ASX Release

1 November 2023

LCA Highlights Low Carbon Footprint of Siviour

Independent life cycle assessment confirms Siviour's potential as cleaner source of Purified Spherical Graphite

- Independent environmental consultancy Minviro Limited has completed a Life Cycle Assessment (**LCA**) of the environmental footprint of Renascor's 100%-owned Siviour Battery Anode Material (**BAM**) Project in South Australia (the **Siviour Project**).
- The cradle-to-gate assessment includes mining, concentrating, spheronization and purification, encompassing both Renascor's proposed Siviour graphite mine and mineral processing plant near Arno Bay, South Australia and Purified Spherical Graphite (**PSG**) production facility in Bolivar, South Australia.
- Minviro estimates that the climate change impact of producing one tonne of PSG from the project will be approximately 2.0 tonnes of CO_2 equivalent emissions (**CO_2e**).
- The Siviour Project's climate change impact compares favourably with current production of PSG from Heilongjiang, China, the world's main source of PSG[1], where Minviro estimates the impact of producing one tonne of PSG is approximately 7.0 tonnes CO_2e.
- The graphite market continues to grow, with Benchmark Mineral Intelligence predicting an increase in battery anode demand of 300% by 2028 and with policy initiatives such as the US Inflation Reduction Act incentivizing the growth of new supply chains to meet the growing demand.
- China, which supplies approximately 70% of the global supply of graphite and 90% of global supply of anodes for lithium-ion batteries[2], has recently announced graphite export restrictions, highlighting the need for new ex-China supply sources, such as from Renascor's Siviour Project.
- The Siviour Project is in the advanced stages of development, with Renascor having obtained its primary mining approvals with the award of the Program for Environment Protection and Rehabilitation[3] and completed a Definitive Feasibility Study level assessment in the recently announced BAM Study[4]. Renascor expects that the completion of the LCA will assist in securing financing and offtake commitments.

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Renascor Resources Limited (ASX: RNU) (**Renascor**) is pleased to announce the results of a life cycle assessment (**LCA**) of Renascor's 100%-owned Siviour Battery Anode Material (**BAM**) Project in South Australia (the **Siviour Project**).

The LCA is intended to assess the environmental impacts associated with all stages of Renascor's production of Purified Spherical Graphite (**PSG**) from the Siviour Project.

Commenting on the LCA, Renascor Managing Director David Christensen stated:

> "*The Life Cycle Assessment confirms Siviour's potential to deliver not only a secure and low-cost source of Purified Spherical Graphite, but to supply this important product with a significantly lower environmental footprint than existing sources.*
>
> *As the graphite supply chain seeks new sources of graphite to meet the growing demand for lithium-ion battery anodes, we expect that the level of environmental responsibility and emission performance of the Siviour Project will assist in making Renascor an integral part of the clean energy transition*."

Life Cycle Assessment

The LCA was undertaken by independent environmental consultancy Minviro Limited (**Minviro**) to quantify the environmental impacts of producing PSG from the Siviour Project.

The cradle-to-gate assessment includes mining, concentrating, spheronization and purification, encompassing all stages of Renascor's proposed mine and concentrator near Arno Bay, South Australia and PSG production facility in Bolivar, South Australia. The LCA was based on Renascor's recently completed Battery Anode Material Study[5].

The LCA was conducted according to the requirements of the ISO-14040:2006 and ISO-14044:2006 standards and included an independent critical panel review.

Minviro estimates that the climate change impact of producing one tonne of PSG from the Siviour Project will be approximately 2.0 tonnes of CO_2 equivalent emissions (**CO_{2e}**), with the impact by scope shown below in Figure 1.

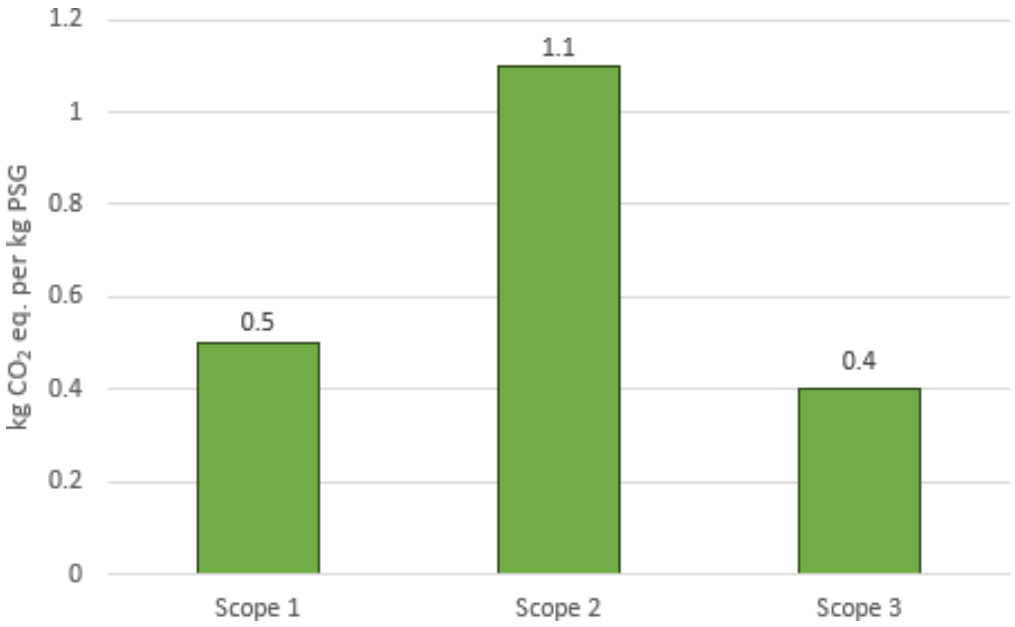

Figure 1. *Siviour Project climate change contribution by scope of emissions*

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Scope 1 emissions, which reflect direct emissions, are associated primarily with the combustion of natural gas in the downstream purification process.

Scope 2 emissions refer to the embodied impact of imported energy and are made up primarily of grid electricity used in the PSG facility.

Scope 3 emissions reflect the embodied impact of consumables and transport, with the largest contributor (approximately 50%) relating to the use of reagents in the downstream purification process.

Indicatively, Siviour's climate change impact compares favourably with current production of PSG from Heilongjiang, China, the world's main source of PSG[6], where Minviro estimates the impact of producing one tonne of PSG to be approximately 7.0 tonnes CO_{2e}. The higher CO_{2e} of PSG production in the Heilongjiang Province is significantly impacted by the use of a relatively high proportion of coal-based power, whereas the Siviour Project will utilise South Australian grid electricity, which includes a higher proportion of renewable sources.

Minviro also assessed the climate change impact associated with the production of coated anode grade synthetic graphite[7]. China similarly dominates the production of synthetic graphite, controlling over two-thirds of the world's production, with the main production centre located in Inner Mongolia[8].

For synthetic graphite, Minviro compared the climate change impact associated with the production of coated anode-grade synthetic graphite in Inner Mongolia with coated anode-grade natural graphite produced using natural flake graphite in Heilongjiang Province[9]. The climate change impact of producing one tonne of coated anode-grade natural graphite was estimated at 13.9 CO_{2e}, whereas the impact of producing one tonne of coated anode-grade synthetic graphite was estimated at 23.4 CO_{2e}. The larger climate change impact of synthetic graphite production is due in significant part to the high-power requirement associated with the graphitisation process, which generally requires the extended use of high temperatures to alter the crystalline structure of petroleum coke and other feedstocks to synthetic graphite grade. To ensure comparability, a sensitivity analyses modelling co-located coating of Renascor's PSG to produce coated anode grade natural graphite resulted in a climate change impact of 5.0 tonnes CO_{2e} per tonnes of upgraded PSG.

Graphite Market

The graphite market is currently experiencing significant growth primarily due to an increase in the demand for graphite in lithium-ion battery anodes, with Benchmark Mineral Intelligence predicting an increase in battery-related demand of 300% by 2028 and with further accelerated demand through 2032. See Figure 2.

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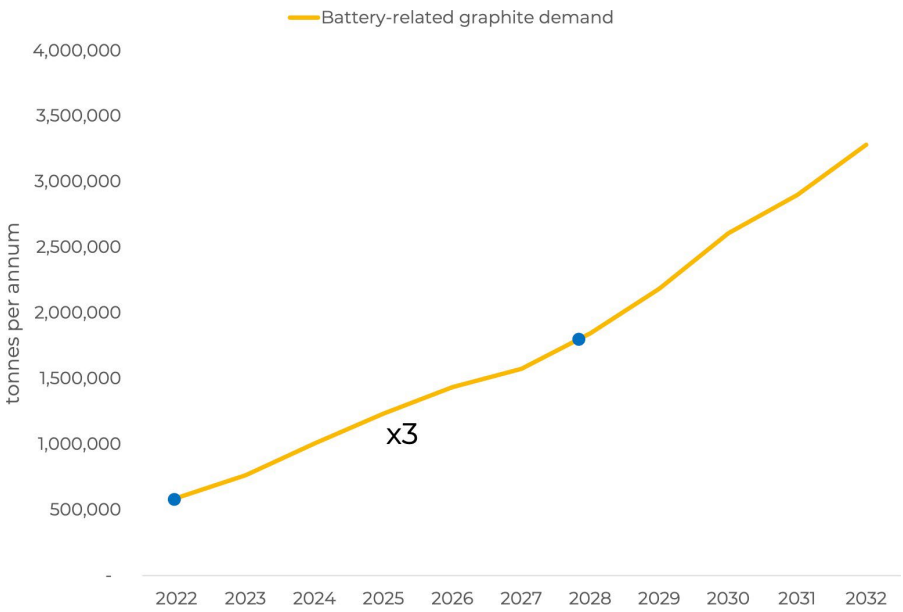

Figure 2. *Battery-related graphite demand (Source: Benchmark Mineral Intelligence)*

China currently dominates the graphite and anode markets, supplying approximately 70% of the global supply of graphite and 90% of global supply of anodes for lithium-ion batteries[10].

To promote new supply chains, policy initiatives, such as the US Inflation Reduction Act (**IRA**) are incentivizing the growth of new supply sources to meet growing demand. Of particular note, commencing in 2025, the IRA requires that all graphite and other critical minerals used in the manufacture of electric vehicles must be from sources outside of China to qualify for the full electric vehicle tax credit in the United States[11].

The importance of new ex-China supply sources has been further underscored by recently announced restrictions on the export of graphite products from China effective 1 December 2023. These restrictions have the potential to limit the ability of non-Chinese companies, including anode manufacturers, to source graphite material from their traditional Chinese supply source.

Next Steps

Renascor's strategy is to continue to accelerate the development of the Siviour Project and to enter the market at a time of growing undersupply.

The Siviour Project is in the advanced stages of development, with Renascor having obtained its primary mining approvals for the Graphite Concentrate operation with the award of the Program for Environment Protection and Rehabilitation[12] and having completed a Definitive Feasibility Study level assessment in the recently announced BAM Study[13].

The BAM Study estimates that Renascor can deliver a globally competitive gross operating cost for Purified Spherical Graphite of US$1,782 per tonne over the first 10 years and US$1,846 per tonne over LOM, including Graphite Concentrate operating cost of US$405 per tonne over first 10 years and US$472 per tonne over LOM[14].

The Australian Government, through its Critical Minerals Facility, has conditionally approved a loan facility of A$185 million for the development of the BAM Project. In addition, Renascor is progressing discussions with Export Finance Australia, the Clean Energy Finance Corporation and commercial lenders. Renascor has also commenced discussions with potential project partners, including potential offtakers, regarding equity investments to help further meet the BAM Project's capital requirements.

Renascor expects that the completion of the LCA will assist in securing financing and offtake commitments.

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This ASX announcement has been approved by Renascor's Board of Directors and authorised for release by Renascor's Managing Director David Christensen.

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[1] China currently accounts for approximately 99% of the world's supply of PSG, with the Heilongjiang Province supplying 60% of global supply and the Shandong Province accounting for 24%. No other province accounts for more than 5%. Source: Benchmark Mineral Intelligence.
[2] Source Benchmark Mineral Intelligence.
[3] See Renascor ASX announcement dated 28 November 2022.
[4] See Renascor ASX announcement dated 8 August 2023.
[5] See Renascor ASX announcement dated 8 August 2023.
[6] China accounts for approximately 99% of the global supply of PSG, with the Heilongjiang Province accounting for approximately 60% of global supply. Source: Benchmark Mineral Intelligence.
[7] According to Benchmark Minerals Intelligence, synthetic graphite accounts for approximately 60% of the anode market, with natural flake graphite account for 35%. The remaining 5% is made up of a combination of mesocarbon microbeads, silicone and lithium titanate oxide.
[8] Source: Benchmark Mineral Intelligence.
[9] Minviro concluded that reliable climate change data for the production of synthetic graphite was limited to the production of coated anode grade synthetic graphite and accordingly assessed the climate change impact of coated anode grade natural graphite to offer a more valid basis of comparison.
[10] Source: Benchmark Mineral Intelligence.
[11] Under the IRA, a tax credit of up to US$7,500 is available for the purchase of electric vehicles, with the credit made up of two US$3,750 tax credits. Commencing in 2025, graphite and other critical minerals sourced from 'foreign entities of concern' (including China) are disqualified for eligibility for the US$3,750 critical mineral tax credit. The other US$3,750 tax credit applies to battery components, with the IRA disqualifying battery components from the US$3,50 battery component tax credit if they are sourced from 'foreign entities of concern' from 2024.
[12] See Renascor ASX announcement dated 28 November 2022.
[13] See Renascor ASX announcement dated 8 August 2023.
[14] See Renascor ASX announcement dated 8 August 2023.

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Appendix 1

About Renascor

Renascor is developing a vertically integrated Battery Anode Material Manufacturing Operation ("**the Project**") in South Australia. The Project comprises:

- **the Siviour Graphite Deposit** - the world's second largest Proven Reserve of Graphite and the largest Graphite Reserve outside of Africa[15];
- **the Siviour Graphite Mine and Concentrator** - a conventional open-pit mine and crush, grind, float processing circuit delivering world-class operating costs in large part due to the favourable geology and geometry of Renascor's Siviour Graphite Deposit; and
- **a Battery Anode Material Production Facility** - where Graphite concentrate will be converted to PSG using an eco-friendly processing method before being exported to lithium-ion battery anode manufacturers.

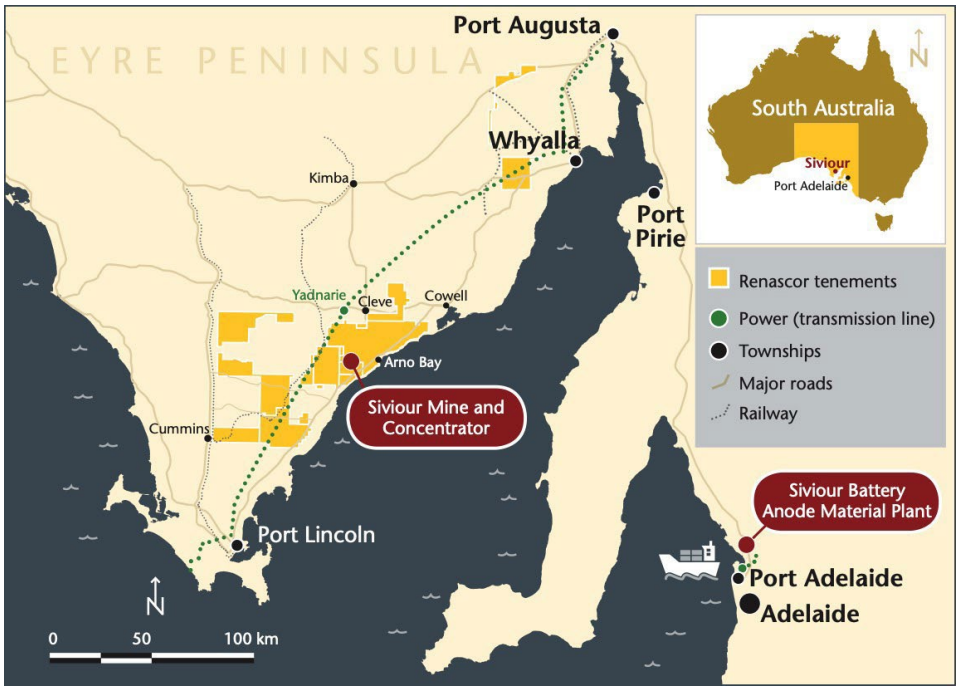

Figure 1. Siviour Battery Anode Material Project location.

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The 100% Renascor owned Siviour Graphite deposit is unique in both its near-surface, flat-lying orientation and its scale as one of the world's largest graphite Reserves. The favourable geology and size of the deposit will allow Renascor to produce Graphite Concentrate at a low-cost over a 40-year mine life.

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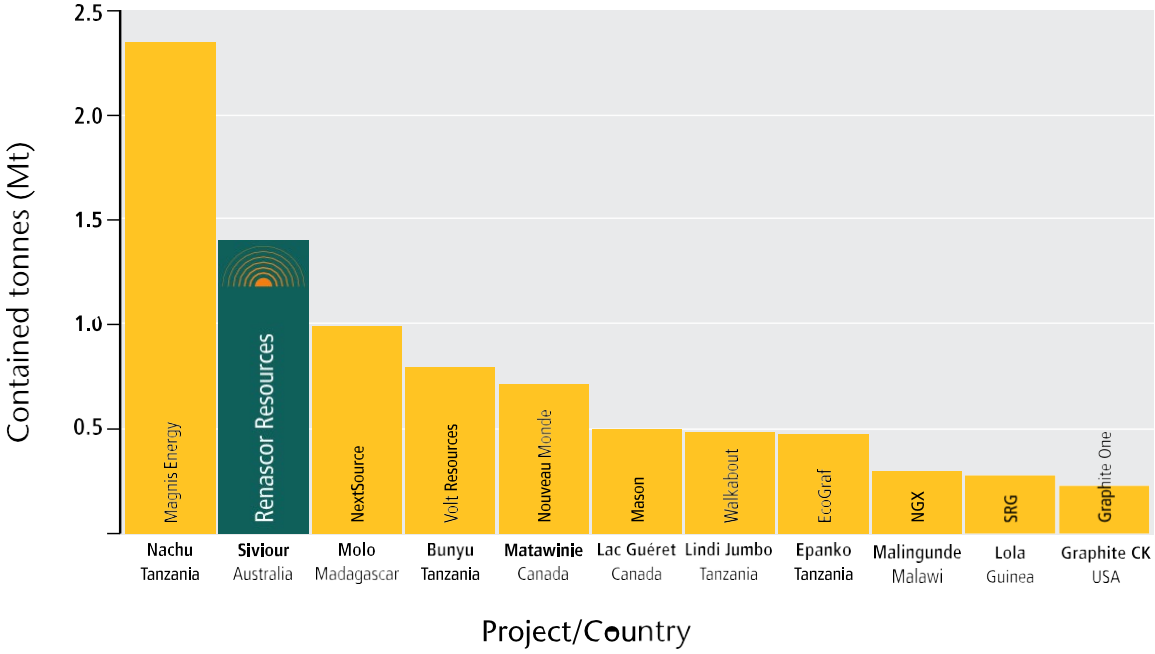

Figure 2. Globally Reported Proven Ore Reserve estimates (September 2023)[16]

Renascor intends to leverage this inherent advantage and develop a vertically integrated operation to manufacture high value PSG from a low-cost graphite concentrate feedstock and provide a secure cost-competitive supply of battery anode raw material into the rapidly growing lithium-ion battery market.

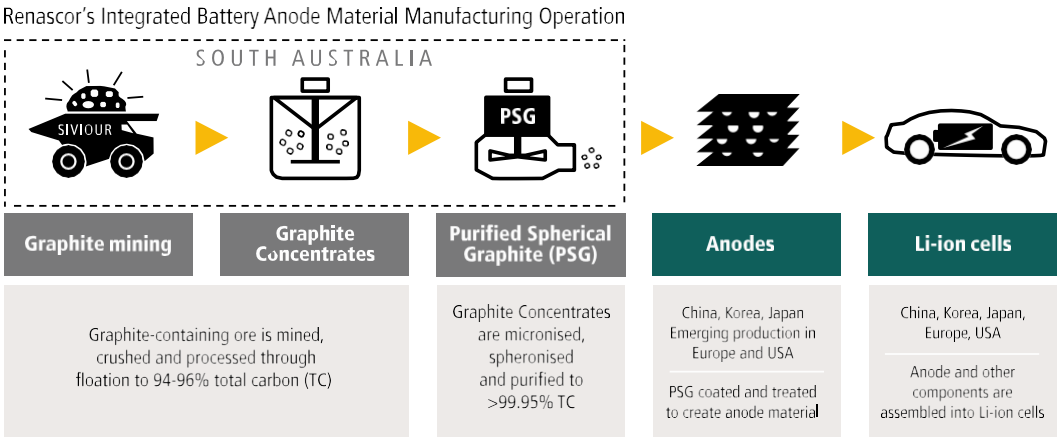

Figure 3. Renascor's vertically integrated Mine and Concentrator and Downstream PSG production facility within the Electric Vehicle supply chain.

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Appendix 2

Peer Comparison Data

Project name	Code	Company	Country	Report name	Date	Link
Bunyu	VRC	Volt Resources Ltd	Tanzania	Pre-Feasibility Study Completed	15 December 2016	https://announcements.asx.com.au/asxpdf/20161215/pdf/43drlhpvdwbhxp.pdf
Epanko	EGR	Ecograf Ltd	Tanzania	Updated 60ktpa Bankable Feasibility Study	21 June 2017	https://announcements.asx.com.au/asxpdf/20170621/pdf/43k2d21wvk2sv1.pdf
Graphite Creek	GPH	Graphite One Inc	USA	Preliminary Feasibility Study Technical Report Graphite One Project	14 October 2022	https://www.graphiteoneinc.com/wp-content/uploads/2022/10/JDS-Graphite-One-NI-43-101-PFS-20221013-compressed.pdf
Lac Guéret	LLG	Mason Graphite Inc	Canada	Feasibility Study Update of the Lac Guéret Graphite Project	12 December 2018	https://masongraphite.com/wp-content/uploads/2021/06/a53b7c_22115be39ccf4d85b9579f359680997c.pdf
Lindi Jumbo	WKT	Walkabout Resources Ltd	Tanzania	Updated Ore Reserve delivers 17.9% graphite grade	28 February 2019	https://announcements.asx.com.au/asxpdf/20190228/pdf/44321stl8dlk5f.pdf
Lola	SRG	SRG Mining Inc.	Guinea	Lola Graphite Project NI 43-101 Technical Report – Updated Feasibility Study	12 April 2023	https://srgmining.com/wp-content/uploads/2023/04/J6626-SRG_Lola_UFS_Rev_0_Fin_2023-0407.pdf
Malingunde	NGX	NGX Ltd	Malawi	Replacement Prospectus	14 June 2023	https://announcements.asx.com.au/asxpdf/20230614/pdf/05qn89bfqrhwx8.pdf
Matawinie	NOU	Nouveau Monde Graphite	Canada	NI 43-101 Technical Feasibility Study Report for The Matawinie Mine and the Becancour Battery Material Plant Integrated Graphite Projects	10 August 2022	https://nmg.com/wp-content/uploads/2022/08/Feasibility-Study-NMGs-Integrated-Phase-2-Projects.pdf
Molo	NEXT	NextSource Materials Inc	Madagascar	Molo Phase 2 Preliminary Economic Assessment NI 43-101 Technical Report	27 April 2022	https://www.nextsourcematerials.com/wp-content/uploads/2023/01/2022_04_27_molo_phase_2_pea_technical_report_dated_april_27__2022__final.pdf
Nachu	MNS	Magnis Energy Technologies Ltd	Tanzania	Bankable Feasibility Study Update Confirms Strong Financial and Technical Viability for the Nachu Graphite Project	27 September 2022	https://announcements.asx.com.au/asxpdf/20220927/pdf/45fhzx2nsgrmjb.pdf
				Supplementary Information Regarding Nachu BFS Update Released 27.9.2022	30 September 2022	https://announcements.asx.com.au/asxpdf/20220930/pdf/45fqs3q6h3hpw4.pdf

[15] Renascor ASX release 21 July 2020.

[16] Source: public company reports. Does not include graphite deposits that do not publicly report data on main stock exchanges in Australia, Canada, the United Kingdom and the United States. See Appendix 2 for further details on sourcing.