

## KASIYA'S GRAPHITE GLOBAL WARMING POTENTIAL TO BE AMONGST LOWEST IN THE WORLD

- Independent benchmarking indicates Sovereign's graphite co-product from Kasiya should have significantly lower global warming potential versus current and developing natural graphite projects
- Global warming potential (GWP) of producing one tonne of flake graphite concentrate at Kasiya estimated to be 0.2 tonnes of CO<sub>2</sub> equivalent emissions (CO<sub>2</sub>e)
- Kasiya has the lowest GWP compared with currently known and planned future natural graphite projects:
  - Up to 60% lower than currently reported GWP of graphite producers and developers, including suppliers to Tesla Inc.
  - 3x less polluting than proposed Tanzanian natural graphite production from hard rock sources
  - 6x less polluting than current Chinese natural graphite production which accounts for up to 80% of current global graphite supply
- In 2022, the lithium-ion battery market became the biggest end-market for natural flake graphite
- Despite graphite being only a co-product to future potential rutile production, Kasiya is still one of the largest and potentially lowest production cost flake graphite resources in the world as it is hosted in soft and friable saprolite material instead of hard rock
- Mining is planned to be via hydro-methods (high-powered water monitors) with the operation powered almost 100% by renewable sources (hydro-generated grid and on-site solar power)
- Previously, Sovereign had announced that its primary product of natural rutile is expected to have a GWP of only 0.1 tonnes CO<sub>2</sub>e – up to 97% lower than alternative titanium feedstocks produced by upgrading ilmenite

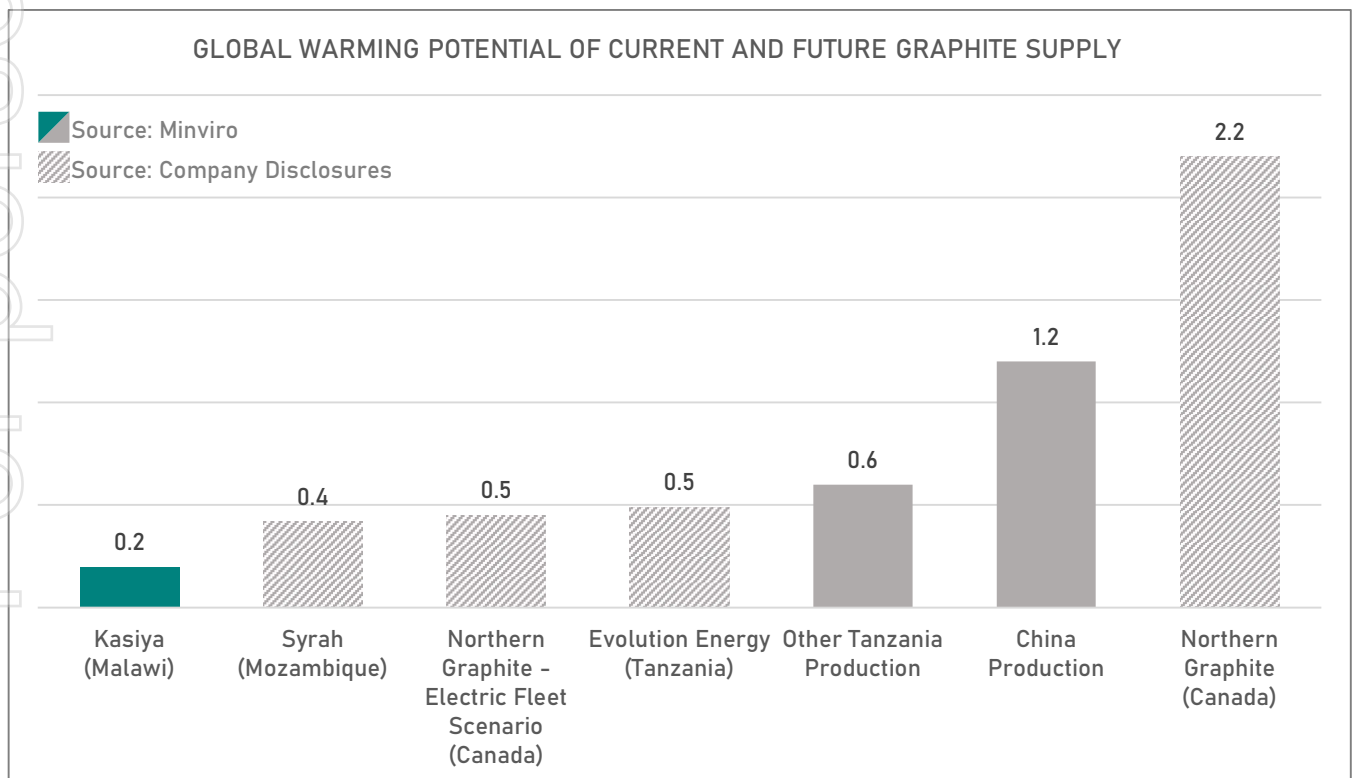


Figure 1: Global Warming Potential per tonne of graphite product (CO<sub>2</sub>e/t)

(Sources: see Appendix)

(Note: All figures are cradle-to-gate except for Syrnh Resources which includes transportation to the port of Nacala; transportation of Kasiya's graphite to the port of Nacala would add an estimated incremental 0.04CO<sub>2</sub>e to its GWP)

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Sovereign Metals Limited (ASX:SVM; AIM:SVML) (**the Company** or **Sovereign**) is pleased to announce the combined results of internal company analysis, supplemented with an independent benchmarking study by UK-based consultancy Minviro Ltd (**Minviro**) which compared the global warming potential (**GWP**) of producing natural flake graphite from the Kasiya Project (**Kasiya** or **the Project**) against relevant current and future natural graphite projects.

The cradle-to-gate life cycle assessment (**LCA**) was carried out by Minviro comparing current natural graphite production from China which produces almost 80% of the world's natural graphite, and proposed near-term production from Tanzania, which offers a regional benchmark against Kasiya in Malawi. The LCA study followed ISO 14067:2008 guidelines and was critically reviewed by a panel of three independent experts.

A number of graphite producers and explorers/developers have conducted their own LCAs, with conclusions of a select number being made public (**Figure 1**). Kasiya's graphite product currently has the lowest GWP of publicly reported current and future potential graphite production.

The benchmarking study found that the total GWP of 0.2 tonnes CO<sub>2</sub>e per tonne of natural flake graphite concentrate produced at Kasiya is significantly lower than the total GWP per tonne produced in Heilongjiang Province, China (1.2 tonnes CO<sub>2</sub>e) and the total GWP per tonne produced in Tanzania (0.6 tonnes CO<sub>2</sub>e).

**Sovereign's Managing Director, Dr Julian Stephens, commented:** "It is remarkable that our graphite co-product from planned rutile production at Kasiya will not only be potentially one of the lowest cost flake graphite projects in the world but now can also be considered to have one of the lowest global warming potentials of current and future graphite mines. Producers and users of lithium-ion batteries are already taking note of the carbon footprint associated with the raw materials that feed into battery technology - so to be developing Kasiya at this time is truly exciting."

Minviro's LCA has already previously shown the potential for Sovereign's primary product of natural rutile to significantly reduce the carbon footprint of the titanium pigment industry.

Each tonne of natural rutile produced at Kasiya is expected to have a Global Warming Potential of only 0.1 tonnes CO<sub>2</sub> eq., which equates to a 95% to 97% reduction in total greenhouse gas emissions (20 to 33 times less) compared to production of titania slag and synthetic rutile respectively - both of which are alternative titanium feedstocks produced by upgrading ilmenite via energy and carbon intensive processes.

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## Why is Kasiya's Graphite able to achieve such a low carbon-footprint?

The GWP for Kasiya's flake graphite product was based on information in the Kasiya Scoping Study from December 2021. This was followed up with an Expanded Scoping Study in June 2022 (see announcement here: <http://www.investi.com.au/api/announcements/svm/c6f18bca-8aa.pdf>). The significantly lower GWP for Kasiya graphite is due to the fact that it is hosted in soft, friable saprolite material which will be mined via hydro methods (high pressure water monitors) powered by renewable energy sources - hydro power from the Malawi grid and on-site solar power. This is opposed to the production in Heilongjiang Province, China where hard-rock ore requires drilling, blasting, excavation, trucking, crushing, and grinding - overall high CO<sub>2</sub>e activities.

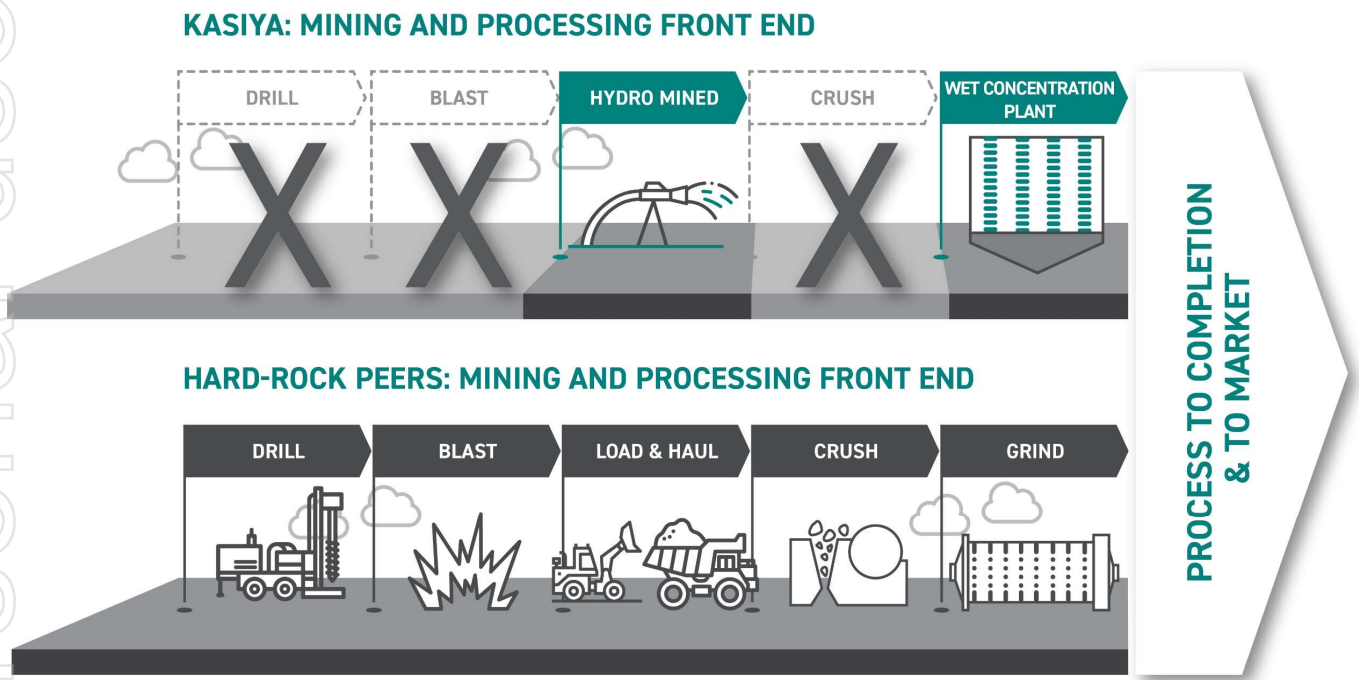


Figure 2: Kasiya's co-product graphite mining and processing front end compared to hard-rock peers

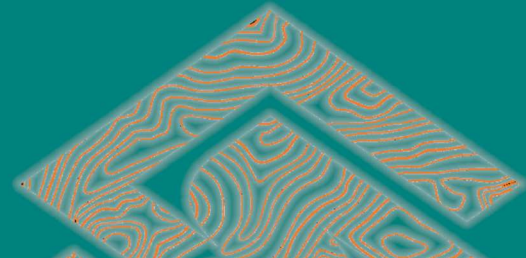
## About Kasiya's Graphite

The Kasiya discovery in central Malawi is the largest natural rutile deposit and one of the largest flake graphite deposits in the world.

The lithium-ion battery sector is the main emerging market for flake graphite. Greater capacity batteries, such as those required for electric vehicles, are expected to drive significant demand for graphite over the coming years. It is forecast the battery sector will become the largest graphite market segment by 2028.

Kasiya will be a simple and conventional operation using traditional and well-developed processes used across the globe on numerous mineral sands and graphite operations.

The proposed large-scale operation will process soft, friable mineralisation that occurs from surface in an area with excellent access and water availability. The Project has high quality surrounding infrastructure including hydro-sourced grid power, bitumen roads and recently upgraded rail lines connecting to the deep water of ports of Nacala and Beira on the Indian Ocean.



## Forward Looking Statement

*This release may include forward-looking statements, which may be identified by words such as "expects", "anticipates", "believes", "projects", "plans", and similar expressions. These forward-looking statements are based on Sovereign's expectations and beliefs concerning future events. Forward looking statements are necessarily subject to risks, uncertainties and other factors, many of which are outside the control of Sovereign, which could cause actual results to differ materially from such statements. There can be no assurance that forward-looking statements will prove to be correct. Sovereign makes no undertaking to subsequently update or revise the forward-looking statements made in this release, to reflect the circumstances or events after the date of that release.*

## Competent Persons Statement

*The information in this announcement that relates to the Mineral Resource Estimate is extracted from the announcement dated 5 April 2022. The announcement is available to view on [www.sovereignmetals.com.au](http://www.sovereignmetals.com.au). Sovereign confirms that a) it is not aware of any new information or data that materially affects the information included in the announcement; b) all material assumptions included in the announcement continue to apply and have not materially changed; and c) the form and context in which the relevant Competent Persons' findings are presented in this report have not been materially changed from the announcement.*

*The information in this announcement that relates to Production Targets, Processing, Infrastructure and Capital and Operating Costs, is extracted from the announcement dated 16 December 2021 entitled 'Kasiya Scoping Study Confirms Globally Significant Natural Rutile Project' (Announcement). Sovereign confirms that: a) it is not aware of any new information or data that materially affects the information included in the announcement; b) all material assumptions and technical parameters underpinning the Production Target, and related forecast financial information derived from the Production Target included in the Announcement continue to apply and have not materially changed; and c) the form and context in which the relevant Competent Persons' findings are presented in this presentation have not been materially modified from the Announcement.*

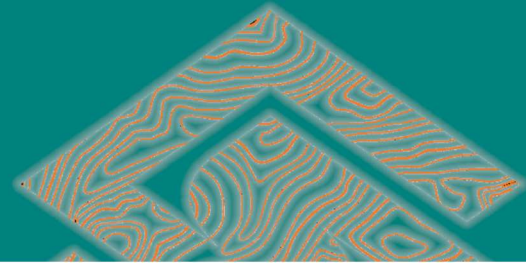
*The information in this announcement that relates to Metallurgy is extracted from the announcement dated 7 December 2021. The announcement is available to view on [www.sovereignmetals.com.au](http://www.sovereignmetals.com.au). Sovereign confirms that a) it is not aware of any new information or data that materially affects the information included in the announcement; b) all material assumptions included in the announcement continue to apply and have not materially changed; and c) the form and context in which the relevant Competent Persons' findings are presented in this report have not been materially changed from the announcement.*

*This ASX Announcement has been approved and authorised for release by the Company's Managing Director, Dr Julian Stephens.*

**Table 1: Kasiya Mineral Resource Estimate at 0.7% Rutile Cut-off**

Mineral Resource Category	Material Tonnes (millions)	Rutile (%)	Rutile Tonnes (millions)	Total Contained Graphite (TGC) (%)	TGC Tonnes (millions)	RutEq. Grade* (%)
Indicated	662	1.05%	6.9	1.43%	9.5	1.76%
Inferred	1,113	0.99%	11.0	1.26%	14.0	1.61%
<b>Total</b>	<b>1,775</b>	<b>1.01%</b>	<b>18.0</b>	<b>1.32%</b>	<b>23.4</b>	<b>1.67%</b>

\* RutEq. Formula: Rutile Grade x Recovery (98%) x Rutile Price (US\$1,308/t) + Graphite Grade x Recovery (62%) x Graphite Price (US\$1,085/t) / Rutile Price (US\$1,308/t). All assumptions are taken from this Study \*\* Any minor summation inconsistencies are due to rounding.



## APPENDIX – PEER SOURCE INFORMATION

### SOURCE 1 – GRAPHITE RESOURCE GLOBAL WARMING POTENTIAL (Figure 1)

Ref	Company	Project	Project Status	GWP (CO <sub>2</sub> e)	LCA Boundary	Source
1	Syrah Resources	Balama	Production	0.42	FOB Nacala	ASX Announcement: Syrah approves Balama solar and battery system final investment decision (released 6 Apr 2022)
2	Northern Graphite (Electric Fleet Scenario)	Bisset Creek	FS & PEA	0.45	Cradle-to-gate	TSX Announcement: Northern Graphite Plans to Further Reduce Carbon Footprint of Bisset Creek Project (released 9 Mar 2022)
3	Evolution Energy	Chilalo	DFS Underway	0.49	Cradle-to-gate	ASX Announcement: Independent life cycle assessment demonstrates Chilalo's low carbon footprint (released 6 Oct 2022)
4	Other Tanzania Production	n/a	n/a	0.60	Cradle-to-gate	Provided by LCA Manager, Minviro Ltd
5	China Production	n/a	n/a	1.20	Cradle-to-gate	Provided by LCA Manager, Minviro Ltd
6	Northern Graphite	Bisset Creek	FS & PEA	2.20	Cradle-to-gate	TSX Announcement: Northern Graphite Plans to Further Reduce Carbon Footprint of Bisset Creek Project (released 9 Mar 2022)