MINERAL COMMODITIES LTD

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EUROPE'S NATURAL GRAPHITE TO ANODE PRECURSOR SUPPLIER

Peter Fox

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The information, if any, in this presentation which relates to Mineral Resources for Munglinup is based on information compiled by Mr Chris De Vitry who is a member of the AusIMM and an independent consultant to the company. Mr De Vitry is the Director and Principal Geologist of Manna Hill GeoConsulting Pty Ltd and has sufficient experience which is relevant to the style of mineralisation and type of deposit under consideration and to the activity he is undertaking to qualify as a Competent Person as defined by the JORC Code (2012). The information from Mr De Vitry was prepared under the JORC Code (2012). Mr De Vitry consents to inclusion in the presentation of the matters based on this information in the form and context in which it appears.

The information, if any, in this presentation which relates to the Ore Reserve for Munglinup is based on information compiled by Mr Daniel Hastings, who is a Member of the AusIMM. Mr Hastings is an employee of Hastings Bell Pty Ltd and a consultant to the Company. Mr Hastings has sufficient experience relevant to the type of deposit under consideration to qualify as a Competent Person as defined by the JORC Code (2012). Mr Hastings consents to the inclusion in the presentation of the matters based on the reviewed information in the form and context in which it appears.

The information, if any, in this presentation that relates to metallurgy, the process plant and infrastructure design for Munglinup is based on information compiled and reviewed by Mr David Pass, who is a Member of the AusIMM. Mr Pass is an employee of Battery Limits Pty Ltd. Mr Pass has sufficient experience relevant to process plant and infrastructure design thereof to qualify as a Competent Person as defined by the JORC Code (2012). Mr Pass consents to the inclusion in the presentation of the matters based on the reviewed information in the form and context in which it appears.

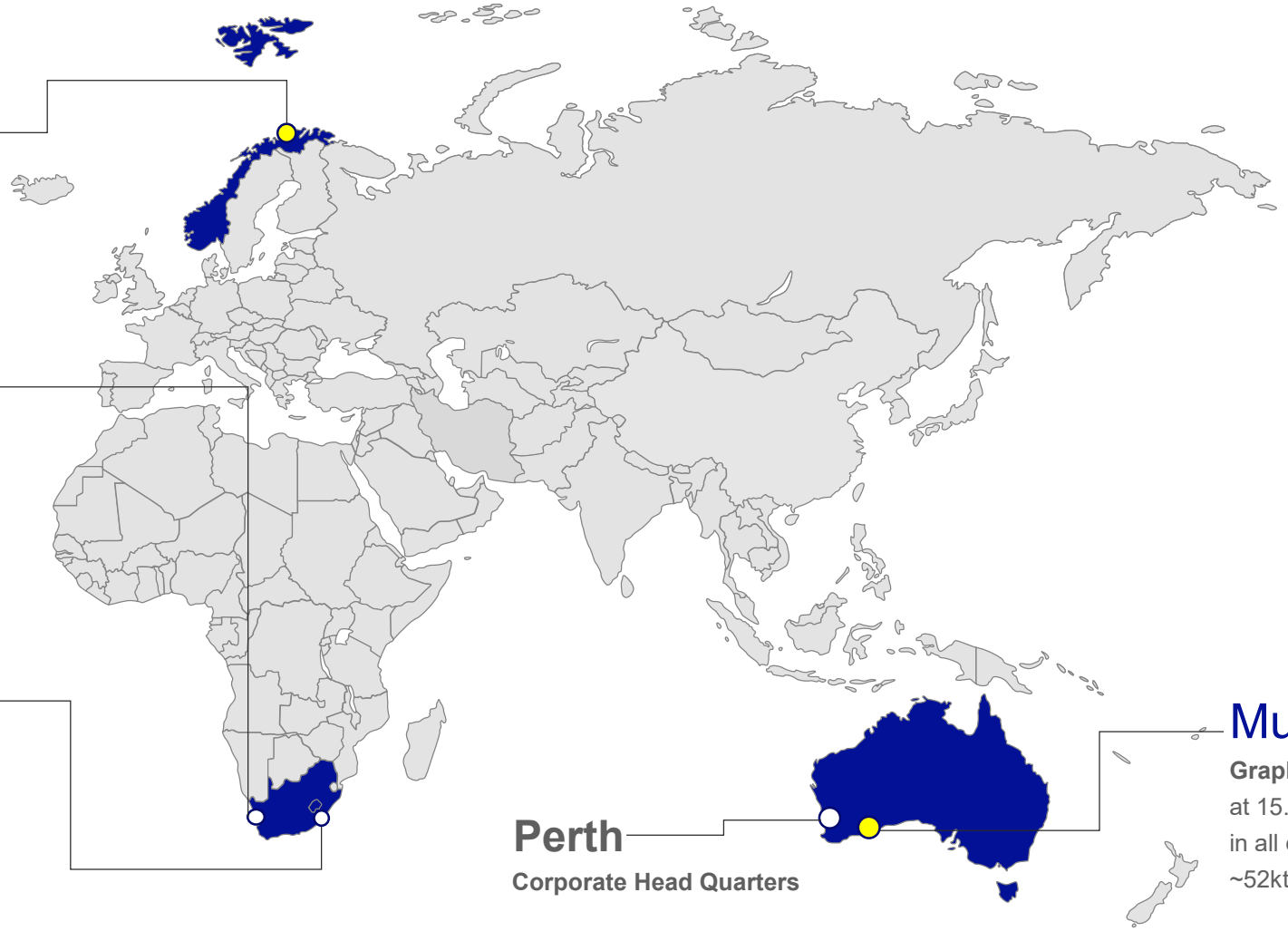
The information, if any, in this presentation which relates to Exploration Results, Mineral Resources or Ore Reserves for Xolobeni is based on information compiled by Mr Allen Maynard, who is a Member of the Australian Institute of Geosciences (“AIG”), a Corporate Member of the Australasian Institute of Mining & Metallurgy (“AusIMM”) and independent consultant to the Company. Mr Maynard is the Director and Principal Geologist of Al Maynard & Associates Pty Ltd and has over 38 years’ of exploration and mining experience in a variety of mineral deposit styles. Mr Maynard has sufficient experience which is relevant to the style of mineralisation and type of deposit under consideration and to the activity which he is undertaking to qualify as a Competent Person as defined in the 2004 Edition of the Australasian Code for reporting of Exploration Results, Exploration Targets, Mineral Resources and Ore Reserves (“JORC Code (2004)”). This information was prepared and first disclosed under the JORC Code (2004). It has not been updated since to comply with the 2012 Edition of the Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves (“JORC Code (2012)”) on the basis that the information has not materially changed since it was last reported. Mr Maynard consents to inclusion in the presentation of the matters based on this information in the form and context in which it appears.

MINERAL COMMODITIES
GLOBAL OVERVIEW

Skaland
Flake Graphite
Production – 10ktpa Flake Graphite

Tormin
Mineral Sands
Production - 2.4Mtpa Processing facility producing :Garnet , Ilmenite, Zircon and Rutile concentrates.

Xolobeni
Mineral Sands Development - JORC Compliant Resource 346MT @ 5% THM



Perth
Corporate Head Quarters

Munglinup
Graphite Development – Ore Reserve of 3.4Mt at 15.9% TGC (10% cut-off) mineralisation open in all directions with anticipated production of ~52ktpa Flake Graphite.

" With the acquisition of Skaland MRC will operate two production facilities, at Tormin and Skaland, while advancing development at Munglinup and progressing ongoing downstream graphite studies from Perth "

ANODE MATERIAL THE OTHER PART OF THE LIB

Anode (Graphite) Material per kg

Tesla Model S

71kg

Kia Niro EV

45kg

Nissan Leaf S Plus

44kg

BMW i3

30kg

Hyundai Kona Electric SEL

45kg

Chevrolet Bolt EV LT

43kg

Audi e-Tron

67kg

Volkswagen e-Golf

26kg

Credit – Richard Clark, Morgans Advanced Materials
Assumptions: operating voltage at 3.92V. “for optimum range” and 360 mAh/g average capacity. Actually: excess anode active material used (up to 20%); some use of 4 to 8% SiOx

MUNGLINUP GRAPHITE PROJECT

High grade mineral resource

- Definitive Feasibility Study (DFS) completing in November 2019 outlining a robust and economically justifiable project
- Ore Reserve of **3.4Mt at 15.9% TGC** (10% cut-off) with mineralisation open in all directions(1)
- **Coarse flake (+150µm)** distribution accounting for **43% to 48% of the concentrate**
- **Coarse flake concentrate grades of 95.7% - 97.7% TGC**
- **Fine flake (-150µm) concentrate grades of up to 98.3% TGC**
- **105km** west by sealed road from the **port of Esperance**
- Mining Lease granted to 2031 on designated Mining Reserve.

2018 MUNGLINUP GRAPHITE PROJECT | PRE-FEASIBILITY STUDY OUTCOMES(2)

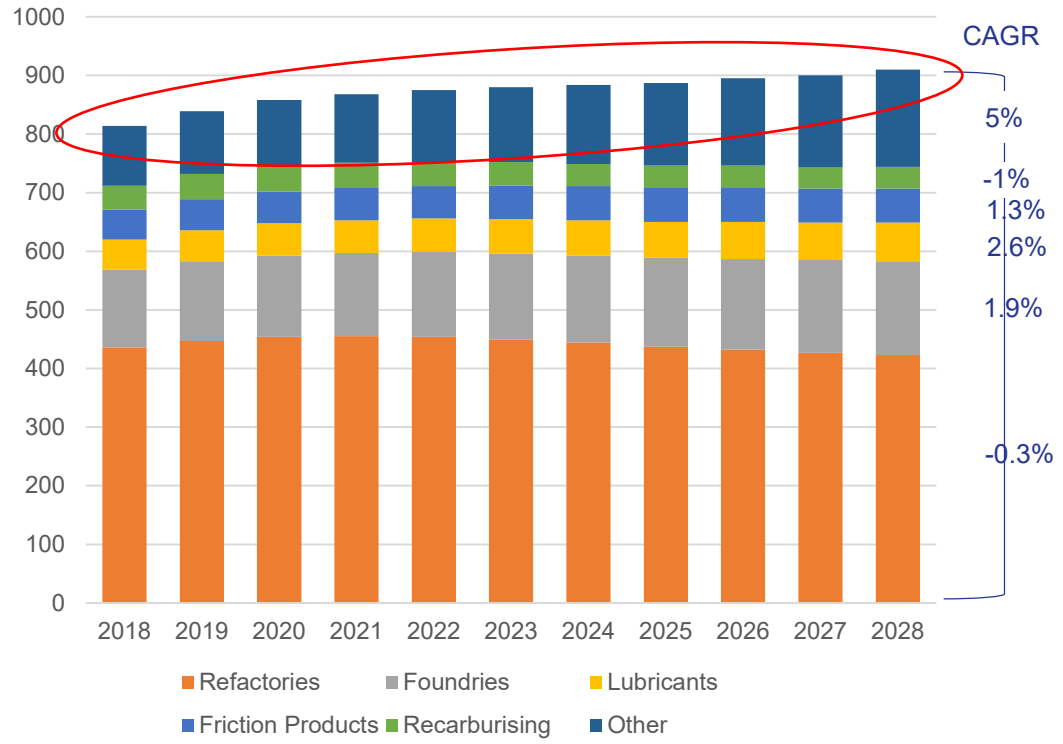
A$139M	48%	A$531/t	A$52M	54.8kt	9 yrs	2 yrs
NPV	IRR	Average OPERATING CASH COST	Total DEVELOP. CAPEX	Average ANNUAL PRODUCTION	MINE LIFE	Capital PAYBACK PERIOD

(1) ASX RELEASE -MRC to acquire 51% interest in Munglinup Graphite Project 11/09/2017
(2) ASX RELEASE – MRC Munglinup Graphite PFS Confirms Robust Project 30/05/2018

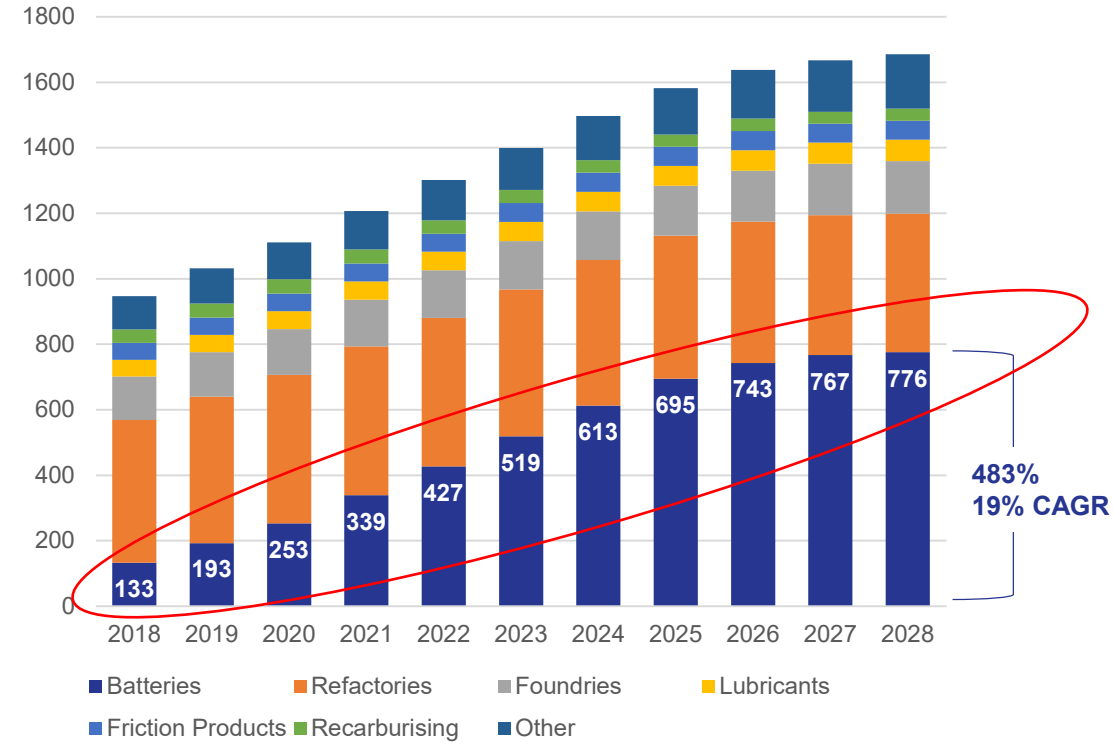
TRADITIONAL v BATTERIES NATURAL FLAKE GRAPHITE MARKET

10 year forecast – Traditional natural flake graphite demand is forecasted to grow just 12%, Battery demand will grow by 483%

TRADITIONAL APPLICATIONS	**12%** Total Growth **1.12%** CAGR



+BATTERY APPLICATIONS	**483%** Total Growth **19%** CAGR

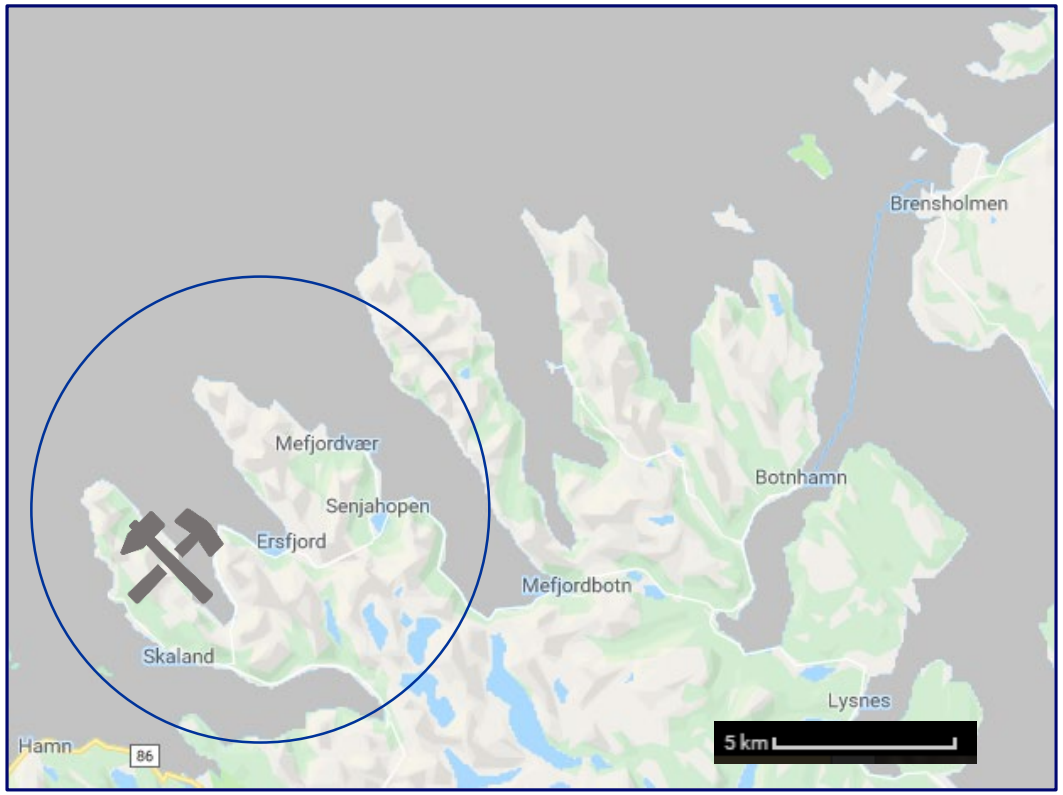


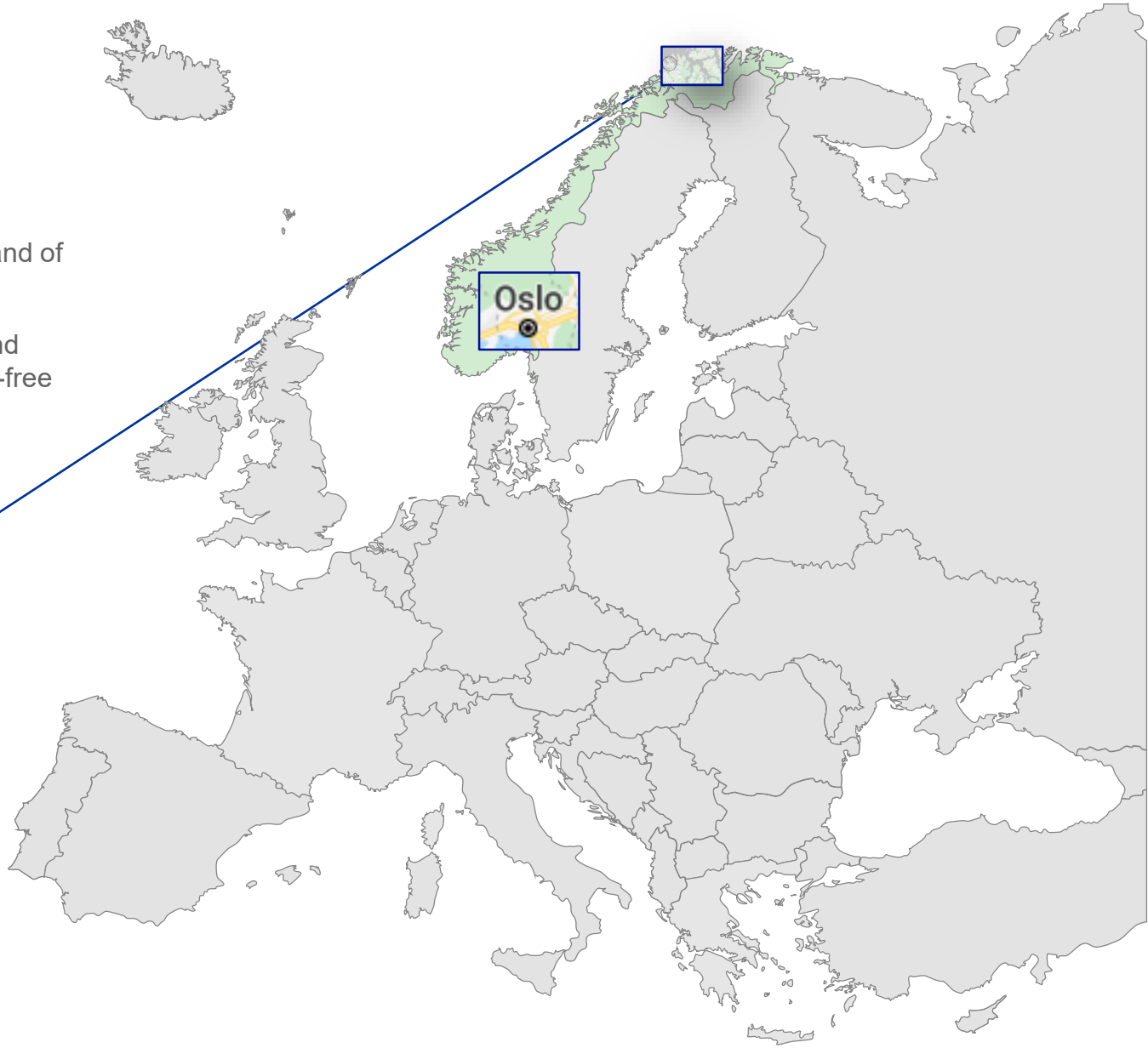
YoY Growth	45%	31%	34%	26%	22%	→	1%

Source: Roskill, Base case, World Forecast demand for natural graphite by application, 2018-2028. Roskill Natural & Synthetic Graphite, Outlook to 2028, 12th Edition. July 2019

SKALAND NORWAY

- Skaland Graphite AS' mine and processing facility located on the island of Senja in northern Norway
- Ideally positioned to supply European markets. Processing facility and shipping are quay-side at Skaland, shipping every 3 weeks from ice-free harbour





SKALAND GRAPHITE

Largest flake graphite producer in Europe and the highest grade flake graphite mine in the world

Presently the world's highest grade operating flake graphite mine with mill feed grade averaging around 28%C

Skaland is the largest flake graphite producer in Europe and fourth largest producer globally outside of China

- Current production **~10ktpa** of graphite concentrate accounts for ~2% of global annual natural flake graphite production
- Ore grades of 25%-33% C delivered to the plant
- Fully Permitted operations allows for expansion to **16kpta** production
- Low-cost hydro power allows for expansion of operations and downstream processing
- Plant currently operated at 60% capacity, an increase to 85% utilisation rate increases production to 15-16kpta
- Opportunity to improve current flowsheet to produce high grade, high value product. Initial testwork resulted in upgrading to 96%-99% TGC with additional attritioning and flotation

PROCESSING OPPORTUNITY

Concentrate Grade and Flake Size Distribution – The opportunity to add value

Average Ore Grades delivered to Plant (C – Carbon)		Production Tonnes
2015	30.5%	9,051
2016	33.0%	9,757
2017	29.7%	10,309
2018	28.5%	9,627

Flake size distribution

PSD	%	+/- 150µm	% C
+315	6.6%	36%	98.1% ✓
+250	6.9%		97.8% ✓
+180	14%		96.9% ✓
+150	8.7%		94.7%
+100	17.6% ✗	64%	91.5%
+75	11.6% ✗		87.5%
-75	34.7% ✗		86.1%

Testwork on Skaland Fines Concentrate Sample

-150 micon Skaland concentrate @ 87% Cg production sample used

✓ Additional milling and polishing in pilot scale testwork resulted in upgrading to

97%-98% Cg

✓ A very high grade feed for downstream value-adding

Pilot testwork finalisation and equipment sizing underway

Testwork on Coarse Flake Recovery

? Pilot-scale testwork underway using a 1t ROM ore sample

? Target coarse flake recovery at the front of the circuit using new equipment. Results expected in approximately two weeks

The current flowsheet has capacity for quick wins, combining on-site optimization and outcomes from off-site testwork to produce high grade, high value products

KEY OPTIMISATION PHASES

Current flowsheet has capacity for upgrading to produce high purity, high value product. This will be the near-term focus whilst research and development is conducted on further value-adding elements

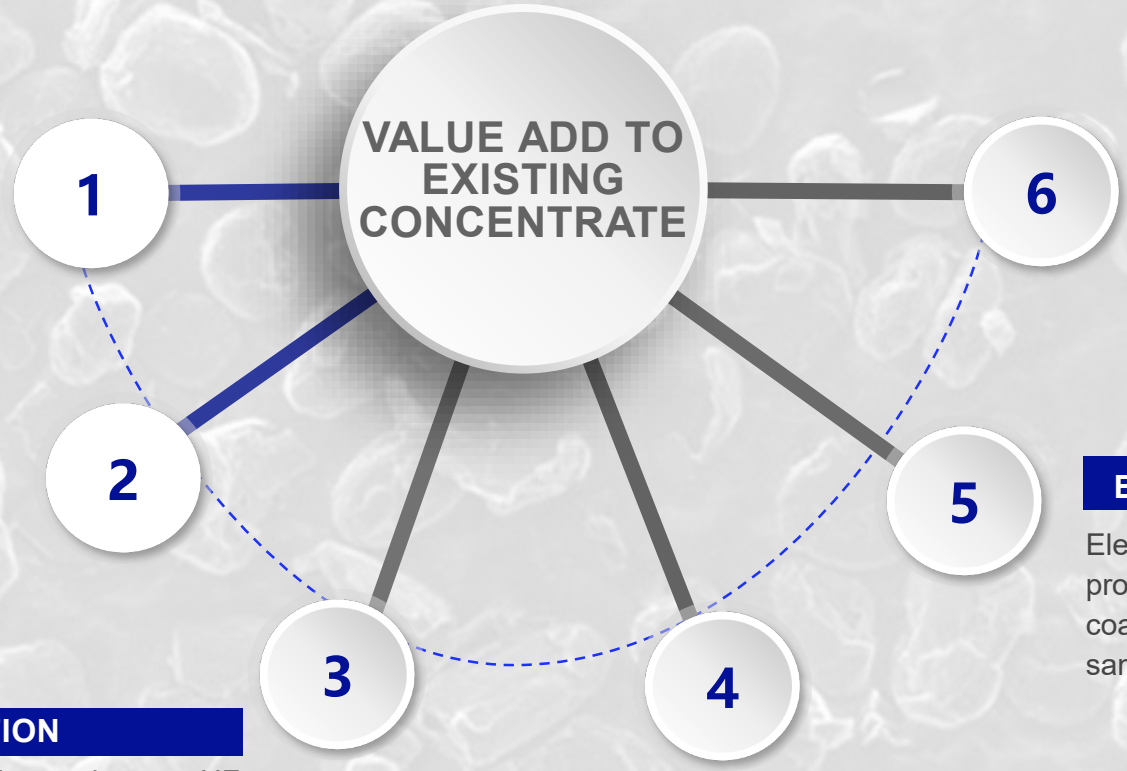
Next 6-8 Months

UPGRADE CONCENTRATE

Equipment installation to increase grade of fines, and percentage of coarse (+150 micron) concentrate

INCREASE PRODUCTION

Once new equipment is commissioned and quality of products improved target increased production to ~16ktpa



EXPANDABLES

Evaluate expansion characteristics of Skaland coarse concentrates (both standard grade and purified samples). Development of expandables strategy from Graphite Intercalated Compounds (GIC) to expanded graphite sheets and foils

BATTERY ANODE MATERIAL (BAM)

Electrochemical evaluation of batteries produced from micronized, spheronised and coated purified fines concentrate. Production samples for customer evaluation

PURIFICATION

Purification of high grade fines using non-HF chemical approach being developed within CRC-P and alternatives to produce Battery Anode feed. Produce high value 'low ash' expandables feed and higher grade refractory coarse flakes.

ONSITE SPHERONISATION

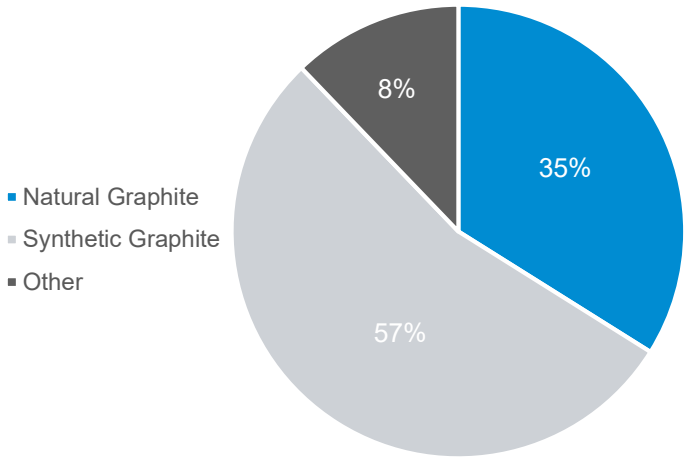
Evaluate potential for micronizing and spheronising the high grade (~98%-99%) fines concentrate into unpurified spherical graphite onsite – leveraging existing infrastructure, management and low-cost power. Potential fast-tracked approach to producing battery anode materials

Ongoing

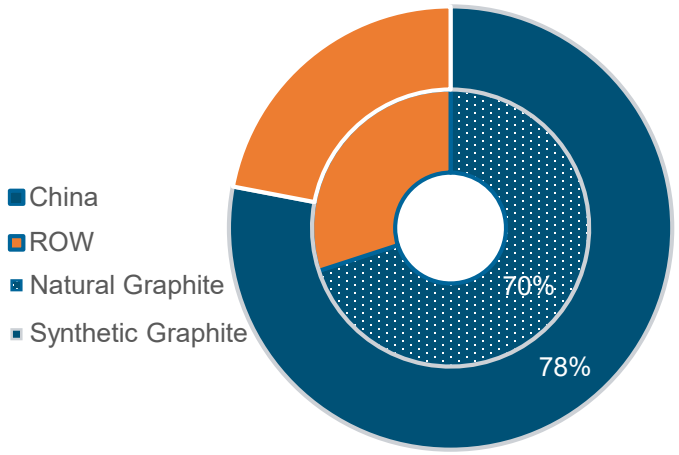
ANODE MATERIAL

Anode production is dominated by the Chinese producers with over 70% market share but with significant CO_2 footprint.

Global LIB Anode Production 2018

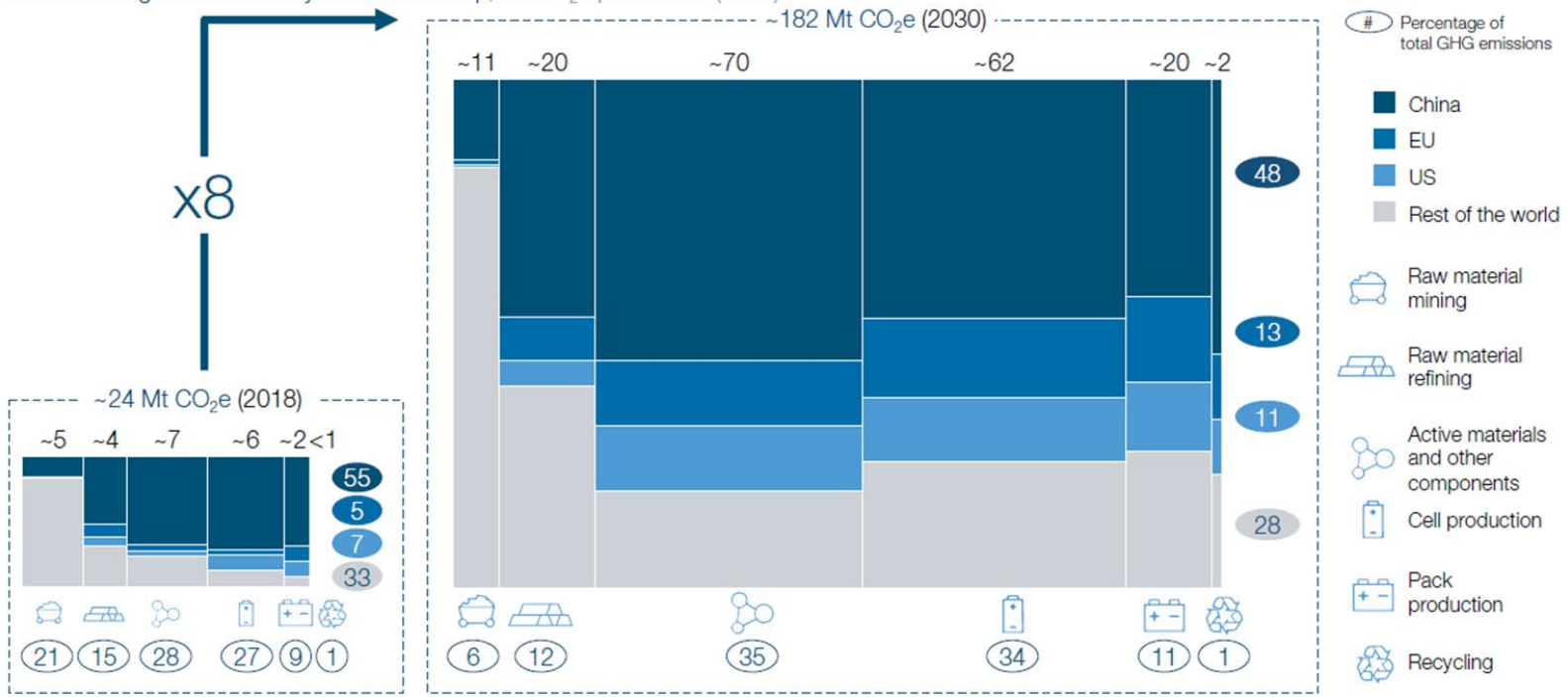


LIB Anode Production 2018 by Region



Battery production with significant CO_2 footprint, mainly driven by active materials and other components as well as cell production in China

Greenhouse gas emissions by value chain step, Mt CO_2e per annum (2030)



Source: World Economic Forum, Global Battery Alliance; McKinsey analysis

Data from C. Pillot, avicenne ENERGY; IIT; Morgan Advanced Materials internal analysis

PURIFICATION

Cornerstone of downstream value-adding is purification

LOI	Al	Ca	Fe	Mg	Si	Cr	Cu	K	Mn	Ni	P
99.968	59	0.6	10	2.3	180	<0.1	<0.1	0.2	0.3	0.2	0.2
99.994	4.2	0.9	0.8	6.7	16	<0.5	<0.1	0.1	0.5	0.7	0.3
99.991	3.6	5.8	2.1	12	34	<0.5	<0.1	0.1	0.2	<0.05	0.2

- Working on a range of purification technologies – being an operator allows for R&D into a range of options rather than pre-emptively selecting one
- Current methods for producing high purity graphite from naturally-occurring deposits can involve using environmentally-harmful fluoride-based substances to remove impurities. These come with high costs for processing and stringent safety and environmental compliance regulations
- August 2019 MRC successfully lead a $2.6M Australian Research Application to develop a commercial-scale process to produce high purity natural graphite (99.95%) partnering with Australia's national science research agency CSIRO and Doral Fused Materials to develop a more environmentally-friendly and lower-cost production method
- CSIRO making excellent progress on non-HF chemical purification of Munglinup graphite. Munglinup showing itself to be very amenable to purification with four nines achieved through a range of methods
- Impurities characterisation and purification work on Skaland concentrates already underway

MICRONISATION SPHERONISATION

Ongoing downstream value-adding study work

MUNGLINUP

- Finalise DFS (Nov 19)
- Secure permitting (Apr 20)*
- Complete marketing agreements, FID (Sep 20)*
- Construction and Commissioning (March 21) *

SKALAND

- Complete transaction (Oct 19)
- Increase grade of fines (Q2 20)
- Increase percentage of coarse (+150 micron) concentrate (Q2 20)
- Increase nameplate production (Q2/Q3 20)*
- Unpurified spheronised graphite (Q3/Q4 20)*

SPHERONISATION

MUNGLINGUP

- Awaiting initial micronisation and spheronisation testwork results as part of BAM testing

SKALAND

- Micronisation and spheronisation conducted on coarse flake previously
- Awaiting micronisation and spheronisation testwork on upgraded fines

BATTERY ANODE MATERIAL

MUNGLINGUP

- Coin cell tests on micronised Munglinup flake shows excellent results (within the constraints of testing on flake)
- Spherical graphite and coated spherical graphite coin cell tests underway

SKALAND

- Prior work on spherical graphite from coarse flake exhibits high initial specific capacity and cyclability
- Additional tests to be conducted on spherical graphite from upgraded fines

WHY NORWAY

Battery electric and plug-in hybrid vehicles together hold a 50 % market share in Norway.

- Norway is leading the way for a transition to low emissions in transport.
- Norway is a world leader in sustainable energy, with 97% of electricity coming from renewable sources and a renewable sector that employs more than 50,000 people.
- Norway's low-cost renewable energy sources provide industry with a competitive advantage, enabling business to produce zero emissions goods and services, and perfectly aligns with many of the European Battery Alliance, key Priority Actions

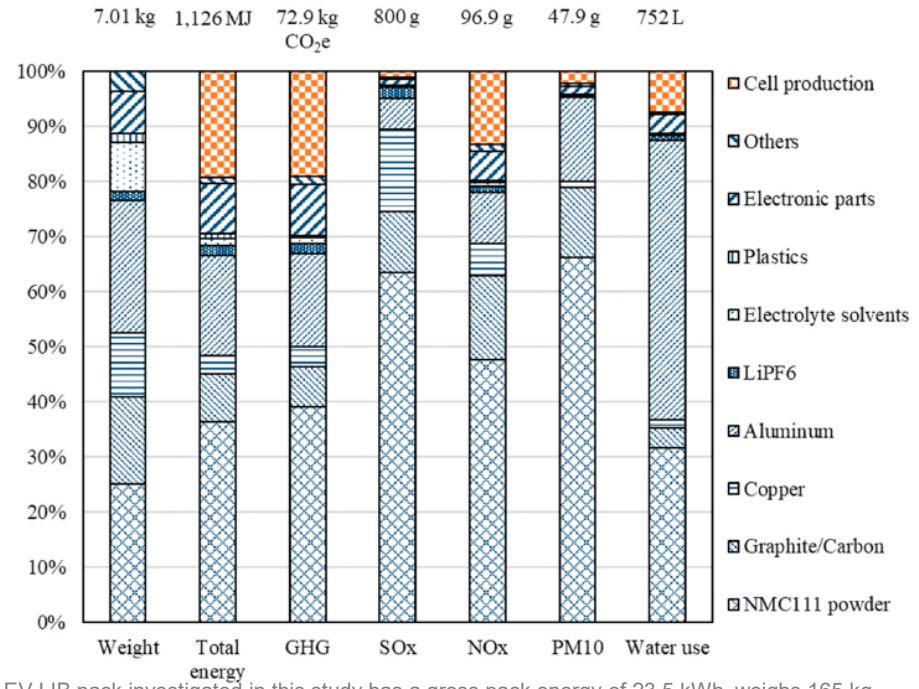
'*Support the growth of a cell manufacturing industry, with the smallest environmental footprint possible. This will provide a key competitive and commercial edge against competitors*.'

EUROPEAN COMMISSION

EUROPEAN BATTERY ALLIANCE | EBA250

IN OCTOBER 2017, THE EUROPEAN COMMISSION LAUNCHED THE 'EUROPEAN BATTERY ALLIANCE' .

ONE OF THE MAIN AIMS UNDER THE STRATEGIC ACTION PLAN WAS TO SUPPORT THE SUSTAINABILITY OF EU BATTERY CELL MANUFACTURING INDUSTRY WITH **THE LOWEST ENVIRONMENTAL FOOTPRINT POSSIBLE, FOR EXAMPLE BY USING RENEWABLE ENERGY IN THE PRODUCTION PROCESS**.



The EV LIB pack investigated in this study has a gross pack energy of 23.5 kWh, weighs 165 kg, and contains 140 46-Ah prismatic cells [19]. The energy density of the battery is 197 Wh/kg at the cell level and 143 Wh/kg at the pack level. Each cell uses NMC111 as the active cathode material and graphite as the active anode material.

Life Cycle Analysis of Lithium-Ion Batteries for Automotive Applications
Qiang Dai *, Jarod C. Kelly , Linda Gaines and Michael Wang

QUESTIONS