

# Helping secure the graphite anode supply chain for Europe's EV industry

Master Investor, EV Economy, January 18, 2024

**GREENROC**  
MINING PLC

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# GreenRoc Mining Plc

## Key Information

Ticker	GROC.L
Index	AIM
Shares In Issue	165,114,452
Share Price*	2.6 pence
Market Capitalisation*	£4.3 million

## Significant Shareholders\*

Alba Mineral Resources	38.17%
Kadupul Limited	12.72%
Monecor (London) Limited, t/a OvalX	3.09%
Securities Not In Public Hands	52.40%

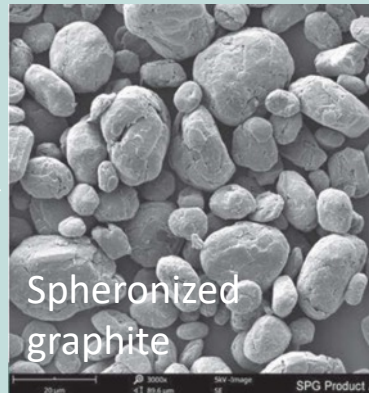
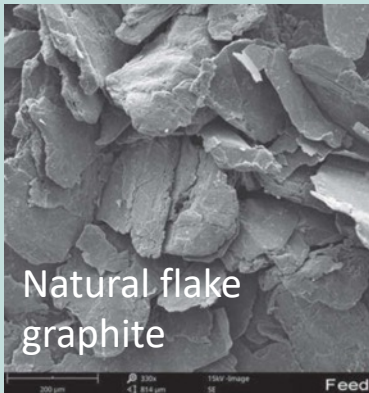
\*As of January 11, 2024



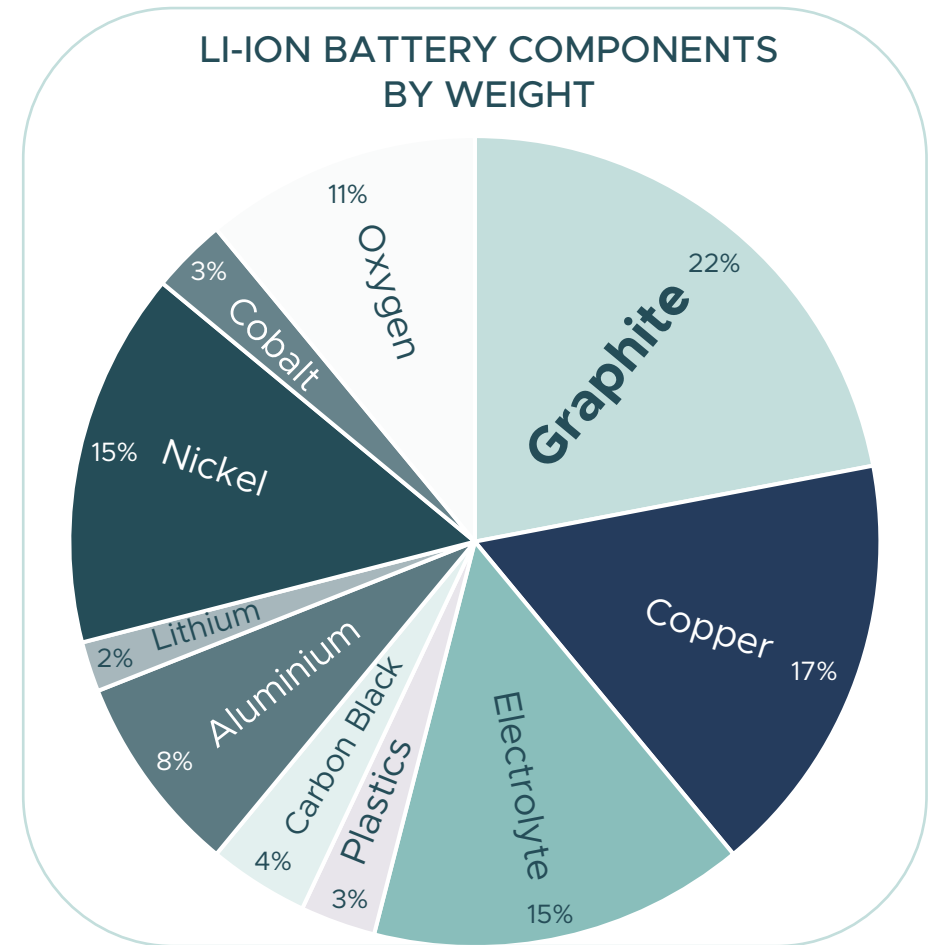
# Electric car batteries need graphite for their anodes

- EV Li-ion batteries contain more graphite than any other raw materials component by weight\*
- An average EV battery carries 40-80kg of coated high purity spherical graphite (cSPG) active anode material (AAM) or ca. 1kg per kWh
- Production of 1kg cSPG requires 2-3kg flake graphite\*

China is world leader supplying 100% of cSPG for European LIB GigaFactories – no European domestic production



\*The Hague Centre for Strategic Studies, Graphite, 2022



American Chemical Soc.

cSPG: coated spherical purified graphite is an active anode material (AAM)

# Threat to graphite supply security

China introduces restrictions on the export of all kinds of battery grade graphite from 1 Dec 2023

## China's natural graphite market share



~60% of global natural graphite



~99% of natural graphite pre-AAM



~90% of natural graphite AAM

## China's synthetic graphite market share



~57% of global synthetic graphite output



~95% of synthetic AAM output

## China's graphite active anode material market share



~93% of global AAM production

*Fastmarket Battery Materials Webinar, Nov. 2023*

*China's move highlights the importance of establishing reliable, long-term coherent and integrated supply chains for European and American Gigafactories*

October 20, 2023 FINANCIAL TIMES

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US-China trade dispute Added

### China imposes export curbs on graphite

Restrictions on critical electric vehicle battery material set to escalate trade tensions with US



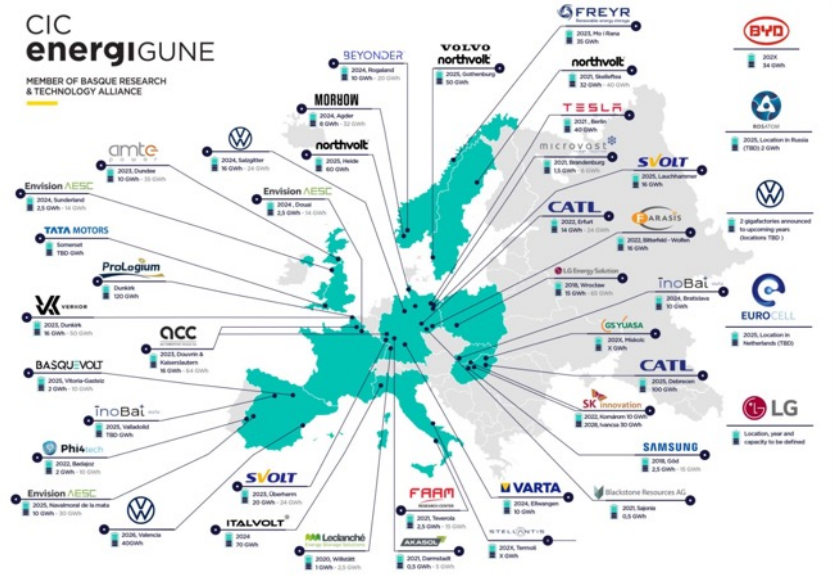
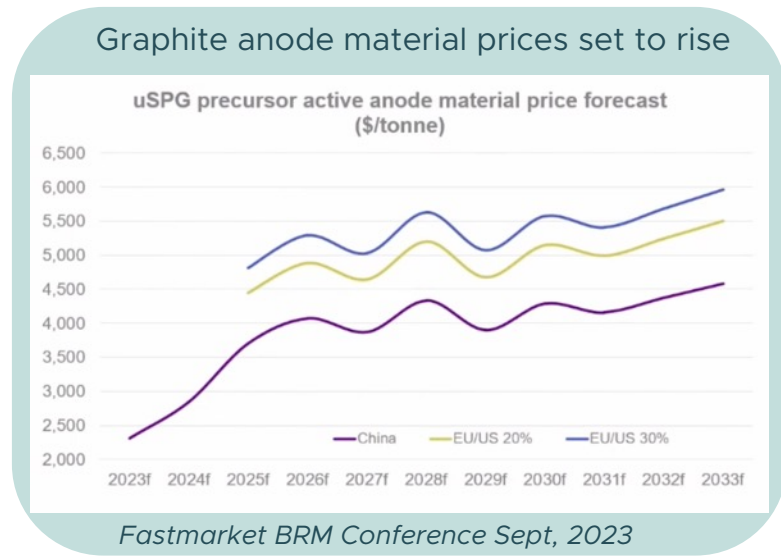
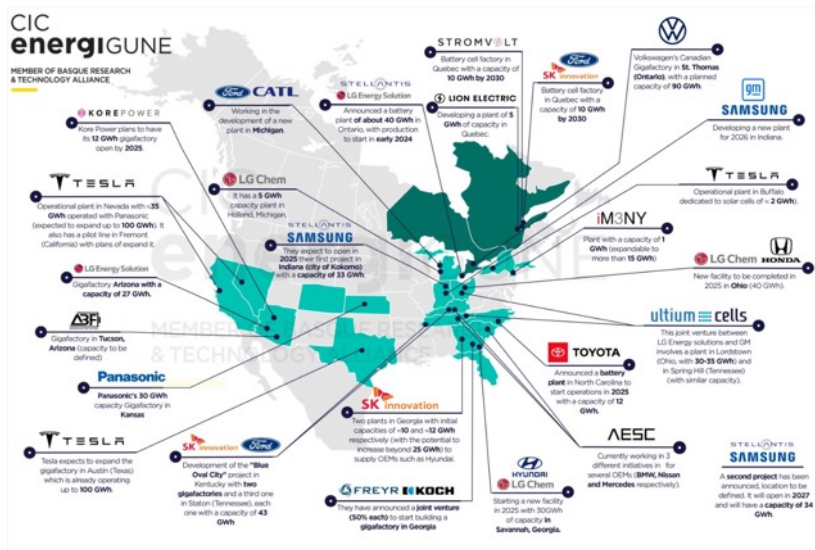
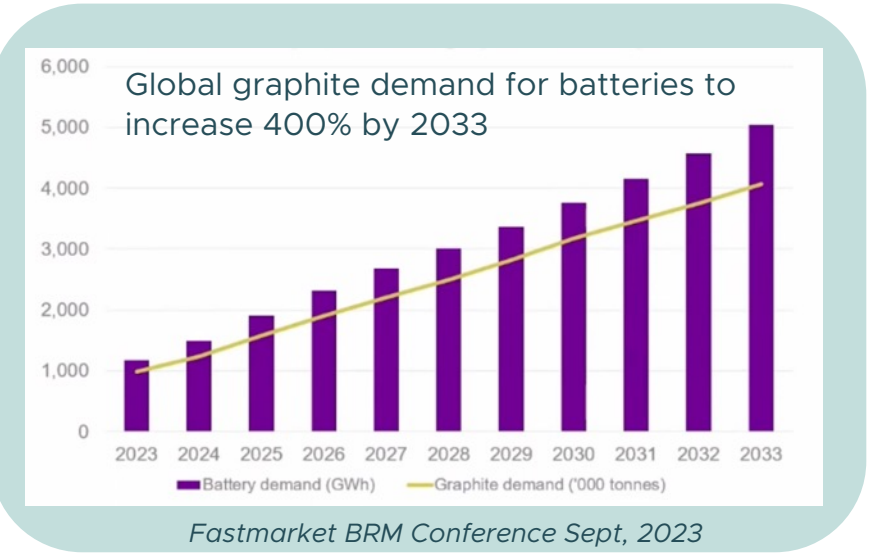
Car battery modules at BMW's factory in Dingolfing, Germany. Graphite is a key material in electric-vehicle batteries © Krisztian Bocsi/Bloomberg

Edward White in Seoul, William Langley in Hong Kong and Harry Dempsey in London  
OCTOBER 20 2023 157

# EV battery sector growth

- By 2030, more than 40 gigafactories with a total capacity of nearly **1.0 TWh\*** will be in production in **Europe**
- In **USA**, nearly 30 gigafactories will be in production by 2030 with a capacity of **0.8 TWh\*\***
- Unlike most other components in Li-based batteries, **graphite anode material cannot be recycled**

\*Data from Faraday Institute, UK, May 2022; \*\* CIC Energigune



# GreenRoc's role in the graphite anode supply chain – **producing and processing**

Production of graphite concentrate at Amitsoq, Greenland

Processing Amitsoq graphite into AAM at a plant in Greenland/N Europe/N America

Mining



Concentration



Spheronisation



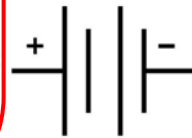
Purification



Coating



Anode



Battery



Qaanaaq

Upernavik

Uummannaq

Ilulissat

Aasiaat

Sisimiut

Maniitsoq

Tasiilaq

Nuuk

Davis Strait

Paamiut

Narsaq

Qaqortoq

Nanortalik

0Km 250Km 500Km

**Amitsoq**



# GreenRoc's role in the graphite anode supply chain – **producing graphite concentrate**

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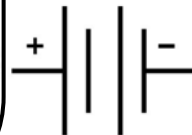
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Coating



Anode



Battery



Qaanaaq

Upernavik

Uummannaq

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Sisimiut

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Nuuk

Davis Strait

Paamiut

Narsaq

Qaqortoq

Nanortalik

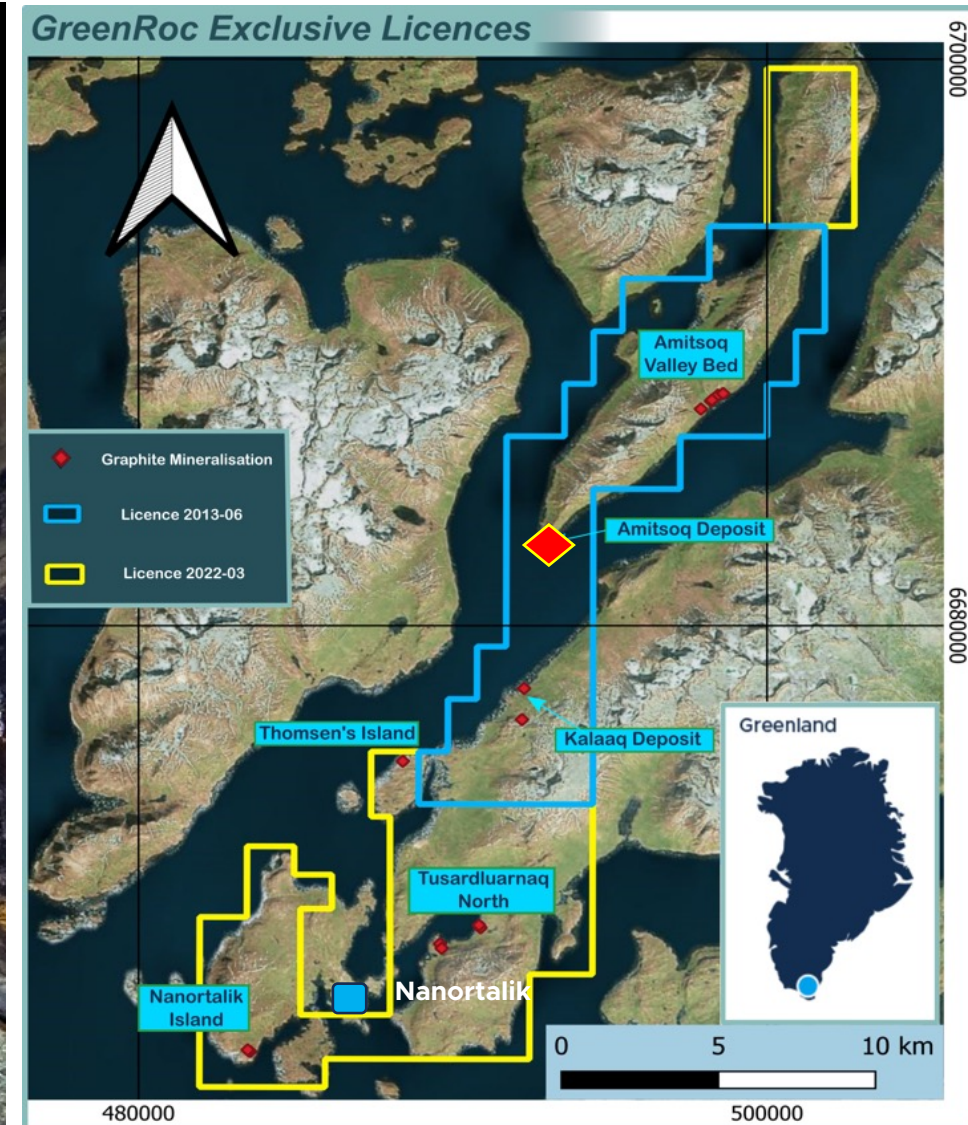
0Km 250Km 500Km

**Amitsoq**

# The source of our Graphite: Amitsoq - A World-Class Deposit

## Amitsoq: a producing graphite mine 1914-1922

- Two drilling phases conducted in 2021 and 2022 defines Mineral Resource
- Two main orebodies: Upper Graphite Layer (UGL) and Lower Graphite Layer (LGL)
- Consistent mineable widths of 3-8m in UGL and 5-15m in LGL– and in places up to 20m widths
- Deposit remains open in three directions – potential for further significant resource upgrades



# Amitsoq: World-class grade and tonnage

Large deposit

World Class grades

Mining friendly Jurisdiction

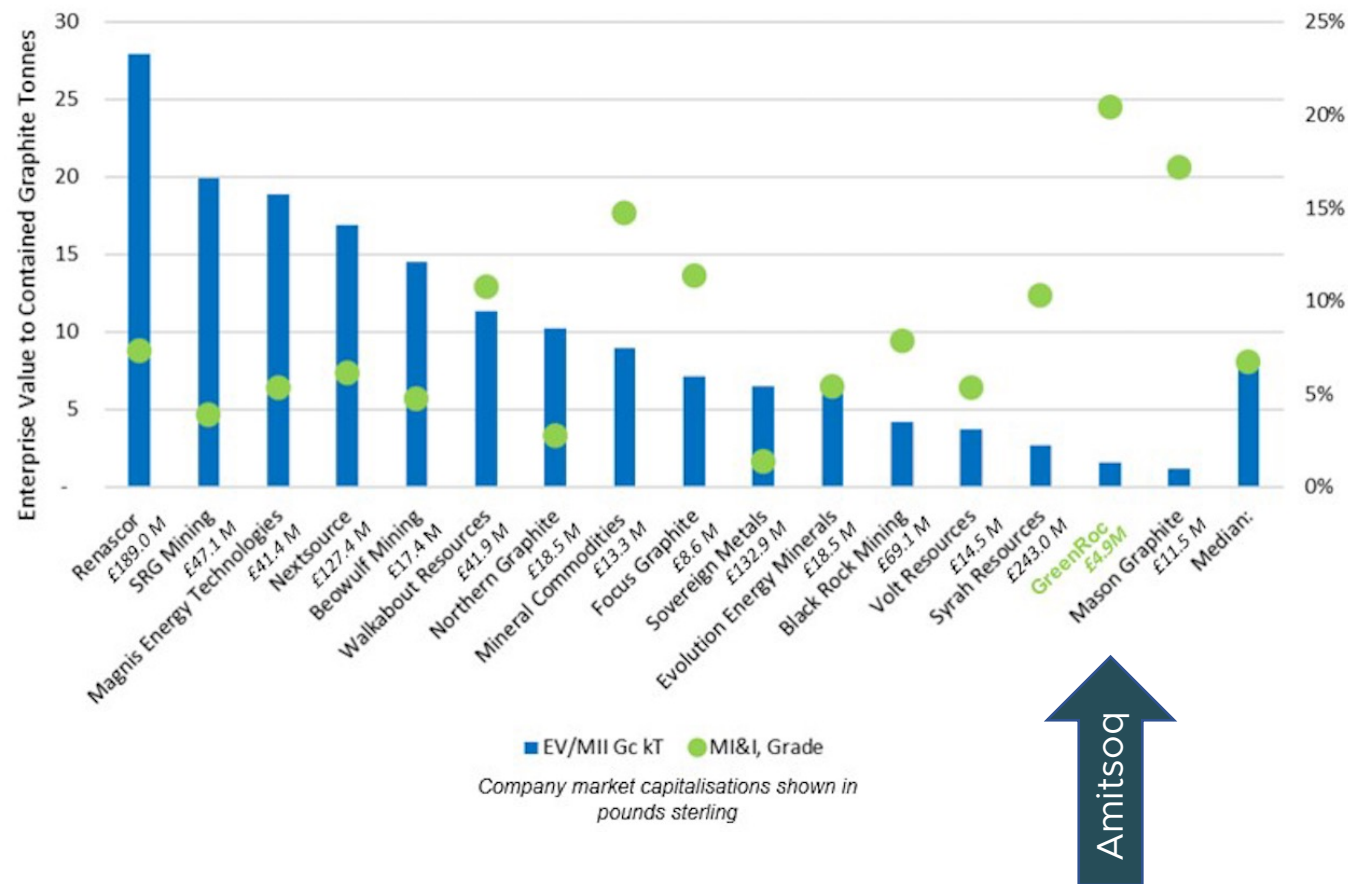
Convenient Location

Enterprise greatly undervalued

## JORC Resource estimate, January 2023

2023 Resource Update	Mt ore	%C(g)	Mt graphite
Measured	1.26	22.05	0.28
Indicated	6.12	21.04	1.29
<b>Total Measured + Indicated</b>	<b>7.38</b>	<b>21.21</b>	<b>1.57</b>
Inferred	15.67	20.04	3.14
<b>Total Resources</b>	<b>23.05</b>	<b>20.41</b>	<b>4.71</b>

Enterprise value/contained graphite tonnage multiples vs grade

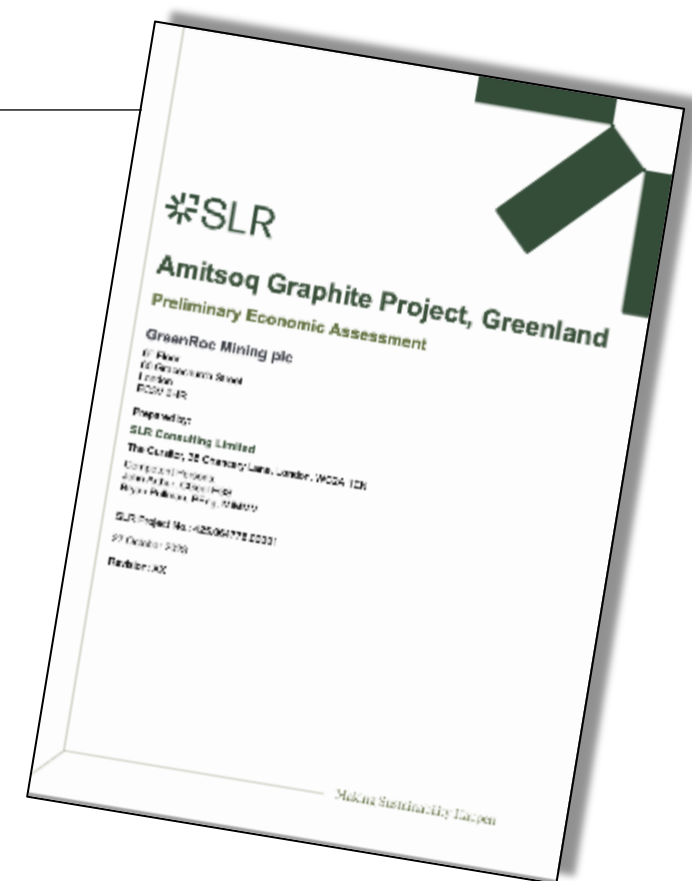


Source: Bloomberg/SP Angel/ Company filings

# Amitsoq Project Economics

Preliminary Economic Study (PEA) published 31 October 2023  
*“Confirms robust economics for Amitsoq Graphite Project”*

- Initial capital cost (Capex): US\$ 131M inclusive of 25% contingency
- Av. operating costs (Opex): US\$ 121/t of milled ore, including shipping
- Av. annual production of 77,000t concentrate of >94% graphite
- Cut-off grade of 18.7% graphite
- Av. Net Revenue is US\$ 89.8M per year throughout the 22-year mine life
- 4-year payback period after production start
- Life of mine (LOM) is 22 years with potential extension



<b>Pre-Tax IRR</b>	<b>31.1%</b>	US\$ '000
Pre-tax <b>NPV</b> at 6% discounting		<b>314,441</b>
Pre-tax <b>NPV</b> at 8% discounting		<b>235,308</b>
Pre-tax <b>NPV</b> at 10% discounting		<b>177,115</b>

<b>After-Tax IRR</b>	<b>26.7%</b>	US\$ '000
After-tax <b>NPV</b> at 6% discounting		<b>243,663</b>
After-tax <b>NPV</b> at 8% discounting		<b>179,353</b>
After-tax <b>NPV</b> at 10% discounting		<b>132,224</b>

# GreenRoc's role in the graphite anode supply chain – **processing into AAM**

Production of graphite Concentrate at Amitsoq, Greenland

Processing Amitsoq graphite into AAM at plant in Greenland/N Europe/ N America

Mining



Concentration



Spheronisation



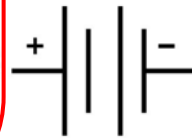
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0Km 250Km 500Km

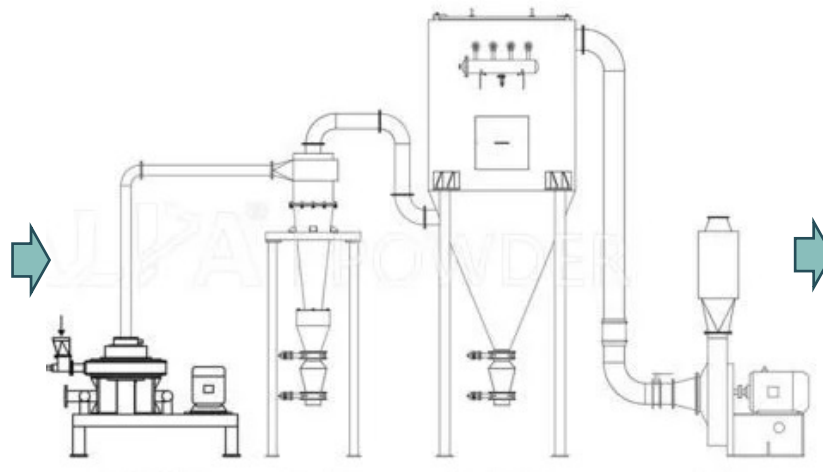
**Amitsoq**

# Amitsoq graphite highly suitable for processing into AAM

Metallurgical test work by ProGraphite GmbH



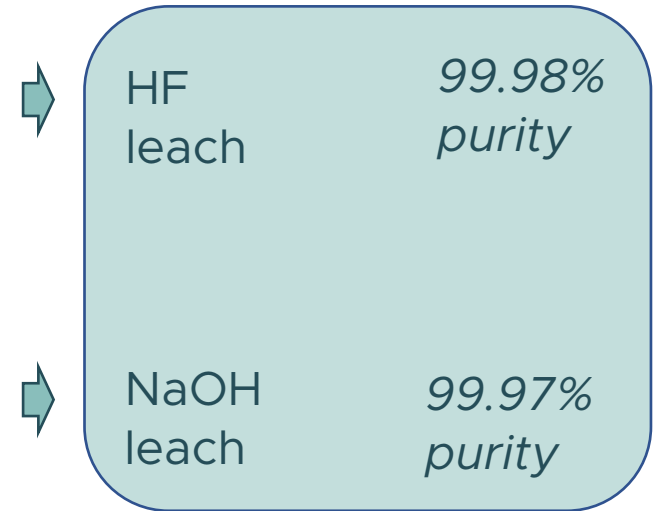
Graphite Concentrate  
96.5% C(g)



Micronization  
Classification  
Spheronization



Spheronized graphite



Purification

→ *Five to six times increase in value* →

# Developing processing capability to produce AAM

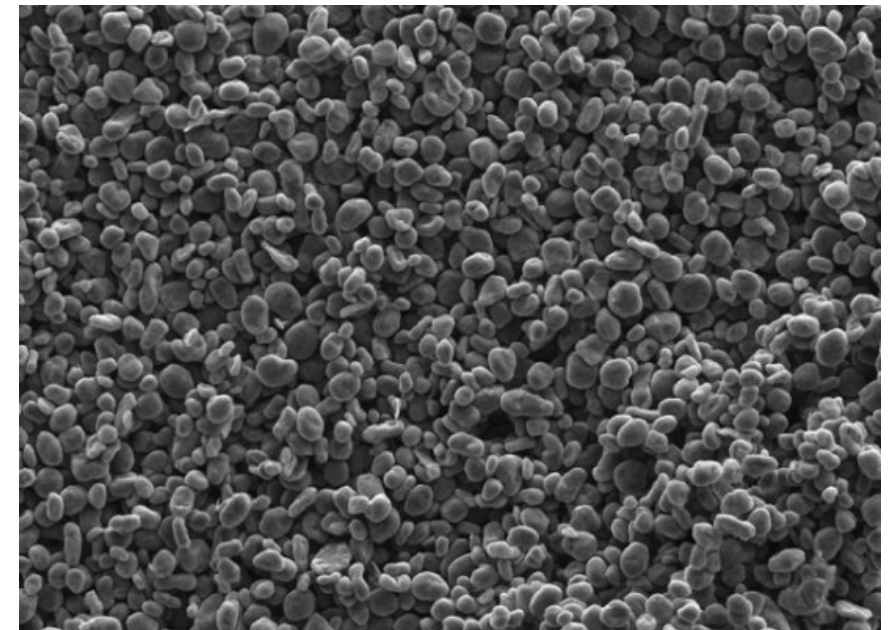
- **Feasibility Study** for an **AAM processing plant** to be concluded Q2 2024
- Supported by c. £250k grant from the UK's Advanced Propulsion Centre
- GreenRoc as project manager, with input from four expert consultants: Benchmark Mineral Intelligence, SLR, ProGraphite and Decision Risk Analytics

Feasibility Study will:

- Provide a business case for the vertically integrated production of AAM using high quality Amitsoq graphite
- Look at locations for processing plant in Greenland, Northern Europe and North America



www.apcuk.co.uk



SEM HV: 20.00 kV WD: 19.99 mm View field: 577.8 µm Det: SE Name: PG\_AMI\_2097\_0019(m/d/y): 11/02/22  
VEGAII TESCAN  
GeoZentrum Nordbayern

*Spheronised Amitsoq graphite, prepared by ProGraphite, Germany*

# Off-takes and partnerships

## Discussions with potential industry partners

GreenRoc is in ongoing discussions with:

- car manufacturers;
- battery companies;
- chemical and engineering conglomerates;
- raw material traders; and
- government agencies

in North America, Europe and Japan

Potential offtaker has tested Amitsoq graphite samples and found that it complies with all technical requirements





# Support from ERMA

EUROPEAN  
RAW MATERIALS  
ALLIANCE

ERMA



## European Raw Materials Alliance (ERMA) letter of support Feb 7, 2023

***"GreenRoc's graphite resource is of global importance and, ....., will enable the European Union to achieve a certain level of independence for the electrical vehicle supply chain. European Raw Materials Alliance has approved the Amitsoq Graphite project and will engage to support its development and financing to produce these critical raw materials for the benefit of the European Union goals"***

# Amitsoq roadmap to primary concentrate and AAM production

## Graphite concentrate production from Amitsoq mine



## AAM processing plant



*Complete or on-going*   *Planned*

# Contact

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