INITIAL MODELLING BY PROFESSOR SORRELL HIGHLIGHTS THE IMMENSE CLEAN ENERGY POTENTIAL OF VHD BLOCKS

- Development of an advanced computer simulation is in progress to optimise solar-thermal system performance under various conditions, ensuring efficient energy capture, storage, and release for industrial-scale clean power generation from VHD blocks.
- Initial modelling by Professor Chris Sorrell has demonstrated that a 1.2m x 1.2m x 0.25m VHD block can store enough energy to power a typical household for 1.5–2 days, showcasing its immense clean energy potential.
- Construction of the VHD Technology pilot plant is underway, designed to produce graphite blocks suitable for demonstration-scale solar-thermal energy systems and further validation of their performance.
- VHD blocks are compatible with Concentrated Solar Power (CSP) and induction heating systems, enabling versatile renewable energy solutions by efficiently capturing and storing energy for consistent power generation.
- VHD graphite blocks feature exceptional thermal conductivity of **617 W/m·K**, ensuring rapid heat transfer, faster energy storage and release cycles, and **unmatched thermal stability at temperatures exceeding 3,000°C in inert conditions**.
- The solar-thermal energy storage market is projected to exceed US$35 billion by 2031[1], offering significant opportunities for VHD Technology to address global decarbonisation and energy transition efforts.
- In parallel to pilot plant construction and building an advanced computer simulation GCM is actively pursuing strategic partnerships with energy companies, end users, and government agencies to accelerate the adoption of VHD Technology and support the development of clean, constant power solutions.
- The VHD Technology is unique not only for its exceptional thermal properties but also for its **highly efficient breakthrough production process**, which requires less time, making it more environmentally friendly and cost-effective than traditional processes, further setting the VHD Block Technology apart.

[1] Allied Market Research, Solar Thermal Market Research 2031

Green Critical Minerals Ltd (ASX: GCM) ('GCM' or 'the Company') is pleased to provide an update on the clean energy potential of its VHD Technology. This potential exists in the form of graphite blocks created from VHD Technology, and these blocks being used within a system comprising the capture of renewable energy and converting it into a source of constant electricity, suitable for use at an industrial scale.

VHD Solar-Thermal Energy Blocks

As the world shifts towards cleaner, more sustainable energy sources, the demand for reliable, scalable, and efficient energy storage solutions has never been higher. As previously advised (see ASX announcement dated 30 October 2024) GCM has identified the potential for the VHD Technology to be at the heart of this transformation – producing a graphite block which redefines how we capture, store, and deploy renewable energy, ensuring consistent, on-demand power.

With its exceptional properties, the graphite block produced from the VHD Technology may be perfectly suited to address the challenges of **renewable energy** and **long duration storage** in utility-scale and distributed energy applications. As part of an integrated renewable energy system, blocks from the VHD Technology offer the potential to deliver round-the-clock power, helping to meet the growing global demand for clean energy solutions.

Initial computer modelling by Professor Charles Sorrell indicates the theoretical potential of a graphite block produced from VHD Technology. This modelling showed that a 1.2m x 1.2m x 0.25m **VHD Technology graphite block can store sufficient energy to power a typical household for 1.5 -2 days** i.e. the potential to supply continuous clean power.

Development and Commercialisation Path for VHD Technology and Renewable Energy

With this opportunity identified, GCM has initiated steps to refine the VHD Technology in relation to graphite blocks for use in producing constant clean energy. GCM has commenced the build phase of its VHD Technology pilot plant (see ASX announcement dated 28 November 2024), with the pilot plant designed to produce graphite blocks suitable for a demonstration scale solar-thermal energy system.

To facilitate the design of the solar-thermal system, GCM is developing a more complex computer simulation to model the behaviour of the solar-thermal system in an industrial scenario. This model will account for various meteorological conditions across different locations, providing key insights for the design of the solar-thermal system. The simulation will analyse the entire process, from renewable energy capture to storage and discharge of thermal energy, and finally to the generation of constant, industrial-scale electricity. Importantly, this simulation work is being conducted in parallel with the construction of the pilot plant to avoid any delays and ensure efficient progress toward commercialisation.

This computer simulation will model the behaviour of the solar-thermal system, from the initial capture of renewable energy to storage and discharge of thermal energy, and finally to generation of electricity – constant power at an industrial scale.

Years of back-testing have already been conducted on the unique properties of VHD Technology graphite blocks, and historical production of these blocks has provided a strong foundation for the current development efforts. These previous advancements not only guide the design and application of the VHD Technology but also give GCM a significant head start, reducing the risks typically associated with technologies at this stage of development.

Completion of this computer model will inform the production of graphite blocks from the VHD Technology for lab-scale simulation of a solar-thermal system, prior to progressing to the construction of a demonstration-scale solar-thermal renewable energy system.

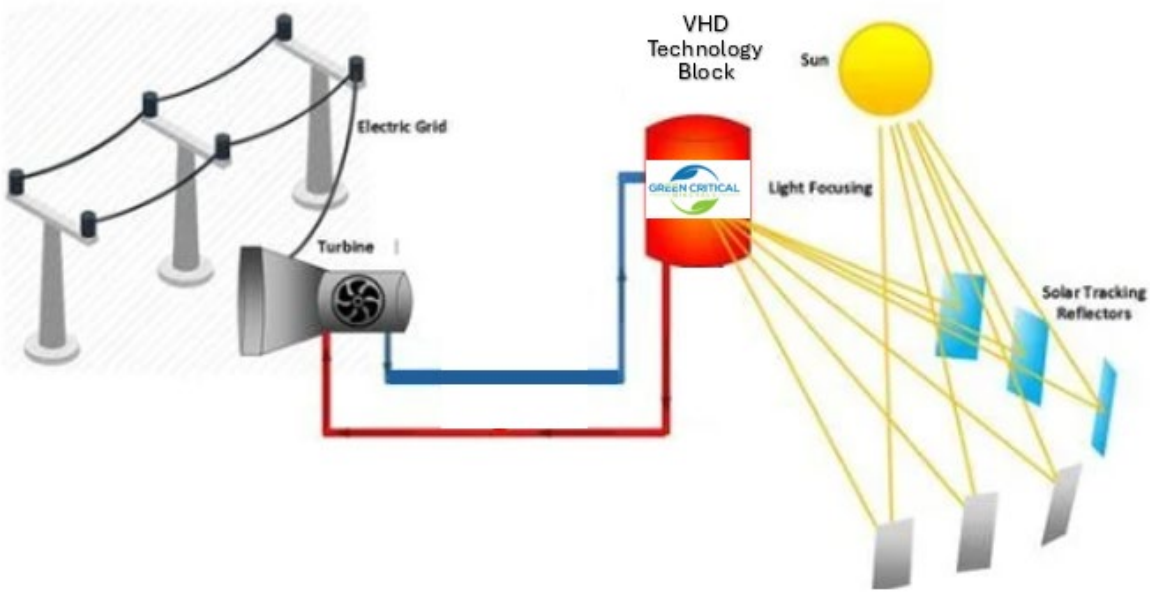

Figure 1 Simplified illustration of possible clean constant energy using CSP, VHD Technology and Steam turbine system

In parallel with the lab scale and demonstration scale solar-thermal systems activities, GCM will be engaging with potential strategic partners – those with expertise in the capture of renewable energy, those with the expertise in downstream energy generation, **those within industry who are end users of energy and seeking to leap frog their competition** in the transition to clean, constant power, and governments and government agencies committed to supporting the development and introduction of the required technological advancements in the renewable sector to facilitate the supply of constant clean energy.

The Solar-Thermal Market Opportunity

The market for thermal energy storage in solar-thermal systems is expected to grow rapidly in the coming years. The **solar-thermal energy market** alone is projected to surpass **US$35 billion by 2031**[2], driven by global efforts to achieve net-zero emissions and the rising need for reliable energy storage solutions. VHD Technology offers the potential to play a critical role in this growth, it could provide an ideal solution when coupled with **Concentrated Solar Power (CSP)** and **induction heating systems**, both of which serve as methods of capturing renewable energy.

Key trends in the market are shaping this exciting opportunity:

- Governments worldwide are adopting ambitious **decarbonisation goals**, increasing investments in **renewable energy** and **energy storage technologies**.
- As the share of **intermittent renewable sources** like wind and solar grows, the need for dependable, **on-demand energy storage** has never been greater.
- The expanding use of **solar-thermal systems** is driving innovations in **high-temperature industrial processes**.

This opportunity exists for graphite blocks from the VHD Technology due to its exceptional thermal properties, positioning it as a crucial material for storing and discharging renewable energy, offering a compelling solution to the industry's pressing challenges.

VHD Technology: Producing the Ideal Material for Thermal Energy Storage

GCM sees VHD Technology at the core of this solution, due to its exceptional ability to meet the unique demands of **solar-thermal systems**. GCM is seeking to specifically engineer a solar-thermal product from the VHD Technology, which is unlike traditional materials used in thermal storage, it will be specifically engineered to address key issues related to heat retention, energy transfer efficiency, and durability under extreme conditions.

First and foremost, VHD Technology graphite blocks have industry-leading **thermal conductivity**, with a value of **617 W/m·K** along the grain. This allows it to absorb and transfer heat at an unprecedented rate, ensuring that energy is stored and released more efficiently than ever before. By facilitating rapid heat transfer, VHD Technology graphite blocks offer the opportunity to enable faster charging and discharging cycles, enhancing the overall performance of solar-thermal systems.

[2] Allied Market Research, Solar Thermal Market Research 2031

In addition to thermal conductivity, VHD Technology graphite blocks **thermal stability** is **second to none**. It can withstand temperatures exceeding **3,000°C** in inert conditions, making it ideal for high-temperature applications where traditional materials like molten salts often fall short. This superior thermal resilience ensures that VHD Technology graphite blocks can be relied upon for long-term, continuous operation with reduced degradation, even under the intense conditions of solar-thermal power plants.

Moreover, VHD Technology's **environmental sustainability** and **cost-effective production** processes set it apart from traditional storage solutions. Produced using a **scalable and energy-efficient** method, graphite blocks from VHD Technology offers a sustainable alternative to existing solutions that are not only more expensive to produce but also less environmentally friendly.

Finally, the **modular scalability** of the VHD Technology allows it to be tailored to various project sizes, whether it's a small-scale **microgrid** or a large, utility-scale **solar-thermal power plant**. This flexibility makes it the ideal choice for a wide range of applications, from localised energy solutions to global power generation systems.

How VHD Technology Graphite Blocks Fits into Solar-Thermal Energy Systems

VHD Technology graphite blocks will be the central component in a system which uses CSP, solar PV, and or wind turbines to capture renewable energy, storing this energy within the VHD Technology graphite block and then discharging this stored renewable energy into a steam turbine power generation system or other alternative system for creating electricity.

In a CSP system, the solar thermal energy captured by mirrors or lenses is transferred to **VHD Technology graphite blocks**, where the heat is stored for later use. These thermal storage blocks allow the renewable energy captured from the CSP system to be stored and discharged as thermal energy when the sun isn't shining, allowing the constant generation of electricity.

Alternatively, it is expected that renewable energy captured via solar PV or wind turbines can be integrated into a system with the VHD Technology, through the conversion of this renewable energy to thermal energy stored in the VHD Technology graphite blocks via an **induction heating** system. The unique nature of graphite makes it amenable to thermal heating via induction methods.

Once the thermal energy is stored in the VHD Technology graphite blocks, it is transferred to a working fluid. This working fluid drives a **steam turbine** or other power generation system to convert the thermal energy into electricity, ensuring a continuous supply of power regardless of sunlight or wind availability.

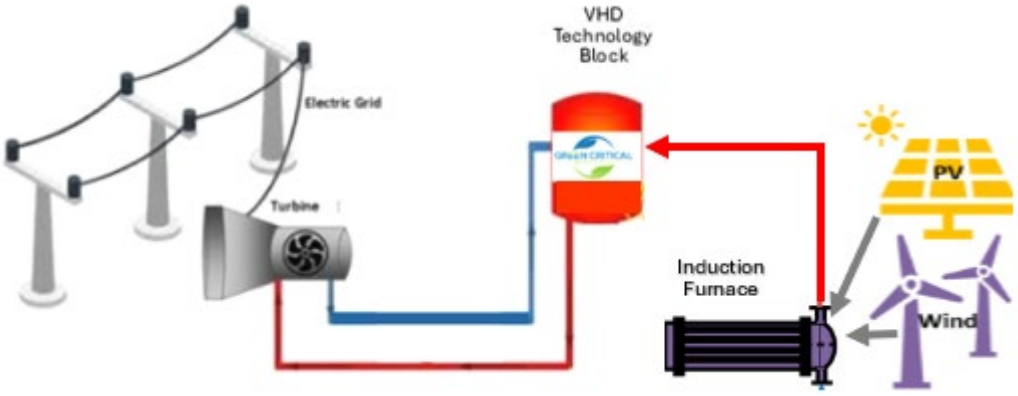

Figure 2 Simplified illustration of possible clean constant energy using solar PV / wind, induction furnace, VHD Technology and Steam turbine system

The Role of VHD Technology Graphite Blocks in Utility-Scale Power Plants

One of the most transformative applications for VHD Graphite is in **utility-scale solar-thermal power plants**. These facilities harness solar energy to generate and store heat, which is then converted into electricity when required. The integration of the **VHD Technology graphite blocks** into CSP or induction heating systems enhances their efficiency and reliability by:

- Storing large quantities of thermal energy in a compact, highly efficient medium.
- Enabling longer operational lifespans due to the material's high thermal stability and resistance to degradation.
- Ensuring consistent energy output during peak demand periods or at night, even when renewable energy is unavailable.

By improving both the **performance** and **longevity** of solar-thermal power plants, the VHD Technology helps lower the levelised cost of energy (LCOE), making renewable energy more competitive.

Expanding Market Potential

The global **solar-thermal energy storage** market, forecasted to reach **US$35 billion by 2031**[3], is ripe for disruption. With its superior thermal properties, the VHD Technology is positioned to lead this transformation. It is considered that the integration of **CSP** and **induction heating systems**, powered by VHD Technology, has the potential to provide a **reliable, scalable solution** to the intermittency problems that have plagued renewable energy sources like solar and wind.

[3] Allied Market Research, Solar Thermal Market Research 2031

VHD Technology's flexibility also extends to **industrial applications**, where its thermal storage capabilities may support high-temperature processes such as **steel production**, **desalination**, and **chemical manufacturing**. These industries are increasingly seeking sustainable alternatives to fossil fuel-based energy systems, and the VHD Technology provides a cleaner, more efficient option.

Why VHD Technology is a Game-Changer for the Renewable Energy Market

1. **Efficiency**:
    - Graphite blocks produced from the VHD Technology exhibit exceptional thermal conductivity and stability, ensuring faster energy transfer, improved system efficiency, and higher capacity for energy storage.
2. **Durability**:
    - VHD Technology produces graphite blocks designed for long-term, high-temperature operation with reduced degradation, reducing maintenance costs and downtime.
3. **Flexibility and Scalability**:
    - VHD Technology graphite blocks can be produced in various sizes and forms, allowing for scalability from small systems to large utility-scale installations.
4. **Cost-Effective and Sustainable**:
    - VHD Technology produces graphite blocks faster and with less energy than conventional graphite, resulting in a more affordable and environmentally friendly solution.

Green Critical Minerals: Leading the Charge Toward a Clean Energy Future

GCM is committed to advancing the **VHD Technology** and its integration into the next generation of renewable energy systems. With our **pilot plant** currently under construction, we are on track to demonstrate the full potential of the VHD Technology in both **solar-thermal power plants** and **industrial heat storage** applications.

As the world continues its transition to cleaner energy solutions, we see the potential for VHD Technology to be at the forefront of this transition, helping to drive a **sustainable, decarbonised future** for all.

Authorisation

The provision of this announcement to the ASX has been authorised by the Board of Directors of Green Critical Minerals Limited.

Forward Looking Statements

This announcement contains general information about GCM's activities current as at the date of the announcement. The information is provided in summary form and does not purport to be complete.

This release contains estimates and information concerning our industry and our business, including estimated market size and projected growth rates of the markets for our products. Unless otherwise expressly stated, we obtained this industry, business, market, and other information from reports, research surveys, studies and similar data prepared by third parties, industry, and general publications, government data and similar sources. This announcement also includes certain information and data that is derived from internal research. While we believe that our internal research is reliable, such research has not been verified by any third party. Estimates and information concerning our industry and our business involve a number of assumptions and limitations. Although we are responsible for all of the disclosure contained in this announcement and we believe the third-party market position, market opportunity and market size data included in this announcement are reliable, we have not independently verified the accuracy or completeness of this third-party data. Information that is based on projections, assumptions and estimates of our future performance and the future performance of the industry in which we operate is necessarily subject to a high degree of uncertainty and risk due to a variety of factors, which could cause results to differ materially from those expressed in these publications and reports.