Black Rock Mining

BKT.AX

MST Access

A research platform of MST Financial

26 July 2023

Advancing toward project funding

NEED TO KNOW

- Binding agreements signed with POSCO
- Debt financing process well advanced; credit-approved term sheets from lenders in Q3 CY23

Advancing towards financing: BKT is progressing on funding, with three potential lenders completing site visits and nearing due diligence finalisation. Board approval for Binding Term Sheets is expected in CY23 Q3. Alongside this, BKT is exploring alternative financing strategies, including project-level partnerships as a less dilutive equity alternative. Notably, there's significant interest from industry entities, OEMs, mining firms, private equity funds, and sovereign wealth funds.

BKT strengthens strategic ties with POSCO: BKT advanced strategic ties with POSCO, signing binding agreements that include a US$10M prepayment, to be offset via product delivery, and a 100% life of mine offtake deal for graphite fines from Module 1. The relationship was further deepened by an MOU for 6ktpa of premium graphite concentrate from Module 1 to POSCO.

A$10M Placement Secured: BKT successfully raised A$10M at A$0.115 per share in a strongly backed placement, attracting both new and existing sophisticated investors, with notable support from a prominent US-based fund. This situates BKT in a strong position to fund the project up until FID.

Investment Thesis

High-quality, shovel-ready flagship asset: The Mahenge project, majority-owned by BKT (84%), has a large graphite mineral resource of 213Mt at 7.8% TGC and the second-largest Ore Reserves worldwide. It can produce up to 350kt/year of high-quality graphite concentrate at first quartile costs driven by access to low-cost hydro-dominated grid power.

Modular approach lowers risk, improves returns: BKT is employing a capital-light, high-returning four-stage approach to developing Mahenge. Module 1 production of 1.0Mtpa feed/89ktpa concentrate is proposed to be delivered for capex of US$182m (MSTe US$200m), with future expansions funded out of operational cash flow (up to 4.0Mtpa).

Graphite prices do not yet reflect likely future shortages: Although battery demand has caused lithium prices to soar (+800%), graphite prices remain relatively stable. This is unexpected given that lithium-ion batteries (LIBs) contain 7–10X times more graphite, with the role of this mineral in LIBs often overlooked. As the battery demand share of total market grows, we foresee upward pressure on natural graphite prices.

Valuation A$0.45 (Previous A$0.52)

We value BKT at A$0.45, fully diluted. Our valuation is based on BKT's flagship Mahenge Project. We applied a conservative 70% risk weighting to account for outstanding project risks (financing, construction, commissioning) and dilution for a A$141m equity raise at A$0.15/share to fund BKT's equity contribution to the project (we assume 50:50 debt and equity).

Risks

Key risks include inability to access funding, project delays, escalation in capital costs, a fall in the graphite price, inability to sell large flake into the high-value markets, and continuity of key persons.

Equities Research Australia

Mining and Energy

Jonathan Sharp, Analyst
jonathan.sharp@mstaccess.com.au

BLACK ROCK MINING LIMITED

Black Rock Mining (ASX:BKT) is a mining company focused on graphite projects in Tanzania. The main project is the Mahenge Graphite Project, a world-class deposit of high-quality graphite ore. The company's goal is to become a leading producer of high-grade graphite for use in lithium-ion batteries and other high-value applications.

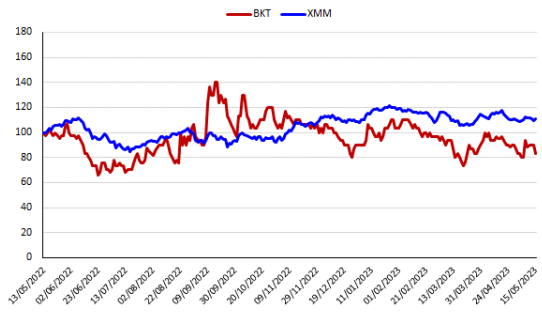
https://blackrockmining.com.au/

Valuation	**A$0.45** *(Precious A$0.52)*
Current price	**A$0.11**
Market cap	**A$108**
Cash on hand	**A$11.7m** *(as of 30 June)*

Upcoming Catalysts and Newsflow

Period	
3Q CY23	Credit-approved term sheets for project debt
3Q CY23	Potential for POSCO to exercise its right to a BKT Board Seat
3Q CY23	Potential sell-down of a stake in the project to provide funding

Share Price (performance comparison)



Source: FactSet, MST Access.

Financial Summary: Black Rock Mining

BLACK ROCK MINING						BKT.AX
Year end FY2023						
MARKET DATA						
Share Price	A$/sh					0.11
52 Week Low	A$/sh					0.10
52 Week High	A$/sh					0.23
Market Cap (A$m)	A$m					113
Net Debt / Cash (A$m)	A$m					(11)
Enterprise Value (A$m)	A$m					103
Shares on Issue	m					1,078
With performance rights	m					1,159
After capital raise	m					2,098
INVESTMENT FUNDAMENTALS		**Jun-21**	**Jun-22**	**Jun-23e**	**Jun-24e**	**Jun-25e**
Reported NPAT	A$m	(3)	(6)	(3)	(19)	14
Underlying NPAT	A$m	(3)	(6)	(3)	(19)	14
EPS Reported (basic)	¢ps	(0.5¢)	(0.5¢)	(0.2¢)	(1.0¢)	1.1¢
EPS Underlying (basic)	¢ps	(0.5¢)	(0.5¢)	(0.2¢)	(1.0¢)	1.1¢
P/E Reported (basic)	x	N/A	N/A	N/A	N/A	9.3
P/E Underlying (basic)	x	N/A	N/A	N/A	N/A	9.3
Operating Cash Flow / Share	A$	(0.00)	(0.00)	(0.00)	(0.01)	0.01
Price / Operating Cash Flow	x	(43.8)	(24.5)	(46.6)	(10.7)	11.4
Free Cash Flow / Share	A$	(0.00)	(0.01)	(0.02)	(0.11)	(0.03)
Price / Free Cash Flow	x	n/m	n/m	n/m	n/m	n/m
Free Cash Flow Yield	%	-3.2%	-11.3%	-22.0%	-102.1%	-27.0%
Book Value / Share	A$	0.04	0.06	0.10	0.08	0.09
Price / Book	x	2.69	1.87	1.10	1.24	1.15
NTA / Share	A$	0.04	0.06	0.10	0.08	0.09
Price / NTA	x	2.69	1.87	1.10	1.24	1.15
Year End Shares	m	849	977	2,014	2,014	2,014
Market Cap (spot)	A$m	89	103	211	211	211
Net Cash / (Debt)	A$m	11	26	120	(95)	(153)
Enterprise Value	A$m	78	77	91	307	364
EV / EBITDA	x	n/m	n/m	n/m	n/m	1.9x
Net Debt / Enterprise Value		(0.1)	(0.3)	(1.2)	0.9	1.5

PRODUCTION AND PRICING		**Jun-21**	**Jun-22**	**Jun-23e**	**Jun-24e**	**Jun-25e**
Ore Mined	kt		-	-	-	1,107
Graphite Concentrate Produced	kt	-	-	-	-	87
Graphite Basket Price (97% grade)	US$/t	957.0	1,160.3	1,081.5	1,133.0	1,187.5
AUDUSD	:	0.75	0.73	0.68	0.71	0.71

12-Month Relative Performance vs S&P/ASX Metals & Mining

Profit & Loss (A$m)	**Jun-21**	**Jun-22**	**Jun-23e**	**Jun-24e**	**Jun-25e**
Revenue	-	-	-	-	145
Expenses	(3)	(6)	(3)	(3)	(90)
EBITDA	**(3)**	**(6)**	**(3)**	**(3)**	**54**
D&A	(0)	(0)	(0)	(0)	(12)
EBIT	**(3)**	**(6)**	**(3)**	**(3)**	**42**
Interest	0	0	0	(16)	(23)
Tax	-	-	-	-	(6)
Underlying NPAT	**(3)**	**(6)**	**(3)**	**(19)**	**14**
Exceptional					
Reported Profit	**(3)**	**(6)**	**(3)**	**(19)**	**14**

Balance Sheet (A$m)	**Jun-21**	**Jun-22**	**Jun-23e**	**Jun-24e**	**Jun-25e**
Cash	11	26	261	45	88
Receivables	0	1	-	-	10
Inventory	-	0	-	-	16
PP&E	0	1	43	238	302
Exploration	22	30	30	30	30
Other	-				
Assets	**34**	**57**	**333**	**314**	**446**
Creditors	0	2	-	-	17
Debt	-	-	141	141	241
Other	0	0.73	1	1	3
Liabilities	**0**	**2**	**142**	**142**	**260**
Shareholder's Equity	**33**	**55**	**191**	**171**	**184**

Cashflow (A$m)	**Jun-21**	**Jun-22**	**Jun-23e**	**Jun-24e**	**Jun-25e**
Net Cash From Operations	**(2)**	**(4)**	**(5)**	**(20)**	**19**
Capex	(0)	(0)	(42)	(196)	(76)
Exploration	(1)	(7)	-	-	-
Other	-				
Net Cash From Investing	**(1)**	**(7)**	**(42)**	**(196)**	**(76)**
Equity	14	26	141	-	-
Borrowings	-	-	141	-	100
Dividend					
Net Cash From Financing	**14**	**26**	**282**	**-**	**100**
Effects of FX	(0)	0	-	-	-
Net Increase / (Decrease) in Cash	**11**	**15**	**235**	**(216)**	**43**

Source: Company data, MST Access.

Q4 Update: Momentum building towards financing

POSCO's $10M Prepayment Backs BKT's Graphite Production

POSCO to provide BKT with US$10M prepayment.

In the last quarter, BKT firmed up its partnership with POSCO by entering into binding contracts, securing the supply of the entire (25–30ktpa) planned fines (-#100) production from Mahenge's Module 1 (see Appendix A and Figure 11 for explanation of graphite size). The agreement, featuring a US$10M prepayment obligation, underpins BKT's graphite concentrate's position in the certified commercial market. By aligning with an industry pricing benchmark, the contracts consolidate BKT's strategic alliance with POSCO, their primary shareholder, and pave the way for future developments.

Figure 1 below details the key elements of the contracts between BKT and POSCO International Corporation, divided into Offtake Clauses and Prepayment Terms.

Figure 1: Key terms of the Agreements between BKT and POSCO

Offtake	Prepayment
Binding long form offtake agreement	Prepayment facility agreement
Life of mine offtake for 100% of -#100 mesh concentrate from module one	US$10m plus capitalised interest
30ktpa (minimum quantity 20ktpa)	To be used as part of construction financing
Pricing mechanism linked to visible industry benchmark.	Repayable via fixed amount per tonne offset against delivery of product
	Aligned with expected project economics

Source: BKT

Further De-risking Funding Strategy with Large Flake Offtake

Confirmed MoU with POSCO International to supply 6ktpa of large flake graphite concentrate.

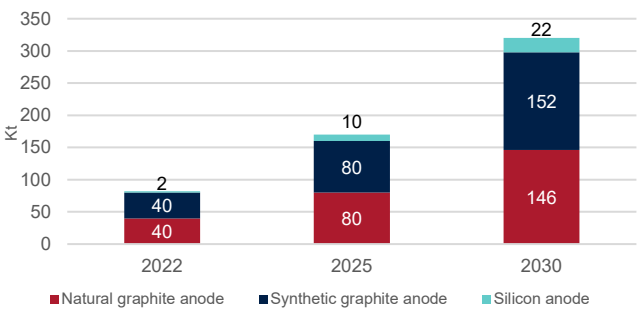
During the quarter BKT confirmed a non-binding MoU with POSCO International to supply 6ktpa of large flake graphite concentrate from its Mahenge Module 1, representing an additional ~7% of forecast production. This MoU, supplementing the existing binding agreement with POSCO Chemical, further strengthens the partnership between the companies. We see this announcement as momentum building for BKT, as it further diversifies BKT's customer base, adds another blue-chip customer and, in our view, enhances its debt financing prospects.

Who are POSCO and why they matter?

POSCO Holdings Inc, a leading South Korean steel conglomerate with a market capitalisation exceeding US$20bn, is making substantial strides in the battery materials sector. The conglomerate's 60% owned battery business, previously known as POSCO Chemical and now rebranded as POSCO Future M Co., Ltd, is a major player in anode production. The conglomerate's primary trading arm, POSCO International Corporation, is 70.7% owned by POSCO Holdings Inc and plays a crucial role in securing raw materials for the group.

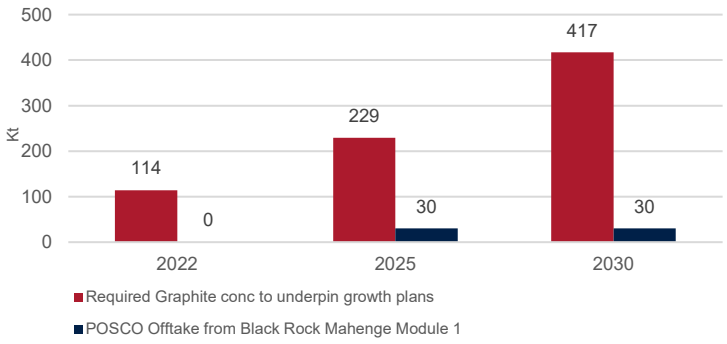
POSCO aims to increase its anode production from 40ktpa in 2022 to an estimated 150ktpa by 2030 (Figure 2). To support this goal, the company has an offtake agreement with BKT for 30ktpa of -#100 mesh material. As far as we know, POSCO has no other graphite concentrate agreements, and no other developer has passed its strict qualification process.

Figure 2: POSCO's growth plans for its anode business



Source: BKT, Source: POSCO Chemical Earnings Release Q3 CY22, 24 Oct 2022, Slide 13

Figure 3: POSCO's Graphite Concentrate Requirements



Source: BKT

Using the usual industry conversion rate to SPG in China of 35%, the necessary graphite concentrate to accommodate POSCO's natural graphite anode growth strategies is presented in Figure 3. This is compared with the offtake from BKT's Mahenge Module 1.

BKT has similar uncommitted offtake volumes for Modules 2, 3, and 4. Given POSCO's ambitious growth plans, we believe it is likely that it would be interested in securing additional offtake from BKT to ensure a stable and reliable supply chain.

BKT Strengthens Position: A$10m Raised in Share Placement

In the recent quarter, BKT secured A$10 million by issuing 86,956,525 new ordinary shares.

The issue price was A$0.115 per share, indicating:

- A 20.7% discount from BKT's closing price on 7 June 2023, and
- A 14.9% discount from the 15-day VWAP.

For every three shares purchased in the placement, participants received one option, valid for 24 months and exercisable at A$0.20.

Placement proceeds will fund corporate expenses and working capital to conclude debt and project partner processes.

Financing Activities

Binding Term Sheets by lenders expected in Q3 CY23

BKT progressed its debt financing, conducting site visits for a third potential lender, who gave positive feedback. Site visits are now completed by all three potential lenders, and they are nearing the end of their due diligence. Binding Term Sheets are expected to be approved by the lender Boards in Q3 CY23.

Simultaneously, BKT is exploring alternative financing options, such as bringing in a project-level partner, seen as less dilutive than equity. Interest has been noted from various parties, including industry participants, OEMs, mining entities, private equity funds, and sovereign wealth funds.

Capital Management

End of Qtr., BKT had A$11.7M cash, spending ~A$3M per quarter.

As of 30 June 2023, BKT held cash reserves of A$11.7M. BKT anticipates a reduced quarterly cash expenditure of approximately A$3m per quarter until the FID for Mahenge.

The expenditure for the quarter is summarised in Figure 4.

Figure 4: Summary of expenditure incurred during the quarter

Expense Category	Amount (A$'000)
Consulting	803
Site Costs	222
Tenement Administration	238
Environmental and Social Impact Assessment (ESIA)	1620
Resettlement Action Plan (RAP)	74
Total	**2,957**

Source: BKT

Valuation: risked NPV of A$0.45/share

We value BKT at A$0.45, fully diluted, implying an upside of 324%

Our updated valuation for BKT is A$0.45 per share (down from A$0.52), on a fully diluted basis. This represents a substantial 324% upside potential from the current share price. The revised valuation is driven by dilution from an increased share count. Additionally, our assumption of a lower equity raise price for A$141m (US$100m) was adjusted from A$0.20 to A$0.15, has also impacted dilution.

In our view, the current share price undervalues the high-quality, shovel-ready Mahenge deposit which has secured offtake agreements and has upcoming catalysts. Graphite's strong structural tailwinds are currently underappreciated, and we anticipate tight medium-term fundamentals in the market, with potential for growth similar to lithium.

Valuation Summary

In Figure 5 we have presented a summary of our valuation. The analysis is based on a discount rate of 12% and a probability risk weighting of 70%. We value the net assets at A$934m compared to the current market value of A$152m.

Figure 5: Base-case valuation summary

Black Rock Valuation				
	Discount rate	Risk weighting	AUD$mn	AUD$/sh
Mahenge	12.0%	70.0%	856	0.41
Total operating assets			**856**	**0.41**
Corporate/SG&A	12.0%		(42)	(0.02)
Net cash/(debt)			120	0.06
Provisions			(0)	(0.00)
Net Asset Value			**934**	**0.45**
Current Share price				0.11
Upside				324%

Source: MST Estimate

Key Assumptions

Key assumptions are in Figure 6. Given the project's location in Africa, we applied a 12% nominal discount rate and assumed A$200m in initial development capital. We conservatively set our graphite basket price (average for initial 10 years) at US$1,458/t, offering upside if prices exceed forecasts.

Figure 6: DFS assumptions underpinning our base-case valuation

Assumptions	MST
PROJECT ASSUMPTIONS	
Project Ownership (%)	84%
Strip Ratio (waste : ore)	0.8
Ore Reserve Grade (% TGC)	8.2%
Concentrate Grade (% TGC)	97.3%
Average Recovery (%)	92.8%
Average Material Mined (ktpa)	7,261
Average Ore Mined (ktpa)	4,034
Mine Life (years)	26
Development Capex (A$m)	200
Debt to equity	50:50
COST & FINANCING ASSUMPTIONS	
Discount Rate (%)	12%
Inflation Rate (%)	3%
Debt interest rate	12%
Share price for Equity raising (A$/share)	0.15
PRICING & EXCHANGE RATE ASSUMPTIONS	
AUDUSD	0.71
Graphite Price (Real) (US$/t)	1,238
Basket Price Price (US$/t) - Average first 10 years	1,458
Royalty Rate (%)	3%
Corporate Tax Rate (%)	30%

Source: MST

Investment Thesis and Catalysts

Key pillars of our investment thesis

1. **Shovel-ready project at world-class deposit**: The Mahenge Project is a Tier-1, shovel-ready graphite project located 450km by road from Tanzania's largest port, Dar es Salaam. BKT holds an 84% stake in the project through a joint venture company, Faru Graphite Corporation (Faru), while the Tanzanian Government owns the remaining 16% (free carry).
2. **First quartile costs:** The Mahenge Project has first-quartile cost position on the global cost curve, driven by access to low-cost hydro-dominated grid power. BKT's energy mix consists of 60–70% hydro and 30–40% gas, a sustainable mix that provides a competitive edge in terms of the company's cost structure and environmental position.
3. **BKT's Position Amid Shifting Sustainability Requirements:** As Western nations begin implementing sustainability requirements, the dominance of synthetic graphite could start to lessen. Already, Europe has instituted battery sustainability standards, mandating the disclosure of each component's carbon footprint. These measures are scheduled to take effect from 2024, with a more inclusive framework coming into play by mid-2025 (see here). This increased visibility into synthetic graphite's carbon footprint could provide a boost to BKT's graphite products. Over time, as these sustainability standards potentially become widespread in the US and other countries, it could further enhance BKT's standing.
4. **Mahenge Geologically and geographically blessed**: The Mahenge Project boasts one of the world's largest graphite mineral resources, measuring 213Mt at 7.8% total graphitic carbon (TGC). It holds the second-largest Ore Reserves worldwide, with 70mt at 8.5% TGC. These Ore Reserves support a mining operation that can produce up to 350kt/year of graphite.

   Mahenge deposit's high-quality graphite ore has low impurities and large flake size, and requires minimal processing in order to produce a very high-grade concentrate, differentiating it from other graphite deposits. Of the total graphite to be produced at Mahenge, ~60-70% will be well-suited for high-value end-value products that require large natural flake size, and ~30-40% will be highly suitable for the rapidly growing battery anode market. It is worth noting that all of the product can be directed towards the battery anode market if deemed value accretive.
5. **Benefitting from experienced management:** BKT's management team is made up of individuals with extensive experience in these areas, including Daniel Pantany (GM Engineering & Technical), who worked on Syrah's Balama project from Front-end Engineering Design through to commissioning and whose insights have been incorporated into the design of Mahenge.
6. **Financing is moving quickly with discussions underway:** BKT is seeking ~US$200m to fund the Mahenge Project, aiming for a 50% debt and 50% equity financing structure. The company is exploring various financing options and discussing with potential lenders, who conducted site visits to the project in February 2023. BKT expects to receive credit-approved term sheets soon.

   We believe the approval of the 26-year Special Mining License in September 2022 and updated capital expenditure estimates put BKT in a solid position to advance financing discussions.
7. **Macro outlook:** Graphite poised to be lithium 2.0: While the importance of lithium-ion batteries (LIBs) is widely understood, the crucial role that graphite plays in the anode for all types of LIBs is often overlooked, with LIBs requiring 7–10x more graphite than lithium.

   Due to supply shortages and rapid acceleration of EV demand, lithium prices have risen significantly (+800%) in recent years. Ongoing deficits are predicted in the graphite market in the near future; as an example, Benchmark Mineral Intelligence forecasts deficits to exceed the entire natural graphite market (1.2mt in 2022) in 7 years.

Potential near-term catalysts

- Q3 CY23: Credit-approved term sheets from lenders
- Q3 CY23: Potential for POSCO to exercise its right to a BKT Board Seat
- Q3 CY23: Potential sell-down of a stake in the project to fund development and reduce dilution (subject to attractive pricing)

We note that POSCO may exercise its right to a seat on BKT's Board, which it holds as long as it maintains a stake of at least 10% in the Company. If POSCO were to take a seat on the board, it would be a further indication of its long-term commitment to the success of the project, and we would expect this to be well received by the market.

Appendix A: Graphite Explained

Graphite is a naturally occurring form of carbon with unique properties that make it useful for many applications. It has a hexagonal crystal structure and is known for its thermal and electrical conductivity, chemical stability, lubricating properties, and strength. It is used in applications including pencils, refractory bricks, and batteries.

Classification of graphite: natural vs synthetic graphite

The graphite market consists of two types of graphite: **natural** and **synthetic**. Although both are called graphite, they are two different commodities with unique properties.

Natural graphite

Natural graphite occurs in mineral deposits of three types: microcrystalline (amorphous), macrocrystalline (flake) and vein (crystalline vein or lump).

Natural flake graphite is mined; crushed, ground, milled and screened; and then separated from non-graphitic material in a froth flotation process. The resulting graphite concentrate, depending on its source, is about 95% graphitic carbon and exhibits a distinctive particle size distribution. The concentrate is used as is in many traditional applications (refractories, etc.), or further purified and processed into higher-value products for use in advanced applications (fire retardants, battery anode materials, etc.).

Synthetic graphite

Synthetic graphite is produced by heat treatment (graphitisation) of hydrocarbon materials above 3,000°C for up to several days. High-temperature processing transforms the precursor carbon forms into a graphite structure and vaporises impurities. As a result, synthetic graphite is more than 99.9% graphite. Synthetic graphite is significantly more expensive and has a much larger CO_2 footprint.

Uses of natural graphite: lithium-ion batteries are key application

The breakdown of global consumption of natural graphite by application is shown in Figure 7.

Figure 7: Main uses of graphite

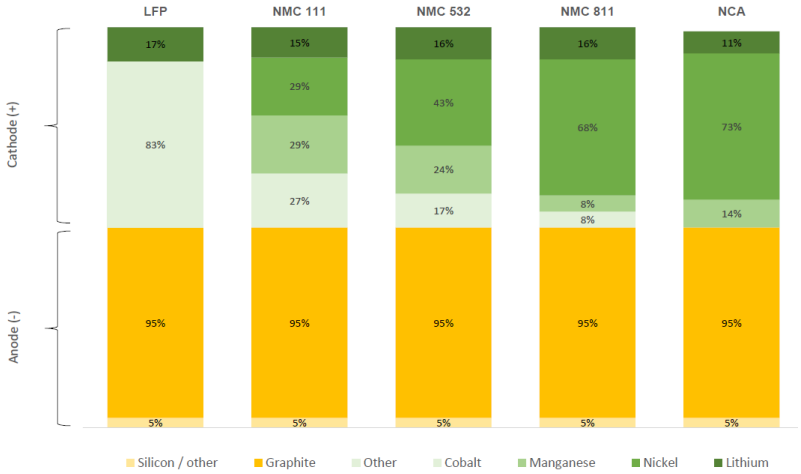
Application	Description
Lithium-ion batteries	Used as an anode material in lithium-ion batteries (LIB)
Refractories	Used in the production of refractory materials, which are used to line high-temperature furnaces and reactors
Lubricants	Used as a lubricant in various industrial processes, including in the production of machine parts and in the mining and drilling industries
Nuclear power	Used in the production of nuclear power, specifically as a moderator to slow down neutrons in the reactor core and control the fission process
Fuel cells	Used in the production of fuel cells, which convert chemical energy into electricity.
Graphite composites	Used to produce graphite composites, which are used in various industrial applications such as aerospace, automotive, and defence industries
Pencils	The main component of pencil leads
Other uses	Used in the production of coatings, inks, ceramics, and other industrial products

Source: MST

Use of flake graphite in battery anodes has grown in recent years

In the past decade, flake graphite has become increasingly important in Li-ion battery anodes as a substitute or additive to synthetic graphite. Anode producers blend materials to optimise cost and battery performance. To make the flake suitable for a Li-ion battery anode, it is spheronised, purified to at least 99.95% graphitic carbon, coated with carbon, and carbonised. The resulting coated spherical graphite (CSPG) is an ingredient in a battery anode. Cell producers combine the anode material with other battery components to produce cylindrical, prismatic, or pouch-shaped cells. Original Equipment Manufacturers (OEMs) purchase these cells from battery producers for various powered applications.

Figure 8: Graphite is the dominant anode material, regardless of battery chemistry



Source: BKT

Not all graphite is created equal: quality required for battery use

The quality of the graphite used to make anodes is directly linked to their performance. Any impurities in the graphite can significantly impact the battery's functionality. If any deleterious elements are present in the product after processing, it can negatively impact its quality and performance. Impurities such as vanadium, uranium, and tungsten can reduce or even eliminate suitability for these high-value applications.

Therefore, graphite qualification is essential for OEMs to ensure their products meet specific performance standards. Samples with high impurities are likely to be deemed unsuitable.

The process of qualifying graphite for batteries involves four stages, as shown in Figure 9.

Figure 9: Qualification process for the battery market

Testing Stage	Description
First	Testing a small sample of up to 5kg to determine if the graphite has the desired properties like low levels of deleterious elements, and suitable physical properties like Tap Density.
Second	Constructing batteries using samples of up to several hundred kilograms of the graphite.
Third	Testing up to 20t of the material by using the batteries constructed in the second stage with end users.
Fourth (Optional)	a final stage of testing may be required, involving up to 100t of graphite per product grade.

Source: MST.

Graphite: Quality More Important than Grade

Although resource tonnes and graphitic carbon content (grade) are key metrics in assessing projects, the evaluation of graphite projects is more complex. Key attributes (in addition to size of deposit and grade) are product purity and flake size distribution. A deposit with high grade but poor product quality is likely to be less desirable than a deposit with lower grade but a better-quality product. For example, a high-grade ore with high deleterious impurities will need more processing, reducing product size, which in turn reduces the product quality and sale price.

Figure 10: Examples of approximate prices relative to graphite product flake size and purity

Market Terminology	Mesh Size	Microns	Purity	Price (US$/t)
Jumbo flake	+48	>300	90 – 97%	~2,000
Large flake	-48 to +80	180 – 300	90 – 97%	~1,300
Medium flake	-80 to +100	150 – 180	90 – 97%	~1,100
Small flake	-100 to +200	75 – 150	90 – 97%	~750
Fines	-200	<75	80 – 85%	~450

Source: Graphite Focus

Purity: understanding the importance

Purity (the proportion of graphite to deleterious elements after processing) is particularly important for higher-value end uses such as LIBs and is a key determinant in saleability of the product. Any deleterious elements left in the product after processing can negatively impact its quality and performance. Impurities (e.g. vanadium, uranium, tungsten) reduce, or even eliminate, suitability for these high-value applications.

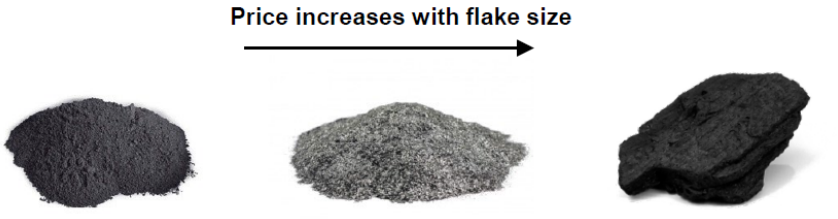
Moreover, further processing to remove deleterious elements increases operating costs and reduces recoveries, while also reducing product size, which decreases sale price.

Flake size: larger flake attracts a higher price

Flake (large) size graphite has superior properties relative to smaller flake, including higher conductivity and better mechanical strength. Larger flake size also allows for greater surface area which increases conductivity. Large flake graphite is more resistant to fracturing and cracking. This increased strength and durability makes it more suitable for use in high temperature and pressure applications.

Larger-flake graphite has higher purity and is easier to process, lowering costs. Large flakes can be crushed and ground further to produce smaller flakes, but smaller flakes cannot be transformed into larger flakes.

Figure 11: Graphite prices increase with flake size

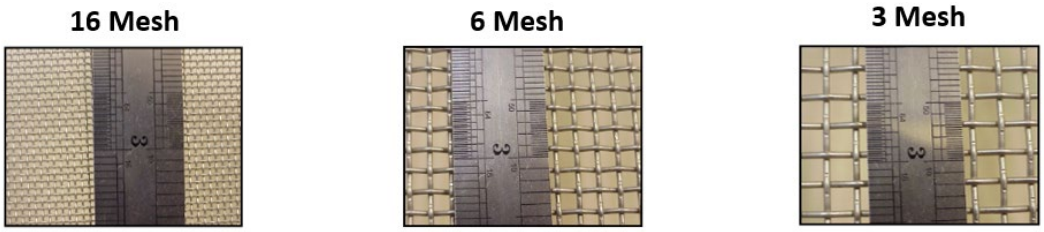


SMALL FLAKE (FINES)	LARGE FLAKE	JUMBO FLAKE
Lithium-Ion Batteries	Flame Retardants	Flame Retardants
Paint & Coatings	Refractories	Gaskets & Seals
Lubricants	Aviation	Expandable Graphite
Pencils	Lithium-Ion Batteries	Fuel Cells

Source: BKT

Graphite flake size is determined by passing it through sieves with different mesh openings to measure its particle size distribution. The mesh size, or number of openings per inch, is used to classify the size of the flake. For example, a 200-mesh powder would have 200 openings per square inch, meaning the particles are very fine. A minus (-) sign before the mesh size means particles smaller than the specified size will pass through the screen, while a plus (+) sign means particles larger than the specified size will be retained on the screen.

Figure 12: Understanding mesh sizes



Source: ESPI Metals

Appendix B: Key Differences Between Mahenge Project and Other Graphite Mines

Current graphite prices, seemingly ignoring potential future shortages, are impacting active mines like SYR's Balama. This is clearly shown in SYR's recent quarterly figures, where the selling price for concentrate is around US$636/t, substantially below the all-in sustaining cost (AISC) of US$806/t.

We hold the view that the Mahenge Project has certain key differentiating factors when compared to operations like SYR's Balama mine. These distinctions are crucial to understand why we believe Mahenge continues to be an appealing asset. Figure 1 provides a detailed comparison of SYR's Balama operation and BKT's Mahenge Project. Importantly, while the Balama mine is currently operational, Mahenge is not, and it needs to be noted that many of the comparatives are estimates not actuals and are derived from the Definitive Feasibility Study on Mahenge.

Three key differences create the greatest competitive advantage

Mahenge: 70% high-value flake graphite and 30% lower-value fines

Product quality

Mahenge's product composition and quality have notable differences vs other operating graphite mines. Mahenge is projected to produce 70% high-valued flake graphite and 30% lower-valued fines, in contrast to SYR's composition of ~91% fines. The high proportion of flake graphite in Mahenge's product mix results in a more valuable product per tonne due to its higher market price.

BKT's product mix ~US$1,162/t, notably higher than SYR's avg. price of US$636/t

Revenue

BKT's graphite product sales prospects outdo those of other operational mines. Unlike some competitors who have not secured offtake agreements, BKT has locked in ~80% of Module 1 production under offtake/option agreements, affirming its product demand. The current estimated basket price for BKT's product mix is ~US$1,162/t, significantly higher than the prices seen for SYR which received a realised weighted average price of US$636/t (March qtr.). BKT's increased value per tonne implies greater revenue potential compared to its competitors.

BKT's energy cost, ~1/3 of Balama's, saving ~US$150/t over SYR

Costs

Based on data from Benchmark Mineral Intelligence, we note that a peer analysis confirms Mahenge's first-quartile position on the global cost curve, potentially giving it a distinct cost advantage. For example, its projected C1 cash cost and energy cost compare very well to peers (see Figure 13). BKT's energy mix consists of 60–70% hydro and 30–40% gas, a sustainable mix that provides a competitive edge in terms of the company's cost structure and environmental position. BKT's energy cost stands at roughly one-third of our estimated cost for Balama's hybrid diesel-solar system. This is expected to produce operational savings of around US$150/t for BKT relative to SYR, further enhancing its potential competitive edge.

Figure 13: Comparing the Mahenge Project's key attributes with Balama's

Category	*SYR*	*BKT*	*Observations*
Graphite mine/project	Balama	Mahenge	Balama started in 2019; while Mahenge's ~20 month construction is scheduled to begin in 2025
Reserves	110mt at 16% TGC	70mt at 8.5% TGC	Balama has world's largest reserves, while Mahenge has world's second reserves (world's largest measured resource)
Location	Mozambique	Tanzania	Tanzania's credit risk weighting is higher: Mozambique - Caa2↑; Tanzania - B2↑
Product quality			
Product composition	~90% fines / ~10% flake	~30% fines / ~70% flake	BKT offers a more valuable product mix per tonne
Energy source	70% diesel generators, 30% solar/battery	Anticipated 60-70% hydro, 30-40% gas for grid power	BKT benefits from a more sustainable energy source with a lower carbon footprint
Revenue			
Present basket price*	US$799/t	US$1,162/t	BKT's product mix has a higher value per tonne. SYR's basket price for March qtr was US$636/t
Graphite product sales	No confirmed offtake agreements	~87% of Module 1 production under offtake/option/MOU	BKT demonstrates a stronger ability to sell its graphite products
Cost			
C1 cash cost	US$668/t	US$466/t	BKT's estimate, while MST's estimate is ~US$480/t
Power cost	~US$0.25-0.30/kWh	US$0.08/kWh	BKT's energy cost is 1/3 of SYR's, providing a cost advantage of ~US$150/t product

*Source: MST, using publicly available data. Note: *prior to any product adjustments/discounts.*

Appendix C: Why Natural Graphite Has Not (Yet) Followed the Lithium Trajectory

there is 7–10 times more graphite than lithium in a lithium-ion battery

Despite the fact that demand for lithium-ion batteries has surged over the past few years, leading to a significant increase in the price of lithium carbonate used in batteries, graphite prices have not risen substantially. This may seem surprising, given that there is 7–10 times more graphite than lithium in a lithium-ion battery, and the global demand for graphite is expected to grow sevenfold between now and 2035.

In this section, we explore why natural graphite prices have yet to increase significantly and why we believe that this situation will inevitably change. For a review of the types of graphite and their applications, see the Appendix.

Reason 1: Global graphite demand has been less concentrated on batteries – but this is changing

Graphite prices have lagged lithium prices partly because of the difference in demand for each mineral in battery application as a proportion of the total market. As the proportion of battery demand for a mineral relative to the total market size increases, the price of that mineral becomes more sensitive to fluctuations in battery demand.

Consequently, the price of lithium is more sensitive to fluctuations in battery demand at this stage, although the sensitivity of the graphite price to battery demand is set to grow over time.

Figure 14 shows that lithium carbonate prices significantly increased in 2021, when battery demand as a percentage of the total lithium market was ~65%.

The percentage of lithium demand from batteries in the overall lithium market is growing, increasing from 47% in 2019 to an estimated 80% in 2023. Similarly, the percentage of natural graphite demand from batteries in the total market is also increasing, from 26% in 2019 to a projected ~63% in 2023.

Battery demand anticipated to constitute ~60% of the market by 2023, a comparable proportion to the lithium price surge.

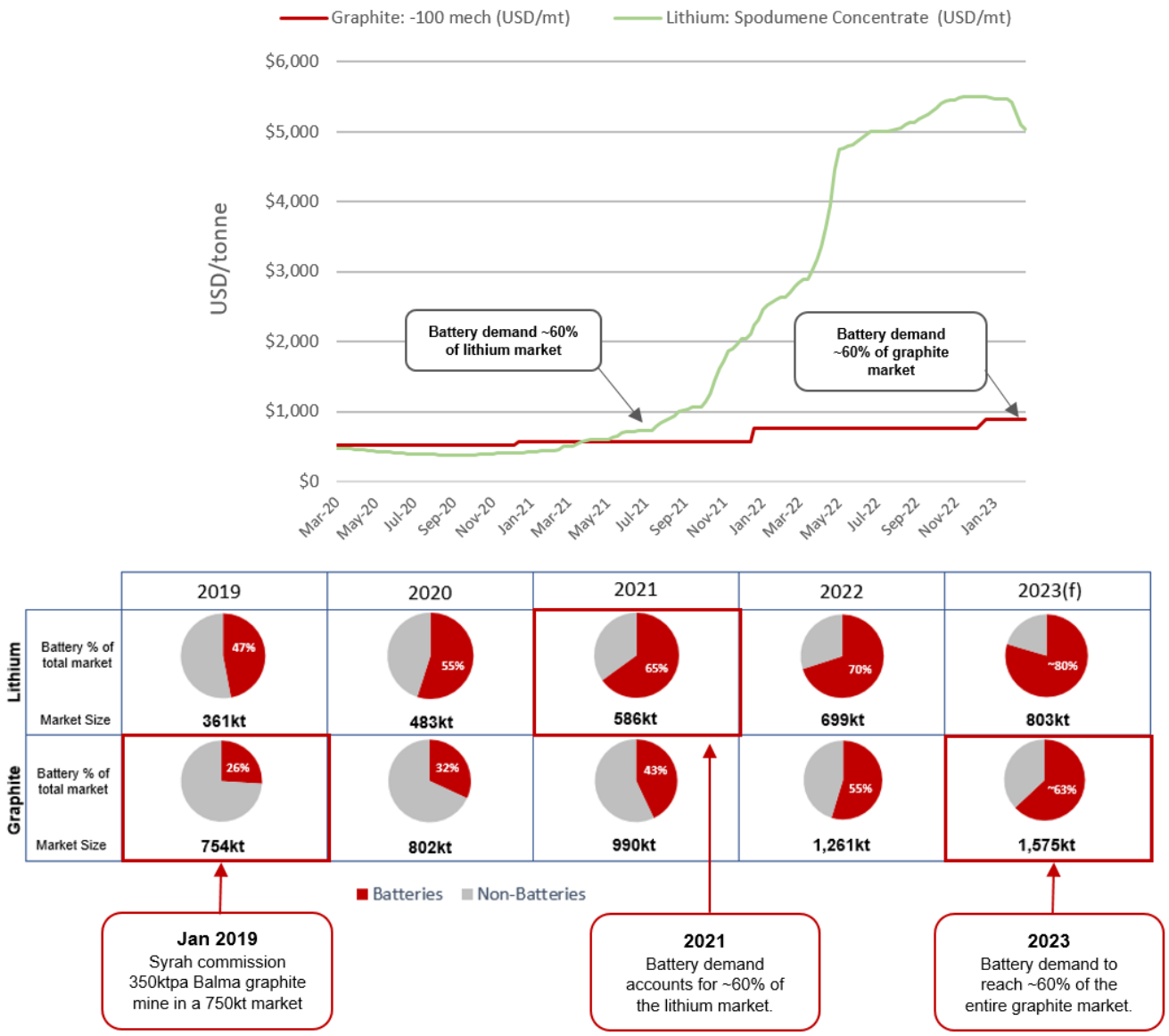
Historically, graphite has been more closely tied to global crude steel production. The decline in crude steel production, brought about by COVID-related lockdowns in China, led to reduced demand for graphite in steel-related applications. This, in turn, exerted downward pressure on natural graphite prices.

Nonetheless, the situation is evolving, and we believe the global flake graphite market will experience a pivotal moment in 2023, with batteries projected to make up ~63% of the market, similar to when lithium prices surged.

What we highlight in Figure 14 is the following:

- **Lithium prices surged in 2021 when battery demand represented ~60% of total lithium market**
- **Historically, graphite has been closely tied to global crude steel production, but this is changing**
- **Battery demand is expected to make up ~60% of the market by 2023, similar to the lithium price surge.**

Figure 14: Battery demand to start driving graphite pricing from 2023?



Source: MST, using publicly available data

Reason 2: Synthetic graphite has dominated – but natural graphite is expected to become more prevalent

Graphite anodes can be obtained through the extraction of natural graphite or from synthetic graphite, created using crude oil (see Appendix).

We believe graphite prices have been held back by the dominance of synthetic graphite anodes, which account for ~57% of the battery anode market.

Natural graphite is cheaper and ~55% less carbon intensive

Synthetic graphite is produced from petroleum coke, which is a carbon-rich material obtained from oil refining. As a result, fossil fuels are currently supplying a significant portion of the growing anode demand for graphite.

However, experts are predicting that natural graphite is likely to increase in anodes relative to synthetic. Natural graphite is cheaper, has greater range, and is ~55% less carbon intensive, making it more attractive in terms of cost-effectiveness, performance benefits, environmental concerns, and the growing demand for sustainable materials.

Reason 3: The graphite market is still opaque – greater transparency might drive up prices

The graphite pricing market is quite opaque due to supply chain transparency issues, few market players, and concerns about price information reliability.

Increased demand from ethical suppliers, may drive up prices

As demand for graphite continues to grow, there is likely to be greater pressure on market players to provide more reliable and transparent pricing information. This will likely lead to increased demand from ethical suppliers, which may drive up prices. We have seen this in other markets; for example, the implementation of stricter environmental regulations and greater transparency in the cobalt supply chain led to increased scrutiny and higher prices.

Conversely, a more transparent market may facilitate increased funding for new supply. The graphite market's opacity in terms of pricing has made bankers hesitant to finance new projects as forecasting long-term prices is difficult.

Reason 4: OEMs not incentivised (yet) to use ex-China product

China produces >80% of global anode material supply, exposing OEMs to supply chain risks.

Western Governments are placing mounting pressure on EV OEMs to source their anode materials from non-Chinese suppliers. Currently, China produces ~83% of the global supply of anode material, a dependency which exposes OEMs to supply chain risks due to potential disruptions from trade tensions, tariffs, and export restrictions.

Concerns over the environmental and social impact of raw material mining and processing in China have also led to increased scrutiny and pressure from regulators (notably the USA and the EU) and investors for responsible sourcing practices. Additionally, the expected growth of the EV market is driving up the demand for anode material and increasing the urgency for OEMs to secure reliable and sustainable sources of supply.

Policies such as the US *Inflation Reduction Act* (2022) will incentivise OEMs to explore alternative anode material sources outside of China. We expect the shift towards non-Chinese sources to result in upward pressure on natural graphite prices.

We believe that a surge in natural graphite prices is not a matter of if, but rather a matter of when.

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