



Graphene Manufacturing Group

**ENERGY SAVING AND ENERGY STORAGE SOLUTIONS**

[www.graphenemg.com](http://www.graphenemg.com) | TSX-V:GMG

April 2024

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develop its products will not be adversely impacted by COVID-19 or the ongoing conflict in eastern Europe. Additionally, forward-looking information involve a variety of known and unknown risks, uncertainties and other factors which may cause the actual plans, intentions, activities, results, performance or achievements of GMG to be materially different from any future plans, intentions, activities, results, performance or achievements expressed or implied by such forward-looking statements. Such risks include, without limitation: (a) GMG's operations could be adversely affected by possible future government legislation, policies and controls or by changes in applicable laws and regulations; (b) public health crises such as the COVID-19 pandemic may adversely impact GMG's business and the ability of the Company to develop its products; (c) the volatility of global capital markets; (d) political instability; (e) the failure of GMG to attract and retain skilled personnel; (f) unexpected development and production challenges; (g) GMG could face technology or software disruptions; (h) unanticipated costs; (i) risks relating to the extent and duration of the conflict in Eastern Europe and its impact on global markets; (j) that the Company will be unable to develop, market, and sell its products as currently anticipated; (k) that the Company will be unsuccessful in identifying and engaging strategic partners; (l) that the Company will be unable to acquire equipment to streamline its production process, or that the expansion of the production facility will not result in the benefits currently expected; (m) that companies currently working with GMG will not be interested in purchasing the Company's products; and (n) the risk factors set out under the heading "Risk Factors" in the Company's AIF dated October 18, 2022 available for review on the Company's profile at [www.sedarplus.ca](http://www.sedarplus.ca). Such forward-looking information represents management's best judgment based on information currently available. No forward-looking statement can be guaranteed and actual future results may vary materially. Accordingly, readers are advised not to place undue reliance on forward-looking statements or information. Neither GMG nor any of its representatives make any representation or warranty, express or implied, as to the accuracy, sufficiency or completeness of the information in this Presentation. Neither GMG nor any of its representatives shall have any liability whatsoever, under contract, tort, trust or otherwise, to you or any person resulting from the use of the information in this Presentation by you or any of your representatives or for omissions from the information in this Presentation. The forward-looking statements herein are made as of the date of this Presentation only, and the Company does not assume any obligation to update or revise them to reflect new information, estimates or opinions, future events or results or otherwise, except as required by applicable law. Historical statements contained in this Presentation regarding past trends or activities should not be taken as a representation that such trends or activities will continue in the future. In this regard, certain financial information contained herein has been extracted from, or based upon, information available in the public domain and/or provided by the Company. In particular, historical results should not be taken as a representation that such trends will be replicated in the future. No statement in this document is intended to be nor may be construed as a profit forecast. An investment in the Company is speculative and involves substantial risk and is only suitable for investors that understand the potential consequences and are able to bear the risk of losing their entire investment. Investors should consider the risks set out in the AIF, in addition to many others, and consult with their own legal, tax and financial advisors with respect to all such risks before making an investment.

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# BOARD OF DIRECTORS & ADVISORY TEAM

## Craig Nicol | Founder, Managing Director & CEO

Craig Nicol has a career of over 20 years in delivering large scale innovation including leading multi-billion-dollar gas and LNG value chains in Australia and Asia Pacific and managing sales and marketing teams across Asia Pacific working for Shell International. Craig has a Bachelor of Engineering degree in Manufacturing Systems (Honours) and a bachelor's degree in Business Marketing from the Queensland University of Technology. Craig is a member of the Australian Institute of Company Directors (AICD).

## Jack Perkowski | Chair & Director

Mr Perkowski founded ASIMCO Technologies in 1994, and from 1994 to 2008, served as the Chairman of ASIMCO's Board of Directors and the company's Chief Executive Officer. Under Mr Perkowski's leadership, ASIMCO became one of the most important players in China's automotive components industry and gained a reputation for developing local management and integrating a broad-based China operation into the global economy. ASIMCO was later sold to Bain Capital in 2010 and is still regarded as one of the most successful automotive component manufacturing companies in China. Prior to this Mr Perkowski was Managing Director of Paine Webber, an investment bank that was eventually acquired by UBS in 2000. In 2009, Mr Perkowski founded JFP Holdings, a merchant banking firm focused on China, where he now serves as Chairman.

## Bob Galyen | Non-Executive Director

Bob is a highly experienced executive in the battery energy storage world and science/engineering-based communities. Bob was previously the Chief Technology Officer (CTO) of Contemporary Amperex Technology Company Limited (CATL). CATL is widely known as the largest lithium-ion battery manufacturer in the world – supplying electric vehicles and high-efficiency storage systems. He serves on multiple Committees of Directors and Technical Advisory Boards.

## Andrew Small | Non-Executive Director

Andrew was a Founder and Director of Innogence, a SAP Business Intelligence consultancy in Australia which following significant growth was acquired by the Japanese multinational company NTT Data. Andrew has supported and invested in GMG since 2017, remains a significant shareholder of the Company and is committed to actively supporting the Company's drive to deliver on its plans and set it up for the next stage of maturity. Andrew has a Bachelor of Engineering (Manufacturing Systems) and a Bachelor of Business (Marketing) from Queensland University of Technology.

## Professor Dan Brett | Advisor

Dan is Professor of Electrochemical Engineering at the University College London (UCL), a top ranked University, where he is a director of the Electrochemical Innovation Lab (EIL) and Advanced Propulsion Lab (APL). He is an academic founder of the Faraday Institution (a UK battery research programme with a consortium of over 20 UK universities and 50 businesses – including 450 researchers) and member of its Expert Panel.

# WE DEVELOP, MAKE AND SELL:

All of which are based on Graphene, we produce from Natural Gas.

## THERMAL-XR®



\$28B\*  
USD

### HEAT EXCHANGER COATINGS SYSTEM

Deployed

Heat Transfer & Corrosion Protection.

Commencing revenue with Asian and North American Distributors and Customers in various countries.

## G® LUBRICANT



\$15B\*  
USD

### AUTOMOTIVE FLUIDS ADDITIVES

Deployed

Engine Oil Additive.

Engaging prospects in Australia, South-East Asia & North America.

Conducting engine fuel saving testing.

## GRAPHENE ALUMINIUM-ION BATTERY



\$108B\*  
USD

### ENERGY STORAGE BATTERY

Development

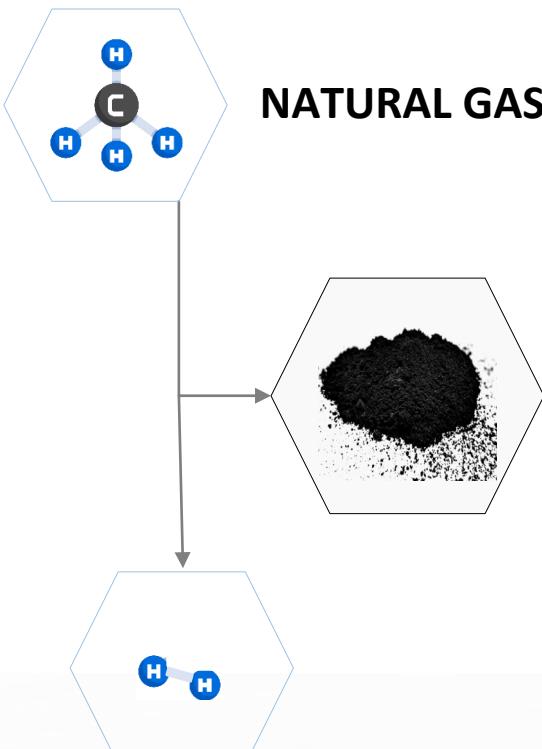
Initial Commercial Prototypes Development Target by end of H1 2024.

The University of Queensland Collaboration.



Graphene Manufacturing Group

# GROWTH PLAN\* FOR GMG PRODUCTION CAPACITY



\*Conditional on financing

# GMG COMMISSIONS MODULAR GRAPHENE PRODUCTION PLANT | PHASE 1.0

Innovative natural gas to graphene production.

Modular plant designed and built for growth and replication.

*"We are very excited .... it is a significant milestone for the company. It uses GMG's self-developed technology, which creates high-quality graphene for THERMAL-XR®, G® LUBRICANT and Graphene Aluminium-Ion Battery Prototypes." Craig Nicol (CEO)*

December 2023





Graphene Manufacturing Group

# GROWTH PLAN\* FOR GMG PRODUCTION CAPACITY

RICHLANDS, BRISBANE, AUSTRALIA



\*Conditional on financing



# THERMAL-XR® HVAC-R DISTRIBUTOR NETWORK - GROWING



Canada, USA,  
Mexico, Caribbean

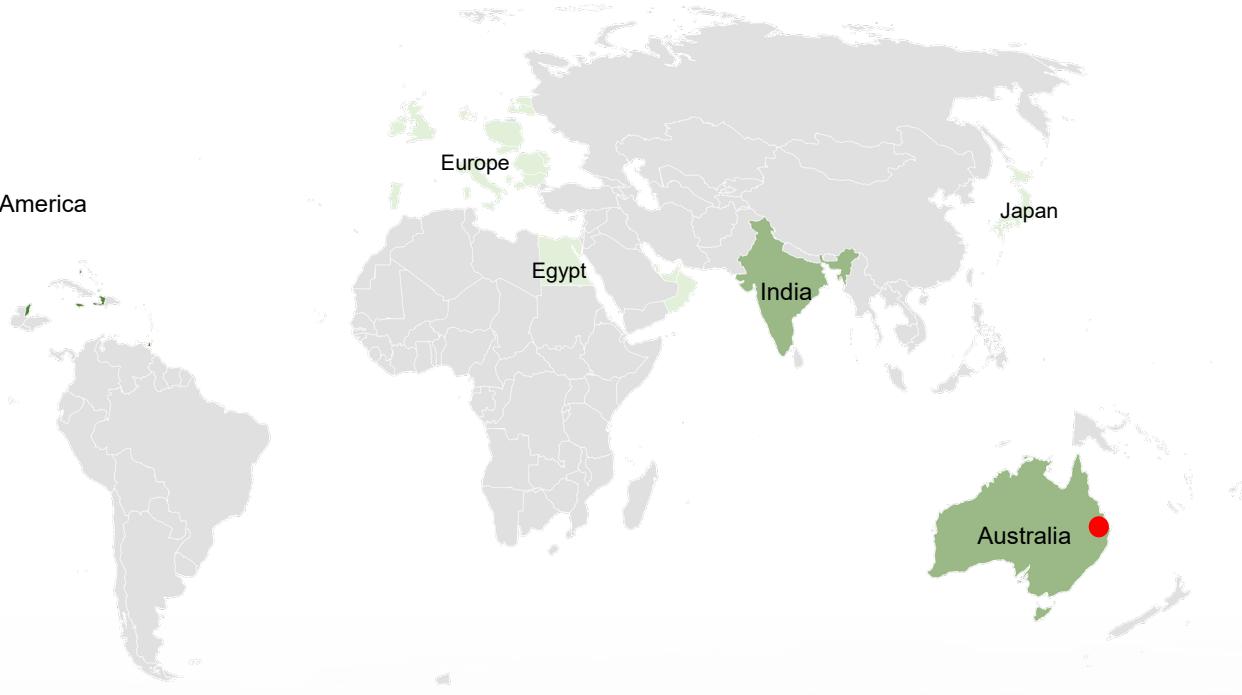
North America

**THERMAL-XR®HVAC-R**

Assessing

Negotiating

Signed



South Korea



Thailand



Singapore



Indonesia

**THERMAL-XR® INDUSTRIAL**

Markets available for business development.

## INDUSTRY & MARKET SEGMENTS (IN USE AND PROSPECTIVE)



HVAC-R (BUILDING)



RAIL/TRANSPORT



DATA CENTRES



LNG, GAS & PETROCHEMICALS



CHEMICAL, HEAVY & MINING



ENERGY & SOLAR CELLS

## CUSTOMER PROJECTS



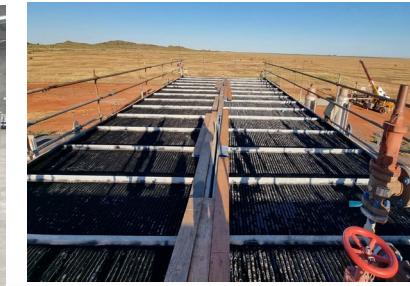
DATA CENTRE  
16% ENERGY  
SAVINGS



RAIL /  
TRANSPORT  
FUEL  
SAVINGS



HVAC-R  
ENERGY  
SAVINGS



LNG  
16%  
PERFORMANCE  
IMPROVEMENT



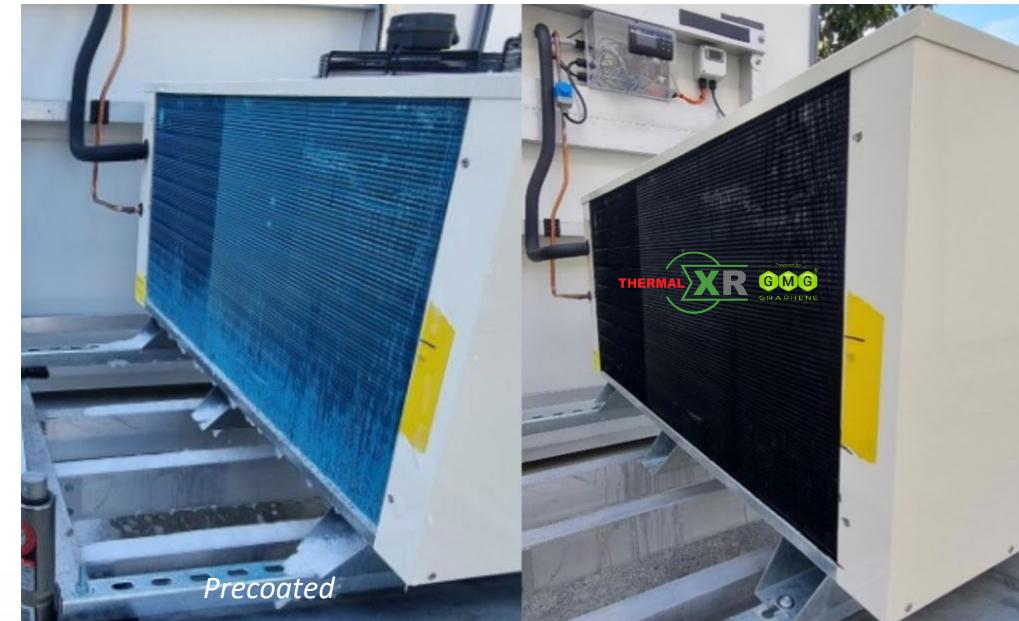
# INDEPENDENTLY VERIFIED HVAC-R ENERGY SAVINGS

## NEW CONDENSER COIL PRE & POST COATING COMPARISON



### Measured Energy Savings for THERMAL-XR®

- Pull-Down Test                            15.9% ▼
- 48 Hour Temperature                    4.69% ▼
- Cycle Test



4.3kw Refrigeration Unit with an electronic expansion valve with variability disabled.

**THERMAL XR® is proven to save energy on a new refrigeration unit in this test**



# G™ LUBRICANT PERFORMANCE

- Deposition of graphene particles via G® LUBRICANT lowers the coefficient of friction in the critical boundary lubrication zones (pistons)
- More than 60% of engine friction is generated in these zones and ~ 30% of fuel burned in an engine is burned to overcome internal friction



- ENERGY SAVINGS test results up to 10%.
- Coefficient of Friction reduction up to 10%.
- Wear Preventative Test results have experienced reductions of wear enhancements up to 10%.
- Extreme Pressure Test results have experienced reductions of wear up to 20%.

\* Results vary and the figures are sources from client performance testing, GMG 4 ball wear testing, and SGS testing on a variety of base oils and fully formulated engine oils with 0.01% GMG Graphene.

# JOINT DEVELOPMENT AGREEMENT

## Accelerated Development & Application

Graphene Aluminium-Ion Battery

Heavy Vehicle Equipment OEM involvement to be sought

## Technical & Operational

Heavy mobile equipment & grid energy storage applications in the mining and mineral industry

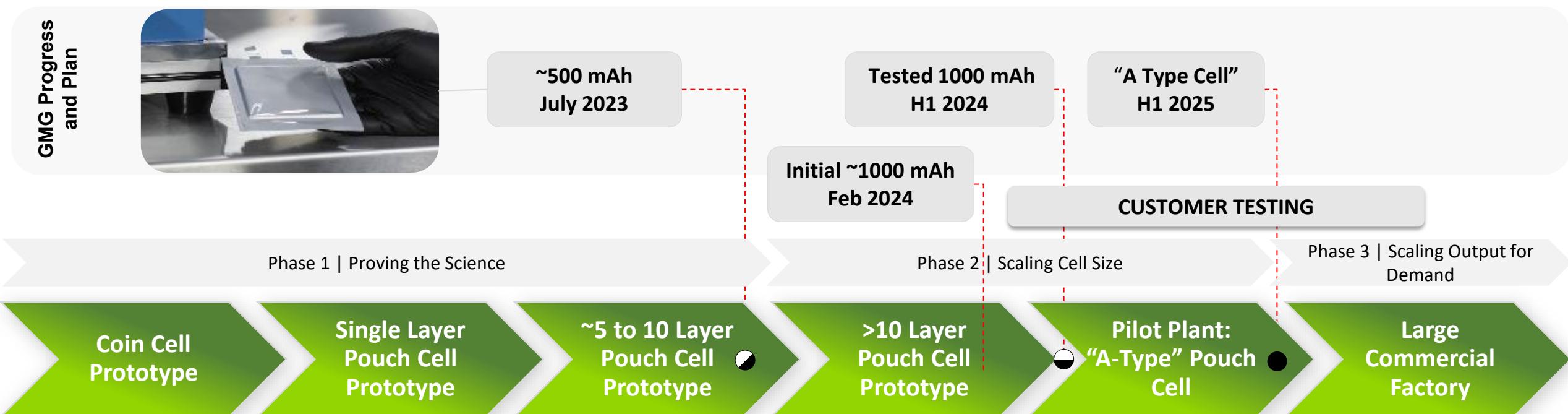
## Commercial

A\$6 Million to GMG  
Preferential Access Rights

## Environmental Social & Governance

Net zero transition with actions to decarbonisation

# POUCH CELL PROTOTYPE SCALE-UP PROCESS PLAN



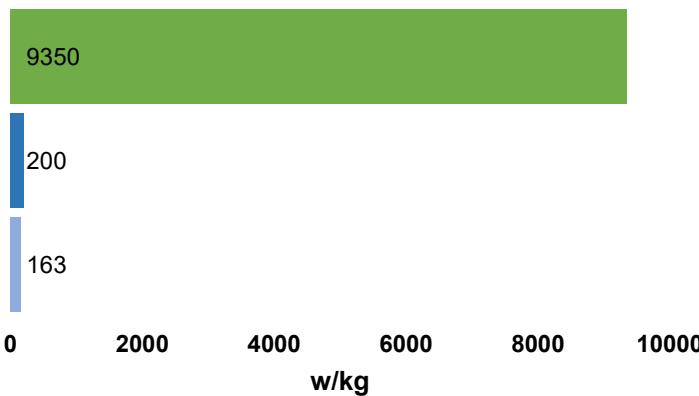
- Assembled manually to semi-automatic assembly.
- Determination and validation of electrochemical properties for small cell prototypes.

- Design and procurement in progress.
- Customer trials: Fully tested 1000 mAh cells.
- Scale manufacturing proofing.
- Build teams for pilot production.

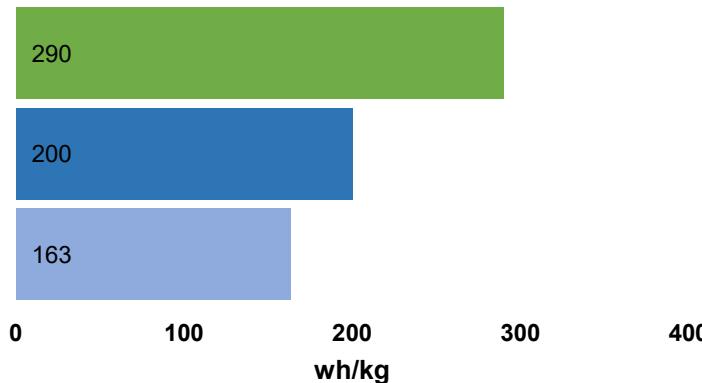
- Develop supply chain and logistics.
- Production testing for large-scale manufacturing.
- Final design verification.

# NEXT GENERATION BATTERY PERFORMANCE SHOWN BASED ON COIN CELL TESTING

**Power Density (W/kg)**



**Energy Density (Wh/kg)**



## Graphene Aluminium-Ion Potential Benefits:

- Aluminium is 1000 times more available & ~10 times cheaper than Lithium
- No Lithium needed – lower cost & less complicated supply.
- Cathode: Graphene coated metal foil
- Anode: No coating - aluminium foil only - lower cost & less complicated to manufacture
- Up to 60 Times Faster-charging
- Safer (no risk of electrochemical fires)
- Up to 3 x More Battery Life (tested up to 3000 cycles).

GMG + UQ Graphene Aluminium Ion\*

Lithium Manganese Nickel Cobalt Ion (NCM) @ 1C<sup>#</sup>

Lithium Iron Phosphate (LFP)<sup>\$</sup>

Pouch cell performance data could be significantly different and will be published once 1000 mAh+ capacity pouch cells are developed and tested.

Source:

\*University of Queensland validated GMG testing data based on industry standard estimate methodology from coin cells using a reducing factor of 2.3.

#CATL 3.7V 65Ah NCM Lithium Battery Cell - LiFePO4 Battery ([lifepo4-battery.com](http://lifepo4-battery.com)) on 29/09/22

\$ CATL 3.2V 150Ah LiFePO4 Battery Cell - LiFePO4 Battery ([lifepo4-battery.com](http://lifepo4-battery.com)) on 29/09/22

# BATTERY TECHNOLOGY READINESS LEVEL (BTRL)

GMG Progress

G+AI Battery has progressed to BTRL 4.

GMG is currently optimizing electrochemical behaviour for pouch cells.



Lab-Scale Production and Basic Property Research

Electrochemical Development

Component Production Process Development

Cell Production Process Development

Commercialisation

1

2

3

4

5

6

7

8

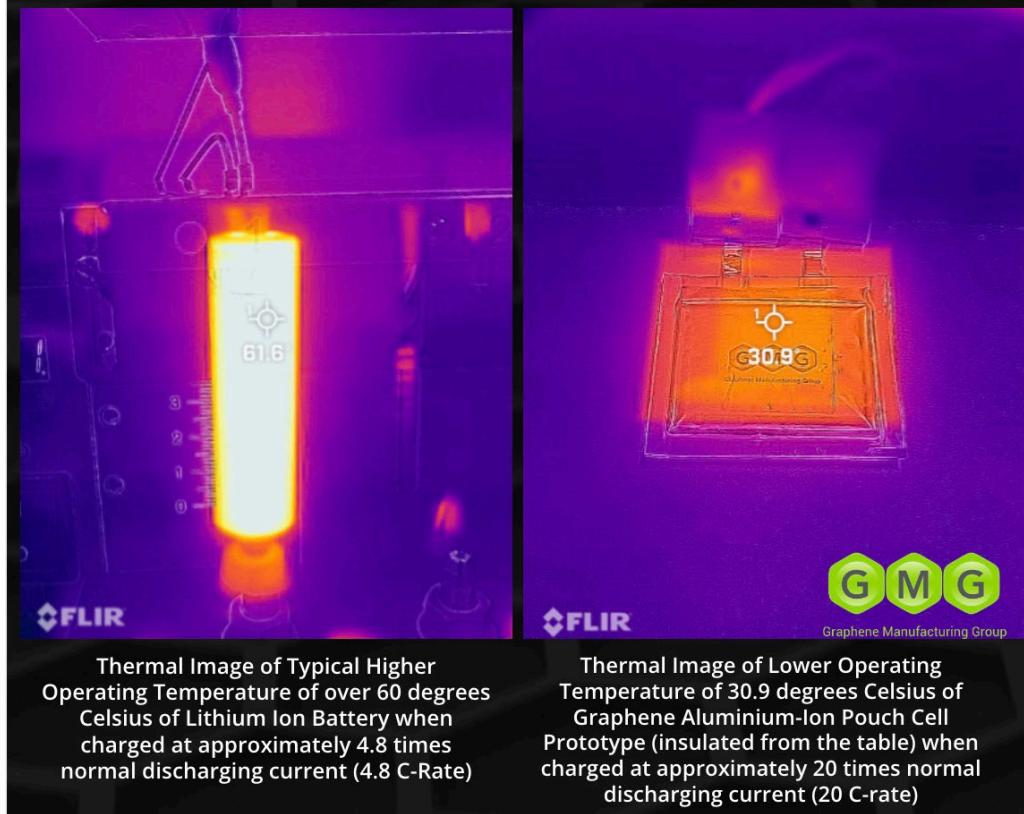
9

Phase 1 | Proving the Science (1-3)

Phase 2 | Scaling Cell Size (4-6)

Phase 3 | Scaling Output for Testing (7-9)

# FAST CHARGING AND COOLING ADVANTAGES



GMG's Graphene Aluminium-Ion Battery **may not need a thermal management system** when used in an electric vehicle battery pack or an energy storage system, which will lead to a **simpler, more cost effective and higher energy density battery pack**.

The elimination of thermal management can potentially reduce the weight of an electric vehicle battery pack by **up to 16%**.

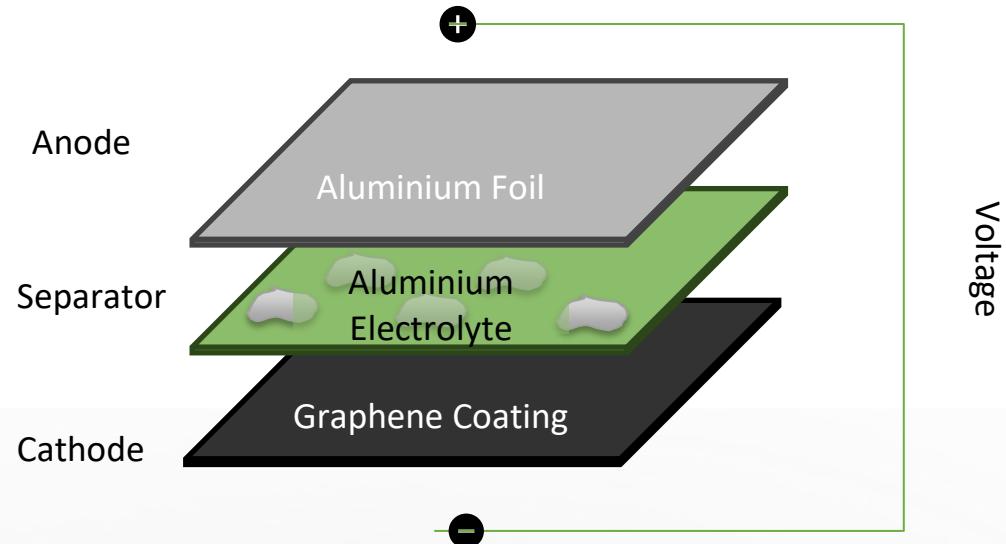
**Additional range improvements could be expected to come from no thermal management parasitic drain on the battery during operation.**

# G+AI BATTERY SIMPLICITY

G+AI Battery's simplicity is one of its most attractive and competitive advantages.

## Simplicity Drives Structural Advantages Over Battery Technology.

- No material coating on the Anode.
- Use the same equipment to make the battery as a Li Battery
- Uses very similar components to a Lithium Battery.



# GRAPHENE ALUMINIUM ION BATTERY ADVANTAGES

	Lithium Ion Battery	Graphene Aluminum Ion Battery
<b>Battery Performance</b>		
1. Very Fast Charging/Discharging (60 times)	✗	✓
2. Long Life (>1000 full cycles)	✗	✓
3. Higher Cell to Pack Density (no cooling needed)	✗	✓
<b>Supply Chain</b>		
4. Supply Chain Simplicity (< 1 km vs 50,000 km)	✗	✓
5. Availability of Raw Materials and their Reserves	✗	✓
<b>Health, Safety and Environmental</b>		
6. Product Supply Environmental Concerns	✗	✓
7. Recyclability of Product	✗	✓
8. Safety of Product Regarding Fires and Toxicity	✗	✓
<b>Capex/Cost</b>		
9. Battery Structural Cost Advantages	✗	✓

# LOWER STRUCTURAL COST BATTERY PRODUCTION PROCESS

The same equipment is used to make the G+AI Battery as the Lithium Ion Battery - except there are fewer needed.

	Lithium Ion Battery		Graphene Aluminum Ion Battery		
	Cathode	Anode	Cathode	Anode	
1. Slurry Preparation	✓	✓	✓	✗	The G+AI Anode is ONLY aluminium foil and does not need any slurry coating like a Li Battery.
2. Slurry Coating	✓	✓	✓	✗	
3. Drying	✓	✓	✓	✗	
4. Calendering	✓	✓	✓	✗	
5. Slitting – Pouch Cell	✓	✓	✓	✓	G+AI Battery Cost Benefits
6. Pouch Cell Assembly	✓	✓	✓	✗	~10% less battery equipment capex
7. Pouch Formation Time	~2 weeks		~3 hours		Significant reduction in cost from faster formation

# BATTERY CELL ROADMAP

- 500 mAh Cell
- Cell Testing

2023

- Battery Pilot Plant "A" & "B" type cells for JDA Partners
- Commercial Sale Contracts Signed

2024

- 1000 mAh Cell
- Cell Testing
- Cell to JDA Partners
- Battery Pilot Plant Construction

2025

- Commercial Scale Battery Plant Construction Investment Decision

2026

2027+

- Commercial Scale Battery Plant Commissioned
- Battery Cells/Modules supplied to Customers



# DEVELOPMENT ROADMAP

Graphene Manufacturing Group

- G+AI BATTERY
- G® LUBRICANT
- THERMAL-XR®
- Graphene R&D + IP

BUSINESS OBJECTIVES/PRODUCT STREAMS	2024				2025				2026				2027 +	
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4		
<b>PRODUCE GRAPHENE &amp; IMPROVE/SCALE PRODUCTION</b>	Graphene Plant Phase 1.0													
	Graphene Plant Phase 2.0												Progressively Commissioned	
	Regional Plant Builds													
<b>BUILD REVENUE FROM ENERGY SAVINGS PRODUCTS</b>	THERMAL-XR® HVAC-R Distribution Sales													
	THERMAL-XR® Industrial Sales													
	G® LUBRICANT - Verification & Commercial Testing													
	G® LUBRICANT - Sales													
<b>DEVELOP NEXT-GENERATION BATTERY</b>	Development												Progressive Improvement	
	Plant Development (Commercial Low-Volume)													
	Plant Development (Commercial Full Scale)													

# MATURING FINANCIAL CAPABILITY

BUILD REVENUE	DEVELOP	PARTNER	CASH ON HAND
Maturing sales and marketing team, processes and systems.	First leading segment partner – Rio Tinto JDA (AU\$ 6M)  <b>Exploring JDA's with other global sector leaders for the battery.</b>	Australian Government R&D Tax Rebate Support (2023: AU\$ 2.6M)  <b>\$2M Qld Government Grant for 50% of Battery Pilot Plant.</b>	AU\$ 3.6M  (End of December 2023)
New Distributors in Asia & North America (Awaiting EPA Approval for USA)		Exploring Grants and incentives	
NDA's with global companies targeting increase in sales			



# GMG FINANCES & STRUCTURE

As at 31 December 2023

Ticker	Shares Outstanding	Market Capitalization	Options	Warrants, RSU
TSX-V Toronto Stock Exchange Ventures				
<b>GMG</b>	<b>84,524,329</b>	<b>~C\$70 M</b>	<b>4,200,473</b>	<b>5,496,951</b> <b>678,738</b>

## Investor Relations

✉ info@fcir.ca  
☎ +647 – 689 – 6041  
🌐 www.focusir.ca





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