

# The Critical Minerals Institute October Report: A slowing global economy continues to temper demand

written by Matt Bohlsen | October 13, 2023

Welcome to the October 2023 [Critical Minerals Institute](#) ("CMI") report, designed to keep you up to date on all the latest major news across the critical minerals markets. Here is the IEA [list of Critical Minerals](#).

## A slowing global economy continues to temper demand for critical minerals in 2023

High interest rates in most Western countries continue to be a drag on the global economy. Last month saw the U.S. Fed pause their interest rate hikes, with the [reserve rate still at 5.5%](#). However, U.S. inflation has been rising again and the Fed has indicated rates will need to stay higher for longer. The September [CPI was 3.7%](#), same as August's 3.7%, but up on the July 3.2% figure. Long-term bond rates have adjusted higher leading to higher borrowing rates. All of this is slowing the U.S. and much of the global economy therefore not helping EV sales. China's housing collapse is another negative drag on sentiment and has resulted in slower China EV sales growth in 2023.

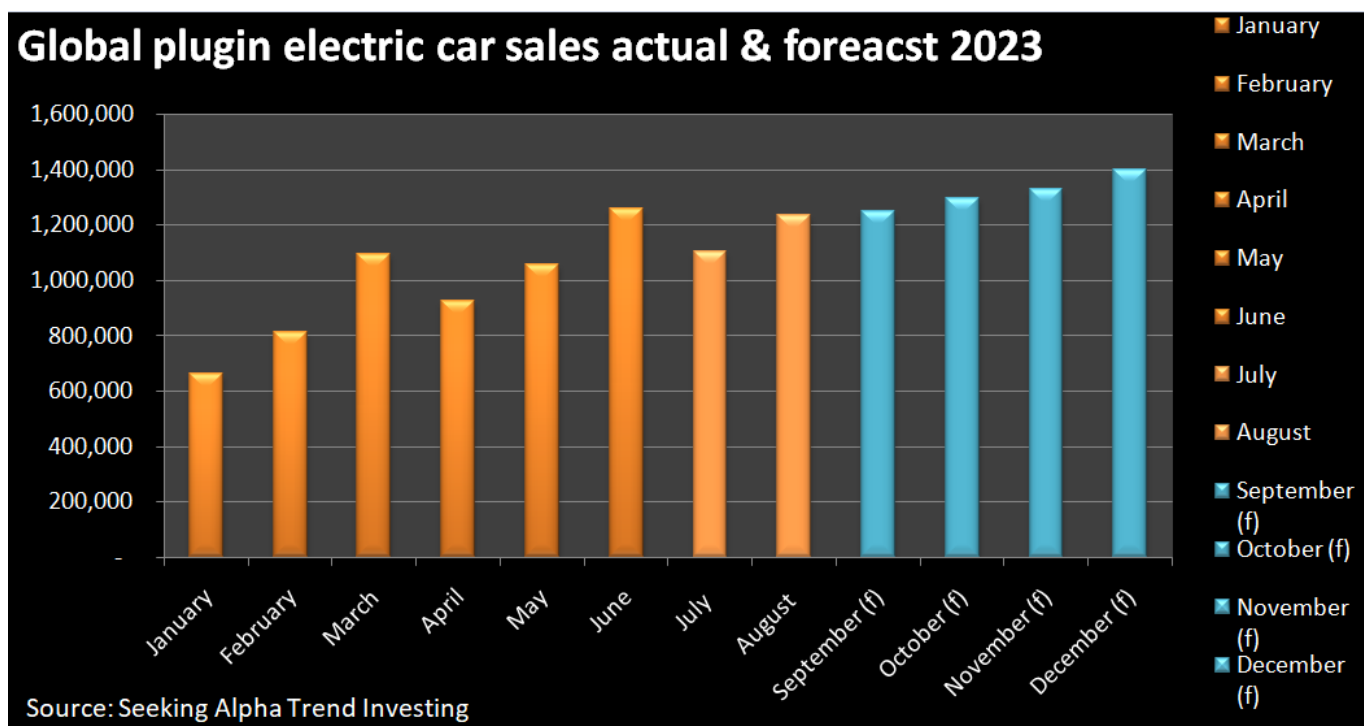
# Global critical minerals and electric vehicle (“EV”) update

October 2023 saw some better results coming in for global plugin electric car sales which gives some hope that depressed EV metals prices may soon start to recover. Q4 is traditionally the strongest quarter for EV sales with December usually the best sales month of the year.

Global plugin electric car sales were [1,238,000](#) in August 2023, up 45% on August 2022 sales. Global plugin electric car market share in [August was 18%](#), led by China with [39% share](#), Europe with [30% share](#), and USA with [9.51% share](#). Reports to date suggest that September sales look like being another strong month of about 1.25 million.

2023 sales look set to finish at ~13.5 million and 17% market share, which would be a 28% increase on 2022 (10.522 million and 13% market share). A 28% growth rate in 2023 would be a significant slowdown on the 56% growth rate achieved in 2022.

**Global plugin electric car ‘monthly’ sales in 2023**



## The West is working hard to build up EV and battery capacity rather than being too dependent on China

One of the biggest news of the last month was that Quebec, Canada is in talks with battery makers and automobile companies looking to invest about C\$15 billion (US\$11 billion) in Quebec over the next three years to support EV supply chains. The report [stated](#):

*"Quebec has secured C\$15 billion over the past three years and another C\$15 billion is coming in the next three years...Over the past three years, Quebec has attracted investments from auto and battery makers such as General Motors, POSCO and Ford Motors. The biggest investment was announced on Thursday when Swedish battery maker Northvolt announced plans to build a \$5.2 billion plant in the province."*

While this is good news for the EV and battery manufacturers it

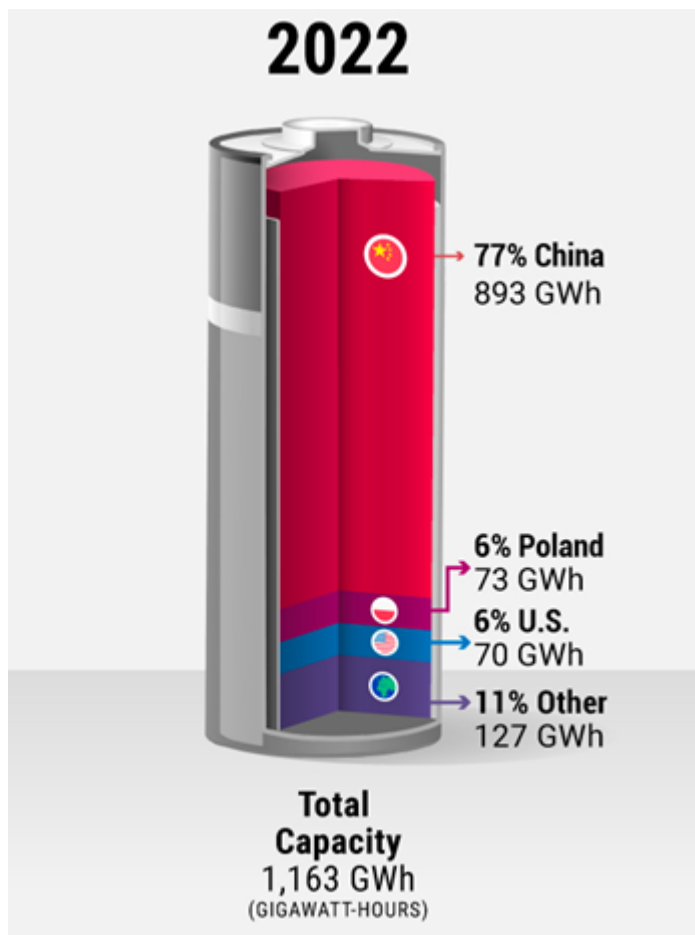
does nothing to support the mining industry. It is similar to the U.S. Inflation Reduction Act, where most funds are going to auto and battery companies and very little to the upstream miners. This will only boost demand for critical minerals needed to feed the EV and energy storage booms. Very little is being done to address the looming supply deficits of these critical materials in the second half of the decade.

For example, there are [18 gigafactories](#) planned to be built in the USA this decade, requiring 715,000tpa of lithium, but only 180,000tpa is currently planned. Similar mismatches of supply and demand exist in the pipeline for several other critical metals. Europe's critical minerals supply chain looks even more dire.

## **China continues to dominate the EV and battery manufacturing industry**

Many people might be unaware that China manufactures ~75-80% of all new global plugin electric cars and [~77% of global lithium-ion batteries](#). China's BYD is the world's largest seller followed by Tesla, who makes over 50% of their cars in China.

**In 2022 China had 77% of the lithium-ion battery global capacity**



Source: [Visual Capitalist](#)

## Lithium

China lithium carbonate [spot prices fell](#) so far in October 2023, with the price now at [CNY 166,500/t](#) (USD 22,781/t) and [down 68%](#) over the past year. At these prices, some of the marginal producers in China have begun shutting down. We did get a glimmer of hope for a bottom this week (mid October) as lithium carbonate futures contracts in Guangzhou [jumped by 7% to limit up](#) for the day.

## Lithium takeovers and equity

# interests are a leading trend in mid 2023

The biggest news the past month in the lithium sector has been the fight for control of Australia's Lontown Resources Limited (ASX: LTR), who 100% own the near production Kathleen Valley Lithium Project in Western Australia. U.S. lithium giant Albemarle Corporation (NYSE: ALB) is currently doing due diligence after upping their offer to [A\\$3.00 per share, or about A\\$6.6 billion \(US\\$4.23 billion\)](#) to purchase all of Lontown Resources. However, in recent weeks Australia's richest woman, Gina Rinehart, via her controlled company Hancock Prospecting, increased its stake in Lontown to [19.9%](#). Rinehart's motives are not yet known but it appears the iron ore magnate has become very interested in lithium.

Only 2-3 months back Albemarle bought a [6.4% stake](#) in Canadian lithium junior Patriot Battery Metals Inc. (TSXV: PMET | ASX: PMT | OTCQX: PMETF). The purchase price paid was **C\$109 million** and it was made just one day after Patriot Battery Metals announced their Maiden Resource of 109.2 Mt @ 1.42% Li<sub>2</sub>O Inferred, the largest lithium spodumene resource in the Americas. The interesting part is that Patriot Battery Metals market cap is only US\$866 million, 4.7x lower than Lontown Resources market cap of US\$4.068 billion. Lontown Resources resource is about 50% bigger (156Mt at 1.4% Li<sub>2</sub>O) and about 4 years more advanced than Patriot Battery Metals Corvette Project. Nonetheless, if Albemarle decides to back away from the Lontown Resources takeover bid then there is a very good chance Albemarle will turn their takeover attention towards Patriot Battery Metals.

Mineral Resources Limited (ASX: MIN) has also been very active in 2023 in the lithium space. In September it was confirmed that

Mineral Resources is bidding for the liquidated Bald Hill Lithium Mine. Mineral Resources has also backed Develop Global's [takeover offer](#) for Essential Metals Limited (ASX: ESS) for A\$152.6 million (US\$101 million), plus *Mineral Resources has also bought equity stakes in Delta Lithium Ltd. (ASX: DLI) and Global Lithium Resources (ASX: GL1).*

*Chile's SQM (NYSE: SQM) also recently made a [takeover offer](#) for Azure Minerals Limited (ASX: AZS) for US\$585 million.*

All of this takeover activity from the major lithium companies suggests that we are near a bottom in the lithium price cycle and that the mid to long term outlook for lithium remains very strong.

## Rare Earths

Rare earths supply disruptions have led to some price improvements recently. Neodymium ("Nd") prices continued their recent recovery so far in mid October 2023 after a rough 2023, currently sitting at [CNY 650,000/t](#).

Rare earths prices have been falling for most of 2023; however [recent supply disruptions in Myanmar](#) have caused most rare earth prices to strengthen. There have also been some reports that Malaysia is developing a policy to ban exports of rare earths raw materials so as to boost their domestic industry. There is no date given yet as to when a ban may start. In any event, Myanmar is a much more important supplier than Malaysia.

This month [Australian Strategic Materials Limited](#) (ASX: ASM) announced some world-class [test work results](#) with their terbium (Tb) and dysprosium (Dy) heavy rare earth separation test work. Pilot plant test work produced [">99.99% for Tb and > 99.95% for Dy1, at steady state"](#). Results like this from their Dubbo

Project ore should give some more impetus to getting the Dubbo Project financed with probable output of around 140tpa Dy and 20tpa Tb. ASM Managing Director, Miss Rowena Smith [stated](#):

*“These excellent results demonstrate the strength of ASM’s advanced technical capability...Terbium and dysprosium oxides are not only scarce commodities they are very difficult to separate at high purity. With the continued expertise of the team at ANSTO and the welcome support of the NSW Government, we are positioning the Dubbo Project to be at the forefront of Australia’s rare earth and critical minerals evolution.”*

Dysprosium is a key rare earth used in nuclear reactor control rods and neodymium-iron-boron permanent magnets used in many EVs and wind turbines. Terbium is used in fluorescent lamps and television and monitor cathode-ray tubes.

## **Cobalt, Graphite, Nickel, Manganese and other critical minerals**

**Cobalt** prices (currently at [US\\$14.84/lb](#)) remained flat the past month and continue to be very depressed. China’s demand for NMC cathode material for EVs has been weak, not helped by the popularity of LFP cathodes that don’t use nickel or cobalt.

**Flake graphite [prices](#)** remain very weak with prices near the marginal cost of production. A combination of slower EV sales growth in 2023 and increased China graphite supply has led to a depressed graphite market. [Macquarie](#) and [others](#) forecast graphite to start heading into deficit from about 2024.

**Nickel [prices](#)** have recently weakened further due to oversupply concerns from Indonesia and a slowing Chinese property sector.

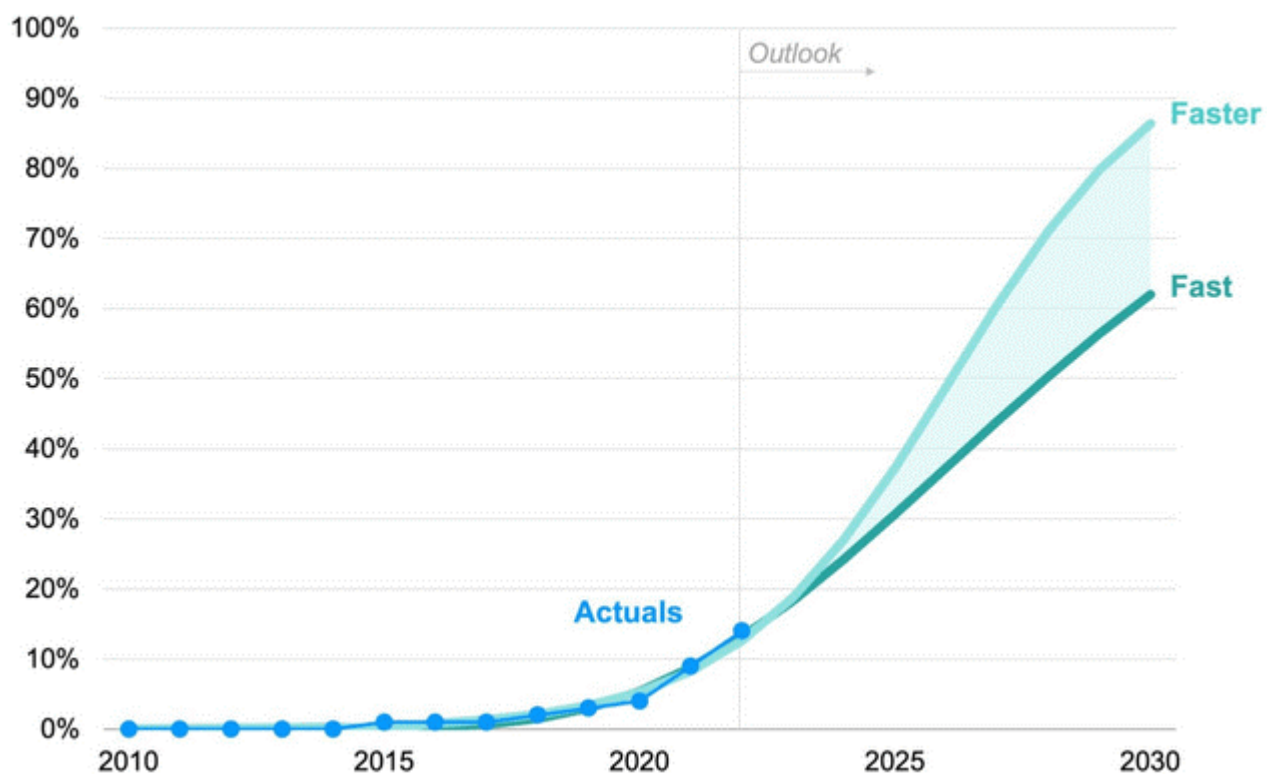
**Manganese [prices](#)** remain weak mostly due to weak Chinese demand



as the Chinese housing industry continues to rebalance after years of over construction and oversupply.

Longer term the outlook for the EV and energy stationary storage (“ESS”) sectors looks extremely strong. This is expected to lead to a huge surge in demand for the critical metals that supply these sectors.

**EV sales are forecast to increase to somewhere between 62% and 86% market share of global car sales by 2030**



Source: [CleanTechnica](#) courtesy Rocky Mountain Institute

**Trend Investing v IEA demand forecast for EV metals**

### Increase in metal demand 2020 to 2037 (100% EV and sustainable energy world)

	Trend Investing (f) to 2037	IEA (f) to 2040		
Lithium demand	35	13 --42		
Cobalt demand	5.7	6--21		
Nickel demand	2.8	7--19		
Manganese demand	1.7	3--8		
Flake Graphite demand	17	8--25		
NdPr demand	5.9	3--7		
Copper demand	2.3	2--3		

Source: [Trend Investing](#) and the [IEA](#)

### Latest CMI events

- Friday October 20, 2023 – **CMI Masterclass: Critical Minerals in the Congo**. Details and event tickets [here](#).

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# Lynas Surges Ahead with Expansion Plans, Record Production & Solid Quarterly Results Despite Tesla's Rare Earths Comments

written by InvestorNews | October 13, 2023

[Lynas Rare Earths Limited](#) (ASX: LYC) ("Lynas") recently announced some positive news that the Malaysian authorities have advised that their license to import and process lanthanide

concentrate is now valid until 1 January 2024, effectively a 6-month extension to get their Malaysian rare earths unit in line with environmental requirements.

Meanwhile, Lynas continues to oppose the Malaysian government's 'new' rules and is working on alternate facilities in Western Australia. Should the Malaysian situation not be resolved then Lynas has a backup plan. The announcement [stated](#):

*“The licence variation allows the Lynas Malaysia cracking and leaching plant to continue to operate until 1 January 2024 and will remove the requirement for a shutdown at the Lynas Malaysia plant prior to 1 January 2024.”*

At the heart of the issue is that the Malaysian authorities say the cracking and leaching plant generates radioactive waste. Lynas argues that they are meeting the conditions as per their original agreement with the Malaysian government. Lynas stated:

*“Lynas had applied to the MOSTI Minister for the removal of the conditions which limit operations at the Lynas Malaysia facility as they represent a significant variation from the conditions under which Lynas made the initial decision to invest in Malaysia.”*

We will have to wait until January 1, 2024, to see what happens next regarding Lynas operating its cracking and leaching plant in Malaysia.

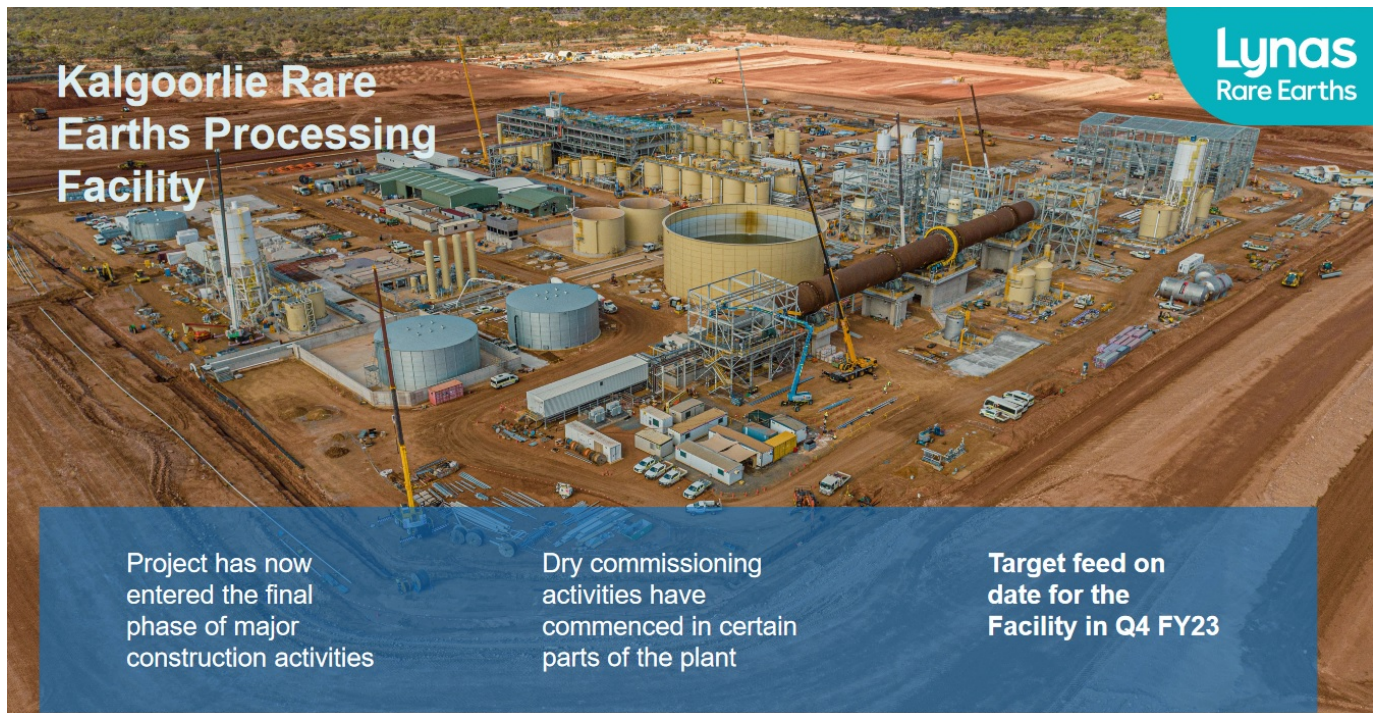
## **Lynas' Kalgoorlie Rare Earths Processing Facility is in the final**

## **stages of construction, feed to start this quarter (Q4/FY23 – Ending June 30)**

Lynas has been rapidly building a backup rare earths processing facility in Kalgoorlie, Western Australia. Lynas [stated](#) that the facility “has now entered the final phase of major construction activities, dry commissioning activities have commenced in certain parts of the plant, target feed on date for the Facility in Q4 FY23.”

Lynas plans to use rare earths carbonate feed from their Mt Weld Mine to feed the new Kalgoorlie rare earths processing facility once complete (noting a ramp-up period applies). The product would then be shipped to Malaysia for final processing.

**FIGURE 1: Lynas’ under construction rare earths processing facility in Kalgoorlie Western Australia**



Source: [Lynas company presentation](#)

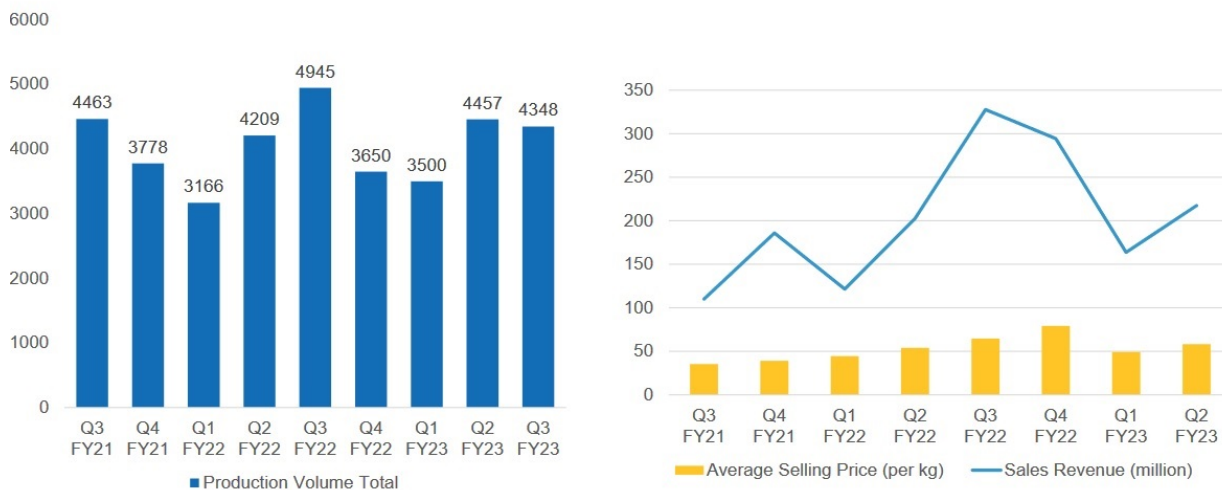
## Lynas achieved record NdPr production in Q3/FY23 (Ending March 31)

In Q3/FY23 Lynas produced [4,348 tonnes](#) of total rare earths oxide and a record [1,725 tonnes](#) of Neodymium-Praseodymium (“NdPr”). This resulted in [A\\$237.1 million](#) of revenue for the quarter. The chart below shows Lynas’ revenue trending slightly higher over the past 2 years on the back of solid production and prices.

**FIGURE 2: Lynas’ last 2 years Total Rare Earth Oxides (“TREO”) production volumes and sales revenues**



## Lynas' performance over the past 2 years



Source: [Company presentation](#)

## USA LRE and HRE facilities update

The USA Light Rare Earth (“LRE”) and Heavy Rare Earth (“HRE”) facilities plan to be able to process both light and heavy rare earths.

Lynas has secured a greenfield site in an existing industrial zone in Texas, further progressed the detailed engineering design, and engaged a preferred U.S. Engineering, Procurement, Construction, and Management (“EPCM”) contractor.

## Tesla plans to use non-rare earths motors in their next generation vehicle

Lynas CEO, Amanda Lacaze, stated in the [Q3, FY 2023 earnings call](#):

*“The neodymium iron boron [NdFe] magnet technology is the most*

*energy efficient, because it is the lightest motor, and over the life time of the vehicle it gives you the best efficiency... ..and it has the lowest CO2 emissions... ..more are choosing NbFe technology than the alternative... ..today we find that demand still is ahead of our ability to service everyone who would like to buy Lynas NdPr... ..the current (price) softness is very much about internal China dynamics... ..but we at Lynas remain very confident of the long term trend and we know that the Chinese rare earth firms share that confidence. We remain committed to growing to meet the market and that's one of the reasons why our ambitious capital investment plan continues."*

## Closing remarks

Lynas is very well positioned in 2023 with [A\\$1.12 billion](#) in cash (as of March 31, 2023) and is on target with its expansion plans.

The 6-month Malaysian extension also means that Lynas' rare earths production can continue uninterrupted, at least until January 1, 2024. At that point, the Kalgoorlie facility should hopefully be operating smoothly and ramping up production and offer an alternative should the Malaysia cracking and leaching plant need to be shut down on January 1, 2024.

Lynas Rare Earths trades at a market cap of [A\\$6.82 billion](#) and a PE ratio (TTM) of [12.39](#).

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# The Second Fuel Crisis and the Potential Doom of the Domestic Automotive Industry

written by Jack Lifton | October 13, 2023

Economic illiteracy in general and a complete lack of understanding, in particular, of the economics of what the oft-cited political mantra refers to as “working families” by political elites and the new growing class of industrial elites has doomed the domestically owned OEM automotive industry.

Mark Twain is reputed to have said, “History doesn’t repeat itself, but it often rhymes.”

In the 1960s, when oil was cheap, less than \$2 per barrel (“bbl”), I heard a [General Motors](#) (NYSE: GM) executive say that, “ ‘we’ predict that the domestic American auto market in 2000 will be 28 million cars, and we are preparing for that.” (Note: In 2000, 17.8 million new cars and trucks were sold.) In those far-off days, the big three American OEM automakers had 99% of the domestic market and were vertically integrated, so they were designing and building not only assembly plants but also component plants en masse.

No one in Detroit, then as now, gave any thought to the issue of fuel. They made cars and trucks. The oil industry could take care of finding, producing, refining, and distributing “fuel.” Purdue and the General Motors Institute produced all of the engineers that GM would ever need, and no one at GM even knew if either of those institutions had oilfield engineering or oil refining courses.

The car makers specified the fuel requirements, and it was up to



the oil industry to provide the products.

## **First Fuel Crisis – 1972 Arab Oil Embargo**

In 1972, the [Arab Oil Embargo](#) hit and suddenly resource nationalism, although not called that then, hit the American OEM automotive industry like a brick wall. I am going to call this series of events the First Fuel Crisis.

Up until 1972, American oil production had not been anywhere near enough to meet domestic demand, but even with freight from the Persian Gulf, oil from the Middle East was so much cheaper than domestic oil that there was little point in increasing domestic production. Except for the West Coast, which was too far from the Middle East to make transportation economical and southern California was covered with pyramidally shaped structures, which were in fact producing oil wells. When I lived in Los Angeles in the late 1960s, I paid no attention to these structures which were common along the coast.

What was called the “Arab” oil embargo shocked the domestic American OEM automotive industry. Up until then, fuel efficiency was nowhere near as important as muscle cars.

## **When Crisis Meets Opportunity**

But the oil shock and its concomitant rise in fuel costs opened a window for Asian and Western European car makers, who by necessity, had been engineering and producing inexpensive fuel-efficient cars for their economically devastated post-war populations.

By the end of the 1970s, Japanese cars were making headway into the US market. But they were poorly designed and not really ready for the US market. Young people, however, flocked to buy them, because they were affordable. U.S. domestic car makers

scoffed at “Japanese junk,” but the Japanese were quick learners and they not only rapidly improved their products, but they kept the prices low so that they were “buying” market share.

American government regulations began to weigh heavily on OEM costs. First, there were mandatory safety requirements ([Unsafe at any Speed](#)), then the fear of air pollution brought about the [catalytic converter requirement](#), and then competition and spiraling fuel costs mandated engineering improvements that drove margins down.

The Koreans entered the American market with the same scheme as the Japanese had originally had, the purchase of market share.

On top of that desire, as the Japanese and Korean economies boomed and even automation could not contain home country manufacturing costs, both the Japanese and the Koreans began to build assembly and even parts plants in the USA (and Europe, Canada, and Mexico). Even the Germans joined the move to assemble vehicles in the USA and their supply bases soon followed.

The domestic American OEMs had shed their vertical integration in the 1990s to raise much-needed cash and claim that not controlling their supply chains was more efficient for just-in-time manufacturing.

## **China's vertically integrated EV supply chain**

Meanwhile, a rough beast was slouching towards America, not the Chinese OEM automotive assembly industry but the Chinese total supply chain control of OEM industries.

China's car industry began with fossil-fueled vehicles, but that soon led to enhanced air pollution in its cities where steel

factories already poisoned the air.

China watched as a young South African émigré to the USA, after making his first fortune in the online bill-paying industry, revived the battery-powered electric car, which emitted no chemical pollution. Elon Musk forced the global car-making industry to look at the lithium-ion battery as the right technology to finally underpin a mass-producible, electric-powered car.

China created a resource security and resource processing sufficiency-based industrial policy to support its entry into electric vehicle (“EV”) development and manufacturing from the start of its entry into the mass production of this technology. These steps, up until just now, have been ignored by the American (and European) OEM automotive industry, which abandoned vertical integration for outsourced just-in-time delivery at the same time that China, as a nation, moved in the opposite direction to support its fledgling automotive industry both for fossil-fueled and, critically, for battery-powered EVs.

Today, these policies, developed and implemented over the last 15 years have given China dominance or outright control in all of the critical minerals and their processing into end-user forms to support the world’s largest fossil fuel and EV car industry.

China’s domestic electric power grid has simultaneously managed to support the supply of electricity for charging its world’s largest and fastest-growing domestic fleet of “new energy” cars, trucks, and buses.

No other nation has undertaken such a massive and comprehensive support program for an OEM automotive industry transformation of power trains from fossil fuels to electricity.

## Second Fuel Crisis – Critical Minerals and Battery Metals

The second Fuel Crisis has thus hit the non-Chinese car industry even harder than the Arab oil embargo.

Natural resources are limited in their production. They are not organic, self-replicating resources. The metals and metalloids critically necessary for the production of the key components of batteries, miniaturized electronic switches and controls (“chips”), and the most efficient electric motors are scarce and or secondary, i.e., they are byproducts of the production of other metals. Thus the main issue of producing them is cost because capital and capital allocation are not infinite resources either.

The controlled production, distribution, and storage of electricity necessary to “fuel” battery-powered electric vehicles was never considered by those building those systems. It is a conceit of those ignorant of electrical engineering to just assume that the systems can accommodate a massive influx of irregular demand without added costs, if at all. It is beyond belief that anyone assumes that the developing nations will prioritize electric vehicles over electric lights as they build their domestic production and distribution systems for electric power, so it is clear that electric vehicles will remain an agenda item of only the developed nations and then only for so long as electricity is affordable.

Today’s OEM automotive industry would never consider converting away from fossil fuels if it were not for [governmental mandates](#), themselves based on a dubious climate change agenda, making the manufacturing and sale of fossil-fueled vehicles prohibitively expensive.

Paradoxically, it is only through the continued sale of the largest fossil-fueled vehicles, SUVs, pickup trucks, cargo vans, and freight trucks that the American OEM automotive industry can continue to operate, and that only so long as government subsidies and grants for electric vehicles and new manufacturing facilities continue.

## Where is my EV 'gas' station

But, back to fuel production and distribution. The unelected bureaucrats and academics who execute the policies prescribed by the elected politicians are quiet with regard to the rebuilding and repowering of the electrical distribution grid that is necessary to accommodate the addition of tens of millions of electric vehicles needing charging at random times across the 5 time zones that encompass the US. This is because the US economy does not have the ability to fund such a massive undertaking and continue on its climate crisis agenda alongside its massive "entitlement" system.

Studies estimate that the electricity-transmitting capacity supplying power to households that own an EV must increase by 70% to 130% to accommodate EV charging. **Upgrading the electrical grid to meet this demand could cost from \$10-\$25 billion nationwide by 2030. In addition, when you add the additional costs for electrical generation and storage, customer-side infrastructure, and EV chargers, the total investment could range from \$75-\$125 billion.** While utilities are likely to see an increase in revenue from EV users, it may not be sufficient to cover all of the additional expenses across the electric power supply chain.

The true crisis of on-demand electric fuel is that it is an impossible goal if the current American standard of living and quality of life are to be maintained.

Contrary to what the priesthood of climate change preaches, there is no infinite resource of critical minerals and even the processing of what we can produce or obtain of them is no longer possible in the US. The disorganized US government and OEM industries do not have the capital, much less the expertise, to address a slow-motion, non-catastrophic collapse of the US cheap-energy-based economy. Printing money has only accelerated the decline of American manufacturing as ignorant pronouncements from Washington replace market-based economics.

## **Goodbye American OEMs, it is too little, too late**

The random moves by OEM automotive to reform its century-old procurement system to recognize total supply chains over immediate suppliers have resulted in the chaotic allocation of money to high-risk (aka, unproven) and poorly selected placeholders in total supply chains for not only critical minerals but also for their refining and end-user fabrication vendors.













Only those OEMs that have chosen wisely will survive, and they will be only those that make a mix of vehicles using both types of fuel, fossil and electric. For the rest, their unsold inventory of expensive EVs will be auctioned off by their bankruptcy trustees.

Around 20% of the world's annual production of motor vehicles is assembled in North America. Yet, as the chart below shows, the US only has 6% of the global battery-making capacity. Even more disconcerting is the fact that the US has only 4% of the world's lithium production capacity.

This is not a formula for success or even for the continued existence of an industry.

# Battery manufacturing capacity by country (2022)

Battery manufacturing capacity by country in 2022

Rank	Country	2022 Battery cell manufacturing capacity, GWh	% of total
#1	China	893 	77%
#2	Poland	73 	6%
#3	USA	70 	6%
#4	Hungary	38 	3%
#5	Germany	31 	3%
#6	Sweden	16 	1%
#7	South Korea	15 	1%
#8	Japan	12 	1%
#9	France	6 	1%
#10	India	3 	0.2%
	Other	7 	1%
Total		1,163 	100%

 – The countries of Central and Eastern Europe

Source: BloombergNEF

## Will 2023 be a breaking point for the EV revolution?

written by Jack Lifton | October 13, 2023

In 2023 well funded, or at least funded, development of deposits of critical minerals into mines will continue providing that the

target production of the minerals is projected to be profitable, and the first product is projected to be delivered on time.

Savvy readers know that my above statement is just boilerplate for an OEM automotive annual report. It's tautological, its conclusion is contained in its premises. It is not at all certain that high-tech, critical minerals producers and processors, will be ready or even existent by the time the minerals can be delivered to their end-user manufacturers.

Even the car makers who have been so generous (or profligate) in their "investments" in critical mineral production and projects have finally begun to realize that their future demand projects, when measured against contemporary real world supply, have caused critical minerals prices to go too high to support their inclusion in the consumer products manufactured from them. [Lithium](#) is a prime example.

Worse than that the bankers who once viewed car makers as AAA investments are now very concerned at the profligate use of the enormous lines of credit by the car makers being used to fund critical minerals wannabes that the banks themselves would never consider. "Use retained earnings" has been the response of credit line providers asked to cover such "investments."

It's time that car makers performed a due diligence on the critical minerals' supply space.

They need to ascertain whether or not the supply of finished components necessary for the assembly of motor vehicles, such as batteries, traction electric motors, miniature accessory electric motors, and, yes, even catalytic converters can meet current and all future demand.

Simultaneously, they need to predict and mandate price maximums for critical minerals that they can afford if their products are



to be saleable.

For the first time, they need to address the lifetimes, as well as the costs, of critical mineral enabled components, since consumers will have to keep the vehicles for much longer than in the past in order to be able to afford them at all.

They need to assess these factors for minerals, metals, and manufactured components dependent upon lithium, cobalt, nickel and the rare earths.

If car makers are to change over from ICE powertrains to BEVs then they need to do this right now, and they need to recruit managers and analysts who can do the job.

2023 is a breaking point if there is to be an EV revolution/transformation.

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## **With interest focused on smart nuclear, Sunday Mine complex mining operations prepare to restart in the New Year**

written by Tracy Weslosky | October 13, 2023

The global energy crisis is causing chaos in 2022. This is a key topic at this year's climate conference (COP27), currently underway in Egypt; never mind the Critical Minerals Summit I just hosted on scalability challenges in Toronto yesterday for the Critical Minerals Institute. FACT: The world needs to switch

to renewables but right now is suffering energy price shocks as Russia and OPEC hold the world to ransom. Global natural gas prices have [roughly doubled](#) the past year, and have risen even faster in Europe. Coal prices have skyrocketed higher the past year [from US\\$148/t to US\\$339/t](#). Oil prices have also [risen significantly](#) in 2022. Little wonder we have a global inflation problem, as energy and oil prices push up the price to produce and deliver everyday items.

Climate change enthusiasts would say the answer is solar, wind, hydro and energy storage; however the truth is right now we rapidly need more baseload power and to move away from coal and gas as quickly as possible.

The answer is smart [nuclear](#). This idea is supported by [President Biden](#) and even [Elon Musk](#). Now to boost nuclear energy we need more uranium, ideally sourced not from Russia or Kazakhstan, which is another [potential problem](#).

Western uranium producers have been idling their mines for years waiting for the uranium surplus to decline, leading to higher uranium prices. Judging by the 2022 uranium price action ([now at ~US\\$50](#)) and forecasts for uranium deficits in the next few years, that time has now arrived.

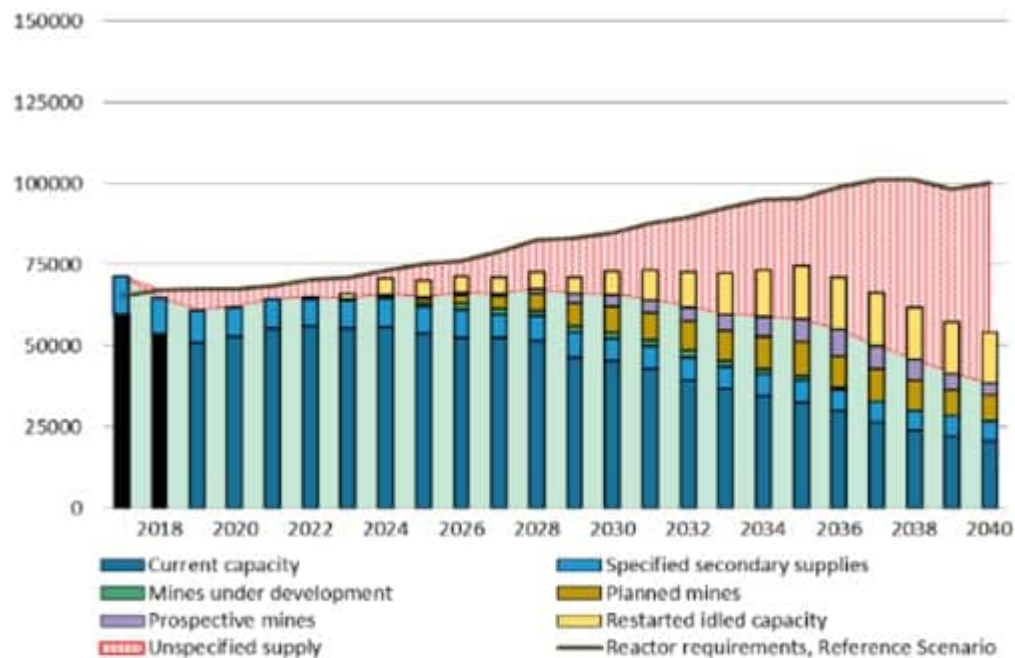
Today we look at a promising uranium company that also thinks uranium's time has finally come.

The company is [Western Uranium & Vanadium Corp.](#) (CSE: WUC | OTCQX: WSTRF).

**Uranium demand is set to potentially exceed supply from now to 2040**

## Projection Uranium Production to 2040- Reference Scenario Supply (tonnes U) <sup>(1)</sup>

Figure 7: Reference Scenario supply, tU



<sup>(1)</sup> Source: The Nuclear Fuel Report: Global Scenarios for Demand and Supply Availability 2019-2040

[Source:](#) Western Uranium & vanadium company presentation

### Western Uranium & Vanadium Corp. (“Western”)

The world is short of affordable energy and demand is only set to grow further, especially as we rapidly move to electrification of the transport sector. The quote below sums up the current situation very well.

In a November 2022 market update Western President & CEO [commented](#):

*“Western currently is observing positive catalysts across multiple levels of the nuclear fuel and uranium markets. At a micro-level the projected supply / demand imbalance is expanding.....There are multiple data points pointing to a depletion of the secondary supply overhang, which was prevalent for the last decade. At a macro-level, the electrification transition and climate change initiatives have increased global support for nuclear. Further, Russia’s invasion of Ukraine and*

*the ensuing global energy crisis has focused attention on security of supply and supply chain risks.”*

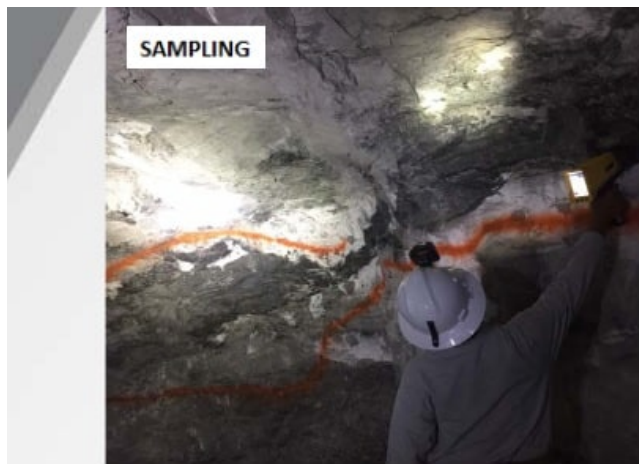
Right now in the U.S, there are less than a handful of uranium producers. Western is probably the lowest market cap of them all and is ready to quickly scale up uranium production.

### **Sunday Mine complex mining operations are targeted to restart in January 2023**

In some very good news for investors, Western [announced](#) only last week, that as of January 2023 they will restart mining operations at their Sunday Mine Complex. Western [stated](#):

*“Western has completed the build-out of its in-house mining capability. Additional employees for the first mining team have been hired over the last two months, facilities have been upgraded, and equipment and vehicles have been acquired and readied for deployment.....Mining operations are targeted to restart in January 2023.”*

### **Western’s Sunday Mine Complex in Colorado USA**



[Source](#): Western Uranium & vanadium company presentation

The Western Uranium & Vanadium market cap is [C\\$64 million](#), InvestorIntel will follow up in early 2023 to update our audience on how progress is going at the Sunday Mine Complex restart. Stay tuned,

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# Skyrocketing LFP demand has

# experts asking, “How fast can Nano One scale production?”

written by Tracy Weslosky | October 13, 2023

Lithium iron phosphate (“LFP”) batteries are rapidly gaining market share due to their improved energy density, longer cycle life, improved safety, generally lower costs, and no requirement for nickel and cobalt. It certainly makes sourcing the critical materials much easier as lithium and graphite become the only critical materials needed. No need to source cobalt from the Congo or [nickel](#) from Russia.

Furthermore, the LFP trend is now expanding out from China to other regions as Chinese patents expire. In October last year, Tesla [announced](#) it is switching all of its standard range Model 3 and Model Y electric cars globally to LFP batteries. Multiple OEMs have since followed Tesla’s lead. The problem is now that the [Inflation Reduction Act](#) will only reward U.S or U.S free trade countries if their batteries are made locally (not in China), but there are very few western LFP battery facilities.

## **Nano One Materials now owns the only LFP battery facility in North America**

In news [announced](#) on October 31, [Nano One Materials Corp.](#) (TSX: NANO) has now completed the acquisition of Johnson Matthey Battery Materials Ltd., who just happens to own the only LFP battery factory (the “Candiac facility”) in North America. Many in the market failed to appreciate the significance. And let me lay out – there is a massive demand for western made LFP batteries, and there is an extremely small current western supply to access.

Highlights of the announcement are:

"The Acquisition helps expedite Nano One's business strategy for LFP and other battery materials and includes:

- A talented and dedicated workforce of 46 professionals with almost 400 years of scale-up, commercialization, and cathode manufacturing know-how on LFP.
- **The only existing North American lithium iron phosphate ("LFP") production facility.**
- An 80,000 square foot, 2,400 tpa capacity LFP production facility on 9.5 acres, strategically located near Montréal.
- Certification systems supplying tier 1 cell manufacturers for the automotive sector."

*Note: Bold emphasis by the author.*

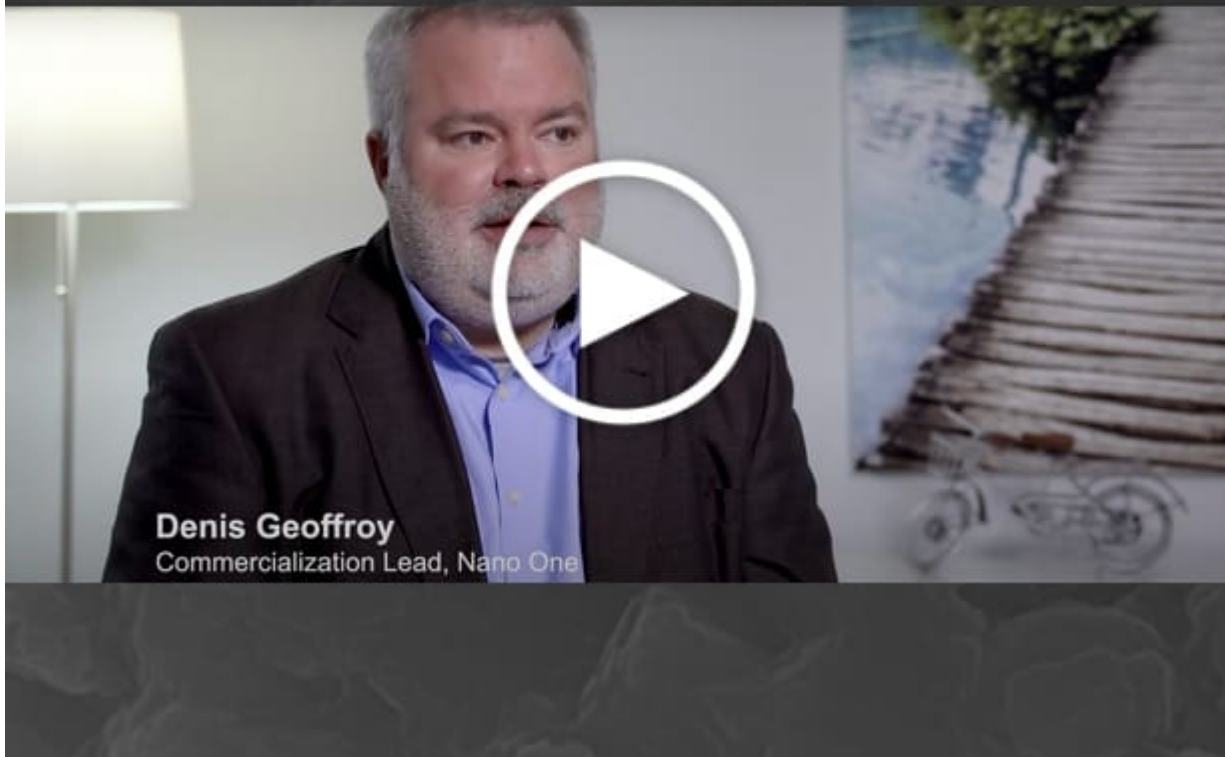
Another key factor many in the market fail to appreciate is the difficulty in obtaining experienced battery manufacturing personnel. In the case of the above-mentioned deal, Nano One was able to secure a very key person, namely Denis Geoffroy. Denis was an early contributor to Phostech Lithium, which led the first commercial manufacturing of LFP cathode active materials globally. Nano One CEO Dan Blondal summed it up well [stating](#):

*"Today marks the beginning of an exciting new chapter in the Nano One story. I am pleased to report that the entire team in Candiac has transitioned to Nano One and this positions us with the most experienced LFP workforce in North America."*

**Denis Geoffrey is the Chief Commercialization Officer of Nano One**



**We're building a  
commercialization team to  
scale our tech for a localized  
battery supply chain**



Source: [Nano One Materials website](#) ([video link](#))

In terms of the next steps Nano One [states](#):

*"The Company will begin with trials in the Candiatic facility to validate the production of LFP using the Company's patented One-Pot process. Results from these trials will drive business, commercial and plant conversion decisions in 2023."*

One would think Tesla and other North American based electric car and battery OEMs would be taking notice of how this all develops, and off-take deals could potentially soon emerge.



## The rise and rise of LFP batteries

LFP batteries outsold NMC batteries last year in China, rapidly gaining market share (see below).

### LFP battery demand skyrocketing – LFP outsold NMC in China as of March 2022

#### ‘Skyrocketing demand’

Like Wood Mackenzie, Clean Energy Associates (CEA) noted the competitive dynamic heating up between LFP and NMC batteries. Safety advantages, long lifecycle and lower costs have led to EV makers starting to accept the trade-off of lower energy density in adopting LFP batteries, both firms have noted.

LFP has already been accepted by the stationary battery energy storage system (BESS) sector, where energy density tends to be a less decisive factor.

CEA said LFP outsold NMC among batteries sold by Chinese manufacturers, with its market share growing through the year: of 100GWh of lithium batteries used for EVs and ESS, 44% were NMC and the majority of the remainder LFP.

Source: [Energy Storage News](#)

Looking ahead this decade it looks likely that LFP will continue to gain market share from NMC and become the preferred battery cathode type. Energy Storage News quotes research from Wood Mackenzie [stating](#): “Lithium iron phosphate (LFP) will be the dominant battery chemistry over nickel manganese cobalt (NMC) by 2028.”

Time will tell, but certainly, the current trend is towards LFP gaining market share globally. In North America the LFP demand will massively outweigh the supply, putting Nano One Materials in the box seat this decade, as a LFP battery manufacturer. The question really will be – **How fast can Nano One scale production?**

Nano One trades on a market cap of [C\\$266 million](#).

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# Jack Lifton addresses the problem of scalability of critical minerals in the EV supply chain

written by InvestorNews | October 13, 2023

In this video, [Critical Minerals Institute](#)'s (CMI) Executive Chairman Jack Lifton talks about the upcoming [Critical Minerals Summit](#) (CMS 2022) on Wednesday, November 9, 2022, at the historic [National Club](#) in Toronto, Canada from 9 AM to 4 PM EST.

Jack says that his opening remarks at the summit will try to address the problem of scalability of critical minerals in the EV supply chain. He adds that the problem is "severe but is the most ignored problem in critical minerals." With the demand for lithium per person grown by "5000 times between 2007 to 2022", Jack explains how we are moving towards "a world of the haves and the have-nots" when it comes to having access to non-fossil fuel energy.

To access the full episode, [click here](#)

**Note from Publisher:** Next week – on Wednesday, November 9th in Toronto, the inaugural [Critical Minerals Summit](#) is on! To secure a delegates pass, [click here](#) – READ: [Summit to Address the Impact of the \\$1.2 Trillion EV Market Demand by 2030 on the Critical Minerals Sector](#)

Don't miss other InvestorIntel videos. Subscribe to the InvestorIntel YouTube channel by [clicking here](#).

## About The Critical Minerals Institute

The [Critical Mineral Institute](#) (CMI) is an international organization for companies and professionals focused on battery materials, technology metals, defense metals, ESG technologies and practices, the general EV market, and the use of critical minerals for energy and alternative energy production. Offering an online site that features job opportunities that range from consulting roles to Advisory Board positions, the CMI offers a wide range of B2B service solutions. Also offering online and in-person events, the CMI is designed for education, collaboration, and to provide professional opportunities to meet the critical minerals supply chain challenges.

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# These are the graphite leaders as we head towards a forecast graphite deficit in 2023

written by Matt Bohlson | October 13, 2023

The flake graphite sector does not get as much attention as [lithium](#), yet the demand wave coming is also very significant. For example, in 2021 the International Energy Agency [forecast](#) that flake graphite demand could grow between **8x to 25x** from 2020 to 2040. Benchmark Mineral Intelligence [forecasts](#) we need **97 new (56,000tpa) natural flake graphite mines** from 2022 to 2035.

### The calm before the storm

More recently in October 2022, Fastmarkets [stated](#):

*“Fastmarkets has forecast that demand for graphite from the battery sector in 2022 will rise by 40% year on year, in line with growth in the EV sector.....**We expect to see the graphite market tip back into deficit in late 2022.....**Graphite prices are in a lull, but this lull will prove to be temporary and may well be **the calm before the storm.**”*

*Note: Bold emphasis by the author.*

An 8 to 25x increase in demand, 97 new graphite mines, graphite deficit coming in late 2022! Yet no one is talking about graphite. Today we cover the main western graphite producers and touch on a few promising near term graphite producers, noting China currently dominates the graphite and anode sectors.

### **The western flake graphite leading producers**

[Syrah Resources Limited](#) (ASX: SYR) – Syrah is an Australian company and one of the world’s largest flake graphite producers from their Balama graphite mine in Mozambique. Syrah is also working towards becoming a vertically integrated producer of Active Anode Materials (“AAM”) at their Vidalia facility, Louisiana, USA. In some exciting [recent news](#) for shareholders, Syrah was selected for a U.S Department of Energy grant of up to US\$220 million towards their Vidalia facility expansion (initial production targeted to begin in Sept. quarter 2023). This comes on top of the news late in 2021 that Syrah [signed a four year deal](#) to supply graphite anode materials to Tesla. Syrah also recently signed an [MOU with Ford and SK On](#) as well as an [MOU with LG Energy Solution](#). Clearly, Syrah Resources is in the box seat to become a critical supplier of both graphite and active anode materials this decade, especially for western OEMs.

The following companies are smaller scale western flake graphite producers:

- **Advanced Metallurgical Group NV (AMS: AMG | OTC: AMVMF)** – Is a diversified producer of critical metals. They mostly produce lithium and vanadium, but also [some high purity natural graphite production](#).
- **Ceylon Graphite Corp. (TSXV: CYL | OTCQB: CYLYF)** – Produces graphite from their '[vein graphite](#)' mine in Sri Lanka.
- **Mineral Commodities Ltd. (ASX: MRC)** – [State](#) they have the “world’s highest-grade operating flake graphite mine with mill feed grade averaging ~25%C”. Also that they are “the biggest crystalline graphite producer in Europe and the fourth largest producer globally outside of China and accounts for around 2% of global annual natural flake graphite production” at their Skaland Graphite Operation in Norway. They also own the Munglinup Graphite Project in Western Australia and [have received Critical Minerals Grant funding](#) to build a pilot scale battery anode plant in Australia.
- **Northern Graphite (TSXV: NGC | OTCQB: NGPHF)** – Recently completed the [purchase](#) from Imerys of the Lac des Iles producing graphite mine in Quebec and the Okanjande graphite deposit/Okorusu processing plant in Namibia. They also own the Bissett Creek graphite project located 100km east of North Bay, Ontario, Canada and the nearby Mousseau West Graphite Project.

### **Near term western potential flake graphite producers**

- **NextSource Materials Inc. (TSX: NEXT | OTCQB: NSRCF)** – Completion of construction activities and the start of mining activities is expected in [November 2022](#), at their Molo Graphite Project in Madagascar. Phase 1 of the Molo Mine is designed to operate at a production capacity of [17,000 tonnes](#) per annum.
- **Westwater Resources Inc. (NYSE: WWR)** – Owns the [Coosa](#)

[Graphite Plant](#) (2023 production start targeted) in USA. The Company plans to source natural graphite initially from non-China suppliers and then from the USA from 2028.

- **Nouveau Monde Graphite Inc.** ( NYSE: NMG | TSXV: NOU ) (“NMG”) – Own the Matawinie graphite project, located in Quebec, Canada. In September this year it was [announced](#) that Tesla had recently visited their project in Quebec. Also recently the Company [announced](#): “NMG, Panasonic Energy and Mitsui announce Offtake and Strategic Partnership supporting the supply of active anode material plus US\$50 million private placement by Mitsui, Pallinghurst and Investissement Québec.”
- [Lomiko Metals Inc.](#) (TSXV: LMR | OTCQB: LMRMF) – Earlier stage but 100% owns the promising [La Loutre Graphite Project](#) in Québec, Canada, where a PEA has been completed.

## Closing remarks

An 8 to 25x increase in demand by 2040, 97 new graphite mines needed by 2035, graphite deficit coming in late 2022! Investors should not forget about graphite, and particularly focus on those graphite miners that are working towards being able to manufacture value-added active anode materials (spherical graphite), as that is where the real money is.

We may be experiencing ‘the calm before the storm’ (before graphite deficits push up prices), which means the sector still offers many great opportunities for investors.

*Disclosure: The author is long Syrah Resources (ASX: SYR) and Advanced Metallurgical Group NV (AMS: AMG).*

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# Defining Criticality

written by InvestorNews | October 13, 2023

Everybody is claiming to have “Critical Metals/Minerals” these days. Desperados in the copper space are the most shameless at touting this claim, while the most ludicrous are those in the gold space (though that goes without saying).

But how to measure what is and what isn't critical?

## Rankings

Criticality and Chinese dominance have become popular themes over the last decade with the British Geological Survey's (BGS) first Criticality ranking in 2011 (in the midst of the Rare Earth boom) firing the starting gun on a race between countries to define what is critical to their own circumstances.

All attempts at ranking criticality are bound to run into criticism with different pundits and different economies perceiving different needs. Moreover, circumstances change, as Cesium showed when it went from being dominated by the US to being dominated by China when the US, fecklessly, let Sinomines acquire Cabot's specialty fluids division. In our perception, Tungsten is not as critical as it was due to numerous non-Chinese developments in the pipeline.

Of all the Criticality lists the BGS one was the only one giving scoring to the metals and then producing degrees of risk to supply. Moreover, it gives the impression of being focused upon which metals are at risk (largely from China-dominance, though unstated) rather than saying (as the JOGMEC list does) that certain metals are critical for a specific (i.e. Japan's) economy.

## Criticality as Semantics

Metals rankings have now become like radio stations' Top 40 lists of days gone by. However, it may just be a matter of international semantics as to what the word "critical" actually implies.

Some are saying that this means a metal is vital to an economy (which of course iron ore is to every economy) but others are interpreting it as being that the supply is in some way threatened or vulnerable. And the latter is where the China Factor is invoked. Europe meanwhile wants to fence-sit and pretends that it is not accusing the Chinese of wielding a big stick threatening EU industries (when really the Chinese are being threatening indeed).

The BGS by using the word "Risk" did not mince its words. Everyone knew what it meant. Chinese dominance meant supply could be turned off.

### **Rising Tide of Concern?**

The financial media chattering about Chinese dominance of particular metals is one thing, but it is when the average householder gets concerned that the issue really becomes popular. Giving a speech several years ago on Erbium and 5G we noted that few, if any, of the public even knew that the jump from black & white TVs to colour TVs was made possible by Europium and behind that lay the Mountain Pass mine.

For the public, the new 5G technology seems to come out of the ether, literally, and thus it is not a good idea to ask too many questions about what metals make it happen because one would find out that (notwithstanding Huawei's involvement) the REE component (Erbium) in 5G largely is China-sourced or China-processed. Who amongst the Great Unwashed (or experts) can tell us where other 5G inputs, like Scandium, Cesium and Tantalum, come from?



Alarm bells though have been ringing in the C-Suites (of Germany and South Korea, more than Detroit) about the vulnerability of the EV “revolution” to Chinese machinations and that has set off a furious hunt for non-Chinese supply chains.

Curiously though, the European list does not include Lithium amongst the critical metals, though this is probably predicated upon its upstream supplies being mainly from “friendly” sources such as Australia, Argentina and Chile. But with China dominating conversion of Lithium into Lithium ion batteries (and having a stranglehold on Cobalt from the DRC) it does not pay to be so simplistic in calculating where one’s sources might be.

Ergo, with China being the principal midstream processor, can one be so blithely dismissive of the criticality of Lithium?

The various surveys that followed on the heels of the original BGS Criticality rankings now reinforce the sheer number of metals at risk, though as one can see below each agency producing these lists has differing views of the criticality of different metals within their remit.



We can note from the lists above that the US regards most metals as having some degree of criticality.

## **Conclusion**

The critical metals space is torn with rising demand for metals that have seen little, to no, development since before the Commodity Supercycle even began and is now seeing a secular decline in Chinese production due to over-production, exhaustion and environmental devastation. This makes for a rather dramatic tug of war.

It is now clear that the genie set free by Trump’s seemingly

prophetic “Trade War” of the Chinese threat to supplies cannot be put back in its bottle. The “love” of the US industrial complex’s for cheap Chinese minerals has now even been called into question. We doubt that the East Asians (i.e. Japan, Korea and Taiwan) and the Germans can ever be easily lulled back into a false sense of security (of supply) by the Chinese.

The legacy of underinvestment and the lack of capital markets’ interest in specialty metals stories (beyond momentary pump-and-dumps) combined with the Chinese massive own goal in splurging its resource base in predatory pricing and, frankly, dumping over three decades has made for a secular crisis in metals supplies.

This crisis is likely to be enduring and will definitely result in the long-term higher prices (even shortages).

All the chatter does not provide money for projects. Unfortunately, it is only metal price spikes that seem to do so. The soaring price of Lithium and Cobalt in 2017 was a case in point and then the Vanadium surge of 2018. However, the REE putsch of mid-2019 waxed and waned so fast that no party got any financings done before the brief window of opportunity slammed shut.

Less sexier metals never even get their day in the sun. Tellurium or Cesium could quadruple and it would not generate more than a muffled whisper in the trade journals. The same for individual Rare Earths such as Erbium and Dysprosium.

We are of the opinion that the critical “state” of the metals world will remain as long as the West is not self-sufficient in its supply of specialty metals. The Chinese have shown themselves to be malevolent players and that was while they had the whiphand in many metals. As they start to lose their grip the frustrations will start to rise, already we are starting to

see some rancour in relations with Burma over neo-colonial resources policies being imposed by China on its neighbour. Other Belt-and-Road “beneficiaries” have found that Chinese largesse comes at a hefty price. Is this mere sparring or the first shots in a monumental struggle over the world’s most crucial mineral resources?

In retrospect, Trump’s “Trade War” of 2018-20 may be seen as the “phoney war” phase of a much bigger tussle over access to the world’s scarce specialty metals resources. The criticality rankings are the playlists for the background music as this plays out.

**Note from Publisher:** Next week – on Wednesday, November 9th in Toronto, the inaugural [Critical Minerals Summit](#) is on! To secure a delegates pass, [click here](#) – READ: [Summit to Address the Impact of the \\$1.2 Trillion EV Market Demand by 2030 on the Critical Minerals Sector](#)

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# Summit to Address the Impact of the \$1.2 Trillion EV Market Demand by 2030 on the Critical Minerals Sector

written by Tracy Weslosky | October 13, 2023

## ***CMI Presents “The Race to Achieve a Critical Minerals Supply Chain ROW” at the Critical Minerals Summit on Wednesday, November 9th***

Toronto, October 31, 2022 – The [Critical Minerals Institute](#), which was founded for education, collaboration, and to provide professional opportunities to meet the critical minerals supply chain challenges, is pleased to announce the inaugural Critical Minerals Summit (CMS 2022) on Wednesday, November 9, 2022, at the historic [National Club](#) in Toronto, Canada from 9 AM to 4 PM EST.

“With automakers planning on spending nearly \$1.2 trillion by 2030,” says Critical Minerals Institute founder Tracy Weslosky, “it is equally as important to discuss not only where these battery materials are coming from and the technologies involved, but also where will we find the skilled professionals it requires.”

Themed ***The Race to Achieve a Critical Minerals Supply Chain***, the Chairman of the Critical Minerals Institute Jack Lifton will begin the event with opening remarks aptly titled ***Scalability, Why the EV Timelines Simply do not Work***.

Geoff Atkins, Founder of Cheetah Resources and previously Managing Director of Vital Metals who succeeded in bringing the Nechalacho rare earths mine into production will kick off the day with his keynote speech titled ***The Perfect Storm: Prioritizing the Demand Drivers Necessary for Mission Critical Minerals Supply Chain***.

A one-day, in person event, the Critical Minerals Summit is a bi-annual event designed to bring industry leaders and investors together to address scalability, resource and human capital

needs, not only to meet the EV market demands, but to achieve the aggressive legislative timelines set around sustainability and climate change.

In the context of this theme, a special presentation designed by Prof. Saleem H. Ali, Ph.D., Chair, Department of Geography & Spatial Sciences, who is a Blue and Gold Distinguished Professor of Energy and the Environment from University of Delaware, will be presented during lunch. Author of a new book on environmental systems titled *How Natural Laws Define Human Life* (Oxford Univ. Press), his presentation will be followed by a Q&A style interview on the Global Critical Minerals Market with international expert and renowned market leader Constantine Karayannopoulos, President, CEO and Director of [Neo Performance Materials Inc.](#) (TSX: NEO).

Throughout the day, a series of 5 panels will be hosted by CMI Directors and the “Who’s Who” of international critical minerals experts, with leading industry CEOs participating as panelists. Highlights include the following panels:

- ***Securing the Capital to build a Supply Chain for the ROW.***
- ***The Extraction & Processing Timeline Advantage***
- ***Global Challenges in Advancing the Critical Minerals Supply Chain***
- ***Dealing with the Resource Challenge, the Critical Minerals Shortage.***
- ***The Power of Politics: Government Investment in the Critical Minerals Market***

In addition to the above, the CMI will have Ed Buiel PhD, President & CEO, Coulometrics, LLC, speak on the paradox of producing graphite in North America and competing with China, along with special guest and Acting Consul-General, Greg Quinn from the British Consulate-General Toronto, who will address the key points from the recently released UK national critical

minerals strategy.

The Critical Minerals Summit will be held at the historic [National Club](#) in Toronto from 9 AM to 4 PM EST. Space is strictly limited. For more information go to [CriticalMineralsInstitute.com](https://CriticalMineralsInstitute.com). To purchase a delegate pass, [click here](#).

**About the Critical Minerals Institute:** The [Critical Mineral Institute](#) (CMI) is an international organization for companies and professionals focused on battery materials, technology metals, defense metals, ESG technologies and practices, the general EV market, and the use of critical minerals for energy and alternative energy production. Offering an online site that features job opportunities that range from consulting roles to Advisory Board positions, the CMI offers a wide range of B2B service solutions. Also offering online and in-person events, the CMI is designed for education, collaboration, and to provide professional opportunities to meet the critical minerals supply chain challenges.



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