

## ASX Announcement

5 February 2024

### Robust Optimisation Study results support Globe's Kanyika Niobium Project

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#### Highlights

Globe has completed its Optimisation Study which confirms robust financial and technical outcomes for the Kanyika Niobium Project, including:

- Pre-tax NPV (8%) of US\$1.004B and IRR of 47.08%.
- Total unit cost of Niobium Pentoxide reduces by 15% to US\$18.90/kg and gross profit margin increases by 5% to 71%.
- 27-year life of mine.
- Two-Phase development approach allows a significant reduction in initial upfront capital from US\$70m to US\$30m and greatly reduces the risk profile of the Project.
- Change in refining technology to the chlorination process, which is more environmentally sustainable, cost-effective, and produces high purity products which can command premium prices.
- Preferred location of the Refinery to be Malawi.

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**Globe Metals & Mining Limited** (ASX: GBE) ("**Globe**" or "**Company**") is pleased to announce it has achieved significantly improved economic and environmental outcomes from its Kanyika Niobium Project in Malawi ("**Project**") through an optimisation study which provides a strong foundation for Globe to advance the Project towards financing and development.

Kanyika has the potential to become the first new globally significant niobium mine in 50 years, with an average nameplate production of 3,267 tonnes per annum of niobium pentoxide, (Nb<sub>2</sub>O<sub>5</sub>) and 136 tonnes per annum of tantalum pentoxide (Ta<sub>2</sub>O<sub>5</sub>) over the 27-year life of operations. The Nb<sub>2</sub>O<sub>5</sub> and Ta<sub>2</sub>O<sub>5</sub> products will be high-specification high-purity products with grades exceeding 99.5% and 99% respectively.

The optimisation study follows the announced 2021 Definitive Feasibility Study ("**DFS**") which first established Kanyika's potential configuration and economic feasibility. Globe will present a further detailed report regarding the optimisation study during the current quarter.

The key elements of the optimisation include:

- a low-risk, two-phased approach to the development of the Project;
- optimisation of the milling and concentration circuits;
- the use of chlorination technology for the refining of high-purity metal oxides rather than the traditional HF acid floatation process; and
- the preferred location of the refinery to be Malawi.

The financial impacts of these optimisation steps (versus the DFS in 2021) are summarised in the financial results discussion below.

### Summary of financial results of the optimisation study: Kanyika Niobium Project Malawi

Metrics	Units	Phase 1	Phase 2
ROM Ore Production	ktpa	86	1,455
ROM Grade (Nb <sub>2</sub> O <sub>5</sub> )	Ppm	4,933	3,063
Concentrate production	Ktpa	2	18
Concentrate grade	%	20%	18%
Refined Nb <sub>2</sub> O <sub>5</sub>	tons/year	313	3,155
Refined Ta <sub>2</sub> O <sub>5</sub>	tons/year	14	142
Annual Turnover	US\$m	20	205
Annual EBITDA	US\$m	7	112
Capital Costs (Mine & Concentrator)	US\$m	17	190
Capital Costs (Refinery)	US\$m	12	41
Total Capital cost including Environmental bond & PAP relocation	US\$m	29	231
Operating Cost (Mine & Concentrator)	US\$/kg (Nb <sub>2</sub> O <sub>5</sub> )	14.17	6.91
Operating Cost (Refinery)	US\$/kg (Nb <sub>2</sub> O <sub>5</sub> )	11.90	11.88
Total Operating Costs	US\$/kg (Nb <sub>2</sub> O <sub>5</sub> )	26.08	18.79
Project NPV/pre-tax (8%)	US\$m	20	984
IRR (pre-tax)	%	32.54%	47.08%

### Financial Commentary

- Estimated NPV 8% (pre-tax) confirmed at just over US\$1B contributing an IRR (pre-tax) just under 50% over an updated 27-year life of mine.
- A 15% reduction in unit cost of Niobium Pentoxide to US\$18.90/kg.
- Gross margin increases to 71%, a 5% increase versus the 2021 DFS with an average selling price forecast of US\$51.48 per kg of NB205 and US\$280 per kg for Ta205 over the life of the mine.
- Initial Phase One Capex of US\$29m including Environmental bond and project-affected people relocation.

## Summary of the optimisation results relative to the 2021 DFS: Kanyika Niobium Project Malawi

Metrics	Units	2021 DFS	2023 Optimisation Study
NPV 8% (pre-tax)	US\$m	1,009	1,004
IRR (pre-tax)	%	49.70%	47.08%
Closing cash balance (LOM)	US\$m	4,361	2,882
Total FCF pre-tax (LOM)	US\$m	3,759	3,834
Life of Mine	Years	23	27
Payback period (Yrs)	Years	1.3	4.4
Revenue (LOM)	US\$m	4,961	4,785
Cost of goods sold (LOM)	US\$m	1,632	1,395
Gross Margin (LOM)	US\$m	3,329	3,390
Gross Margin (LOM)	%	67.10%	70.83%
EBIT (LOM)	US\$m	2,838	2,719
Net profit before tax (LOM)	US\$m	4,645	3,805
Tax (LOM)	US\$m	134	1,122
Net profit after tax (LOM)	US\$m	4,511	2,682
Total ore mined	tons m	33.8	33.8
Total ore including waste mined	tons m	87.1	87.2
Total concentrate produced	tons (000's)	186.3	414.0
Total Nb205 production	tons (000's)	73.3	73.8
Total Ta205 production	tons (000's)	3.2	3.3
Total unit cost per ton of ore	US\$	48	41
Total unit cost per ton of ore including waste	US\$	19	16
Total unit cost (Per kg Nb205)	US\$	22.28	18.90
Selling price of Nb205 (per kg)	US\$	50.00	51.48

### Two-Phased Development Approach

#### Phase 1

1. Low risk and low capital (estimated total capital cost of US\$29m) cost phase 1 (mine, concentrator, and refinery development).
2. Mine capacity of 86k tonnes per annum ROM, and 1,760 tonnes per annum of concentrate, for shipment to the planned Lilongwe refinery.
3. Deferral of the Milenje River Dam by 4 years (capital cost US\$25m).
4. The preferred location of the phase 1 refinery is Malawi (this is subject to the finalisation discussions with the Government of Malawi).

#### Phase 2

1. Mine and concentrator ramp up in year 3 of operations.
2. Mine capacity development to 1.5m tonnes per annum and 17.7k tonnes per annum of concentrate.

3. Phase 2 Refinery to be built in Malawi (subject to finalisation of financial incentives with the Government of Malawi).

#### **Mine Concentrator Design Optimisation**

1. Replacement of SAG mill with the EDS horizontal multi-shaft mill.
2. Redesign of the two-stage flotation circuit to a single stage, and the reduction of flotation reagents to 4 from 12 reagents.
3. Optimisation of mass pull and recovery of concentrator.
4. Dry tailings disposal and co-deposition with mine strip waste material.

#### **Refining Technology**

Switch in refining technology from the traditional HF digestion/solvent extraction process to the carbochlorination process.

1. The carbochlorination process involves reacting a mixture of charcoal and concentrate with gaseous chlorine. The metal oxides in the ore convert to chlorides some of which have boiling points below the 900°C reactor temperature. These chlorides leave the reactor, and the gas is systematically cooled down allowing for the removal of separate metal chlorides. The separated metal chlorides are purified before being oxidised to yield high-purity metal oxides.
2. The Niobium oxide products will be sold into the speciality metals markets, realising premium prices over the ferro-niobium market.

#### **Preferred Refinery Location – Malawi**

1. The Company has evaluated a number of options for the location of the Refinery, including the UAE, Namibia, and Malawi.
2. Malawi is the preferred location of the Phase 1 refinery for the following key reasons:
  - (a) Regulatory – initial discussions relating to the regulatory requirements of operating a Class 7 facility in Malawi have been constructive and favourable to the Project.
  - (b) Availability of land.
  - (c) Initial discussions around a range of financial incentives to operate a refinery in Malawi have been favourable.
  - (d) Stable and low-risk country in which to operate.
  - (e) Transparent and efficient legal and regulatory system.
  - (f) Cost-effective source of reagents, including salt (chlorine generation).

## Sales and Marketing

Globe is focused on the production of high purity Niobium Oxides and will not be competing in the mainstream ferro-niobium market. The high-purity Niobium oxide products will be sold into the specialty metals markets, realising premium prices over the ferro-niobium market. The oxide market includes all oxide grades from standard grade up to optical grades of 99.99% niobium pentoxide, thus facilitating prices over US\$50/kg.

## ESG

Niobium is on the US critical mineral list and has many applications in the new economy. A key target market is the fast-charging battery market. Using niobium as the anode is proven to allow faster and safer charging, higher energy density, and safer performance.

Niobium (Nb) is an integral component of daily-use, energy-related, and specialty technologies and structures such as in steels (for example, bridges, high-rise buildings, offshore platforms, oil and gas pipelines, automobiles), superalloys (for example, aircraft engines, rocket assemblies, and solar power generator engines), and superconducting magnets (for example, medical imaging devices, and nuclear power generation).

The Kanyika Project has been shown to be a bottom quartile cost project and is designed to ensure the production of “green Niobium” in that its Scope 1 and Scope 2 carbon emissions will be of the lowest in the world, with hydroelectric and solar power dominating its power sources for both the mine site and the refinery. The very low carbon footprint is also supported by a unique closed-cycle chlorination refining process, which is transformative for the industry.

## Continuation of metallurgical test work and refinery pilot plant

Globe continues to conduct metallurgical test work on the Kanyika ore concentrate to further develop its intention to refine its production to high-purity Niobium and Tantalum oxides. We refer to our revised announcement on 27 October 2023, in which we announced the positive extraction tests resulting in the extraction of over 99% of both Niobium and Tantalum from the Kanyika concentrate. Further test work is continuing, and the design and development of the refinery pilot plant is underway.

Grant Hudson, Globe’s CEO commented:

*“The extremely positive results of the Optimisation Study reflect the continuing upward trajectory of this exciting venture, and as the use of niobium soars, Globe is in the invidious position of being the most advanced new niobium producer in the world. Our latest refinery technology initiatives, coupled with our conflict-free status and outstanding green credentials, will further enhance Globe’s strong economic proposition and I look forward to sharing this wonderful story with interested investors and off-take partners at this week’s Mining Indaba in Cape Town.”*

This announcement has been authorised for release by the Company’s Chief Executive Officer, Grant Hudson.

**For further information, please contact:**

Grant Hudson  
Chief Executive Officer  
+61 8 6118 7240  
gh@globemm.com

Paul Smith  
Chief Operating Officer  
+61 8 6118 7240  
paul.smith@globemm.com

### About the Kanyika Niobium Project

The Kanyika Niobium Project is located in central Malawi, approximately 55km northeast of the regional centre of Kasangu and is secured by Large-Scale Mining Licence No. LML0216/21 which grants the Company security of tenure and the right to mine niobium, tantalum, and deleterious uranium.

Drilling programs totalling 33.8 kilometres of percussion and core drilling have defined the extent of mineralisation. Structured and progressive engineering studies have resulted in the current (JORC 2012) Mineral Resource Estimate (refer below) and given rise to significant improvements and simplifications in the process flowsheet.

In addition, Globe has undertaken substantial metallurgical optimisation work and commissioned the pilot plant design work to demonstrate and further optimise metallurgical processes. Metallurgical optimisations studies have improved recoveries from 62% in 2012 to 75% today, through novel patented metallurgical processes.



The Kanyika operations will produce a pyrochlore mineral concentrate that contains both niobium and tantalum in commercially valuable volumes to be shipped to a refinery for advanced processing into high purity materials.

A Mineral Resource Estimate for the Kanyika Niobium Project under the 2012 JORC guidelines was reported to ASX on 11 July 2018 as follows:

**Table 1: MRE for KNP using a 1,500 ppm Nb<sub>2</sub>O<sub>5</sub> lower cut**

Category	Resource (Mt)	Nb <sub>2</sub> O <sub>5</sub> (ppm)	Ta <sub>2</sub> O <sub>5</sub> (ppm)
Measured	5.3	3,790	180
Indicated	47	2,860	135
Inferred	16	2,430	120
<b>TOTAL</b>	<b>68.3</b>	<b>2,830</b>	<b>135</b>

**Table 2: MRE for KNP using a 3,000 ppm Nb<sub>2</sub>O<sub>5</sub> lower cut**

Category	Resource (Mt)	Nb <sub>2</sub> O <sub>5</sub> (ppm)	Ta <sub>2</sub> O <sub>5</sub> (ppm)
Measured	3.4	4,790	220
Indicated	16.6	4,120	160
Inferred	2.8	4,110	190
<b>TOTAL</b>	<b>22.8</b>	<b>4,220</b>	<b>190</b>

### Mineral Resource Estimates

The information in this report that relates to Mineral Resources is extracted from the report titled “Kanyika Niobium Project – Updated JORC Resource Estimate” released to the Australian Securities Exchange (ASX) on 11 July 2018 and available to view at [www.globemm.com](http://www.globemm.com) and for which Competent Persons’ consents were obtained. Each Competent Person’s consent remains in place for subsequent releases by the Company of the same information in the same form and context, until the consent is withdrawn or replaced by a subsequent report and accompanying consent.

The Company confirms that is not aware of any new information or data that materially affects the information included in the original ASX announcement released on 11 July 2018 and, in the case of estimates of Mineral Resources, that all material assumptions and technical parameters underpinning the estimates in the original ASX announcement continue to apply and have not materially changed. The Company confirms that the form and context in which the Competent Persons’ findings are presented have not been materially modified from the original ASX announcement.

Full details are contained in the ASX announcement released on 11 July 2018 titled “Kanyika Niobium Project – Updated JORC Resource Estimate” available to view at [www.globemm.com](http://www.globemm.com).