Graphene Manufacturing Group Ltd (GMG.V)
Rating: Buy

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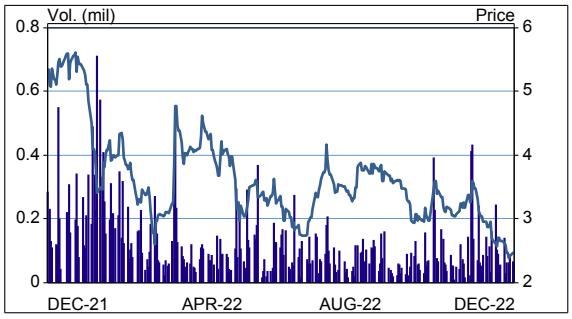
Disruptive Technology With Applications in Several Industries; Initiating at Buy and C$8.00 PT

Stock Data	12/12/2022
Price	C$2.46
Exchange	TSXV
Price Target	C$8.00
52-Week High	C$5.95
52-Week Low	C$2.28
Enterprise Value (M)	C$186
Market Cap (M)	C$201
Shares Outstanding (M)	81.8
3 Month Avg Volume	93,917
Short Interest (M)	2.24
Balance Sheet Metrics	
Cash (M)	C$14.90
Total Debt (M)	C$0.00
Total Cash/Share	C$0.18

General: Cash and Shares Outstanding amounts include the effect of the equity financing completed on November 30, 2022.

EPS (A$)			
Full Year - Jun	2022A	2023E	2024E
1Q	0.01	0.05A	--
2Q	(0.21)	(0.03)	--
3Q	0.02	(0.03)	--
4Q	0.02	(0.03)	--
FY	(0.15)	(0.14)	(0.14)

Revenue (A$M)			
Full Year - Jun	2022A	2023E	2024E
1Q	0.0	0.2A	--
2Q	0.1	0.2	--
3Q	0.0	0.2	--
4Q	1.4	0.3	--
FY	1.5	0.9	2.4



Commercializing a disruptive graphene production process. Brisbane-based Graphene Manufacturing Group Ltd. is an early-stage company seeking to commercialize, we believe, a disruptive graphene producing technology that uses methane gas to produce high-grade graphene in bulk quantities at a very low cost, as compared to the conventional graphene extraction process. The company's current product pipeline includes graphene powder, graphene-based Thermal-XR (TXR) HVAC coating systems, graphene aluminium-ion (G+AI) batteries, and liquid graphene in the form of lubricants, coolants, and graphene-enhanced diesel solutions. Initial testing results from the company's flagship G+AI batteries have shown the potential to compete or beat lithium-ion (Li-ion) battery applications in consumer electronics, electric vehicles, and the energy storage market. GMG's HVAC coating solutions and automotive fluids utilize graphene's high thermal properties, superior electric conductivity, and lubricating properties to enhance energy efficiency that support the energy conservation value proposition.

Graphene could take market share from competing materials, providing unique growth opportunity. The global market for graphene is still relatively small, valued at around $75M in 2020 and projected to grow at a seven-year CAGR of roughly 35% to exceed $650M by 2027. This growth is primarily expected to be driven by extensive research, and government and private investments for the development of the material and applications. However, we believe the more exciting prospects for graphene stem from reimagining and re-designing a lot of components and products in several large end markets. Graphene's thermal conductivity properties, coupled with high strength and durability, make it ideal as a component in automotive, paints and coatings, health, construction, defense and aerospace, plastics and composites, electronics, and energy storage, to name a few. In our opinion, providers who can successfully scale graphene production at low costs should be able to take meaningful share of large markets such as energy storage, estimated to be over $12B in 2022, lubricants, estimated to be over $150B in 2022, and EV batteries, estimated to be over $20B in 2022.

Partnerships provide path to commercialization. The company has formed core partnerships with established research institutions and corporations for product and business development including the University of Queensland (UQ) for the development of graphene fluid dispersions and graphene batteries, and Rio Tinto (RTNTF; not rated), Wood (LON:WG; not rated), and Bosch (NSE:BOSCHLTD; not rated) for the scaling, automation, and commercial-level production of graphene powder and G+AI batteries. The company's commercialization strategy involves entering multiple end-markets over time, setting up a diversified revenue base. We are expecting revenue contribution from sales of graphene powder, TXR coating products, G+AI batteries, graphene lubricants, coolants, and diesel fluids.

Under followed stock with meaningful upside. We believe the company's small size, Canadian listing, and limited sell-side coverage have prevented discovery of the stock. We believe both the graphene industry and the company stand at an important inflection point, moving from R&D to commercialization, that should create broader awareness of the associated growth opportunity. We are anticipating several developments for the company over the next 12-18 months that should act as favorable catalysts for the stock. These include: (1) launch of the company's graphene automotive lubricants; (2) establishing larger production infrastructure; (3) commercializing coin cell batteries and advancing the pouch pack design; and (4) G+AI batteries making progress towards being market ready. We believe current levels present an attractive long-term entry point into the story.

Valuation. Graphene Manufacturing Group currently generates revenue predominantly from the sale of graphene powder, TXR kits, and graphene mixed coolants and lubricants. The company's revenue also comprises government grants, subsidies, and R&D incentives received by the company for carrying out graphene-based research activities. During FY2020, FY2021, and FY2022, total revenues were A$1.3M, A$1.3M, and A$1.5M, respectively, mostly from grants and incentives. We are not projecting significant revenues during FY2023 and first half of FY2024; during this time, we expect the company to focus on development and optimization of coin cells, pouch cells, and the pilot plant. We are projecting revenues to rise to A$2.4M during FY2024, with the incremental revenue coming from traction in sale of initial pouch cells and continued growth in the sales of TXR products.

Management has indicated that it plans to build three larger-scale battery production facilities with annual capacities of 250MWh/year, 1GWh/year, and 10GWh/year, expected to be operational during 2025, 2027, and 2028, respectively. The company believes that the cost of building a battery production facility would be around $70-75 (approximately A$105-115) per kWh of capacity. In addition, management expects the cost of the graphene manufacturing facility to be in the same range. For our model, we have conservatively assumed $80 (approximately A$120) per kWh of capacity, each battery production facility and the graphene manufacturing facility. Though we believe that these costs could be lowered due to optimization and efficiencies realized between now and 2025-2028, we have conservatively assumed costs to be higher in those years, adjusted for inflation at 3.25% per year. The company expects to fund this using approximately 50% of debt and 50% of a combination of government incentives and company's equity. We are conservatively assuming the debt to fund 70% of the total cost, and have not included any government incentives or subsidies in our projections.

We are also being conservative in estimating the utilization of these plants at 55-70% of full capacity and have further applied risk-adjusted probabilities of success of 90%, 75%, and 30%, for the 250MWh, 1GWh, and 10GWh capacity plants, respectively (implying buildout capacities of 225MWh, 750MWh, and 3GWh, respectively). We are assuming sale prices of $350 (A$525) per kWh of battery capacity, much lower than the $1,000 (A$1,500) per kWh applications being targeted by the company. We are projecting the company's revenues to increase from A$0.9M in FY2023 to A$12.8M in FY2025, and expect to reach over A$2B in FY2032, at a seven-year CAGR of over 100%.

We expect EBITDA to turn positive in FY2026 and rise from an estimated A$70.0M in FY2026 to A$1.3B in FY2032, at a six-year CAGR of approximately 62.4%. To fund its operations and capacity buildout, we expect the company to raise total debt of A$1.0-1.2B at 10% interest rate, and issue total equity of over A$100M at A$2.50 per share, between FY2023 and FY2028. We arrive at our C$8.00 price target (approximately A$8.70 at an exchange rate of A$1.00=C$0.92) by applying a 50% execution risk to the value per share of approximately A$17.40 that we get using a DCF analysis that uses a discount rate of 18.7% derived from the company's weighted average cost of capital (WACC).

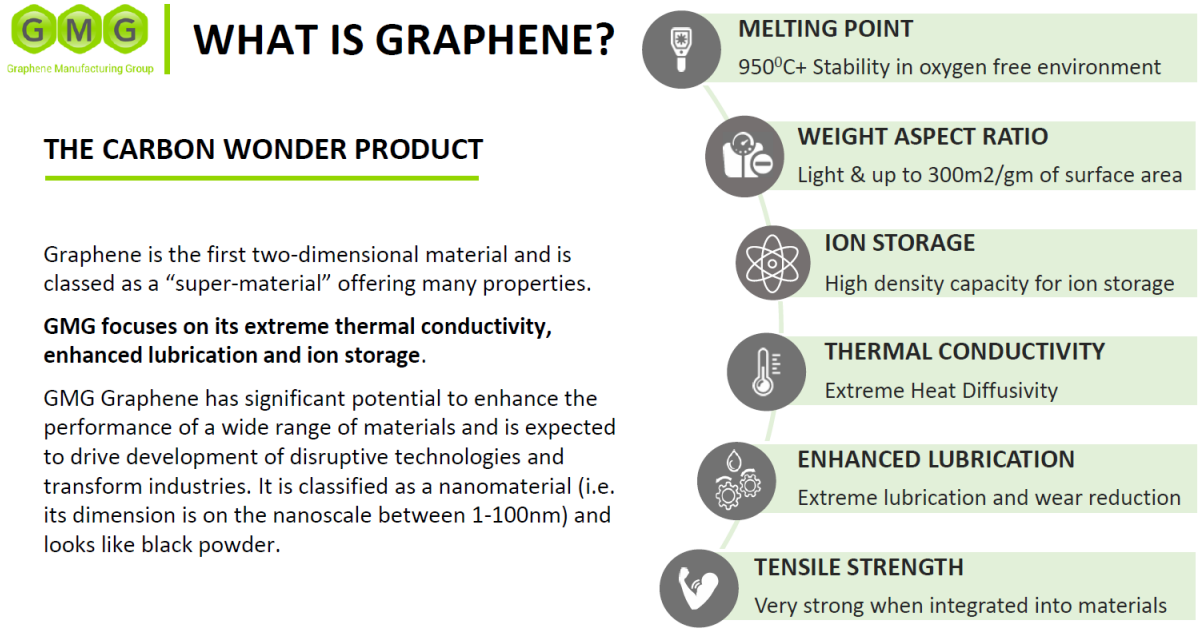
Risks. (1) Dilution risk; (2) competition risk; (3) project risks; (4) execution risk; (5) IP and trade secret risks; (6) regulatory risk; and (7) uncertainty due to the COVID-19 pandemic.

Company Overview

Graphene Manufacturing Group is an Australia-based graphene manufacturing technology company engaged in the production of low-cost, high-quality graphene from methane gas using a proprietary, single-step, high-yield plasma process. The company has further enhanced its technology to add fluid graphene solutions to its powder-based product line. The resultant graphene can be applied for material enhancements to a wide range of cleantech, energy saving, and energy storage solutions. Currently, the company supplies these graphene-based lubricants and coolants to several B2B customers, including OEMs, lubricant blending companies, industrial manufacturers, automobile suppliers, and customer electronics. The company has its primary manufacturing base in Australia. Going forward, it plans to diversify its customer base across North America, Southeast Asia, the Middle East, Australia, and North Africa.

Graphene is a "two-dimensional" one-atom-thick layer of carbon atoms arranged in a hexagonal lattice. It has several unique characteristics, including exceptional heat and electrical conductivity, strength—200x stronger than steel, lightweight, atom-thin size, and water repellant features.

GMG Graphene Characteristics



Source: Graphene Manufacturing Group presentation.

Traditional graphene extraction methods are capital intensive, with long gestation period and polluting process that require responsible mining, crushing, processing, distribution, refining, and waste handling techniques. According to GMG, its technology is a single-step, environment-friendly process that produces no carbon emissions and eliminates toxic wastes associated with the traditional production process.

Founded in 2016, GMG entered into an arrangement with a capital pooling company Cuspis Capital Ltd. to qualify for the Canadian Stock Exchange. In April 2021, the company commenced its trading on the Canadian TSX Venture Exchange under the ticker symbol 'GMG.V'. It is also listed on Tradegate in Germany under the ticker name '0GF'. Separately, the company's product is registered under the trademark "G", with an exclusive IP in Australia.

GMG has three operating segments: (1) the graphene manufacturing division; (2) the liquid graphene division; and (3) the battery division. The company's core manufacturing division is involved in producing graphene powder by splitting methane gas into hydrogen and carbon (as graphene) atoms. The powdered graphene is utilized by the company's liquid graphene division that uses dispersion technology to completely disperse the graphene into a fluid that is suitable for use in several energy savings applications. While GMG graphene has the potential to be used in a broad range of applications across industries, it has strategically pointed its focus to target select applications and industries, more

precisely to be in energy saving and energy storage applications. At present, the segment offers a graphene-based coating solution called Thermal-XR (TXR), an HVAC energy saving coating. Management is also focused on commercializing its graphene lubricant concentrate in the near term. Lastly, within the energy storage battery segment, GMG and the University of Queensland are working together with financial support from the Australian government for the development of its flagship graphene aluminium-ion (G+AI) batteries. Initially, the focus is on developing: (1) coin cell battery prototypes for small devices like watches, phones, and laptops; and (3) pouch pack batteries that can be used to store energy for a wide range of applications from personal devices to electric vehicles, aircraft, household, and energy grid storage systems. The company has already commissioned equipment for 2032-type coin cell and pouch cell manufacturing, which should enable the productization of this technology for a wider range of applications.

GMG has undertaken the expansion of its graphene manufacturing facility to scale up the production of graphene for use in G+AI batteries and liquid graphene products. The facility is initially planned to be semi-automated, to be operational during 2023, and subsequently would be fully automated in 2024. The company has entered into an agreement with Ozkem to procure the manufacturing and branding rights for Thermal-XR.

GMG has collaborated with several universities, corporations, government bodies, and councils to enhance the graphene production facility and to advance the development of its graphene G+AI battery cells. It has partnered with the University of Queensland (UQ) for the development of graphene fluid dispersions and graphene batteries. It has also collaborated with large corporations, such as Rio Tinto (RTNTF; not rated), Wood (LON:WG; not rated), and Bosch (NSE:BOSCHLTD; not rated) for the scaling, automation, and commercial-level production of graphene powder and G+AI batteries. Some of the company's collaborative activities include R&D and testing of new graphene-based formulations to develop several other products, such as G-fluid concentrate, G-diesel and biodiesel, and G-paint.

The company intends to build larger scale G+AI battery manufacturing plants, with an initial 250MWh/year capacity plant being planned to be operational during 2025, followed by 1GWh/year and 10GWh/year capacity plants in 2027 and 2028. Once the 250MWh/year plant is operational, management has plans to licence out the technology as a source of additional revenues.

Products

The graphene powder. GMG has pioneered a technology that uses electric plasma to break naturally available hydrocarbons (methane) into hydrogen and carbon atoms with no metallic residues. The isolated pure carbon atoms are nothing but graphene with superior physical, electrical, and mechanical properties. GMG graphene has a high aspect ratio, high flexibility, and mechanical strength. This material is tuneable, meaning the interactions between the carbon fiber and polymer matrix can be adjusted as needed. It also has a definable and customizable platelet size which can be adjusted to suit the needs of the end-application.

GMG Graphene

Source: Graphene Manufacturing Group presentation.

The manufactured graphene can be utilized in different types of applications, with focus on three products, namely Thermal-XR, graphene lubricant concentrate, and the next-gen G+AI batteries.

Thermal-XR (TXR). TXR is a unique patented graphene-based coating that is used on damaged coils to restore, extend life, and maintain HVAC condensers and on new coils to maintain high energy efficiency. According to the company, its results showed that TXR facilitates a 20-30% reduction in energy consumption in HVAC applications and 40-50% energy savings in large vehicles. TXR-RESTORE, developed using TXR is a water-based, high-quality acrylic resin infused with highly concentrated thermally conductive materials to protect HVAC condenser coils from corrosion, rebuild damaged thermal bonds, improve the rate of heat transfer, and increase thermal conductivity. The water-based solution makes the product safe and environment friendly.

The TXR coating is UV resistant, has a dry film thickness of approximately 15 microns, and is flexible and resistant to aggressive environments. The adhesion level meets Cross Hatch Test Level 0 (European) and 5B (U.S.) according to ASTM 3359-88 53151 method B-A. The corrosion resistance is confirmed by testing more than 10,000 hours of salt spray resistance per ASTM B117 using aluminium test panels.

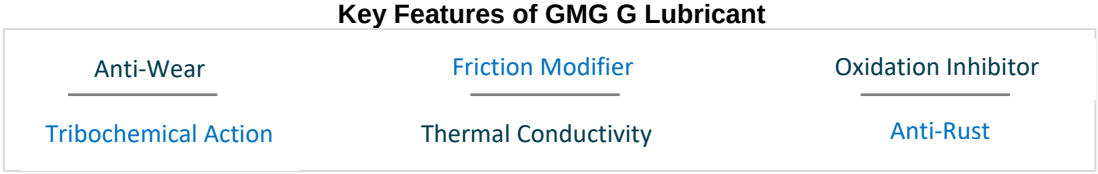
Key Advantages of TXR

• Long-term protection, prolongs the life of the coil by 5+ years.
• Highly concentrated thermally active particles that rebuild lost thermal conductive between the aluminum collar and copper tube.
• Water-based coating. Safe and environment friendly.
• Highly effective corrosion-resistant coating that protects the coil from further thermal efficiency losses.
• Effective defense against mold and bacteria.

Source: Thermal-XR website.

G Lubricant. This is an engine-oil additive, a concentrate of GMG Graphene and any other lubricating oil (1%). The lubricant has been developed to effectively reduce friction in engines, save energy, lower emissions, prevent wear and tear, leading to lower maintenance, and increase heat dissipation in industrial products.

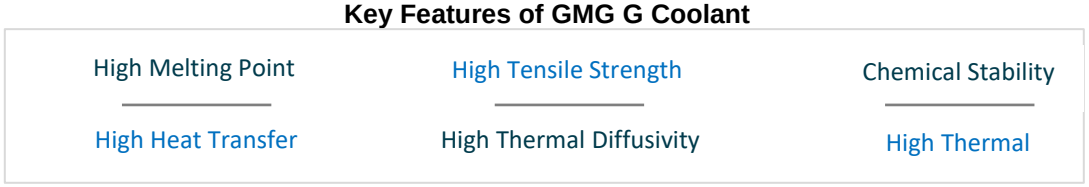
Key Features of GMG G Lubricant



Source: Graphene Manufacturing Group website.

G Coolant. This is a GMG Graphene and Glycol base heat transfer coolant dispersion concentrate (1%). According to the company, this coolant is designed to realize energy saving, reduce emissions, reduce engine stress, increase longevity of the vehicle, and lower maintenance costs. The concentrate can also be added to an existing fully formulated coolant or can be tailored by GMG as an addition to the customers' choice of fluid.

Key Features of GMG G Coolant



Source: Graphene Manufacturing Group website.

Graphene and Aluminium Ion (G+Al) Batteries. GMG, in collaboration with the University of Queensland (UQ) and the Australian government, is developing a G+Al battery, which could potentially extend battery life and reduce charging times. Laboratory results show that GMG's G+Al batteries have 3x longer battery life and 70x faster charging speed than that of lithium-ion (Li-ion) batteries. The G+Al batteries also have higher power and energy densities than Li-ion batteries. of G+Al batteries stand exceptionally high when compared to traditional and Li-ion batteries. The company believes that these batteries are extremely safe, with no upper ampere limit to cause spontaneous overheating and fires.

Key Specifications of GMG Battery

Parameters	GMG G+Al Battery
Energy Density	150-160 Wh/kg
Power Density	7000 W/kg
Number of Cycles	3000 cycles at 10C-66C
Fast Charge Data	Tested 1000 cycles at 66C. Calculated time to fully charge average phone battery: 1-5 minutes
Fire Risks	None expected
Supply Chain	In-house graphene production
Recyclable	Nearly 100% recyclable
Raw Materials	Graphene, Aluminum

Source: Graphene Manufacturing Group presentation.

GMG is in the process of testing its G+Al batteries in coin cells and pouch pack format across different performance ranges.

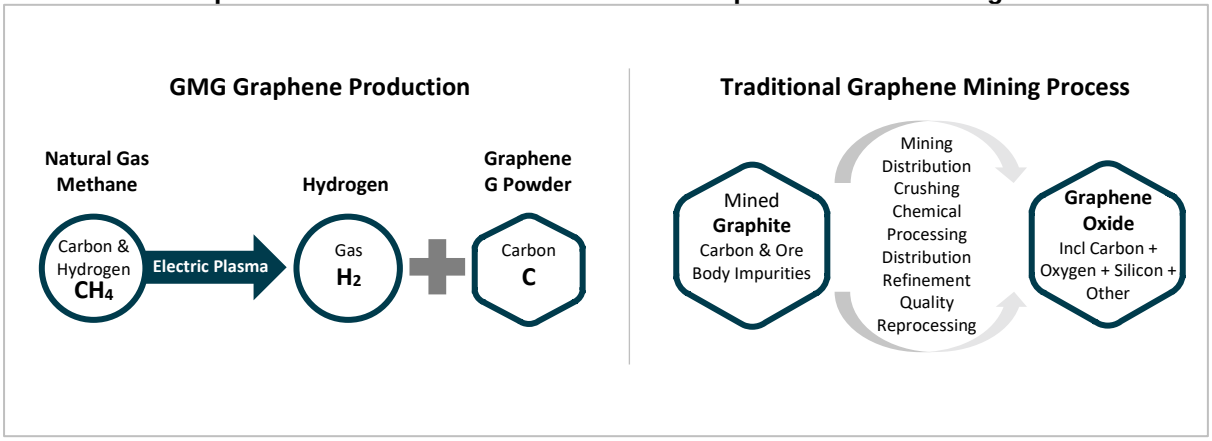
Investment Overview

Our investment thesis on Graphene Manufacturing Group is driven by these seven salient points: (1) the company's graphene-producing technology could be disruptive; (2) graphene's favourable properties align well with cleaner energy consumption; (3) G+AI battery technology seeks to fill potential gaps stemming from Li-ion supply constraints; (4) G+AI battery performance appears compelling; (5) prototype coin cell batteries in production, and supportive to pouch pack design; (6) graphene's thermal conductivity properties could support traction in the energy saving industry; and (7) graphene liquid dispersion offering could extend reach into new applications and markets.

1. The company's graphene-producing technology could be disruptive. GMG is developing a proprietary graphene production process that has shown promising early results. Traditionally, graphene has been derived from naturally mined graphite, which is a highly capital-intensive activity involving large investments and a long gestation period. In addition, the mining and purification activity is highly detrimental to human health and the environment. Apart from being ecologically hazardous, the graphite mining method is also commercially challenging as it produces graphene in limited batches in a time-consuming process. The batch production style results in inconsistency in the graphene platelet size. To overcome the issues of traditional production methods, several efficient graphene formation methods, such as depositing vapor from a gas or chemical treatment of graphite, have emerged, but we believe these also tend to produce impurities in the final output. Metallic impurities can reduce the efficiency of graphene, rendering it unsuitable for certain applications. We believe there should be significant demand for high-purity graphene with a specified structure and size for high-tech applications.

GMG's confidential, patent-pending, one-step graphene extraction process overcomes these issues by simply breaking down methane gas via an electric plasma into smaller elements of hydrogen gas and carbon. The graphene is then subsequently obtained from the decomposed carbon atoms without releasing any toxic residue. We believe that the key differentiating factor in the entire process is the raw material itself, wherein mined graphite is replaced with natural gas. Natural gas is available abundantly, ensuring an uninterrupted supply of feedstocks for continuous production that too cost-effectively. We believe, the simplified process is scalable, relocatable, and could be replicated on a larger scale to produce bulk graphene in a relatively shorter period. We believe GMG's method requires a comparatively small footprint and low capital expenditure and can be scaled up in a modular fashion.

GMG Graphene Production Versus Traditional Graphene Manufacturing Process



Source: Graphene Manufacturing Group presentation.

We believe GMG's process provides several distinctive advantages. First, the standardized operation ensures consistent graphene width size without compromising grade and quality. Second, the achieved uniformity facilitates the customization of graphene nanoplatelets to suit different applications having specified requirements to meet the desired performance outcome.

Key Advantages of GMG Graphene Production Method

Source: Graphene Manufacturing Group website.

2. Graphene's favorable properties align well with cleaner energy consumption. Since its first successful isolation in 2004, interest in exploiting graphene's properties has grown multi-fold, leading to numerous industrial and fundamental research. Hailed as a 'wonder material,' graphene is lauded for its durability, sustainability, and a range of potential applications across industries. Currently, most of the spend for graphene is related to research and development. However, despite having outstanding properties, the widespread adoption and commercialization of the material is still a challenge, mainly due to mass production issues. The graphene supply chain is relatively in its infancy, with small amounts produced for research and development. The industrial processes used to make graphene are also at the development stage. We think GMG's unique, cost-effective technology to produce high-quality graphene offers a great proposition to overcome these issues. We believe the company's approach to initially targeting energy storage and energy saving segments is very logical, as it utilizes the most obvious properties of graphene. Another such company that is producing graphene without using graphite is HydroGraph Clean Power Inc. (CNSX:HG; not rated). HydroGraph claims to produce graphene with its Hyperion detonation process using hydrocarbon and oxygen. While we understand that there are many competing companies that are developing innovative processes to produce graphene, we believe the graphene market could become very large and can provide ample runway for growth for multiple players simultaneously.

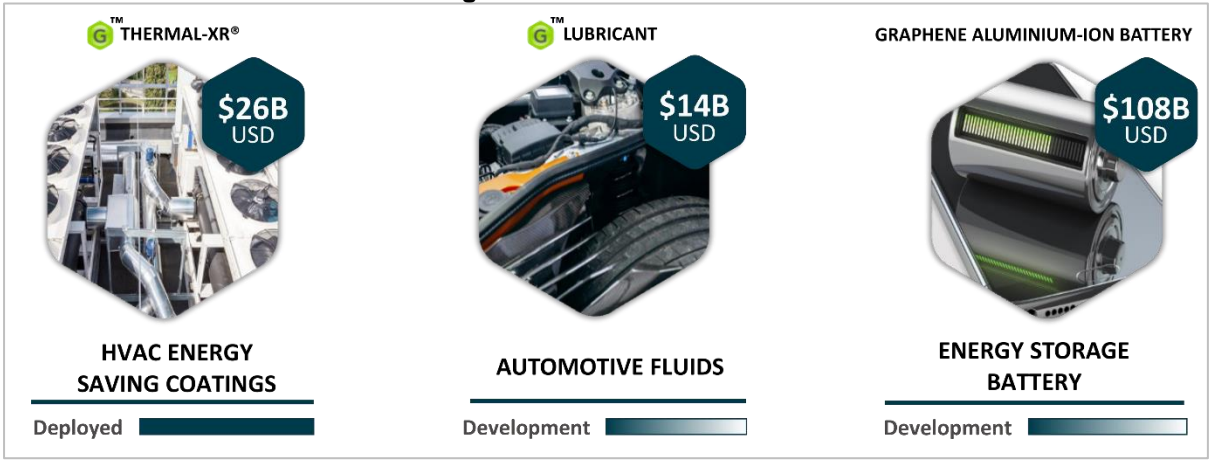
In recent years, energy storage battery systems have gained substantial momentum due to rising demand for consumer electronics and the long-term trend of electrification of vehicles. Currently, Li-ion batteries are dominating the energy storage space thanks to their favorable energy density characteristics resulting in long-lasting battery charge. However, Li-ion batteries are highly susceptible to overheating, leading to combustion risks. Moreover, the use of lithium, cobalt, manganese, and other rare earth metals brings up issues such as long-term sustainability. Meanwhile, there is a rising demand for advanced multifunctional portable devices, which require higher performance in terms of power density, posing a challenge for Li-ion battery technologies to meet such demand. As a result, many research and development pathways have led to the advent of higher density hybrid batteries and other types of supercapacitors, which are stronger candidates to satisfy the requirements in a condition where Li-ion batteries underperform. Graphene-based batteries could emerge as a suitable alternative to meet shortcomings associated with incumbent solutions. Initial results have shown G+AI battery's superiority over the Li-ion battery, which could be a game changer in the widespread adoption of graphene-based energy storage solutions.

Apart from energy storage solutions, technologies that can achieve efficiency in energy consumption have also attracted substantial attention in recent years. According to the International Energy Agency (IEA), HVAC systems account for almost 60% of the energy consumption in buildings, undergoing a three-fold increase in energy usage in the last thirty years with the potential of exponential growth into the future. It is estimated that around 75% of the energy that enters a building is wasted due to inefficient heating and cooling systems and is responsible for around 25% of global emissions. To meet the ambitious goal laid down in the Paris agreement of 2015, lawmakers across the world have directed corporations to set their energy efficiency targets, policies, and actions. Several federal energy saving policies, such as EU's Ozone Depleting Substances (ODS) regulation and California's Air Resource Board's initiatives, were drafted to curb the carbon emissions from the HVAC systems. Moreover, the U.S. Department of Energy (DoE) has periodically lowered minimum efficiency standards for air conditioning and heating equipment, in line with governments' push to implement more stringent standards to reduce CO_2 discharge. According to the IEA report, over 50 countries, including Australia, are mandated to improve their air conditioner energy performance in the near term. Additionally, countries, including the Portuguese, have drafted new efficiency regulations on the HVAC systems in building facilities setting strict standards for HVACs energy consumption limits, conducting energy audits, and limiting the pollutant concentrations inside the buildings. Studies have suggested that increasing energy efficiency is among the most significant ways to improve the sustainability of the

systems. We think the rising demand for HVAC energy-efficient solutions would further boost the demand for GMG's Thermal-XR HVAC coating technology.

According to IEA estimates, other than the building cooling and heating systems, significant CO_2 reductions can be achieved through savings in vehicle fuel consumption. The drive to drastically cut energy consumption and operational costs, as well as stringent environmental restrictions on automotive and manufacturing businesses, have bolstered the demand for lubricants and other performance-enhancing fluids. We believe GMG, through its in-development liquid graphene portfolio, is well placed to tap into the lucrative automotive fluids industry.

GMG's Target Markets and Growth Potential



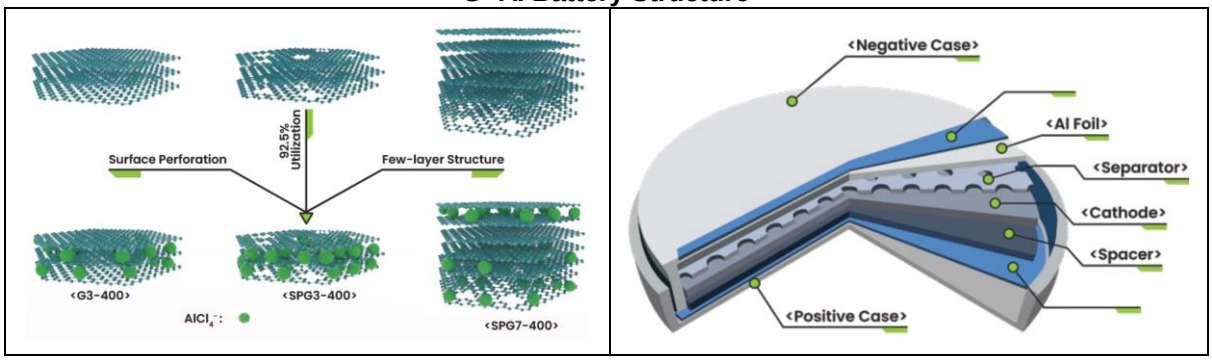
Source: Graphene Manufacturing Group website.

In our view, GMG's suite of offerings complements the directives set by the federal body for controlling emissions, optimizing energy efficiency, and providing a cost-effective solution to customers looking for energy storage and energy saving solutions.

3. G+Al battery technology seeks to fill potential gaps stemming from Li-ion supply constraints. As mentioned earlier, GMG graphene's high storage density and conductivity facilitate fast charging and discharging of electrically powered devices, presenting a potential alternative solution in the rapidly growing energy storage market. We believe these unique attributes of graphene position the company's development-stage G+Al batteries as a very competitive solution for energy storing systems in the quickly expanding market of personal electronics, grid storage, and electric vehicles.

The technology behind G+Al batteries was originally developed by the University of Queensland (UQ). The scientists at UQ used nanotechnology to insert aluminium atoms inside tiny perforations in GMG's graphene panes. The aluminium atoms stick inside the graphene, making it extremely dense. At present, aluminium ion cells are a hot bed of research and development activities, thanks to their inherent property of exchanging three electrons per ion instead of just one. By exploiting the individual strength of the two materials, the company aims to develop a revolutionary battery cell, which could potentially change the dynamics of the existing rechargeable battery market.

G+Al Battery Structure

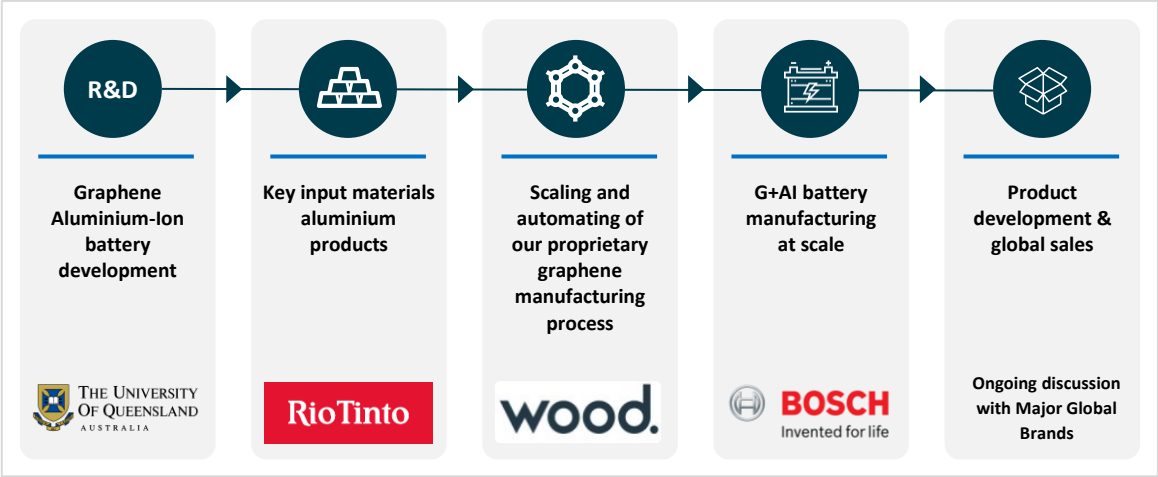


Source: Graphene Manufacturing Group presentation.

UQ's development activities are also being supported by the Australian Research Council, wherein the council would provide funds to the tune of A$390,000 over three years. In April 2021, GMG entered into a license agreement with Uniquest, a commercialization wing of UQ, for the battery cathode technology for a period of 20 years. Upon commercialization, GMG is required to pay royalty on the sale of each G+AI battery to UQ. Jointly, they have also filed a patent application for their battery technology to secure developmental and commercialization rights.

GMG took a strategic decision to form a coalition at each step of the battery development and production stage and take advantage of the expertise of the leaders in the value chain. For instance, GMG has signed a cross-selling arrangement with Rio Tinto, wherein it will procure aluminium metal from the latter and supply manufactured batteries for its industrial applications. Additionally, the company will utilize Rio Tinto's metal mining expertise to improvise the battery development process and explore the use of alternate metals as inputs in batteries. Separately, Wood was contracted to design, build, automate, and upscale its graphene manufacturing plant in Australia and overseas. Meanwhile, GMG collaborated with Bosch to make use of its engineering and construction services to expand the G+AI battery production facility. We believe the shared expertise of Rio Tinto, Bosch, and Wood should help build an efficient process from the production of graphene to the manufacturing of batteries.

Collaborations Across Graphene Aluminum-Ion Battery (AIB) Value Chain



Note: Publicly traded companies mentioned above include: Rio Tinto (RTNTF; not rated), Wood (LON:WG; not rated), and Bosch (NSE: BOSCHLTD; not rated).
Source: Graphene Manufacturing Group presentation.

4. G+AI battery performance appears compelling. As mentioned earlier, the company is developing G+AI batteries in coin cell and pouch pack formats across different performance ranges. The laboratory testing done by UQ on coin cell battery performance confirmed that the rechargeable G+AI batteries have high energy and high-power densities of 7,000W/kg, which is 20 times more than that of Li-ion batteries. According to the company, this level of performance provides three times longer battery life and 70 times faster charging speed than that of Li-ion batteries. Lab experiments indicate that G+AI batteries retain charge for a larger number of cycles without any dip in performance. The technology is being further upgraded to increase the voltage of the coin cell from ~1.7Volts to ~3.4Volts, which would allow the cells to be used in everyday personal devices. Initial performance comparison done against other methods of developing G+AI batteries and other types of energy storage batteries has also demonstrated superior performance.

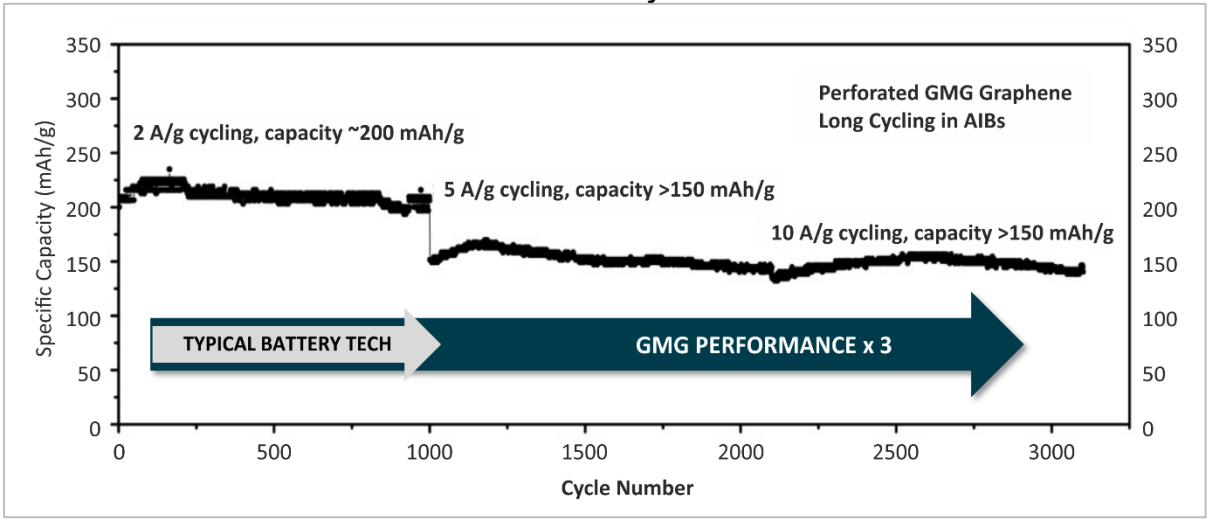
Comparative Performance Test Results

Battery Technology	Electrode Materials	Energy Density (W/kg)	Power Density (W/kg)	Calculated Time to Fully Charge Avg. Phone Battery (Minutes)
Graphene Aluminum-Ion Batteries				
Taiwan/Stanford US	Natural graphite/Al	~68.7	~41.1	60 – 110
Stanford US	CVD graphitic foam/Al	40	~3000	1 – 5
GMG + UQ	**GMG + UQ Graphene/Al**	**150-160**	**~7000**	**1 – 5**

Source: Graphene Manufacturing Group presentation.

The G+Al battery's superior performance and technical attributes are validated by a positive publication by Advanced Functional Materials. The publication highlights the test results of the battery, indicating an exceptionally high-performance rate at a capacity of 149mAh/g cycling at 5A/g, its excellent electrochemical performance, and an extraordinary reversible capacity of 197mAh/g cycling at 2A/g. We believe these results imply that GMG's G+Al batteries can sustain their performance at longer cycling with higher charge densities.

2032 Coin Cell Battery Performance



Source: Graphene Manufacturing Group presentation.

5. Prototype coin cell batteries in production, and supportive to pouch pack design. Following positive customer feedback over the results of coin cell performance studies, GMG initiated the production of commercial prototype coin cell batteries. In December 2021, the company manufactured its first G+Al 2032 coin-cell battery prototype and subsequently dispatched it to prospective customers across the world for testing and evaluation. Coin cell testing to date has demonstrated that GMG coin cell prototypes are fully rechargeable in several seconds, retain the capacity for several thousand charge-and-discharge cycles, are non-flammable, and are relatively non-toxic and almost fully recyclable. These characteristics compare favorably against typical rechargeable Li-ion 2032 type coin cells, which take around 3-6 hours to recharge, are toxic and can be harmful if ingested, are difficult to recycle, are flammable under certain conditions, and degrade more rapidly in performance. Utilizing its extensive experience gained from the development of coin cell batteries, the company has expanded its efforts on advancing the pouch pack battery format. In June 2022, GMG manufactured its first G+Al pouch pack battery prototype. In our opinion, the parallel advancement of pouch pack battery development is an important milestone for the company, given the fact that there are multiple use cases of such pouch pack batteries in a large range of end products ranging from personal and industrial appliances to grid batteries and EVs. Riding on the back of the initial success of its prototypes, GMG anticipates that the commercial production of coin-cell batteries could commence as early as 2023, and of the pouch pack battery units in 2024.

GMG's pilot plant is expected to undertake the initial production and testing activities of coin cell and pouch pack battery prototypes. The pilot plant is a fully integrated and automated facility comprising a climate-controlled environment that facilitates ideal temperature, humidity, and dust conditions, suitable to optimize the battery manufacturing process. The facility is also equipped with specialized equipment for assembling, testing, and developing battery prototypes. The company has also commissioned pouch cell manufacturing equipment at the pilot plant in response to positive test reviews and increased demand from potential customers. We believe additional investments are needed for the advancement of the pilot plant and procuring sophisticated equipment to progress these battery development activities.

The company is planning the expansion of its existing manufacturing plant. Upon approval of the final investment decision for phase 1 of the expansion project, GMG executed a five-year lease involving a proposed investment of A$1.5M for an additional space of 1,500m^2. The facility is expected to be fully commissioned by the first half of 2023. The expansion would result in increased production of graphene, which would ultimately be used to meet the growing requirement of G+AI batteries for evaluation and liquid graphene concentrates.

6. Graphene's thermal conductivity properties could support traction in the energy saving industry. As a result of its thermally insulating properties. GMG's graphene can be used to enhance the energy efficiency of refrigeration and air conditioning coils in HVAC systems. The refrigeration gas inside the system moves the heat from within the facility to control temperature. However, pollution corrodes the outdoor condenser coil of the unit, leading to unavoidable loss of heat exchange efficiency and wastage of electricity. The lost thermal efficiency is irrecoverable in most cases, requiring replacement of the coil at significant costs. To avoid these costs, GMG's patented graphene-powered Thermal-XR (TXR) can be used as a coating that optimizes the heat exchange capacity of the HVAC systems. It is a hydro-based and high-quality acrylic-designed conductive coating material that repairs the damaged coil by rebuilding heat conductivity and improving the rate of heat transfer. The TXR coating mechanism utilizes the water-repellent and non-porous properties of graphene to prevent oxygen from reaching the coil material and eroding the surface area. According to the company, the graphene in TXR has 10-15 times greater heat conductivity than other metals and is effective in safeguarding aluminium and copper coils from damage. The increased heat dissipation prevents the compressor from overheating and malfunctioning on a regular basis. Most importantly, it is a onetime application, as the treatment process restores and protects the old and new coil's thermal conductivity permanently.

The TXR thermal restoring procedure comprises four steps. The first and the second step involves spraying the TXR Prep and TXR Activate concentrates with a high-pressure spray gun to clean and activate the coil before treatment. Subsequently, TXR Restore is sprayed to rebuild the lost thermal efficiency and protect it from further damage from the environment. The last step involves the use of TXR Maintain to clean, de-rust, and decontaminate the coil surface, ensuring the long-lasting effect of the treatment.

TXR can safeguard HVAC-R (HVAC and refrigeration) systems in a wide range of industries, including infrastructure, facility and food supply management, retail and shopping centers, food outlets, transports, utilities, and educational institutions. TXR has received authorization from the Australian government as a coating agent for application in industrial products. HVAC-R condensers are the largest energy users, accounting for a majority of the total energy consumed in businesses and commercial buildings. The aluminium and copper coils consume an estimated ~70% of the energy used by the air condensers and generate 60% of greenhouse gas emissions. Inefficient cooling systems result in continuous breakdowns and exorbitant utility bills. GMG's graphene-based TXR solution provides protection to valuable assets by repairing and extending the equipment life by more than five years. It also facilitates a reduction in energy consumption and enhancement in energy savings in large vehicles. According to the company, the application of the coating solution has resulted in 46% savings in energy costs in some cases. Each gram of graphene-activated TXR coating has the potential to increase heat transfer on 300m^2 of the micro surface area of the system, displaying favorable performance efficiency. In comparison, a thin layer of application of any other coating system can reduce heat conductivity by 2-5%. Additionally, GMG's offering is water-based and contains chemically resistant graphene material, making it safe and environment friendly.

The company has successfully demonstrated the significant benefits of the coating through several customer product applications through real-life case studies.

Thermal-XR Case Studies

	Facility	Unit	Size of the Unit (kW)	% Energy Saving Calculated	Calculated Annualized Energy Saving (kWhr)	Calculated Annualized Emissions Reductions
Case Study 1	Public Library	Air Conditioner	53.2 kW	52%	4,021	3.3 CO_2 tonnes
Case Study 2	Health and Fitness Club	Air Conditioner	85 kW	22%	27,046	21,662 CO_2 kg
Case Study 3	Cold Room Storage Facilities	Refrigerated System		8%		
Case Study 4	Poultry Processing Facility	Split Ducted Unit	Triplet compressors on the ground with 15m pipe	6.5%	18,177	3,625 CO_2 kg
Case Study 5	Residential	Air Conditioner	5 kW	13.4%	127.7	127.7 CO_2 kg
Case Study 6	Food Management	Air Conditioner	11.2 kW	15%	3,280	3,280 CO_2 kg
Case Study 7	Logistics Warehouse	Air Conditioner	11.2 kW	15.7%	49,175	4,954 CO_2 kg
Case Study 8	Health & Fitness Club	Air Conditioner	16.5 kW	14%	6,177	6,177 CO_2 kg
Case Study 9	Health & Fitness Club	Air Conditioner	14 kW	59%	6,752	6,752 CO_2 kg
Case Study 10	Fast Food Restaurant	Freezer	5 kW	5.4%	1,020	1,020 CO_2 kg
Case Study 11	Fast Food Restaurant Chain	Chiller	2 x 3.5 kW	6.8%	381	381 CO_2 kg
Case Study 12	Fast Food Restaurant Chain	Air Conditioner	50 kW	19%	722	722 CO_2 kg
Case Study 13	Residential	Panasonic Air Conditioner	5 HP	45%	3,936	3,936 CO_2 kg
Case Study 14		HVAC unit	85 kW	22%	28,468	21,663 CO_2 kg

Sources: Graphene Manufacturing Group website.

Separately, we think the company should benefit from the August 2022 strategic acquisition of TXR's production patent and branding ownership from OzKem. Initially, the company held the exclusive global distribution rights of TXR product which was developed using its proprietarily produced graphene material. After taking over the business, GMG is expected to exclusively buy the base coating from OzKem for five years, manufacture TXR in-house, and eventually sell the final product. Further, the agreement restrains OzKem from developing graphene-based coatings for a five-year period as well. The company agreed to pay an initial A$1M in cash, and a subsequent A$1M of company shares post the successful commercial production of the blended TXR product. We believe the partnership between the two companies should help accentuate the potential of this technology and could prove to be a lucrative venture for GMG.

Encouraged by the positive results from the global commercial demonstrations and initial sales on a small scale, the company is gearing up for the commercial maturation of the TXR product line. It has

facilitated several live demonstration projects in numerous locations and engaged HVAC-R manufacturers and service contractors in Australia and other countries. GMG has availed the services of Openia Project Management Services for the exclusive distribution of TXR throughout the UAE to penetrate the Middle East market. We believe the innovative coating technology, a broad range of applications, and several performance validations provides an attractive value proposition to the energy conservation market.

7. Graphene liquid dispersion offering could extend reach into new applications and markets. As mentioned before, GMG is working in partnership with the nanotechnology division of the University of Queensland (UQ) to constantly improve the graphene developing process and explore enhanced versions and applications of the graphene material. Following extensive R&D efforts undertaken since 2018, GMG's graphene technology has been adapted to convert graphene powder into a range of graphene liquid dispersions. The liquid graphene project has received financial support from the Advanced Manufacturing Growth Centre (AMGC) in the form of a $226,861 grant amount. At present, the company is undergoing in-house testing and customer engagement trials with manufacturers in specialty oils, lubricants, rubber, construction materials, plastic, and paints sector to validate the use cases and credibility of the liquid graphene solution in various commercial applications.

Graphene fluids are suspended graphene nanoplatelets in water or other organic solvents. GMG's graphene fluid can be diluted at low concentration, ensuring ease of material handling, high lubrication, and economical transportation cost. The fluid has the potential to reduce weight and increase the strength, heat and electric conductivity of plastics, concrete, rubber, and composites.

GMG is targeting its liquid graphene portfolio for use in lubricants, coolants, fluids, diesel, and biodiesel at different concentrations. The company's graphene-based lubricant is an engine oil additive, which reduces friction in engines and prevents wear and tear of the automotive metal interface. Trials have shown that the lubricant solution results in 10% savings in fuel consumption, 12% energy savings, 30% lower metal friction, and 10-20% reduction in wear and tear. The product is currently under development and commercialization is being targeted toward B2B markets in Australia, South-east Asia, and the Middle East. The company has received numerous requests for customer trials from small-scale as well as larger players in lubricant manufacturing, blending, and marketing space. Meanwhile, the company's graphene diesel and bio-diesel solutions are designed to enrich the efficiency and reduce emissions of diesel engines by adding a 0.006% of the graphene solution to the diesel fuel. In our opinion, the concentrate would offer an extremely cost-effective solution to improve the performance and fuel consumption of diesel-powered vehicles. Currently, the product is in the initial stages of performance testing with no concrete plans for large-scale production.

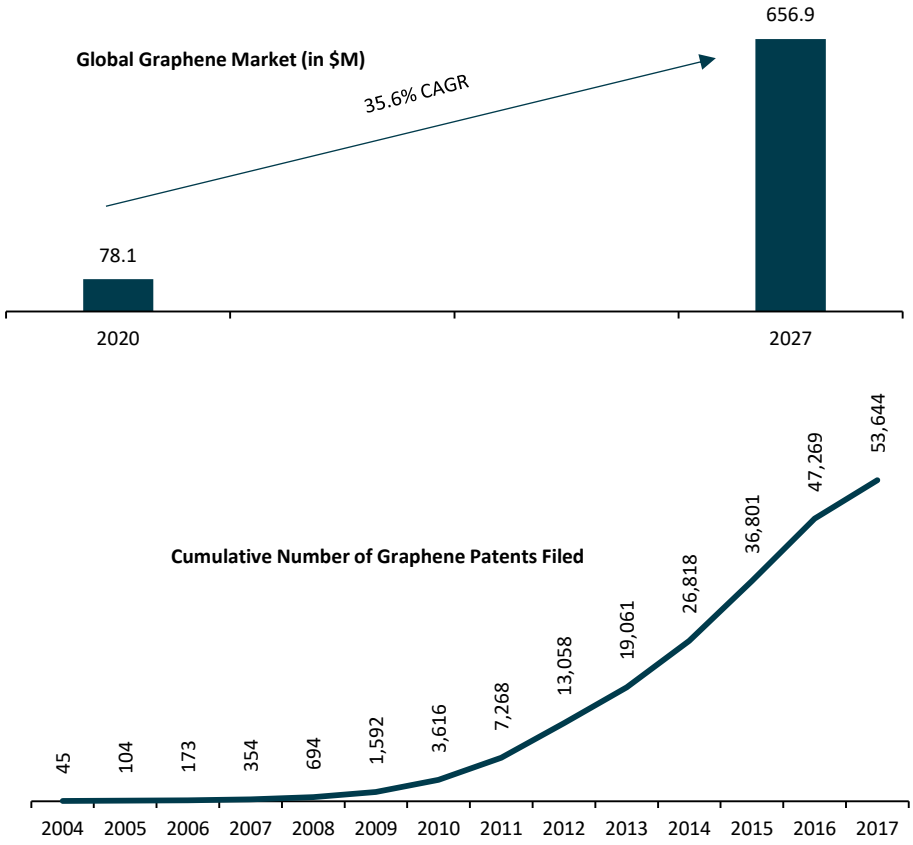
Capitalizing on the collaborative R&D on new graphene-based formulations, GMG is developing a variety of new disruptive solutions, such as paints, vehicle components, biomedical treatments, and self-charging medical implants.

Industry

The graphene industry is in nascent stages, but significant growth is expected in coming years. Historically, the graphene industry has faced several hurdles related to development of cost-effective and high-quality large-scale production methods, lack of awareness about the material, and lack of understanding of the integration process. These issues have led to slower commercialization of graphene. However, several corporations, institutions, and universities are undertaking joint efforts to address these issues, because of which the industry is expected to gain traction. The global market for graphene was estimated at $78.1M in 2020 and is projected to reach $656.9M by 2027, at a seven-year CAGR of 35.6%. In the U.S., the demand for graphene was estimated at $23.5M in 2020, accounting for approximately 30% share of the global market. It is closely followed by China, which is expected to reach $112.8M by 2027, at a seven-year CAGR of 34.7% from 2020 to 2027 period. Several other countries, such as Japan, Canada, Korea, and Europe, are also ramping up their efforts to use graphene in building future sustainable technologies.

According to data published by Nixor Limited, 45 patents based on graphene technology were filed in 2004; the number surged to 53,644 by 2017. More than half of the patents have been filed in China, followed by Korea, the U.S., and Japan.

Graphene Market Size and R&D Activity



Source: ReportLinker, Nixor Limited.

Governments, academia, and major corporations across the globe are investing in the industry. To support the accelerated pace of R&D efforts, several research grants, rebates, and subsidies are being announced by governments all over the world. The EU has established the Graphene Flagship in 2013, which is expected to invest $1.3B in graphene R&D over a 10-year period. Several companies, such as Samsung (SSNLF; not rated), Nokia (NOK; not rated), Intel (INTC; not rated), Sony (SONY; not rated), and IBM (IBM; not rated), are investing in R&D toward cost-effective means to produce graphene and have developed graphene-integrated products.

Select Research Initiatives

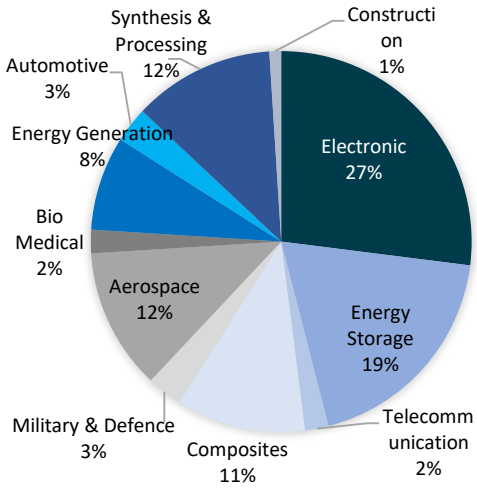
Countries	Targets/Actions
Britain	Identified graphene as one of the four emerging technologies and invested £50M. Appended £21.5M to explore the commercialization of graphene. The National Graphene Institute completed.
Korea	Funded graphene project $18.7M. Plans to invest $250M in graphene project. Announced that the Graphene Union is set up by 41 research institutes and six companies, Government invested $42.3M.
China	The 13th Five-Year Plan (2016-2020) lists graphene as a leading sector of the national economy. Invested $210M to promote the development of the graphene Industry.
Europe	Ranked graphene as one of the "Future Emerging Technologies Flagship Projects" and will invest €1B over the next decade.
Malaysia	Launch of the National Graphene Action Plan (NGAP) in 2014.
Graphene Producer	**Targets/Actions**
IBM	Developing and producing innovative uses of graphene to improve the performance of transistors and other electronic components.
Toyota Motor Corp	Researching and patenting graphene in batteries for electric cars.
Tata Steel	Founded Graphene Development Centre (GDC). The center produced corrosion-resistant graphene paint and supplied graphene powder to renowned tire companies. Demonstrated the potential of Graphene Inks (Gink).
GAC Group	Developed a breakthrough graphene battery for EVs.
Graphene Developer	**Targets/Actions**
Ford	Announced the use of graphene in fuel rail covers, pump covers, and front engine covers in collaboration with Eagle Industries and XG Sciences.
Huawei	Graphene cooling films for smartphones.

Public listed companies: IBM (IBM; not rated), Toyota Motor Corp (TM; not rated), Tata Steel (NSE:TATASTEEL; not rated), GAC Group (HKG:GAC0W; not rated)
Source: Electric Vehicles Research, AZO Nano.

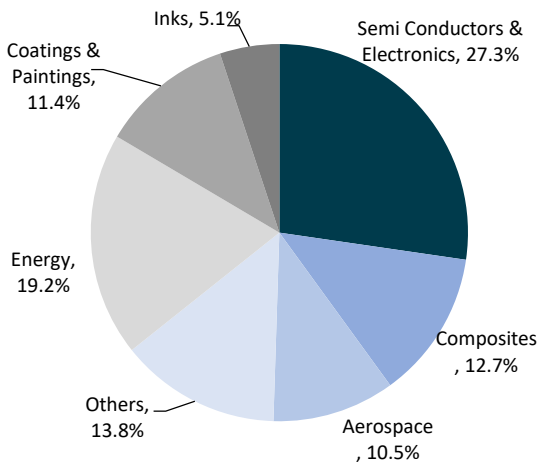
Graphene has applications in several industries. In the electronics industry, graphene can be used as a coating in phones and tablets to improve touch screens, build circuits for computers, and develop transistors and flexible wearable devices. In the energy storage market, graphene can be used in battery anodes, supercapacitors, solar cells, hydrogen storage, and fuel cells.

Wide Range of Applications

Global Graphene Application Structure, 2017



Global Graphene Application Structure, 2020

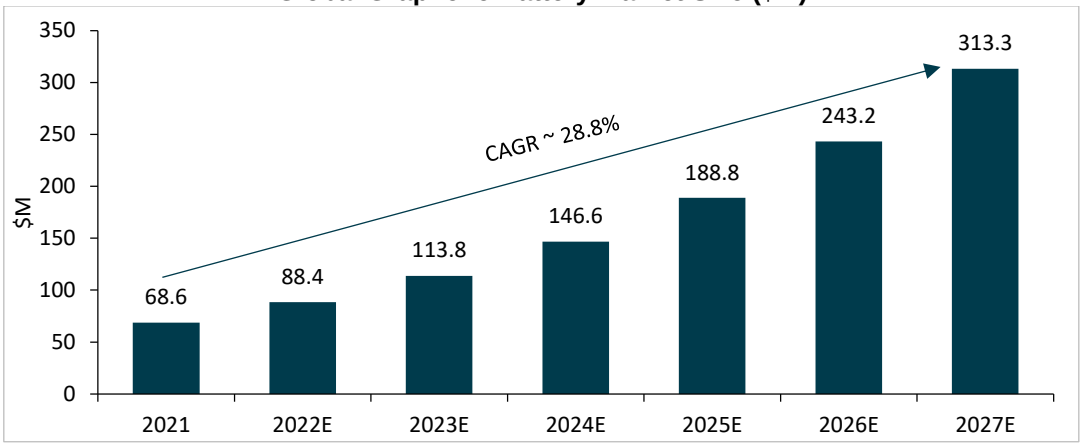


Source: Research Gate, Research in China.

Graphene also has applications for several other industries, including construction, transport, automotive parts, aerospace, conductive inks, coatings, plastics, membranes, sensors, surgical implants, and biomedical treatments.

Graphene is expected to play a significant role in the battery industry. The requirement for high power and high energy density batteries in renewable energy storage systems and the growing demand for electric vehicles globally are anticipated to drive the demand for graphene. According to the IMARC Group, global graphene battery market size was $68.6M in 2021 and is expected to reach $313.3M in 2027, at a six-year CAGR of 28.8%. An increasing number of photovoltaic installations, nuclear power plants, and wind energy projects, expanding off-grid installations in the U.S., India, China, and Germany are expected to further boost the graphene market growth.

Global Graphene Battery Market Size ($M)



Source: IMARC Group.

Stock Chart

Graphene Manufacturing Group's stock was at 52-week highs in December 2021, following the November 30, 2021, announcement of filing the patent application for its G+AI battery technology, but had since experienced substantial erosion. The stock was once again boosted following the collaboration agreement with Wood to engineer the graphene manufacturing projects. Despite a steady stream of positive developments, the stock has not reached its 52-week high levels since January 2022. Currently, the stock is trading at 52-week lows after raising C$5.7M in an equity transaction. In our opinion, investors could return once there is: (1) evidence of more sales traction of GMG's lubricant and coolant products; (2) further progress on pouch cells; and (3) more visibility on the fully automated manufacturing facility.

52-Week Performance—Stock Price and S&P 500 Index

Source: Google Finance as of December 2, 2022.

1. **December 9 and 22, 2021.** Commences graphene aluminium-ion battery pilot plant operations; Graphene aluminium-ion battery prototypes sent to customers for testing and evaluation
2. **March 1, 2022.** GMG and Wood agree collaboration arrangement for Wood to engineer and deliver major graphene manufacturing expansion projects; GMG technical advisory committee leadership team additions and CFO change
3. **April 1 and 27, 2022.** CVMP results 52% energy savings utilising Thermal-XR; announces investor relations agreements
4. **May 10 and 18, 2022.** GMG becomes member of the Thermal & Fluid Sciences Affiliates Program at Stanford University; GMG and Rio Tinto to explore the use and development of GMG's energy savings products and graphene aluminium-ion battery
5. **June 6, 15, and 23, 2022.** GMG technical advisory committee leadership team additions, and CFO change; commissions G+AI pouch cell equipment and manufactures the first pouch cell batteries; announces changes to board of directors
6. **July 18, 2022.** GMG strengthens its management team with the appointment of Frederick Kotzee as CFO
7. **August 15, 17, and 24, 2022.** GMG to acquire Thermal-XR manufacturing intellectual property and brand rights to set stage for global growth; GMG announces Phase 1 expansion project to graphene manufacturing facility for energy saving products and batteries; GMG board additions – directors and company secretary
8. **September 28, 2022.** GMG completes Thermal-XR acquisition
9. **October 11, 2022.** GMG provides progress and performance update on its G+AI Battery and the GMG battery grade graphene production quality program
10. **November 9, and November 30, 2022.** GMG initially announces C$5.0M transaction and eventually closes an upsized C$5.8M deal.

Latest Financials

F1Q23 results overview. GMG reported its F1Q23 results on November 25, 2022. The company posted total revenue of A$229K, compared to A$17K in year-ago quarter. Approximately A$143K of these revenues came from refundable R&D tax offset, recoverable from further assets qualifying for immediate tax write-off. Total operating expenses were A$2.9M, up from A$1.5M in F1Q22, but flat sequentially relative to F4Q22. Net loss during the quarter was A$3.6M or A$0.05 per share, compared to a net profit of A$$0.8M, or A$0.01 per share. The previous-year quarter included a A$2.4M positive impact from gain on change in fair value of warrants. At the end of the quarter, the company had A$8.4M in cash and no debt. Subsequent to the quarter end, the company raised approximately C$5.8M (A$6.3M) on November 30, 2022, in an equity offering.

Peers

GMG operates in an emerging, but competitive market, characterized by several domestic as well as international players. There is growing competition to produce graphene, as evidenced by 53,000-plus patent applications and involvement of 200-plus companies involved in the development of the technology. The company's key competitors include Hydrograph Clean Power (CNSX:HG; not rated), NanoXplore (NNXPF; not rated), Zentek (ZTEK; not rated), Graphite One (GPHOF; not rated), G6 Materials (GPHBF; not rated), First Graphene (FGPHF, not rated), Talga Resources Ltd. (ASX:TLG; not rated), Haydale Graphene Industries (HDGHF; not rated), and Elcora Advanced Materials (ECORF; not rated). Additionally, the company faces competition in the battery market from global battery players, including Samsung Electronics (SSNLF; not rated), Cabot Corporation (CBT; not rated), Hybrid Kinetic Group Ltd. (FESTF; not rated). In the energy saving solutions market the company's peers include ZEN Graphene Solutions Ltd. (ZENYF; not rated) and Graphene NanoChem LLC (GRPEF; not rated).

Valuation

Graphene Manufacturing Group currently generates revenue predominantly from the sale of graphene powder, TXR kits, and graphene mixed coolants and lubricants. The revenue also comprises government grants, subsidies, and R&D incentives received by the company for carrying out graphene-based research activities. During FY2022, total revenue from the sale of TXR kits and graphene mixed coolants and lubricants for trial purpose was approximately A$54K. But the bulk of the overall revenues was in the form of a A$1.4M refundable R&D tax offset. GMG is continuing its efforts towards commercialization of its coin and pouch cells with optimisation and testing is underway at the G+AI battery pilot plant. According to the company, next steps toward commercialization on this front include further engineering and development activities to achieve coin cell production capacity for initial customer sales. Subsequently, the company is planning to progress work on the pouch cell during 2023. According to the company, the pilot plant would need initial investment of A$200-300K for a partially automated facility, expected to be incurred during 2023, and approximately A$5M for a fully automated facility, expected to be completed during 2024.

During FY2020, FY2021, and FY2022, total revenues were A$1.3M, A$1.3M, and A$1.5M, respectively, mostly from grants and incentives. We are not projecting significant revenues during FY2023 and first half of FY2024; during this time, we expect the company to focus on development and optimization of coin cells, pouch cells, and the pilot plant. For FY2023, we are projecting approximately A$924K in total revenues, including: (1) less than A$500K in revenues from sale of TXR kits and graphene mixed coolants and lubricants, as well as from some initial coin cell sales for testing with customers; and (2) under A$500K from grants and incentives; this compares to A$1.2M, A$1.0M, and A$1.5M, received during the previous three years, respectively. We are projecting revenues to rise to A$2.4M during FY2024, with the incremental revenue coming from traction in sale of initial pouch cells and continued growth in the sales of TXR products.

Management has indicated that it plans to build three larger-scale battery production facilities with annual capacities of 250MWh/year, 1GWh/year, and 10GWh/year, expected to be operational during 2025, 2027, and 2028, respectively. The company believes that the cost of building a battery production facility would be around $70-75 (approximately A$105-115) per kWh of capacity. In addition, management expects the cost of the graphene manufacturing facility to be in the same range. For our model, we have conservatively assumed $80 (approximately A$120) per kWh of capacity, each for the battery production facility and the graphene manufacturing facility. Though we believe that these costs could be lower due to optimization and efficiencies realized between now and 2025-2028, we have conservatively assumed costs to be higher in those years, adjusted for inflation at 3.25% per year. The company expects to fund this using approximately 50% of debt and 50% of a combination of government incentives and company's equity. We are conservatively assuming the debt to fund 70% of the total cost, and have not included any government incentives or subsidies in our projections.

We are also being conservative in estimating the utilization of these plants at 55-70% of full capacity and have further applied risk-adjusted probabilities of success of 90%, 75%, and 30%, for the 250MWh, 1GWh, and 10GWh capacity plants, respectively (implying buildout capacities of 225MWh, 750MWh, and 3GWh, respectively). We are assuming sale prices of $350 (A$525) per kWh of battery capacity, much lower than the $1,000 (A$1,500) per kWh applications being targeted by the company.

Based on the above assumptions, we are projecting the company's revenues for FY2025 to be A$12.8M, and exceed A$500M in FY2028, and reach $2.0B in FY2032. The revenues could potentially be significantly higher if our abovementioned assumptions prove to be too conservative.

We are also being conservative in our gross margin estimates for the company. Based on the high value applications being targeted, the company expects overall gross margins to be over 70%. We are projecting these to ramp from just over 50% in FY2025 to just under 65% in FY2032.

We expect operating expenses to be A$10.7M during FY2023 and ramp up as the company builds out its production capacity. In later years, we expect the company to be able to extract operating leverage and lower its operating margins from nearly 40% of revenues in FY2026 to 11-13% of revenues in FY2030 and beyond.

To fund its operations and capacity buildout, we expect the company to raise total debt of A$1.0-1.2B at 10% interest rate, and issue total equity of over A$100M at A$2.50 per share, between FY2023 and FY2028.

We have used a DCF analysis to arrive at our valuation for the company. Our analysis suggests that the company's shares should be fairly valued at C$8.00 over the next twelve months. As with all DCF models, the results are highly sensitive to a wide range of input assumptions. For our analysis, these assumptions include:

- We have modeled cash flows up to FY2032. From FY2033 onwards, we have assumed free cash flows to grow at a stable 0.5% per year
- We are projecting the company's revenues to increase from A$0.9M in FY2023 to A$12.8M in FY2025, and expect to reach over A$2B in FY2032, at a seven-year CAGR of over 100%
- We expect increase in overall operating expenses from an estimated A$20.7M in FY2026 to A$230.8M in FY2032, at a seven-year CAGR of 41.2%
- We expect EBITDA to turn positive in FY2026 and rise from an estimated A$70.0M in FY2026 to A$1.3B in FY2032, at a six-year CAGR of approximately 62.4%
- Discount rate of approximately 18.7% derived using the company's weighted average cost of capital (WACC)
- An execution-risk haircut of 50%
- Currency exchange rate of A$1.00 = C$0.92

Discounted Cash Flow Analysis

		FY2023E	FY2024E	FY2025E	FY2026E	FY2027E	FY2028E	FY2029E	FY2030E	FY2031E	FY2032E	Terminal Value
Free Cashflow to the firm (A$'000)		(A$8,528)	(A$19,863)	(A$59,009)	A$10,521	(A$201,790)	(A$474,368)	A$781,753	A$848,404	A$891,441	A$1,002,744	A$4,680,164
Discount Rate (WACC)	**18.7%**	1.1	1.4	1.6	1.9	2.3	2.7	3.2	3.8	4.5	5.3	5.3
Discounted Cashflows (A$'000)		**(A$7,477)**	**(A$14,669)**	**(A$36,704)**	**A$5,512**	**(A$89,037)**	**(A$176,289)**	**A$244,692**	**A$223,662**	**A$197,934**	**A$187,524**	**A$875,244**
Long Term Growth Rate - G	**0.50%**											
Enterprise Value - EV (A$'000)	**A$1,410,392**											
Outstanding Debt (A$'000)	A$0											
Cash (A$'000)	A$13,689											
Market Value of the Firm	**A$1,424,080**											
No.of Outstanding Shares ('000)	81,792											
Fair Value Per Share (A$)	A$17.41											
Execution Risk Haircut	50.0%											
Fair Value Per Share (A$)	**A$8.71**											
Currency conversion rate(A$ to C$)	0.92											
Fair Value Per Share (C$)	**C$8.01**											

https://www.xe.com/currencyconverter/convert/?Amount=1&From=AUD&To=CAD

Notes: (1) Cash and Outstanding Shares reflect the financing closed on November 30, 2022; (2) Cash flows include the impact of capital investment timing and amounts.
Source: H.C. Wainwright and Co. estimates.

Sensitivity analysis. Below, we have shown the sensitivity of our fair value/share estimate to both the discount rate and the terminal free cash flow growth rate.

Sensitivity Analysis

		Terminal Growth Rate						
		0.17%	0.25%	0.35%	0.50%	0.55%	0.61%	0.67%
Discount Rate	13.7%	C$15.06	C$15.08	C$15.12	C$15.17	C$15.19	C$15.21	C$15.23
	15.2%	C$12.32	C$12.33	C$12.35	C$12.39	C$12.40	C$12.41	C$12.42
	16.9%	C$9.97	C$9.98	C$9.99	C$10.01	C$10.02	C$10.03	C$10.03
	18.7%	C$7.98	C$7.99	C$8.00	C$8.01	C$8.01	C$8.01	C$8.02
	19.5%	C$7.33	C$7.33	C$7.34	C$7.34	C$7.35	C$7.35	C$7.35
	20.3%	C$6.71	C$6.71	C$6.72	C$6.72	C$6.73	C$6.73	C$6.73
	21.1%	C$6.14	C$6.14	C$6.14	C$6.15	C$6.15	C$6.15	C$6.15

Source: H.C. Wainwright and Co. estimates.

Management

Name	Description
Craig Nicol Founder, MD, and CEO	• Craig Nicol founded Graphene Manufacturing Group in 2016. He has been serving as the Managing Director and CEO since the inception • Over two decades of experience in delivering large-scale innovation, including leading multi-billion-dollar gas and LNG value chains in Australia and the Asia Pacific and managing sales and marketing teams across the Asia Pacific working for Shell International • Member of the Australian Institute of Company Directors (AICD) and Chair of the Australian Graphene Industry Association (AGIA) • Holds an honors bachelor of engineering degree and a bachelor of marketing degree from the Queensland University of Technology
Frederick Kotzee CFO	• Mr. Kotzee joined the company as CFO in July 2022 • Over 20 years of experience in large, listed groups, in mining and industry, and South African and international merchant banks • Served as General Manager of Corporate Finance in the Anglo-American Group (LON:AAL; not rated), Head of Business Development at Anglo Platinum (ANGPY; not rated), and then Chief Financial Officer of Kumba Iron Ore Limited (KIROY; not rated) • Worked in Kidman Resources Limited, an Australia-listed lithium project developer, where he successfully secured financing and offtake agreements with large battery purchasing companies as well as supported the company's ultimate acquisition by Wesfarmers Limited (WFAFY; not rated) for more than $750M • Chartered accountant and lawyer; holds a bachelor of commerce degree from the University of Pretoria/University van Pretoria
Jeff Morris Chief Technology & Projects Officer	• Mr. Morris joined the company in August 2021 as a process engineer and is currently serving as a CTO since February 2022 • Over 25 years of experience in engineering and project management working in the oil and gas, mining, water treatment, and renewable energy industries, such as Wood, Siecap, Origin Energy (OGFGF; not rated), Westside Corporation Limited, and Queensland Gas Company • Specializes in construction, commissioning, energy management, and business development • Master's degree in Executive Business from the Queensland University of Technology; Diploma in project management from the University of New England; and Bachelor's in chemical engineering from The University of Queensland
Sheena Ward COO	• Sheena Ward has been serving as the Chief Operating Officer of the company since May 2021 • Served as HSEQ Manager since October 2020 and developed and implemented HSEQ management systems for its manufacturing facility; identified UN 17 sustainable development goals (SDGs) in business practices • Over 15 years of HSEQ major and hazardous operations, regulatory, and supply management experience, having advised companies in manufacturing, chemical, mining, heavy vehicle, transport, and logistics industries • Successfully implemented HSEQ systems and improvements at Toll mining services, Dyno Nobel, and Incitec Pivot Limited (ICPVF; not rated) • Diploma in international business and SAI Global Assurance Auditor Certification
Dr. Ashok Kumar Nanjundan Chief Scientific Officer	• Dr. Nanjundan has been with GMG since 2019 and currently serves as a chief scientific officer. • Responsibility includes commercializing graphene for post-lithium-ion battery technologies, automotive fluids, and fuels, securing academia and government liaison and grants, and covering patents • Possesses understanding of carbon-based nanostructured materials and polymers, organic and polymer synthesis, surface science, thin films, and materials electrochemistry to create emerging energy, composite, and coating applications • Holds adjunct professor positions at the University of Queensland and Queensland University of Technology • Has published over 100 journal articles in high-impact peer-reviewed journals and has been cited more than 5,000 times • Holds a master's degree in science from Bharathiar University and has received a doctorate in materials engineering from the Pukyong National University

Risks

Dilution risk. The company is in the early stage of commercializing its graphene-based products and is yet to record its first substantial sales. As a part of its business plan, the company intends to continue to upgrade its technology, scale up its plant capacity, and acquire complementary business to diversify its market potential. GMG funds its project investments through equity financing and also grants, subsidies, and R&D incentives. Though the company has adequate liquidity to fund its current operations, we believe the company is likely to require additional capital with further portfolio expansion that may come in the form of dilutive equity.

Market risk. The industry in which GMG operates is characterized by evolving technology, driven by changes in customer demand and industry trends, efforts to lower costs, and need to improve product performance. Any failure or delay in adopting enhanced technologies could adversely affect the company's competitive edge and business plans.

Commercialization risk. GMG has spent more than five years developing its technology and supply lines, culminating in the commissioning of its current graphene manufacturing facility. The current production plant has the advantage of low-cost manufacturing, and its CapEx requirements have already been fulfilled. However, there remains commercialization risk associated with its existing product lines as they still need to prove its value proposition to the customers.

Competition risk. The company operates in a highly competitive industry. With technological advancements and rising investments in R&D activities, the competition should be expected to intensify. Such intense competition could negatively impact the company's commercialization and pricing strategies. Moreover, some of its peers have greater sales, assets, and financial resources. To remain competitive, the company is required to continuously invest in technology, marketing, and customer service & support. Failure or delay in making the necessary investments due to a shortage of resources may affect the competitive positioning of GMG.

Regulatory risk. The company is in the young and evolving graphene-based product industry that is characterized by the lack of proper standards, mass-production issues, unsuccessful practical applications, improper market rules and regulations, and price transparency. These issues raise concerns over the development of the graphene market. Governments around the world have implemented a few standards and established bodies to regulate the overall mechanism of the market, but it is likely to require more effort and time to properly regulate the market. The absence of unified regulation and proper guidelines can lead to a lack of trust and transparency, deterring major corporates from entering the market. This could have a negative impact on market growth and consequently on the business operations and growth prospects of the company.

IP Risk. GMG has its trademark registered and protected in Australia. Apart from that, it has also filed a patent application for G+AI battery technology globally. But the risk of securing the patents and protecting its trademark in other countries persists. The company is working on the IP protection of its technology and related products but runs the risk of being overtaken by breakthroughs in technological know-how.

Lingering business uncertainty due to the COVID-19 pandemic. The company experienced an unanticipated interruption in customer trials and potential sales following the unprecedented restrictions imposed due to COVID-19. The lockdown led to delays in TXR demonstration projects and graphene lubricant testing, resulting in slowed-down commercialization plans. If the pandemic persists, the company's mid-to-long-term business plans could also be adversely affected.

GMG Income Statement (A$'000)			FY2022A					FY2023E												
Particulars	FY2020A	FY2021A	Sept '21A	Dec '21A	Mar '22A	Jun '22A	FY2022A	Sept '22A	Dec '22E	Mar '23E	Jun '23E	FY2023E	FY2024E	FY2025E	FY2026E	FY2027E	FY2028E	FY2029E	FY2030E	FY2031E	FY2032E
Revenue	111	246	13	15	9	17	54	86	79	107	175	447	1,414	11,387	79,224	141,658	511,181	1,418,203	1,617,313	1,820,735	2,037,922
Revenue Growth Y/Y (%)	*NA*	*122.5%*	*(74.1%)*	*(66.0%)*	*(92.0%)*	*(54.5%)*	*(77.9%)*	*559.7%*	*427.0%*	*1077.0%*	*914.7%*	*722.0%*	*216.0%*	*705.3%*	*595.7%*	*78.8%*	*260.9%*	*177.4%*	*14.0%*	*12.6%*	*11.9%*
Revenue Growth Q/Q (%)			*(65.7%)*	*15.6%*	*(39.6%)*	*90.2%*		*397.2%*	*(7.7%)*	*34.8%*	*63.9%*										
Other Income Including Subsidies, Grants, and Incentives	1,215	1,013	4	39	6	1,412	1,462	143	107	111	116	477	953	1,430	2,145	2,681	3,217	3,539	3,893	4,282	4,710
Other Income Growth Y/Y (%)	*NA*	*(16.6%)*	*(97.5%)*	*(19.7%)*	*796.6%*	*76.9%*	*44.3%*	*3389.2%*	*173.3%*	*1746.6%*	*(91.8%)*	*(67.4%)*	*100.0%*	*50.0%*	*50.0%*	*25.0%*	*20.0%*	*10.0%*	*10.0%*	*10.0%*	*10.0%*
Other Income Growth Q/Q (%)			*(99.5%)*	*857.6%*	*(84.6%)*	*NMF*		*(89.9%)*	*(25.0%)*	*4.0%*	*4.0%*										
Total Revenue	**1,325**	**1,259**	**17**	**54**	**15**	**1,430**	**1,516**	**229**	**186**	**218**	**291**	**924**	**2,367**	**12,817**	**81,369**	**144,339**	**514,398**	**1,421,742**	**1,621,206**	**1,825,017**	**2,042,632**
Total Revenue Growth Y/Y (%)	*NA*	*(5.0%)*	*(92.1%)*	*(41.7%)*	*(86.8%)*	*70.9%*	*20.4%*	*1235.8%*	*243.7%*	*1344.0%*	*(79.6%)*	*(39.0%)*	*156.2%*	*441.5%*	*534.9%*	*77.4%*	*256.4%*	*176.4%*	*14.0%*	*12.6%*	*11.9%*
Total Revenue Growth Q/Q (%)			*(98.0%)*	*216.8%*	*(72.1%)*	*9361.4%*		*(84.0%)*	*(18.5%)*	*17.1%*	*33.4%*										
Raw Materials & Production Inputs	13	45	8	16	4	7	35	25	52	69	114	260	707	4,555	23,767	38,956	139,297	382,915	428,588	473,391	519,670
% of Revenue	*11.5%*	*18.1%*	*64.5%*	*105.2%*	*48.7%*	*38.2%*	*64.8%*	*29.3%*	*65.0%*	*65.0%*	*65.0%*	*58.2%*	*50.0%*	*40.0%*	*30.0%*	*27.5%*	*27.3%*	*27.0%*	*26.5%*	*26.0%*	*25.5%*
Factory Costs	145	145	36	53	81	106	276	99	87	107	167	460	990	1,708	9,903	14,166	51,118	141,820	161,731	182,074	203,792
% of Revenue	*131.1%*	*58.9%*	*276.7%*	*353.0%*	*892.5%*	*611.8%*	*506.9%*	*115.8%*	*110.0%*	*100.0%*	*95.0%*	*102.8%*	*70.0%*	*15.0%*	*12.5%*	*10.0%*	*10.0%*	*10.0%*	*10.0%*	*10.0%*	*10.0%*
Gross Profit / (Loss)	**1,167**	**1,070**	**(27)**	**(15)**	**(70)**	**1,317**	**1,205**	**104**	**47**	**42**	**11**	**204**	**670**	**6,554**	**47,699**	**91,217**	**323,983**	**897,007**	**1,030,886**	**1,169,552**	**1,319,170**
Gross Margin (%)	*88.1%*	*84.9%*	*(159.6%)*	*(27.2%)*	*(465.9%)*	*92.1%*	*79.5%*	*45.5%*	*25.5%*	*19.1%*	*3.6%*	*22.0%*	*28.3%*	*51.1%*	*58.6%*	*63.2%*	*63.0%*	*63.1%*	*63.6%*	*64.1%*	*64.6%*
Gross Profit Growth Y/Y (%)	*NA*	*(8.4%)*	*NA*	*NA*	*NA*	*71.5%*	*12.6%*	*NA*	*NA*	*NA*	*(99.2%)*	*(83.1%)*	*229.1%*	*877.7%*	*627.8%*	*91.2%*	*255.2%*	*176.9%*	*14.9%*	*13.5%*	*12.8%*
Gross Profit Growth Q/Q (%)			*NA*	*NA*	*NA*	*NA*		*(92.1%)*	*(54.3%)*	*(12.1%)*	*(74.8%)*										
Operating Expenses:																					
Depreciation & Amortization	395	263	36	71	109	135	351	217	211	218	240	887	1,760	6,397	11,968	33,879	112,252	173,394	179,860	187,183	195,402
% of Revenue	*29.8%*	*20.9%*	*211.9%*	*131.0%*	*720.9%*	*9.4%*	*23.1%*	*95.2%*	*113.5%*	*99.9%*	*82.6%*	*96.0%*	*74.4%*	*49.9%*	*14.7%*	*23.5%*	*21.8%*	*12.2%*	*11.1%*	*10.3%*	*9.6%*
Growth (y-y)	*NA*	*(33.5%)*	*(20.2%)*	*32.0%*	*68.7%*	*36.1%*	*33.5%*	*499.8%*	*197.7%*	*100.0%*	*78.7%*	*153.0%*	*98.4%*	*263.4%*	*87.1%*	*183.1%*	*231.3%*	*54.5%*	*3.7%*	*4.1%*	*4.4%*
Growth (q-q)			*(63.3%)*	*95.9%*	*53.4%*	*23.5%*		*61.6%*	*(2.8%)*	*3.1%*	*10.4%*										
Professional & Consulting Fees	551	1,380	410	502	334	593	1,838	433	487	502	517	1,939	2,075	2,210	2,348	2,489	2,632	2,777	2,929	3,090	3,260
% of Revenue	*41.5%*	*109.6%*	*2398.4%*	*925.5%*	*2210.8%*	*41.5%*	*121.3%*	*189.5%*	*261.6%*	*230.0%*	*177.6%*	*209.9%*	*87.7%*	*17.2%*	*2.9%*	*1.7%*	*0.5%*	*0.2%*	*0.2%*	*0.2%*	*0.2%*
Growth (y-y)	*NA*	*150.6%*	*99.7%*	*242.7%*	*0.2%*	*(14.7%)*	*33.2%*	*5.6%*	*(2.9%)*	*50.2%*	*(12.8%)*	*5.5%*	*7.0%*	*6.5%*	*6.3%*	*6.0%*	*5.8%*	*5.5%*	*5.5%*	*5.5%*	*5.5%*
Growth (q-q)			*(41.0%)*	*22.2%*	*(33.4%)*	*77.4%*		*(26.9%)*	*12.5%*	*3.0%*	*3.0%*										
Travel Expenses	124	7	1	14	6	60	81	78	80	81	83	322	330	338	347	355	364	373	383	392	402
% of Revenue	*9.4%*	*0.6%*	*5.3%*	*26.2%*	*39.9%*	*4.2%*	*5.4%*	*34.2%*	*42.8%*	*37.2%*	*28.5%*	*34.8%*	*13.9%*	*2.6%*	*0.4%*	*0.2%*	*0.1%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*
Growth (y-y)	*NA*	*(94.3%)*	*NA*	*641.1%*	*684.8%*	*1273.0%*	*1050.6%*	*8474.6%*	*460.9%*	*1246.7%*	*37.6%*	*295.6%*	*2.5%*	*2.5%*	*2.5%*	*2.5%*	*2.5%*	*2.5%*	*2.5%*	*2.5%*	*2.5%*
Growth (q-q)			*(79.2%)*	*1459.4%*	*(57.5%)*	*898.0%*		*29.7%*	*2.0%*	*2.0%*	*2.0%*										
Occupancy and utilities Expenses	91	154	37	44	59	66	206	84	86	87	89	346	354	363	372	381	391	401	411	421	432
% of Revenue	*6.8%*	*12.2%*	*218.9%*	*81.9%*	*390.3%*	*4.6%*	*13.6%*	*36.7%*	*45.9%*	*40.0%*	*30.6%*	*37.4%*	*15.0%*	*2.8%*	*0.5%*	*0.3%*	*0.1%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*
Growth (y-y)	*NA*	*69.7%*	*48.0%*	*19.4%*	*55.1%*	*22.8%*	*34.1%*	*123.9%*	*92.6%*	*47.9%*	*35.7%*	*67.4%*	*2.5%*	*2.5%*	*2.5%*	*2.5%*	*2.5%*	*2.5%*	*2.5%*	*2.5%*	*2.5%*
Growth (q-q)			*(29.9%)*	*18.6%*	*32.8%*	*11.2%*		*27.8%*	*2.0%*	*2.0%*	*2.0%*										
Employee Benefit Expenses	1,797	2,576	896	933	878	1,700	4,408	1,567	1,288	1,042	1,063	4,960	5,735	8,266	12,687	13,669	17,174	20,203	21,415	22,700	24,062
% of Revenue	*135.6%*	*204.6%*	*5237.8%*	*1721.7%*	*5812.8%*	*118.9%*	*290.8%*	*685.6%*	*691.7%*	*477.5%*	*365.2%*	*536.8%*	*242.3%*	*64.5%*	*15.6%*	*9.5%*	*3.3%*	*1.4%*	*1.3%*	*1.2%*	*1.2%*
Growth (y-y)	*NA*	*43.4%*	*78.5%*	*44.8%*	*33.6%*	*120.0%*	*71.1%*	*74.8%*	*38.1%*	*18.6%*	*(37.5%)*	*12.5%*	*15.6%*	*44.1%*	*53.5%*	*7.7%*	*25.6%*	*17.6%*	*6.0%*	*6.0%*	*6.0%*
Growth (q-q)			*16.0%*	*4.1%*	*(5.9%)*	*93.6%*		*(7.9%)*	*(17.8%)*	*(19.1%)*	*2.0%*										
Share Based Compensation	102	108	45	295	273	250	864	279	280	281	283	1,123	1,298	1,871	2,872	3,101	3,896	4,584	4,950	5,346	5,774
% of Revenue	*7.7%*	*8.6%*	*262.4%*	*544.7%*	*1809.9%*	*17.5%*	*57.0%*	*121.9%*	*150.3%*	*128.9%*	*97.2%*	*121.5%*	*54.8%*	*14.6%*	*3.5%*	*2.1%*	*0.8%*	*0.3%*	*0.3%*	*0.3%*	*0.3%*
Growth (y-y)	*NA*	*6.3%*	*258.5%*	*885.7%*	*1982.8%*	*378.7%*	*700.6%*	*520.4%*	*(5.2%)*	*2.9%*	*12.9%*	*29.9%*	*15.6%*	*44.1%*	*53.5%*	*8.0%*	*25.6%*	*17.6%*	*8.0%*	*8.0%*	*8.0%*
Growth (q-q)			*(14.2%)*	*557.4%*	*(7.4%)*	*(8.4%)*		*11.2%*	*0.5%*	*0.5%*	*0.5%*										
Other Expenses	173	4,669	103	180	150	172	604	283	286	289	292	1,151	1,180	1,209	1,239	1,270	1,302	1,335	1,368	1,402	1,437
% of Revenue	*13.1%*	*370.7%*	*604.1%*	*331.3%*	*990.3%*	*12.0%*	*39.9%*	*124.0%*	*153.7%*	*132.5%*	*100.4%*	*124.6%*	*49.8%*	*9.4%*	*1.5%*	*0.9%*	*0.3%*	*0.1%*	*0.1%*	*0.1%*	*0.1%*
Growth (y-y)	*NA*	*2595.3%*	*79.0%*	*208.7%*	*63.7%*	*(96.1%)*	*(87.1%)*	*174.3%*	*59.4%*	*93.3%*	*70.0%*	*90.4%*	*2.5%*	*2.5%*	*2.5%*	*2.5%*	*2.5%*	*2.5%*	*2.5%*	*2.5%*	*2.5%*
Growth (q-q)			*(97.7%)*	*73.7%*	*(16.7%)*	*14.8%*		*65.0%*	*1.0%*	*1.0%*	*1.0%*										
Total operating expenses	**3,233**	**9,157**	**1,529**	**2,039**	**1,809**	**2,976**	**8,353**	**2,941**	**2,719**	**2,501**	**2,567**	**10,727**	**12,732**	**20,654**	**31,833**	**55,146**	**138,011**	**203,066**	**211,317**	**220,536**	**230,770**
% of Revenue	*243.9%*	*727.1%*	*8938.8%*	*3762.3%*	*11974.7%*	*208.2%*	*551.0%*	*1287.1%*	*1459.3%*	*1146.1%*	*882.1%*	*1161.0%*	*537.8%*	*161.1%*	*39.1%*	*38.2%*	*26.8%*	*14.3%*	*13.0%*	*12.1%*	*11.3%*
Profit / (Loss) from operations (EBIT)	**(2,065)**	**(8,087)**	**(1,557)**	**(2,054)**	**(1,880)**	**(1,658)**	**(7,148)**	**(2,837)**	**(2,671)**	**(2,459)**	**(2,556)**	**(10,524)**	**(12,061)**	**(14,100)**	**15,865**	**36,071**	**185,972**	**693,941**	**819,570**	**949,016**	**1,088,400**
EBIT Margin (%)	*(155.8%)*	*(642.2%)*	*(9098.5%)*	*(3789.5%)*	*(12440.6%)*	*(116.0%)*	*(471.5%)*	*(1241.6%)*	*(1433.8%)*	*(1127.0%)*	*(878.5%)*	*(1138.9%)*	*(509.5%)*	*(110.0%)*	*19.5%*	*25.0%*	*36.2%*	*48.8%*	*50.6%*	*52.0%*	*53.3%*
EBIT Growth Y/Y (%)	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*127.4%*	*415.6%*	*273.1%*	*18.1%*	*15.8%*	*14.7%*
EBIT Growth Q/Q (%)			*NA*	*NA*	*NA*	*NA*		*NA*	*NA*	*NA*	*NA*										
Total depreciation and amortization	395	263	36	71	109	135	351	217	211	218	240	887	1,760	6,397	11,968	33,879	112,252	173,394	179,860	187,183	195,402
Adjusted EBITDA	**(1,670)**	**(7,824)**	**(1,520)**	**(1,983)**	**(1,771)**	**(1,524)**	**(6,798)**	**(2,620)**	**(2,460)**	**(2,241)**	**(2,316)**	**(9,636)**	**(10,301)**	**(7,703)**	**27,834**	**69,951**	**298,224**	**867,335**	**999,430**	**1,136,200**	**1,283,802**
EBITDA Margin (%)	*(126.0%)*	*(621.3%)*	*(8886.6%)*	*(3658.5%)*	*(11719.8%)*	*(106.6%)*	*(448.4%)*	*(1146.4%)*	*(1320.3%)*	*(1027.1%)*	*(795.8%)*	*(1042.9%)*	*(435.2%)*	*(60.1%)*	*34.2%*	*48.5%*	*58.0%*	*61.0%*	*61.6%*	*62.3%*	*62.9%*
EBITDA Growth Y/Y (%)	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*151.3%*	*326.3%*	*190.8%*	*15.2%*	*13.7%*	*13.0%*
EBITDA Growth Q/Q (%)			*NA*	*NA*	*NA*	*NA*		*NA*	*NA*	*NA*	*NA*										
Gain/(Loss) on Change in Fair Value of Warrants	-	-	2,403	(14,190)	3,777	3,452	(4,559)	(693)	-	-	-	(693)	-	-	-	-	-	-	-	-	-
Finance Costs	(2)	(23)	(5)	(8)	(20)	(29)	(63)	(28)	-	-	-	(28)	-	-	-	-	-	-	-	-	-
Foreign exchange adjustments	-	-	-	-	-	0	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Interest expense	-	-	-	-	-	-	-	-	-	(2)	(12)	(14)	(419)	(2,568)	(5,074)	(15,076)	(50,996)	(67,609)	(47,609)	(27,609)	(12,609)
Other income (expense), net	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total other income (expense), net	**(2)**	**(23)**	**2,397**	**(14,198)**	**3,757**	**3,423**	**(4,622)**	**(721)**	**-**	**(2)**	**(12)**	**(735)**	**(419)**	**(2,568)**	**(5,074)**	**(15,076)**	**(50,996)**	**(67,609)**	**(47,609)**	**(27,609)**	**(12,609)**
Profit / (Loss) before taxes	**(2,067)**	**(8,110)**	**841**	**(16,252)**	**1,877**	**1,764**	**(11,770)**	**(3,559)**	**(2,671)**	**(2,461)**	**(2,569)**	**(11,259)**	**(12,480)**	**(16,667)**	**10,791**	**20,996**	**134,975**	**626,331**	**771,960**	**921,407**	**1,075,791**
Income tax expense	-	-	-	-	-	-	-	-	-	-	-	-	-	-	(2,158)	(4,199)	(26,995)	(125,266)	(154,392)	(184,281)	(215,158)
Consolidated Net Profit / (loss)	**(2,067)**	**(8,110)**	**841**	**(16,252)**	**1,877**	**1,764**	**(11,770)**	**(3,559)**	**(2,671)**	**(2,461)**	**(2,569)**	**(11,259)**	**(12,480)**	**(16,667)**	**8,633**	**16,797**	**107,980**	**501,065**	**617,568**	**737,126**	**860,633**
Profit Margin (%)	*(156.0%)*	*(644.0%)*	*4914.0%*	*(29988.3%)*	*12424.2%*	*123.4%*	*(776.4%)*	*(1557.2%)*	*(1433.8%)*	*(1127.8%)*	*(882.7%)*	*(1218.5%)*	*(527.2%)*	*(130.0%)*	*10.6%*	*11.6%*	*21.0%*	*35.2%*	*38.1%*	*40.4%*	*42.1%*
Profit Growth Y/Y (%)	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*94.6%*	*542.9%*	*364.0%*	*23.3%*	*19.4%*	*16.8%*
Profit Growth Q/Q (%)			*NA*	*NA*	*NA*	*(6.0%)*		*NA*	*NA*	*NA*	*NA*										
Basic and diluted Income (loss) per share (A$	**(0.04)**	**(0.13)**	**0.01**	**(0.21)**	**0.02**	**0.02**	**(0.15)**	**(0.05)**	**(0.03)**	**(0.03)**	**(0.03)**	**(0.14)**	**(0.14)**	**(0.17)**	**0.08**	**0.15**	**0.83**	**3.86**	**4.76**	**5.68**	**6.64**
Basic and diluted weighted number of outsta	**53,444**	**60,535**	**71,536**	**76,585**	**77,704**	**78,318**	**76,036**	**78,916**	**83,884**	**83,884**	**83,884**	**82,642**	**88,884**	**98,884**	**106,702**	**109,702**	**129,702**	**129,702**	**129,702**	**129,702**	**129,702**
Basic weighted number of outstanding shares	53,444	60,535	71,536	76,585	77,704	78,318	76,036	78,916	83,884	83,884	83,884	82,642	88,884	98,884	98,884	101,884	121,884	121,884	121,884	121,884	121,884
Diluted weighted number of outstanding shar	53,444	60,535	71,536	76,585	77,704	78,318	76,036	86,735	91,702	91,702	91,702	90,460	96,702	106,702	106,702	109,702	129,702	129,702	129,702	129,702	129,702

Source: H. C. Wainwright & Co. estimates.

GMG Balance Sheet (A$'000)			FY2022A					FY2023E												
Particulars	FY2020A	FY2021A	Sept '21A	Dec '21A	Mar '22A	Jun '22A	FY2022A	Sept '22A	Dec '22E	Mar '23E	Jun '23E	FY2023E	FY2024E	FY2025E	FY2026E	FY2027E	FY2028E	FY2029E	FY2030E	FY2031E	FY2032E
Assets																					
Current assets																					
Cash and cash equivalents	659	3,359	14,112	15,117	14,169	12,258	12,258	8,406	13,689	11,677	9,358	9,358	9,577	11,138	34,340	17,245	88,236	620,485	1,235,753	1,910,452	2,808,883
Other Current Assets																					
Amounts receivable and Prepaid	36	56	52	76	292	143	143	303	31	36	48	48	97	527	3,344	5,932	21,140	58,428	66,625	75,001	83,944
Inventory, net	6	336	364	358	355	350	350	334	61	72	96	96	195	1,053	6,688	11,863	42,279	116,856	66,625	75,001	83,944
Research and Developmet Grants Receivable	934	736	736	-	-	1,412	1,412	1,554	-	-	-	-	-	-	-	-	-	-	-	-	-
Other current assets	9	184	151	193	289	318	318	369	10	12	16	16	32	176	1,115	1,977	7,047	19,476	22,208	25,000	27,981
Total current assets	**1,643**	**4,671**	**15,415**	**15,744**	**15,105**	**14,481**	**14,481**	**10,967**	**13,791**	**11,797**	**9,517**	**9,517**	**9,901**	**12,894**	**45,486**	**37,018**	**158,701**	**815,244**	**1,391,211**	**2,085,454**	**3,004,752**
Property, Plant and Equipment	228	225	302	1,647	1,852	2,162	2,162	2,936	2,909	2,935	3,738	3,738	11,735	57,362	65,620	298,570	948,982	781,995	615,009	448,022	281,036
Intangible Assets	31	49	47	46	45	33	33	1,984	1,944	1,905	1,866	1,866	1,803	2,231	5,885	12,209	35,635	100,315	168,501	239,555	313,271
Total Non Current Assets	**259**	**274**	**349**	**1,693**	**1,896**	**2,195**	**2,195**	**4,921**	**4,853**	**4,839**	**5,605**	**5,605**	**13,538**	**59,593**	**71,505**	**310,779**	**984,617**	**882,310**	**783,510**	**687,578**	**594,307**
Total Assets	**1,903**	**4,944**	**15,764**	**17,438**	**17,001**	**16,676**	**16,676**	**15,887**	**18,644**	**16,636**	**15,122**	**15,122**	**23,439**	**72,486**	**116,992**	**347,796**	**1,143,318**	**1,697,555**	**2,174,721**	**2,773,032**	**3,599,059**
Liabilities																					
Current liabilities																					
Trade and Other Payables	176	539	520	369	316	804	804	1,291	184	215	287	287	584	3,160	22,293	39,545	140,931	389,518	444,166	500,005	559,625
Lease Liabilities	-	-	-	126	130	137	137	249	249	249	249	249	249	249	249	249	249	249	249	249	249
Financial Liabilities	-	2,189	3,420	13,090	8,253	4,410	4,410	4,744	4,744	4,744	4,744	4,744	4,744	4,744	4,744	4,744	4,744	4,744	4,744	4,744	4,744
Employee Benefit Liabilities	42	162	191	178	177	207	207	250	250	250	250	250	250	250	250	250	250	250	250	250	250
Provisions	-	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
Short Term Debt	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Current Liabilities	**218**	**2,910**	**4,151**	**13,783**	**8,896**	**5,578**	**5,578**	**6,554**	**5,446**	**5,478**	**5,550**	**5,550**	**5,846**	**8,423**	**27,555**	**44,808**	**146,194**	**394,781**	**449,429**	**505,267**	**564,888**
Lease Liabilities	-	-	-	957	922	898	898	1,239	1,239	1,239	1,239	1,239	1,239	1,239	1,239	1,239	1,239	1,239	1,239	1,239	1,239
Provisions	-	-	-	100	100	100	100	200	200	200	200	200	200	200	200	200	200	200	200	200	200
Other non-current Liabilities	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Long term Debt	-	-	-	-	-	-	-	-	-	140	840	840	7,543	43,810	57,679	243,834	776,093	576,093	376,093	176,093	76,093
Total Liabilities	**218**	**2,910**	**4,151**	**14,840**	**9,918**	**6,576**	**6,576**	**7,993**	**6,886**	**7,057**	**7,829**	**7,829**	**14,829**	**53,672**	**86,674**	**290,081**	**923,726**	**972,313**	**826,961**	**682,800**	**642,420**
Shareholders' Equity																					
Common stock - Share Capital (including Warrant Premium)																					
Opening	-	5,769	13,851	22,352	29,072	31,405	13,851	32,407	33,481	40,016	40,297	32,407	40,580	54,378	81,249	84,120	94,722	148,618	153,202	158,152	163,498
Additional Capital	-	8,083	8,500	6,721	2,332	1,002	18,555	1,074	6,535	281	283	8,173	13,798	26,871	2,872	10,601	53,896	4,584	4,950	5,346	5,774
Closing	5,769	13,851	22,352	29,072	31,405	32,407	32,407	33,481	40,016	40,297	40,580	40,580	54,378	81,249	84,120	94,722	148,618	153,202	158,152	163,498	169,272
Special Warrant Subscriptions	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Reserves	186	563	760	1,276	1,552	1,803	1,803	2,081	2,081	2,081	2,081	2,081	2,081	2,081	2,081	2,081	2,081	2,081	2,081	2,081	2,081
Accumulated losses	(4,270)	(12,381)	(11,499)	(27,751)	(25,874)	(24,110)	(24,110)	(27,668)	######	(32,800)	(35,368)	(35,368)	(47,849)	(64,516)	(55,884)	(39,087)	68,893	569,958	1,187,527	1,924,652	2,785,285
Total Stockholders' Deficit / Equity	**1,685**	**2,034**	**11,613**	**2,598**	**7,083**	**10,100**	**10,100**	**7,894**	**11,758**	**9,579**	**7,293**	**7,293**	**8,610**	**18,814**	**30,318**	**57,716**	**219,593**	**725,241**	**1,347,760**	**2,090,232**	**2,956,639**
Total Liabilities	**1,903**	**4,944**	**15,764**	**17,438**	**17,001**	**16,676**	**16,676**	**15,887**	**18,644**	**16,636**	**15,122**	**15,122**	**23,439**	**72,486**	**116,992**	**347,796**	**1,143,318**	**1,697,555**	**2,174,721**	**2,773,032**	**3,599,059**

Source: H. C. Wainwright & Co. estimates.

GMG Cash Flow Statement (A$'000)			FY2022A					FY2023E												
Particulars	FY2020A	FY2021A	Sept '21A	Dec '21A	Mar '22A	Jun '22A	FY2022A	Sept '22A	Dec '22E	Mar '23E	Jun '23E	FY2023E	FY2024E	FY2025E	FY2026E	FY2027E	FY2028E	FY2029E	FY2030E	FY2031E	FY2032E
Cashflow from Operating Activities																					
Net Profit(Loss)		-	-	-	-	-	-	-	(2,671)	(2,461)	(2,569)	(7,700)	(12,480)	(16,667)	8,633	16,797	107,980	501,065	617,568	737,126	860,633
Add/Less: Adjustment Factor		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
														-							
Receipts from Cutomers and Government Subsidies	401	546	28	37	26	(4)	87	108	-	-	-	108	-	-	-	-	-	-	-	-	-
Payment to Suppliers and Employees	(3,365)	(4,808)	(1,519)	(1,923)	(1,674)	(2,241)	(7,356)	(2,766)	-	-	-	(2,766)	-	-	-	-	-	-	-	-	-
Research & Development Tax Incentive Received	802	911	-	736	-	0	736	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Interest Received/(Paid)	(1)	2	1	(5)	(16)	(15)	(36)	(18)	-	-	-	(18)	-	-	-	-	-	-	-	-	-
Adjustments to reconcile net income (loss) to net cash used in operating activities																					
Unrealized Foreign Exchange Loss	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ammortization	-	-	-	-	-	-	-	-	211	218	240	670	1,760	6,397	11,968	33,879	112,252	173,394	179,860	187,183	195,402
Stock based compensation	-	-	-	-	-	-	-	-	280	281	283	844	1,298	1,871	2,872	3,101	3,896	4,584	4,950	5,346	5,774
Revaluation of warrant liability	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Change in operating assets and liabilities:																					
Accounts receivable and other receivables	-	-	-	-	-	-	-	-	272	(5)	(12)	255	(49)	(429)	(2,817)	(2,588)	(15,208)	(37,288)	(8,197)	(8,376)	(8,943)
Inventory	-	-	-	-	-	-	-	-	273	(10)	(24)	239	(99)	(859)	(5,634)	(5,176)	(30,416)	(74,576)	50,231	(8,376)	(8,943)
Research and Developmet Grants Receivabl	-	-	-	-	-	-	-	-	1,554	-	-	1,554	-	-	-	-	-	-	-	-	-
Other current assets	-	-	-	-	-	-	-	-	359	(2)	(4)	353	(16)	(143)	(939)	(863)	(5,069)	(12,429)	(2,732)	(2,792)	(2,981)
Accounts payable and accrued liabilities	-	-	-	-	-	-	-	-	(1,107)	31	72	(1,004)	297	2,577	19,132	17,252	101,386	248,587	54,648	55,839	59,621
Other Current Liabilities	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Net cash used in operating activities	**(2,162)**	**(3,349)**	**(1,490)**	**(1,156)**	**(1,664)**	**(2,259)**	**(6,568)**	**(2,676)**	**(829)**	**(1,947)**	**(2,013)**	**(7,466)**	**(9,290)**	**(7,255)**	**33,214**	**62,403**	**274,821**	**803,336**	**896,328**	**965,951**	**1,100,562**
Cashflow from Investing Activities																					
Acquisition of Property, Plant, & Equipment	(133)	(256)	(112)	(207)	(312)	(436)	(1,066)	(315)	(140)	(200)	(1,000)	(1,655)	(9,576)	(51,810)	(19,813)	(265,935)	(760,371)	-	-	-	-
Acquisition of Intangibles	(23)	(21)	-	-	-	(14)	(14)	(1,007)	(4)	(4)	(6)	(1,021)	(118)	(641)	(4,068)	(7,217)	(25,720)	(71,087)	(81,060)	(91,251)	(102,132)
Proceeds from return of Investment Capital	-	2,178	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Net cash used in investing activities	**(156)**	**1,901**	**(112)**	**(207)**	**(312)**	**(449)**	**(1,080)**	**(1,322)**	**(143)**	**(204)**	**(1,006)**	**(2,676)**	**(9,694)**	**(52,451)**	**(23,881)**	**(273,152)**	**(786,090)**	**(71,087)**	**(81,060)**	**(91,251)**	**(102,132)**
Cashflow from Financing Activities																					
Proceeds from Borrowings	-	-	-	-	-	-	-	-	-	140	700	840	6,703	36,267	13,869	186,155	532,259	-	-	-	-
Repayment of Borrowings	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	(200,000)	(200,000)	(200,000)	(100,000)
Proceeds from Issue of Shares	1,184	4,076	9,822	(128)	-	-	9,694	-	6,255	-	-	6,255	12,500	25,000	-	7,500	50,000	-	-	-	-
Proceeds from Issue of Share Warrants	-	357	3,634	-	-	-	3,634	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Proceeds from Excercise of Share Options	-	-	-	200	73	324	597	23	-	-	-	23	-	-	-	-	-	-	-	-	-
Proceeds from Excercise of Share Warrants	-	-	-	2,360	984	506	3,850	192	-	-	-	192	-	-	-	-	-	-	-	-	-
Share Issue transcation Cost	(36)	(326)	(1,102)	(40)	(0)	0	(1,142)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Others	-	-	-	(26)	(30)	(32)	(87)	(67)	-	-	-	(67)	-	-	-	-	-	-	-	-	-
Net cash provided by financing activities	**1,148**	**4,107**	**12,355**	**2,367**	**1,027**	**798**	**16,547**	**147**	**6,255**	**140**	**700**	**7,242**	**19,203**	**61,267**	**13,869**	**193,655**	**582,259**	**(200,000)**	**(200,000)**	**(200,000)**	**(100,000)**
Effect of exchange rate changes on cash		41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Increase / (Decrease) in Cash during the year	**(1,170)**	**2,701**	**10,753**	**1,005**	**(948)**	**(1,911)**	**8,899**	**(3,852)**	**5,283**	**(2,012)**	**(2,319)**	**(2,900)**	**219**	**1,561**	**23,202**	**(17,094)**	**70,990**	**532,249**	**615,267**	**674,700**	**898,431**
Opening Money Market Funds & Cash Balance	1,828	659	3,359	14,112	15,117	14,169	3,359	12,258	8,406	13,689	11,677	12,258	9,358	9,577	11,138	34,340	17,245	88,236	620,485	1,235,753	1,910,452
Closing Cash Balance	**659**	**3,359**	**14,112**	**15,117**	**14,169**	**12,258**	**12,258**	**8,406**	**13,689**	**11,677**	**9,358**	**9,358**	**9,577**	**11,138**	**34,340**	**17,245**	**88,236**	**620,485**	**1,235,753**	**1,910,452**	**2,808,883**

Source: H. C. Wainwright & Co. estimates.

Important Disclaimers

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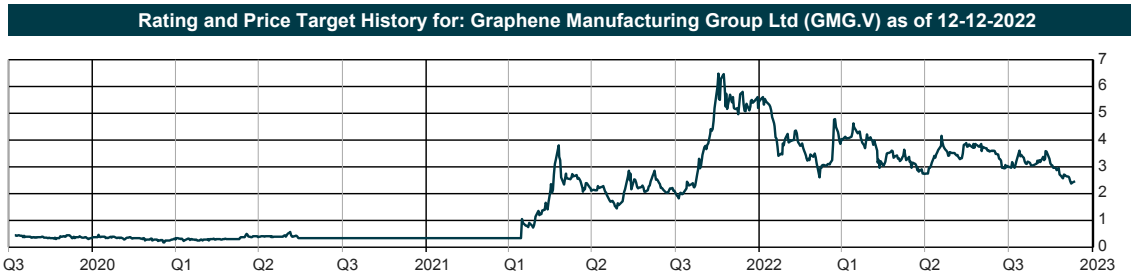
RETURN ASSESSMENT

Market Outperform (Buy): The common stock of the company is expected to outperform a passive index comprised of all the common stock of companies within the same sector.

Market Perform (Neutral): The common stock of the company is expected to mimic the performance of a passive index comprised of all the common stock of companies within the same sector.

Market Underperform (Sell): The common stock of the company is expected to underperform a passive index comprised of all the common stock of companies within the same sector.



Investment Banking Services include, but are not limited to, acting as a manager/co-manager in the underwriting or placement of securities, acting as financial advisor, and/or providing corporate finance or capital markets-related services to a company or one of its affiliates or subsidiaries within the past 12 months.

Distribution of Ratings Table as of December 12, 2022

			IB Service/Past 12 Months	
Ratings	Count	Percent	Count	Percent
Buy	584	87.03%	127	21.75%
Neutral	68	10.13%	9	13.24%
Sell	0	0.00%	0	0.00%
Under Review	19	2.83%	4	21.05%

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