Allenby Capital

Company Note

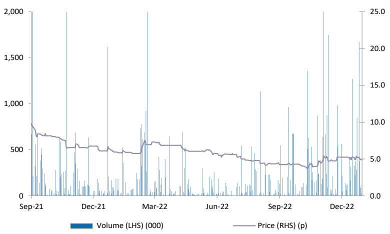
Update

30 January 2023

Corporate

Current price	**4.90p**
Sector	Mining
Code	GROC.L
Listing	AIM

Share Performance



% Change	1m	3m	12m
GROC.L	-6.7	+14.0	-17.7

Source: Thomson Reuters, Allenby Capital

Share Data

Market Cap (£m)		5.4
Shares in issue (m)		118.2
52 weeks (p)	High	Low
	7.50	3.70
Financial year end		30 November

Source: Company Data, Allenby Capital

Key Shareholders

Alba Mineral Resources plc	50.59%
Kadupul Ltd	17.71%
Monecor (London) Ltd	6.77%
Bernstein (Stefan)	0.67%
Adams (Kirk)	0.23%

Source: Refinitiv, Allenby Capital

Peter J Dupont

0203 002 2078

p.dupont@allenbycapital.com

www.allenbycapital.com

GreenRoc Mining plc (GROC.L)

Quantum leap in Amitsoq resource base

GreenRoc (GROC.L), the critical materials junior, has announced a quantum upgrade in the JORC compliant graphite resource tonnage of its Amitsoq project in southern Greenland. The classification of the resource has also been considerably enhanced with a much higher proportion in the indicated and measured category. The almost threefold increase in contained graphite tonnage achieves critical-mass for development and makes Amitsoq one of the leading graphite projects globally. Bearing in mind tonnage, the elevated grade, favourable geology for mechanised mining and deepwater access, Amitsoq has the potential to occupy a competitive position on the international cost curve for graphite. There also remains plenty of scope for exploration both on Amitsoq Island and to the east at the undrilled Kalaaq deposit. We now believe that Amitsoq will move to the scoping study stage. This is likely to be followed by pre-feasibility and definitive feasibility studies in 2024/25. GreenRoc is planning mine start-up by H1 2027.

- **Amitsoq background**: The 100% owned Amitsoq project lies in southern Greenland about 10 km north of the small town of Nanortalik, the most southerly in the country and about 100 km south of the international airport of Narsarssuaq. Access is via boat from Nanortalik or helicopter. The adjacent fjord is free of pack ice in winter. Amitosoq was the site of a small graphite mine in the early 20th century.

- **Drilling activity**: GreenRoc has undertaken two diamond core drilling programmes in the third quarters of 2021 and 2022. In total there have been 29 drill holes covering 3,779m of which the second programme covered 19 holes and 2,844m. Drilling has taken place towards the southern tip of Amitsoq Island along about 1 km of the strike of two parallel graphite layers (Upper and Lower Graphite Layers). According to GreenRoc, the second phase of drilling more than doubled the footprint of the Amitsoq deposit. The deposit remains open towards the north, west, southwest and at depth. This points to the potential for exploration upside.

- **Resource base**: Following Phase 2 drilling, Amitsoq's ore reserves have increased by 178% to 23.05m tonnes at an average grade of 20.4% Graphitic Carbon (Cg) for contained graphite of 4.71m tonnes. The last mentioned was up 189% on Phase 1. Resources in the high confidence Measured category have been assessed for the first time. The contained graphite categorisation split is now Measured 0.28mt, Indicated 1.29mt and Inferred 3.14mt. Significant resources in the Measured and Indicated categories accounting for 33% of the total is an important validation of project fundamentals. Resources proved to be largely insensitive to Cg grade cut-off.

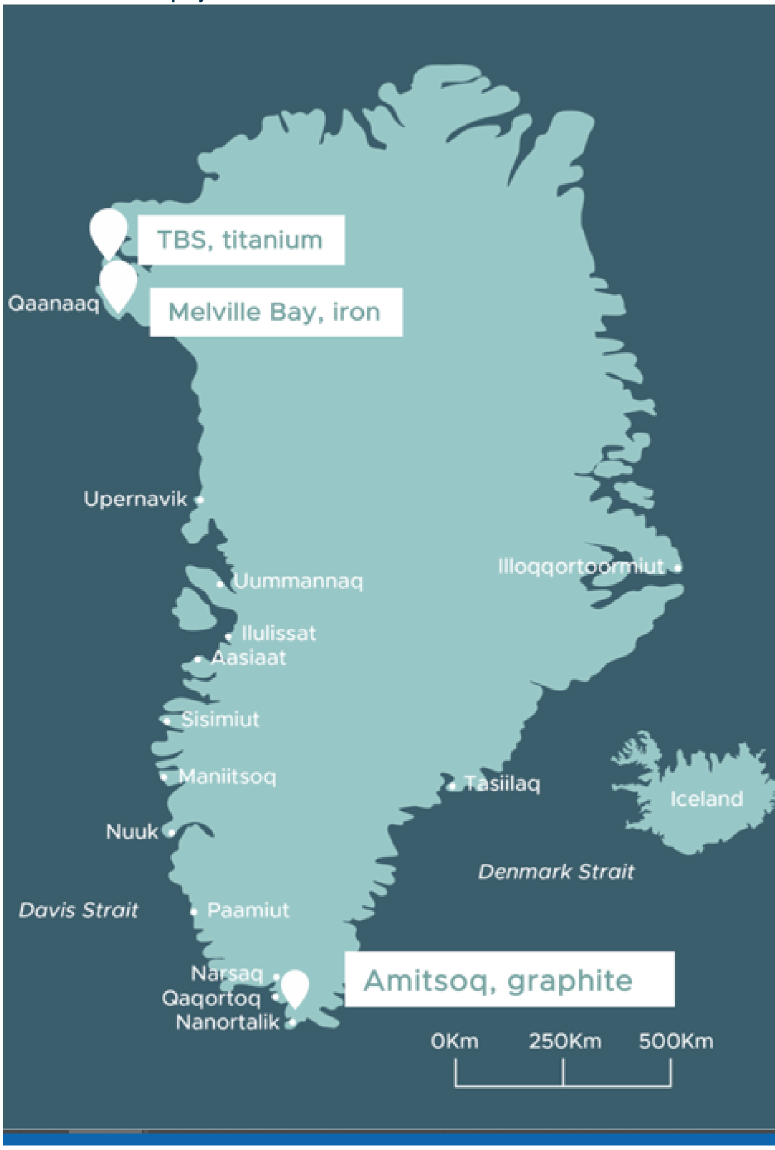
- **Graphite layers:** Drilling has revealed that mineable widths of graphite (>2.0m true thickness) were present in all 19 holes on the LGL (Lower Graphite Layer) and 8 of the 10 on the UGL (Upper Graphite Layer). Thicknesses were between 2.72m and 7.99m in the UGL and between 2.50m and 20.69m in the LGL. Graphite outcrops at the south of Amitsoq and occurs at shallow depths elsewhere.

Year End: November			
(£'000)	**2021**	**2022**	**2023E**
EBITDA	(305)	(1,000)	(1,050)
NET (DEBT)/CASH	3,269	520	(1,058)

Source: Allenby Capital. Allenby Capital provides research services to GreenRoc Mining plc (GROC.L)

Please refer to the last page of this communication for all required disclosures and risk warnings.

Exhibit 1: GreenRoc project locations



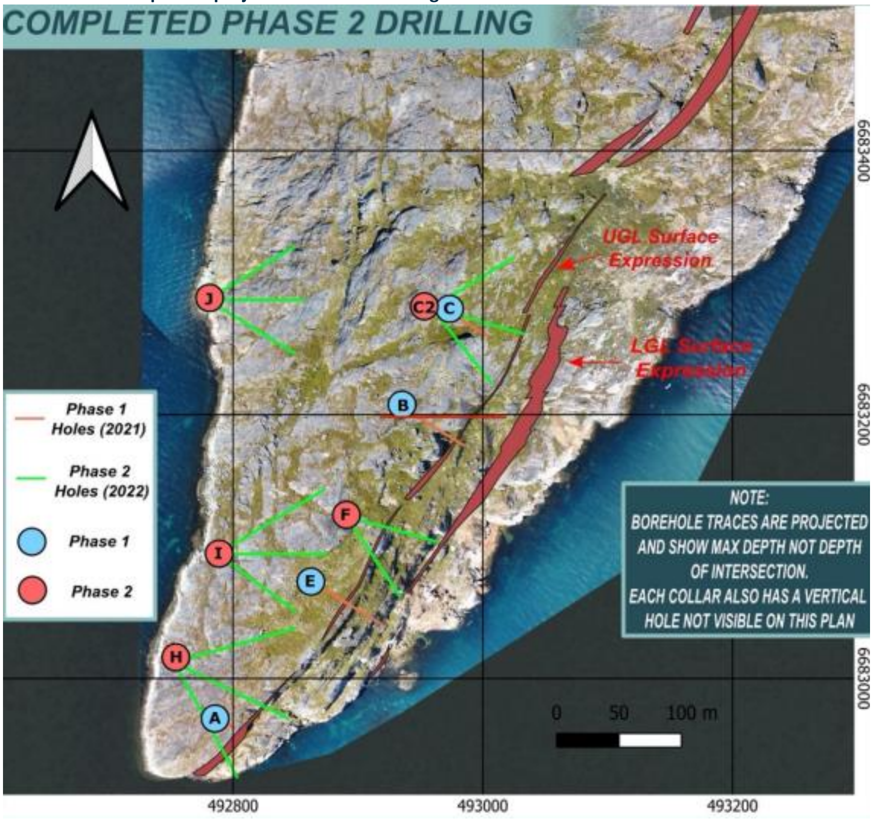
Source: Company

How does Amitsoq compare?

World class potential reflecting outstand grades: The short answer is very well on all major counts. We believe Amitsoq has genuine world class potential. At this juncture, Amitsoq's key strength is arguably its graphite grade of circa 20%. Out of the half a dozen or so major graphite development projects only Talga Group's Vittangi project near Kiruna in northern Sweden comes close to matching Amitsoq. Grades for the other five leading development projects range between 4.4% for Tirupati Graphite and 17.2% for Mason Graphite. As far as we are aware, none of the large scale established players in the graphite industry have grades of around 20% Cg. Taking Syrah Resources (SYR: ASX) Balama operations in Mozambique, the world's largest graphite mine, the grade is 10% Cg. We believe, in fact, that the industry average is around this level. It should be remembered that grade is a key determinant of cost.

Critical-mass has now been reached for development: In terms of the resource base, Amitsoq with almost 5m tonnes of contained graphite has now reached critical-mass for development in our view. Furthermore, as we have noted, there is considerable scope for expansion. A total resource of >10m tonnes contained graphite for Amitsoq Island would not appear surprising in our view given the excellent exploration upside potential. Taking our peer group, total resources range between 1.15m tonnes at Tirupati and 14.67m tonnes at Mason Graphite.

Exhibit 2: Amitsoq Island project and Phase 2 drilling



Source: Company

Metallurgical testing

Successful metallurgical testing: GreenRoc's technical consultants, Bavaria-based ProGraphite GmbH, have undertaken metallurgical test work on Amitsoq ore. They determined firstly that Amitsoq ore can produce a high-grade 97% graphite concentrate using simple ore processing techniques. This in turn can be used as the precursor to produce spherical graphite and has been successfully achieved in tests conducted by ProGraphite. The required 99.95% very high purity graphite for spherical graphite for lithium-ion battery anode applications is normally achieved via conventional hydrofluoric acid processing but in GreenRoc's case is also achievable using alkaline purification.

Ultra-high purity graphite using alkaline processing: GreenRoc has recently announced that ProGraphite has enhanced its processing technology for producing ultra-high purity graphite. Tests showed that 99.97% graphite purity could be obtained using drill core sourced from the Amitsoq project and sodium hydroxide alkaline processing technology. Concentrate derived from the drill core was used to produce spherical graphite and then processed using the alkaline technology to 99.97% purity.The latest tests not only produced material exceeding the purity specification required for lithium-ion anodes but also offered environmental and economic advantages compared with the conventional route. This reflected lower toxicity and a simpler process.

Amitsoq risks

De-risked geologically: Following Phase 2 drilling, the Amitsoq Island project would appear to have been largely de-risked geologically. Amitsoq will, however, need to progress through potentially lengthy Pre-feasibility and Definitive Feasibility studies, including mine, mill and infrastructure Front End Engineering and Design (FEED), before project financing or joint-venture arrangements can be concluded. It should be noted here that GreenRoc, in common with some of its peers, has been contemplating a downstream presence in graphite by producing spheroidized material. This could offer the potential for higher margins than simply producing a graphite concentrate given the potential for significant price premiums.

Financing is probably the key risk: Arguably the key risks currently relate to financing the lead time between now and commercialising the Amitsoq project. It should also be noted that even when feasibility studies have been completed, concluding financing can take some time and is not assured. We would, however, say that given the Amitsoq project's excellent characteristics and the potentially strong demand growth for battery grade anode material, it would be surprising if financing was not forthcoming.

No near to medium term threats to lithium-ion batteries but solid-state batteries and silicon could be long-term threats to graphite: Near to medium term we do not perceive any major threat from alternative technologies to lithium-ion batteries in electric light vehicle applications. Theoretically solid state technology using ceramic electrodes could pose a threat but development for large scale production appears to be proving more challenging than originally thought by the auto industry. Cost is also an issue. We believe Toyota has the most advanced development programme in applying solid state battery technology. Graphite could, in principle, be substituted by silicon as a battery anode material with the key advantage being much higher energy density. There are however major drawbacks with the main one being volume expansion upon lithium insertion which leads to a short cycle life. The application of both solid-state battery technology and silicon anode technology at volume would appear unlikely much before the mid-2030s.

Graphite markets

Two distinct markets based on traditional industrial applications----Natural graphite has an excellent range of properties particularly in terms of heat resistance, electrical conductivity and energy density which provide a wide range of applications. There are two distinct market sectors. Firstly, there are the traditional diverse markets in metallurgy and engineering. Key examples are refractory materials, liners for metallurgical processing ladles and crucibles, carbon additives used in steelmaking and powder metallurgy, friction materials used in auto components, electric motor bushes and expanded materials. The traditional markets are broadly GDP growth driven but with a weighting to steel and foundry industry activity.

------and lithium-ion batteries: The second application group relates to lithium-ion battery anodes in general and those supplied for battery electric vehicles (BEV) applications in particular. Increasingly, lithium-ion battery anode demand is being driven by BEV and hybrid electric vehicle (HEV) output. Broadly speaking, lithium-ion battery based light vehicles use between 36 kg (Tesla Model 3, Renault Leaf) and 96 kg (Ford F150 Lightning pick-up truck) per vehicle of graphite. On average graphite usage is about 70 kg/light vehicle. The largest element by weight in a lithium-ion vehicle battery is graphite accounting for 22% of the total according to the American Chemical Society. It should be noted, however, that EV lithium-ion battery anodes typically comprise a 50:50 mix of natural and synthetic graphite. For several years the auto lithium-ion battery market has been growing much faster than traditional graphite markets. We believe the weighting of the former is now more than 50%.

Supply deficits a distinct possibility in the coming years due to surging EV battery demand Using data sourced from the Oxford-based Faraday Institution, lithium-ion gigafactory battery manufacturing capacity under construction or planned in Europe (potentially GreenRoc's target market) is expected to increase by around 7X between 2022 and 2030. Similar increases can probably be expected elsewhere in the world. This would imply quantum growth in demand for battery materials, including graphite. The key question now is whether there will be sufficient mine/processing capacity on-stream to supply the battery plants over the balance of the decade. Based on current trends supply looks like lagging demand possibly by a wide margin. This raises the prospect of supply deficits, rising commodity prices and quite possibly declining battery plant utilisation. Therefore, growth in EV-related demand might not be quite as strong as implied by Faraday but nevertheless substantial.

Hydrogen fuel cell opportunity

Hydrogen fuel cells are graphite intensive: Lithium battery technology has well known drawbacks. Key examples include the use of expensive materials, range, recharging times, performance in cold climates, payload, battery life (particularly where rapid charging is regularly used), towing capability and fires. An alternative technology that overcomes these drawbacks is hydrogen fuel cells. Fuel cells generate electricity by combining hydrogen with oxygen in the presence of a catalyst. Significantly, they are graphite intensive using about twice as much as a BEV for equivalent power. Key components in fuel cells using graphite are the bipolar plates. These distribute hydrogen and air evenly to the anode and cathode respectively, conduct current from cell to cell, act as a cooling agent and prevent leakages of gas and liquids.

Potentially the powertrain of choice for heavy vehicles: Fuel cells, in our view, are likely to become the powertrain technology of choice for heavier vehicles including pick-up trucks and SUVs. Fuel cell powered heavy truck development is currently underway at several truck producers and diesel engine manufacturers including Mercedes Benz, Volvo Trucks, IVECO (CNH), Hyundai, Kenworth, Toyota and Cummins Engines. Production of fuel cell powered trucks is scheduled to gain momentum in the late 2020s. By the 2030s graphite producers should be major beneficiaries.

Relinquishing Inglefield licence

GreenRoc originally had four licence interests in Greenland. Recently the company has announced that it is relinquishing the Inglefield Multi-element licence in the remote northwest of the country. This reflects the very early stage of appraisal and the desire to concentrate resources on the Amitsoq project to advance production as fast as possible. We think the decision makes eminent sense.

Financials

Comfortable near-term cash position: GreenRoc raised £315,000 gross in December 2022. The terms were 7.0m shares at 4.5p/share. Significantly the CEO Stefan Bernstein subscribed to £36,000 worth of shares. As of late January 2023, the stock was trading at about 5.35p/share. While our estimated cash position in late January 2023 of £0.55m is probably comfortable near-term, particularly as no drilling is being undertaken, capital outlays are likely to increase as the work programme gathers momentum. The key items of project-related expenditure in 2023 are likely to be the following:

- Permitting costs (Environmental and Social Impact Assessments)
- Consultancy costs
- Amitsoq scoping study and possibly the early stages of a PFS
- Carryover resource assessment costs from 2022

- Miscellaneous licence related costs

Assuming project-related costs of around £1.0m and G&A of £0.88m we would look for a theoretical net-debt position at 2023 year end of about £1.1m.

Exhibit 3: GreenRoc summary financials

Year end November 30 (£'000)			
Income statement	**2021A**	**2022E**	**2023E**
Revenue	0	0	0
Cost of sales	0	0	0
Gross profit	0	0	0
Administrative expense	-305	-1000	-1050
Depreciation	0	0	0
Operating loss	-305	-1000	-1050
Finance income/(expense)	-1	0	0
Other	0	0	0
Loss before tax	-306	-1000	-1050
Tax	0	0	0
Loss for the period	-306	-1000	-1050
EBITDA	-305	-1000	-1050
Average share in issue	28	111.2	118.2
Balance sheet	**2021A**	**2022E**	**2023E**
Intangible fixed assets	8259	10211	11211
Total non-current assets	8259	10211	11211
Trade and other receivables	64	89	119
Cash	3269	520	200
Total current assets	3333	609	319
Total assets	11592	10820	11530
Non-current liabilities	1004	1004	1004
Trade and other payables	482	557	607
Payable to parent	52	52	52
ST debt	0	0	1258
Current payables	534	609	1917
Total payables	1538	1613	2921
Net assets	10054	9207	8609
Share capital	161	161	168
Reserves	9893	9046	8441
Shareholders' equity	10054	9207	8609
Shareholders' equity and liabilities	11592	10820	11530
Shares in issue end year m	111.2	111.2	118.2
Cash flow	**2021A**	**2022E**	**2023E**
Operating loss	-305	-1000	-1050
Share based payments	84	153	153
Operating cash flow before wc	-221	-847	-897
Payables inc/dec	202	75	50
Receivables (inc)/dec	-64	-25	-30
Operating cash flow	-83	-797	-877
Exploration expenditure	-475	-1952	-1000
Share issues net	4276	0	299
Repayment of loan from parent	-448	0	0
Other	-1	0	0
Net cash flow	3269	-2749	-1578
Net cash/(debt)	3269	520	-1058

Source: Company; Allenby Capital

Valuation

Methodology

Sum of the parts benchmarked against peers: In our GreenRoc initiation report of September 27, 2022, we based our valuation on a sum-of-the-parts calculation reflecting its status as a junior exploration play with exposure to several different commodities and projects. We continue to use this approach. The key metric used is enterprise value per unit of resource benchmarked against comparable junior stocks. The valuation quotients have been subjectively adjusted for variances in the stage of development and commodity mix. The adjusted quotients have then been applied to the relevant GreenRoc resource base to obtain the valuation. Where a project has yet to be assigned resources, we have used a valuation based on an assessment of development expenditure to date.

Amitsoq

Average valuation for the peer group is US$23.5/tonne: For GreenRoc there are two relevant projects and commodities for valuation purposes. These are the Amitsoq graphite and the Thule Black Sands (TBS) ilmenite projects, both of which have JORC compliant resources. Amitsoq is easily the more influential of the two. Our benchmarks for Amitsoq are six graphite exploration/development juniors. These include Beowulf, Leading Edge Materials and Talga with projects in Europe (Finland and Sweden), Mason Graphite the Laurentian Shield play in Quebec and two Madagascar plays, NextSource Materials and Tirupati Graphite. Valuation quotients for the six plays range between US$9.6/tonne and US$38.3/tonne and average US$23.5/tonne which is close to that determined at the time of the initiation. Previously we had discounted the average by 25% for the Amitsoq valuation to allow for an earlier stage of development than the peer group.

Exhibit 4: How the graphite stocks compare

Company	Refinitiv symbol	Price	Project Location	Enterprise value US$m	Status	Down-stream ops	Resources tonnes (m) M+I	Inferred	Total	Grade % Cg	EV unadjusted US/tonne	EV adjusted US/tonne
GreenRoc	GROC: AIM	5.00p	Amitsoq Greenland	6	JORC resource	No	1.57	3.14	4.71	20.41	1.27	
Beowulf Mining	BEM: AIM	4.00p	Aitolampi Finland	37	JORC resource	No	0.540	0.73	1.270	4.7	29.13	9.61
Leading Edge Materials Corp	LEM: TSX-V	C$0.275	Woxna Central Sweden	31	PEA, historical mine	No	0.83	0.2	1.03	7.9	30.10	15.05
Mason Graphite	LLG: TSX-V	C$0.39	Lac Guéret Quebec	34	FS	No	11.27	3.4	14.67	17.2	2.32	15.20
NextSource Materials	NEXT: TSX	C$2.83	Molo Mdg	259	FS/mine commisioning	No	6.29	2.37	8.66	6.3	29.91	29.91
Tirupati Graphite	TRGT: L	35.5p	Vatomina/ Sahamamy Mdg	44	FS	Yes	1.15	0	1.15	4.4	38.26	38.26
Talga Group	TLG:ASX	A$1.74	Vittangi N. Sweden	399	FS	Yes	5.88	6.33	12.21	18.6	32.68	32.68

Source: Company Reports, Refinitiv and Allenby Capital

Note: Resources refer to contained graphite.

Prices are at January 23, 2023 status

Mdg Madagascar, FS feasibility study, PEA preliminary economic assessment

Beowulf, Leading Edge Materials, Mason Graphite and NextSource Materials are all evaluating downstream operations

Leading Edge PEA relates only to Kringel deposit, LEM NI 43-101 resource base relates to four closely situated deposits along a 40 km mineralisation trend.

Kringel concession includes an historic mine and concentrator.

LEM valuation adjusted for Norra Karr and Bihor Sud projects.

Discount for less advanced development status cut from 25% to 15%: Our new valuation coefficient for Amitsoq's measured and indicated resources is US$20/tonne. This reflects the revised average US$23.5/tonne discounted by 15% rather than 25% to allow for the significant advance in development that has been made with the latest JORC resource estimate. Most of the peers have progressed through feasibility studies which suggest a

Amitsoq discount is still required. For the inferred resources we have used a significantly lower valuation coefficient of US$5.0/tonne. This however is well up on the US$0.2/tonne used previously for prospective resources. For perspective, GreenRoc as of late January is valued at a mere US$1.3/tonne. Our absolute valuation for Amitsoq is US$47.1m split US$31.4m and US$15.7m for the measured+indicated and inferred resources respectively.

Thule Black Sands

Benchmarked against Bluejay Dundas project: For TBS our benchmark is Bluejay's (JAY: AIM) Dundas ilmenite project which is located in close proximity on the west coast of Greenland. As of late January 2023, Bluejay had a market capitalisation of US$64.0m and an enterprise value of US$57.8m (£1=US$1.23). Bluejay has four projects but we believe Dundas is by far the most important and have assigned a weighting of 85% accordingly to the enterprise value. This would imply a valuation of US$49.1m for the project. Based on indicated and inferred resources of 7.2m tonnes of ilmenite the valuation quotient is therefore US$6.8/tonne. This compares with US$7.8/tonne at the time of the initiation with the variance reflecting a lower market valuation for Bluejay.

50% discount to Dundas: Reflecting the much earlier stage of development of TBS, we discounted the Dundas valuation coefficient by 50% previously. We propose doing so again. Using US$3.4/tonne this would imply an absolute valuation of US$5.8m based on TBS's ilmenite JORC compliant resources of 1.7m tonnes. As previously, we have also included an allowance for TBS's prospective resources based on the lower end of the exploration target of 3m tonnes of contained ilmenite. We have applied a valuation quotient for this purpose of US$0.2/tonne implying an absolute valuation of US$0.6m. The combined valuation for TBS'S JORC compliant and prospective resources is US$6.4m.

Other projects

Previously we had included subjective valuations for the Melville-Bay iron-ore and the Inglefield Multi-Element projects of US$0.5m and US$0.2m respectively. Following the decision to relinquish the Inglefield licence this has now dropped out the valuation.

Our GreenRoc valuation 37.7p/share

Valuation sharply increased due to upgraded Amitsoq resource estimate: We have sharply increased our valuation for GreenRoc. The absolute valuation rises 70% from US$32.5m to US$55.2m while the per share valuation increases 50% from 25.3p to 38.0p. This is a premium of 7.5X the share price on January 25, 2023 of 5.00p/share. The lower increase per share reflects both a firming in sterling since the initiation and the greater number of shares outstanding following the raise in December 2022. The increase in the dollar valuation is attributable to the recently announced upgraded JORC resource estimate for Amitsoq. This enabled us to reduce the discount to the average benchmark valuation quotient for the measured and indicated resources and substitute inferred for prospective resources on a higher valuation basis.

Note that our initiation valuation was based on Amitsoq contained graphite resources of 4.93m tonnes which was slightly above the JORC resource assessment of 4.71m tonnes. The earlier valuation included 3.30m tonnes of prospective resources valued at only US$0.2/tonne. If we had used the valuation quotient of US$20/tonne for all Amitsoq's JORC resources of 4.71m tonnes, the absolute valuation would be US$94.2m for this project and US$101.7m overall.

Potential for positive news flow and valuation upgrades: We believe GreenRoc has an aggressive programme to develop the Amitsoq project. This is likely to generate positive news flow which could provide scope for significant valuation upgrades in the coming months.

Exhibit 5: GreenRoc Mining Valuation

	GreenRoc interest	Resources	Valuation quotient	Absolute valuation		Valuation/share
Project	**%**		**US$/t**	**US$m**	**£m**	**£**
Amitsoq Graphite tonnes m						
JORC compliant M+I resources	100	1.57	20.0	31.40	25.53	21.6
JORC inferred resources	100	3.14	5.0	15.7	12.76	10.8
Total	**100**	**4.71**		**47.10**	**38.29**	**32.4**
Thule Black Sands Ilmenite tonnes m						
JORC compliant resources	100	1.7	3.4	5.78	4.70	4.0
Prospective resources	100	3.0	0.2	0.60	0.49	0.4
Total	**100**	**4.7**		**6.38**	**5.19**	**4.4**
Melville-Bay Iron-ore tonnes m						
JORC resources	100	63		0.50	0.43	0.4
Cash				0.74	1.00	0.5
Total				**54.72**	**44.51**	**37.7**

Source: Company; Allenby Capital

Note: Prospective resources are based on the lower end of the Target Range for TBS.

Cash is estimated at late January status.

Exchange rate: £1=US$1.23

Disclaimer

Peter J Dupont is the author of this research and is employed by Allenby Capital Limited as an Equity Analyst. Unless otherwise stated, the share prices used in this publication are taken at the close of business for the day prior to the date of publication. Information on research methodologies and disclosure in relation to interests or conflicts of interests can be found at www.allenbycapital.com. Allenby Capital provides research services to GreenRoc Mining plc.

Allenby Capital, 5 St Helen's Place London EC3A 6AB, +44 (0)20 3328 5656, www.allenbycapital.com