



# Australia's Mining Industry

AN ECONOMIC ANALYSIS PREPARED BY THE UWA STUDENT MANAGED INVESTMENT FUND

# Major Drivers in Industry

Political and environment factors have contributed heavily to commodity volatilities across the globe, impacting Australia's industry growth and outlook

## CLIMATE CHANGE CONCERNS



- Dependence on fossil fuels as an energy sources by Australia and other economies has sustained their demand in recent years.
- Climate concerns are expected to constrain medium and long-term sector growth of fossil fuels.
- Global net zero carbon ambitions have changed trajectory of industry towards renewables.

## POLITICAL INSTABILITY



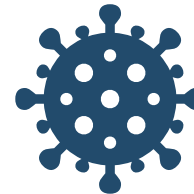
- Russia/Ukraine conflict likely to cause short to medium term disruptions to global supply and exportations.
- Tensions in South American countries have created opportunities for Australian exports to expand their place in the market.

## ELECTRIC VEHICLES GAIN TRACTION



- Industry swings towards lithium batteries have underpinned industry growth.
- Movement towards electric vehicles (EVs) has drive rise in demand for lithium.
- Demand for crude oil likely to suffer in the long-term as uptake of EV impact demand for traditional gasoline car.

## DEMAND CONSTRAINT FROM COVID-19 PANDEMIC



- International border restrictions have contributed to persistent supply constraints in recent years.
- Drastic fall in global demand during pandemic dealt heavy losses to producers.
- Return to pre-pandemic levels underway as demand for metals and fuels accelerate.





# Base Metals

IRON ORE, NICKEL, COPPER, ALUMINIUM & NICKEL

OVERVIEW, TRENDS & FORECASTS

# Iron Ore Overview

The dominant resource in Australia's export mix, with China by far the largest customer

## IRON ORE - LARGEST IMPORTERS AND EXPORTERS (2020)



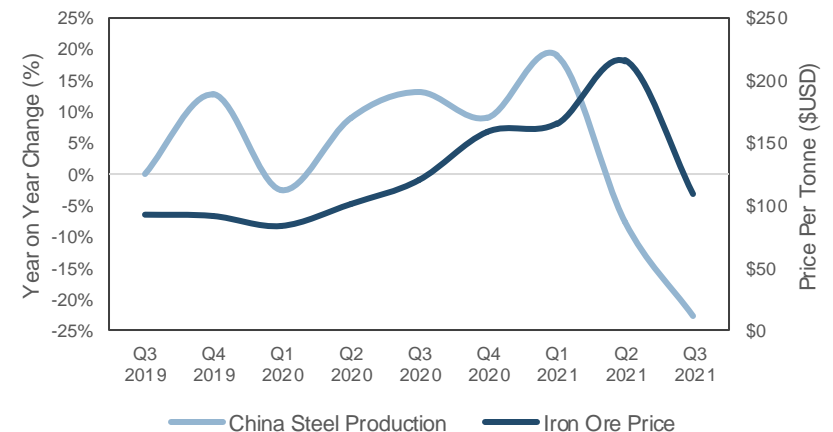
## A HIGHLY CONCENTRATED TRADE MARKET

- Exports dominated by **Australia and Brazil**, with no other country greater than 4%.
- Importers dominated by **China (63%)**, with South Korea (4%) and Japan (7%) following.
- A key part of Australia's exports, valued at \$153 billion in 2020-21, over 41% of Australia's mineral exports.
- 97% of Australia's iron ore production is mined in WA, making the WA's exports even more concentrated with iron ore.

## DRIVERS: A TALE OF CONSTRUCTION

- Demand is heavily **tied to Chinese steel production**, which is largely determined by domestic construction activity.
- Residential property construction and large public infrastructure works key to steel consumption in China.
- Centralised economic planning and pollution-related regulatory decisions guide and restrict the Chinese market.
- Australian and Brazilian production capacity prone to impact of **extreme weather and labour shortages**.

## CHINA STEEL PRODUCTION & IRON ORE PRICE



# Major Players

**RioTinto**

**\$176.2b**

Market Cap.

**17**

Iron ore mines

**4**

Port terminals

**1700km**

of rail lines in WA

**BHP**

**\$260.3b**

Market Cap.

**5**

Iron ore mines

**2**

Port terminals

**208km**

of rail lines in WA



**\$66.9b**

Market Cap.

**180**

million tonnes of iron ore exported annually

**4**

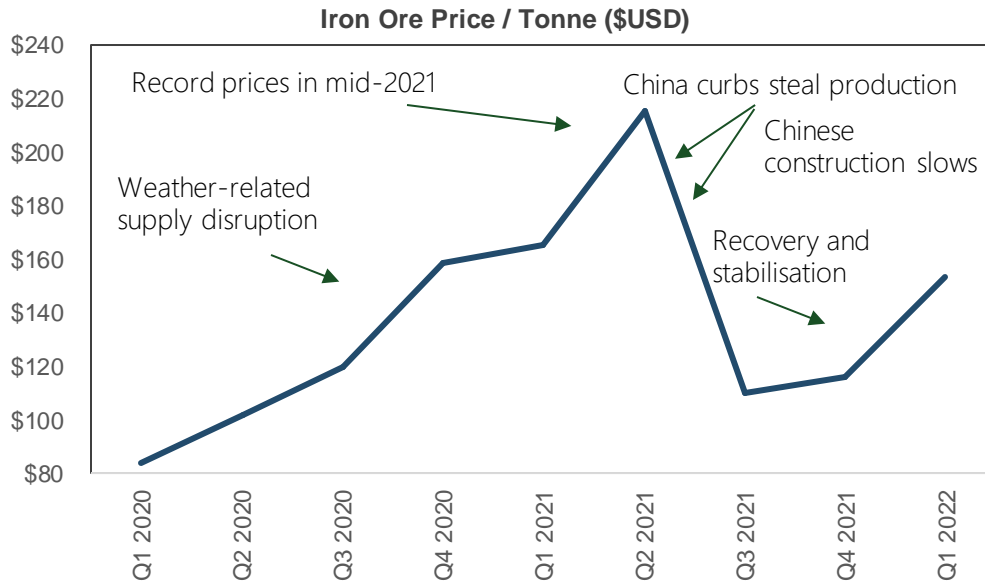
Port terminals

**260km**

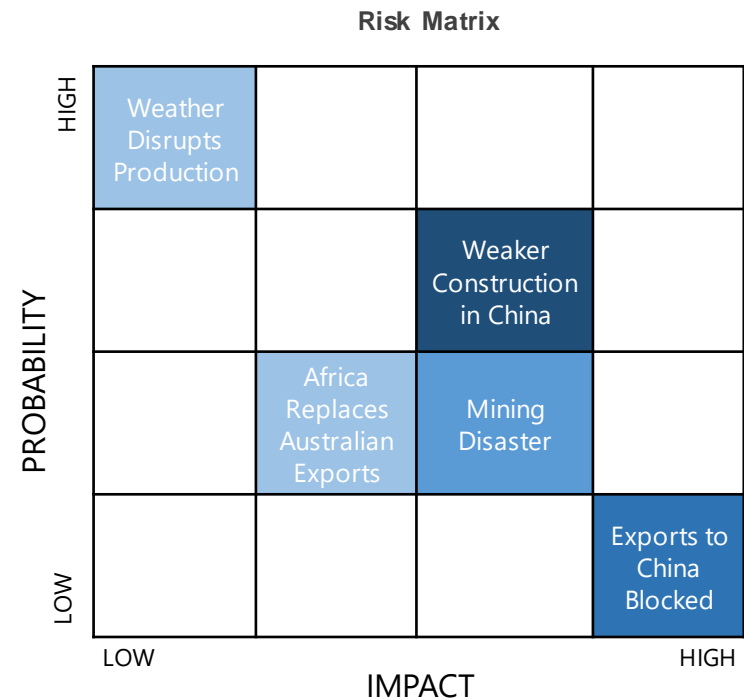
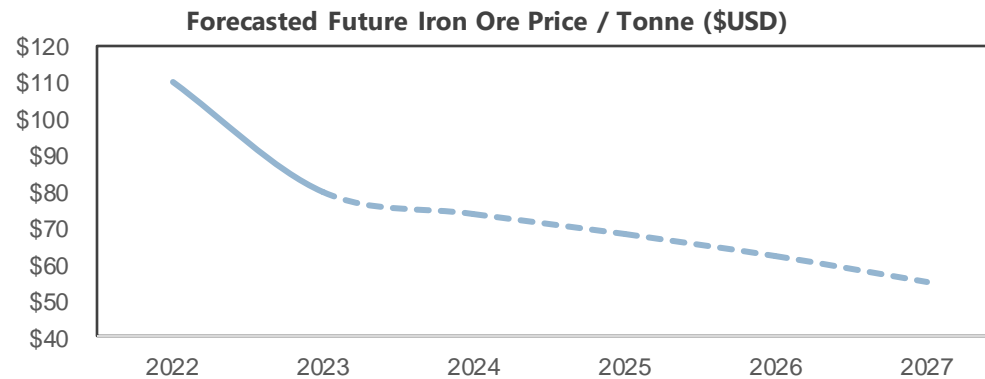
of private rail lines in WA

# Trends, Risks & Forecasts

Surge in price during Covid-19 pandemic, however short-lived and trending down



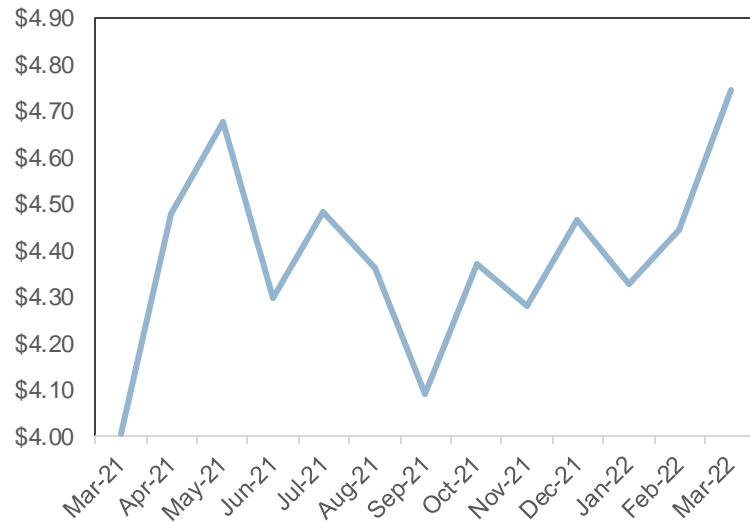
*Slowing of China's construction activity remains **biggest risk** for Australian iron ore miners.*



# Copper & Nickel

## Record prices and opportunities in decarbonisation

Copper Price Per Pound (\$USD)



- Major exporters are Chile and Peru, with 31% and 12% of global export share respectively, with Australia at 5%
- China accounts for over **half of global copper imports**
- Export value of \$11.44 billion AUD** for Australia in 2020-21, projected to increase to \$13.8 billion AUD by 2026-27
- Long term growth opportunity** due to significant usage in electric vehicles, as EV transition intensifies alongside government policy and incentives

Nickel Price Per Tonne (\$USD Thousands)



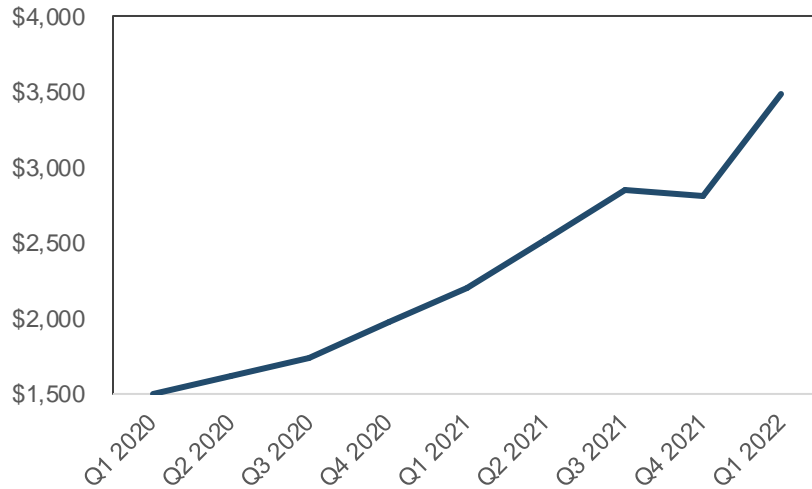
- Huge surge in asset price to over \$100,000 USD due to a short squeeze in March 2022, which has decreased.
- Prices are anticipated to stabilise** to an average of US\$24,875 in 2022.
- Australia's nickel exports projected to rise in coming years due to greater production capacity coupled with strong demand.
- As nickel is used to produce EV batteries, as with copper, nickel is set to benefit from the global transition to electric vehicles.



# Aluminium & Zinc

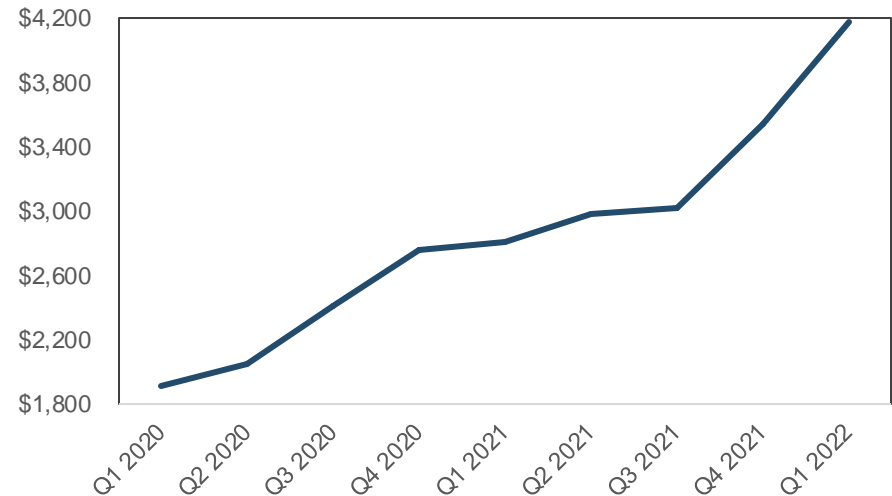
Too much price growth?

Aluminium Price Per Tonne (\$USD)



- **Strong prices** reflecting growth in global aluminium consumption, particularly in China, US, Germany and Japan
- **Price growth accelerated** after Russia's invasion of Ukraine in early 2022, as Russia is world's third largest primary aluminium exporter, accounting for 14.% of global exports
- Australia's primary **aluminium exports are forecasted to peak** in 2022, gradually decline until 2024 and **then increase again** to \$5.84 billion AUD by 2026-27, with volume remaining relatively stable.

Zinc Price Per Tonne (\$USD)



- Australia the **world's second largest zinc exporter** after Peru, with 13% and 14% of global export share respectively
- Europe, particularly Belgium and the Netherlands are major importers of zinc, making it a less Asia-concentrated metal
- Consumption growth is primarily driven by industrial production, with strong construction activity and car production slowly recovering from a lull, however this trend is at risk of reversing with the European and **global energy crisis intensifying**
- High price also reflects supply shocks due to Covid-19
- Australia's **zinc exports are forecast to increase** to around \$4.3 billion in 2021–22 but are projected fall to \$2.8 billion in 2026–27.





# Battery Metals

LITHIUM

OVERVIEW, TRENDS & FORECASTS

# Current Price and Factors

After a price crash in 2019 and 2020, the lithium price has surged since the beginning of 2021

## LITHIUM PRICE INCREASES


### Explosive Price Rise Across Lithium Concentrates:

- **450% gain** year-on-year on Lithium carbonate prices
- **478.3% increase in price** of Spodumene concentrate from Jan 2021 to Jan 2022
- **323.5% increase in price** of Lithium hydroxide from Jan 2021 to Jan 2022

### Chinese lithium carbonate-hydroxide spread at record highs

- 2021 saw spot carbonate prices rise above the lithium hydroxide price
- Driven by shifting battery chemistry preferences

## CURRENT CONCENTRATE PRICES

	<b>\$75700/t</b>	Lithium Carbonate
	<b>\$81500/t</b>	Lithium hydroxide
	<b>\$63900/t</b>	Spodumene
	<b>\$3075/t</b>	Lithium Carbonate

## DEMAND-SIDE FACTORS

### Surging Demand for Electric Vehicles

- EV sector accounts for approximately 45% of total lithium demand, with most EV batteries containing 700-800g of LCE per kWh
- 6.5 million EVs sold worldwide in 2021, up 109% on 2020
- 3.2 million EVs sold in China accounting for 15% of new cars sold
- 2.3 million EVs sold in Europe accounting for 19% of new cars sold

### Rebound of economy following easing of restrictions in H2 2021.

- Pent up demand pushed EV sales higher, leading to sharp increases in lithium consumption and prices
- Substantial EV infrastructure investment mitigating range anxiety concerns and improving perceived viability

### Lithium-ion battery manufacturers accelerating capacity expansion

- Increased downstream cathode material orders
- Destocking of lithium products in 2021 so increasing pressure for supply chain to re-stock

## SUPPLY FACTORS

### Supply constrained relative to exploding demand

- Expected shortfall in 2022 of between 20,000 and 60,000 tonnes
- Low prices in 2019/20 forced many operations into care and maintenance
- Still not producing at full capacity, with a return to full production expected end of 2022
- Development of projects slowed in 2019/20 due to lower prices and strict COVID restrictions in Australia and Argentina
- Supply response will be qualified as new production lines take time to produce at full capacity

### Spodumene shipping backlog present in early 2022 has been relieved

- Contributed to a significant uptick in line with lithium chemical prices to which spodumene contracts are tied.



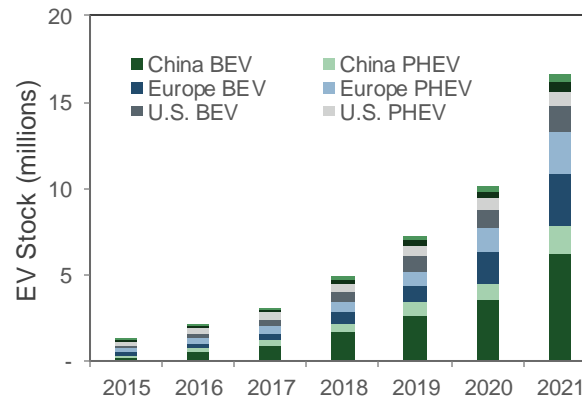
# IN FOCUS: Electric Vehicle Demand Growth

Exponential demand growth in the EV market is expected to catalyse complementary demand growth for the lithium that is required to produce EV batteries

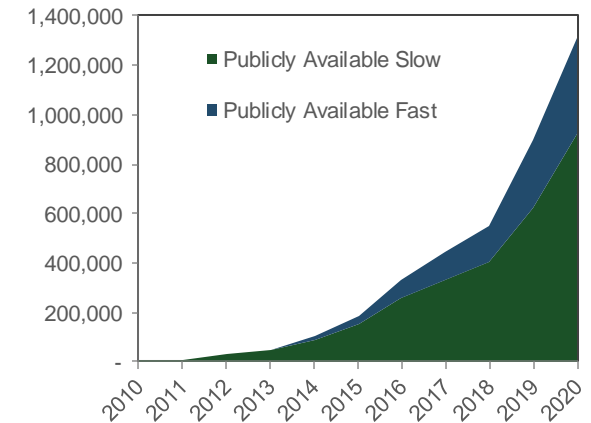
## EV TRENDS

- **Surge in demand** for electric vehicles following rebounding post-COVID restrictions has been met with a lacklustre supply response
- EV is expected to account for **80% of total lithium demand** by 2030, up from 45%
- Governments increasingly employing regulatory targets to enforce the move to EV
- However, Chinese government announcement of a **30% reduction in EV subsidies** from 2022 and end to subsidies entirely from 2023 will likely cause a slowdown in the growth of EV demand

## GLOBAL ELECTRIC VEHICLE STOCK

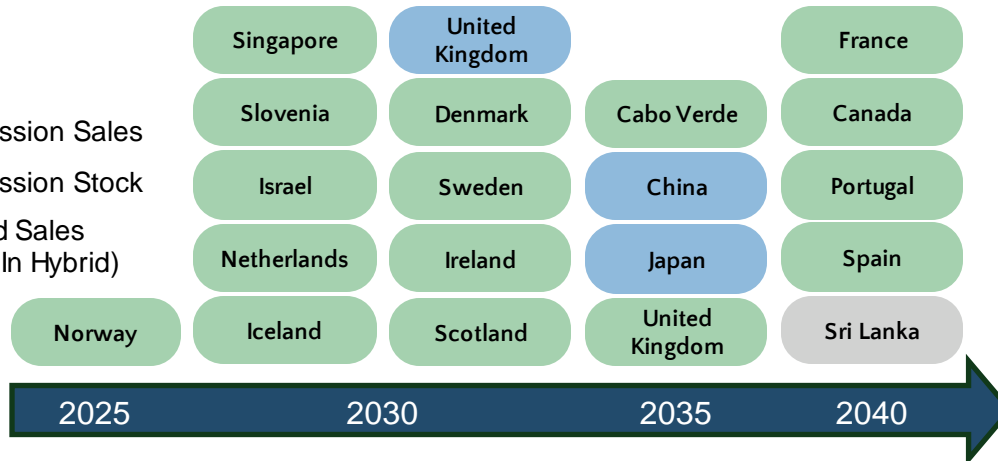


## GLOBAL EV CHARGERS

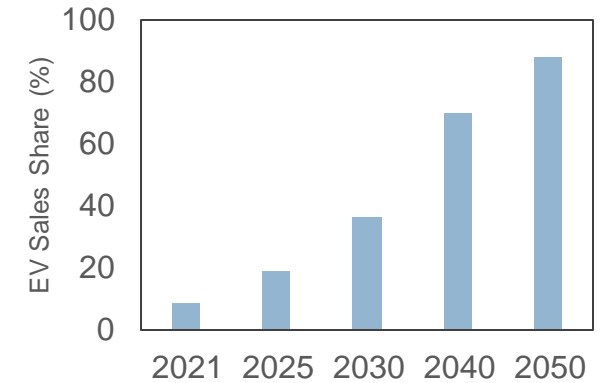


## EV SALES

- 100% Zero-Emission Sales
- 100% Zero-Emission Stock
- 100% Electrified Sales (Including Plug-In Hybrid)



## Projected Global EV Sales Share for Passenger Vehicles, SDS Scenario



# COMPANY SPOTLIGHT: Allkem



## OVERVIEW

Market cap: \$8.621b

- Formed by the merger of Galaxy Resources and Orocobre in August 2021
- Dual lists on the ASX and TSX
- Group revenue for the March 2022 quarter was approximately **US\$235 million**
- Group gross operating cash margin was approximately US\$189 million

## CURRENT OPERATIONS

### Mt Caitlin

- Hard rock operation in Western Australia
- Production reduced 50-55%** in 2020 and returned to full capacity in 2021
- Now **negotiating spodumene contracts** at US\$5,000/t for the June quarter
- Potential for **\$300 million revenue** at Mt Caitlin on projected sales of 50,000 tonnes

### Olaroz

- Brine operation in Argentina
- FY2021 production of 12.6ktpa
- Only **15% of defined resources extracted**
- Estimated **mine life of 40 years**
- Negotiated prices rising from US\$27,236/t in the March quarter to US\$35,000/t in the June quarter

## STRENGTHS

- 1 Diverse Asset Portfolio**
- 2 Strong Project Pipeline**
- 3 Ability to Expose Contracts to Rising Spot Prices**

## RISKS

- 1 Potential for Overexposure to Argentina**
- 2 Questions over Capacity of Lithium Hydroxide Plant to Provide Strong Future Returns**
- 3 Lack Spodumene Mining Capacity of Other ASX Listed Companies**

## OPERATIONS IN DEVELOPMENT/EXPANSION

*3 Brine operations in development/expansion, all based in Argentinian*

### Stage 2 Expansion of Olaroz

- First production in 4-6 months with 2 year ramp up to reach full capacity

### Sal de Vida

- Expected to commence operations in H2 2023
- 44-year project life

### Cauchari

- In pre-development, with 4.8 Mt of measured and indicated lithium reserves

### James Bay Hard Rock Project in Quebec

- Upstream phase to finish construction in 6-9 months
- Expected pre-tax internal rate of return of 45.8%
- Mine life of 19 years

### Lithium Hydroxide Plant in Naraha, Japan

- Produce battery grade lithium hydroxide from primary grade (lower quality) feedstock from Olaroz brine operation
- 10 ktpa production capacity
- Operations to commence in 2022



# Chile and Argentinian Political Situation

Chile and Argentina are both heading in the same direction in creating a more challenging operating environment for private enterprise

*Although Australia is the largest lithium producer in the world the vast majority of lithium supplies are located in the 'lithium triangle' within Bolivia, Argentina and Chile*

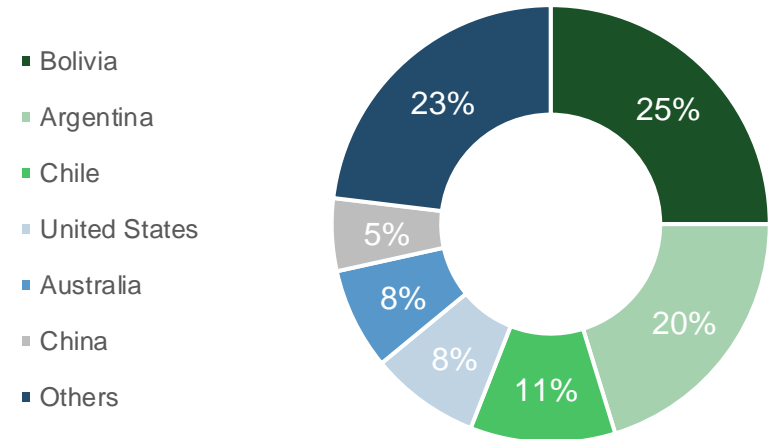
## CHILE

- Left-wing President has stated his intention to create a state mining company
- Not insignificant potential for a clause nationalising all lithium resources to be integrated into Chile's new constitution
  - Passed through initial committee stages
- Chilean environmental courts have suspended two US\$20.5 million lithium tenders issued under the last government
- Significantly higher export royalties between 6-40%

## ARGENTINA

- Argentina approved an increase in corporate tax rate from 30% to 35% for corporate taxpayers with earnings above US\$500,000.
- Current government has previously raised concept of creating a state lithium miner but has subsequently walked back on this proposal, ruling out the creation of a state miner or nationalisation.
- However, Argentina does **remain the most business friendly** of the lithium triangle nations.
  - Mining investment laws allow for duty-free imports of equipment
  - Royalties of 3% for exports
- Strong federalism provides provinces with control over mining and the environment, **limiting the capacity of federal government** to intervene.

## NATIONAL SHARE OF GLOBAL LITHIUM RESERVES



## IMPLICATION FOR AUSTRALIAN INVESTMENT

- Australia, particularly Western Australia, provides a **stable and globally competitive operating environment** for private enterprise.
- **Hesitance over medium to long term future** of the lithium sector in Patagonia may dissuade investors from undertaking the substantial fixed cost capital investments necessary to establish mining operations
  - May lead to **diversion of foreign investment flows** towards other substantial lithium miners, including Australia
- Investors looking to expose themselves to lithium in the future may prefer certainty of the Australian market.
  - Companies with Australian based lithium mining assets **may trade at a future premium** as a result.

# Sector Trends and Outlook

Demand for lithium chemicals required to create lithium-ion batteries is expected to be driven by significant expansion in off-the-metre and grid-scale electricity storage

## MOVE TO RENEWABLE ENERGY

- Lithium-ion batteries will play an **enormous role in electricity storage**
- Rapid scale-up in storage capacity is necessary to address hour-to-hour variability of wind and solar power generation
- Total storage capacity will need to **rise 35-fold** between 2020 and 2030 to reach net zero by 2050
- Implies an average annual **growth rate of 38%**
- Lithium carbonate and hydroxide are **expected to see accelerated demand.**

## ALTERNATIVE BATTERY CHEMISTRIES

- Lithium-ion chemistries are the most prolific battery technology in use for most commercially available EVs.
- Current Lithium-ion battery chemistries have a number of significant drawbacks
- **Lithium iron phosphate is emerging** as a competitive lithium-ion chemistry
- Lithium is **not vulnerable in the short to medium term** to a change in battery chemistry used within Evs.

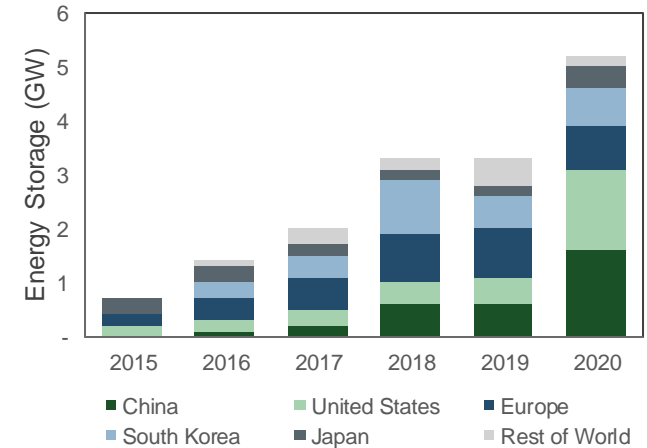
## POTENTIAL FOR SUPPLY CRUNCH

- New supply expected to provide a response to **surging demand in latter half of 2022.**
- Expected **production growth of 28%** in 2022, yet questions remain as to whether this will be sufficient.
- Increasing and sustained demand, primarily driven by EVs, will **require an enormous increase** in lithium supply
- Government policies are helping to incentive supply growth.

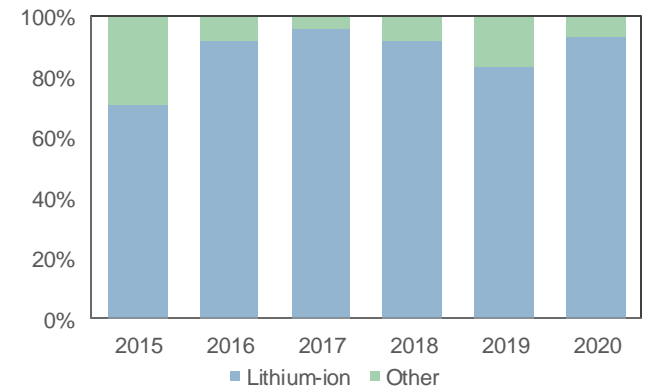
## BATTERY STORAGE

- Lithium-ion batteries make up more than **90% of the global grid battery storage market**
- Investment in storage increased by almost **40% in 2020** to US\$5.5b.
- Government investment in grid-scale batteries rose by more than 60%.
- Driven by **greater public pressure** for renewables investment to meet net zero targets.
- China announced plans to install over 30GW of battery energy storage by 2025

## ANNUAL ENERGY STORAGE ADDITIONS



## BATTERY STORAGE TECHNOLOGY MIX

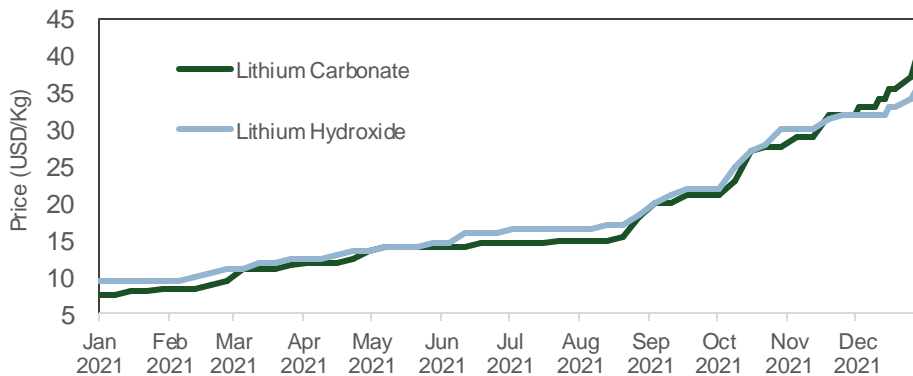


# PRICE FORECAST

## SHORT TERM

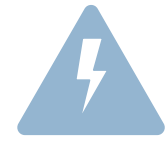
- **Lithium prices expected to remain tight** in first half of 2022
  - An **expansion of supply** as new projects and projects previously in care and maintenance come online is expected in second half of this year and likely will cause prices to ease.
- Despite increasing supply, the market is still expected to **experience an overall deficit in 2022**.
  - Macquarie forecasts a 20,200 tonne deficit in 2022.
  - S&P Global have forecasted a 50,000 tonne deficit in 2022.
- End to Chinese EV subsidies is expected to **reduce EV demand growth** in 2023
  - Increase in EVs in U.S. market has potential to counteract this.
  - **Introduction of electric pickup trucks** could see a substantial increase in uptake of electric vehicles.
  - President Biden has been agitating for greater EV subsidies although these were rejected by U.S. Congress.

## LITHIUM CARBONATE VS LITHIUM HYDROXIDE (USD/KG)



## MEDIUM TERM

- Forecasts between 2025 and 2030 tend to see the **lithium market as bullish**.
- **Potential for a supply crunch** as the lithium market sees consecutive years of deficit in the medium-term.
  - Expect to see a continued surge in the demand for EV vehicles even as battery price rises start to counteract many of the battery cost savings made by recent tech innovation.
- **Rising battery prices**, and hence EV prices, will **likely decrease demand** but not to a great extent beyond 2025 as countries start to ban sale of internal combustion engine cars.
- Potential for lithium **carbonate demand to dramatically increase** as EV manufacturers increasingly employ Lithium iron-phosphate chemistry, given prices of nickel and cobalt are expected to rise.
  - **Increase absolute value of cross-price elasticity** between lithium carbonate and EVs.
  - While absolute cross-price elasticity between lithium hydroxide and EVs decreases.
  - Increased demand for lithium for battery storage as renewables become a more significant proportion of electricity generation.
  - **Storage investment may decline** as households find it increasingly challenging to afford higher cost lithium-ion batteries.





# Fossil Fuel Sector

OIL, GAS AND COAL

OVERVIEW, TRENDS & FORECASTS



# Sector Overview

Australia's historical economic reliance on sector has been impacted heavily by climate change concerns

Makes up  
**93%**  
of Australia's  
energy

**\$11.6B**  
in fossil fuel  
subsidies

**4th**  
Largest natural  
gas exporter

**\$46b**  
AUSTRALIAN  
MARKET SIZE

## KEY INDUSTRY ACTIVITIES:

Mining, crushing, washing, processing

## ECONOMIC RELIANCE ON SECTOR:

- **New South Wales** and **Queensland** are country's largest coal producers (23% and 63% respectively).
- Key source of export revenue for Australia,
- Coal is Australia's **main energy source**, contributing to approx. 60% of the nation's energy production.

## CLIMATE CONCERNS:

- **Greater social responsibility** by multinational mining corporations may counteract some of the slow-down in demand.
- Commitments by mining companies to **employ local workers** will increase as global scrutiny increases.

## MAJOR PLAYERS:

**BHP**



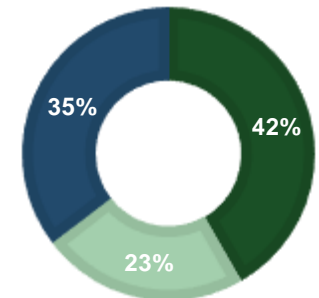
YANCOAL AUSTRALIA

**RioTinto**

GLENCORE

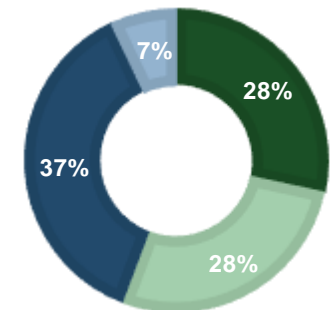
## INDUSTRY COMPOSITION

■ Coal ■ Gas ■ Oil



## AUSTRALIA'S ENERGY CONSUMPTION

■ Coal ■ Gas ■ Oil ■ Renewables



<https://www.mordorintelligence.com/industry-reports/australia-coal-market>

<https://www.ibisworld.com/au/industry/coal-mining/14-770/>

<https://www.ga.gov.au/data-pubs/data-and-publications-search/publications/australian-minerals-resource-assessment/coal#:~:text=Coal%20is%20Australia's%20largest%20energy,that%20produce%20iron%20and%20steel.>

<https://ourworldindata.org/electricity-mix#:~:text=Coal%20is%20currently%20the%20largest,from%20coal%20across%20the%20world.>

# Key Resources

Fossil fuel mining relies on the drilling, extraction and refining of resources, which are used in industry applications and as highly utilised energy source



## GAS

- Valued at over **\$244b** in 2021.
- **7<sup>th</sup> largest** producer in the world.
- About **74%** of the country's production is exported.
- Identified resources will last approximately for **32 years** based on current exploration rates.
- Lower gas prices in 2020 have seen shift from coal to gas by the USA and countries in the EU.
- Global gas supply growth expected to be driven by the US.



## COAL

- Australia's sector valued at **\$46b** in 2021.
- **4<sup>th</sup> largest** black coal exporter, contributing to 9% of the world's supply.
- Key products include black coal, steaming coal, and brown coal.
- Application as an energy source and in the production of coke to make steel and iron.
- 80% of coal is mined from open-cut mines, which is cheaper than underground mining, and allows a **90% resource recovery rate**.
- **New South Wales** and **Queensland** are country's largest coal producers (23% and 63% respectively).
- Approximately **500 years** worth of coal reserves remain unrecovered in Australia.



## CRUDE OIL

- Australian reserves account for approximately 0.1% of total global oil reserves.
- **31<sup>st</sup> largest** producer of oil and is a net importer of oil'
- About a quarter of reserves are in the Cooper Basin.
- Oil production has been declining since 2009 due to depletion outpacing reserve discovery.
- Based on current national consumption levels, Australia has approximately **3 years** of oil left.
- Uncertainty about potential discovery of oil reserves.

# Sector Analysis

Structural challenges are expected to reduce Australia's sector growth in the medium to long term

## STRENGTHS

- **Strong global reputation** as exporter of high-quality coal and natural gas
- Presence of large coal reserves across NSW and QLD have underpinned industry success
- **Well-established** mining expertise and advanced occupational health and safety regulations for workers.
- Proximity to key export markets such as China, Japan, India and South Korea.

## OPPORTUNITIES

- Advances in **geospatial data** and mapping provide support to dominance of Australia's market.
- Adopting of **technological advancements** such as driverless trucks and drones can reduce costs and improve production efficiency.
- High capacity for innovation to improve future waste management.

## WEAKNESSES

- Australia's dependence on global demand makes the industry highly volatile to fluctuations in foreign demand.
- Ongoing shift towards more renewable sources of energy have damaged traction for future growth, with commitments by countries to reduce carbon emissions reducing coal demand globally.
- Extensive waste mismanagement, environmental destruction and damage of sacred sites by have damaged the reputation of the mining industry.

## THREATS

- COVID-19 pandemic dealt producers heavy losses since 2020, with demand and revenue recovery still yet to return to pre-pandemic expectations.
- Shifts to renewable power generation sources by Australia's import partners likely to restrained long-term growth.
- Rise of alternative energy sources expected to detract from industry's future trajectory.

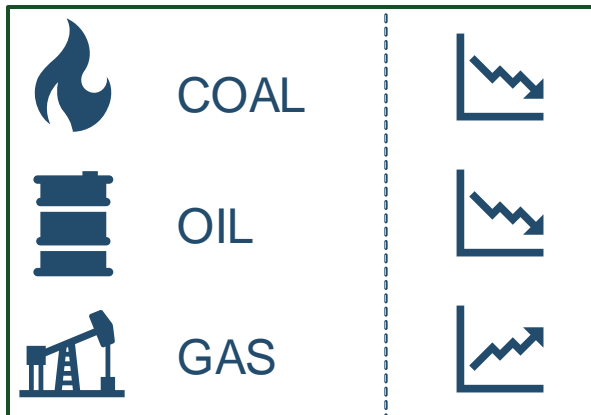
# Forecast and price outlooks

Demand expected to maintain in the short term before facing a decline in the medium to long term

## CLIMATE CONCERNS

- Impact of global climate concerns are expected to amplified over time.
- Gas is only fossil fuel expected to experience growth beyond 2035.
- Subsidies and economic reliance on sector supporting short term growth.
- Any long-term growth in sector is expected to be **constrained by climate concerns**.

## OUTLOOK IN SHORT TERM



## GLOBAL DEMAND

### Gas:

- Natural gas demand is relatively stable in comparison to coal and oil demand.
- Driven by demand from Asian economies.
- Expected to increase by over 25% by 2030.

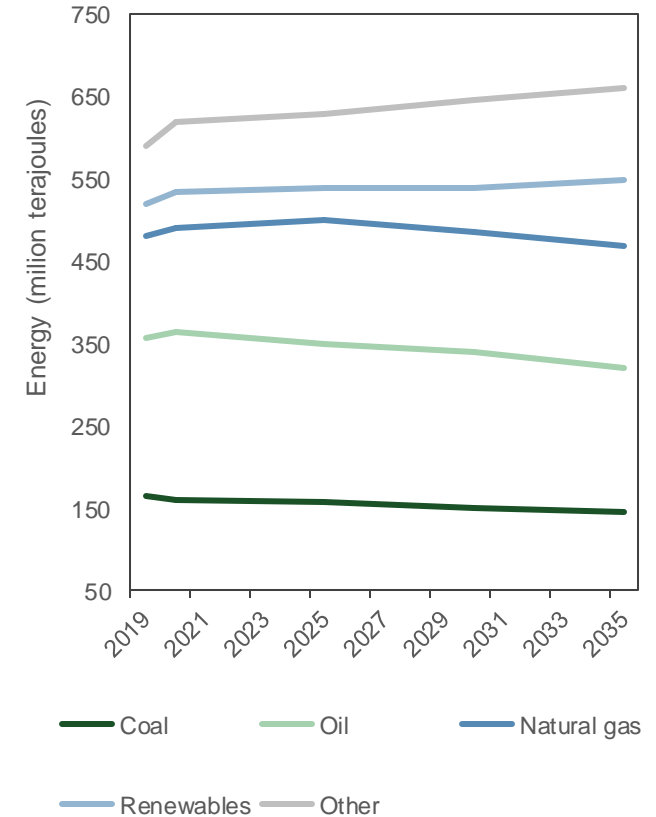
### Coal:

- COVID-19 pandemic saw global **coal demand declined by 4%** during 2020.
- China is the only economy where demand for coal is increasing.
- Demand CAGR of 1.4% expected until 2025.

### Oil:

- Global oil demand anticipated to rise by 4.15 million barrels per day over 2022.
- Approx. **47 years of oil supply left** globally given current consumption levels
- Demand for oil likely to plummet approaching 2050, as nations pursuit climate change goals.

## FORECAST GLOBAL ENERGY DEMAND







# Precious Metals

GOLD, SILVER, PALLADIUM

OVERVIEW, TRENDS & FORECASTS

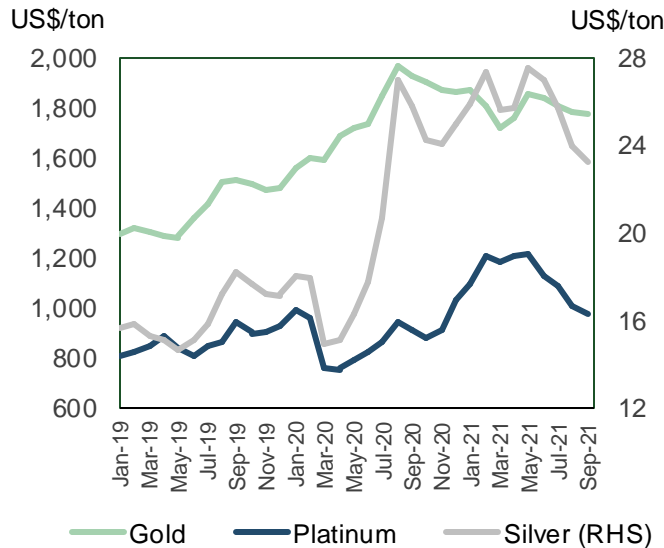
# Sector Overview

Potential for industry growth due to possibility for global expansion and growing technological applications

## SECTOR SIGNIFICANCE

- Historical stake in gold mining has underpinned industry's contribution to GDP
- Global financial system transitioned away from gold as the standard in 1972, but has persisted as a key storer of value globally
- More than 78,500 tonnes of gold held by investors across the globe

## RECENT GLOBAL PRECIOUS METAL PRICES



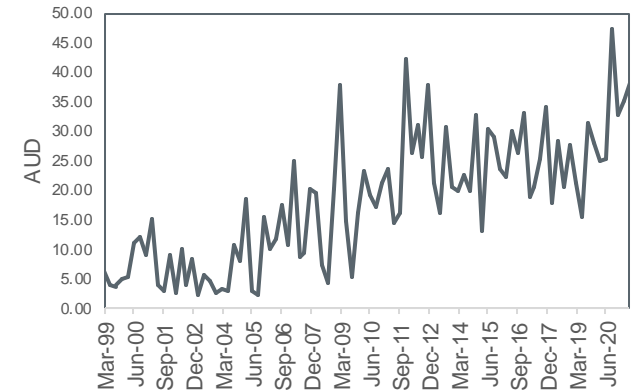
## SILVER

- Used as an asset for a store of value and in industrial applications
- Australia has the **largest share** of world's economic silver resources
- Has experienced a **decrease in production** since 2020, falling from 1340 ton to 1300 ton in 2021,
- Majority of silver mining concentrated in Queensland in Australia
- **South America** is the nation's largest competition in the sector for silver production.

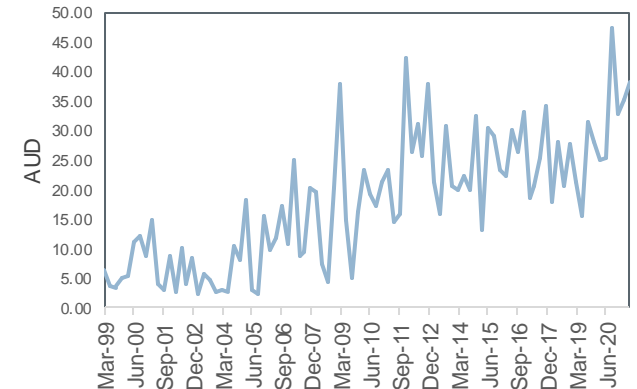
## PALLADIUM

- Growing future industry in Australia, many industrial and sustainable applications
- **Global supply deficit** leading to increase in prices from 2016 to 2020
- Current possibility for Australia's market share to increase amidst political instability in Russia

## VALUE OF AUSTRALIAN SILVER



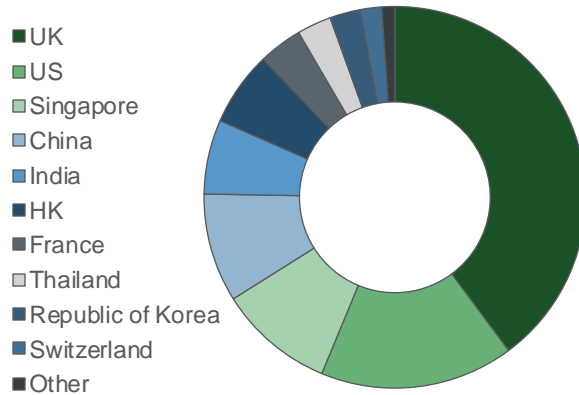
## VALUE OF AUSTRALIAN PALLADIUM



# IN FOCUS: Gold Market

Strong market and growth in WA and Australian industry situates gold as a promising investment

## WA'S MAIN GOLD EXPORT DESTINATIONS



## SUPPLY

- Australia increased its production by 0.6% in 2020 despite a decrease in supply of 3.9% due to Covid-19
- Australia **produced 327 tonnes** of gold in 2020
- WA accounts for almost 70% of nation's total gold production
- **Introduction of new mines** projected to increase production to approximately 388 tonnes in 2022-2023.

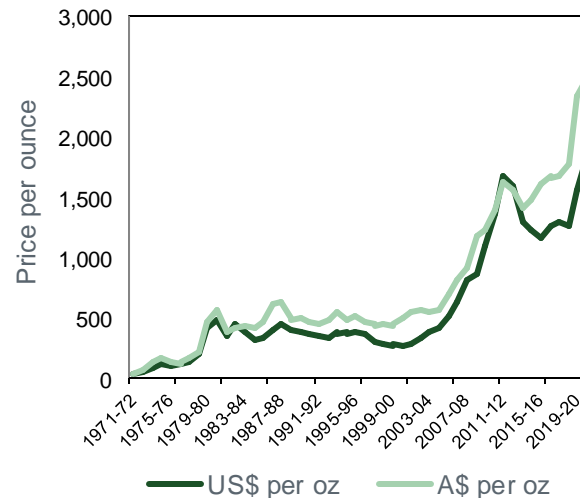
## WA'S POSITION

- Australia is currently **world's largest** gold producer
- WA's **second most valuable** mineral commodity
- Sales volumes increasing 3 consecutive years (2017-2020), reaching 212 tonnes in 2017-18, leading to 5% increase in the production value of the sector
- 11 of Australia's biggest gold mines are located in WA

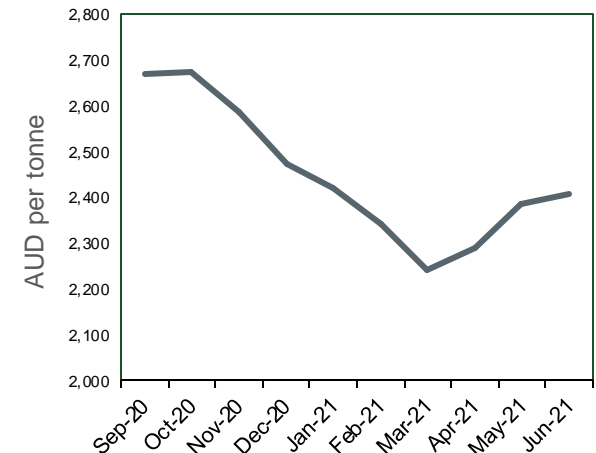
## AUSTRALIAN GOLD AT A GLANCE



## GOLD PRICE USD VS. AUD (1970-2022)



## GOLD PRICE AUD PER TONNE (2020-21)



# Sector Analysis

Strong opportunities for Australia, despite structural challenges that are expected to impact sector growth in the medium to long term

## STRENGTHS

- **Strong industry and growth throughout Covid-19**, making it a safe and durable asset industry wide.
- Commodity prices aren't dependent on the interest rate and investment can be hedged against inflation.
- **Relatively non-volatile asset**, situated as a valuable portfolio diversifier.
- Key products such as gold can hold value in climates of economic and political instability.

## OPPORTUNITIES

- Expected industry-wide growth in Australia due to potential for shifts in commodity market share
  - Supply deficit in foreign palladium, silver and gold reserves, granting Australia a competitive advantage.
- Strong **potential for growth in silver** as it is undervalued compared to gold and less volatile relative to palladium.
- Expansion in industrial applications with new technologies and advancements in production methods.

## WEAKNESSES

- **Depletion of resources**, though depletion rates are lower in Australian compared to other countries.
- Expensive and technically **strenuous exploration processes** for new reserves.
- **Vulnerable to fluctuation in prices** of specific metals
  - Silver and palladium are more volatile due to their industrial applications.
  - World price of palladium fell dramatically in December 2021.

## THREATS

- **Competition from new highly profitable reserves** in developing states.
  - EG: Freeport Grassport mine in West Papua, Indonesia
- Supply chain issues created by semi-conductor shortage and slump in vehicle production heavily impacting the Palladium industry.
- **Continued fall in prices** expected throughout 2022 with similar threats with silver based on its more volatile industrial applications.

# Major Players

## GOLD

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### 1 Newmont Corporation – International

- Based in the US
- World's largest gold mining company.
- Not ASX listed but a key player due to multiple mines located in Australia and worldwide

### 2 Newcrest Mining – Australia

- Australian owned company and one of the biggest gold producers in the world.
- Key shareholders include HSBC and JP Morgan Chase Australia.

### 3 Northern Star Resources – WA

- Australian global gold exploration and mining company based in WA, operates mines in Kalgoorlie, Yandal and Pogo (North America)

### 4 Evolution Mining – WA

- WA based Australian gold mining company
- Operates 5 mines in WA, QLD, NSW and in Ontario, Canada.

## SILVER

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### 1 South 32 – WA

- Based in WA
- Owns and operates Australia's largest Silver Mine, the Cannington Silver Mine in Queensland.

### 2 Silver Mines – Australia

- Silver mining and exploration company
- owner of the Bowden project in NSW – one of the worlds largest silver deposits.

## PALLADIUM

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### 1 Australia Vanadium Ltd – WA

- Second largest Australian producer.
- Specializes in the mining of Palladium and production of the redox flow battery

### 2 Chalice Mining Limited – WA

- Owner of Julimar palladium mine project in Perth – Australia's first major palladium discovery (2021).



# Trends and Forecast

Expanding application to technology has situated Australia's precious metals in strong position, with trends signaling future sector growth

## SECTOR TRENDS

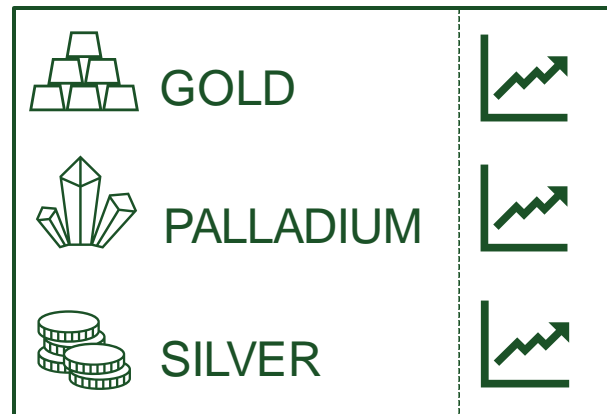
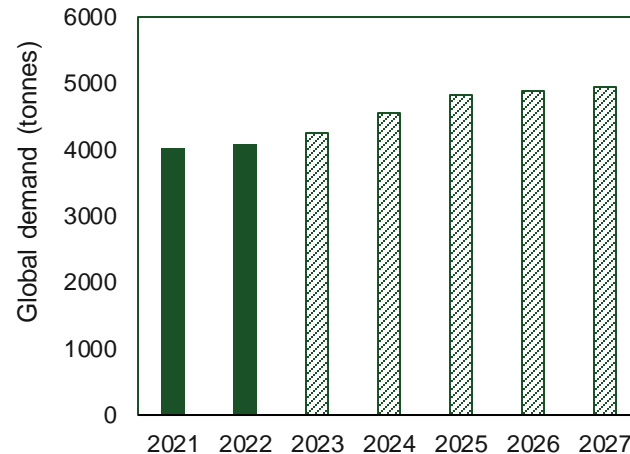
### Gold Reserves Depletion:

- Current mines facing resource depletion, with future production heavily reliant on exploration.
- **No major gold deposit discoveries** in Australia in recent years, with 13-year delay between discovery and development of a new mine.
- 2016-2018: 1.6 billion invested in gold exploration in Australia.
- 47% of mineral explorations in Australia for Gold.

### Volatile Global Palladium Supply:

- Palladium deposits in competing nations are depleting, with growing supply deficit
- Short-long term effect of Russian sanctions give Australia opportunity to increase market share
- Russia accounts for 40% of world's palladium production, second only to South Africa
- Length of crisis and Ukraine conflict may infer greater supply chain risks.

## FORECASTED GLOBAL GOLD DEMAND



## COMMODITY OUTLOOK

### GOLD:

- Australia has overtaken China as **largest producer of gold** in 2021.
- Growing reach of market to Asian market beyond Europe, seeing increase in exportation reach and market share.
- Expanding applications in microchip production, aerospace, satellites and solar radiation.
- Uses in nano-technology and medicine to target and identify cancer tumors.

### PALLADIUM:

- Growth in tech applications beyond use for catalytic converters to chemical applications and hydrogen energy.

### SILVER:

- Tech production of innovative and sustainable circuits and processes to solar panels, electrical vehicles and 5G networks.
- Silver expected to remain more volatile relative to gold.



# Rare Earth Metals

LANTHANIDES, YTTRIUM, SCANDIUM

OVERVIEW, TRENDS & FORECASTS

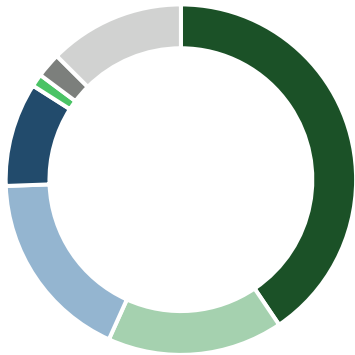
# Sector Overview

The rare earth subsector comprises of 15 metals from the lanthanide series, as well as yttrium and scandium

## AUSTRALIAN RESERVES

- Australia has the **6<sup>th</sup> largest reserves** of rare earths in the world.
- Rare earths sector is growing significantly with supply forecasts **predicting a large expansion**.
- Numerous sites are in the exploration or construction phase, indicating Australian rare earth industry is also set to expand.

## SIZE OF RESERVES



- China
- Brazil
- Russia
- USA
- Australia
- India
- Other

## APPLICATIONS AND USES

Abundance of uses from mobile phones to fighter jets, ranging from:



## CHINESE DOMINANCE

- China accounts for over 58% of global market



# Major Players



Market Cap: \$348m

- Awaiting final investment decision for Nolan Project.
- Recently acquired \$30 million under Governments Modern
- Manufacturing Agreement, which saw shares trade higher.
- Specialize in neodymium, praseodymium, dysprosium and terbium.



ILUKA

Market Cap: \$4.72b

- Granted approval in April 2022, to start production of refinery on the Eneabba site, the largest rare earths deposit in the world was approved.



Market Cap: \$10.14b

- Achieved record revenue in March quarter 2022.
- Began Construction on anew rare earth processing facility in Kalgoorlie.
- Specialize in neodymium, praseodymium, lanthanum and cerium

# Forecast and Opportunities

As the world turns it back on Chinese rare earths, an opportunity arises for Australia.

## OPPORTUNITIES FOR AUSTRALIA:

### 1 Geopolitical Tensions

- Tension with China are forcing the US and other Western countries to source from alternate supply chains.
- Majority of the globe's rare earth refineries are based in China allowing them to dominate the market, however they import raw materials from numerous countries.
- Situates Australia to capitalize on market share
- Lynas Group has recently committed to opening new processing facilities in Texas.

### 1 Supply Disruptions

- Restrictions placed on Myanmar exports after the military coup has forced China and other nations to seek supply elsewhere.
- Myanmar exports just over half of the Chinese supply of raw heavy rare earths.
- Australia expected to strength exportations to China.

## PRICE EXPECTATIONS

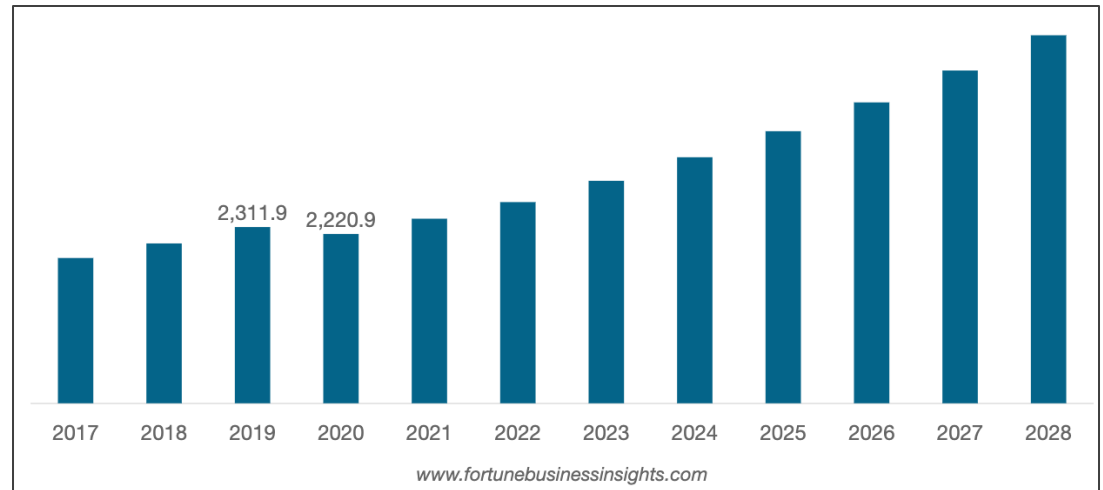
### Positive outlook for prices and demand

- The increase in demand for electric vehicles likely to increase demand for rare earths in medium to long term.
- Very minimal stockpiles.
- Uncertainty surrounding Myanmar supply of rare earths (3<sup>rd</sup> largest rare earth supplier in the world)

## SECTOR RISKS

- Ukraine has an abundance of rare earths, current situation with Russia may disrupt global supply of rare earth metals
- Domestic competition in China has caused a decrease in the price of rare earths,
  - Government intervention is being considered and could make this a short-term factor.

ASIA PACIFIC SECTOR SIZE AND FORECAST (USD million)





# Market Forecast

Continued overall industry growth is anticipated in the short to medium term, with market trends expected to impact heavily on fossil fuels, base and battery metals



## Fossil Fuels

Price volatilities are likely to increase as nations move towards renewables energy. Coal and oil are expected to trend downwards, while gas will be more resilient in the medium term.



## Base Metals

Aluminum exports expected to peak this year, while zinc exports are set to increase. Copper and nickel set to increase as movement towards EVs gains traction.



## Battery Metals

Lithium expected to play increasingly significant role in market. Supply deficits as new projects enter pipelines. Adoption of EV is driving sector expansion.



## Precious Metals

Application of metals to tech industry is driving future growth, as Australia's dominance in gold is expected to increase. Price of silver expected to remain more volatile than gold.



## Rare Earth Metals

Strong outlook for prices in short term. Supply volatilities likely to evolve as political tensions disrupt export flows globally.