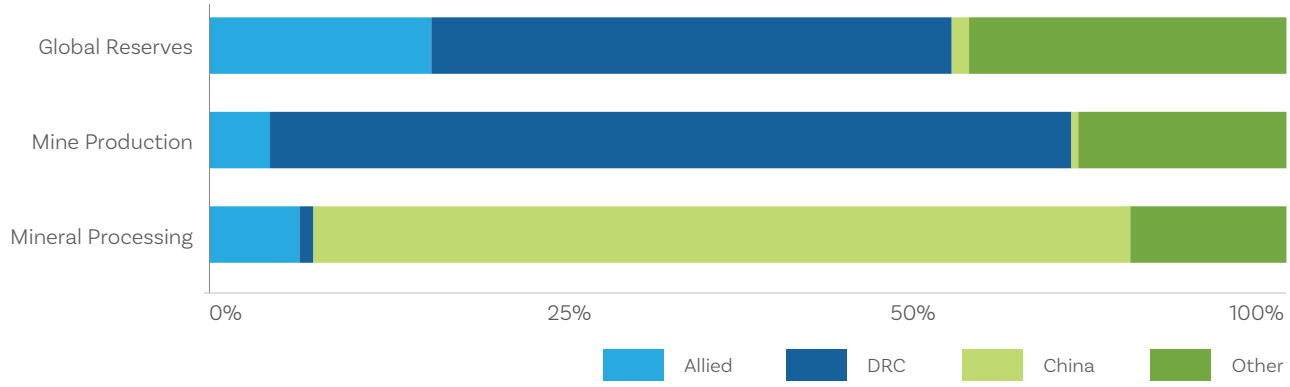
COB's aim is to capitalise on this growing segment of the battery raw material supply chain and is the primary driver behind the rationale for the development of the cobalt-nickel refinery.

Concentrated Supply Chain

China dominates the global cobalt market, controlling the majority share of both mining and refining (Figure 6). In terms of mining and extraction, Chinese interests have an entrenched partnership with the Democratic Republic of Congo (DRC), which itself holds ~70% of global reserves. Of the 25 operating cobalt/copper assets in the DRC, China has a controlling share in 19. Combined with its domestic production and interests in other parts of the world, China controls 52% of global mined supply.

China refines ~75% of the world's cobalt (almost exclusively from imports) into industrial products and controls ~90% of the battery-grade cobalt market.

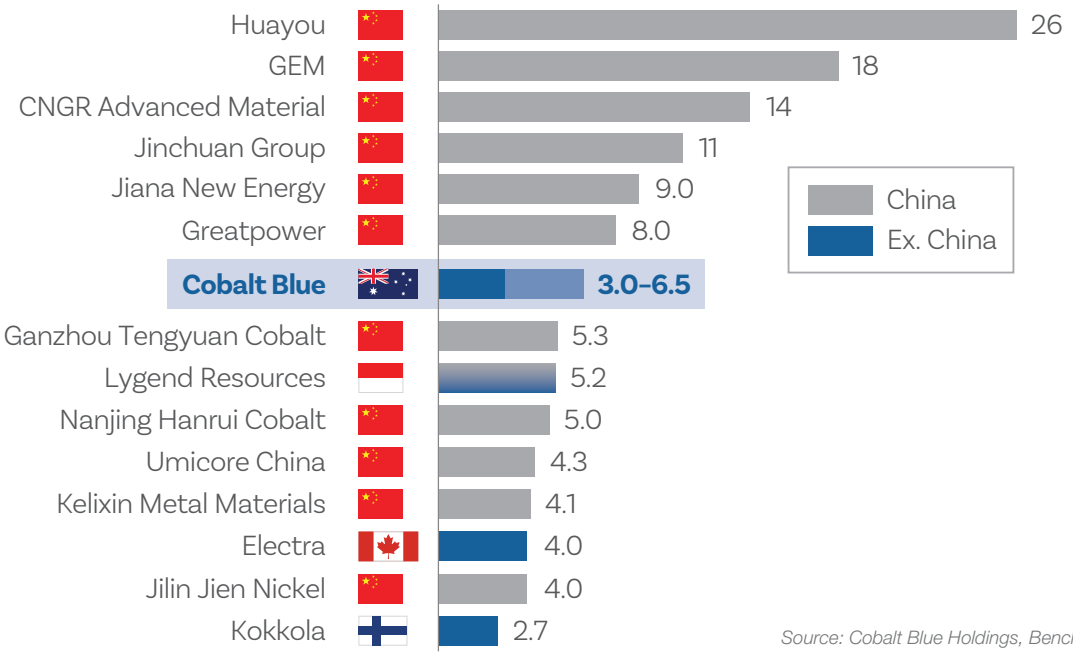
Figure 6 – **Cobalt is a highly concentrated commodity**



Source: USGS. Benchmark Minerals Intelligence, Cobalt Blue Holdings

The global battery grade cobalt sulphate refining industry is dominated by Chinese interests as shown in Figure 7. The Refinery (Stages 1 & 2) are super imposed on the chart for comparison.

Figure 7 – **Global battery-grade sulphate capacity (Kt Co), 2026–2030**



Source: Cobalt Blue Holdings, Benchmark Minerals Intelligence

Supply Chain risk

A consequence of this level of concentration is a risk China could impose export restrictions on cobalt products. This is certainly not unprecedented – in 2023 the country imposed export restrictions on three critical minerals, germanium, gallium and graphite. Similar restrictions on cobalt could inflict significant long-term damage to economies that rely on cobalt imports. According to a study conducted by the National Mineral Information Center,[4] just a 20% reduction of cobalt supply into the US economy would result in up to a two percent reduction in GDP.

3.2 International Context

Given the high-level of concentration and security risks in the cobalt supply chain there are several policy initiatives being developed within Allied Nations to diversify the supply chain and develop the downstream processing capability outside China.

3.2.1 United States

The US is unlikely to further develop significant domestic mining capabilities given the long-lead times of approvals and costs for new mining projects. It is expected that over the next decade the US will seek partnerships to source minerals overseas.

4 *Building Larger and More Diverse Supply Chains for Energy Minerals, July 2023.* *https://csis-website-prod.s3.amazonaws.com/s3fs-public/2023-07/230719_Majkut_SupplyChain_EnergyMinerals.pdf?VersionId=i1kjZCd9l_zHZY3gqLR0vVux3rMw8CYb*

Inflation Reduction Act

The 2022 IRA aims to advance decarbonisation and clean energy goals through expanded and new tax credits, incentives, and other measures. According to S&P Global Commodity Insights, the outlook for EV sales in the US by 2030 has more than doubled the pre-IRA forecast.

The law revises and expands tax credits for EVs over the next 10 years (Figure 8). Key provisions of the IRA include tax credits for purchasers of certain new EVs.

Eligible battery-powered EVs must meet critical mineral and battery component content and other requirements to qualify for credits of up to $7,500 per vehicle. Vehicles that meet one of the requirements, but not both, are eligible for a credit of $3,750.

The IRA requires that a certain percentage of materials used in a vehicle's batteries are extracted, processed, manufactured and/or assembled in the US or in certain US-allied countries (including countries that have a Free Tade Agreement (**FTA**) with the US, such as Australia). We term this group of countries the 'Allied Nations.'

After 2024, an EV will not qualify for the tax credit if it contains any critical minerals that are "extracted, processed, or recycled by a foreign entity of concern (**FECs**)" – including companies owned by, controlled by or subject to the jurisdiction of the government of the People's Republic of China, Iran, Russia or North Korea.

Figure 8 – **IRA EV tax credit timeline**

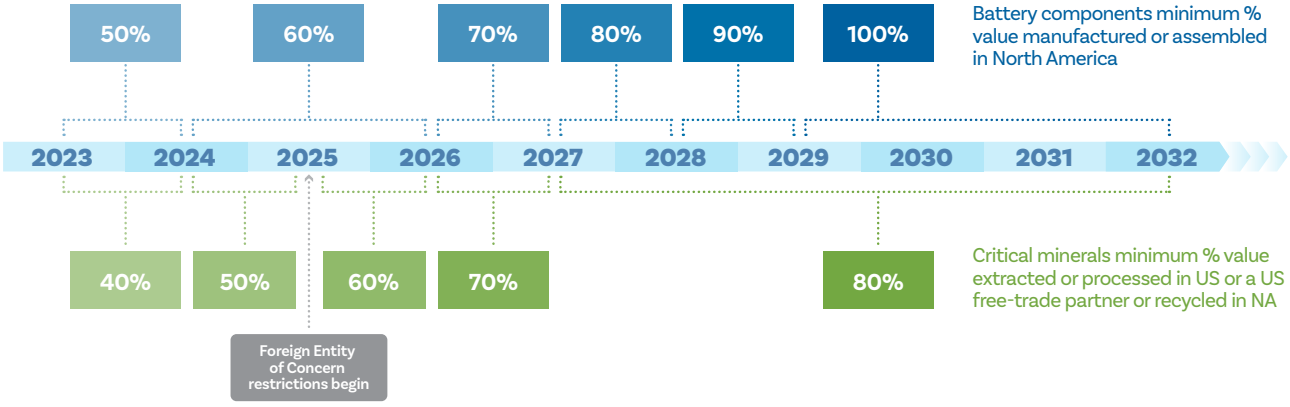
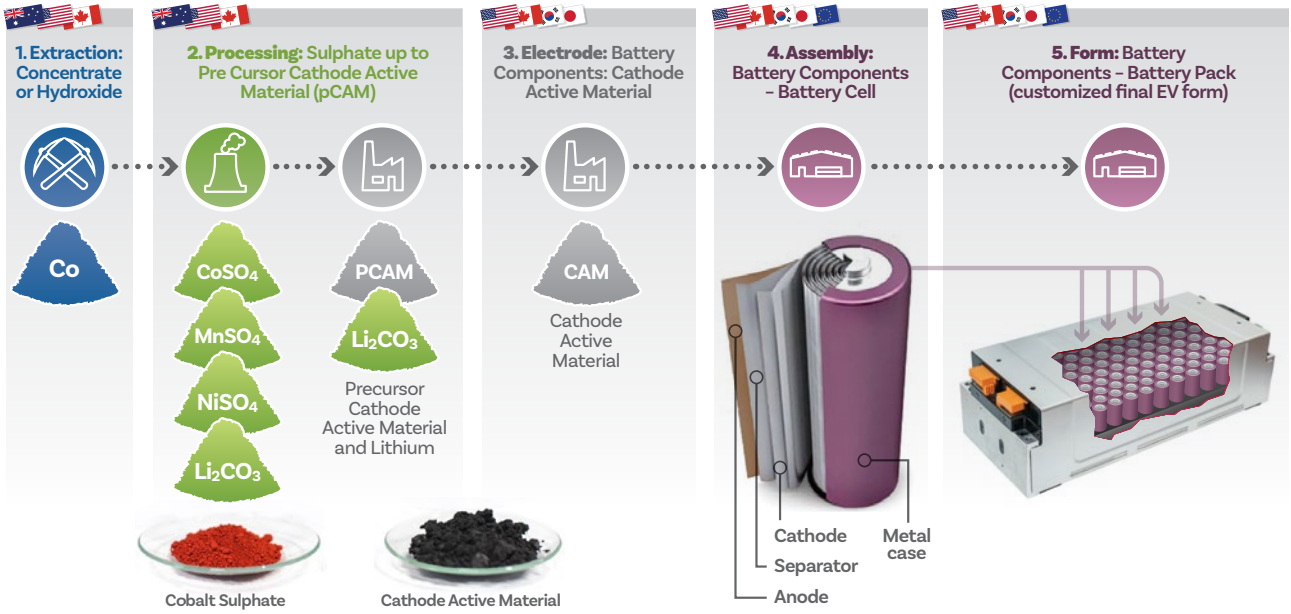


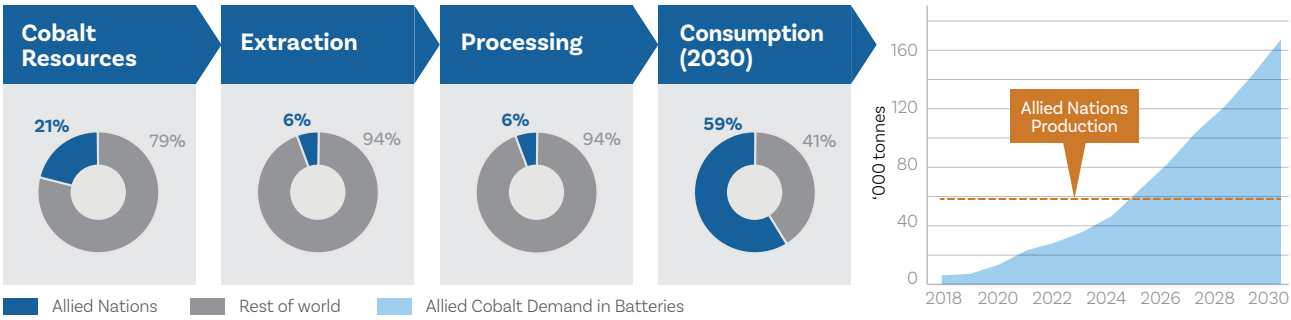
Figure 9 highlights the key steps in the global cobalt mine to EV battery production chain overlaid with IRA Clean Vehicle Credit (**CVC**) nation eligibility (**FTA country** or North America (**NAM**)).

Figure 9 – **Stages of EV battery production in the Allied Supply Chain**



As FECs are excluded from assistance under the IRA, the extraction and processing industries of Allied Nations are being incentivised to respond (Figure 10). Their historical response to demand challenges has been poor and instead became heavily reliant on China. Within the cobalt market, the price of metals sourced from unsustainable practices (for example artisanal cobalt from Africa) is a disincentive to a supply response from sustainable and ethical sources. Both EU and US governments are attempting to incentivise the development of new and sustainable critical mineral supply chains.

Figure 10 – **Allied Nations Cobalt Production vs Forecast Demand Shortfall**



Source: Benchmark Minerals Intelligence, Cobalt Blue Holdings

Figure 10 above shows the cobalt resource, extraction (mining) and processing (refining) of Allied Nations. Today, while these nations extract and process just 6% of both mined and processed cobalt, they are expected to consume ~60% of global consumption by 2030. This shortfall can only be overcome by creating new supply chains that include new mines and refineries.

The vast majority of critical minerals for batteries are mined or processed in countries ineligible for IRA incentives. It is estimated that 90% of minerals used in EVs today are processed in China. Minerals sourced from there and several other major source countries do not count toward the battery content eligibility requirement, and any China mineral content will be disqualified from 2025.

In order to meet these strict criteria, the United States must work closely with the Allied Nations to ensure adequate supply. At a recent Benchmark Minerals Intelligence Critical Minerals conference, the Bureau of Energy Resources at the State Department said that the US will work with its partners to "diversify every node of every supply chain. We can't do it alone, and acting alone is not how we do business."

The Climate, Critical Minerals and Clean Energy Transformation Compact

In May 2023, the governments of US and Australia signed a framework for greater cooperation called the Climate, Critical Minerals and Clean Energy Transformation Compact (the '**Compact**'). Included in the framework is the potential to designate Australia as a domestic source which opens doors to incentive-subsidised equity investment and debt funding by US companies and agencies. In other words, the Compact will help ensure that IRA-incentivised US capital would flow into Australia.

3.2.1 Japan

Japan does not possess an IRA eligible FTA with the US. Therefore, US buyers of Japanese EVs would not receive the full benefit of the tax incentives under the IRA. However, in 2023, the US and Japan entered into an agreement to support their partnership and strengthen their critical mineral supply chains for EV batteries. Japanese officials have publicly stated that they expect the agreement to enable Japanese producers to qualify for the FTA criteria within the IRA. This agreement is especially important for Japanese EV manufacturers of LiBs using NCM chemistries.

3.2.2 South Korea

South Korea is emerging as a pivotal ally in America's pursuit of an energy transition. Over a third of the announced IRA supported investments have been directed toward prominent South Korean battery material producers and battery manufacturers. Korea has an IRA eligible FTA with the US.

3.2.3 European Union

The Critical Raw Materials Act (**CRMA**) aims to ensure the European Union (**EU**) has access to materials and security of supply of raw materials required for the EU net-zero technologies. The Act comes with targets for production and for reducing dependency on any single third country. China currently dominates the supply chain for many of the entries on Europe's list of "strategic" metals and supplies about 95% of the EU's rare earths.

The EU is also seeking to catch-up with the United States, which is already investing heavily in critical metals capacity under the aegis of the Defense Production Act and the IRA. The CRMA recommends the accumulation of strategic metal stocks to buffer against unexpected supply disruptions. The CRMA also proposes that no more than 65% of the EU's consumption of each strategic raw material at any relevant stage of processing come from a single third country.

3.3 Domestic Context

In Australia, there are two key Australian Government policy initiatives supporting the development of critical mineral projects. Firstly, the **Critical Minerals Strategy** with objectives to diversify supply chains and develop downstream processing capacity in Australia. Secondly, and more recently, is the creation of the **National Reconstruction Fund,** which will amongst other matters targets assistance in adding value to resources. More indirectly, but potentially equally important, is the **National Battery Strategy** focussed on battery materials and batteries themselves.

3.4 Refinery value and benefit

The value and the benefit of the development and operation of the refinery in Australia includes:

- **Australia's First Cobalt Refinery.** The refinery will represent Australia's first cobalt refinery that will produce high-quality, battery-grade cobalt and nickel sulphate.
- **World Scale.** The refinery is expected to bel be a world scale cobalt sulphate production facility that can be expanded at relatively low incremental capital cost. It is expected to increase Australia's cobalt production capability from 6,400 tpa to >9,000 tpa cobalt metal, elevating Australia to become a top three global cobalt producer.
- **IRA Compliant.** The refinery's production is targeted to be US IRA compliant. From 2025, there will be a looming shortfall of IRA compliant cobalt sulphate supply. COB's products will hold a responsible sourcing qualification that will be able to be traced across the entire battery supply chain, from mine to EV purchase.
- **Resilient and sustainable supply chains** through strong and secure international partnerships. The refinery, together with a well-established partner from a strategically aligned country, will become a significant supplier of responsibly produced cobalt to battery manufacturers and will enable Australia to become a major supplier of cobalt outside of China.
- **Early Production Start.** The refinery is targeting production from mid-2025 representing a quick to market critical mineral value-add downstream processing development.
- **Supports Australian Battery Material and Manufacturing Initiatives.** With global demand for cobalt for use in LiBs increasing, reflecting the increased demand for and use of EVs and the growth in battery-powered energy storage solutions, the refinery will support the development of Australia's battery material and battery production capability. The refinery will form a key component in supplying one of the four battery minerals required for the production of pCAM.
- **Sovereign capability in critical minerals processing.** COB and its partner will move up the critical minerals value chain and increase Australia's downstream processing by producing high-value products
- **Adding value to resources.** The refinery will extract more value from Australian resources and produce high-value cobalt sulphate that will support the development of pre-cursor cathode material manufacturing capability and capacity in Australia.
- **Location.** Located in Kwinana, the refinery will have easy access to export markets being close to deep-water port and export facilities; ready access to reagents produced in the area; and will be close to processing facilities producing all four of the cathode elements and so represent an ideal location to cooperate with battery industry peers to make cathode precursor or active cathode materials for global markets.

4 Market Analysis

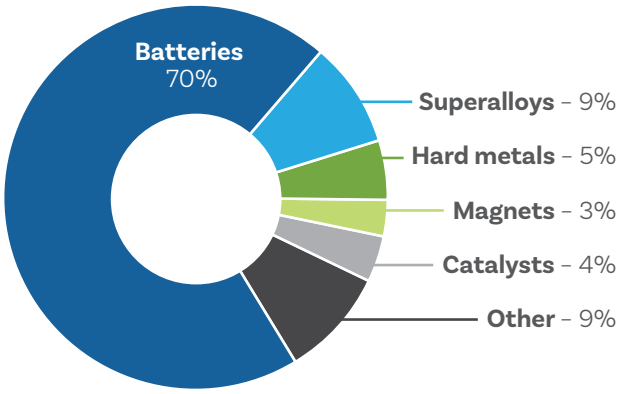
4.1 Cobalt market

Cobalt is an important and critical raw material with demand dominated by the LiB industry. This segment, led by EVs, has driven cobalt in battery consumption to grow 15% per annum since 2018 and is set to rise a further 10% every year the rest of this decade. From a supply perspective, the global cobalt market is highly concentrated, with China commanding a ~50% share in global mining and ~75% in refining.

4.1.1 Cobalt Demand

Cobalt's demand is split into new and old economy drivers (Figure 11). New economy drivers include lithium-ion batteries and superalloys. Old economy drivers are typically industrial uses that include steels, tools, industrial chemicals and magnetic materials.

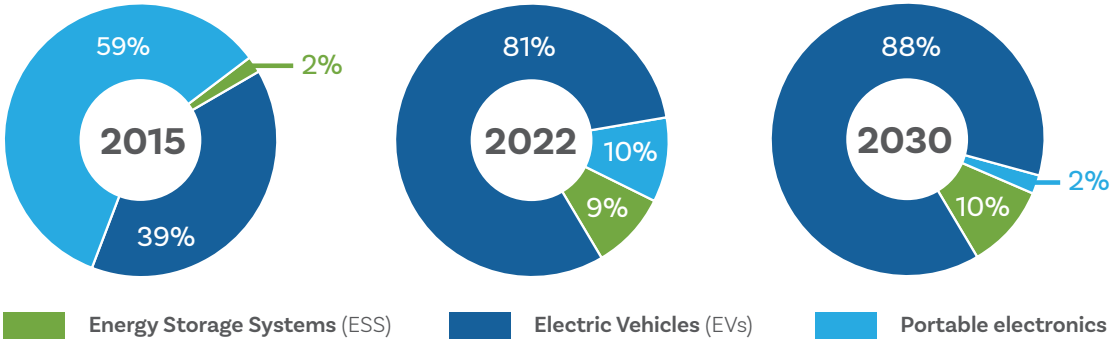
Figure 11 – **Cobalt demand breakdown, 2022**



Source: Benchmark Minerals Intelligence

The most significant driver of cobalt demand in the coming decade is the LiB industry (Figure 12). While cobalt is present in most portable electronic devices that are part of daily lives, in 2021 EVs surpassed electronics as the major source of demand.

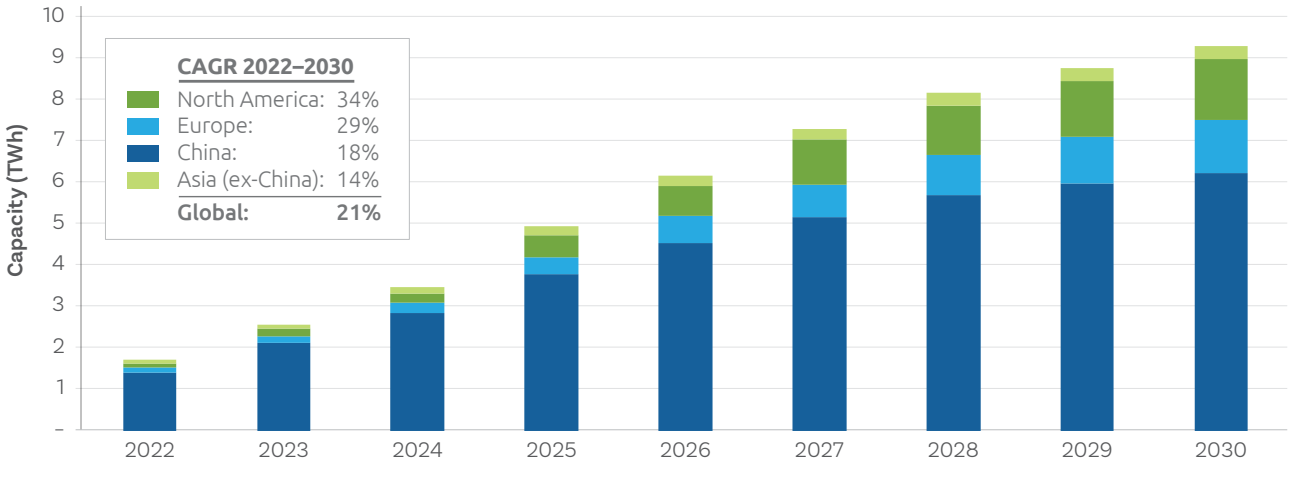
Figure 12 – **Cobalt in battery end use breakdown, 2015–2030**



Source: Benchmark Minerals Intelligence

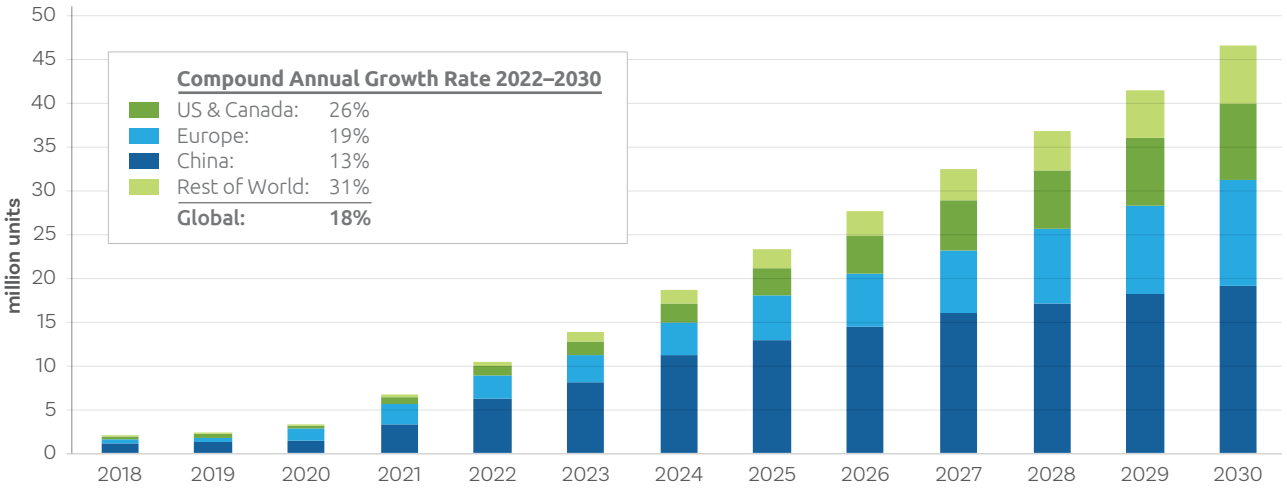
EV sales growth saw significant acceleration in 2020/21 following purchase subsidies (part of post-COVID economic stimulus in the EU and China). Growth will remain strong over the coming decade, underpinned by legislation in many economies that are incentivising consumer take-up – including the US focussed IRA (Figure 13 and Figure 14).

Figure 13 – **Gigafactory capacity (TWh) forecasts – North America and Europe are centres of growth**



Source: Benchmark Minerals Intelligence

Figure 14 – **EV sales forecasts by region – North America and Europe are centres of growth**



Source: Rho Motion

4.1.1.1 Cobalt in batteries

The cobalt-based LiB was first commercialised in 1991 by the Sony Corporation of Japan. This technology has several physical characteristics that represent a significant improvement on the incumbent Nickel Metal Hydride (**NiMH**) and Nickel Cadmium (**NiCd**) battery technologies.

Cobalt alloys form part of the battery cathode material and gives batteries high energy density, increased thermal stability and longer life spans. There are three dominant cobalt-based cathode materials:

1. Lithium Cobalt Oxide – ($LiCoO_2$) ~60% Co, commonly called LCO
2. Lithium Nickel Manganese Cobalt Oxide: ($LiNiMnCoO_2$) up to 15% Co, commonly called NCM
3. Lithium Nickel Cobalt Aluminium Oxide ($LiNiCoAlO_2$) ~9% Co, commonly called NCA

LiBs initially used cathodes that were about one-third nickel. However, in recent years, automakers have increased the percentage of nickel in cathodes to boost the battery energy density and increase vehicle range. Most are now using cathodes that contain at least 60% nickel. This trend has gained pace over the past two years, in part to reduce or eliminate cobalt, and in part to increase density for premium applications.

4.1.1.2 NCM vs LFP

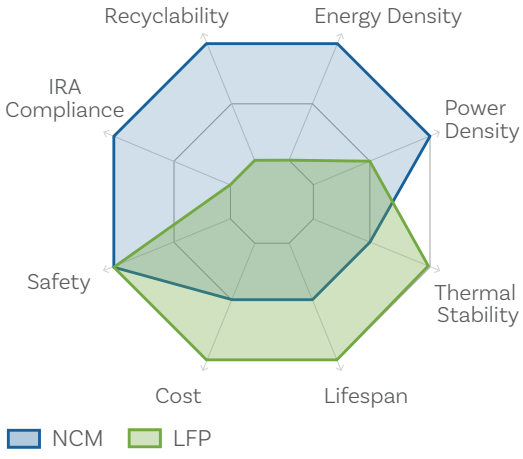
Another trend that has gained pace in recent years is greater use of Lithium Iron Phosphate (**LFP**) batteries. LFPs have already been accepted by the stationary battery energy storage system sector (**ESS**), where energy density (thus weight) tends to be a less decisive factor. However, over the past couple of years, some EV makers have started to accept this trade-off of lower energy density for cost advantage in some of their car models.

NCM versus LFP characteristics are shown below. In short, NCM chemistries have better range but are more expensive (Battery University, Cobalt Blue Holdings).

Figure 15 – **LiB cathode chemistry characteristic comparison**

Financials	LFP	NCM
Energy Density	●	● ● ●
Power Density	● ●	● ● ●
Thermal Stability	● ● ●	● ●
Lifespan	● ● ●	● ●
Cost	● ● ●	● ●
Safety	● ● ●	● ● ●
IRA Compliance	●	● ● ●
Recyclability	●	● ● ●

● ● ● Excellent ● ● Good ● Poor



Source: Battery University, Cobalt Blue Holdings

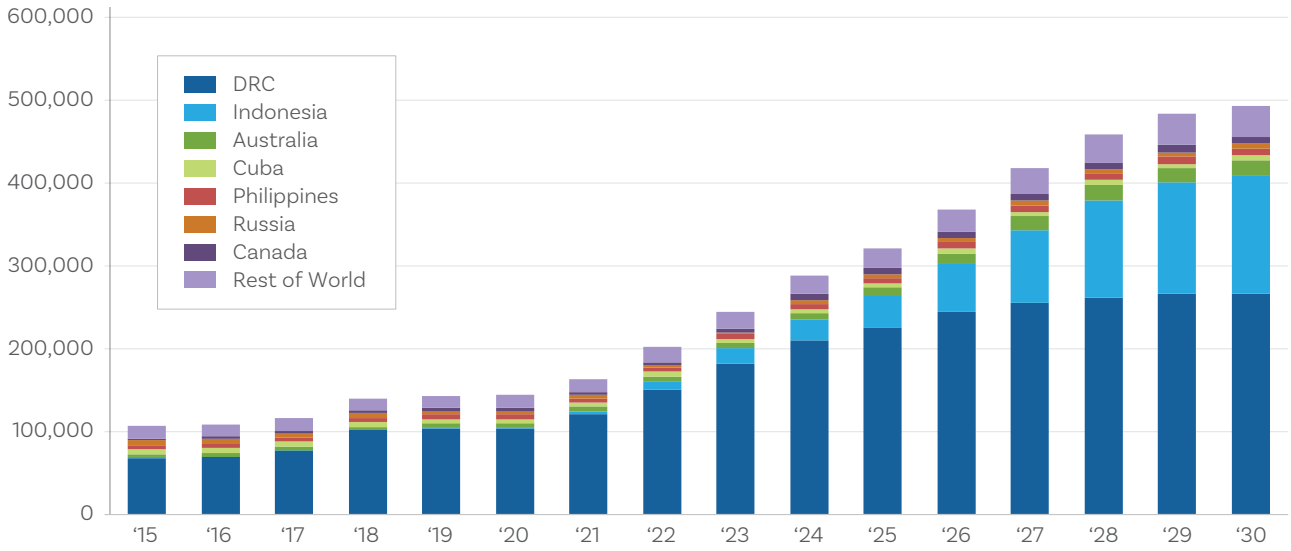
While there continues to be discussion over the gain in market share of LFP cathodes in EV batteries, it is important to note this trend remains isolated to certain regions, namely China and other high-density emerging market areas where demand for lower costs outweigh range requirements in batteries. According to Rho Motion, LFP share in the US & Canda is just 15% and in the European block only 5%. These low levels of LFP penetration are likely to persist for two reasons. First, nickel/cobalt-based chemistries are already mainstream and there are long-term commitments from EV manufacturers. Second, given LFP batteries rely heavily on key components controlled by China and thus likely to be marginalised as a result of the IRA and other legislation. We therefore expect NCM cathodes to remain dominant in those regions.

4.1.2 Cobalt Supply

Mined Supply

While cobalt is in abundance within the earth's crust, it appears in economic quantities in less than 20 countries. As a result, the global cobalt market is highly concentrated with the top five countries supplying >80% of the global market. While the majority of the cobalt supply comes as a byproduct of copper operations in the DRC, the majority of growth going forward will come from byproducts from nickel operations in Indonesia.

Figure 16 – **Global Cobalt Production by source**



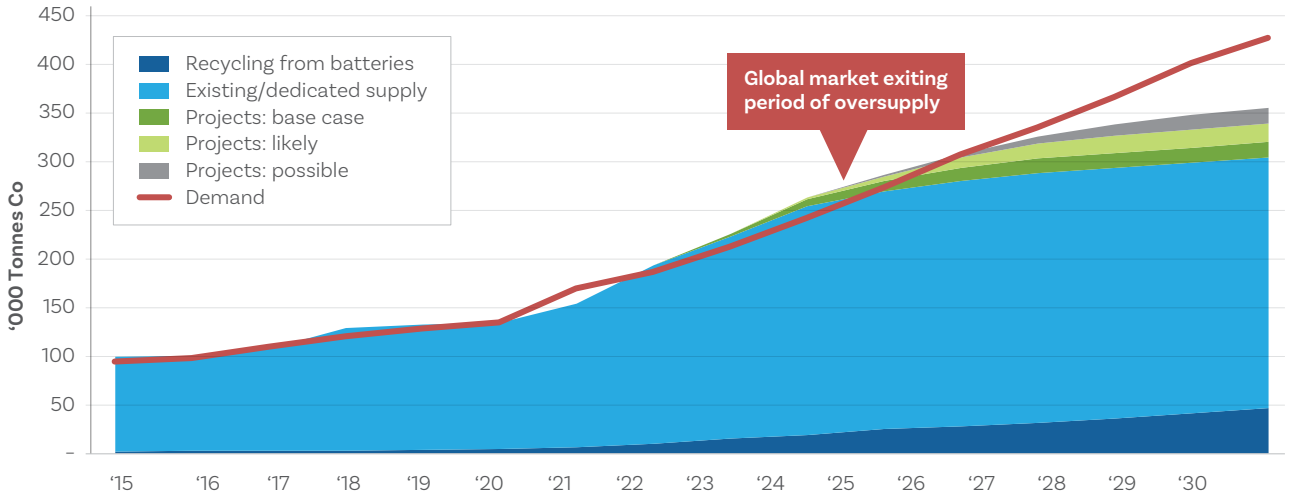
Source: Benchmark Minerals Intelligence

4.1.3 Cobalt Market outlook

Unlike other metals, traditional supply and demand dynamics do not necessarily influence cobalt supplier behaviour. In most commodity trades, suppliers will adjust production levels in part to manage price. With commodities where the majority is produced as a byproduct, supply is managed in conjunction with the dynamics of the primary metal. In the case of copper, a market that has been in perpetual short supply, producer focus has been on maximising output. This has been to the detriment to the cobalt market since 2022 as producers in the DRC expand output to leverage healthy copper prices. Although cobalt prices have fallen close to historical lows, cobalt mining continues to grow at above average rates.

As a result, global supply growth has outweighed demand growth in 2022 and 2023, and will likely do so again in 2024. However, from 2025 this trend will likely reverse, and demand is forecast outpace supply for the next decade (Figure 17).

Figure 17 – **Global cobalt supply vs demand**

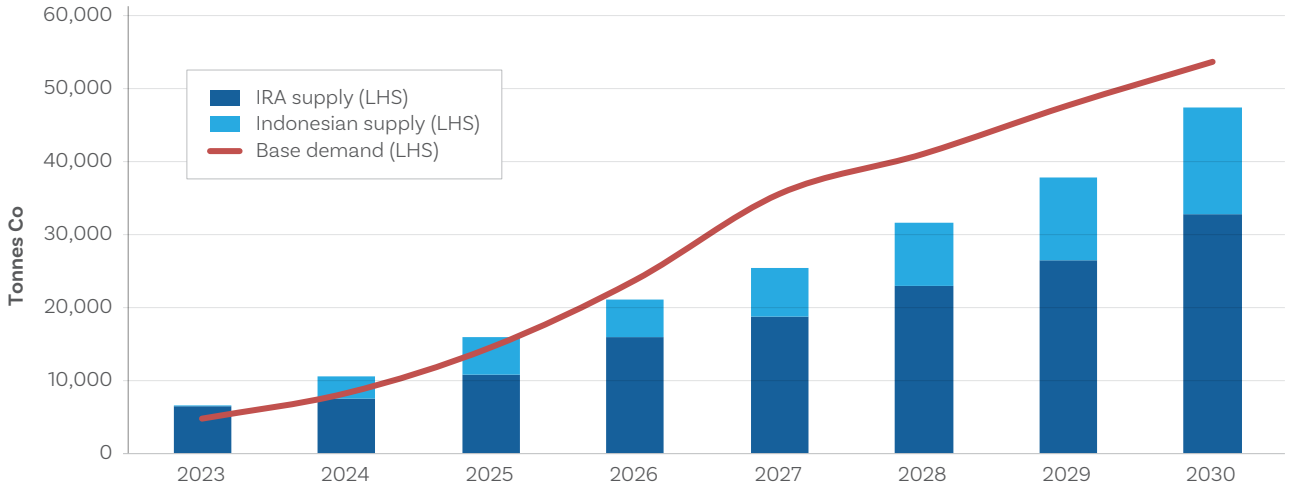


Source: Cobalt Blue Holdings, Benchmark Minerals Intelligence

The above analysis considers the entire cobalt market including the many other applications required among various industries. When considered through the lens of available capacity for IRA-compliant, battery grade cobalt, there is an immediate shortfall that only grows as IRA restrictions tighten. COB's refinery strategy is designed to address this urgent segment of demand.

Figure 18 demonstrates demand for IRA-compliant, battery-grade cobalt in the US vs forecasts for available capacity. Even including the potential for Indonesian supply to qualify, there is clearly an impending shortfall.

Figure 18 – **IRA Compliant (+ Indonesian) Cobalt Sulphate – Market Balance**



Source: Cobalt Blue Holdings, Benchmark Minerals Intelligence, Rho Motion

4.1.4 Cobalt Price Forecasts

The study highlights cobalt metal forecast prices from Benchmark Minerals.

Table 3 – **Cobalt Price Forecast, Battery Grade Metal, EXW Europe basis, US$/lb**

Source	2023	2024	2025	2026	2027	2028	LT real 2023$
Benchmark Minerals	$16	$16	$17	$18	$19	$20	$27

Source: Benchmark Minerals Intelligence, Cobalt Blue Holdings

Table 4 – **Cobalt price scenarios**

Price Range	Scenario
US$15–20	A well supplied intermediates market, supported by DRC hydroxide expansions, rapidly growing Indonesian MHP and sulphate ramp-up and other supply driven by Allied Nation legislative and economic incentives
	China remaining ahead of capacity requirements in both metal and chemical markets
	Expectations of cobalt demand growth softening in EVs and for competing battery chemistries to continue to expand
US$20–25	Intermediate supply growth to slow from current levels in the DRC and Indonesia
	Chinese refined capacity to tighten on lower investment
	LFP and other non-nickel/cobalt bearing cathode chemistry market share to plateau
	IRA and other legislation and economic incentives lead to a slowdown in investment among Foreign Entities of concern (China, Russia, Iran, North Korea)
US$25+	Structural supply-side changes as a result of IRA and economic incentives discouraging further growth in DRC and Indonesian growth
	Sustained growth in current levels of cobalt demand in batteries
	Strong requirements for more IRA-compliant supply growth among Allied Nations

4.1.5 The emergence of two-tiered pricing

COB believes the IRA's Clean Vehicle Credit (**CVC**) scheme will create a de facto price premium for compliant cobalt and nickel sulphate. The CVC provides a US$3,750 tax incentive to the US consumer for purchasing an EV that contains a threshold level (peaking at 80% value definition by 2027) of critical minerals where production steps 1 and 2 or 2 alone are performed within an FTA country. As a result, the IRA Act presents Australia with a strong opportunity to capitalise on its ability to process its own or non-FTA extracted material into CVC credit compliant material. Note there is a second US$3,750 CVC tax incentive component for the consumer when the battery is manufactured or assembled in North America.

It is important to understand the significance of the US$3,750 CVC critical minerals sourcing tax credit. The table below estimates the cost of critical minerals (at long term prices) for a 60kWh Nickel Cobalt Manganese (NCM 8:1:1) Li ion battery. Total cost of critical minerals (A) equates to ~US$1,500 per battery. These minerals are then processed (B) to produce constituent materials at a cost of ~US$580 per battery. Australia is the only country globally that produces all of these materials.

Table 5 – **Critical minerals costs in an NCM battery**

				(A)	(B)	
		Avg Battery Content	LT Price	Cost	Materials Processing Costs	
Mineral	**Cell Part**	kg	US$/kg	US$/kg	Sulphate + Cathode	US$/kg
Nickel	Cathode	29	$17	$500	+20% + 20%	$200
Manganese	Cathode	10	$0.8	$10	+20% + 20%	$4
Cobalt	Cathode	8	$61	$480	+20% + 20%	$192
Lithium	Cathode	6	$40	$240	+20% + 20%	$96
Graphite	Anode	52	$3.0	$160	+20% + 20%	$64
Aluminium	Cathode, Casing, Current collectors	35	$2.6	$90	+30%	$27
Total		**140**		**~$1,500**		**~$580**

Source: Cobalt Blue Holdings

A focus on just four of these minerals (namely nickel, cobalt, lithium and graphite) would allow Australian producers to target ~US$2,000 in value (= US$1,380 direct + associated processing costs). Note: by extension, this analysis infers that the entire US$3,750 will effectively subsidise 100% of the critical minerals and associated processing for up to a ~80 kWh battery for approved vehicle types.

This tax incentive demonstrates that the US Government is prepared to subsidise higher-cost inputs for critical minerals in order to secure supply that meets or improves their own labour and environmental standards. Therefore, to access CVCs, EV makers and battery producers are incentivised to obtain materials sourced from smaller, compliant supply chains.

As a result, COB believes battery industry participants will be willing to pay a premium for responsibility-sourced/IRA-compliant material. COB's products will hold a responsible sourcing qualification that will be able to be traced across the entire battery supply chain, from mine to EV purchase.

Table 6 – **NPV and IRR versus cobalt price and a potential IRA Premium**

Sensitivity on Post-Tax NPV ($M)* for Changes in Cobalt Price and IRA Premium						
		Cobalt Price				
IRA Premium	15.0	**20.0**	25.0	**30.0**	35.0	40.0
0%	61	**70**	97	**104**	75	111
2%	75	89	120	131	108	148
4%	88	107	143	158	140	184
6%	102	125	165	186	172	221
8%	116	143	188	213	204	257
10%	130	162	211	241	236	294

* *At time of early works*

Sensitivity on Post-Tax IRR* for Changes in Cobalt Price and IRA Premium						
		Cobalt Price				
IRA Premium	15.0	**20.0**	25.0	**30.0**	35.0	40.0
0%	20%	**21%**	24%	**24%**	20%	24%
2%	22%	24%	27%	28%	24%	28%
4%	24%	26%	30%	31%	28%	33%
6%	26%	29%	33%	34%	32%	37%
8%	28%	31%	36%	38%	35%	40%
10%	30%	33%	38%	41%	39%	44%

* *At time of early works*

Quality or carbon-superior premiums have precedence in current commodity market contracts. For example, since 2017, Rio Tinto offers its branded *RenewAl* aluminium that guarantees 4 tonnes or less of CO_2 equivalent. Alcoa also has a product line called *Sustana* that offers less than 2.5 tonnes. These compare to an industry average of 11 tonnes. Both companies charge customers a premium for the metal, although contract specifics are confidential. Alcoa has publicly stated that negotiated premiums with each buyer and their size depend on the customer's needs and local availability of alternatives.

5 Capital and Operating Cost Estimate

The capital costs for the plant were estimated from equipment quotes from vendors. All major mechanical equipment was costed. Standard industry factors were used for piping, electrical and instrumentation, civils and structural. The installed plant was estimated to be $46.5m, as shown in Table 7

Table 7 – **Capital Cost Estimate Stage 1**

Source	Cost	Comment
Direct Equipment	$15.5m	Quoted
Installation	$18.5m	Factored
Buildings	$7m	Quote + Factor
EPCM	$6m	15%
TOTAL	$47m	
Contingency (15–20%)	$7–9m	

The operating costs were estimated in three categories:

- Feedstock purchasing – purchase price formula linked to metal prices
- Feedstock processing – reagent consumption relative to each feedstock (based on reagent quotes and power inputs). The major consumables were sulphuric acid and oxygen for leaching, lime/limestone/caustic for neutralisation, and power for isopropanol recovery after crystallisation.
- Fixed plant costs – labour, general equipment power, maintenance, consumables. These totalled ~A$14m per annum, including a 20% contingency.

6 Forward Work Plan

The upcoming tasks are expected to be completed by mid-2024:

Process Development

- Complete testing of 5 t sample of 3rd party MSP
- Complete testing of 5 t sample of 3rd party MHP

Detailed Plant Engineering

- Select engineering partner and construction firm
- Convert study documentation into construction ready documentation
- Develop execution model, and tender for contracts

Feed and Offtake Contracts

- Secure binding feedstock contracts for the first 3–5 years of operation
- Secure offtake contracts, subject to product validation

Permitting

- Complete studies relating to permit application
- Apply for permit and negotiate with regulator for licenses

Advance project financing and joint-venture agreements

7 BHCP DFS Update

BHCP Feasibility Studies are progressing, focussing on finalising/optimising capital and operating estimates, with the study now likely to be delivered in April 2024.

8 CWSP Update

Current progress on CWSP projects may be summarised as follows:

- **European Union** – COB is engaging with the European Raw Materials Alliance (**ERMA**) with a view to potentially partnering (subject to further commercial negotiations) to explore significant mine waste opportunities within the European Union. We aim to finalise negotiations in Q1 2024 (and if successful) begin a systematic evaluation of opportunities across the 27 EU nations and will look to engage with/seek assistance from the EU Commission regarding key provisions of the Critical Raw Materials Act (**CRMA**) pertaining to sustainability and mine waste/metals recycling.
- **North America** – Flin Flon Mine test work. COB has now completed preliminary roasting test work with positive results warranting further evaluation. The overall results successfully achieved greater than 90% conversion of the pyrite into pyrrhotite and elemental sulphur. If the final test work results meet expectations, then further discussions concerning the next stages of technical cooperation will be held. Future collaboration may include larger-scale test work in parallel with potential commercial negotiations.
- **Australia – Queensland** – COB continues to perform test work to gauge suitability of our proprietary processing technology to recycle mine waste and produce elemental sulphur (an ingredient in the production of sulphuric acid).

9 Forward-Looking Information and Disclaimer

This announcement contains certain forward-looking statements. Forward-looking statements can generally be identified by the use of forward-looking words such as 'anticipate', 'believe', 'expect', 'project', 'forecast', 'estimate', 'likely', 'intend', 'should', 'will', 'could', 'may', 'target', 'plan' and other similar expressions within the meaning of securities laws of applicable jurisdictions. Indications of, and guidance or outlook on future earnings, distributions or financial position or performance are also forward-looking statements. These forward-looking statements have been made based upon the Company's expectations and beliefs concerning future developments and their potential effect upon the Company (and its controlled entities) and are subject to known and unknown risks and uncertainties which are, in many instances, beyond the Company's control, and may involve significant elements of subjective judgement and assumptions as to future events which may or may not be correct. No assurance is given that future developments will be in accordance with the Company's expectations. Actual results could differ materially from those expected by the Company and the Company assumes no obligation to update any forward-looking statements or information.

10 About Cobalt Blue

Cobalt Blue Holdings Limited (ASX: COB) is an exploration and project development company. Work programs advancing its Broken Hill Cobalt Project in New South Wales continue. Cobalt is a critical mineral in strong demand for new-generation batteries, particularly lithium-ion batteries now widely used in clean energy systems. Further information about COB can be found at www.cobaltblueholdings.com.

This announcement was authorised for release to the ASX by the board of Cobalt Blue Holdings Limited.

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Released Information

This ASX announcement refers to information extracted from the following reports, which are available for viewing on COB's website http://www.cobaltblueholdings.com

- 23 November 2023: Positive Results – Preliminary Flin Flon Tailings Test Work.
- 03 August 2023: Demonstration Plant success. Refinery Development Program launched.
- 27 June 2023: Flin Flon Tailings Testwork Agreement with Hudbay Minerals Inc.
- 05 June 2023: Definitive Feasibility Study Update.

COB confirms it is not aware of any new information or data that materially affects the information included in the original market announcement, and, in the case of estimates of Mineral Resources, that all material assumptions and technical parameters underpinning the estimates in the relevant market announcements continue to apply and have not materially changed. COB confirms that the form and context in which the Competent Person's findings presented have not been materially modified from the original market announcement.