



# 7 things we learned at the Future Facing Mined Commodities Forum

March 2020

The Wood Mackenzie Future Facing Mined Commodities Forum took place on 3 March and included sessions focused on battery material demand, investment in energy transition metals, the drive for greener metals and more.



**Take a closer look at future facing mined commodities:**

Access a replay of Vice President of Metals & Mining Robin Griffin's presentation on the growing importance of future facing commodities **here**. This includes downloadable presentation slides with charts on prices, costs, market growth and more.

What was clear from our presenters was the sheer scale of the challenge that needs to be overcome to deliver the metals required for the energy transition. There is a need to accelerate project development, which will be hampered by long lead times. The amount of capital that needs to be deployed is eye-wateringly high when margins look set to be under pressure. Lastly, supply security is becoming an increasing concern, with China dominating the supply chain for many critical commodities.

**Missed the forum, or looking for a recap? Read on for seven talking points from across some of the forum's key sessions.**

**1. Rare earth magnet demand will double by 2035**

*David Merriman, Research Director, Rare Earths*

The use of rare earth permanent magnet motors in *electric vehicles (EVs)* and renewable energy is placing significant strain on *rare earth* supply chains, causing prices for key rare earth elements and products to reach 10-year highs. Higher prices and supply availability concerns are leading end-users to look at opportunities to reduce consumption of rare earth products in some applications. Performance and efficiency benefits of using rare earth permanent magnet motors and generators compared to alternative technologies have made them difficult to replace however, particularly in an increasingly competitive EV market.

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Demand for rare earth permanent magnets is forecast to double in the period to 2035. The development of magnet manufacturing capacity in Europe, North America and Asia will erode China's dominance of the rare earth supply chain, though China will remain the largest supplier of rare earth products to the global market.



## **2. By 2040, nickel requirement for the energy transition will be equivalent to the whole nickel market in 2020**

*Andrew Mitchell, Director, Nickel Research*

By 2040 the annual requirement for *nickel* in EVs/energy storage systems (ESS) will be the same as the total nickel market in 2020 – around 2.4 Mt. Providing the additional nickel required for the energy transition will be challenging, particularly in an ESG-constrained world.

Between 2011 and 2023, an additional 1.8 Mt of nickel will have been brought online. However, the net addition outside Asia will be just 68 kt, or 4% of the total. If the west is to meet its energy transition and CO<sub>2</sub>e emission targets, recycling will be key as will investment. This will need to be supported by governments and not left to individual companies.

## **3. Graphite accounts for over 90% of lithium-ion anode materials with all natural graphite processing still in China**

*Suzanne Shaw, Principal Analyst, Graphite*

*Graphite* is a vital anode material for lithium-ion batteries. With battery-grade demand forecast to grow by 14% per year to 2035, there's an increasing focus on both supply criticality and ESG concerns. While production of raw material natural flake and synthetic graphite are both dominated by China, there is also significant supply available from the rest of the world. However, China is the sole producer controlling the downstream processing of battery-grade flake (spherical graphite). This forms a pinch-point in the supply chain.

Several projects are looking to build an ex-China supply chain for spherical graphite, with many developing new production methodologies that side-step the traditional route of hydrofluoric acid (HF) processing. HF methods are widespread in China but their environmental footprint raises eyebrows with EV consumers that trade on sustainable, green credentials. Can a new supply chain be competitive with China on cost? Will end-users be prepared to pay a premium for sustainability?



#### **4. The lithium industry needs over US\$88 billion of capital to 2035 to meet demand**

*Allan Pedersen, Principal Analyst, Lithium*

Growth in demand for rechargeable batteries will continue to be the main driver of *lithium* demand going forward. EV sales, battery size, energy density and cathode chemistries are all taken into account in our forecast. We expect lithium demand to grow almost fivefold to 2035 to reach nearly three million tons.



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To meet this demand, significant investments must be made in the lithium industry – we estimate more than US\$88 billion between now and 2035. This estimate does not take into account any cost escalation, inflation, additional cost linked to tighter product specifications or ESG-associated costs. It also excludes any capital needed for exploration to find additional resource, as well as for the recycling industry.

#### **5. 40% of copper demand growth will be driven by energy transition end uses**

*Nick Pickens, Research Director, Copper*

Copper's property as an electrical conductor fuels long-term demand. Nearly two thirds of global demand growth over the next 20 years is linked to electrical network and transport end uses, and most (40%) relates to fulfilling the world's decarbonisation needs. Demand is such that projects must be sanctioned at a rate of 400 ktpa to meet the supply gap in 2025. This increases to 950 ktpa for the supply gap in 2040.

The future requirement for *copper* will also need to be met from *scrap* – there are signs of significant investment in new processing capability, and not just in China.



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## 6. The rise and rise of lithium iron phosphate (LFP) batteries continues

*Kevin Shang, Research Analyst, Cathode and Precursor Materials and Gavin Montgomery, Research Director, Battery Raw Materials*

Last year saw EV sales register incredible growth. We've revised up our forecast projections, and now expect electric passenger car sales to account for 16% of total sales in 2025, rising to 29% by 2030. But it's not just EV forecasts that matter to metals demand. *Cathode* chemistries must also be accounted for, and the resurgence of LFP demand is a key trend.



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LFP offers cost competitiveness, safety benefits and better cycle life performance than nickel manganese cobalt (NCM) – but lower energy density. While its rising popularity has so far been a China-focused story, we're now seeing Western OEMs like Tesla, VW and Ford lean into LFP technology. Indeed, Tesla also plans to switch all its stationary energy storage products to LFP.

## 7. A more diverse and transparent cobalt value chain is emerging

*Ying Lu, Senior Research Analyst, Energy Transition & Battery Materials Markets*

The *cobalt* market in 2035 is forecast to double in size compared with 2020. Strong EV momentum and steady aerospace recovery is driving demand. Rising mining costs due to falling ore grades and increased *ESG* scrutiny will create more supply discipline, supporting prices.

Substitution and supply security risks are amongst the main challenges the cobalt market faces. But challenges also bring opportunities. As the market matures, with a growing futures market and a more formalised artisanal mining sector, a more diverse and transparent cobalt value chain is beginning to take hold.

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