



# CriticalMetals

High Purity Metals for Europe

[www.criticalmetals.eu](http://www.criticalmetals.eu)

# Introduction

- High-purity metals production and exploration in Sweden, Norway, Finland and Denmark including cobalt, lithium, nickel, copper and vanadium.
- Urban Metals – aiming to establish a lithium ion battery recycling plant to produce high-purity battery chemicals for supply to precursor / cell manufacturers.
- Traditional Metals – exploration for copper, nickel, vanadium, PGMs and gold.

Urban Mining refers to the recycling of household and commercial waste to extract valuable raw materials, and in doing so decreasing the reliance on extracting these same raw materials from the earth.



# **Lithium Ion Battery Recycling in Sweden, Norway, Denmark and Finland**



**CriticalMetals**

# Production of High-Purity Battery Metals

- Sole and exclusive technology rights<sup>1</sup> to extract cobalt, nickel, lithium and manganese from spent lithium ion batteries – technology rights cover Sweden, Norway, Denmark and Finland.
- LiB Recycling Pty Ltd free-carried through to Final Investment Decision.
- Flowsheet covers range of battery chemistries (LCO and NMC), has high recoveries and is environmentally friendly.
- Pilot plant (100kg/day) being operated by SGS Canada since January 2019, scheduled for completion October 2019 – pilot plant covers comminution, leaching and purification processes.
- Results of pilot plant testing to be released November 2019, Feasibility Study (50 t/day) June 2020, Demonstration Plant Q3/Q4 2020 and FID December 2020.
- Fabrication and Construction of commercial plant ~12 months.
- Recovered metals will be converted to chemicals for sale to precursor chemical manufacturers and or electrode / cell manufacturers.
- Subject to FEED and FS, production of battery grade chemicals from recycled LiBs planned from 2022.

Production

1. Technology owned by subsidiary of Neometals Ltd and licensed to LiB Recycling Pty Ltd (a wholly owned subsidiary of Critical Metals Ltd).

# Nordic Priority – Maximise Recycling

- Producers of batteries are responsible for waste batteries.
- Producers must either sign up to a collective collection system or create their own collection system.
- Producers of electric and electronic equipment are responsible for its waste (WEEE).
- Producers of household WEEE must join a collective.
- Producers of professional WEEE must take-back but are not obliged to join a collective.
- Nordic countries have advanced and fully integrated waste collection system. The region is well positioned to collect the required volume of end-of-life LiBs to create an economic business case for domestic recycling of LiBs.
- Nordic countries have been strong adopters of electric vehicles (i.e. globally high penetration rates) and portable devices (containing lithium ion batteries).

Production

# European Union (EU) – Metals Must be Recycled

- The EU needs between 10 and 20 Lithium Ion Battery (LiB) Giga factories to meet demand.
  - €20 Bn is required to fund this growth.
  - 1st Giga factory is being built in northern Sweden, by Northvolt.
- The EU faces intense global competition for critical metals to supply the Giga factories.
- Waste generated from end-of-life LiBs will be large and must be recycled.
- Forecast growth of EVs using LiBs is massive.
- Substantially more critical metals need to be sourced from within the EU.
- High potential to source feedstock and create a sustainable LiB recycling business with support of both the EU legislation and Nordic recycling culture.

Production

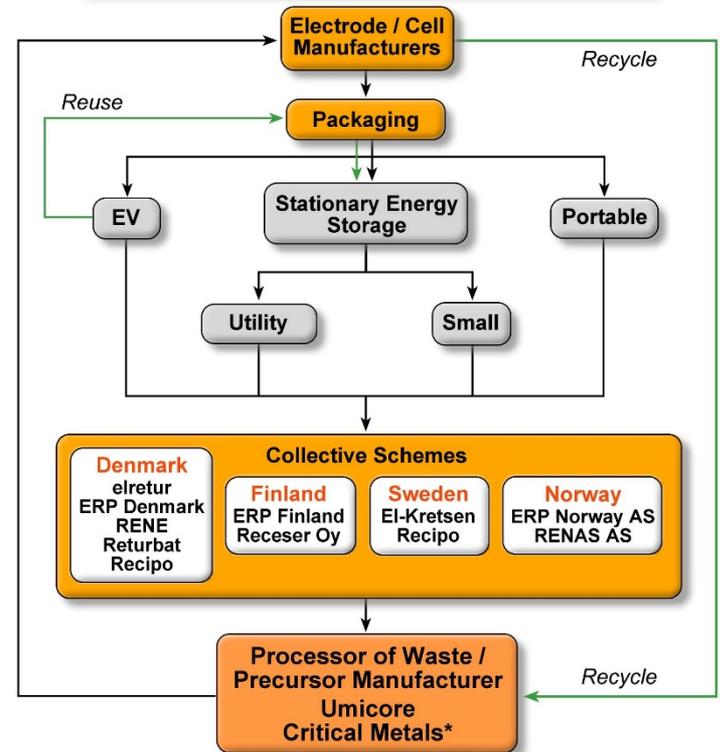
# Waste Collection – Nordic Region

Sources of End-of-Life LiBs include:

- Waste and off-specification product from Electrode / Cell Manufacturers;
- End-of-Life (EOL) LiBs returned to the producer/distributor under take-back programs; and
- EOL consumer electronic devices (with built-in LiBs) and LiBs from collective schemes.
- There are no commercial hydrometallurgical or pyrometallurgical solutions to recycle spent LiBs in the Nordic region. LiB waste is currently mechanically shredded, sorted and sold to metal refining companies in other countries (thereby increasing the CO2 footprint of waste recycling activities).

Production

Lithium Ion Battery Lifecycle Flowchart



\* Critical Metals aims to enter this market

# Business Model

- Independently process waste lithium ion batteries.
  - Revenue from sale of high-purity metals 'produced' from recycling waste LiBs.
- Batch process (toll treat) waste lithium ion batteries on behalf of collectives, existing recycling companies and importers & distributors of electronic and electric equipment.
  - Revenue from providing service to third party.
- Joint venture initiatives with National Government, local Kommuns, recycling companies, collectives and importers & distributors of electronic and electric equipment.
  - Partner with existing actors to generate an optimal solution for the recycling of waste containing critical metals.

Production

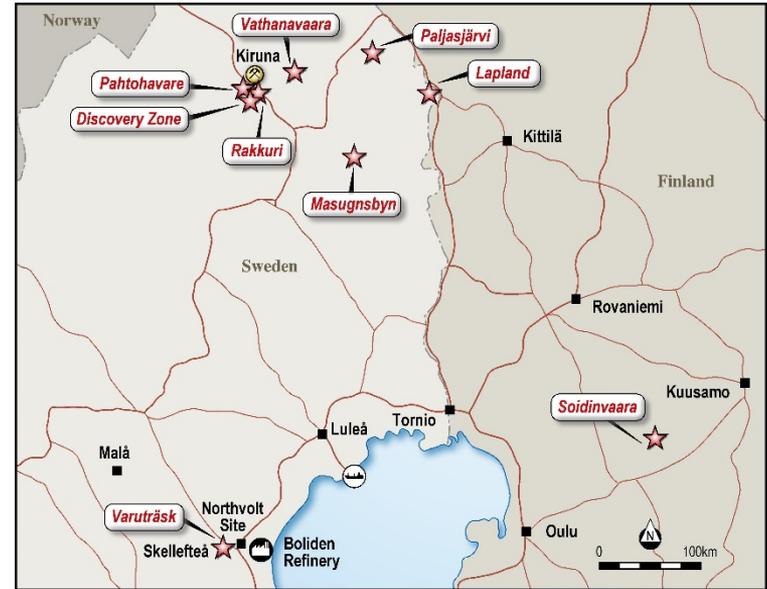
# Metals Exploration in Sweden and Finland



**CriticalMetals**

# Exploration for Metals

- Soidinvaara Vanadium Project, Finland – ready for drill testing optimised targets and completing additional metallurgy to assess economic potential.
- Lapland Cu-Ni-PGE / Fe-V-Ti / IOCG Project, Sweden – aiming to confirm the camp scale nature of this highly prospective “hot-spot”.
- Pahtohavare Copper-Gold Project – free-carried by joint venture partner through to Decision to Mine.



Exploration

# Vanadium – Soidinvaara

- Our primary aim is to assess whether ore from Soidinvaara can be used to economically produce a vanadium chemical for use in Vanadium REDOX Flow Batteries (VRFB).
- The Soidinvaara exploration reservation (24km<sup>2</sup>) was granted to CMS in June 2018 over historic vanadium-titanium-iron deposits located outside of Natura 2000 conservation areas, national parks and nature reserves.
- Soidinvaara is located 20km southwest of the historic Mustavaara vanadium mine (not owned by CMS). Mustavaara was the largest producer of vanadium pentoxide (V<sub>2</sub>O<sub>5</sub>) in Western Europe and accounted for some 10% of the global supply of vanadium during the 1970-80's.
- Soidinvaara field trip completed, initial stakeholder meetings held, historic drill core from four separate deposits within the project re-logged, re-sampled and re-assayed. New DTR tests / assays completed, results producing high-grade magnetic concentrates with an average grade of 1.69% V<sub>2</sub>O<sub>5</sub>. Detailed ground magnetic survey completed over new targets in January 2019. Permit to drill will be applied for once additional funding secured.
- New data will be used in developing a flowsheet to test potential to produce vanadium chemicals.
- For a project specific presentation click [here](#).

Exploration

# Copper, Nickel, PGM – Lapland

- Our aim is to assess whether Lapland has the potential to host a major polymetallic orebody.
- Lapland project is a highly prospective, unexplored and potential new mineral province, with the exploration targets having high ore potential; project is located outside of Natura 2000 conservation areas.
- Economic mineralisation could potentially include: massive to disseminated Cu-Ni-PGE, stratiform Cr, reef style PGE, Fe-Ti-V deposits, hydrothermal Au-Cu, IOCG mineralisation and REE mineralisation within pegmatites.
- Critical Metals believes it holds the most promising land position in this exciting province. The project covers a significant portion of a very large positive gravity anomaly. Geophysical interpretation by independent consultants suggests the gravity feature is related to a major deep-seated mafic intrusive complex that has never been drill tested.

Exploration

# Copper & Gold – Pahtohavare (Joint Ventured)

- Our aim is to own part of a profitable long-life sustainable mining centre that is environmentally and socially acceptable to stakeholders – via processing copper-gold ore on site or via toll treatment.
- An exploitation concession application (ECA) for the oxide deposit at Pahtohavare is expected to be lodged by joint venture partner Lovisagruvan AB in April 2019 – high potential sulphide targets remain to be tested. Critical Metals is free-carried (to 30%) by joint venture partner Lovisagruvan AB, to decision to mine.
- Pahtohavare is located ~8km from Kiruna and the JORC resource is 2.3Mt @ 1.74% Cu, 0.6 g/t Au with significant upside beneath existing shallow oxide deposit and beneath lowest mined levels (150m) of two historic underground copper mines – business case scenario based on Kylylahti mine in Finland.
- Critical Metals also owns 100% of the Discovery Zone deposit, which has a JORC resource of 9Mt @ 0.8% Cu and 0.19 g/t Au.

Exploration

# Contact Details

For further information please contact:

<p>Damian Hicks Executive Director M: +61 419 930 087 E: <a href="mailto:dhicks@criticalmetals.eu">dhicks@criticalmetals.eu</a></p>	<p>Pernilla Renberg Chief Administrator M: +46 703 225 133 E: <a href="mailto:prenberg@criticalmetals.eu">prenberg@criticalmetals.eu</a></p>
<p><a href="http://www.criticalmetals.eu">www.criticalmetals.eu</a></p>	<p>@CuAuNiFeLiCoC</p>

# Directors

---

## **Jonathan Murray – Independent Non-Executive Chairman**

Resides in Perth, Australia

20 years experience as a corporate lawyer; Senior Partner of Steinepreis Paganin. Principal legal practice areas include equity capital markets, takeovers, project acquisitions and divestments, corporate governance, commercial law and strategy.

## **Kris Gram – Non-Executive Director**

Resides in Oslo, Norway

5 years Management Consultant and 10 years Investment Banking experience. Currently CEO of family investment company. Director of Kiruna Iron AB

## **Amanda Scott – Technical Director of Subsidiary Companies**

Resides in Malå, Sweden

Geologist with 15 years experience (8 years in Sweden). Extensive experience in Western Australia and northern Scandinavia generating new projects and exploring for lithium, gold, copper, nickel, PGEs, iron and manganese. Director of Kiruna Iron AB and Critical Metals Scandinavia AB.

## **Olof Forslund – Non-Executive Director**

Resides in Malå, Sweden

Geophysicist with extensive international experience in the mineral exploration industry. Founder of Malå Geoscience. Commenced with Geological Survey of Sweden (SGU) in 1966 and during the period 2003 – 2007 was Regional Manager of the Mineral Resources Information Office in Mala, Sweden.

## **Markus Bachmann – Non-Executive Director**

Resides in Johannesburg, South Africa

Corporate finance professional with 20 years experience. Founder of Craton Capital. Craton Capital awarded Fund Manager of the Year at the Mining Journal's "Outstanding Achievement Awards" during December 2010.

## **Damian Hicks – Executive Director**

Resides in Perth, Australia

15 years experience as Founder of resources companies in Western Australia (since 2002) and Sweden (since 2007). Financial, legal and compliance qualifications with principal responsibilities including strategy formulation, team development, deal origination & execution and capital raising. Director of all subsidiary companies.

---

# Critical Metals Group – Management & Consultants

## **Hans Nilsson – Senior Consultant**

Resides in Luleå, Sweden

Sales, Marketing & Logistics. Iron ore executive with deep experience in sales, marketing and logistics globally. Previous employment and consultancies include Kaunis Iron AB, Ferrexpo plc, Northland Resources Inc, Minelco and LKAB. General Manager of wholly owned subsidiary company Kiruna Iron AB ([www.kirunairon.se](http://www.kirunairon.se)).

## **Christer Nordström – Senior Consultant**

Resides Boden, Sweden

Mining Engineer. Worked for >30 years with LKAB as underground production engineer, open-pit superintendent, global iron ore production research, general manager LKAB Luleå Ore Harbour and product development and marketing for Minelco AB.

## **Mindy Ku – Company Secretary**

Resides in Perth, Australia

Accountant. Diverse experience in finance, compliance, information technology, marketing and management, both in Australia and internationally ([www.corpbervices.com](http://www.corpbervices.com)).

## **Pernilla Renberg – Chief Administrator**

Resides in Malå, Sweden

Responsible for the day-to-day operations, management and administration of Critical Metals Ltd and its subsidiary companies.

For more information visit [www.criticalmetals.eu](http://www.criticalmetals.eu)