



BEOWULF MINING plc

European Critical Raw Materials for the Green Transition

January 2025



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Developing a portfolio of critical minerals

Delivering European minerals for a sustainable future



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Portfolio of European critical minerals

- Listed on AIM (UK) and Spotlight (Sweden)
- Focused on delivering shareholder returns



Jokkmokk Iron

26

Fe

Iron
55.8

Iron ore for Green Steel

- High-grade, low-impurity concentrate
- Growing demand in Europe (and globally)



GRAFINTEC

6

C

Carbon
12.0

Graphite anode material for Li-ion batteries

- Developing Graphite Anode Materials Plant
- One of Europe's largest flake graphite resources

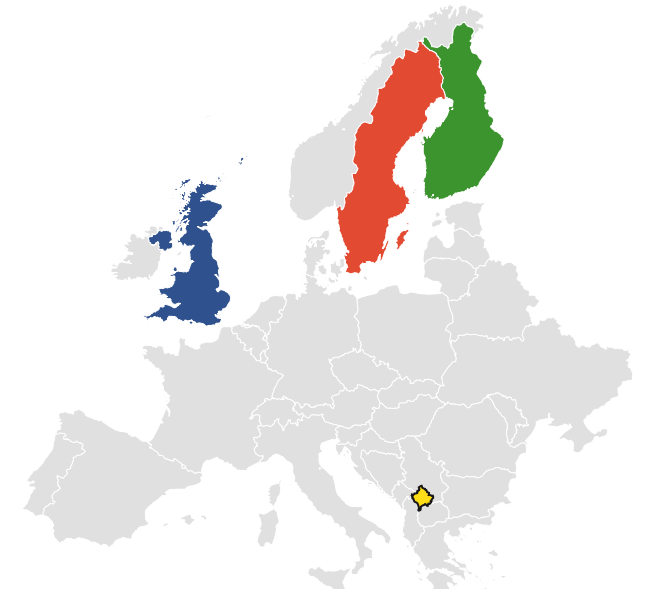


VARDAR
MINERALS

29 Cu Copper 63.5	30 Zn Zinc 65.4	3 Li Lithium 6.9	47 Ag Silver 107.9
27 Co Cobalt 58.9	28 Ni Nickel 58.7	79 Au Gold 197.0	

Portfolio of European exploration assets

- Focus on base and precious metals
- Targeting discovery of critical minerals



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Investment case – right assets, location and timing

Developing a diverse portfolio of critical minerals

Diversified portfolio of high-quality assets:

- Kallak – Sweden’s largest undeveloped iron ore project
- Grafintec – developing anode material plant and one of Europe’s largest flake graphite resources
- Exploration assets offer significant upside and optionality

Leveraged to the Green Transition:

- Demand for high grade iron ore driven by decarbonisation of the steel industry
- Battery grade graphite – growth of Li-ion batteries to drive demand, graphite the largest single constituent
- Political interventions to bolster supply chains - EU’s Critical Raw Materials Act and CBAM
- Strategic and OEM investment in battery minerals and green steel

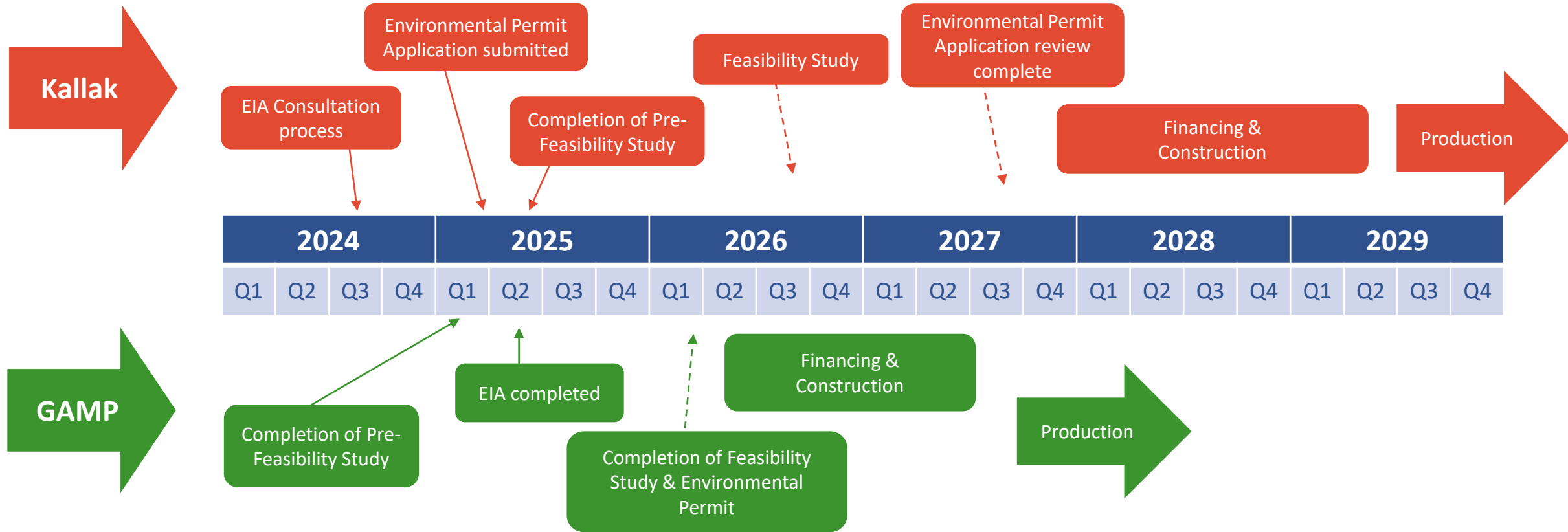
Focus on unlocking asset value:

- Core assets at major de-risking inflection points, PFSs nearing completion and permitting in process
- Portfolio offers development optionality
- Substantially new Board and Management, with significant industry experience



Key milestones

Significant de-risking of core assets



Vardar and exploration assets

- Ongoing focused low-cost exploration
- Discussions with strategic partners to accelerate programmes



Building blocks for a sustainable future

ESG embedded throughout the company as a core value

Sustainability approach driven by:

- Transparency and Accountability
- Meaningful Stakeholder Engagement
- Environmental Stewardship
- Corporate Governance
- Innovation and Technology

Beowulf plans to:

- Build a sustainable minerals business
- Adopt innovation and technology
- Target carbon neutrality
- Support the green transition
- Generate value for all stakeholders





Jokkmokk Iron



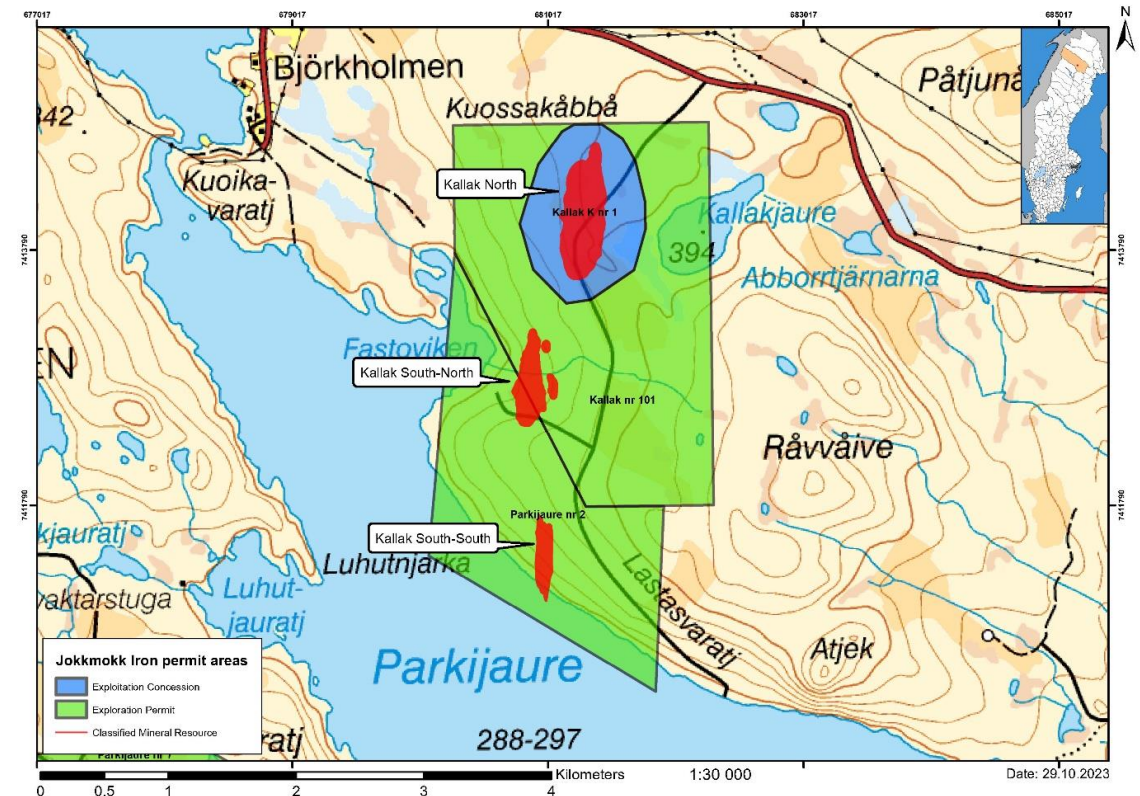
Kallak: high-grade, low-impurity iron ore

Critical product to decarbonise the steel industry

- Sweden's "largest undeveloped quartz banded iron ore deposit"¹
 - M&I Resource²: 111Mt @ 28% Fe
 - Inf Resource²: 25Mt @ 28.3% Fe
- Potential to produce high-grade, low impurity concentrate
 - ~2.7Mtpa at >68% Fe
 - Further upgrade possible to >70% with low gangue
- Growing demand from domestic and international markets
- Well located for existing iron ore infrastructure
 - Rail within 40km and multiple port options
 - Access to low-cost, clean energy
- Exploitation concession received
- PFS and EIA well advanced
- Significant exploration upside

1: Government statement released on 18 January 2024

2: Based on 2021 PERC compliant Mineral Resource Estimate for Kallak North

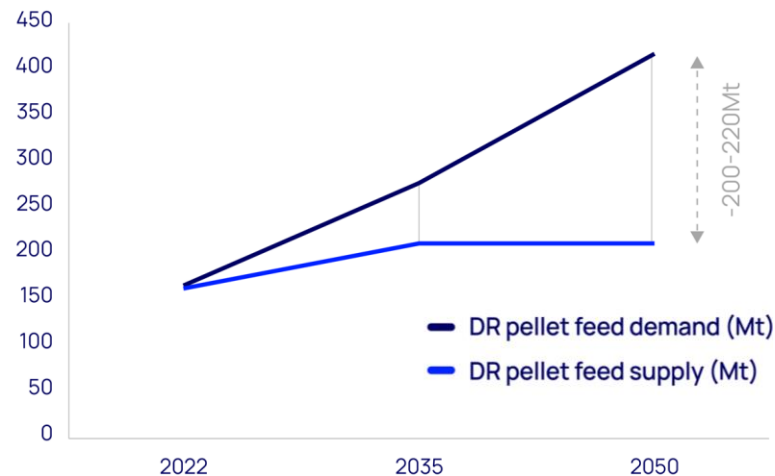


High-grade iron ore: demand forecast to grow

Decarbonisation of steel to drive demand of low carbon feedstocks, primarily DRI

Steel industry:	2023	2050
Global production (bt)	1.9	2.5
China production	54%	35%
India production	7%	20%
CO ₂ emission intensity (tCO ₂ /t steel)	1.4	0.6

- Steel industry currently accounts for ~7% of global CO₂ emissions
 - Industry targeting 60% decrease in CO₂ emission intensity by 2050 (and 90% by 2070)
 - Electric Arc Furnaces (EAFs) are replacing highly polluting Blast Furnaces (BFs)
 - Low-carbon feedstocks, primarily Direct Reduced Iron (DRI), will be essential to support EAF capacity
 - DRI produced with green hydrogen offers a real route to delivering low-carbon steel
- Source: IEA Sustainable Development Scenario



- DRI currently accounts for ~5% of supply to steel industry
 - Significant supply deficit forecast
 - Mines capable of supplying sufficiently high-quality material for DRI will not meet demand
 - DRI will also likely need to be produced from lower quality iron ore but at a cost
 - Supply constrains to drive premiums for high-quality concentrate
- Source: McKinsey , Wood Mackenzie

Location advantage

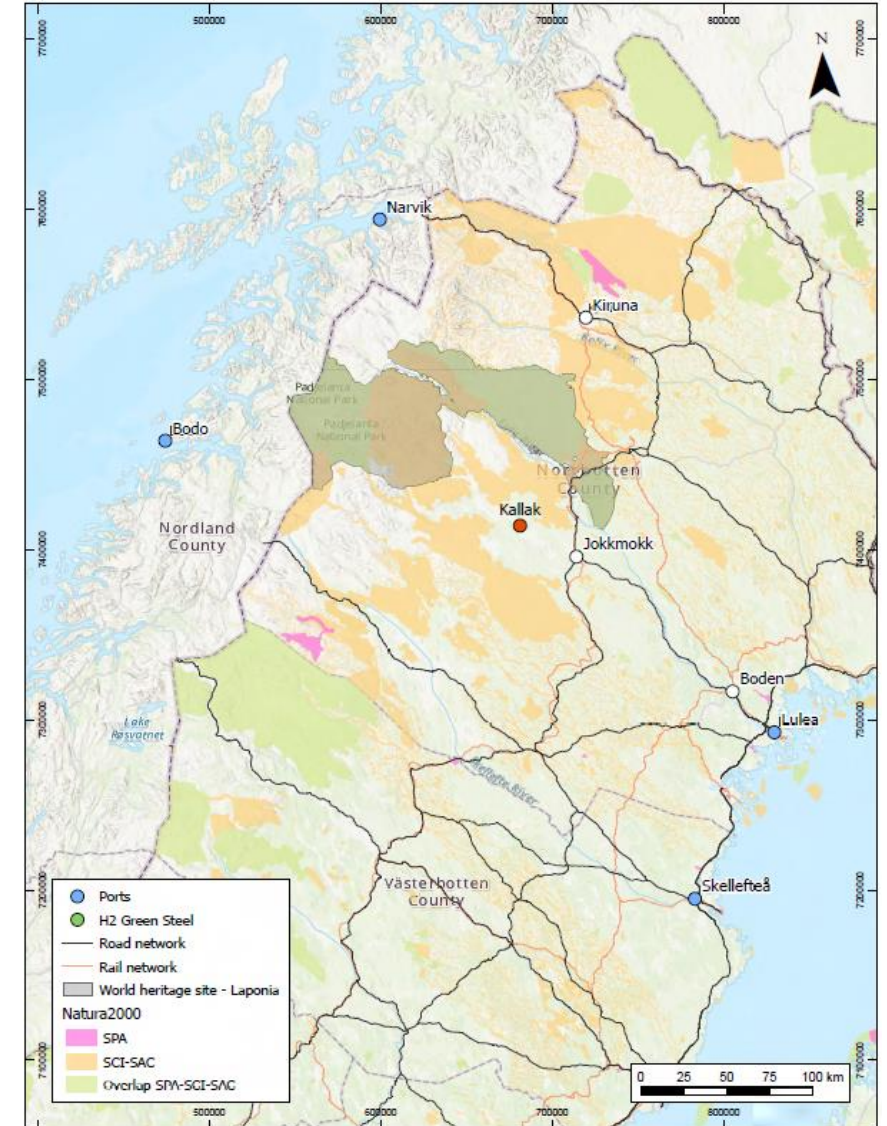
Well-located for domestic and international markets

Northern Sweden

- Multi-decade history of iron ore mining
- Skilled and experienced workforce
- Political support for sector
- Significant investment in Green Steel
- CBAM – a future benefit

Infrastructure advantages:

- Low-cost, clean energy
- Rail head 40km from project
- Multiple port options
- Domestic consumers



Kallak North Iron Ore Project

Scoping Study project parameters

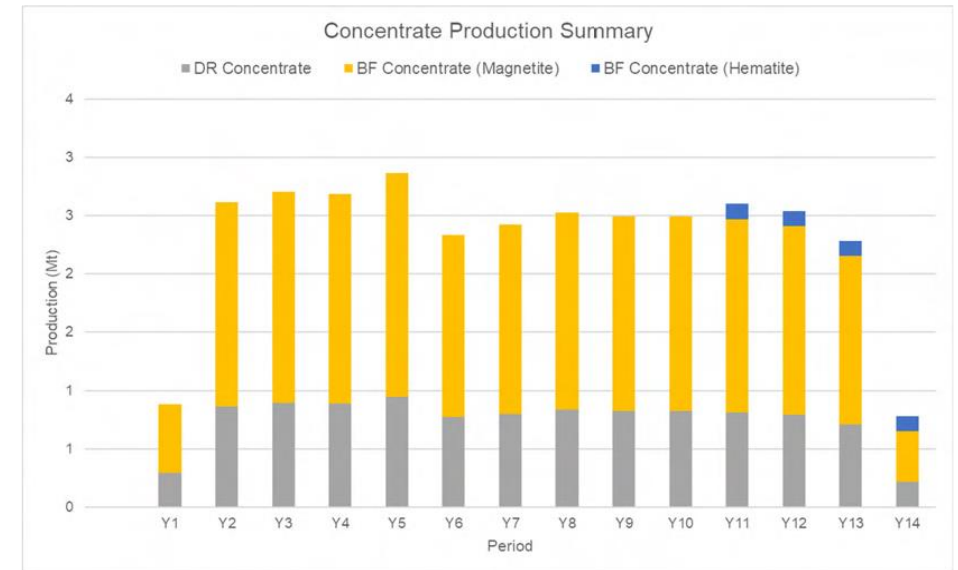
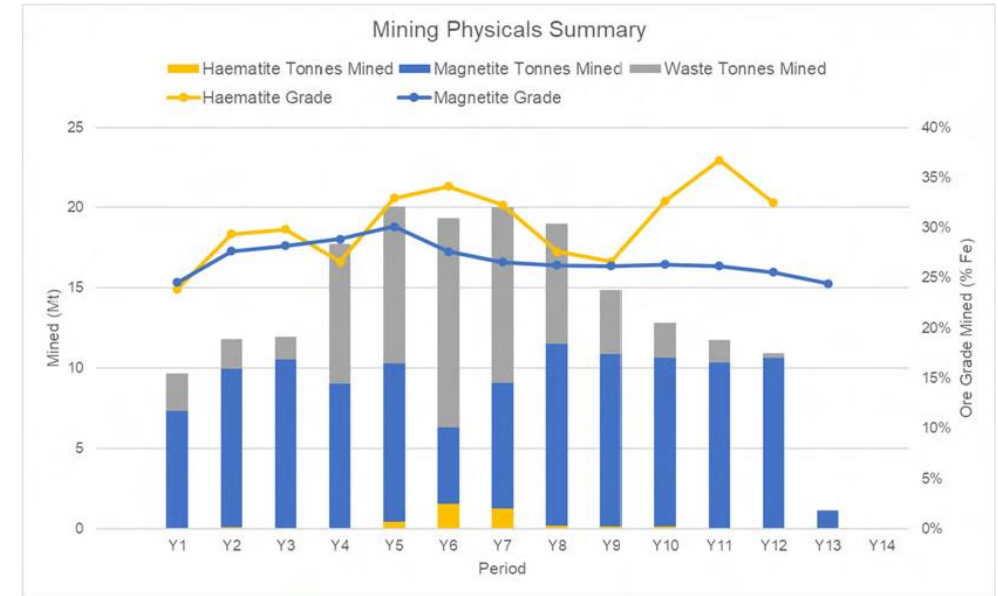
2023 Scoping Study completed on Kallak North Deposit:

- Open pit mine
- Mining ~9Mtpa of ore
- Producing ~2.5Mtpa of high-grade, low-impurity concentrate
- Initial 14 year mine-life

Physical Parameters	
Mining rate (Mtpa)	14
Total Ore Mined (Mt)	114
Strip Ratio (waste/ore)	0.5
Processing throughput (Mtpa)	9
Total concentrate produced (Mt)	32
Concentrate production (Mtpa)	2.5
Average concentrate grade (Fe %)	69%

Economic parameters	
Initial Capital (US\$m)	386
Contingency - 20% (US\$m)	77
Sustaining Capital (US\$m)	138
Mining costs (US\$/t mined)	2.85
Processing costs (US\$/t processed)	6.30
Transport & Logistics (US\$/t processed)	7.07
Other (US\$/t processed)	1.03
Total Operating Costs (US\$/t processed)	18.79

Source: Kallak North Scoping Study, January 2023



Current workstreams

Focus on developing a world class mine

Environmental:

- EIA consultation
- Nature values, biodiversity, water quality
- Hydrogeology
- Noise and vibration
- Air quality
- Cultural Heritage
- Reindeer Herding Analysis
- World Heritage Impact Assessment
- Social Impact Assessment
- Ecological compensation
- Ongoing stakeholder engagement

Spring 2025:

Submission of the Environmental Permit application

Technical:

- Infill drilling
- Mineral Resource Estimate
- Mine Planning
- Metallurgy & Mineral Processing
- Waste Management
- Infrastructure
- Logistics, transportation and Marketing
- Economic Analysis

Q2 2025:

Completion of the Pre-Feasibility Study

Kallak advantage

Targeting a premium product

Enhanced economics:

- Premium product - critical for decarbonising steel industry
- Highly sought after for domestic and international markets
- Focus on developing a sustainable world class mine
- Further upside potential from Kallak South deposits

Scoping study base case parameters			Management Case 3
NPV at 8%:	US\$177m	➔	US\$758m
IRR:	14.5%	➔	30.1%
Payback period:	4.5 years	➔	2.9 Years
Concentrate split:	67% BF ¹ , 33% DR ¹		67% BF, 33% DR
Iron Ore Price	US\$80/dmt ²		US\$125/dmt ³
BF premium:		US\$29/dmt ²	
BF price:	US\$109/dmt		US\$165/dmt
DR premium:		US\$45/dmt ²	
DR price:	US\$125/dmt		US\$181/dmt



Source: <https://tradingeconomics.com/commodity/iron-ore>

Notes:

1. BF - Blast Furnace feed and DR - Direct Reduction feed
2. Scoping Study pricing assumptions assume premia archived over Platts 62% Fe benchmark price of US\$80/dry metric tonne ("dmt")
3. Management Case assumes the same premia achieved as with Scoping Study but uses the 5-year average price to September 2024 of the Iron Ore 62% Fe CFR China of US\$125/t.

Exploration upside

Untested potential

Kallak North

- M&I resource¹: 111Mt @ 28% Fe
- Inf resource¹: 25Mt @ 28.3% Fe
- *Exploration target²: 3-7.5Mt @ 20-30% Fe*

Kallak South

- M&I resource¹: 21Mt @ 26.9% Fe
- Inf resource¹: 14Mt @ 24.9% Fe
- *Exploration target²: 25-75Mt @ 20-30% Fe*

Parkijaure 2

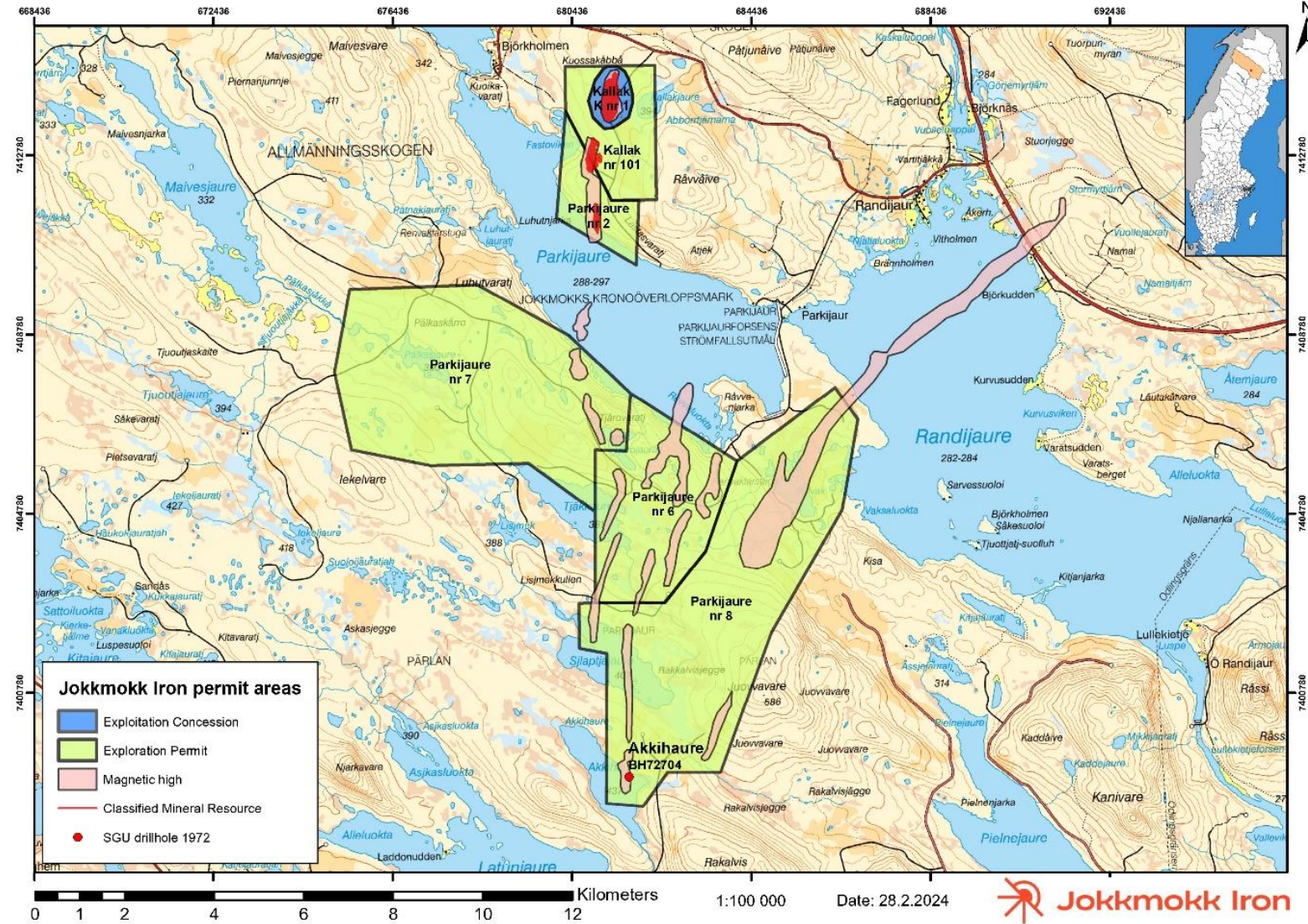
- *Exploration target²: 45-135Mt @ 20-30% Fe*

Parkijaure 6, 7, 8

- *Magnetic Anomaly: >6 times strike of Exploration Target*

1: Based on 2021 PERC compliant Mineral Resource Estimate

2: Defined as part of 2021 Mineral Resource Estimate





GRAFINTEC

Grafintec

Aiming to be a European leader in the sustainable supply of anode material



Anode Materials Production

- Development of anode materials production facility in Finland
- Established partnerships to provide an integrated solution
- Advanced discussions with several mines to secure supplies of imported raw material in the short term



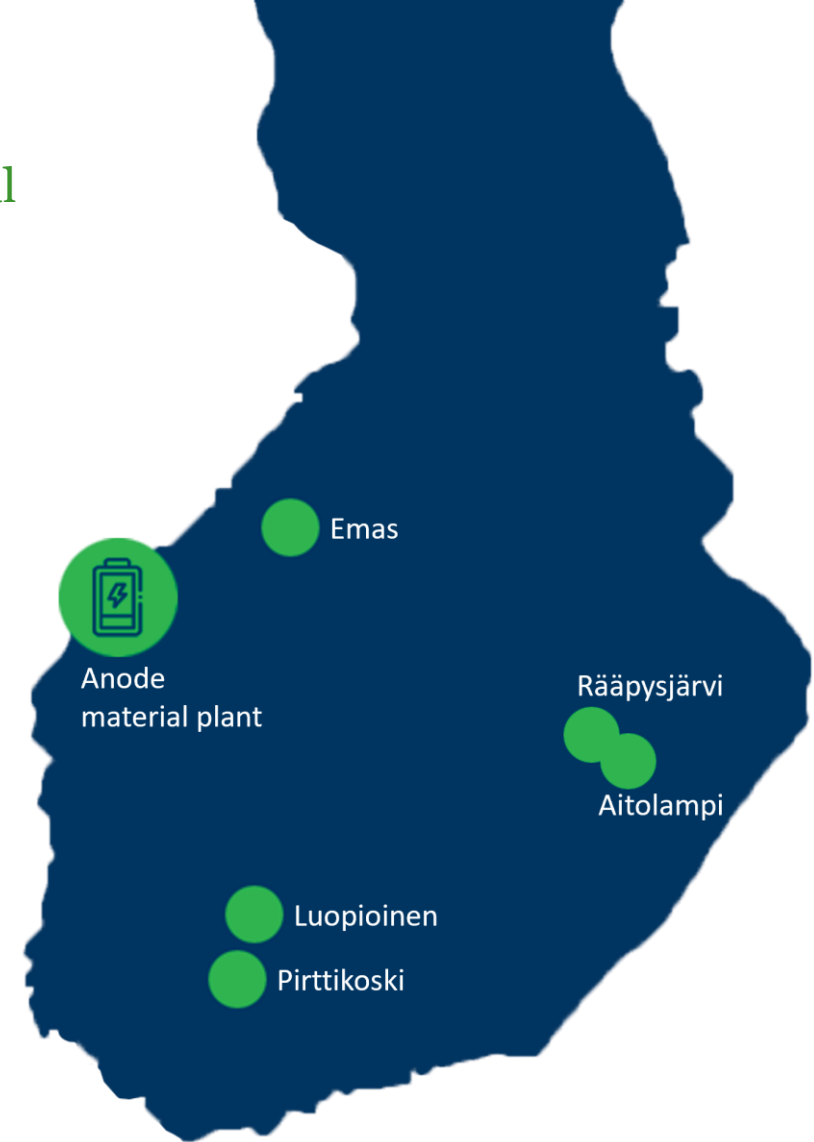
Primary Raw Material

- Aitolampi graphite project provides long-term security of supply
- Total Indicated and Inferred Mineral Resource of 26.7Mt at 4.8% for 1,275,000 t of contained graphite
- Exploration upside with other graphite prospects



Sustainability, Transparency and Security

- Sustainability focus
- Local/optimised/seamless/ESG certified supply chain
- Powered by renewable electricity
- Key role in the Finnish battery cluster

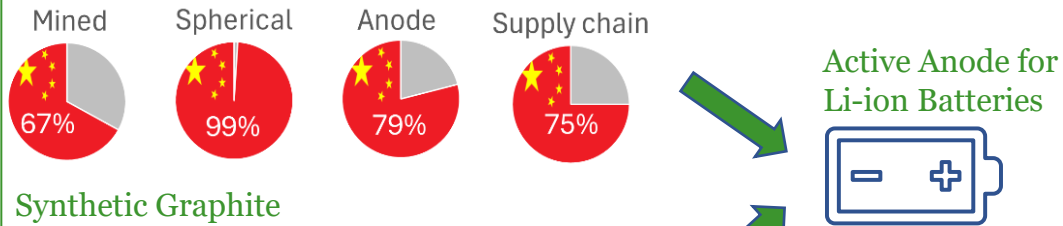


European graphite market

Supply / demand imbalance

China dominates current supply of Natural and Synthetic Graphite

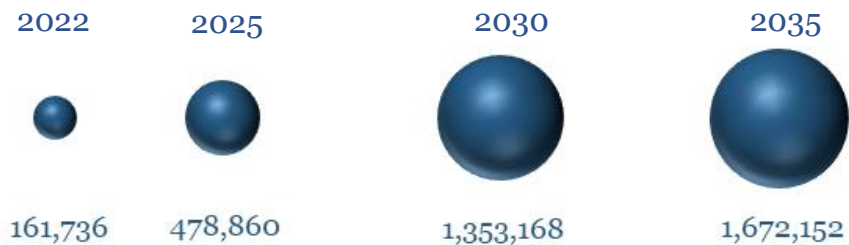
Natural Graphite



Synthetic Graphite



Forecast graphite demand for European Li-ion battery sector (t)



Natural Graphite offers significant environmental advantages over Synthetic Graphite

	Natural	Synthetic
Carbon Intensity (tonne CO ₂ / tonne uncoated graphite)	6.59	23.71
Estimated anode composition	56%	44%

EU Critical Raw Materials Act to secure EU supply:

- >10% extracted from EU
- >40% processed within EU
- >25% from recycling
- <65% from a single country

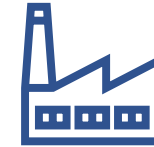


To meet CRM targets, the EU needs to:

- Mine >200,000 tpa by 2030 – currently no production
- Process >800,000 tpa by 2030 – currently no production

Graphite Anode Materials Production

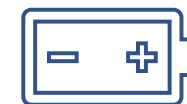
GigaVaasa Energy Industrial Hub



Dedicated Site
for Battery
Technologies



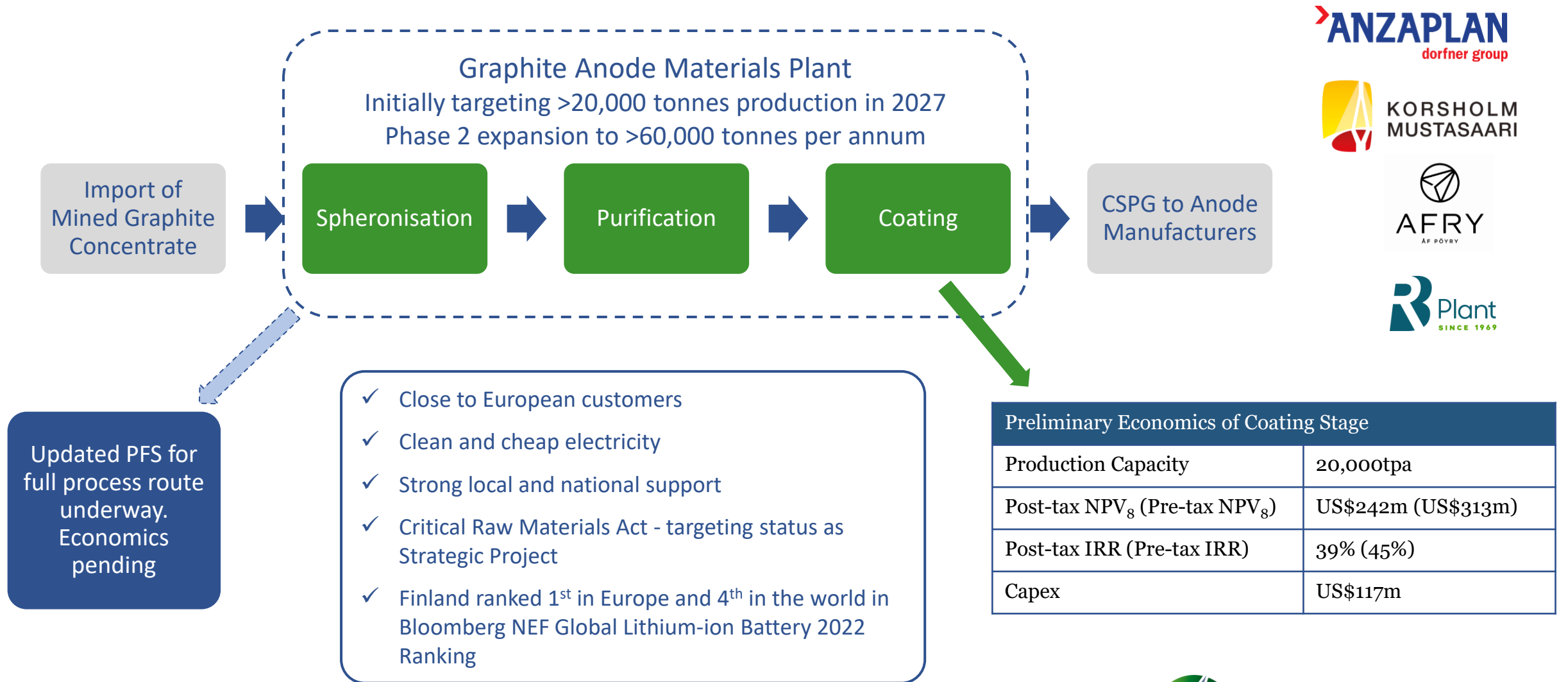
100%
Renewable
Energy



20,000 tpa
Graphite
anode

Graphite Anode Materials Production

Pre-Feasibility in progress



Development Timeline

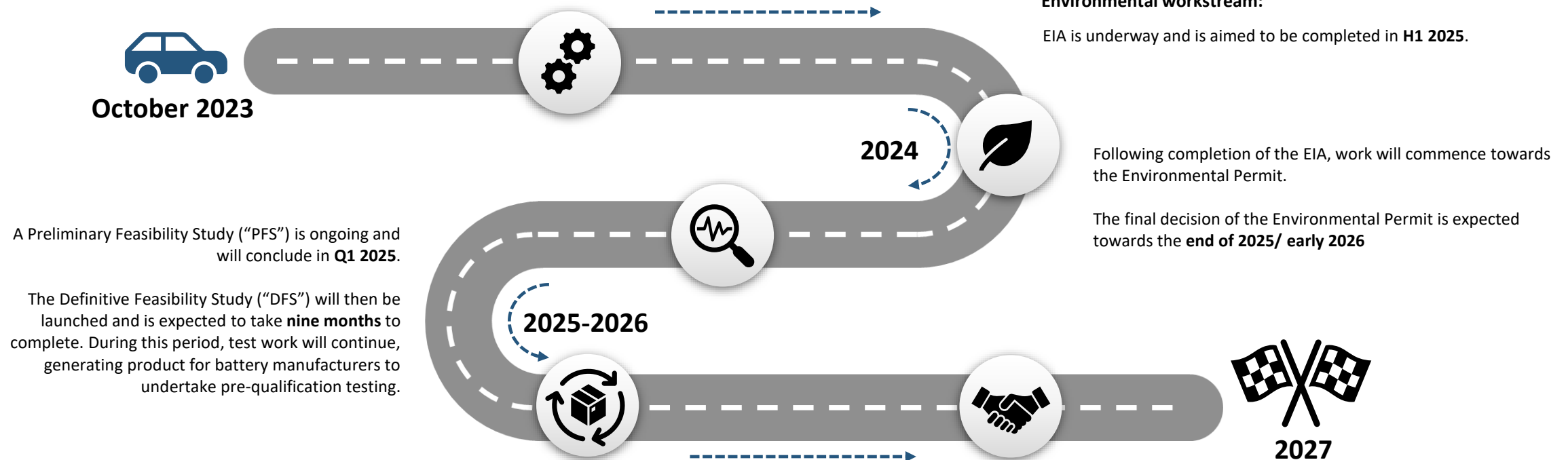
Environmental and Technical Workstreams

Technical workstream:

The project is advancing with bench-scale test work that commenced in October, which is to be followed by pilot-scale test work.

Environmental workstream:

EIA is underway and is aimed to be completed in **H1 2025**.



With the successful conclusion of the Environmental and Technical workstreams listed above, the GAMP project will enter Front-End Engineering Design (FEED), financing and ultimately construction phases with first production targeted for 2027.

Strategic resources

One of Europe's largest flake graphite deposits

Aitolampi

Mineral resource

- Indicated and Inferred 26.7Mt at 4.8% graphite for 1,275,000 tonnes of contained graphite (Indicated and Inferred)
- Several untested EM conductive areas

Metallurgical testwork

- 96.8% to 97.5% graphite concentrates produced suitable as a pre-cursor for graphite anode materials production
- Purification tests achieved >99.95% graphite
- Spheronisation and battery application tests completed

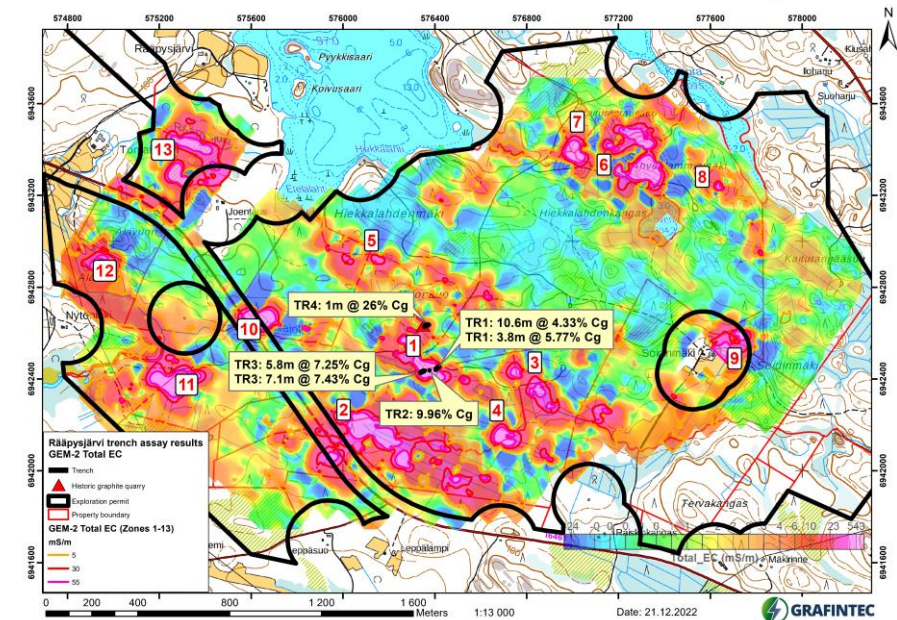
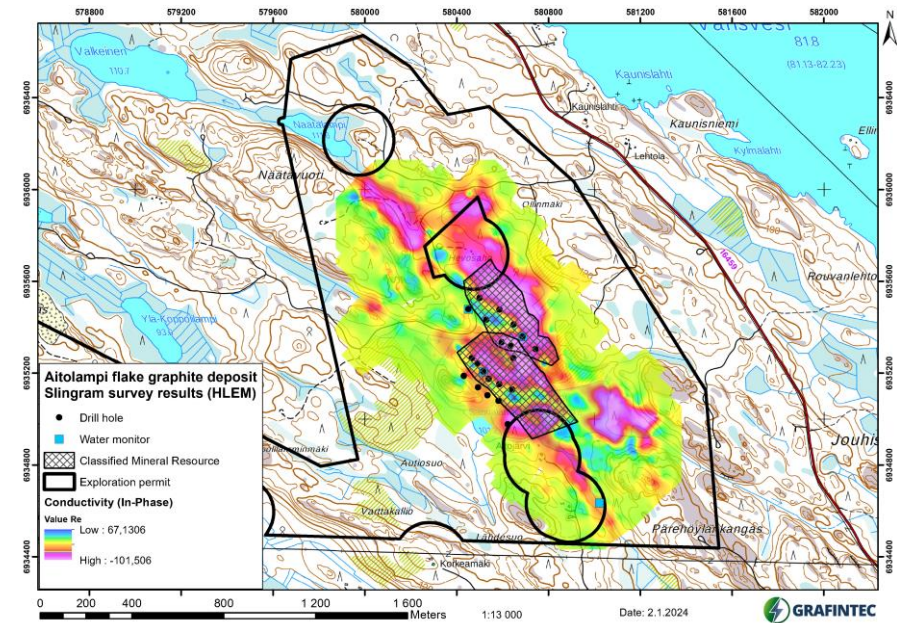
Rääpysjärvi

Exploration work

- Located 8km from Aitolampi
- EM conductive anomalies are more extensive - potential for a larger tonnage of graphite mineralisation in the area
- >50% graphite assayed (*limitation of the analysing methodology*) from grab sample at historic graphite quarry at Zone 1 - potential for localised very high-grade mineralisation
- Four trenches revealing significant flake graphite mineralization, including 1.0m at 26.00% graphite & 7.1 m at 7.43% graphite

Metallurgical testwork

- Composite surface grab sample with a head grade of 19.8% graphite
- 97.4% graphite concentrate produced with 18.8% in the large/jumbo flake fraction





Vardar – focused on discovery

Tethyan Belt – a major metallogenic province

Timok deposit (Zijin), Serbia:

- Zijin acquired Nevsun Resources Ltd. for US\$1.4b in 2018, after Nevsun acquired Reservoir Minerals Inc. for US\$365m in 2016
- Total resources of 1.8bt @ 0.9% Cu & 0.2g/t Au
- Forecast 2023 production of 3Mt for 181kt Cu & 156koz Au

Skouries deposit (Eldorado Gold), Greece:

- Total resource of 308Mt @ 0.6g/t Au & 0.5% Cu

Stan Terg mine (Trepca), Kosovo:

- Reported historic resource of 63Mt @ 3.5% Pb, 2.3% Zn & 80g/t Ag

Sasa deposit (Central Asia Metals), North Macedonia:

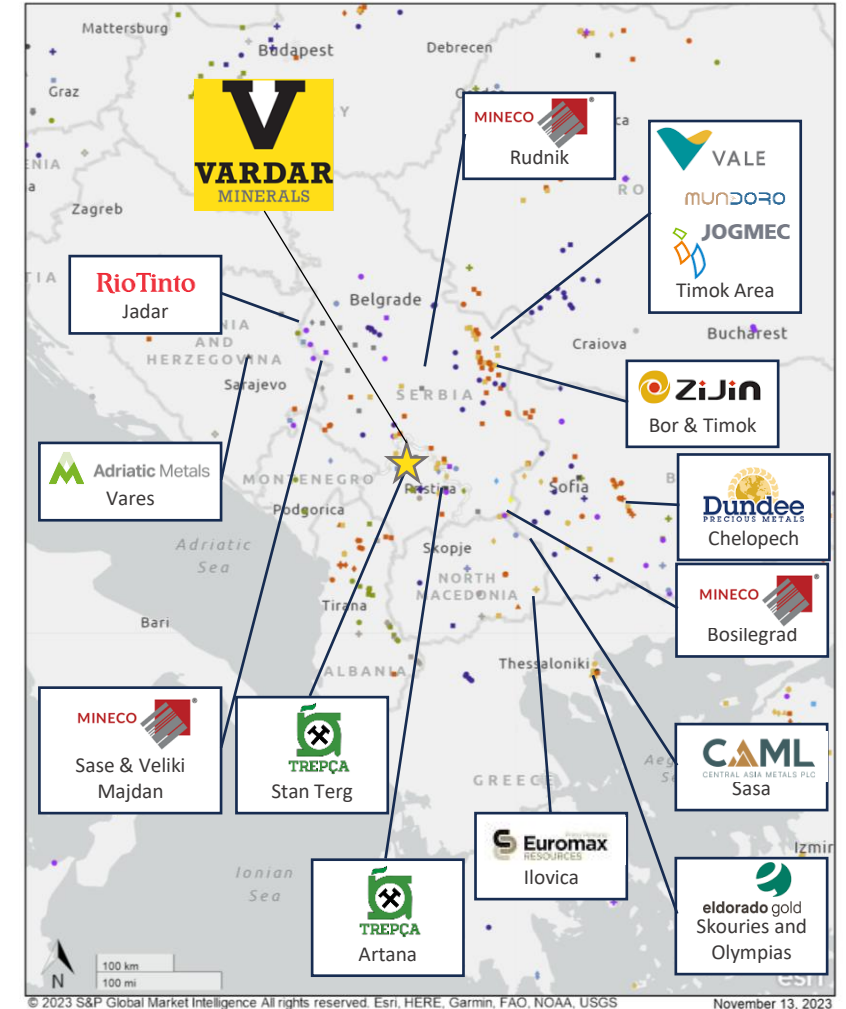
- Acquired for US\$402.5m in 2017
- Total resources of 22.3Mt @ 4.2%Pb, 2.5% Zn & 20.5g/t Ag
- 2022 production of 807kt @ 3.6% Pb & 3.2% Zn

Vares deposit (Adriatic Metals), Bosnia & Herzegovina:

- Targeting commercial production in Q4 2024, US\$244.5m finance raised
- Total resource of 21.1Mt @ 156g/t Ag, 4.3% Zn, 2.8% Pb, 1.2g/t Au, 0.4% Cu, 0.2% Sb & 27%BaSO₄
- Forecast production of 15Moz Ag equivalent pa for first 6 years

Jadar deposit (Rio Tinto), Serbia:

- Total mineral resource of 144Mt at 1.8% Li & 14.3% B₂O₃



Source: Company websites and reports



Vardar – systematic exploration

First-mover in highly prospective Kosovo

Kosovo:

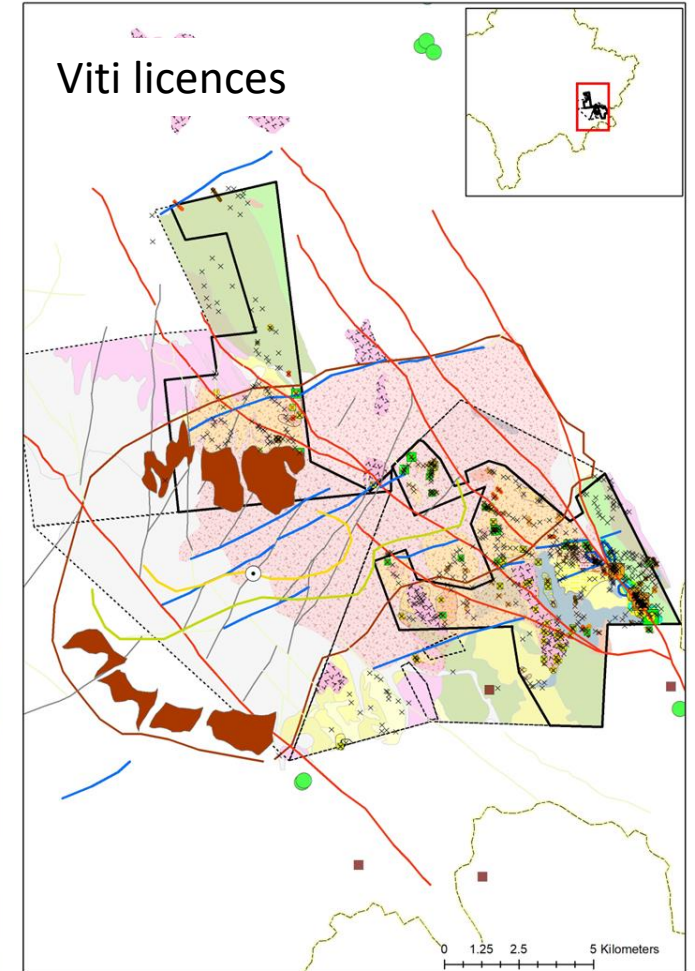
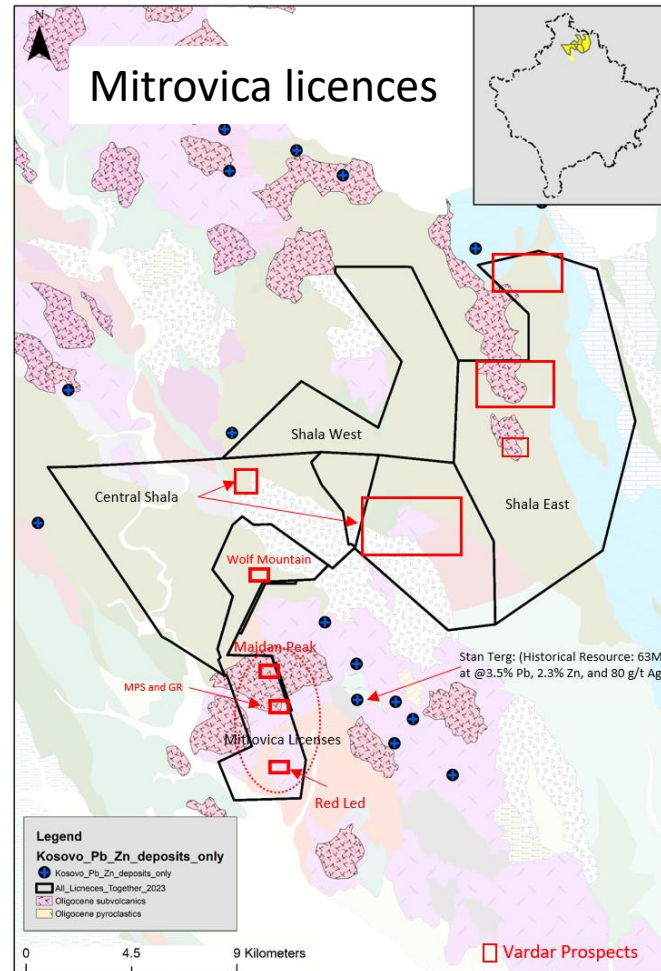
- highly prospective for base and precious metals
- limited to no exploration since the 1980s

Mitrovica licence area:

- km-scale hydrothermal alteration systems identified - comparable in size to world-class base and precious metals deposits
- multiple high-quality targets defined by mapping, geochemistry, geophysics and drilling
- Red Lead priority Zn target yet to be drilled, similarities and proximal to Stan Terg
- significant drill results to date include:
 - MP6: 10.8m at 0.48 g/t Au, 0.1% Cu and 18 g/t Ag
 - MP6: 6.8m at 4.1% Pb, 0.6% Zn and 15 g/t Ag
 - MP15: 44.4m at 0.2 g/t Au

Viti licence area:

- anomalous copper and gold from surface sampling and drilling
- potential for Jadar-like lithium mineralization - up to 1,260 µg/l Li and 10,500 µg/l B from spring water



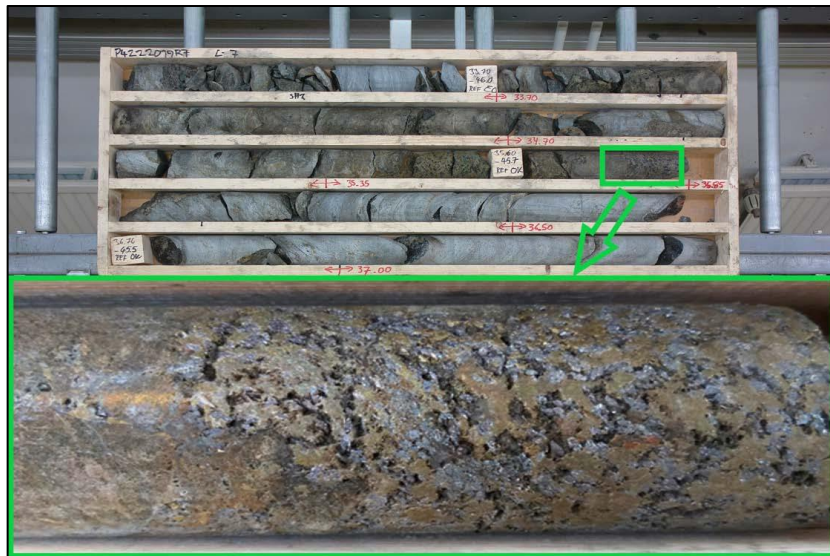
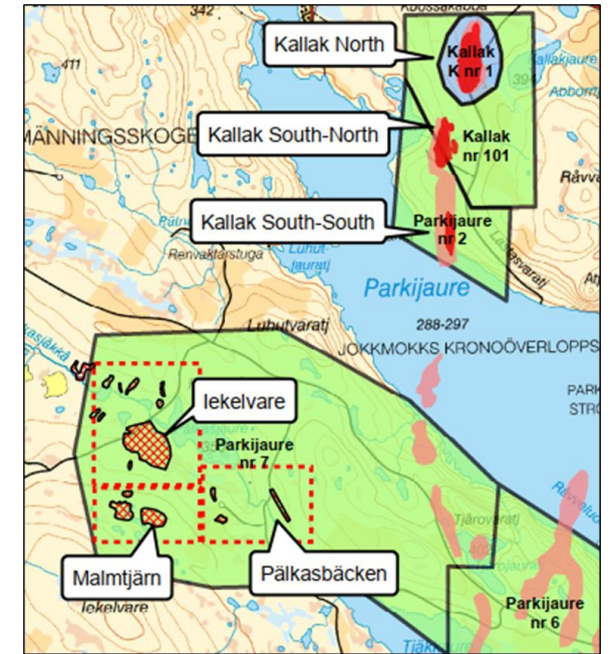
Note: The Mitrovica, Viti North and Viti East licences are currently under application

Exploration assets

Optionality and leverage

Parkijaure nr 7, Sweden – possible IOCG copper target

- **14.6% copper, 0.56% zinc, 119g/t silver and 0.35g/t gold** boulder sample (March 2024)
- **6.2m @ 1.53% Cu** from 133.08m (including **3.6m @ 2.45% Cu**) and **2.6m @ 0.96% Cu** from 95.59m in diamond drillhole 74002
- **110m of 0.42% Cu, 0.54g/t Au and 0.16% Zn** from 34.80m (including a higher-grade zone of **37.6m at 0.63% Cu, 0.87g/t Au and 0.21% Zn** from 91.4m) in diamond drillhole MAJ04001.
- 22.12 km² exploration license, 7 km to the south-west of the Kallak North Exploitation Concession



Emas, Finland – nickel-cobalt target

- **10.5 m @ 0.8% Ni and 0.11% Co** from 32.5m, incl. **2.15 m @ 2.79% Ni, 0.58% Co**, 0.14% Cu and 0.32 ppm Au from 33.7 m
- Identified by the Geological Survey of Finland (GTK) in 2019
- GTK completed ground magnetic, multi-frequency electromagnetic (EM) and gravity surveys before 2 drilling campaigns



Summary and Outlook

Right commodities, in the right place at the right time

Core assets supporting the Green Transition:

- Kallak has the potential to produce a market-leading, high-grade, low impurity iron concentrate
- Grafintec aims to develop graphite anode material plant and holds one of Europe's largest flake graphite resources
- Both assets completing PFS and EIAs

Prime location to establish secure European supply chains:

- Nordic assets are located close to leading Green Steel and Gigafactory investments
- Access to low-cost and clean energy, established infrastructure and skilled work force
- Kosovo is located at the heart of the highly prospective Tethyan Belt

Asset development aligned with demand fundamentals:

- Demand being driven by supply chain security and decarbonisation agenda
- Core assets at major de-risking inflection points, exploration portfolio provides optionality
- Value driven by forecast supply deficits in core minerals



An aerial photograph of a wind farm. In the foreground on the right, a large white wind turbine is partially visible, showing its nacelle and a blade. The rest of the farm consists of several other white turbines scattered across a vast green field. A dirt road winds through the field. In the background, there are rolling hills, a small town or village, and a large industrial or agricultural building. The sky is bright and clear, suggesting a sunny day.

Appendices

Corporate summary

Experienced Board & Management

Market Data (as at 3 January 2025)	
Listing	AIM/ Spotlight
Ticker	BEM/ BEO
Share price	14.5p/ SEK 2.12
Shares outstanding	38.8 million
Market Capitalisation	£5.6 million
Cash (30 September 2024)	£1.8 million
Debt (30 September 2024)	Nil
Shares held in Sweden	81%
Average daily volume (LTM)	94,000



Johan Röstin

Non-Executive Chairman

Former CEO of shipping and port companies with significant experience in infrastructure, logistics, capital investments and permitting processes



Ed Bowie

Chief Executive Officer

Over 20 years' experience in corporate, advisory and fund management roles and across a broad range of commodities and jurisdictions



Mikael Schauman

Non-Executive Director

Former SVP Commercial for Lundin Mining responsible for worldwide sales, with more than 40 years' experience of base metals



Chris Davies

Non-Executive Director

Exploration geologist with over 40 years' experience across multiple commodities and jurisdictions



Dmytro Siergieiev

Project Director, Kallak

Former team leader of Sweco's mine environment team with extensive experience in environmental and permitting assignments



Rasmus Blomqvist

MD, Grafintec

Exploration geologist with significant experience across Scandinavia. Founder of Grafintec



Supply chain security

Political initiatives

EU Critical Raw Materials Act to secure EU supply:

- >10% extracted from EU
- >40% processed within EU
- >25% from recycling
- <65% from a single country



US Inflation Reduction Act (IRA) to support clean-energy industries and supply chains:

~US\$370 billion in spending and tax credits



EU's Carbon Border Adjustment Mechanism (CBAM):

- Carbon tariff on industrial goods entering the EU



UK Critical Minerals Strategy



Canada's Critical Minerals Strategy



Australia–India Critical Minerals Cooperation Agreement



US–Japan Critical Minerals Agreement on battery minerals (lithium, nickel, cobalt, graphite and manganese):

- to help Japanese automakers and critical minerals processors access the benefits of the 2022 US Inflation Reduction Act.



The Indian Ministry of Mines JV company, Khanij Bidesh India Ltd. (KABIL) to ensure the supply of critical minerals:

- actively seeking offtake agreements and has already signed with Argentina and Australia



Minerals Security Partnership (MSP)

- led by the US Department of State, to stimulate government and private-sector investment
- Partner governments include Australia, Canada, Finland, France, Germany, Japan, South Korea, Sweden, the UK, the US and the EU.



Supply chain security

Driving investment in critical minerals




PORSCHE
Supply agreement from 2026
H2 **green steel**
October 2023

V O L V O
Supply agreement from 2026
H2 **green steel**
September 2023



€9.2m investment for 11.5% and 40% offtake for 5 years

April 2023



Mercedes-Benz
10ktpa of lithium hydroxide for 5 years' worth ~€1.5b
RockTech
Lithium
October 2022


TESLA
75kt nickel concentrate over 6 years


January 2022



US\$2.9b battery JV

October 2023



Mercedes-Benz
JV on battery recycling plant

August 2023



general motors
US\$650m investment
LithiumAmericas
January 2023



€50m investment for 8%

June 2022

Renault Group
6-17ktpa of lithium offtake

August 2021



US\$155m investment for 14.2%

October 2023



SCANIA
Supply agreement from 2027
H2 **green steel**
June 2023



US\$30m and 45ktpa manganese sulphate offtake for 5 years

January 2023

Renault Group
5ktpa of cobalt sulphate for 7 years

June 2022

Renault Group
Nickel sulphate supply for 200,000EVs or 15GWh pa
Terrafame
October 2021



Scandinavia benefits from cheap, clean energy

Driving both Green Steel and Gigafactory investment

Steel industry

- 7% of global CO2 emissions (5% in EU)
- €130b annual revenues in Europe
- Employs 306,000 people in Europe

Green Steel – reduces emissions by ~95%

H2green steel

€1.5b equity in Sept 2023
€3.5b of conditional debt commitments
Located in Boden, 170km from Kallak

 **BLASTR**
Green Steel

Targeting €4b plant in Finland
Plan to build pellet plant in Norway

HYBRIT
▶▶ FOSSIL-FREE STEEL

JV between LKAB, SSAB and Vattenfall
Targeting production by 2030

Giga factories

- 40 plants for €30b planned in Europe
- 69GWh in 2022
 - 238-286GWh in 2025
 - 413-616GWh in 2027
 - 773-1,395GWh in 2030

northvolt

€17.3b capital raised
€27b in contracts secured (€14b Volkswagen)

FREYR

Initial plant at Mo i Rana, Norway
Further plant considered in US and Vaasa, Finland

MORROW

Initial plant at Arendal, Norway in 2024
Targeting 43GWh by 2028

V O L V O

Planned site with Northvolt in Gothenburg



High-grade iron ore: demand forecast to grow

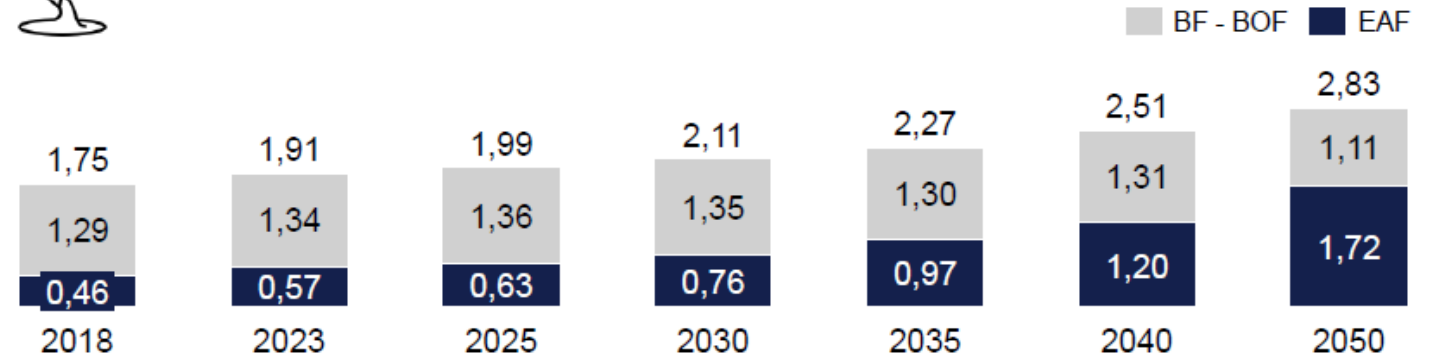
Decarbonisation of steel to drive demand of low carbon feedstocks, primarily DRI

- Electric Arc Furnaces (EAFs) are replacing highly polluting Blast Furnaces (BFs)
- Low-carbon feedstocks, primarily DRI, will be essential to support EAF capacity.
- DRI produced with green hydrogen offers a real route to delivering low-carbon steel
- New hubs will develop in countries with abundant low-cost renewables energy and competitive green hydrogen capacity

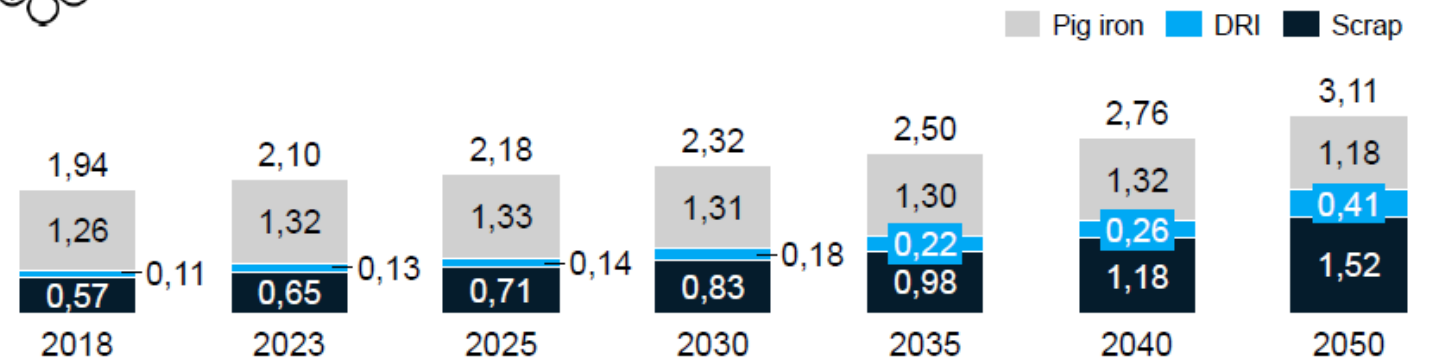
Source: Wood Mackenzie, Fastmarkets and Emirates Steel



Crude steel production, bn tons

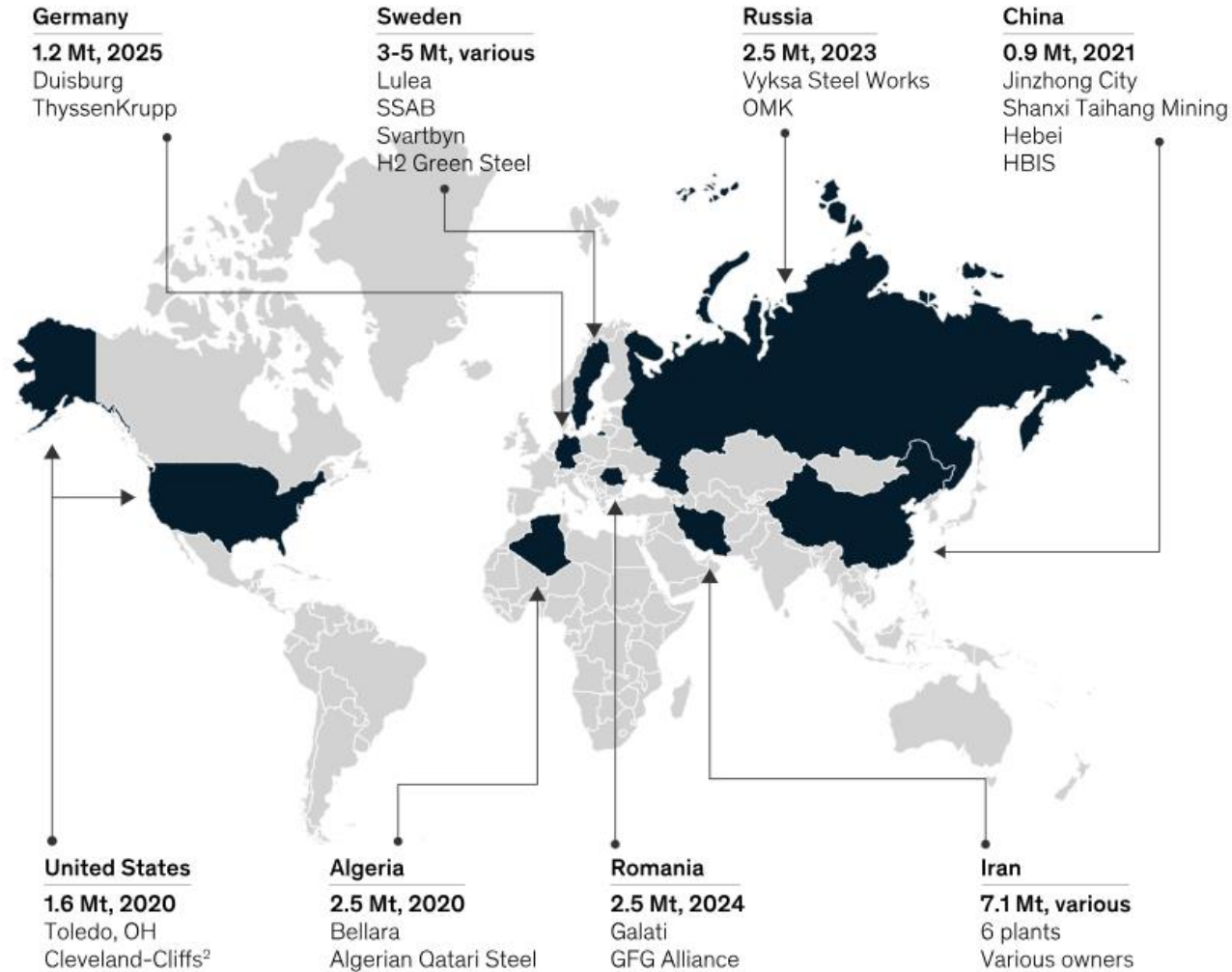


Metallics consumption, bn tons



Forecast growth in steel from DRI

Planned and under-construction DRI plants and capacity¹



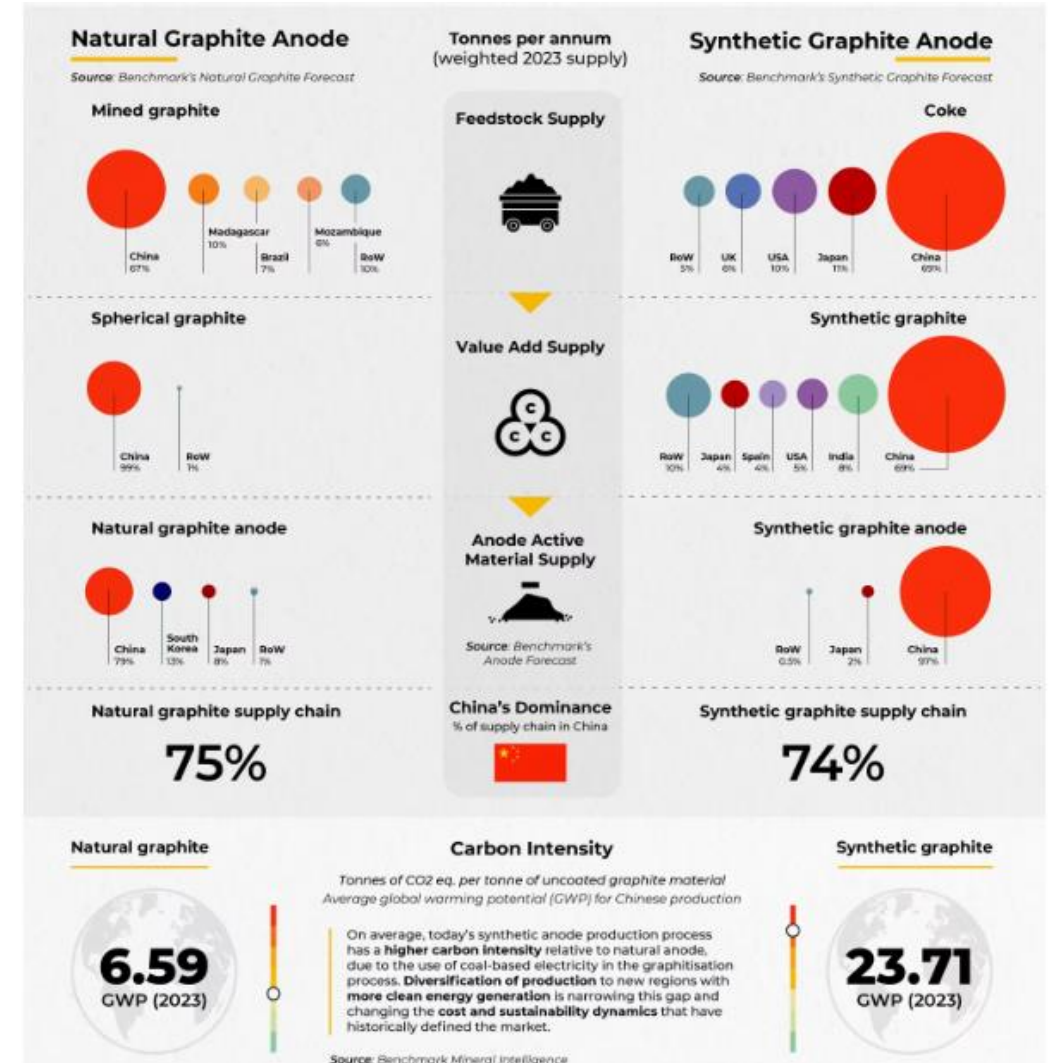
- 1 Estimated metric tonnes of steel based on DRI capacity, expected utilization, and raw material yields
- 2 Began operations in 2020

Source: McKinsey & Company

Global Graphite Supply

Dominated by China

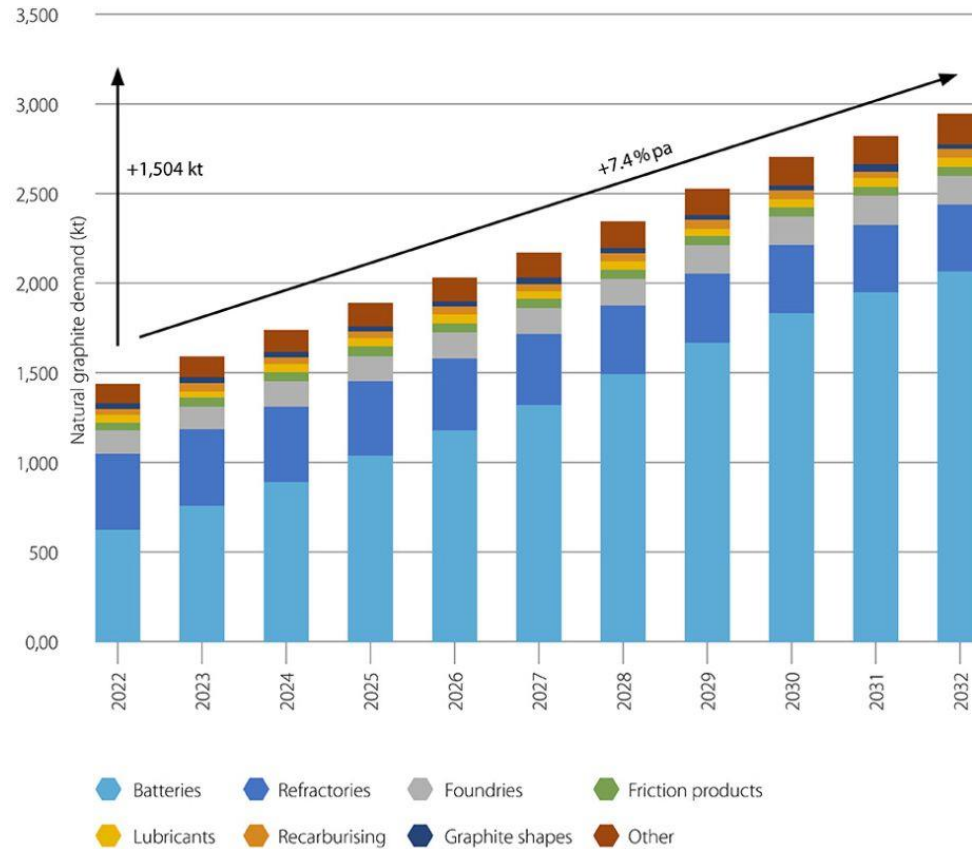
Top 10 Producers of Natural Graphite



Global Graphite Demand

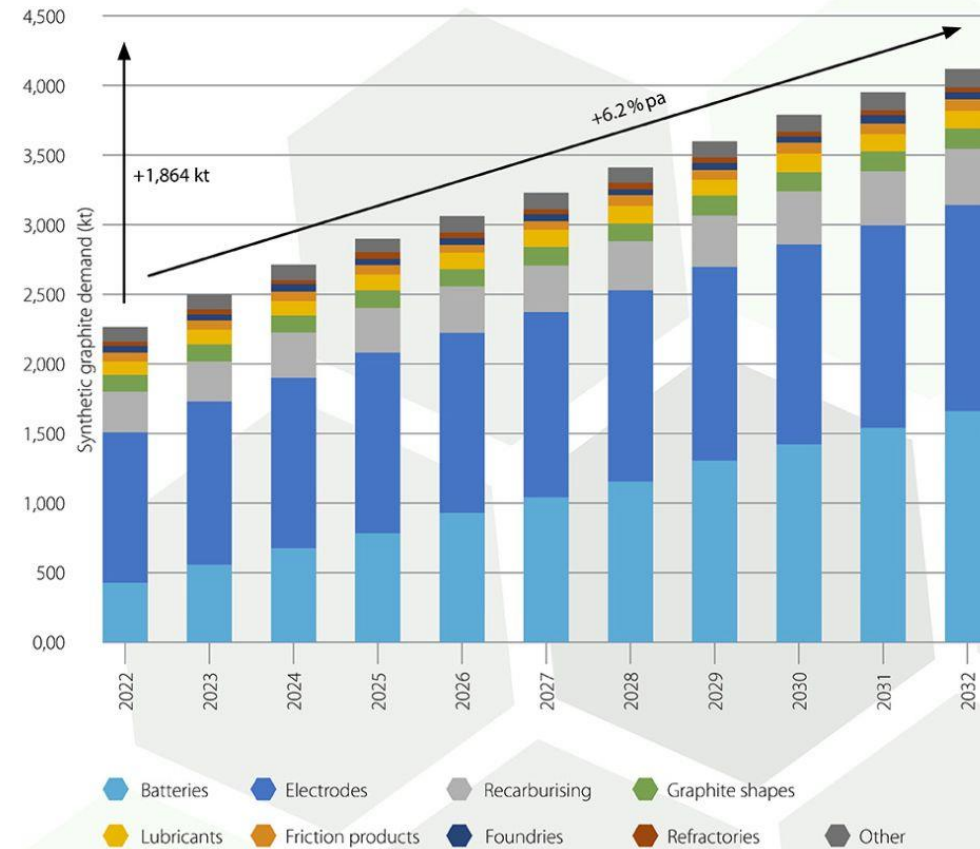
Dominated by China

Global demand of natural graphite



Source: Wood Mackenzie

Global demand of synthetic graphite



Source: Wood Mackenzie



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