Australian Critical Minerals

The Electric Vehicle "Magnificent Seven"

BUYS: S32.AX, NIC.AX, IGO.AX, AKE.AX, PLS.AX, LYC.AX, ILU.AX

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The Opportunity

This market correction provides an opportunity to establish positions in profitable mining companies with quality exposure to the long-term theme of electric vehicles (EV). In this note, we identify a basket of ASX listed companies producing electric vehicle metals:

- Lithium (Li)
- Nickel (Ni)
- Cobalt (Co)
- Manganese (Mn)
- Rare Earth Metals (REE)

These metals, along with graphite, play a key role in the global shift towards electric vehicles. The first four are used in batteries for energy storage. The rare earth metals are critical to make Neodymium-Ferro-Boron permanent magnets for high torque, and high efficiency, electric motors.

The recommended basket of stocks is:

- South32 S32.AX (Ni, Co, Mn)
- Nickel Industries NIC.AX (Ni)
- IGO IGO.AX (Li, Ni, Co)
- Allkem AKE.AX (Li)
- Pilbara Minerals PLS.AX (Li)
- Lynas LYC.AX (REE)
- Iluka Resources ILU.AX (REE, Zr, Ti)

This note identifies the "magnificent seven" Australian electric vehicle metals companies from a longer list, filtered for liquidity and profitability.

The Critical Minerals Thematic

The critical minerals are around fifty commodities that are vital to high-technology applications. These range from electric vehicles to smart phones, defense systems and exotic scientific applications.

The link between scarce commodities, and visible technology trends, has caught the attention of investors. The challenge is to organize the detailed scientific, business and policy data, into a focused investment strategy. Here we develop a new critical minerals-based stock classification and use that to construct a thematic stock selection universe for the ASX listed electric vehicle metals opportunity.

Critical Minerals Policy Trends

Australia has a Critical Minerals Strategy, developed with input from industry, and expert bodies such as Geosciences Australia, the CSIRO, Austrade and the University research sector. The policy is developing rapidly, with significant support for new minerals projects. This augurs well for investors, but the policy effort is also producing highly informative geological surveys, geostrategic analyses, and basic economic data on the scope of opportunity.

Outside Australia, the USA, European Commission, Japan, Canada, India, and China, are developing their own critical mineral strategies. Geopolitics is now driving a competitive race between China, the USA, and other leading industrial nations to secure supply chains. Against the backdrop of trade wars, and the conflict in the Ukraine, governments are supporting investment in new mines and processing facilities. This trend helps to de-risk projects.

Furthermore, due to the role of critical minerals in defense technology applications, this trend should continue. It seems that powering a green future means more mines, and likely more friction about who controls, operates, and profits from those mines. The **critical minerals race is on**.

The Critical Minerals Classified

Drawing on the above policy efforts, we distilled a consensus snapshot of the minerals deemed most critical to national security, see Table 1 The table shows critical mineral lists for each country, along with the typical uses for them in technological applications. While these are not exhaustive, there is an implied consensus in those minerals which appear frequently across all lists. Those highlighted in green are our target EV metals that are used in the motors, wiring and energy storage systems of electric cars. Lithium, Cobalt, Graphite, and the Rare Earth Elements stand out in this list, as do minor metals like Antimony, Bismuth, and the Platinum Group Metals (PGM), which may play a key role in the emerging hydrogen economy. Critical minerals comprise a rich investment opportunity.

The Supply-Chain Conundrum

Historically, periods of geopolitical tension have often led to competition for scarce resources. The emerging state pursues industrial development and technology modernization. This naturally leads to a high mineral intensity, due to the growth of cities, machinery, energy, and transportation systems.

During the first Industrial Revolution, the emerging United States adopted the technologies of coal fired steam power, mechanized manufacturing, and built a large nationwide rail network. The trend may have started in the United Kingdom, and Europe, but it was soon adopted, scaled, and improved in the New World. The geopolitical economy was shaped by resource competition, and colonization, as nations strived to stay ahead in the race to modernize.

The dynamics of digital transformation are similar. Nations compete to be first with technology driven innovation to connect people, automate processes, source key inputs, and distribute economic benefits. There is state-sponsored competitive strategy, the use of espionage to gain competitive secrets, and the trade wars, economic sanctions, and embargoes that are typical of geostrategic competition.

The energy transition to decarbonize economies will require substantial capital investment, and a rethink of accepted business practices:

- Just-In-Time to Just-In-Case
- Low-Cost Sourcing to Low-Risk-Sourcing
- Capital-Light to Capital-Right

This supply-chain reconstruction dovetails with the needed energy transition and the push for reshoring through advanced manufacturing.

The Supply Security Thematic

Humanity does not get to decide where the critical minerals are located but we can form like-minded alliances among trading partners to ensure supply. Similarly, we can maintain good relations with other nations by not denying them what they need, unless circumstances dictate otherwise.

The US Geological Survey analysed the reliance of the United States on net imports of critical minerals. The results shown in Table 2, show China as the rank #1 supplier for 7 out of the 17 commodities that are wholly imported. China is also the dominant Rank #1 source among all commodities on the list. Among countries that are logical friend-sourcing partners for the USA, Canada is prominent, but Australia has clear room for growth.

Geosciences Australia has mapped our outstanding critical minerals endowment. in rare earth metals, lithium, cobalt, and graphite. Austrade produced a report on the Critical Minerals Supply-Chain in the USA, which highlighted opportunities for growth in our trade. The Critical Minerals Facilitation Office (CMFO) will help accelerate this process.

Australian minerals and mineral technology firms have a splendid opportunity ahead. Investors need to back the entrepreneurs developing the mines, processes, and technologies for national benefit. Usually, it is difficult to gain public support for mining, but now it looks set to play a key security role. Our lifestyle depends on access to energy, materials, and transportation systems. The future of these is entwined with trade and foreign policy.

ASX Listed Critical Minerals Stocks

There is no ASX index for critical minerals so we must start the process of building our own thematic indices:

- Form a list of the priority critical minerals
- Gather a list of all the investible stocks
- Map the socks against the critical minerals

The Keep-It-Simple-Stupid (KISS) principle can help us create an investment universe. We need to label the stocks according to their mineral exposure, but there are over 2,000 stocks. Obviously, a stock in the banking sector is irrelevant. These can be eliminated using a standard stock classification, to leave around 900 resources and energy stocks.

Further use of lower-level stock classification can help winnow out the gold, copper, and base metal stocks. However, most classification schemes don't identify the critical mineral commodities. The obvious way forward would be to go through all the websites, but there are several hundred of these. Instead, we used a simple trick to extract keywords from the business description of each company downloaded from a financial database.

This method can be automated to classify stocks using the keywords appearing in the description. The method is not foolproof, since searching for "tin" will turn up a lot of words, which are not actually tin. Through trial and error, this cuts the list down to around 300 candidates. Our final filter targets only liquid stocks of decent capitalization, and puts a penny stock filter over the top, to reject any stock whose price is too low (penny stocks trade below $0.10). These filters are in local AUD.

Our final set of filter rules kept stocks that:

- Have average 30-day market cap > $200M AUD
- Have average 30-day trade > $500K AUD/day
- Have average 30-day price above $0.10 AUD

Any stock that is kept must pass all these filters and have a business description containing any of the keywords of a mineral in the list shown at Figure 1.

The result is around 100 stocks across all critical minerals, and about 45 stocks in the target electric vehicle group. The final list is shown in Table 3, where we have listed the key metal exposures. Since this is a short list, we were able to sense check it. For instance, BHP and Rio Tinto passed our filters, due to their nickel mines, but we discarded them from consideration as "widely held". This note would please BHP marketing, but not our thoughtful readers, if we were to simply recommend that folks just "Buy BHP". Mineral Resources and South32 were kept since they do have important positions in Lithium and Manganese. PPK Group is a lineball case, having business interests in Lithium Sulphur batteries and Boron Nitride Nanotubes.

Core Basket Construction

Using the process described, one could certainly construct an ASX Critical Minerals Index. However, 42 stocks are too many to buy in your own brokerage account. The better way forward is to further prune the list using and company profitability as guides.

Our final screen is to take key valuation, dividend yield and quantitative signals to construct a ranked list of electric vehicle metal stocks. This is shown in Table 4, with data as at close on 4-July-2022. Just take note of the reference price to see if the stock has moved appreciably since publication.

To filter out the noise, we have colour coded the rows in green if the company is bigger than $1B AUD and is forecast to be profitable in the coming year. This reduces 42 stocks to nine, with five stocks set to pay a dividend. There are four that have a trailing Price Earnings Ratio (PER) that is below 12, and seven that have a forecast PER that is below 10.

Obviously, we may see some softness ahead, due to recession fears, but these look to be compelling values for a decades long structural trend. Choosing a diversified basket from among the highlighted names is a reasonable way to gain electric vehicle metals exposure. Risks can be lowered further through diversification by the mineral commodity, and location of the mining jurisdiction.

Recommendations

South32 is across multiple mining jurisdictions in Australia and South Africa with manganese exposure along with diversified base metals, a cheap valuation and attractive yield. **Nickel Industries** is cheap but operates in Indonesia. The valuation is attractive, but we also like **IGO Ltd** for the quality of their nickel, cobalt, and lithium exposure via their 49% Joint Venture interest, with Tianqi Lithium Corporation at the Greenbushes Lithium Mine, and the world class nickel and nickel-copper-cobalt deposits at the Cosmos and Forrestania Nickel Operations in Western Australia.

Mineral Resources has hard rock lithium but also has high exposure to iron ore. In contrast, choosing **Allkem** adds brine sources of lithium in Argentina, and hard-rock mines in Canada and Australia. **Pilbara Minerals** adds further Australian hard-rock lithium, and refining plants at Pilgan and Ngungaju.

Finally, **Lynas Rare Earths** and **Iluka Resources** offer complementary Rare Earth Metals exposure. Lynas has the producing Mt Weld carbonatite deposit, with a heavy rare earth separation plant in development. Iluka is a leading producer of mineral sands **zircon**, **leucoxene**, **ilmenite**, and **rutile**, that supply the critical minerals zirconium and titanium. These have powerful growth trends ahead of them for supplying the superalloy metal titanium, and pure zirconium and hafnium metal for advanced applications in aerospace and nuclear energy.

However, Iluka Resources has also moved to exploit the existing reserves of rare earth rich mineral sands containing **xenotime** and **monazite**. The stockpiles at Eneabba originally supported a major rare earth export trade with the Rhône-Poulenc separation plant at La Rochelle, in France. That closed for imports from Australia in 1993. However, xenotime is now keenly sought as it provides a source of **heavy rare earths** to potentially substitute for that now derived from ionic clay deposits in South Eastern China. The monazite mineral is similar to that found in the Lynas Mt Weld carbonatites, and a good source of **light rare earths**.

In summary, we anticipate a bright future ahead for critical minerals investors and recommend the **Magnificent Seven** basket as core EV metal holdings. The bear market conditions have taken the froth out of valuations and present opportunity for patient accumulation.

Table 1 Compendium of Critical Mineral Lists for Australia, USA, Canada, European Union, India, and China along with their principal uses.

Mineral Commodity	AU (2022)	US (2022)	CA (2021)	EU (2020)	IN (2016)	CN (2016)	JP (2014)	Consensus	Principal Uses	Thematic Category
Alumina (High-Purity)	Y							Y	synthetic sapphire	Ceramics
Aluminium (Bauxite)		Y	Y			Y		YYY	light metals	Light Metals
Antimony	Y	Y	Y	Y	Y	Y	Y	YYYYYYY	batteries & flame retardants	Electronics
Arsenic		Y						Y	semiconductors	Electronics
Baryte (Barium)		Y		Y			Y	YYY	hydrocarbon production	Industrial Minerals
Bauxite				Y				Y	ore to produce aluminium	Light Metals
Beryllium	Y	Y		Y	Y		Y	YYYYY	aerospace & defense industries	Superalloys
Bismuth	Y	Y	Y	Y	Y		Y	YYYYYY	medical and atomic research	Electronics
Borate (Boron)				Y			Y	YY	detergents, fertilisers, & glasses	Industrial Minerals
Caesium		Y	Y				Y	YYY	scientific applications	Electronics
Chromium	Y	Y	Y		Y	Y	Y	YYYYYY	stainless steel & other alloys	Superalloys
Cobalt	Y	Y	Y	Y	Y	Y	Y	YYYYYYY	superalloys & batteries	Superalloys
Coking Coal				Y				Y	steelmaking	Steel
Copper			Y			Y		YY	electrical & diverse industries	Electronics
Fluorspar (Fluorine)		Y	Y	Y		Y	Y	YYYYY	smelting of aluminium	Industrial Minerals
Gallium	Y	Y	Y	Y	Y		Y	YYYYYY	semiconductors	Electronics
Germanium	Y	Y	Y	Y	Y		Y	YYYYYY	fibre optics & optoelectronics	Electronics
Graphite (Natural)	Y	Y	Y	Y	Y	Y	Y	YYYYYYY	batteries & steelmaking	Industrial Minerals
Hafnium	Y	Y		Y			Y	YYYY	nuclear control rods	Nuclear
Helium	Y		Y					YY	semiconductor manufacturing	Electronics
Indium	Y	Y	Y	Y	Y		Y	YYYYYY	liquid crystal display screens	Electronics
Lithium	Y	Y	Y	Y	Y	Y	Y	YYYYYYY	rechargeable batteries	Batteries
Magnesium	Y	Y	Y	Y			Y	YYYYY	metallurgy & for reducing metals	Industrial Minerals
Manganese	Y	Y	Y				Y	YYYY	steelmaking & batteries	Steel & Batteries
Molybdenum			Y			Y	Y	YYY	specialty steels & alloys	Steel
Natural Rubber				Y				Y	natural polymers	Industrial Minerals
Nickel		Y	Y			Y	Y	YYYY	stainless steel	Superalloys & Batteries
Niobium	Y	Y	Y	Y	Y			YYYYY	steel & superalloys	Superalloys
Phosphate Rock				Y				Y	fertiliser & herbicide	Agricultural Chemicals
Phosphorus				Y		Y		YY	fertiliser & animal feed	Agricultural Chemicals
Platinum Group Metals	Y	Y	Y	Y	Y	Y	Y	YYYYYYY	catalytic converters & fuel cells	Platinum Group Metals
Potash			Y			Y		YY	fertiliser and other chemicals	Agricultural Chemicals
Rare Earth Elements	Y	Y	Y	Y	Y	Y	Y	YYYYYYY	permanent magnets & high-tech	Rare Earth Metals
Rhenium	Y				Y			YY	superalloys & catalysts	Superalloys
Rubidium		Y					Y	YY	scientific applications	Electronics
Scandium	Y	Y	Y	Y				YYYY	lightweight aluminium alloys	Superalloys
Selenium							Y	Y	thin-film (CIGS) solar cells	Electronics
Silicon Metal	Y			Y	Y		Y	YYYY	semiconductors & solar cells	Electronics
Strontium				Y			Y	YY	diverse metallurgy	Superalloys
Tantalum	Y	Y	Y	Y	Y		Y	YYYYYY	electronic components	Superalloys
Tellurium		Y	Y				Y	YYY	solar cells	Electronics
Thallium							Y	Y	scientific applications	Electronics
Tin		Y	Y			Y		YYY	solder, coatings, & alloys	Electronics & Steel
Titanium	Y	Y	Y	Y			Y	YYYYY	pigment or lightweight alloys	Superalloys
Tungsten	Y	Y	Y	Y		Y	Y	YYYYYY	wear-resistant metals	Superalloys
Uranium			Y					Y	nuclear fuel & anti-tank shells	Nuclear
Vanadium	Y	Y	Y	Y	Y			YYYYY	steel, & redox flow batteries	Steel & Batteries
Zinc		Y	Y					YY	galvanized steel, & zinc-air batteries	Steel
Zirconium	Y	Y			Y	Y	Y	YYYYY	high-temperature ceramics	Ceramics & Nuclear

Source: US Geological Survey (2022). See: Mineral Commodity Summaries 2022

Table 2 US Geological Survey (USGS) estimates of US Net Import Reliance and top ranked critical mineral import sources.

Critical Mineral (and type)	% Net Import	#1 Rank Origin	#2 Rank Origin	#3 Rank Origin	#4 Rank Origin	China Rank	Russia Rank	Canada Rank	Australia Rank	EV Metal
Caesium	100	Germany	China			#2				
Fluorspar	100	Mexico	Vietnam	South Africa	Canada			#4		
Gallium	100	China	UK	Germany	Ukraine	#1				
Graphite (Natural)	100	China	Mexico	Canada	India	#1		#3		Yes
Indium	100	China	Canada	South Korea	France	#1		#2		
Manganese	100	Gabon	South Africa	Australia	Georgia				#3	Yes
Niobium (Columbium)	100	Brazil	Canada					#2		
Rubidium	100	Germany								
Scandium	100	Europe	China	Japan	Russia	#2	#4			
Strontium	100	Mexico	Germany	China		#3				
Tantalum	100	China	Germany	Australia	Indonesia	#1			#3	
Vanadium	100	Canada	China	Brazil	South Africa	#2		#1		
Yttrium	100	China	South Korea	Japan		#1				
Tellurium	>95	Canada	Germany	China	Philippines	#3		#1		
Potash	93	Canada	Russia	Belarus			#2	#1		
Rare Earths, Compounds & Metals	>90	China	Estonia	Malaysia	Japan	#1				Yes
Titanium, Sponge	>90	Japan	Kazakhstan	Ukraine						
Bismuth	90	China	South Korea	Mexico	Belgium	#1				
Titanium Mineral Concentrates	90	South Africa	Australia	Madagascar	Mozambique				#2	
Antimony, Metal & Oxide	84	China	Belgium	India		#1				
Chromium	80	South Africa	Kazakhstan	Russia	Mexico		#3			
Tin, Refined	78	Indonesia	Peru	Malaysia	Bolivia					
Cobalt	76	Norway	Canada	Japan	Finland			#2		Yes
Zinc, Refined	76	Canada	Mexico	Peru	Spain			#1		
Barite	>75	China	India	Morocco	Mexico	#1				
Bauxite	>75	Jamaica	Brazil	Guyana	Australia				#4	
Selenium	>75	Philippines	China	Mexico	Germany	#2				
Rhenium	72	Chile	Canada	Kazakhstan	Japan			#2		
Platinum	70	South Africa	Germany	Switzerland	Italy					
Alumina	58	Brazil	Australia	Jamaica	Canada			#4	#2	
Magnesium Compounds	55	China	Brazil	Israel	Canada	#1		#4		
Germanium	>50	China	Belgium	Germany	Russia	#1	#4			
Tungsten	>50	China	Bolivia	Germany	Canada	#1		#4		
Cadmium	25	Argentina	Chile	China	Russia	#3	#4			
Magnesium Metal	<50	Canada	Israel	Mexico				#1		
Nickel	48	Canada	Norway	Finland	Australia			#1	#4	Yes
Aluminium	44	Canada	UAE	Russia	China	#4	#3	#1		
Palladium	37	Russia	South Africa	Germany			#1			
Silicon, Metal & Ferrosilicon	32	Russia	Brazil	Canada	Norway		#1	#3		
Lithium	>25	Argentina	Chile	China	Russia	#3	#4			Yes
Zirconium, Ores & Concentrates	<25	South Africa	Senegal	Australia	Russia		#4		#3	

Source: Adapted from US Geological Survey (2022). Original list edited to exclude non-critical minerals. See Figure 2 "2021 Net Import Reliance": Mineral Commodity Summaries 2022

Table 3 Universe of ASX listed companies passing price > $0.10, trading value > $500K day and 30-day average cap > $200M AUD.

Ticker	Company Name	Market Cap. ($M AUD)	ASX 200	First Listed Date	IPO Price ($ AUD)	Critical Minerals Commodity Exposure	Internet Address
S32.AX	South32 Limited	18030	Y	18-May-15	2.13	Nickel, Cobalt, Manganese	www.south32.net
MIN.AX	Mineral Resources Limited	8700	Y	28-Jul-06	0.90	Iron Ore, Lithium	www.mineralresources.com.au
LYC.AX	Lynas Rare Earths Limited	8120	Y	17-Sep-86		Rare Earths	www.lynasrareearths.com
IGO.AX	IGO Limited	7490	Y	17-Jan-02	0.20	Lithium, Nickel, Cobalt	www.igo.com.au
PLS.AX	Pilbara Minerals Limited	6680	Y	19-Sep-07	0.20	Lithium	www.pilbaraminerals.com.au
AKE.AX	Allkem Limited	6410	Y	4-Dec-07		Lithium	www.allkem.co
ILU.AX	Iluka Resources Limited	3980	Y	30-Jun-62		Mineral Sands	www.iluka.com
NIC.AX	Nickel Industries Limited	2620	Y	20-Aug-18	0.35	Nickel	www.nickelmines.com.au
LTR.AX	Liontown Resources Limited	2150	Y	27-Dec-06	0.20	Lithium	www.ltresources.com.au
CXO.AX	Core Lithium Limited	1620	N	11-Feb-11	0.20	Lithium	www.corelithium.com.au
CHN.AX	Chalice Mining Limited	1390	Y	24-Mar-06	0.20	Nickel, Cobalt	www.chalicemining.com
SYA.AX	Sayona Mining Limited	1240	N	30-Mar-04	0.20	Lithium, Graphite	www.sayonamining.com.au
DEG.AX	De Grey Mining Limited	1160	Y	3-Jul-02	0.20	Lithium	www.degreymining.com.au
NVX.AX	Novonix Limited	1090	Y	2-Dec-15	0.20	Lithium, Graphite	www.novonixgroup.com
LKE.AX	Lake Resources NL	1010	N	29-Aug-01	0.35	Lithium	www.lakeresources.com.au
INR.AX	Ioneer Limited	900	N	19-Dec-07	0.20	Lithium	www.ioneer.com
VUL.AX	Vulcan Energy Resources Limited	830	N	30-May-18	0.20	Lithium	www.v-er.eu
SYR.AX	Syrah Resources Limited	830	N	11-Sep-07	0.20	Graphite	www.syrahresources.com.au
MCR.AX	Mincor Resources NL	780	N	16-Jun-97	0.20	Nickel	www.mincor.com.au
JRV.AX	Jervois Global Limited	780	N	1-Dec-80		Nickel, Cobalt	www.jervoisglobal.com
NMT.AX	Neometals Limited	520	N	10-Jul-02	0.20	Lithium, Nickel	www.neometals.com.au
ASM.AX	Australian Strategic Materials Holdings	480	N	30-Jul-20		Rare Earths	www.asm-au.com
LLL.AX	^Leo Lithium Limited	470	N	16-Jun-22	0.70	Lithium	www.leolithium.com
ARU.AX	Arafura Resources Limited	450	N	5-Nov-03	0.20	Rare Earths	www.arultd.com
AGY.AX	Argosy Minerals Limited	440	N	3-Apr-97	0.95	Lithium	www.argosyminerals.com.au
PSC.AX	Prospect Resources Limited	430	N	4-Dec-09	0.20	Lithium	www.prospectresources.com.au
PAN.AX	Panoramic Resources Limited	400	N	14-Sep-01	0.20	Nickel, Cobalt	www.panoramicresources.com
STA.AX	Strandline Resources Limited	390	N	17-May-00	0.20	Mineral Sands	www.strandline.com.au
A4N.AX	Alpha HPA Limited	330	N	22-Oct-07	0.20	Lithium	www.alphahpa.com.au
TLG.AX	Talga Group Limited	330	N	9-Jul-10	0.20	Lithium, Cobalt, Graphite	www.talgagroup.com
GLN.AX	Galan Lithium Limited	320	N	8-Jun-11	0.20	Lithium	www.galanlithium.com.au
RNU.AX	Renascor Resources Limited	310	N	15-Dec-10	0.20	Graphite	www.renascor.com.au
MLX.AX	Metals X Limited	300	N	26-Aug-04	0.25	Nickel, Cobalt	www.metalsx.com.au
MNS.AX	Magnis Energy Technologies Limited	290	N	25-Oct-05	0.20	Lithium, Graphite	www.magnis.com.au
PLL.AX	Piedmont Lithium Incorporated	280	N	28-Mar-83		Lithium	www.piedmontlithium.com
GAL.AX	Galileo Mining Limited	240	N	29-May-18	0.20	Nickel, Cobalt	www.galileomining.com.au
LOT.AX	Lotus Resources Limited	220	N	18-Feb-09	0.20	Nickel, Cobalt	www.lotusresources.com.au
COB.AX	Cobalt Blue Holdings Limited	210	N	2-Feb-17	0.20	Cobalt	www.cobaltblueholdings.com
PPK.AX	PPK Group Limited	200	N	21-Dec-94		Lithium	www.ppkgroup.com.au
AZL.AX	Arizona Lithium Limited	200	N	8-Jul-71		Lithium	www.hawkstonemining.com.au
QPM.AX	Queensland Pacific Metals Limited	190	N	14-Mar-08	0.30	Lithium, Nickel, Cobalt	www.qpmetals.com.au
GL1.AX	Global Lithium Resources Limited	180	N	6-May-21	0.20	Lithium	www.globallithium.com.au

Source: Jevons Global (2022) and Refinitiv (Pricing: 4-Jul-2022). ^Revision to insert Leo Lithium spinoff from Firefinch and include company URLs (19-Jul-2022).

Table 4 Universe ranked by quantitative alpha with profitable firms > $1B AUD highlighted in green (report currency in AUD).

Ticker	Company Name	Mkt Cap ($B AUD)	Last Price ($AUD)	% Below 52Wk. Hi	% Above 52Wk. Lo	Trailing P/E	Forecast P/E	Dividend Yield	Model Rank	Price/DCF Value
NIC.AX	Nickel Industries Ltd	2.62	0.96	-46%	8%	11.33	5.37	7.8%	94	
ILU.AX	Iluka Resources Ltd	3.98	9.46	-26%	18%	9.92	8.32	4.1%	90	0.81
S32.AX	South32 Ltd	18.03	3.89	-28%	43%	9.88	4.67	10.5%	84	0.36
IGO.AX	IGO Ltd	7.49	9.96	-35%	26%	47.77	5.57	1.2%	84	0.77
MLX.AX	Metals X Ltd	0.30	0.34	-57%	60%	4.92			84	
MIN.AX	Mineral Resources Ltd	8.70	45.96	-31%	24%	11.06	4.88	2.0%	81	0.44
LYC.AX	Lynas Rare Earths Ltd	8.12	9.06	-22%	61%	26.94	11.54		69	0.93
PLS.AX	Pilbara Minerals Ltd	6.68	2.26	-42%	61%	84.81	4.98		64	0.43
AKE.AX	Allkem Ltd	6.41	10.12	-30%	58%		6.37		59	0.44
PAN.AX	Panoramic Resources Ltd	0.40	0.20	-49%	39%	239.73	5.07		48	
JRV.AX	Jervois Global Ltd	0.78	0.52	-49%	21%		9.66		45	
PSC.AX	Prospect Resources Ltd	0.43	0.96	-4%	298%		9.52		41	
SYR.AX	Syrah Resources Ltd	0.83	1.25	-41%	28%		38.22		41	
A4N.AX	Alpha HPA Ltd	0.33	0.42	-43%	11%				40	
ARU.AX	Arafura Resources Ltd	0.45	0.29	-42%	147%				30	
NVX.AX	NOVONIX Ltd	1.09	2.24	-82%	8%				30	
RNU.AX	Renascor Resources Ltd	0.31	0.15	-62%	120%				29	
NMT.AX	Neometals Ltd	0.52	0.96	-52%	105%	29.87			24	
LOT.AX	Lotus Resources Ltd	0.22	0.23	-51%	67%				24	
CXO.AX	Core Lithium Ltd	1.62	0.94	-44%	335%		54.69		24	
GL1.AX	Global Lithium Resources Ltd	0.18	1.16	-58%	373%				23	
STA.AX	Strandline Resources Ltd	0.39	0.32	-39%	91%		19.65		21	
CHN.AX	Chalice Mining Ltd	1.39	3.75	-63%	11%				18	
AGY.AX	Argosy Minerals Ltd	0.44	0.33	-42%	210%	251.88			17	
COB.AX	Cobalt Blue Holdings Ltd	0.21	0.67	-38%	189%				16	
MCR.AX	Mincor Resources NL	0.78	1.63	-43%	63%		9.04		16	
GAL.AX	Galileo Mining Ltd	0.24	1.33	-32%	616%				15	
LLL.AX	^Leo Lithium Ltd	0.47	0.48	-23%	3%	21500.00				
PLL.AX	Piedmont Lithium Inc	0.28	0.53	-51%	3%		36.68		14	
AZL.AX	Arizona Lithium Ltd	0.20	0.09	-67%	226%				12	
SYA.AX	Sayona Mining Ltd	1.24	0.15	-62%	100%	11.11			12	
GLN.AX	Galan Lithium Ltd	0.32	1.04	-55%	16%				8	
VUL.AX	Vulcan Energy Resources Ltd	0.83	5.81	-65%	22%				7	
LTR.AX	Liontown Resources Ltd	2.15	0.99	-55%	51%	47.77			7	
LKE.AX	Lake Resources NL	1.01	0.74	-72%	107%				5	
INR.AX	ioneer Ltd	0.90	0.43	-50%	37%				3	
MNS.AX	Magnis Energy Technologies Ltd	0.29	0.31	-60%	15%				2	
DEG.AX	De Grey Mining Ltd	1.16	0.82	-44%	3%				2	
TLG.AX	Talga Group Ltd	0.33	1.09	-51%	9%				1	
QPM.AX	Queensland Pacific Metals Ltd	0.19	0.12	-58%	30%				1	
ASM.AX	Australian Strategic Materials (Holdings) Ltd	0.48	3.44	-76%	5%				1	
PPK.AX	PPK Group Ltd	0.20	2.20	-90%	11%	77.10			1	

Source: Jevons Global (2022), and Refinitiv (Pricing: 4-Jul-2022). Revision to insert Leo Lithium spinoff from Firefinch and local AUD pricing (19-Jul-2022).

TRADING POSITION DISCLOSURE

The Jevons Global Opportunities portfolio holds these trading positions of relevance to this research note:

LONG South32 (ASX: S32.AX)	Thematic Sector: Resources & Energy
LONG BHP Group Ltd. (ASX: BHP.AX)	Thematic Sector: Resources & Energy

The analyst Dr Kingsley Jones, CFA has a beneficial interest in any profit or loss derived from these trading positions.

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The investment process considers portfolio construction regarding the assessed risk and reward characteristics of each thematic sector regarding the targeted level of diversification and portfolio risk. Security selection within each thematic sector combines an assessment of relative value and strategic positioning of the targeted securities within the relevant thematic opportunity set. This process blends original industry research of Jevons Global with third-party quantitative screening models provided by StarMine, a service of Thomson Reuters. To the extent possible, portfolio construction is guided by the historical risk-return characteristics of thematic sectors and risk factors known to influence investment outcomes. These include but are not limited to profitability; balance sheet quality; revenue trends; management and cyclical factors. Model risks for individual positions are managed through attention to position limits and a disciplined approach to portfolio diversification across security, country, and industry exposures. Recommendations are given in the form of thematic sector positions along with a list of preferred security exposures.

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This research note was written in the beautiful urban-rural city of Canberra, Australia.