



Graphene Manufacturing Group

ENERGY SAVING AND ENERGY STORAGE SOLUTIONS

www.graphenemg.com | TSX-V:GMG

November 2023 – Graphene Aluminum-Ion Battery

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capability aligns with management's expectations, that an increase in GMG's existing production facility will result in a corresponding increase in production capacity, that the markets and sales channels for the Company's products will develop as expected, that the Company will enter into additional distributor agreements, and that the Company's operations and ability to 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. 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.

THIRD PARTY INFORMATION

This Presentation includes market and industry data which was obtained from various publicly available sources and other sources believed by the Company to be true. Although the Company believes it to be reliable, the Company has not independently verified any of the data from third-party sources referred to in this Presentation or analyzed or verified the underlying reports relied upon or

WE DEVELOP, MAKE AND SELL:

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

THERMAL-XR®



HEAT EXCHANGER COATINGS SYSTEM

Deployed 

Heat Transfer & Corrosion Protection.

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

G[®] LUBRICANT



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



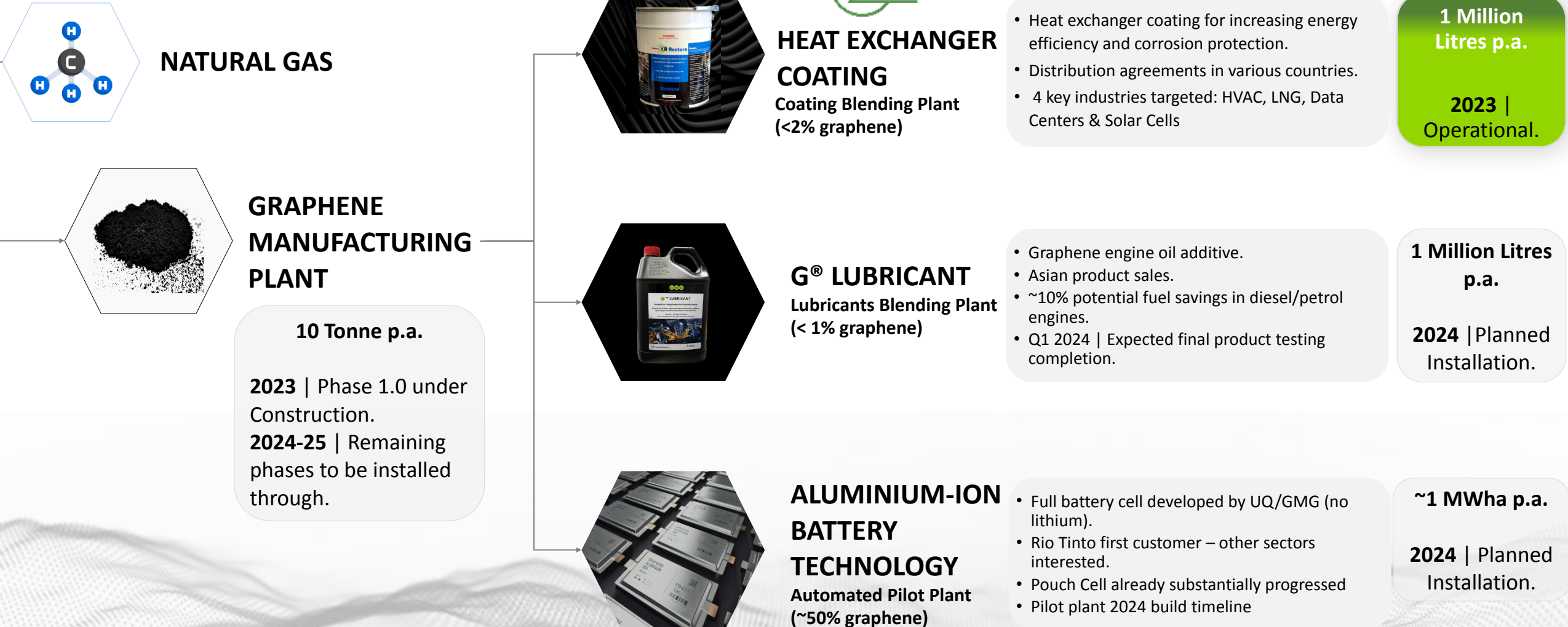
ENERGY STORAGE BATTERY

Development 

Commercial Prototypes Development Target H1 2024.

The University of Queensland Collaboration. Pouch cell prototypes are currently in development.

GROWTH PLAN* FOR GMG PRODUCTION CAPACITY



*Conditional on financing requirements

BRISBANE AUSTRALIA, HQ & CAPABILITIES

Value Chain on one site. Designed for ease of global replication.

Unit 4
THERMAL-XR®
Blending Plant

Unit 4
Graphene Expansion Plant

Phase 1.0 - Under Construction.

Phase 2.0+ 2024-25 Planned Build

Federal government approved for 10mt p.a.



Unit 5
Battery Development Centre & HQ Office

Unit 5
Automated Battery Pilot Plant
2024 Planned Build

Local government approved.

Unit 6A
Materials & Liquids QA & QC Laboratory + Offices

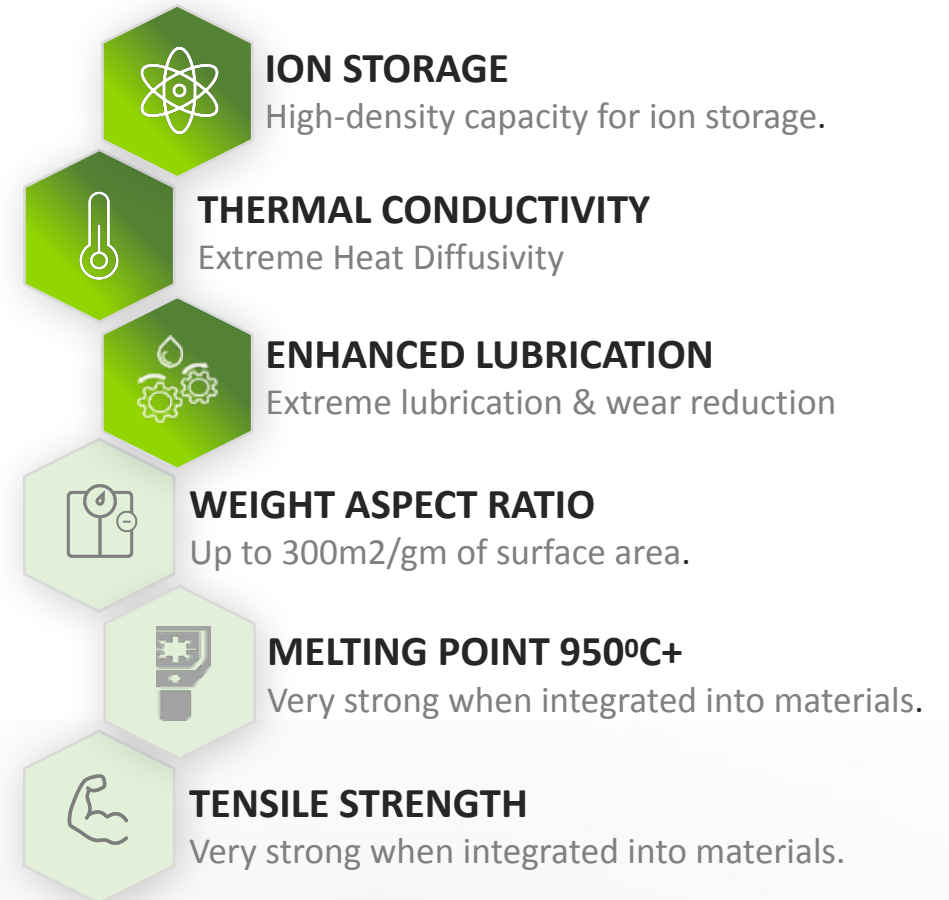
~ 5000 m² of warehouse/facility space for required activities

WHAT IS GRAPHENE?

Graphene is the first two-dimensional material and is classed as a “super-material”, offering many enhancements.

GMG focuses on Ion Storage, Superior Thermal Conductivity, and Enhanced Lubrication.

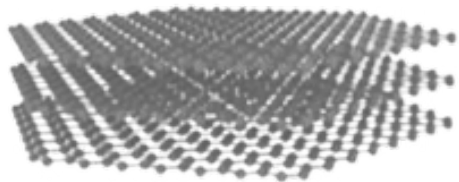
The Company believes GMG Graphene has significant potential to enhance the performance of a range of materials and expects Graphene to drive the development of disruptive technologies and transform industries. It is classified as a nanomaterial (i.e. its dimension is on the nanoscale between 1-100nm) and looks like black powder.



UQ BATTERY NANOTECHNOLOGY SCIENCE

Nanotechnology

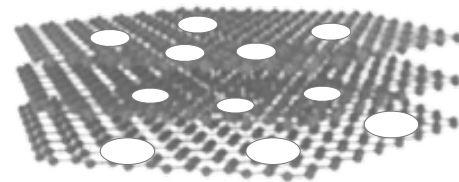
UQ design uses nanotechnology to insert Aluminium-Ions (atoms without some electrons) inside tiny perforations in GMG Graphene platelets.



Graphene Platelets

Spare Electrons

Aluminium atoms have 3 spare electrons vs Lithium atoms with 1 spare electron.



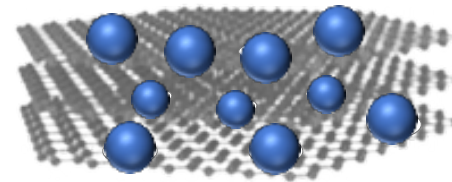
Surface Perforation

Energy Density

Aluminium-Ion batteries have up to 3 times the energy density of Lithium-Ion batteries.

Graphene Storage

Graphene is used to store the Aluminium-Ions (atoms without spare electrons).



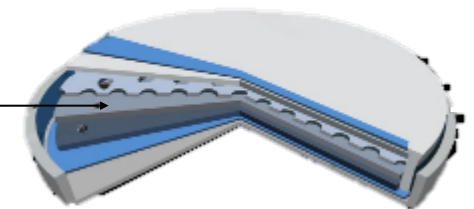
Al-Ions inserted between Graphene Platelets

Supercapacitor

Extremely fast charging and discharging – called a hybrid **supercapacitor battery**.

Construction Simplicity

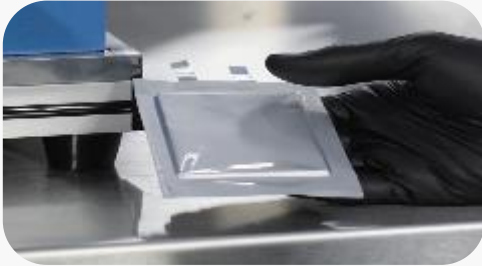
Simpler construction than Lithium-Ion batteries, predominantly Graphene and Aluminium.



Coin Cell Mechanism
Cathode = Perforated Graphene

POUCH CELL PROTOTYPE SCALE-UP PROCESS

GMG Progress and Plan



~500 mAh
July 2023

~1000 mAh
H1 2024

“A Type Cell”
H1 2025

CUSTOMER TESTING

Phase 1 | Proving the Science

Phase 2 | Scaling Cell Size

Phase 3 | Scaling Output for Demand

Coin Cell Prototype

Single Layer Pouch Cell Prototype

~5 to 15 Layer Pouch Cell Prototype

>25 Layer Pouch Cell Prototype

Pilot Plant: “A-Type” Pouch Cell

Large Commercial Factory

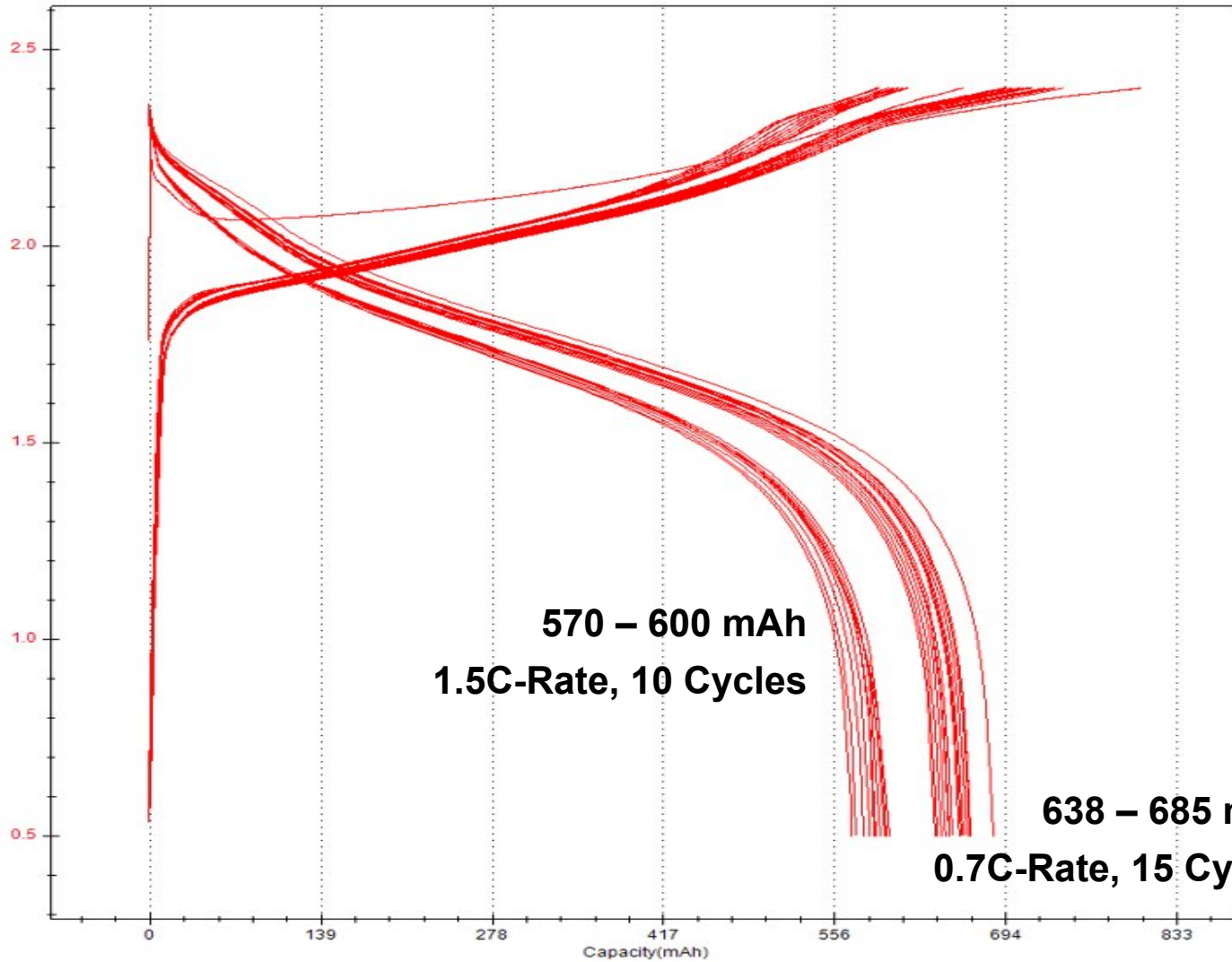


- Assembled manually to semi-automatic assembly.
- Determination and validation of electrochemical properties for small cell prototypes.

- Design and procurement in progress.
- **Customer trial battery cells.**
- Scale manufacturing proofing.
- Build teams for pilot production.

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

OVER 500 mAh 12L- POUCH CELL PERFORMANCE

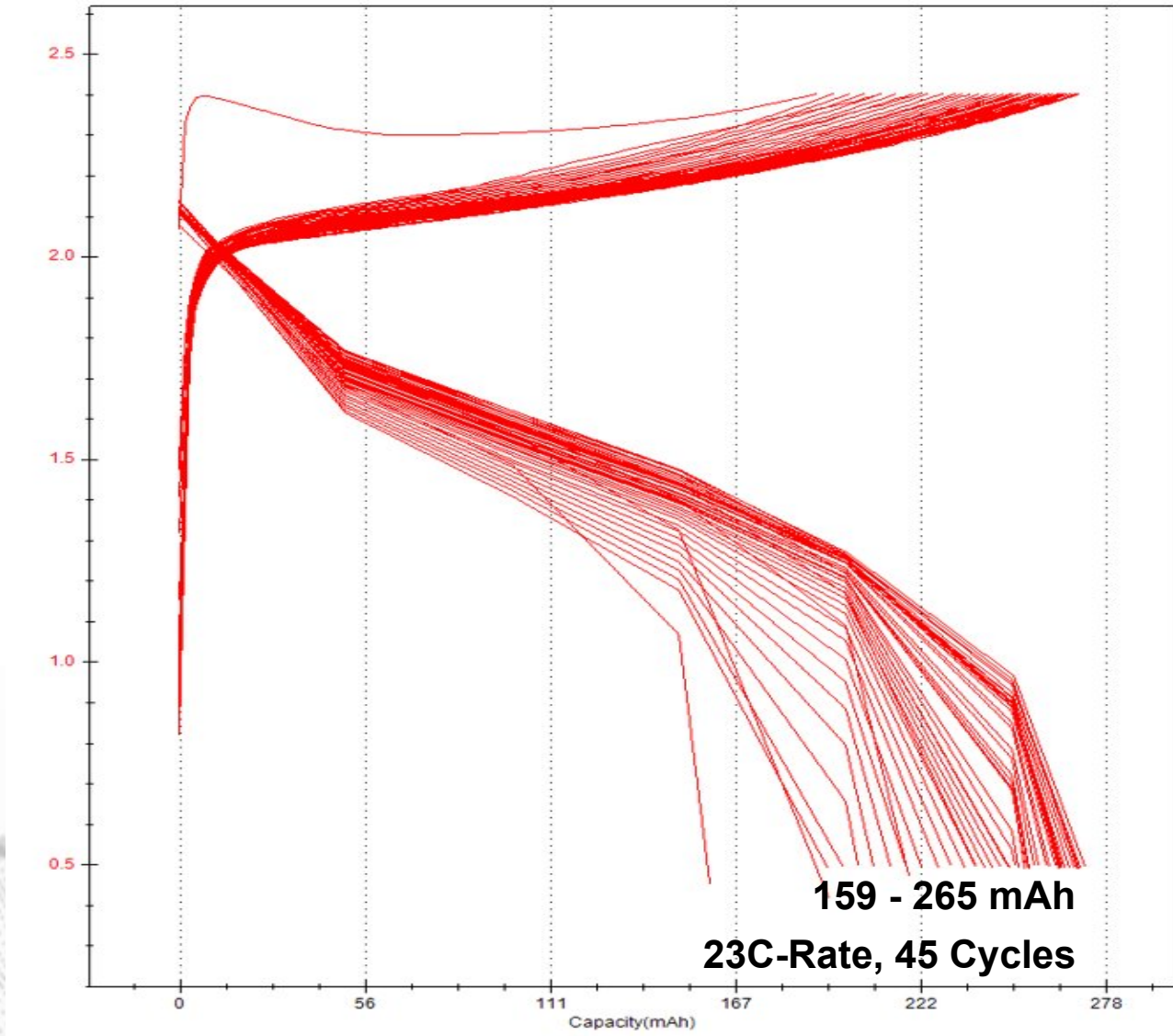


Nominal Voltage: 1.70 - 1.75 V

Cathode Active Material Mass: 17.73 g

Testing Temperature: 24±1 °C

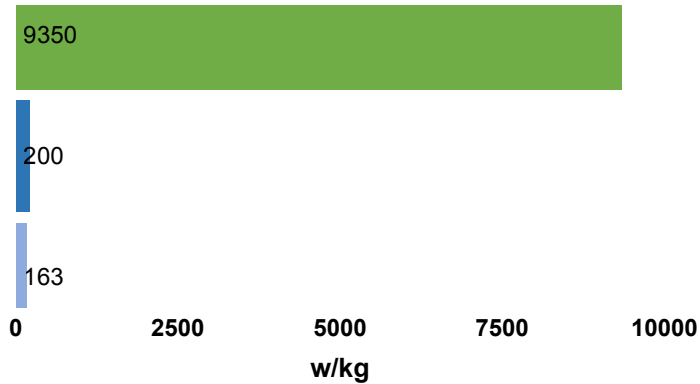
12L-POUCH CELL PERFORMANCE: 23C



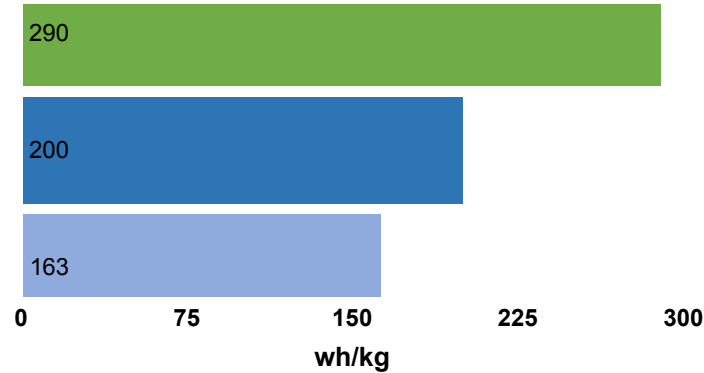
Nominal Voltage: 1.40 - 1.61V
Cathode Active Material Mass: 15.40 g
Testing Temperature: 24±1 °C

NEXT GENERATION BATTERY PERFORMANCE SHOWN BASED ON COIN CELL TESTING

Power Density (W/kg)



Energy Density (Wh/kg)



- GMG + UQ Graphene Aluminium Ion*
- Lithium Manganese Nickel Cobalt Ion (NCM) @ 1C#
- Lithium Iron Phosphate (LFP)\$

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

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 3000 cycles).

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) on 29/09/22 7
 \$ CATL 3.2V 150Ah LiFePO4 Battery Cell - LiFePO4 Battery (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)

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

INCREASING DEPLOYMENT & DEVELOPING PARTNERS



GMG is confidentially working with various global companies to explore partnering on manufacturing, sales and distributing.



COATINGS MANUFACTURING



SALES & DISTRIBUTION



COATING APPLICATION

GRAPHENE ALUMINIUM-ION BATTERY TECHNOLOGY

A range of global companies have confidentially expressed their interest in working with GMG in the following vertical sectors.



DIESEL ENGINE REPLACEMENT



ENERGY STORAGE



ELECTRIC VEHICLES



AVIATION



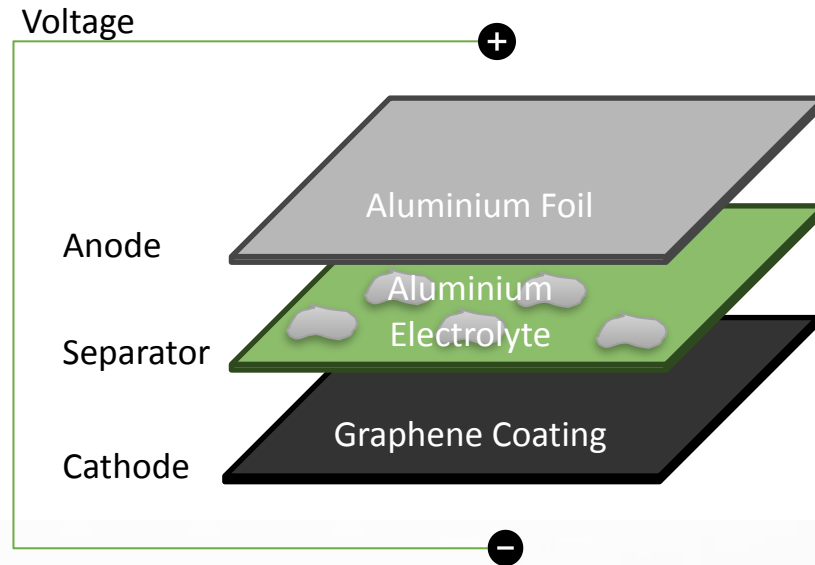
RAIL



PERSONAL ELECTRONICS

G+AI BATTERY SIMPLICITY

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



No material coating on the Anode

Use the same equipment to make the battery as a Li Battery

Uses very similar components as a Li Battery

This simplicity drives many other structural advantages over other battery technologies

GRAPHENE ALUMINIUM ION BATTERY ADVANTAGES

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

LOWER STRUCTURAL COST BATTERY PRODUCTION PROCESS

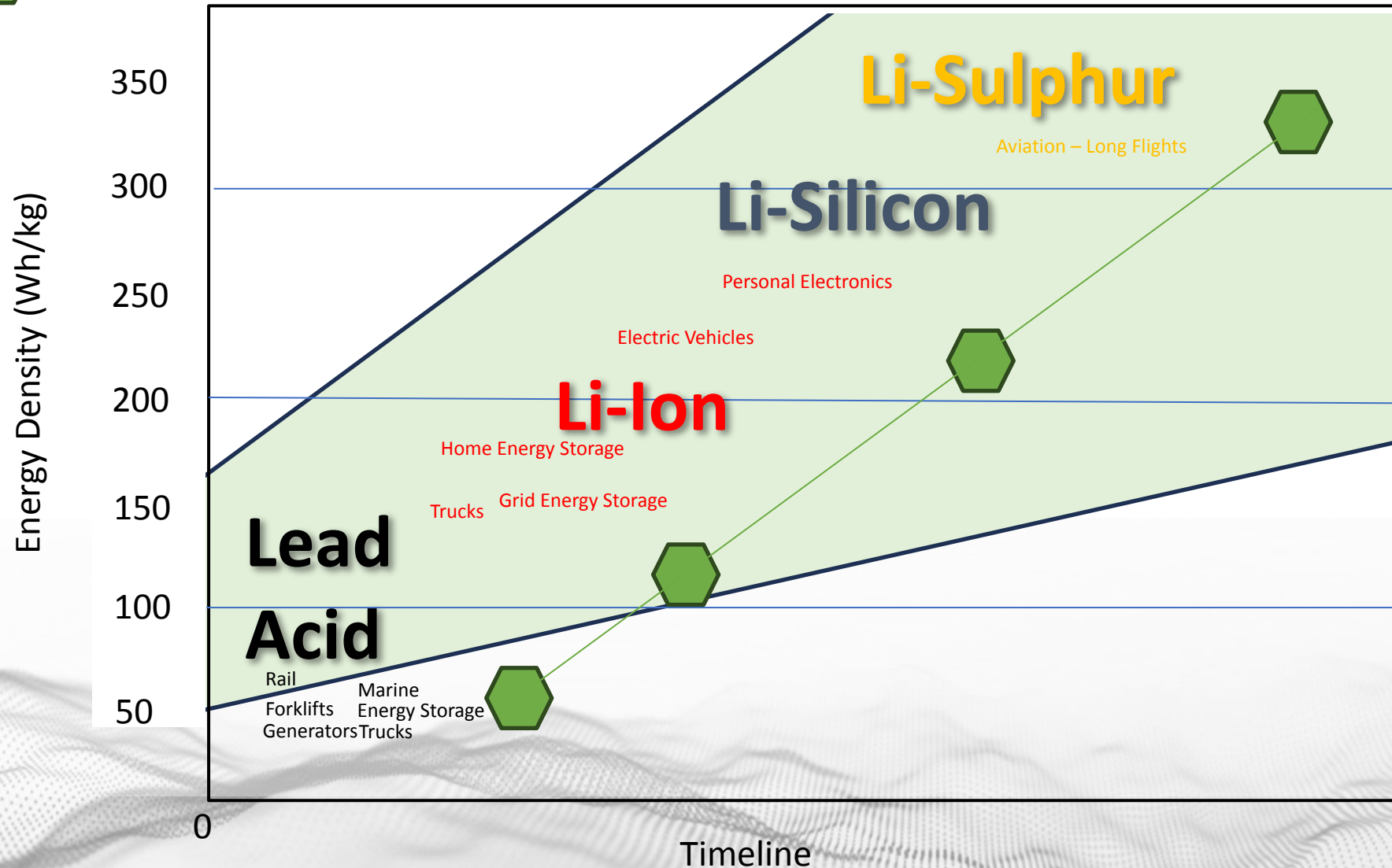
The same equipment is used to make the G+Al Battery as the Lithium Ion Battery - except there are fewer needed.

	Lithium Ion Battery		Graphene Aluminum Ion Battery		
	Cathode	Anode	Cathode	Anode	
1. Slurry Preparation	✓	✓	✓	✗	<p>The G+Al Anode is ONLY aluminium foil and does not need any slurry coating like a Li Battery.</p> <p>The process steps, materials and equipment are not needed for Anodes for G+Al Batteries.</p>
2. Slurry Coating	✓	✓	✓	✗	
3. Drying	✓	✓	✓	✗	
4. Calendaring	✓	✓	✓	✗	
5. Slitting – Pouch Cell	✓	✓	✓	✓	<p>G+Al Battery Cost Benefits</p> <p>~10% less battery equipment capex</p> <p>Significant reduction in cost from faster formation</p>
6. Pouch Cell Assembly	✓	✓	✓	✗	
7. Pouch Formation Time	~2 weeks		~3 hours		



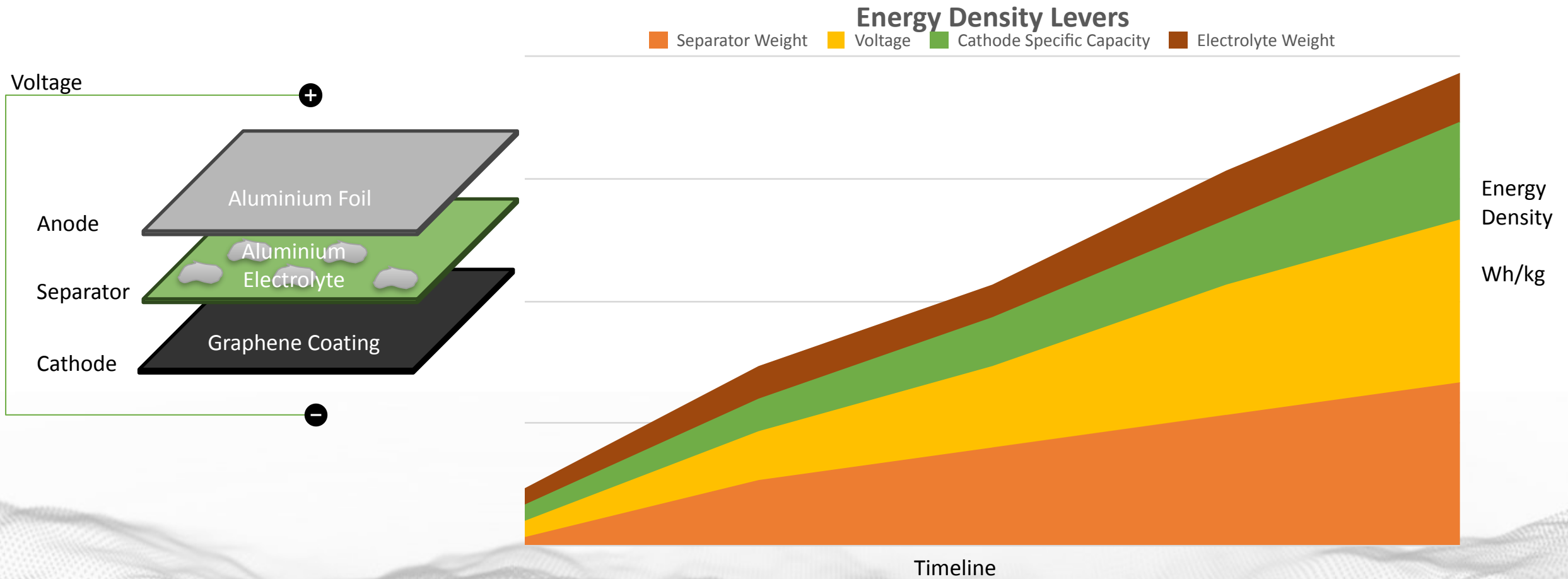
G+AIB POTENTIAL ENERGY DENSITY VS BATTERY TECHNOLOGIES AND APPLICATIONS

As the Energy Density of the Graphene Aluminium Ion Battery (G+AIB) increases we can target more applications



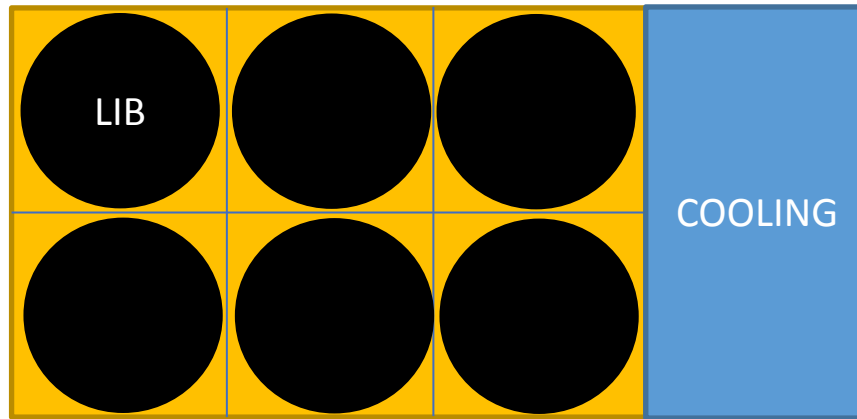
LEVERS TO INCREASE CELL ENERGY DENSITY

There are four main levers to increase the energy density of the G+Al Battery – which will be used to develop.



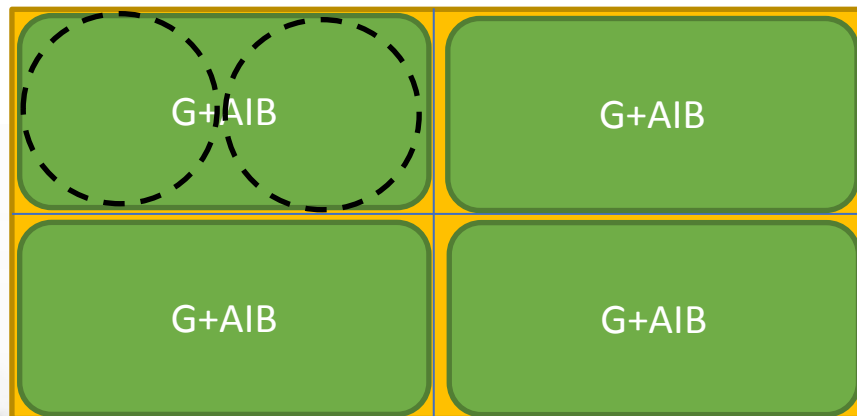
G+Al Battery calculations show 300 Wh/kg is possible with 1000 Wh/kg as the ultimate theoretical capacity.

G+AIB COOLING ADVANTAGES OVER LITHIUM BATTERIES FOR EVs



Expected no cooling advantage:

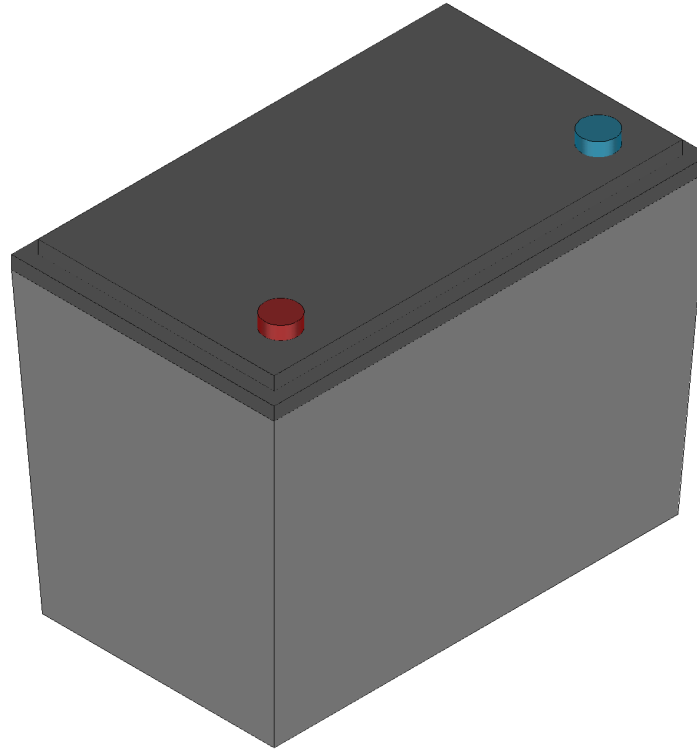
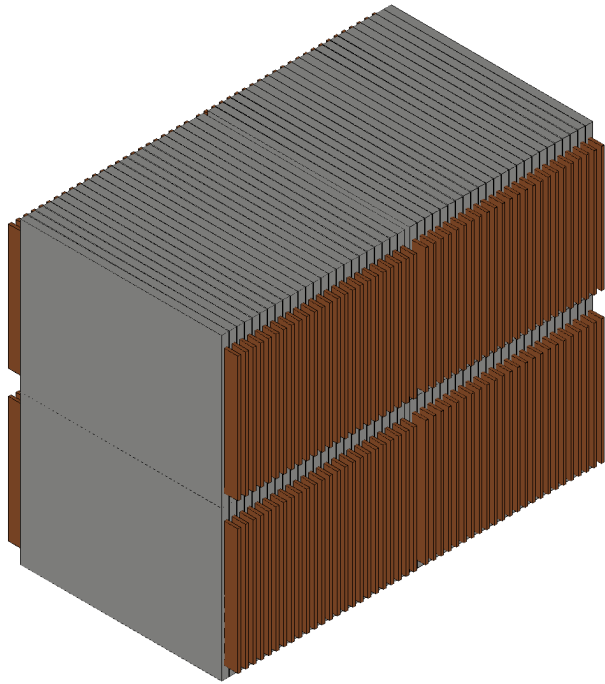
- weight of cooling (~ 20%),
- weight of battery housing (~ 5%)
- volume of cooling (~ 20%) and
- no energy needed for cooling (~ 5%)



Pouch vs cylindrical advantage:

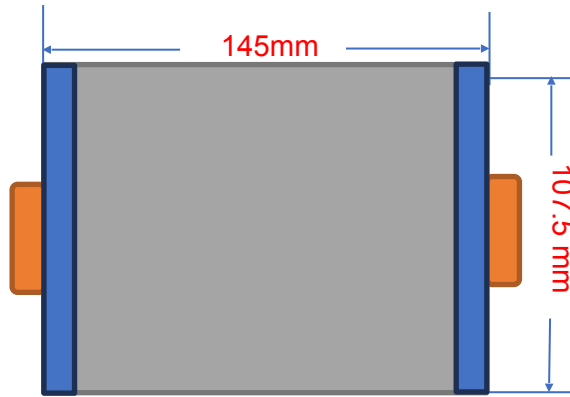
- volume efficiency improvement (~ 20%)

INITIAL 48 V MODULE DESIGN



- 56 x 1.7 Volts Cells
- 28 Series + 2
Parallels
- 11 Ah
- 48 V
- 500 Whr
- Volume: 10 L
- 50 Wh/L
- Cell to Density Pack
Ratio: 74.6%

3-Type of Pouch Cell Design

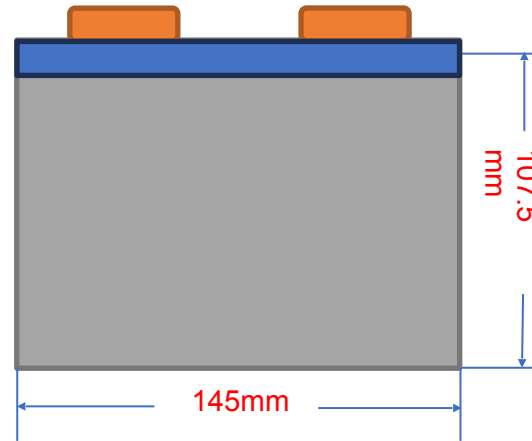


Cell Design 01

Cathode Active Area: $98 \text{ mm} * 86 \text{ mm} = 84.28 \text{ cm}^2$

Cell Capacity (25 Layer/14mm Thick): 4.8 Ah

Volumetric Energy Density: 44 Wh/L



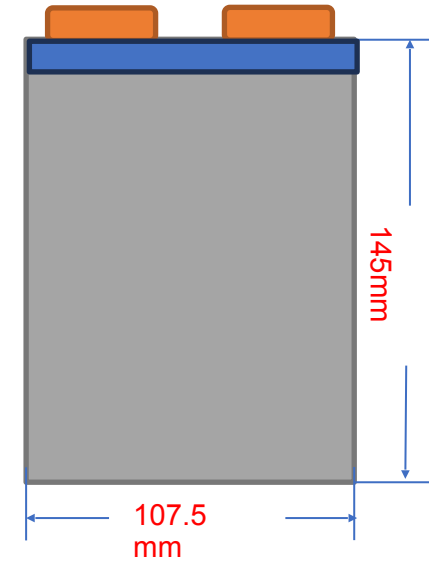
Cell Design 02

Cathode Active Area: $124 \text{ mm} * 74 \text{ mm} = 91.76 \text{ cm}^2$

+ 8.9% Cell Capacity and Volumetric Energy Density

Cell Capacity: 5.2 Ah

Volumetric Energy Density: 48 Wh/L



Cell Design 03

Cathode Active Area: $111 \text{ mm} * 87 \text{ mm} = 96.57 \text{ cm}^2$

+ 14.6% Cell Capacity and Volumetric Energy Density

Cell Capacity: 5.5 Ah

Volumetric Energy Density: 50 Wh/L

CELL TO MODULE TO PACK ROADMAP 2025

2023

- 500 mAh Cell
- 1000 mAh Cell
- Cell testing

- Battery Pilot Plant “A” type cells for JDA Partners
- Updated Module to JDA Partners
- Battery Pilot Plant “B” type larger cells for JDA Partners
- Commercial Sale Contracts



2024

- Cell to JDA Partners
- Battery Pilot Plant Construction
- Cell to Module
- Module to JDA Partners

2026

- Commercial Plant Construction



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October 2023 – Graphene Aluminum-Ion Battery



Graphene Manufacturing Group

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).

Guy Outen (Chair & Director)

Guy Outen has over 35 years of experience with Royal Dutch Shell plc in various roles including EVP Strategy & Portfolio where he worked with the Shell CEO and Board to create amongst other outcomes Shell's New Energies focusing on lower emissions. Guy Outen has a Bachelor of Commerce (Honours) and a Masters of Commerce (Economics) from Melbourne University. Guy Outen is a Senior Advisor to Boston Consulting Group, a Fellow Australian Society of Certified Practising Accountants (FCPA) and Chartered Governance Institute (FCG); a Member of the Institute of Directors UK and the Australian Institute of Company Directors (AICD).

Jack Perkowski (Non-Executive 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.

Rob Shewchuk (Non-Executive Director)

Rob Shewchuk has over 25 years of experience in executive and director experience. Rob is based in Calgary, Alberta, Canada. Rob is the President & CEO of LithiumBank Resources Corp, Director of GMG, Director of Spectre Capital Corp, and Director of Verses Technologies Inc. Rob began his career as an Equities Trader on the floor of the Alberta Stock Exchange in 1995 for Yorkton Securities Inc. Rob became a licensed broker at Yorkton in 1998 and worked on the Equities desk through 2004. Rob joined Standard Securities Capital Corporation where he became Chairman in 2006. Rob merged Standard Securities with Wolverton Securities Ltd in 2009 and became a Director of Wolverton Securities until 2016 when it was purchased by PI Financial Corp.

Emma FitzGerald (Non-Executive Director)

Emma FitzGerald has 25+ years of leadership experience with global businesses in the Water and Energy Sectors. Most recently she was CEO of Puma Energy focused on delivering affordable and sustainable energy solutions to emerging markets in Africa, Central America and Asia. Prior to this she ran gas, water and waste networks for National Grid and Severn Trent in the UK. She also spent many years running Downstream Retail, Lubricants and LPG businesses for Shell plc. around the world. Over the last ten years she has served on the boards of publicly listed, privately owned and not for profit organizations in both Executive and Non Executive Director capacities.

Will Ollerhead (Non-Executive Director)

Will Ollerhead has over 30 years of experience in the capital markets and corporate finance field. Mr. Ollerhead was the CEO of Cuspis Capital Ltd. and has served on several other boards of both public and private companies, and not-for profit organizations, as chairman, director, and as a member and chair of audit committees. He has operated Ollerhead Capital since its founding in 1997, providing corporate finance advisory services and managing a private investment portfolio.

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