



ASX:GCM

Q1 2025 Investor Update

Accelerating to Commercialisation

gcm minerals.com.au



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This document has been authorised for release by the Company's Board of directors.

Investment Highlights

Why Green Critical Minerals is Exciting



VHD Graphite represents cutting-edge innovation

Developed by leading materials scientist Professor Charles Sorrell and team (UNSW).



Wholly owned revolutionary process

Speed to market: Targeting customer qualification commencing in H2 2025.



World class, award-winning team in materials, scientists and engineers



Vertically integrated opportunity in specialised, high-margin graphite

Significant reduction in energy consumption whilst producing superior properties.



VHD Graphite plays a critical role in Data Centers, AI, Supercomputers, Electronics, Clean Energy and Nuclear

Green Critical Minerals is the only listed company globally who has the technology to produce VHD Graphite Blocks

Introduction and Strategic Overview



01

Why VHD Graphite is the Future of Advanced Materials

Faster, More Affordable, and Comparable / Superior to Pyrolytic and Nuclear Graphite

Advanced Stage of Development



VHD Graphite can achieve initial product commercialisation in around 12 months

Targeting growing demand for:

Thermal management advances to support **Data Centres, AI, Supercomputers, Electronics and Automotive.**

Solar-Thermal Energy storage advances to support renewable energy and decarbonisation.

Superior Properties



Superior or comparable properties to Pyrolytic and Nuclear Graphite blocks

Superior –thermal conductivity and electrical resistivity.

Directional – control of heat and electricity.

Very High Density / Extremely low porosity.

Scalable



Further R&D has the potential to open additional markets:

- Aerospace
- Defense
- Nuclear
- Batteries
- Fuel Cells
- Industrial Applications

Potential to scale **manufacturing globally.**

VHD Graphite Technology

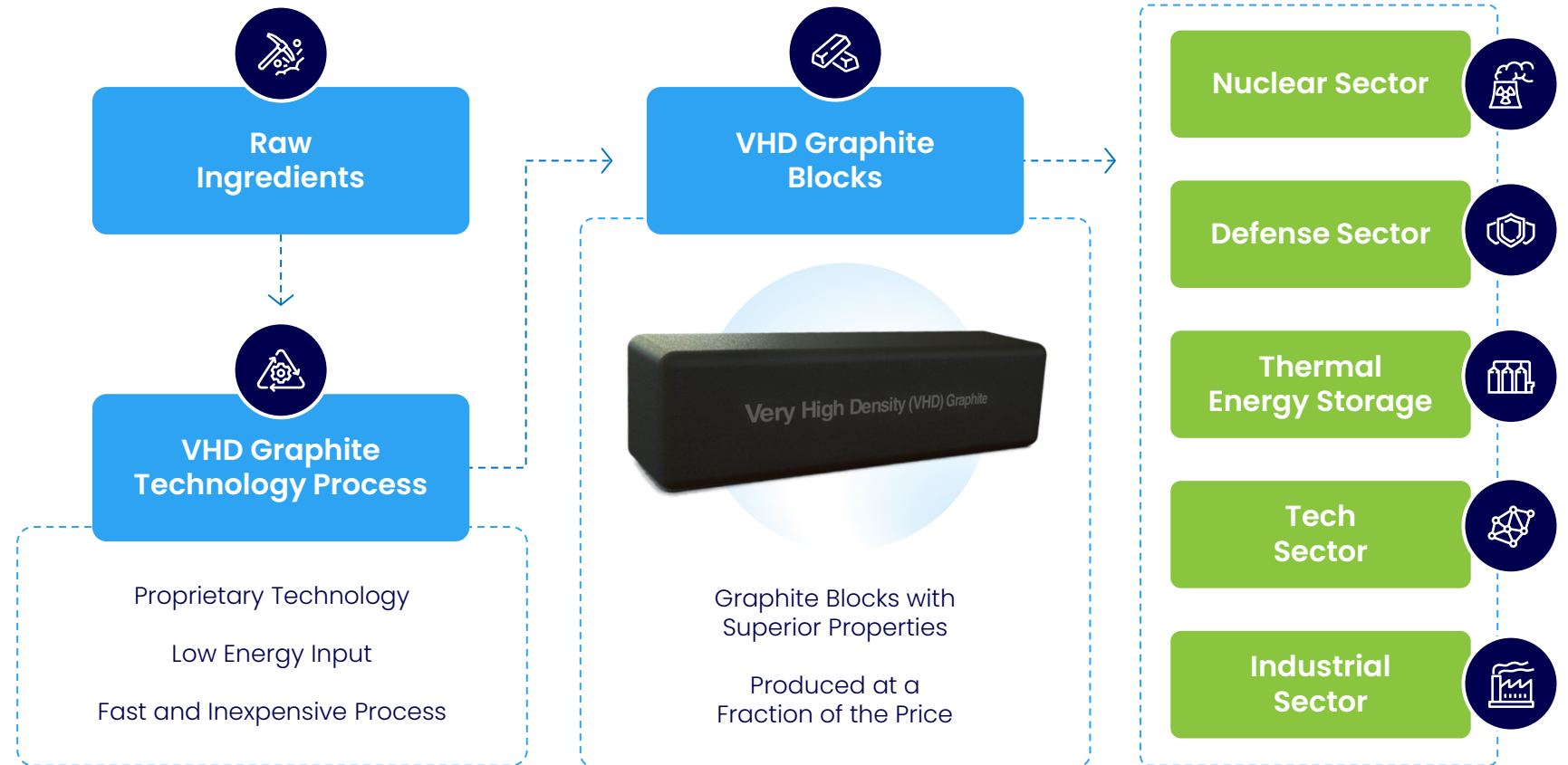


Potential to Disrupt a

+\$700 B

US Market ¹ (2023)

with Superior Graphite
Blocks at Fraction of
the Time and Cost ²



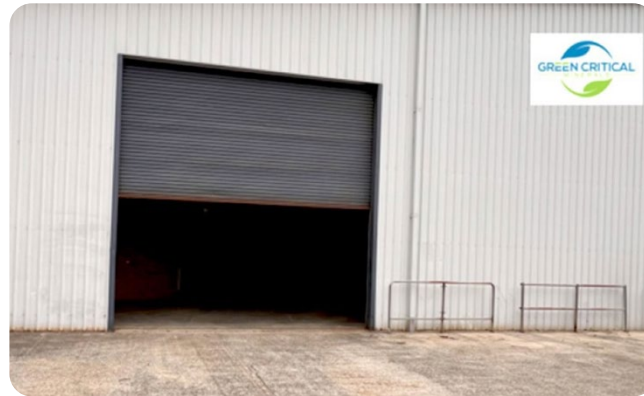
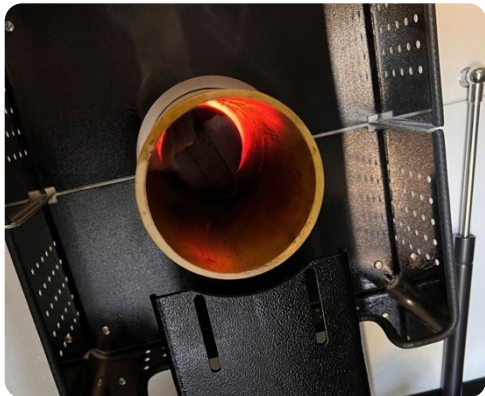
¹Refer slide 12

²The VHD Graphite technology is not yet produced at a commercial level. The technology is in the development phase with the aim to commercialise within the next 12 months

Pilot Plant Milestone Achieved

Accelerating commercialisation ahead of schedule

Marks a pivotal step in delivering energy-efficient solutions to high-value markets, highlighting the speed and scalability of VHD technology.



Construction Completed

The VHD Technology pilot plant has completed its first production line (Line 1) well ahead of schedule, placing GCM in a position to fast-track towards commercialisation by the end of 2025.

Fast-Tracked Commissioning

Initial prototypes expected in January 2025, with customer qualification blocks due by February, significantly advancing timelines.

Tailored Production

Smaller VHD blocks for heat sinks in high-performance electronics (AI data centers, supercomputing).

Larger VHD blocks designed for solar-thermal energy storage, supporting industrial decarbonisation.

Global Scalability with Rapid Growth Potential

VHD Graphite's innovative production process eliminates the need for specialised infrastructure or complex manufacturing techniques.

Innovative Technologies and Competitive Advantages

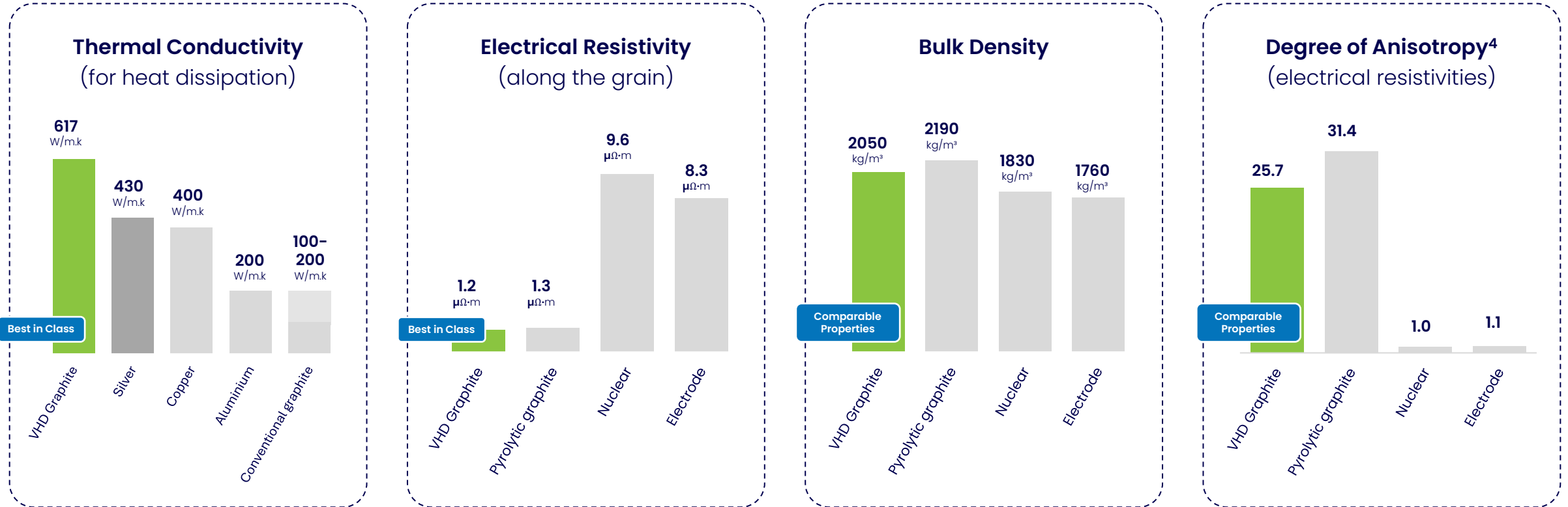
A photograph of a server room with blue lighting. Rows of server racks are visible, with some doors open, revealing internal components and glowing lights. A blue cart is on the left side of the frame.

02

VHD Graphite's Properties³



Superior material properties from a simple manufacturing process



³Determined from test work performed at the UNSW laboratories and not at a commercial scale at this stage. UNSW is ranked 31 in the entire world (and number 1 in Australia) for engineering & technology (QS World University Rankings by Subject 2024: Engineering & Technology).

Refer to test work reported by GCM on 16 January 2025 for density results from VHD Technology graphite blocks produced by GCM

⁴Determined by comparison of electrical resistivities across grain and along grain: [racross grain/ralong grain]

Thermal Management Applications



AI, Data Centres, Supercomputers, and Battery Management Systems

Significant Growth

Opportunities exist in areas like AI, Data Centres, Supercomputers, and Battery Management Systems, which are driving demand for advanced thermal solutions.

As devices become more powerful and smaller, they consume more power and generate more heat, necessitating innovative thermal management solutions.

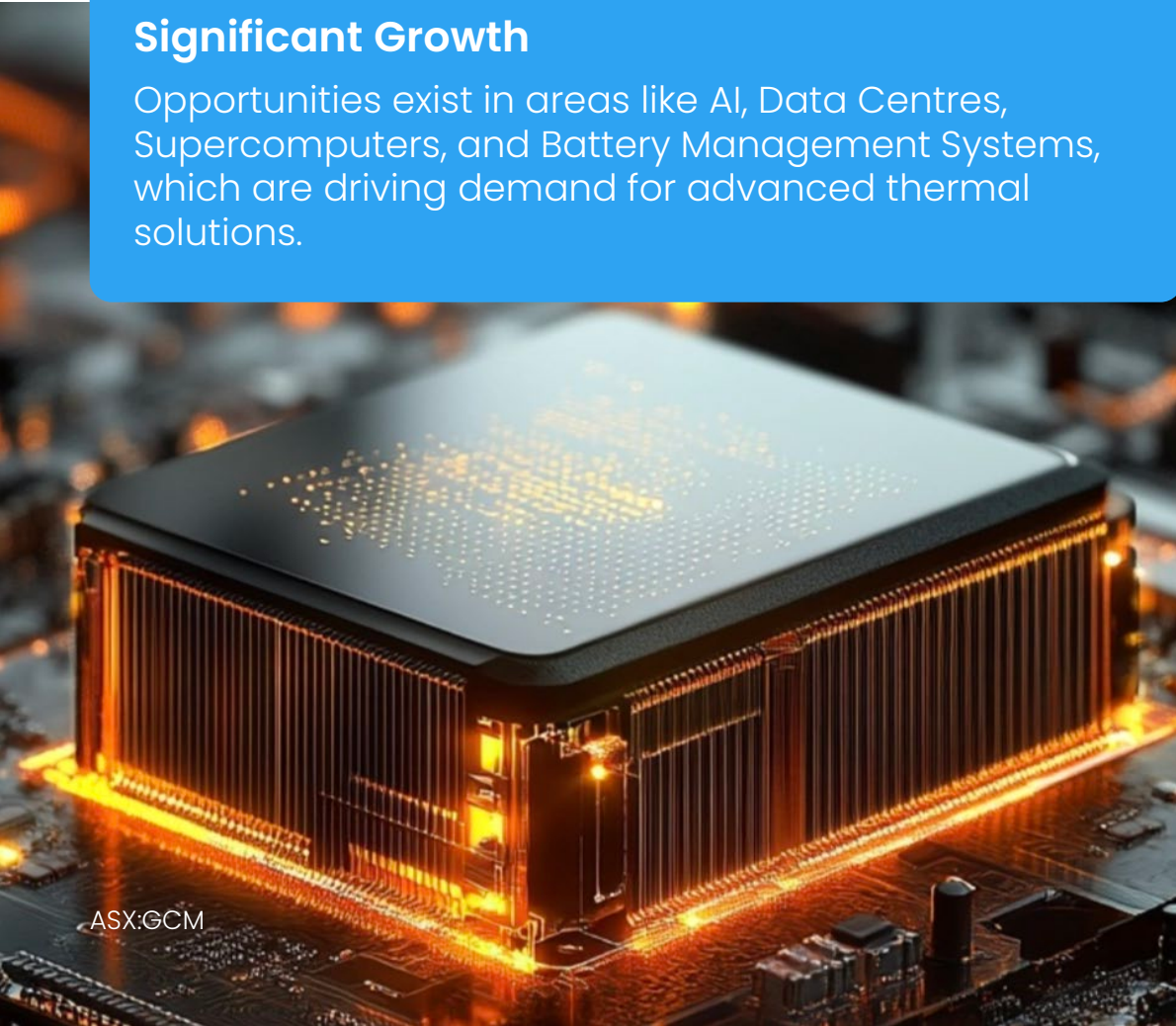
Effectively moving heat away from critical components is essential to avoid damage and support the advancement of next-generation technologies.

VHD Graphite Breakthrough Technology

VHD Technology Graphite material offers superior heat transfer properties and precise heat dispersion, making it ideal for modern thermal management needs.

Heat Sinks for High-Performance Electronics and Computing

VHD Graphite provides superior heat transfer and control, enabling high-performance solutions for electronics and computing systems.



Solar-Thermal Graphite Blocks



Powering industries with efficient, renewable energy

Optimised for High-Energy Retention

Stores and retains thermal energy efficiently

With minimal loss, ensuring stable output even under fluctuating demand.

Up to two days of household energy storage capability

Based on preliminary computer modelling.
Delivering reliability for renewable energy systems.

Environmentally Friendly Production Process

Requires significantly less energy and generates significantly lower greenhouse gas emissions.

Uses advanced processes

Minimal waste and optimise resource utilisation.

Enhanced System Integration

Potential to integrate into existing technologies

Such as Concentrated Solar Power (CSP) and induction heating systems (solar PV / wind).

Enables smoother operation and enhanced efficiency

In energy capture, storage, and release processes.

Addressing Intermittency Challenges

Looking to provide consistent energy availability

Bridging gaps during periods of low sunlight or wind.

Facilitates reliable grid stability

Reducing reliance on fossil fuel-based backup systems and advancing decarbonisation efforts.



Solar-Thermal Graphite Blocks

Revolutionising energy storage for a renewable future

Integration with CSP Systems

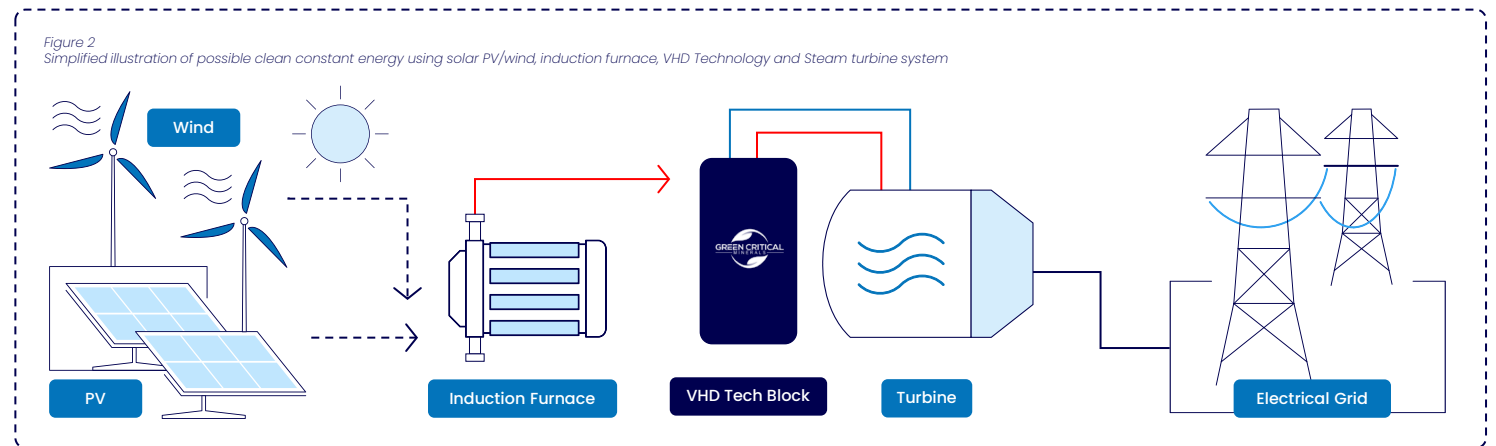
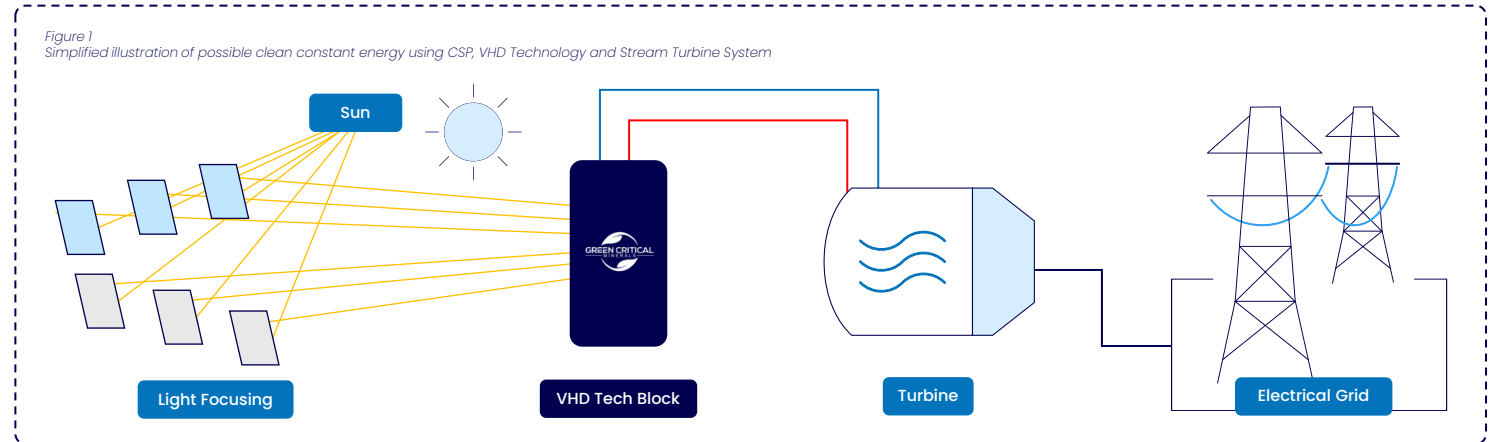
- Capture and stores high-temperature thermal energy efficiently, delivering steady power supply.
- Enhance system performance with rapid heat absorption and transfer.

Enabling Energy Transition

- Scalable design meets the diverse energy needs of industries, from microgrids to large-scale operations.
- Compatible with hybrid systems for seamless integration into existing processes.

Driving Decarbonisation

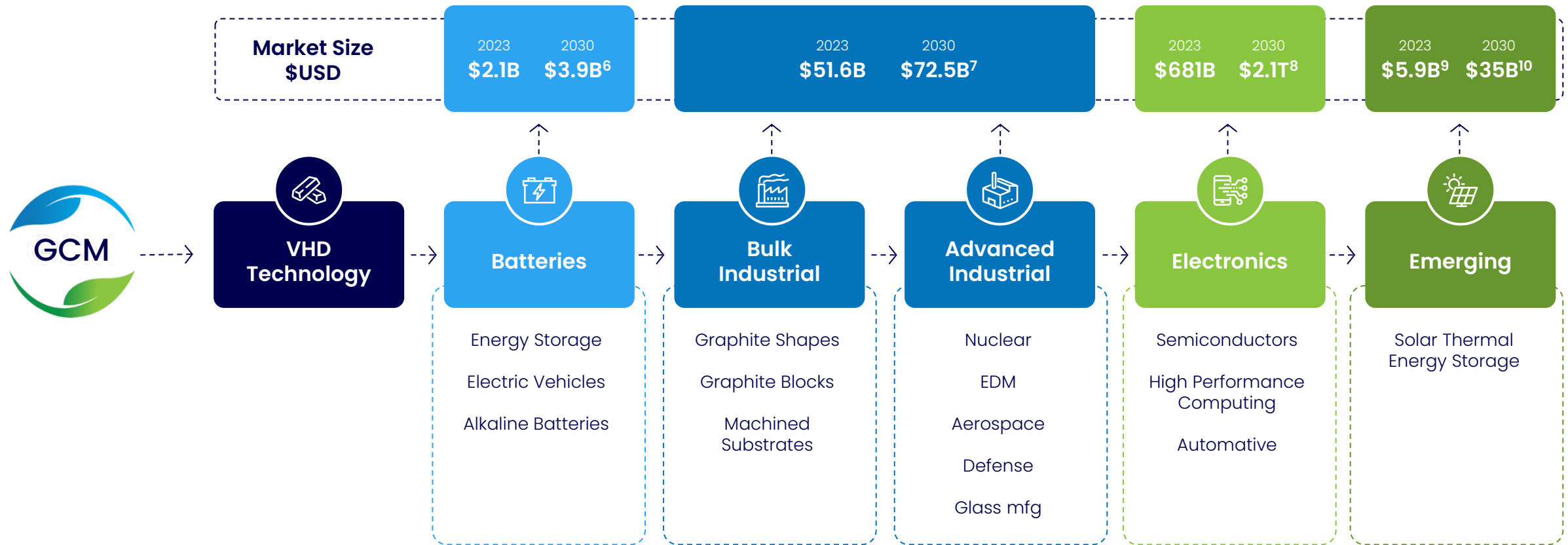
- Reduces greenhouse gas emissions, helping industries meet sustainability goals.
- Provides energy independence in remote, off-grid locations.



Immediate and Scalable Market Opportunities



Global Demand across rapidly growing markets, places GCM in a strong position



⁶Wood Mackenzie, October 2024 | ⁷Lone Star Technical Minerals October 2024 | ⁸Yahoo Finance October 2024 | ⁹Fortune Business Insights September 2024 | ¹⁰Allied Market Research, Solar Thermal Market Research 2031

Grant Funding Opportunities

Opportunities identified and discussions commenced



VHD Technology Produces An Extremely Versatile Material

Universally used in products in demand today.



Graphite Is Recognised Universally As A Critical Mineral

With a wide range of applications to the technology and renewable energy sectors.

Opportunity to accelerate the commercialisation process without diluting shareholder equity.

Australia and the USA provide grant funding opportunities, via agencies such as:



Australian Government
Australian Renewable
Energy Agency

ARENA

Roadmap and Commercial Strategy



03

Near-Term Milestones



To accelerate through commercialisation and transition to revenue generation in 12 months

Team

Appointed Head of Research and Development to lead R&D activities.

Build-out of corporate and technical team underway.

Pilot Plant

Pilot plant commissioning complete (Line 1) – capable of producing graphite blocks for use in heat sinks and also for R&D activities e.g. solar-thermal applications.

Larger Line 2 construction underway – Due for commissioning in Q2 2025.

Customer Qualification

Due to commence production of customer qualification quality VDH Technology graphite blocks in February.

Initial stages of customer engagement process commenced – Direct customer engagement anticipated in Q1 2025.

Strategic Partnerships

Engage with tier one end users of graphite block products to open new markets for graphite blocks e.g. solar-thermal, defense, aerospace.

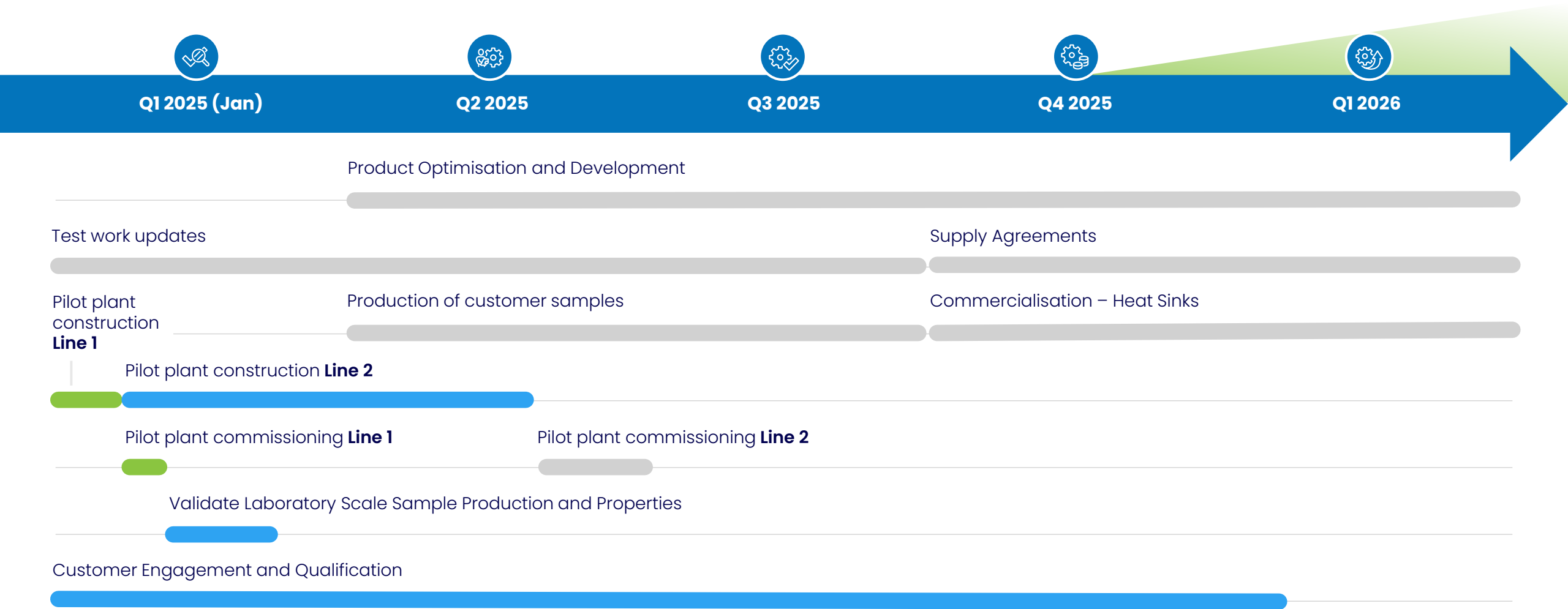
Non-Dilutive Funding

Progress grant funding applications to provide off-balance sheet funding.

Commercialisation

Customer acceptance of VHD Graphite blocks and transition to supply phase and production scale-up.

Fast Track to Commercialisation¹¹



¹¹ Not to scale.

Corporate Overview

An abstract graphic featuring numerous thin, glowing blue lines that curve and flow across the frame. These lines are punctuated by small, bright blue dots, creating a sense of motion and digital connectivity. The background is a deep, dark blue, which makes the glowing elements stand out.

04

Corporate Snapshot



Board of Directors

Charles Thomas

Non-Executive Chairman

Christopher Zielinski

Non-Executive Director

Clinton Booth

CEO and Managing Director

New Leadership

Clinton Booth appointed as CEO and Managing Director in 2024, bringing extensive experience in mineral exploration, project and corporate development, and corporate strategy.

AGM 2024 | ASX:GCM



Commitment to Growth

With a robust leadership team and solid financials, we are well-positioned to advance our strategic initiatives and deliver value to our shareholders.



Market Capitalisation

\$41.97M_{AUD}

As of 20th January 2025



Cash on Hand

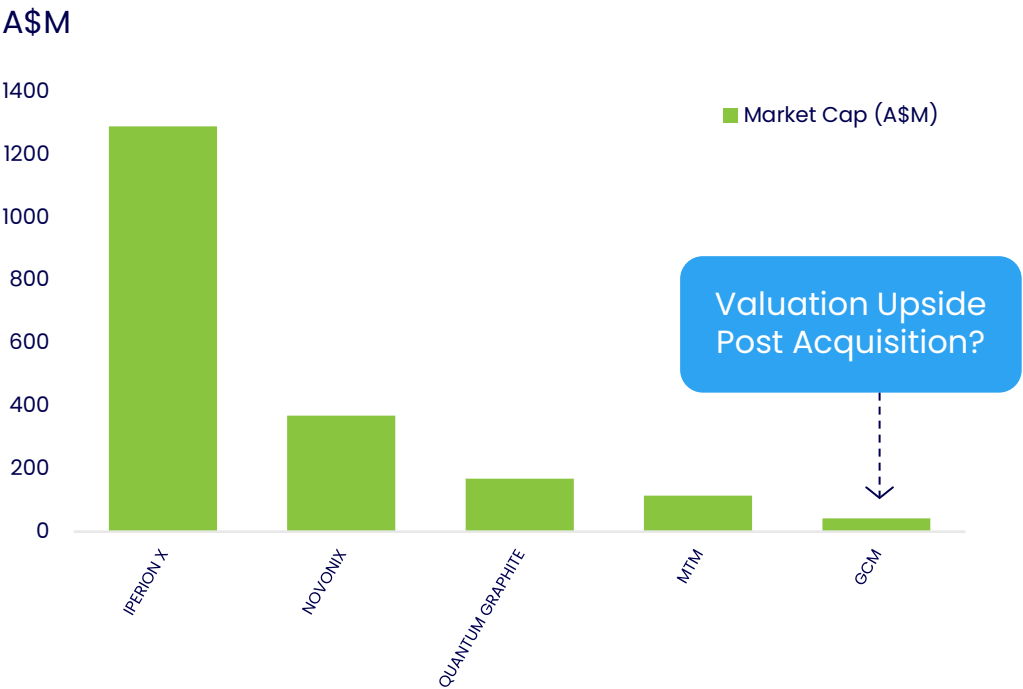
\$3.12M_{AUD}

September Quarterly Report + Capital Raise
in November 2024

Comparable ASX Listed Companies¹³



Market Cap Comparison¹⁴



Company	ASX Code	Market Cap ¹⁴	Stage	
IperionX Limited	IPX	\$1.29Bn	Pilot	
Novonix Limited	NVX	\$369.16M	Pilot	
Quantum Graphite Limited	QGL	\$169.05M	Pilot	
MTM Critical Mineral Limited	MTM	\$114.58M	Pilot	
Green Critical Minerals Ltd	GCM	\$41.97M	Pilot	

¹³The peer comparison presented in this slide is subjective and based on GCM's internal assessment of industrial tech companies operating within similar sectors of mineral processing and extraction. This comparison does not necessarily adhere to any industry-recognised standards and should not be interpreted as an exact like-for-like comparison in terms of stage of development, market cap, or technology maturity. GCM's VHD Graphite technology is currently at a development / pilot plant stage. The companies compared are in various stages of development (as noted in the table), and their progress is based on publicly available information as of the date of this presentation. The development stages referenced in this comparison are for indicative purposes only and are not meant to represent a formal independent analysis based on industry standard. GCM notes that entities listed may be selling different commodities (compared to GCM) or may be selling to different customers / end users. Investors are advised to consult independent sources for a detailed assessment of each company's projects and their stage of development. GCM does not warrant the accuracy of third-party data used for this comparison.

¹⁴As at 20/01/2025, Yahoo Finance



ASX:GCM

Thank you

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Appendix – Single Crystal Mullite Fibre

A

Single Crystal Mullite Fibres

Regarded as the “holy grail” of composite reinforcement materials, offers exceptional properties



High-Temperature Stability

Preserves structural integrity at elevated temperatures, critical for aerospace and industrial applications.



Superior Mechanical Strength

Delivers high tensile strength and fracture toughness, enhancing the durability of composite materials.



Low Density

Supports lightweight composites, essential for weight-sensitive applications.



Chemical Resistance

Exhibits strong resistance to corrosion and chemical degradation, extending the lifespan of components.

A Vital Material

For reinforcing metal matrix composites (MMCs) and ceramic matrix composites (CMCs), ensuring superior performance in extreme environments.

High-end Non-oxide Ceramic Fibre

Such as silicon carbide (SiC) fibres, are similarly renowned for their exceptional properties, including high-temperature stability, strength, and oxidation resistance. These attributes make them ideal for reinforcing metal and ceramic matrix composites used in industries such as aerospace, automotive, and defense.

Market Potential and Size¹²



MMC Growth



The global metal matrix composites (MMC) is experiencing steady growth

driven by rising demand across key industries such as **automotive, aerospace, and defense**.

\$810M

2023 Market Value in USD

\$2.9B+

2032 Projected Market Value in USD

12.4%

Compound Annual Growth Rate (CAGR)

Delivering Advantages



This growth reflects the increasing demand

for materials offering superior performance in extreme environments, with MMCs delivering clear advantages over traditional options for aerospace, defense, and industrial applications.

Pricing



The pricing of these advanced fibres depends

on manufacturing processes, quality, and intended applications.

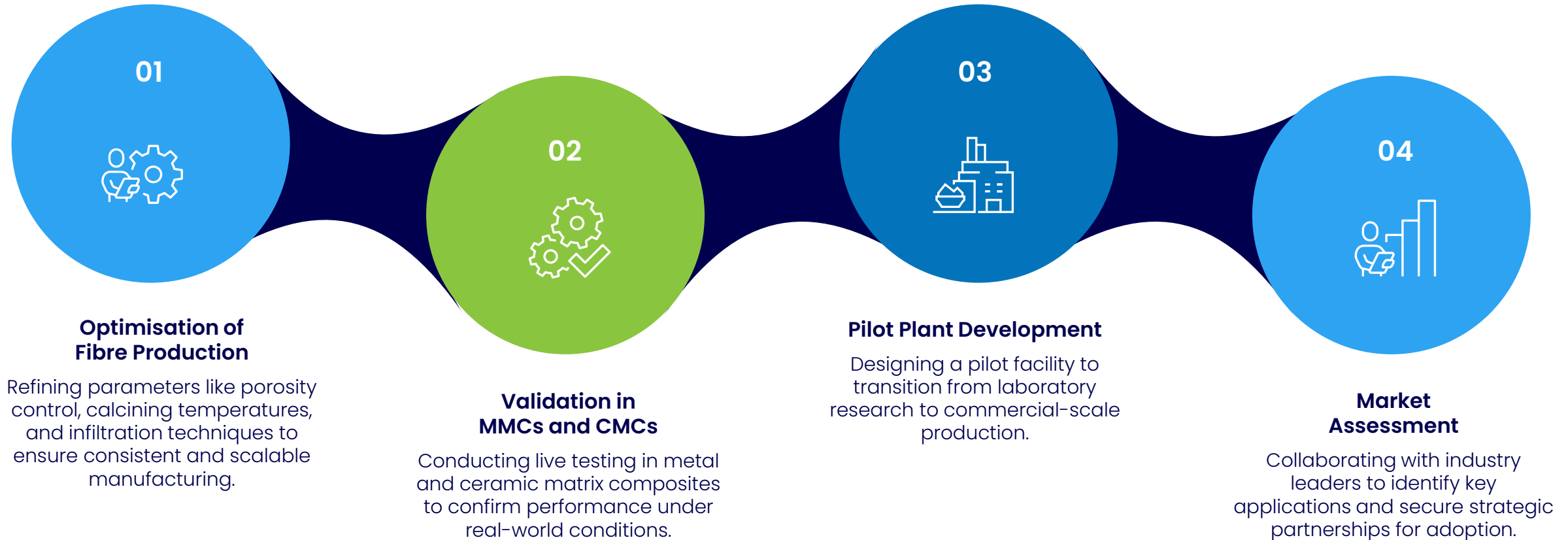
For example, chemical vapor deposited (CVD) silicon carbide (SiC) monofilaments are among the most expensive ceramic fibres, with prices reaching up to €8,000 per kilogram (approximately USD 11,000 per kilogram).

¹²GCM ASX Announcement 27th November 2024

Single-Crystal Mullite Fibres

Work Program Overview

GCM is initiating a comprehensive work program to advance single-crystal mullite fibre technology, based on prior research recommendations



Unlocking the Potential of Single-Crystal Mullite Fibres

Single-crystal offering unparalleled properties:

Exceptional strength, corrosion resistance, and stability in both reducing and oxidising atmospheres.

High melting point

1828°–1890°C

Low coefficient of thermal expansion

$6.03 \times 10^{-6} \text{ }^{\circ}\text{C}^{-1}$ (20°–1600°C)

Low thermal conductivity

$3.89 \text{ Wm}^{-1}\text{K}^{-1}$ at 1400°C

Not Yet Commercially Available

Despite its remarkable attributes. Previously, the only commercially produced single-crystal fibre was alumina, developed by Sapphicon in the early 2000s at a cost of **US\$100,000/kg**.

3-Year Australian Research Council Linkage Grant (ARC)

Secured by CML's wholly owned subsidiary, TopFibre Pty Ltd, in partnership with the UNSW School of Materials Science and Engineering, to address this gap.

Previous Work Performed

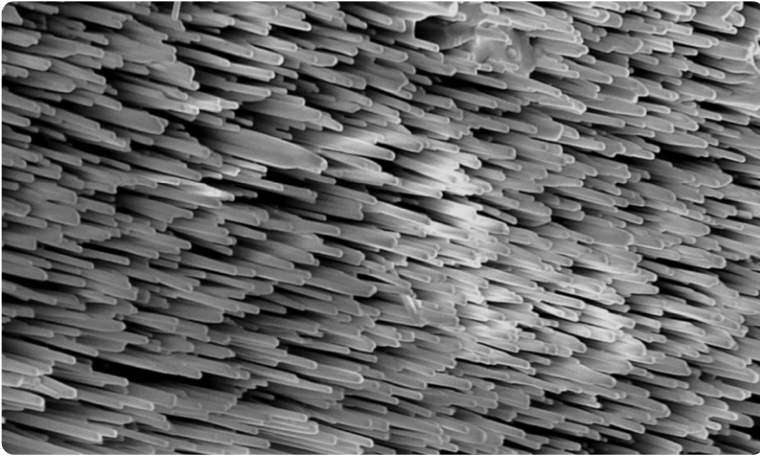
The program's core objective was to pioneer scalable methods for producing commercial quantities of single-crystal mullite fibres from topaz. This work was specifically tailored for use in metal matrix composites (MMCs) and ceramic matrix composites (CMCs).

Proof of concept was successfully achieved,

Demonstrating the feasibility of this innovative approach and laying the groundwork for further development and commercialisation.

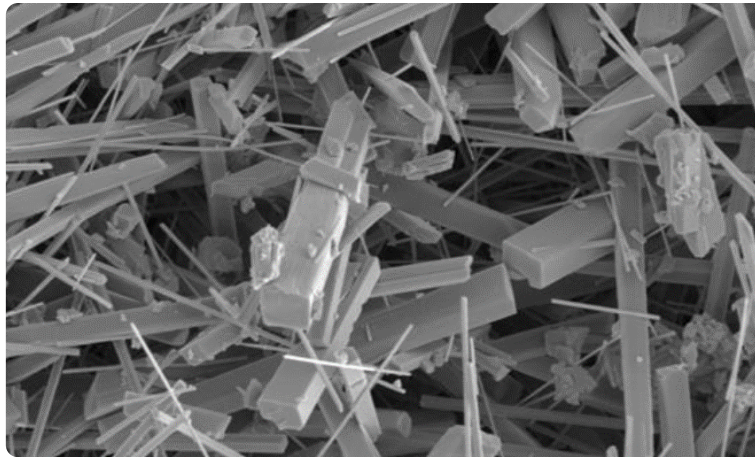


Advancements in Single-Crystal Mullite Fibre Development



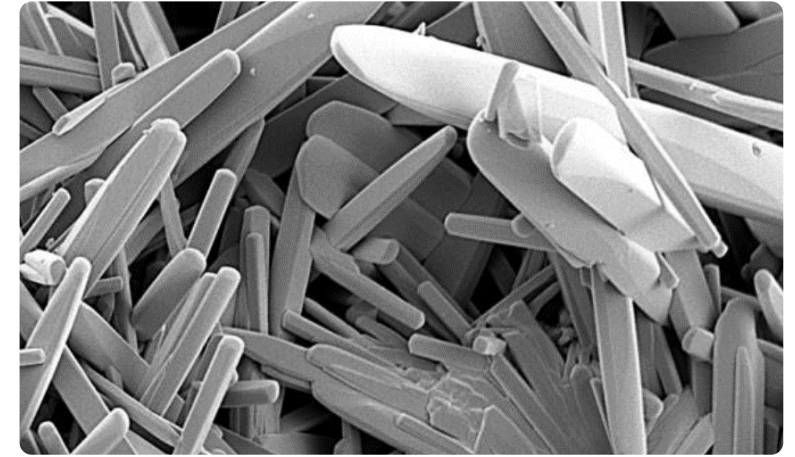
Template-Grown Fibre Proof-of-Concept

Demonstrates the feasibility of fabricating parallel, separable fibres.



Fibre Coarsening Potential

Conversion from thin whiskers to thicker fibres ($\geq 4\mu\text{m}$) is technically feasible – GCM has identified potential pathways for the next research stage.



Fibre Length Achievement

Fibres with a maximum length of $\leq 35\mu\text{m}$ have been successfully fabricated