



# Company Overview

**FINANCE NEWS NETWORK  
19 JUNE 2018  
SYDNEY**



*accelerating adoption of battery technologies  
for a cleaner energy future*

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## A Battery Technology Company

- We make high performance battery materials and testing equipment
- Our customers are leading battery makers, researchers and OEMs
- Operations in USA and Canada and sales in fourteen countries

## Experts Across the Battery Supply Chain

- Expertise from battery engineering/chemistry to cell mass production

## Owner of a World-Class Natural Graphite Deposit

- Mt Dromedary Graphite Project is large high grade deposit (18% TGC)
- Located in established mining region in Queensland, Australia

# BUSINESS UNITS



## 3 BUSINESS UNITS

## OWNERSHIP STAKE

## BUSINESS DESCRIPTION



100%

- Develops leading battery testing technologies and sells battery testing equipment and battery testing and consulting services
- Based in Canada with sales in 14 countries
- Established in 2013



50%  
(with right to achieve 75%)

- Developer of high performance graphite anode materials for the lithium ion battery market
- 50/50 joint venture with Coulometrics
- Currently building Phase 1 Production Capacity
- Based in USA
- Established in 2017

MOUNT DROMEDARY

**graphitePROJECT**

100%

- Large, world-class high-grade (18% TGC) natural graphite deposit located in established mining region in QLD, Australia
- Pending mining approval for 50KTPA base case
- Assessing opportunity to scale project up to 200ktpa
- Established in 2013

# BOARD OF DIRECTORS

## Chairman

Tony Bellas



## Managing Director

Philip St Baker



## Executive Director

Greg Baynton



## Non-Executive Director

Admiral Robert J. Natter



## Non-Executive Director

(effective date 1 July 2018)

Andrew N. Liveris AO



## Non-Executive Director

Robert Cooper





# EXECUTIVE TEAM

## Managing Director

Philip St Baker



## Executive Director

Greg Baynton



## CEO PUREgraphite Joint Venture

Dr Edward Buie



## CEO NOVONIX BTS

Dr Chris Burns



## CTO NOVONIX BTS

Dr David Stevens



## VP Business Development

Nick Liveris



## Mt Dromedary GM

Steve Hadwen

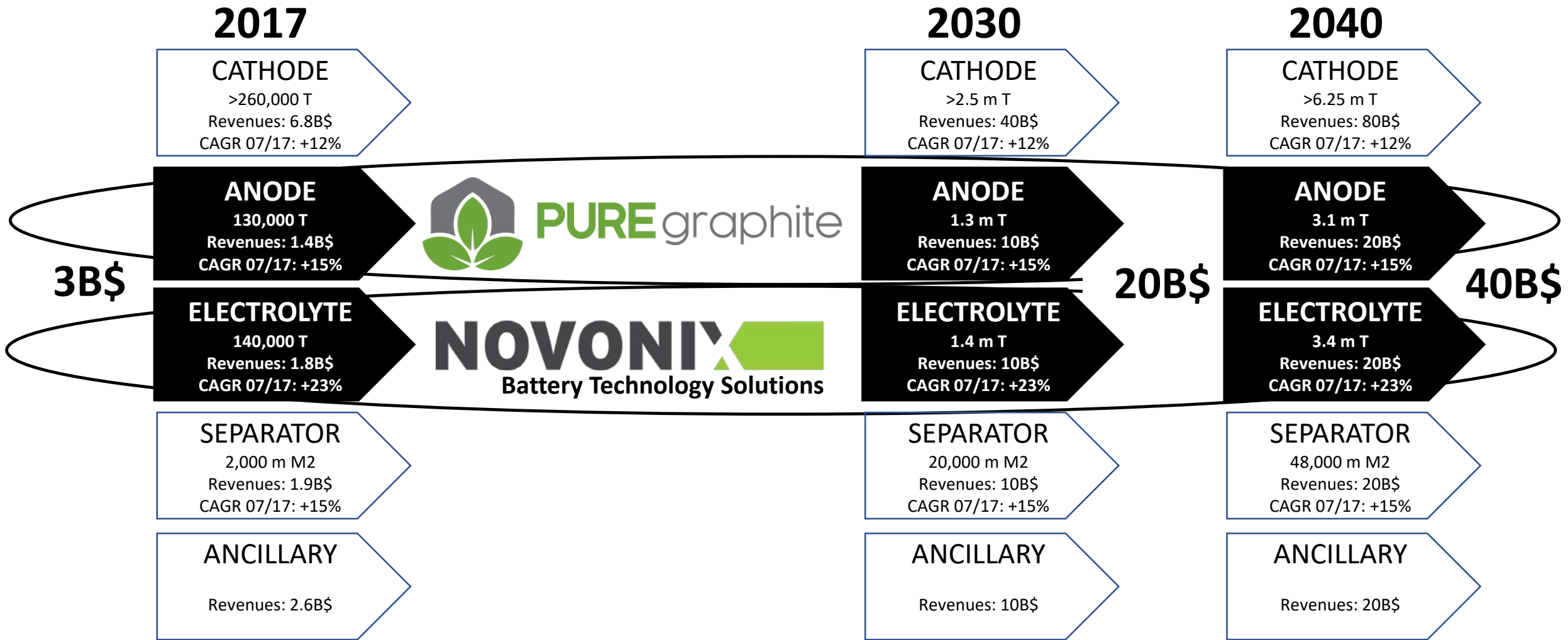


## CFO NOVONIX Group

Suzanne Yeates



# BATTERY SUPPLY CHAIN FOCUS



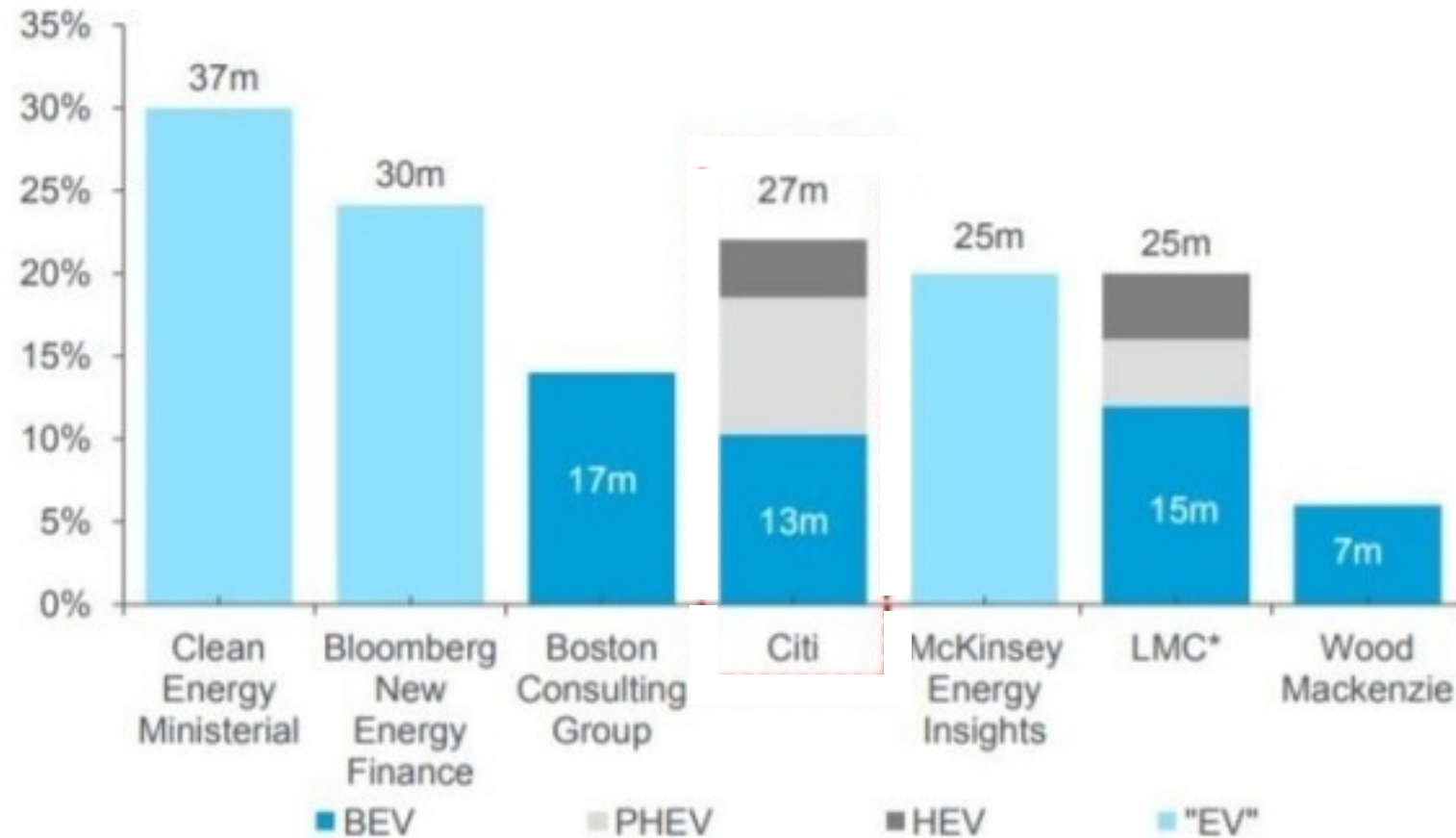
2017 Data Source: AVICEENE ENERGY 2018

2030 and 2040 Data Source: NVX estimate derived from independent (Bloomberg) forecast of growth in lithium-ion battery market.



# EV PENETRATION TO DRIVE BATTERY DEMAND

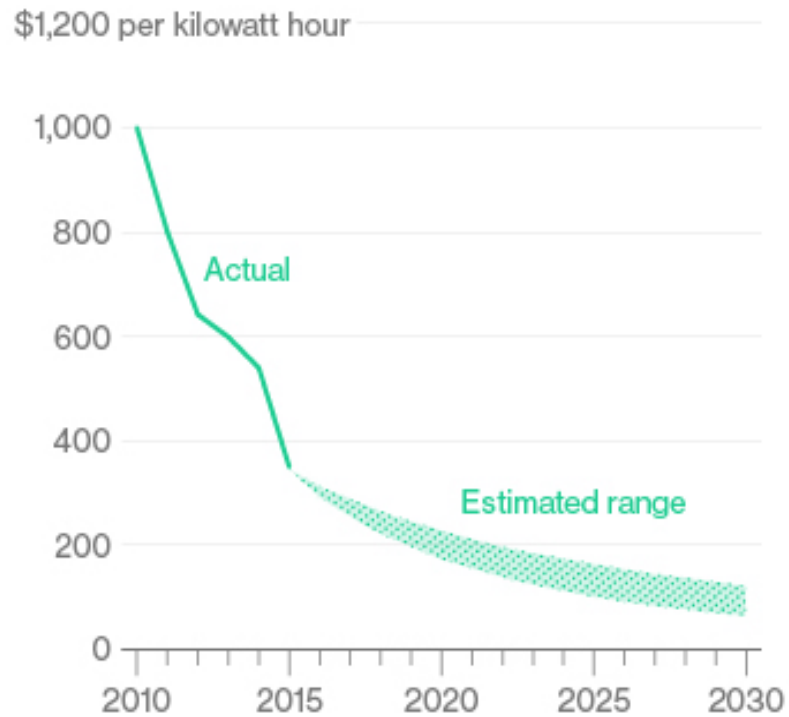
**Forecast EV Penetration (% of New Car Sales) in 2030 – average forecast is 24%**  
**Current EV Penetration (% of New Car Sales) in 2017 is ~1.5%**



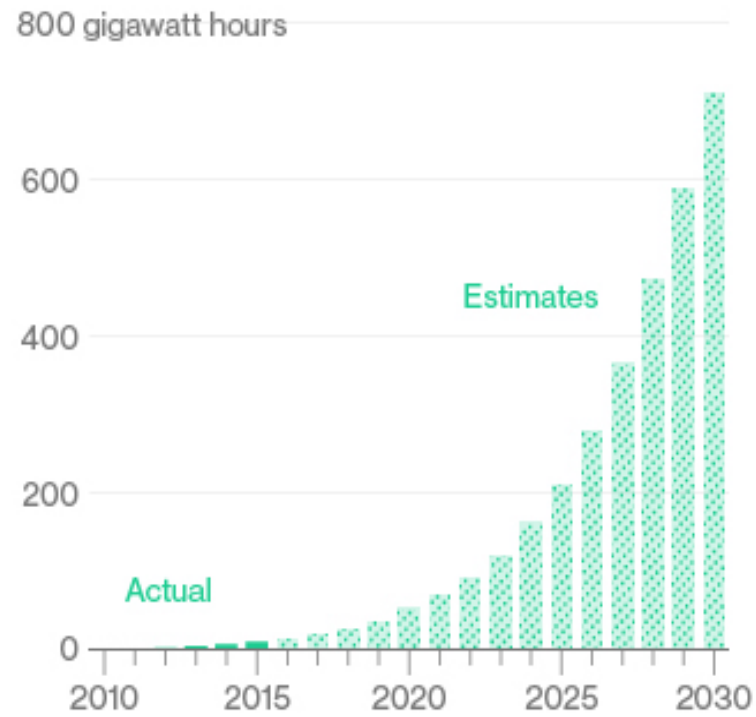
# IT'S ALL ABOUT THE BATTERIES

Batteries make up a third of the cost of an electric vehicle.  
As battery costs continue to fall, demand for EVs will rise.

Cost for lithium-ion battery packs



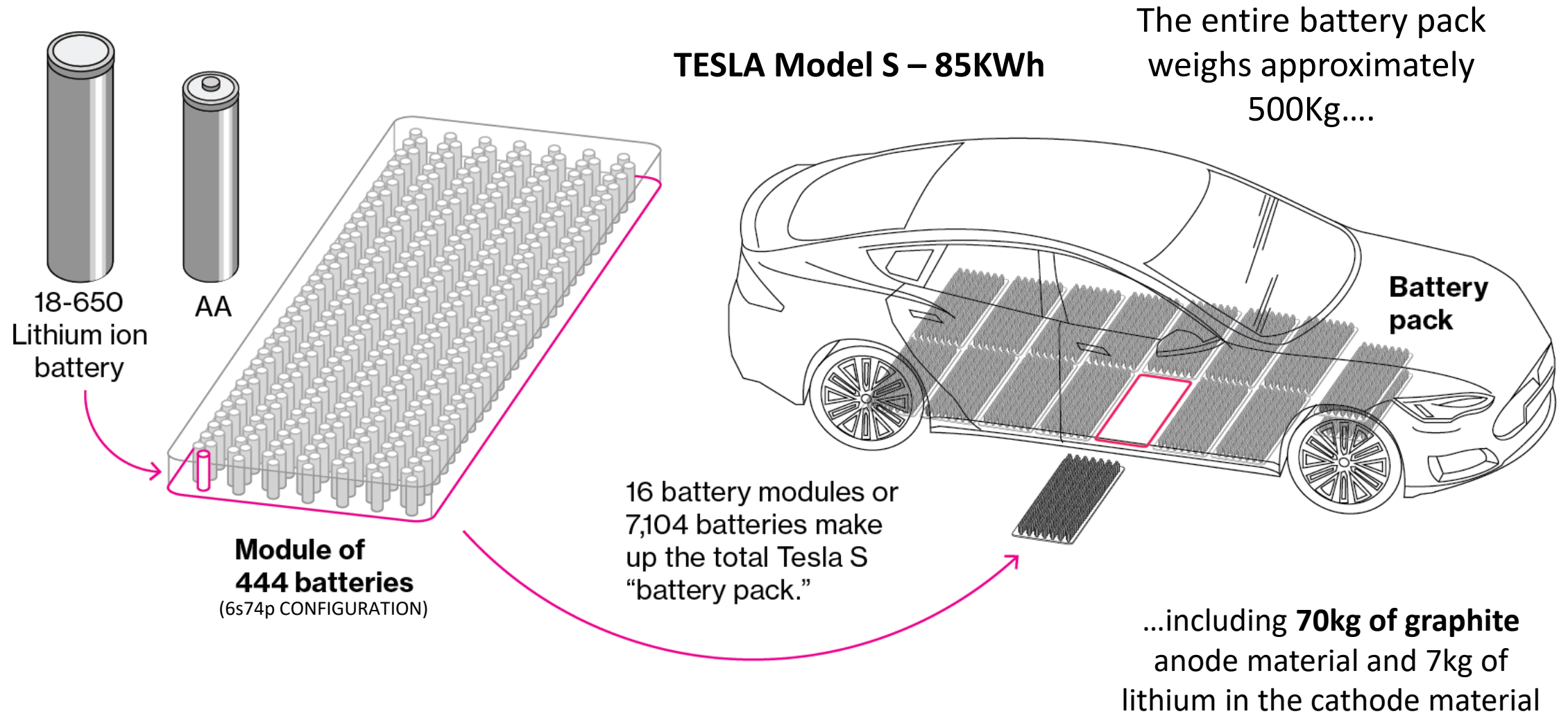
Yearly demand for EV battery power



Source: Data compiled by Bloomberg New Energy Finance



# BATTERIES AND EV - EXAMPLE



# EV ANNOUNCEMENTS



Volkswagen



## Major EV announcements from global auto makers

- 5 June 18 – Fiat Chrysler announces 30 new EV models and US\$9b EV investment by 2022
- 18 May 18 – VW announces it will need > 150GWh of battery capacity annually by 2025
- 26 March 18 – Nissan announces a target of 1 million EV sales by 2022
- 15 January 18 – Ford plans \$11 billion investment, 40 electrified vehicles by 2022
- 2 October 17 – GM announces two more EV models in 18 months and 20 more globally within six years
- 15 September 17 - VW announces plans to invest >EUR50 billion in battery cells
- 7 July 17 - TESLA announce it will build the world's largest grid battery which will be 129MWh in SA
- 5 July 17 - Volvo announced that from 2019 all new Volvo cars will have electric or hybrid engines
- 28 April 17 - VW announced plans to build 2-3 million EV's pa by 2025 and 30 different EV models

## Major EV related announcements from Governments

- 9 September 17 - China flags a long-term plan to phase out vehicles powered by fossil fuels
- 6 July 17 - France announced that France will end sales of petrol and diesel vehicles by 2040
- China, UK, France and India all signalled plans to ban/limit sales of vehicles powered with gasoline or diesel fuels in coming decades and California's Air Resources Board considering similar moves

# BATTERY PRODUCTION GROWTH

## 6X growth in Lithium-ion megafactories by 2020 – Source: BENCHMARK MINERALS

### CHINA IS LEADING THE CHARGE

Lithium-ion megafactories in China to grow capacity 6X by 2020



Global lithium-ion battery production capacity will increase by **521%** between 2016 and 2020.

Capacity in  
**2016**



**28**  
GWh

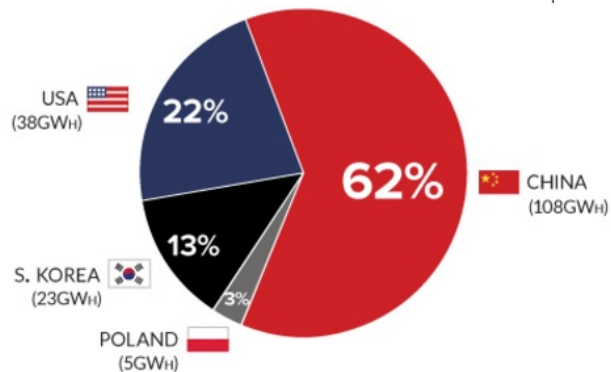
Capacity in  
**2020**



**174**  
GWh



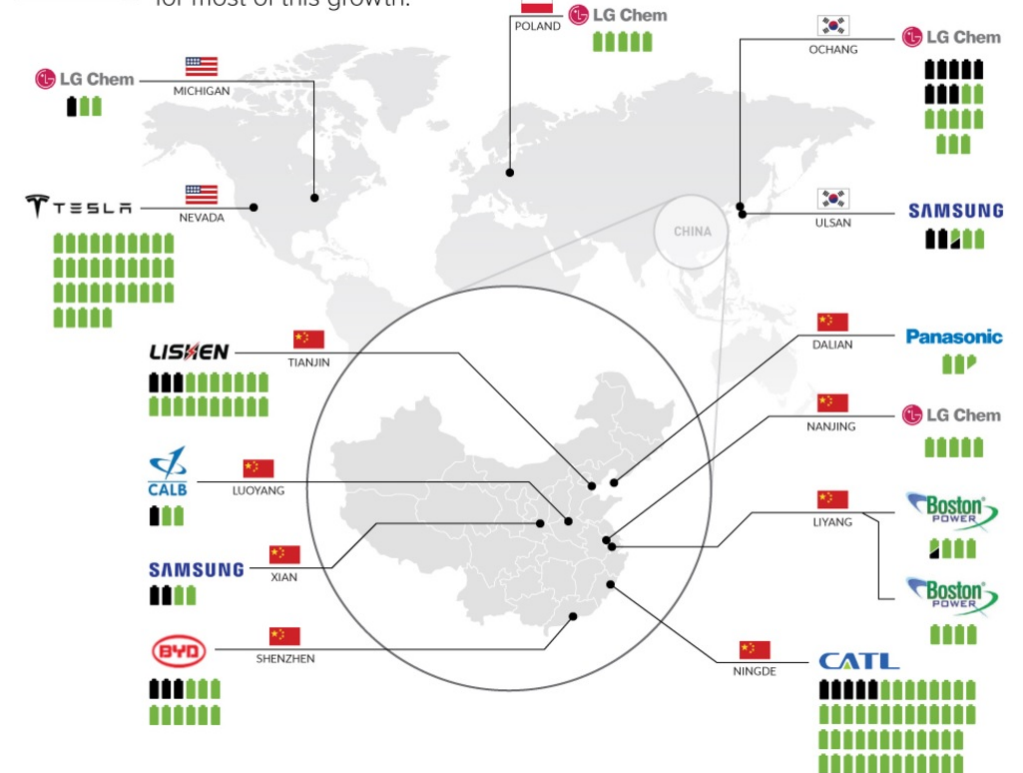
Data by:



By 2020, mass production of lithium-ion batteries will still be concentrated in just **four countries**.



China's battery sector continues to be a hub for most of this growth.







# ABOUT BATTERY TECHNOLOGY SOLUTIONS (BTS)



- BTS HQ in Canada, spun out of Prof. Dahn's lab at Dalhousie (DAL) in 2013
- Makes the most accurate battery cell test equipment in the world
- Used by leading battery makers, researchers and OEMs
- Allows researchers to predict battery life in weeks rather than years
- Our pilot battery cell production line will be operational by July 2018
- Expertise from battery chemistry to battery cell mass production
- Electrolyte development program



**Dr Chris Burns – CEO & GROUP COO**

## **NOVONIX BTS is supported by:**



Government  
of Canada

Gouvernement  
du Canada



Atlantic Canada  
Opportunities  
Agency

Agence de  
promotion économique  
du Canada atlantique

# NOVONIX BTS CUSTOMERS



For confidentiality reasons there are a number of major global automakers, battery makers, medical device and electronics companies that are customers but cannot be represented.

# RECENT HIGHLIGHTS



- **Strong sales growth this year, expected to be above 30% YOY**
- **Ten “Fortune 500” companies have placed equipment orders in the last year**
- **Battery cell pilot line currently being installed at our facility in Halifax Canada**
- **Our in-house electrolyte development program recently commenced**
- **Recent appointment of Ken Broom - the Ex-COO of the 5th largest Chinese battery maker**

# NOVONIX BATTERY CELL PILOT LINE



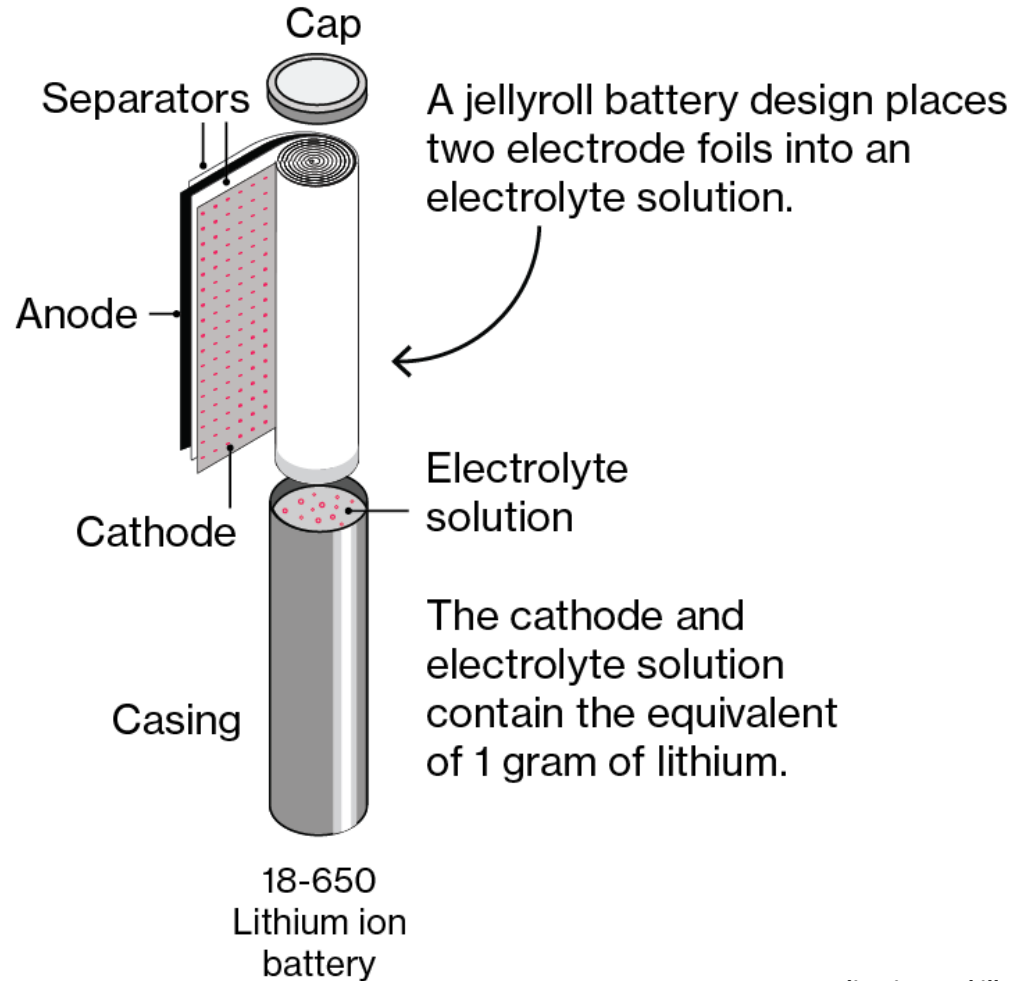
**Photo: The NOVONIX Canada team busy installing and commissioning our battery cell pilot line**

# PUREgraphite – ANODE MATERIAL PRODUCTION



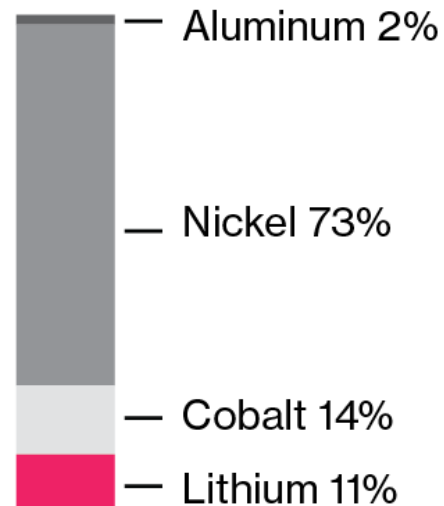


# GRAPHITE IS A KEY COMPONENT OF A LITHIUM ION BATTERY

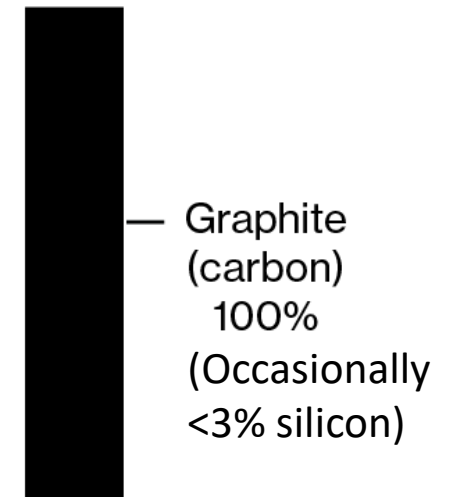


Active materials in a typical Lithium Nickel Cobalt Aluminum Oxide battery

## Cathode



## Anode



*Note: Indicative and illustrative information with approximations applied*



# HOW MUCH GRAPHITE ANODE MATERIAL IS INSIDE?



## CYLINDRICAL BATTERY CELLS

## APPLICATIONS



**~ 10kg ~ US \$100**  
(~20% of battery cell weight)

**~1,000 cells**  
(18650 size)

**HOME STORAGE**  
13.5 kWh  
(Ave home use 20 kWh/day)



**~ 70kg ~ US \$700**

**~7,000 cells**  
(18650 size)

**ELECTRIC VEHICLE**  
80 kWh  
(400km+ full charge range)



**~ 90t ~ US \$900,000**

**~9,000,000 cells**  
(18650 size)

**GRID STORAGE**  
130 mWh  
(size announced for SA)

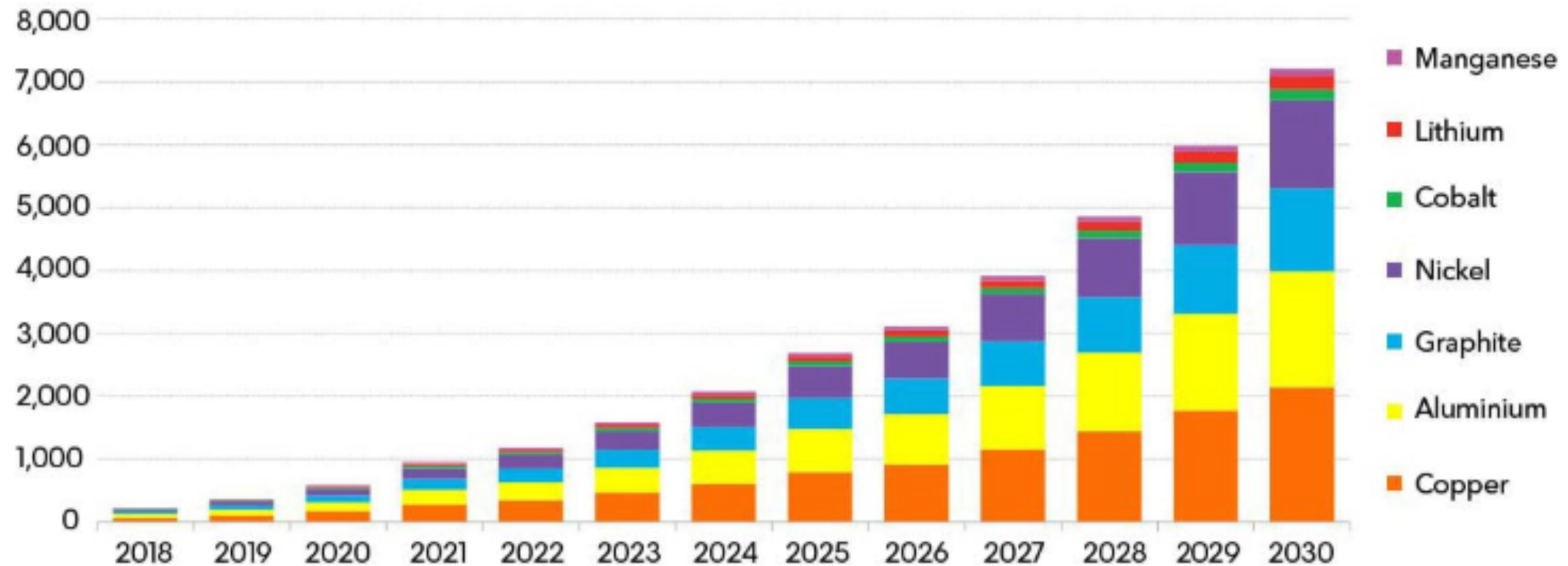


*Note: Indicative and illustrative information with approximations applied*

# GRAPHITE DEMAND TO INCREASE TO OVER 1MT 2030

## Metals and materials demand from lithium-ion battery packs in passenger EVs

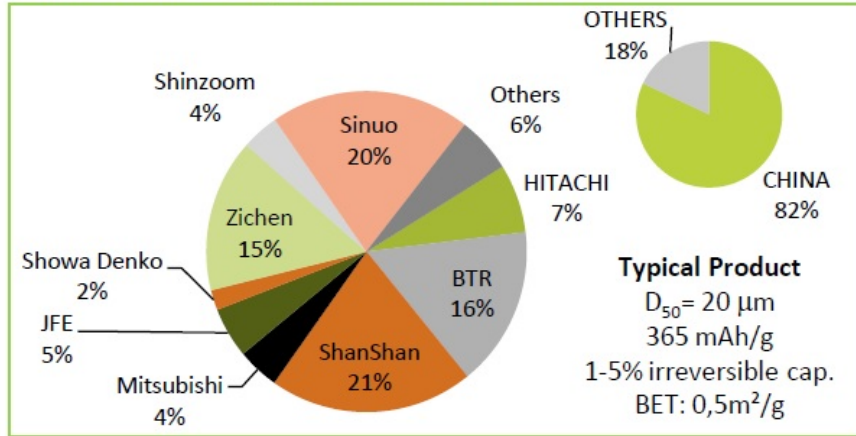
Thousand metric tons



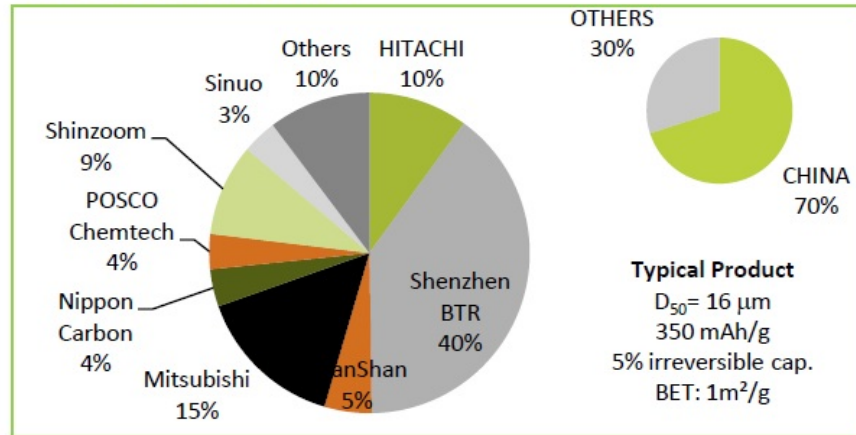
Source: Electric Vehicle Outlook 2018, Bloomberg New Energy Finance. Note: Copper includes copper current collectors and pack wiring. Aluminium includes aluminium current collectors, cell and pack materials and aluminium in cathode active materials.

# LIMITED ANODE SUPPLIERS – DOMINATED BY CHINA

## Artificial Graphite Offer in 2016



## NG Offer in 2016



SOURCE: AVICENNE ENERGY 2017



- Asia supplies almost 100% of anode materials for lithium-ion batteries world wide
- Most of anode supply is from China
- If the anode product is not from China, the graphite feedstock material most likely is
- China also dominates the global graphite concentrate market
- Alternative supply options are being sought by battery makers

# SUMMARY - BATTERY ANODE MARKET OPPORTUNITY



- Demand for graphite anode material suitable for long life high performance lithium-ion batteries is rapidly growing
- The ~USD\$1.4B market is set to double in the next three years and growth 15X in the next twenty years
- There are very few suppliers who can manufacture high performance materials suitable for long life EVs
- Almost 100% of supply is from China or based on China graphite feedstock
- PUREgraphite has demonstrated it can make materials that can compete on performance and cost against the best-in-class materials



# BUILDING A COMPETITIVE U.S. GRAPHITE ANODE PRODUCER



- USA-based 50:50 Joint Venture between NOVONIX and Coulometrics established in 2017
  - NVX has an option to increase its interest to 75% of the Joint Venture and 100% of all production above 1,000tpa.
- PUREgraphite is focused on U.S. production of graphite anode materials for lithium-ion batteries promoting:
  - Lower Cost
  - Longer Life
  - Higher Charge Rate
  - Sustainability
  - Security
  - Safety

# BUILDING ON INTELLECTUAL PROPERTY & TRADE SECRETS



**PURE** graphite



**Coulometrics**

## Intellectual Property

- PUREgraphite has acquired and is commercialising intellectual property and trade secrets developed by Coulometrics and its founder Dr Edward Buie over more than two decades and including the development of proprietary particle coating technology and spherical graphite processing

**Coulometrics graphite anode research has been supported by:**



National Science Foundation  
WHERE DISCOVERIES BEGIN

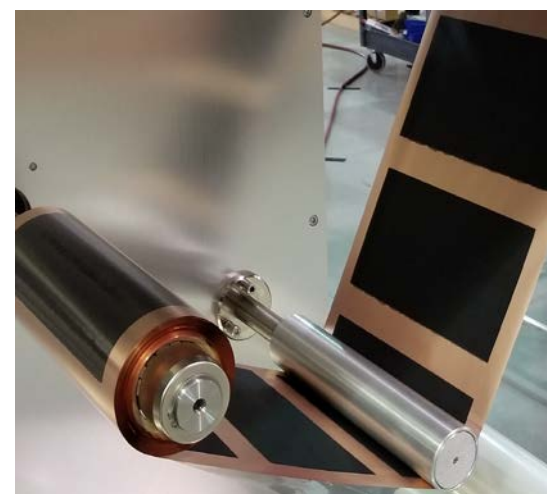
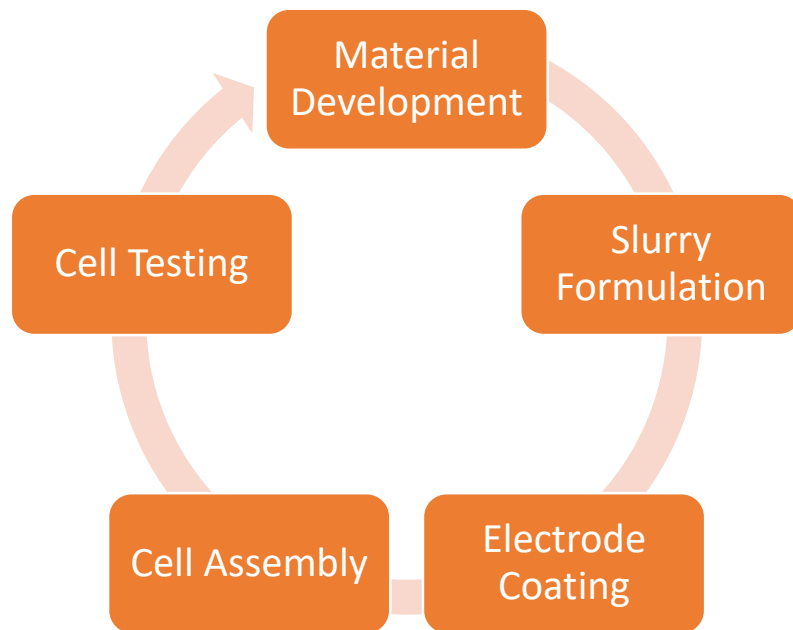
National Science Foundation Grant No. 1315040  
**(CVD Process for Coating Graphite)**



US Department of Energy Grant No. DE-SC0015953 **(High yield spheronization)**



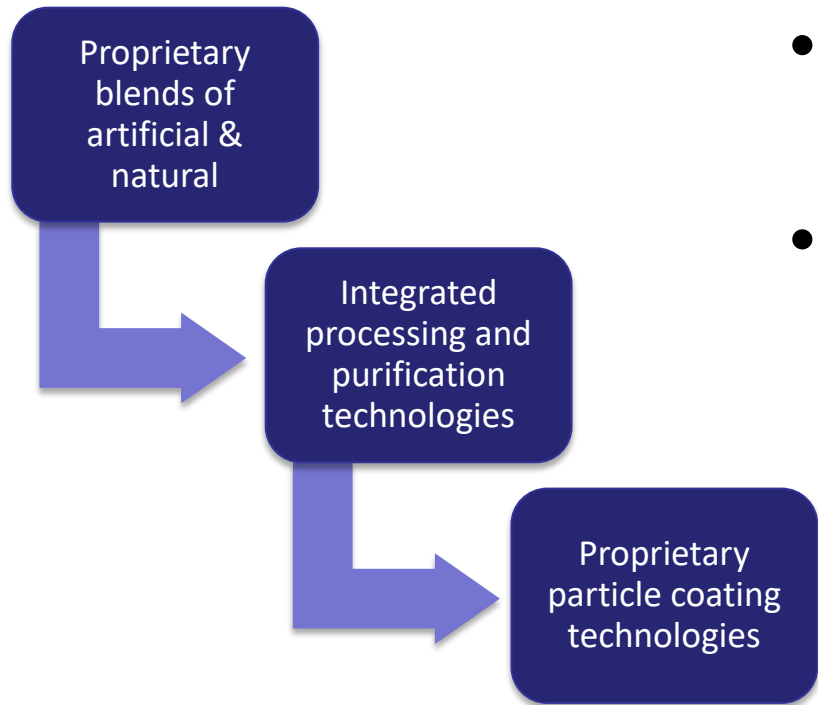
# THE PUREgraphite R&D ADVANTAGE



# THE PUREgraphite PRODUCT ADVANTAGE



**PURE**graphite



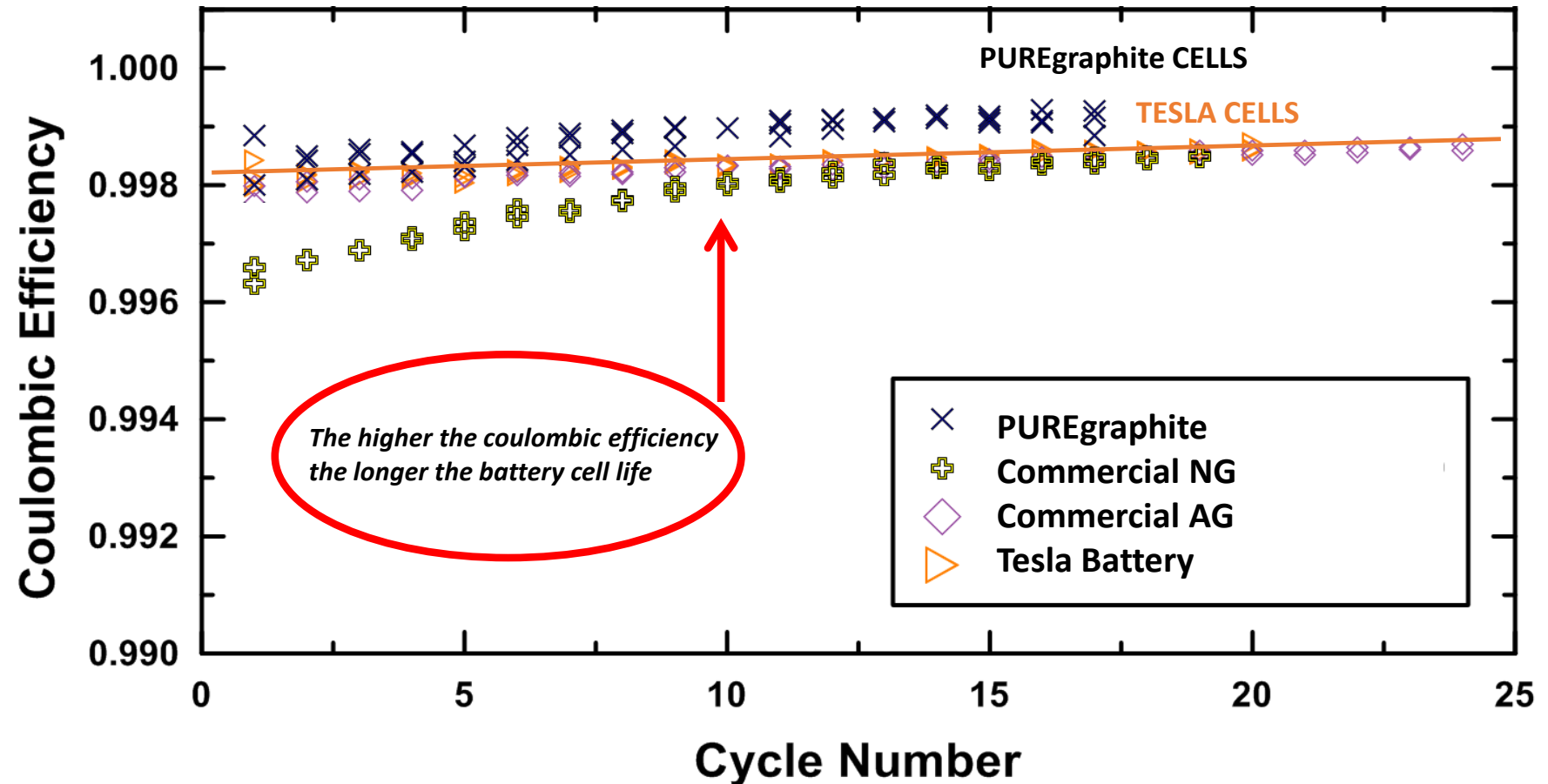
- **Secure supply**, made in the USA
- **Better performance** and cost over imports
  - Battery life improvement up to 30%
- **Based on**
  - Proprietary blends of artificial and natural graphite
  - Integrated processing and purification technologies
  - Proprietary particle coating technologies
  - Low cost and low emission energy sources
  - Secure and sustainable supply chain
  - No chemical purification using HCL/HF

# THE PUREgraphite PRODUCT ADVANTAGE



## PUREgraphite's high-performance anode material:

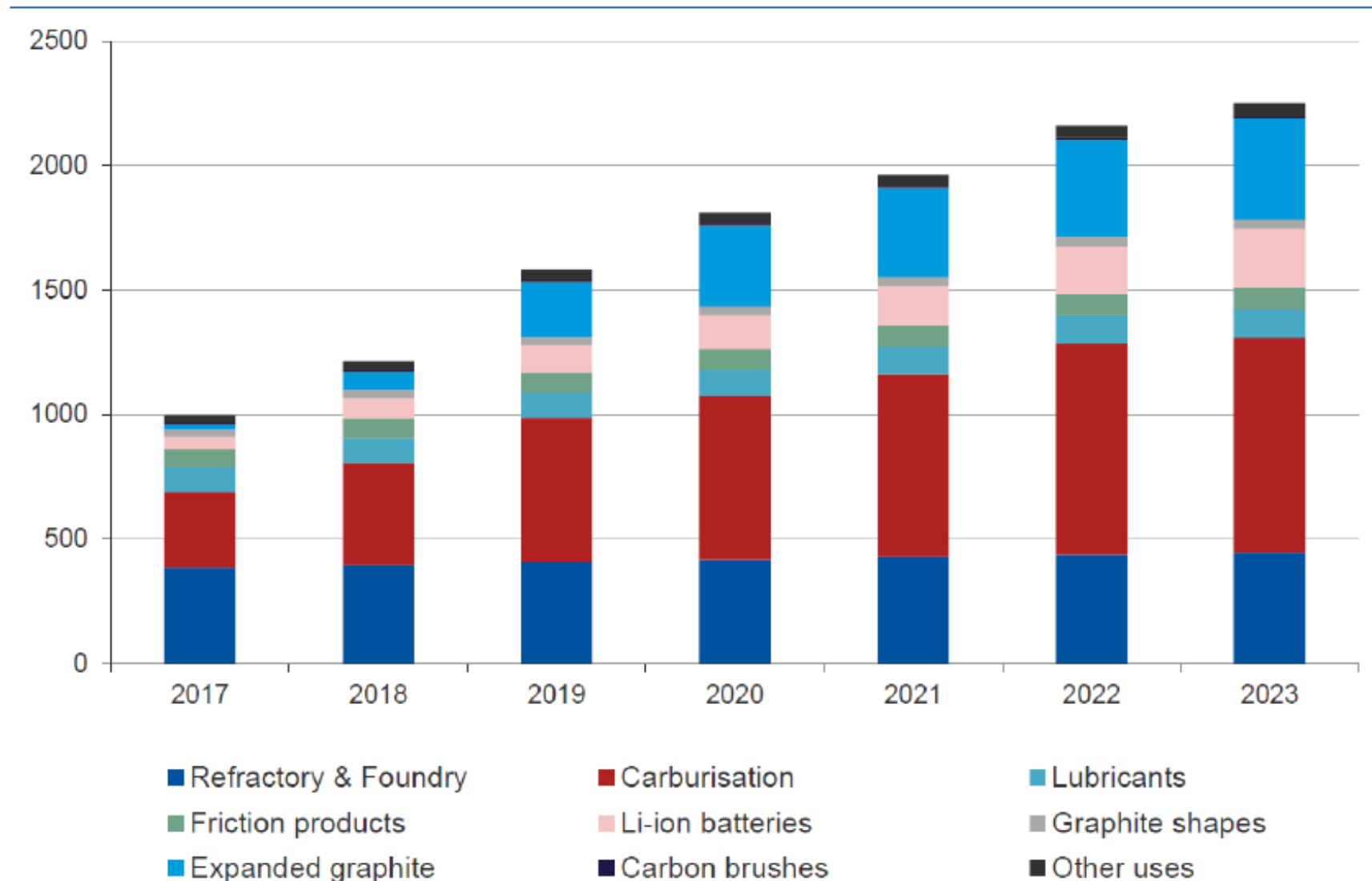
- Consistently demonstrates very high coulombic efficiency performance against industry benchmarks
- Coulombic efficiency directly relates to battery life



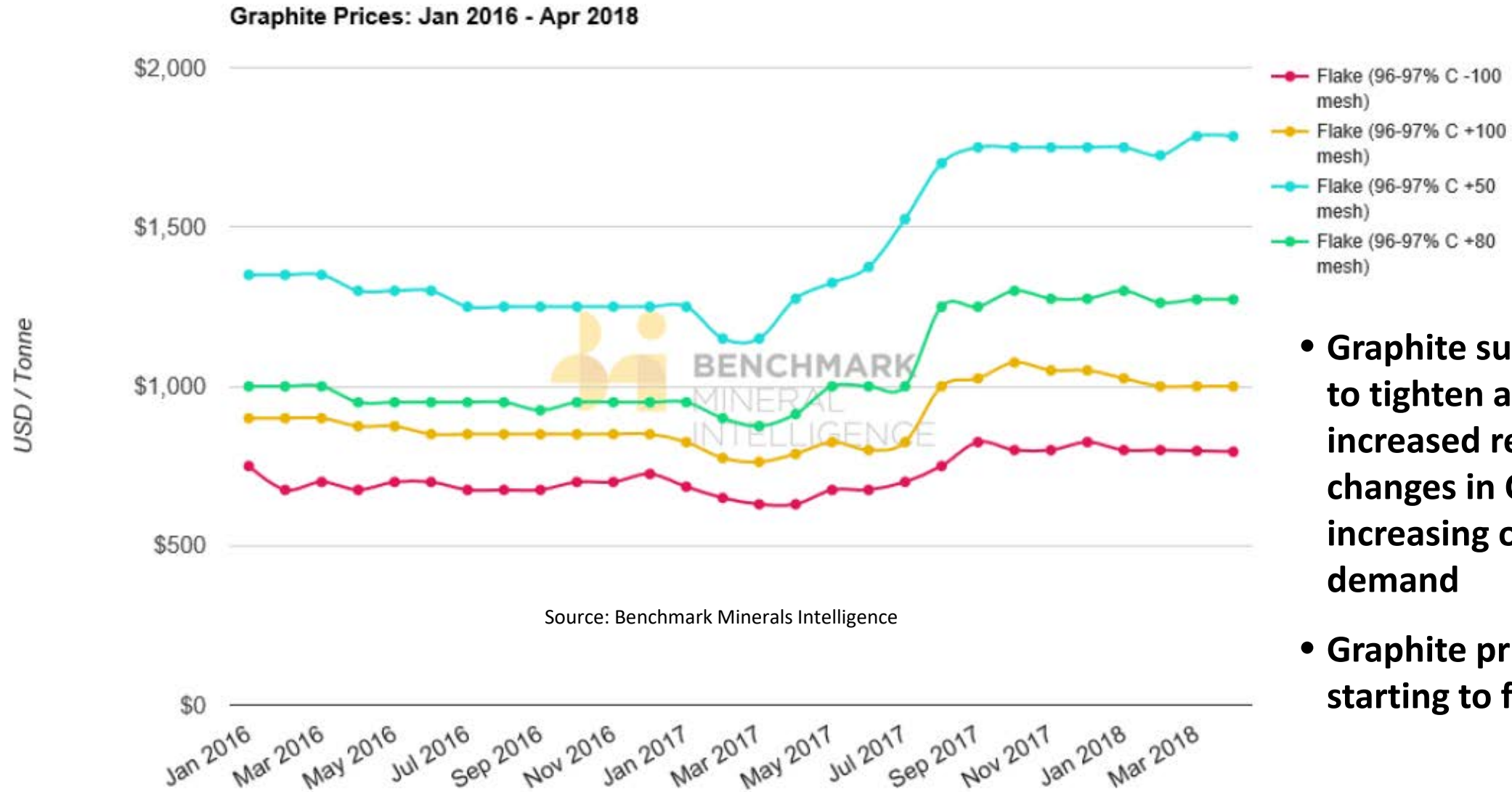
MOUNT DROMEDARY

**graphitePROJECT**

# NATURAL GRAPHITE DEMAND FORECAST (KT)



# NATURAL GRAPHITE PRICES USD\$



- Graphite supply starting to tighten again with increased regulatory changes in China and increasing overall demand
- Graphite pricing is also starting to firm



# MOUNT DROMEDARY VALUE PROPOSITION

MOUNT DROMEDARY

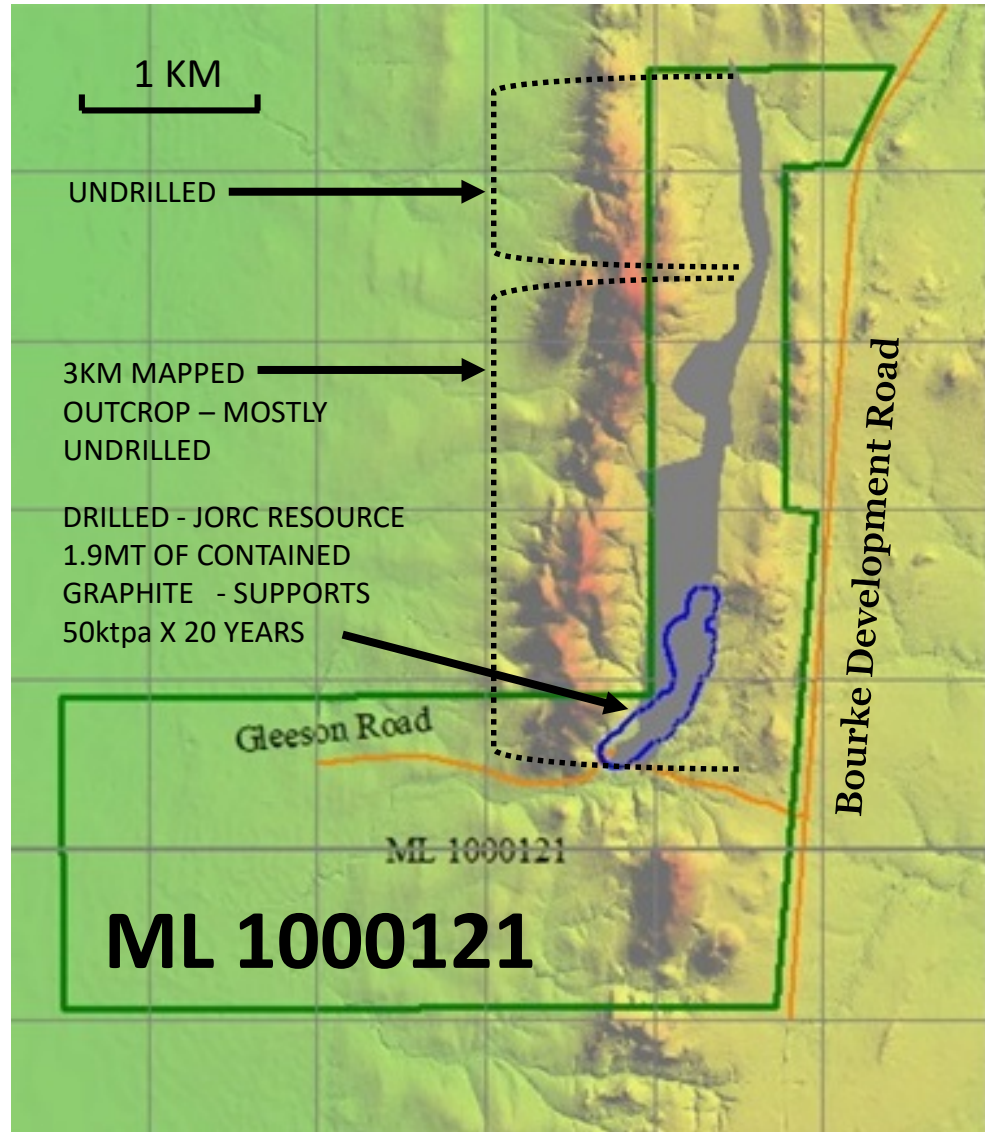
**graphitePROJECT**

Unique Large-Scale Resource	Access to Market and Infrastructure	Concentration and Purification Expertise	License to Operate
<p>World-class, high-grade (18%+) graphite deposit</p> <p>Large - 1.9Mt contained graphite from 20 – 30% of known and expected mineralization areas - Potential for up to 200KTPA</p> <p>Very low strip-ratio (outcropping over 3km)</p>	<p>Adjacent (&lt;1km) to sealed highway connecting to multiple export ports</p> <p>Bulk and containerised export options</p> <p>Attractive back-haul and container transport capacity (road and ocean)</p>	<p>Extensive metallurgical testing done to determine suitability for producing a export grade concentrate</p> <p>NOVONIX has undertaken both thermal and chemical purification trials upgrading the concentrate to lithium-ion battery grade</p>	<p>Well-established mining province</p> <p>Excellent local and state government relationships and support</p> <p>Local community support and encouragement</p>

# SCALE-UP OPPORTUNITY – MT DROMEDARY

MOUNT DROMEDARY

**graphitePROJECT**



- Only 20 – 30% of the known and expected graphite mineralization areas have been drilled
- Significant opportunity to enlarge the resource and scale the project

# MINERAL RESOURCE ESTIMATE

MOUNT DROMEDARY

graphitePROJECT

- Large high grade graphite deposit with 8.5mt at average 18.4% TGC derived from 20-30% of the mapped and expected mineralization areas

Table 1-1 – Mt Dromedary October 2016 Mineral Resource Estimate (4% Total Graphitic Carbon Cut-off)

Domain	Type	Total Mineral Resource			Cont. Graphite kt
		Tonnage Mt	TGC %	TC %	
High Grade (>10% TGC)	Weathered	1.3	17.5	18.8	227
	Primary	7.2	18.6	19.5	1,335
	<b>Sub-Total</b>	<b>8.5</b>	<b>18.4</b>	<b>19.4</b>	<b>1,562</b>
Medium Grade (4 to 10% TGC)	Weathered	0.9	5.7	6.7	51
	Primary	5.0	6.0	6.6	295
	<b>Sub-Total</b>	<b>5.8</b>	<b>5.9</b>	<b>6.6</b>	<b>346</b>
	<b>Total</b>	<b>14.3</b>	<b>13.3</b>	<b>14.2</b>	<b>1,908</b>

Note:

1. Totals may differ due to rounding. Mineral Resources reported on a dry in-situ basis.
2. Flake sizes for the Mineral Resource is tabulated in Table 1-2 to Table 1-4.
3. The Statement of Estimates of Mineral Resources has been compiled under the supervision of Mr. Robert Dennis who is a full-time employee of RPM and a Member of the AusIMM and AIG. Mr. Dennis has sufficient experience that is relevant to the style of mineralisation and type of deposit under consideration and to the activity that he has undertaken to qualify as a Competent Person as defined in the JORC Code (2012).
4. All Mineral Resources figures reported in the table above represent estimates at 12<sup>th</sup> October, 2016. Mineral Resource estimates are not precise calculations, being dependent on the interpretation of limited information on the location, shape and continuity of the occurrence and on the available sampling results. The totals contained in the above table have been rounded to reflect the relative uncertainty of the estimate. Rounding may cause some computational discrepancies.

5. Mineral Resources are reported in accordance with the Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves (The Joint Ore Reserves Committee Code – JORC 2012 Edition).
6. Subsequently Graphitecorp has progressed detailed metallurgical testwork including production of a large sample of product for customer testing. Talks with potential customers have commenced. The Competent Person is of the opinion that because of these activities which are in progress, but are confidential in detail and product specification, there is a reasonable expectation a saleable product and customer will be secured.
7. Reporting cut-off grade selected based on the results of the Mt Dromedary Graphite Project Scoping Study conducted by RPM during August 2016. The Scoping Study indicated that a break-even cut-off grade for the Mt Dromedary Mineral Resource is 4% TGC, assuming a product (very fine) price of \$US800/t, a 95% TGC average concentrate grade and an open pit mining method.
8. TGC = total graphitic carbon.

# SUMMARY INVESTMENT HIGHLIGHTS



## **Established brand in the rechargeable lithium-ion battery industry**

- NOVONIX is an established brand name known for making the most accurate battery cell test equipment in the world

## **Global footprint of blue-chip customers and sales in 14 countries**

- Our battery cell test equipment now used by leading battery, auto and equipment makers and researchers including PANASONIC, CATL, BOSCH, DYSON, 3M, Alcatel-Lucent, DALHOUSIE University, Pacific Northwest National Laboratory, Helmholtz Institute and many others

## **Innovative new products and process being commercialised in large growing market**

- Developing and commercialising new innovations in battery anode materials, anode manufacturing processes, battery cell test equipment and electrolytes

## **Backed by a large world-class natural graphite resource in Australia**

- NOVONIX owns a large high grade, long-life natural graphite deposit in Queensland, Australia (18% TGC)

## **Backed by a board experienced in building and running billion dollar businesses**

- Extensive experience in BD, resources, energy, advanced materials, battery industry, project financing, project delivery, operations and scaling

## **Highly-incentivised Board and Management**

- The Board and Management hold ~45% of the equity in the company

## **Opportunity to position at an early stage in a global market with exponential growth**

- Exponential demand for rechargeable lithium-ion batteries being driven by EV and energy storage demand growth

# NOVONIX CONTACT INFORMATION



## CORPORATE

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Telephone: +1 989 859-3213

### **Brisbane, Queensland, AUSTRALIA**

Contact: Greg Baynton

Email: [greg@novonixgroup.com](mailto:greg@novonixgroup.com)

Level 12 – 114 Edward Street

Brisbane, Qld, Australia

Telephone: +61 414 970 566

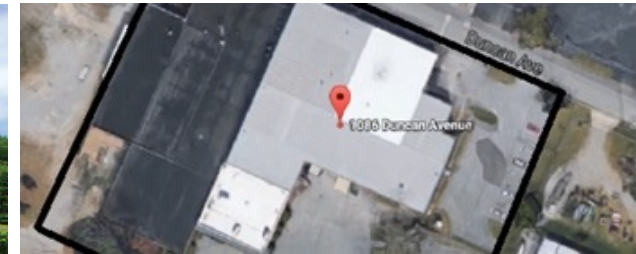
### **USA & AUSTRALIA**

Contact: Philip St Baker

Email: [phil@novonixgroup.com](mailto:phil@novonixgroup.com)

Telephone: +1 970 376 4918

Telephone: +61 438173330



## **BATTERY TECHNOLOGY SOLUTIONS (BTS) FACILITY**

**Bedford, Nova Scotia, CANADA**

Contact: Dr Chris Burns

Email: [chris@novonixgroup.com](mailto:chris@novonixgroup.com)

177 Bluewater Road, Bedford, NS B4B 1H1,  
Canada

## **PUREgraphite BATTERY MATERIALS DEVELOPMENT FACILITY**

**Chattanooga, Tennessee, USA**

1084 Duncan Avenue, Chattanooga, TN,  
37404, USA