CRITICAL MINERALS ASSOCIATION

AUGUST 2021

IOM3: CMA’S BLUEPRINT FOR RESPONSIBLE SOURCING OF CRITICAL MINERALS
CMA HIGHLIGHTS: DEFINING CRITICALITY - WHAT MAKES A CRITICAL MINERAL?
DALRADIANT CARBON NEUTRAL PLUS STATUS 2020
ROSKILL: WHEN WILL WE SEE SOLID-STATE BATTERIES IN EV ADOPTION?
6-7 SEP GEOSCIENCE & THE ENERGY TRANSITION
IOM3 SUSTAINABLE FUTURE WEBINARS
Welcome to our August Critical Minerals Association monthly newsletter & updates on the critical minerals space.

Read on for:

- IOM3: CMA’S Blueprint for Responsible Sourcing of Critical Minerals
- Defining Criticality - What Makes a Critical Mineral?
- Geolsoc - Geosciences and the Energy Transition Virtual Conference 6-7 September ‘21
- Roskill: When Will We See Solid-state Batteries in EV Adoption?
- BGS: Lithium Resources in Africa Report
- Dalradian Announce Renewal of Carbon Neutral Plus Status for 2020
- Pensana Update & Investor Webinar
- Argus: Power Electronics Driving New Demand for Metals
- Minviro to Complete Life Cycle Assessment for Blackstone Minerals
- IOM3 Sustainable Future Webinars - 6-10 Sept ‘21
- CMA - This is Us: Brett Grist & Dr Rebecca Paisley
- Critical Mineral News
- Ecologist: A World Without Mining
- Visual Capitalist: Critical Metals in a Smartphone
- The Green and Ethical Dilemmas of EVs
- BBC: Water Pollution from Metal Mines Will Cost Wales £282m
- Cornwall Event: Minerals to Mars

This month’s newsletter has been put together by Olimpia Pilch, CMA’s Business Development & Communications Associate!

Kirsty & Jeff

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Got a suggestion? Want to feature in next month’s newsletter? Contact olimpia@criticalmineral.org

Want to learn more? Check out our website: https://www.criticalmineral.org/ & follow us on twitter @CMA_Minerals
IOM3: UK's Critical Minerals Association releases blueprint for responsible sourcing

The new Blueprint for Responsible Sourcing of Critical Minerals intends to help navigate the complex landscape of environmental, social and governance (ESG) in mining.

The paper outlines challenges and opportunities for the UK to be a world leader in mining and sourcing critical minerals responsibly.

Enabling the UK’s Green Industrial Revolution

A Blueprint for Responsible Sourcing of Critical Minerals

Environmental, Social and Governance (ESG)

The discussion focused on how a critical mineral can be defined and what determines ‘criticality’ of a metal or mineral. The panellists considered different perspectives and approaches to defining criticality across the industry, including the upstream and downstream, academia and government.

HIGHLIGHTS HERE
The virtual meeting will run on the afternoon of the 6th Sept and the morning of the 7th Sept. Presentations will include an introduction and scene setting from Mike Daly (President of the Geological Society), Julian Kettle, (Senior Vice President, Metals and Mining, Wood Mackenzie), Prof Frances Wall (Camborne School of Mines, University of Exeter).

7 September
Minerals and the Energy Transition (9.50am - 11.10am)

- Brett Grist, CMA
  - The UK and mining: the opportunity to support the Green Industrial Revolution through domestic production.
The Cambridge EnerTech Solid-State Battery Virtual Summit, which took place on Tuesday, 3 August, saw thirty speakers present on the global solid-state battery ecosystems from the viewpoints of scientific research, engineering, safety, cost control strategies, and market forecast.

Roskill's key take-aways from the conference:
- Significant progress has been made in the solid-state battery (SSB) ecosystem;
- No market dominance can be observed for electric vehicle (EV) applications;
- Further efforts are still needed to accelerate solid-state battery manufacturing scalability;
- Cathodes are neglected in the R&D of SSBs;
- The market remains in the early stage.

During the summit, Roskill observed that two of the most frequently asked questions were, “When would we see SSBs in EVs?” and “Which electrolyte would win?“.

Roskill believes that a long-term approach should be taken to look at these questions. The development and maturity of technology is a gradual process.

READ ON HERE
@Roskill_Info
Report Abstract

Decarbonisation of energy and transport, to meet global net zero ambitions, will require significantly increased amounts of the raw materials used to manufacture batteries and other green technologies.

The report focuses specifically on lithium, one of the major battery raw materials, for which demand is expected to grow rapidly in the coming decades. Lithium supply chains are complex and commonly global in their extent, with steps that include exploration, mining, processing, manufacturing, use and recycling.

The continent of Africa has significant natural lithium resources, which may provide an opportunity for many African countries to contribute to meeting increased demand whilst also supporting economic growth.

READ ON HERE

The stages in the lithium supply chain for batteries
Dalradian have announced the renewal of their Carbon Neutral Plus Status for 2020 by minimising, assessing and offsetting their carbon emissions.

An assessment of their data was carried out by Carbon Footprint Ltd using industry best practice/standards WRI/WBCSD Greenhouse Gas Protocol and ISO14064-1.

Dalradian plan to reduce their emissions for 2020 by purchasing an electric car to replace the company car, upgrade their office heating and lighting systems to reduce consumption and switch their electricity to 100% renewable supply with Power NI.

FIND OUT MORE ABOUT THE PROJECT HERE
Chairman Paul Atherley commented, “We continue to work closely with the UK Government’s Automotive Transformation Fund on support for the world-class Saltend rare earth processing hub which will create over 500 jobs during construction and over 100 high value permanent jobs once in operation.

Saltend will be the first major rare earth separation facility to be developed in over a decade and will be the first to be located in a Freeport. The facility will process feedstock from the Company’s Longonjo project and from other sources around the world, producing the magnet metal oxides critical for the EV and offshore wind turbine supply chains.”

Pensana will hold an investor webinar at 08:00 UK on Wednesday 8 September.
Advances in a technology that underpins the consumption, distribution and increasingly the generation of electricity is driving demand for new types of microchips that combine silicon with carbon and electronic metal gallium.

"When we think about digital, the digital age, we are usually thinking about the processing of communications and data and performing calculations. But there is another important area, the control of power," the University of Edinburgh's chair of power electronics, professor Stephen Finney, said.

Huge systems such as interconnectors that connect the power grids of different countries, factories, a mobile phone or a single LED light bulb all rely on microchip systems that can control, measure and convert electricity. More than 80pc of the energy generated globally passes through some kind of power electronics. Hidden away from view in grid infrastructure and inside devices and machines, many people are unaware of the technology.

"All those packets of biscuits we ate during lockdown, they were made using power electronics," UKRI's Challenge Director - Driving the Electric Revolution, Professor Will Drury.
Minviro to Complete LCA for Blackstone Minerals

**Completed Study**

**Vulcan Energy Resources**

Minviro has completed a life cycle assessment (LCA) on the pre-feasibility study of Vulcan Energy Resources’ lithium project in Germany. The study quantified the environmental impacts associated with the production of battery grade lithium hydroxide from geothermal brine using direct lithium extraction.

**VULCAN'S PRESS RELEASE HERE**

**New Project**

**Blackstone Minerals**

Blackstone Minerals has selected Minviro to conduct an ISO-compliant life cycle assessment (LCA) study on their Ta Khoa nickel project and refinery in Vietnam. The study will help quantify and minimize the environmental footprint of Blackstone’s cathode precursor material product.
The Role of the Extractive Industries
7 Sept 2021
1pm – 2.15pm
- Fiona Cessford, SRK
  - Chair & Introductions
- Mike Armitage, SRK
  - CRMs & Circular Economy
- Lucy Crane, Cornish Lithium
  - Lithium and the Energy Transition

The Role of Critical Minerals
7 Sept 2021
4pm – 5pm BST
- Aldo Pennini, Satarla
  - Chair & Introductions
- Jeff Townsend, CMA
  - Net Zero: Role of CRMs

The Role of Education and Outreach
10 Sept 2021
1pm – 2pm BST
- Olimpia Pilch, CMA
  - Earth Sciences
This is Us: Brett Grist & Dr Rebecca Paisley

There are many fantastic people, working hard behind the scenes, involved in all aspects of CMA. Each month, we will be bringing new faces into the spotlight!

This month's spotlight goes to Brett Grist, Exploration Manager at Cornwall Resources and Dr Rebecca Paisley, Exploration Geochemist at Cornish Lithium.

Brett Grist
Chair of UK Domestic Mining Working Group, Critical Minerals Association
BSc Mining Geology, Imperial College
Exploration Manager, Cornwall Resources Limited

Dr Rebecca Paisley
Perception of Mining Working Group, Critical Minerals Association
MEarthSci Earth Science from University of Oxford, and PhD Earth & Planetary Sciences from McGill University
Exploration Geochemist, Cornish Lithium
The following August news articles from Argus Media, Mining Weekly, Mining.com, Roskill and others, provide an overview of critical mineral mining for:

- Cobalt
- Copper
- Graphite
- Lithium
- Manganese
- Nickel
- Tin
- Tungsten
- Rare Earth Elements

The Critical Minerals Association takes no credit for any articles and makes no endorsement of any of the content.
Electric Vehicles

• Asia
  ○ China: Hainan Mining Co [23.8.21]
    ▪ Chinese iron ore miner Hainan Mining Co Ltd said on Monday it would invest 1.065 billion yuan ($164 million) in a plant to make battery-grade lithium hydroxide as it looks to cash in on booming demand in the electric vehicle sector.
  ○ Japan: Sumitomo Metal Mining [16.8.21]
    ▪ Japan’s Sumitomo Metal Mining Co Ltd said on Monday it had developed a technology to recover nickel and cobalt from rechargeable batteries such as used lithium-ion-batteries (LIBs) that can be reused as raw materials for LIBs.
    ▪ [https://www.mining.com/web/sumitomo-metal-develops-rechargeable-battery-recycling-technology/](https://www.mining.com/web/sumitomo-metal-develops-rechargeable-battery-recycling-technology/)

• Europe
  ○ Czech Republic: CEZ [25.8.21]
    ▪ Czech power producer CEZ aims to decide by year-end on the make-up of a consortium to build a “gigafactory” to make auto batteries, a vital element in securing the future of the Czech Republic’s largest manufacturing sector.
  ○ UK: Glencore [17.8.21]
    ▪ Mining giant Glencore Plc acquired a stake in Britishvolt Ltd., allowing the U.K. battery maker to secure long-term supplies of key material cobalt.
Cobalt

- Africa
  - DRC: China Molybdenum [11.8.21]
    - Further expansion plans at Tenke Fungurume would boost its copper and cobalt output significantly.
  - DRC: Tesla [13.8.21]
    - ReSource, a solution to trace responsibly produced cobalt from mine to electric vehicle (EV), is moving forward with a pilot project in the Democratic Republic of the Congo (DRC) jointly developed with EV giant Tesla.

- North America
  - Canada: First Cobalt [24.8.21]
    - First Cobalt plans to raise $45 million to advance the expansion and recommissioning of its cobalt refinery in northern Ontario. This is the only permitted cobalt refinery in North America and should be operational as early as next year.
    - [https://www.mining.com/first-cobalt-to-raise-us45m-for-ontario-refinery-reopening/](https://www.mining.com/first-cobalt-to-raise-us45m-for-ontario-refinery-reopening/)
Copper

• Africa
  ○ DRC [31.8.21]
    ▪ Copper sales in Democratic Republic of Congo rose 10% in the first half of 2021 compared to the same period last year, while cobalt sales climbed 15%, the mines ministry said on Tuesday.

• Europe
  ○ UK: Cornish Metals [31.8.21]
    ▪ Cornish Metals announced the results from five new diamond drill holes that are part of the ongoing drill programme at the United Downs copper – tin project, Cornwall UK.

• Middle East
  ○ Jordan [31.8.21]
    ▪ The Jordanian government has granted permission for copper mining to take place at the country's largest nature reserve.
  ○ Mongolia: Rio Tinto [30.8.21]
    ▪ Rio Tinto is prepared to make concessions to the government of Mongolia as it seeks to complete the development of a huge copper mine in the Gobi desert that ranks as its most important project.
    ▪ https://www.ft.com/content/9e3e015e-113b-4be7-a51e-1b00cab85201
Graphite

• Africa
  ○ Mozambique: Tirupati Graphite [20.8.21]
    ▪ Tirupati Graphite announced that it had entered into a binding agreement with Suni Resources, a subsidiary of Battery Minerals, to acquire its two Mozambican flake graphite projects as well as all associated assets, infrastructure, permits, licenses and intellectual property.

  ○ Tanzania: Walkabout Resources [26.8.21]
    ▪ Walkabout Resources of Australia announced that its Tanzania Lindi Jumbo flake graphite project had progressed into the construction phase following site visits by a CRDB-approved Independent Project Manager (IPM) and Tanzanian government officials including Prime Minister Kassim Majaliwa.

• Oceania
  ○ Australia: Renascor [26.8.21]
    ▪ South Korean company POSCO has signed non-binding offtake and strategic co-operation agreements with Australian graphite developer Renascor Resources.
Lithium

• Europe
  ○ Serbia: Rio Tinto [26.8.21]
    ■ Rio Tinto-led plan for major lithium mine stirs protests in Serbia.

  ○ UK: Geothermal Energy [30.8.21]
    ■ A geothermal power plant in the UK has discovered the highest concentration of lithium ever found in geothermal fluid, opening the door to a new business model for the renewable energy source.

• North America
  ○ Canada: Critical Elements Lithium [12.8.21]
    ■ The Rose lithium-tantalum project belonging to Critical Elements Lithium has received environmental approval from the Canadian Minister of Environment and Climate Change.
    ■ https://www.mining.com/canadian-government-gives-environmental-okay-for-rose-lithium-tantalum-project/

  ○ USA: Pure Energy Metals [17.8.21]
    ■ Pure Energy Minerals announced Tuesday that Schlumberger New Energy has received approval from the Bureau of Land Management for a Plan of Operations covering the construction and operation of a pilot plant at Pure Energy’s Clayton Valley, Nevada, lithium brine project.
Manganese

• Africa
  ○ South Africa: South32 [19.8.21]
    ▪ Diversified miner South32 has posted a 21% year-on-year increase in manganese output from its South African mines to 2.26-million tonnes for the year ended June 30.

• Oceania
  ○ Australia: Element 25 [25.8.21]
    ▪ Element 25 has completed its ramp up to Stage 1 production levels at the company’s flagship Butcherbird manganese mining operation in Western Australia.

  ○ Australia [21.8.21]
    ▪ NT WorkSafe charges mining company OM Manganese over Bootu Creek Mine workplace death.
• Oceania
  ○ Australia: LG Energy Solutions [16.8.21]
    • South Korea’s LG Energy Solution has entered into a six-year agreement with an Australian mining company for cobalt and nickel, securing a stable supply of key minerals to make electric vehicle batteries.
    • https://techcrunch.com/2021/08/16/lg-energy-solution-inks-deal-with-australian-mining-company-for-nickel-and-cobalt/?guccounter=1&guce_referrer=aHR0cHM6Ly93d3cuZ29vZ2xlLmNvbS8&guce_referrer_sig=AQAAABHMcFJCOWd4Bvl8Cvv7f2g6phdUIGJypNfUxnUJB2UUwUrghQ7stH5mxmykuwOCKhTfFXauLV5nkt563CF4oPATiEDuIvZzeWXupVglfW2jkaeixj8S5tQtbVbLxcmpnr4vYC9_AP4xVPkbo7zm5gBfxo1lpln0qlZdkZ0z36
  ○ Australia: Poseidon Nickel [30.8.21]
    • Poseidon Nickel Ltd has completed a heavily oversubscribed share purchase plan, raising A$6 million and adding to the A$22 million received under its placement completed earlier this month.
Tin

• Global [11.8.21]
  - A new outlook by Fitch Solutions Country Risk and Industry Research forecasts that tin mine supply will grow strongly in 2021 due to both high prices by historic standards and reduced disruption to mining operations from the covid-19 pandemic.

• Europe
  - UK: LME [17.8.21]
    - LME tin cash prices broke through US$36,000/t for much of the first two weeks of August, surpassing previous records of US$33,000/t in April 2011, as disruptions to supply and international shipping continued to cause market tightness.

Tungsten

• Europe [4.8.21]
  - European tungsten prices have risen to a three-year high on rising demand, depleted inventories in Rotterdam, shipping delays from Asia-Pacific and tightening raw material supply.
Rare Earth Elements

• Europe [24.8.21]
  - The EU is working on proposals to jump-start home output of a type of magnet vital in electric car motors by offering support to local producers so they can compete with Chinese rivals.

  - Researchers at the French Geological Survey are looking at ways to extract rare earth elements from mine slag heaps using bacteria found in the subsoil.

○ Sweden: Leading Edge Materials [25.8.21]
  - Rare earths developer, Leading Edge Materials, published a PEA assessment for the Norra Kårr project in southern Sweden.

• North America
  ○ USA [16.8.21]
    - A newly introduced legislation outlines plans to extend tax credits to companies that domestically produce rare earth permanent magnets. Under this bill, companies would receive US$20/kg credit for NdFeB magnets made in the USA, with the possibility of increasing the credit to US$30/kg if the rare earth material used is sourced from American mines.
"Can you imagine a world without mining? The US Geological Survey Bulletin bluntly claimed in a 1983 issue that “without mining, there is nothing”.

Even those who are now striving to get us out of the hole we’ve dug ourselves into by burning massive amounts of fossil fuels and destroying whole ecosystems in the past century, often find it hard to break out from 'solutions' based on more and more extraction.

It is now argued that we need to mine far more metals for the energy transition and digitalisation."
Critical Metals in a Smartphone

A Breakdown of the Critical Metals in a Smartphone

TOUCH SCREEN
It contains a thin layer of indium tin oxide, highly conductive and transparent, allowing the screen to function as a touch screen.

DISPLAY
The display contains several rare earth elements. Small quantities are used to produce the colors on the liquid crystal display. Some give the screen its glow.

MICROPHONE, SPEAKERS, VIBRATION UNIT
Nickel is used in the microphone diaphragm (that vibrates in response to sound waves). Alloys containing neodymium, praseodymium and gadolinium are used in the magnets contained in the speaker and microphone. Neodymium, terbium and dysprosium are used in the vibration unit.

ELECTRONICS
Nickel is used in electrical connections. Gallium is used in semiconductors. Tantalum is the major component of micro capacitors, used for filtering and frequency tuning.

CASING
Nickel reduces electromagnetic interference. Magnesium alloys are superior at electromagnetic interference (EMI) shielding.

BATTERY
The majority of smartphones use lithium-ion batteries.

The Earth’s natural resources power our everyday lives. VC Elements breaks down the building blocks of the universe.

We live in a material world.
The EU plans to ban the sale of new petrol and diesel cars by 2035 and major carmakers are pledging billions to develop new electric vehicles (EVs), but as we solve one problem, have we created others? What are the emission costs of the production of electric cars, how sustainable are the raw materials and will the battery degrade like the one in your mobile phone?

Electric cars may generate no tailpipe emissions, but the battery power sources, the recycling of its components and the manufacture of the vehicles and batteries contribute to carbon emissions, so just how clean are these cars?

If the source of energy to power the car is not renewable, the CO2 emissions will be much higher. Fortunately, more renewable energies are being used to generate electricity in Ireland and renewable generation accounted for 43pc of all electricity consumed last year.

READ ON HERE
"Ending pollution from old lead, zinc and copper mines in Wales will cost as much as £282m, Natural Resources Wales has said.

The organisation has identified 129 disused sites causing problems to nearby rivers and streams.

Metal pollution can devastate insects and snails, and leave some rivers with no fish.

The Welsh Conservatives said many problem areas were identified almost 20 years ago. They said work to stop the pollution must happen quicker.

Natural Resources Wales (NRW) said it has had £5m from Welsh government this year alone, and is developing ways to deal with the problem - including a treatment plant which is the first of its kind in the UK."

READ ON HERE
Join AeroSpace Cornwall, Deep Digital Cornwall, Satellite Applications Catapult, and South West Centre for Excellence in Satellite Applications, on Tuesday 7th September (9am-4pm), at Heartlands Cornwall, for a collaborative event, focussed on increasing awareness of access to funding within the expanding aerospace, georesources and space-tech sectors in Cornwall.

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