NOVONIX

# AGM Presentation

*Accelerating adoption of batteries for a cleaner energy future*

Thursday, 21 November 2019

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# Contents



# CORPORATE INFORMATION

| STOCK INFORMATION @ 20 November 2019 | |
|---|---|
| ASX Code | NVX |
| ASX Share Price | A$0.515 |
| 52 Week Low - High | A$0.36 – A$0.73 |
| Shares on issue | 128.14m |
| Market Capitalisation | A$66m |

| CASH POSITION @ 30 September 2019 | |
|---|---|
| Cash available | A$3.6m |

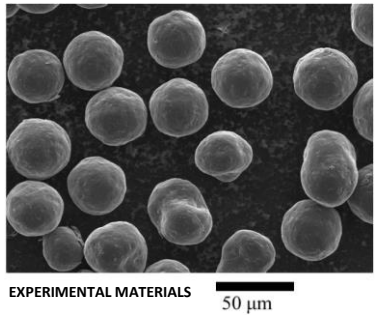
| FINANCIAL INFORMATION FY2019 | |
|---|---|
| FY2019 Revenue | A$1.8m |
| Total Assets @ 30 June 2019 | A$34.9m |
| Total Liabilities @30 June 2019 | A$19.2m |

| SHAREHOLDINGS | (m) | % |
|---|---|---|
| Board and KMP – ordinary shares | 51.8 | 40% |

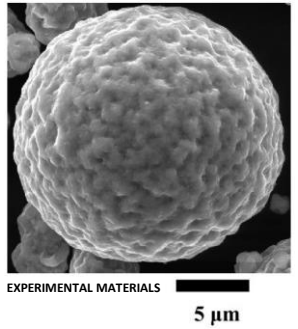
# Primary activities

## NOVONIX is an international battery materials and technology company

- **Manufacturer of battery anode material (PUREgraphite)**
  - Premium high capacity long-life graphite anode material
  - Product qualified by multiple global battery makers
  - Manufacturing plant being commissioned in the USA
  - Commercial production to commence in Q4 2019




- **Supplier of battery technology solutions (BTS)**
  - NOVONIX test equipment accelerates R&D from years to weeks
  - Battery testing equipment used by battery & OEM multinationals
  - Battery pilot line & lab supporting internal and customer projects
  - Based in Canada with sales in 14 countries



# FY2019 Highlights

**Corporate**

- Increase ownership of PUREgraphite from 50% to 100% (FY Q3 & Q4)

**PUREgraphite**

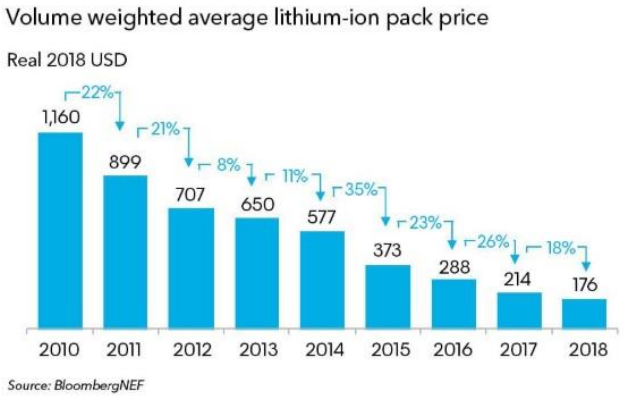
- Soft launch of first commercial product for testing by a select number of battery makers (Q3)
- Regular technical & business development meetings with global battery-makers (Q3 & Q4)
- **Product qualified with two global battery makers**
- Relocation of operations to a larger facility with substantial expansion capacity (Q4)
- Off site manufacturing of commercial processing equipment & on-site preparation (Q3 & Q4)

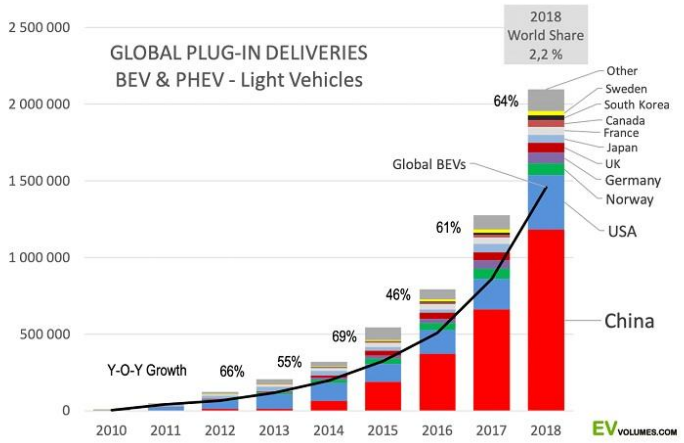
**Battery Technology Solutions (BTS)**

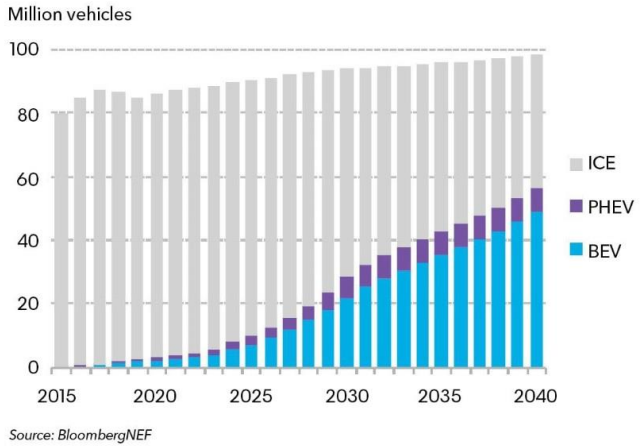
- Commenced strategic battery R&D partnership with Dalhousie University (Q1)
- Filed for provisional patents for a new battery materials and associated manufacturing process
- Rapid growth in service contracts for newly offered cell design, cell building and materials evaluation
- Commercialising proprietary Differential Thermal Analysis (DTA) testing technology

# The virtuous cycle of electric vehicles

## Battery price reduction driving EV sales driving battery price reduction



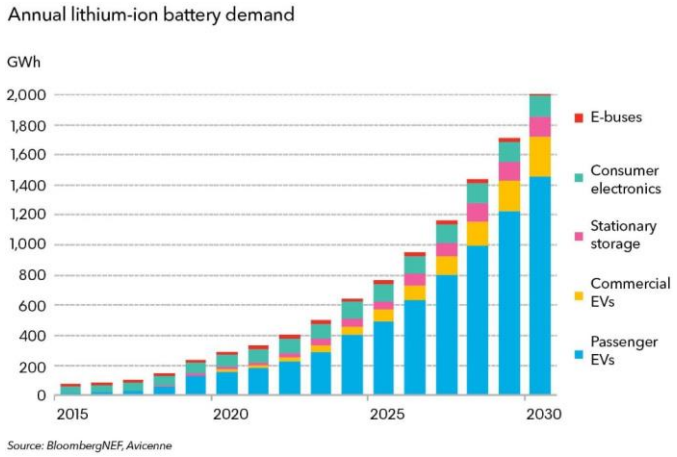

A staggering 85% reduction in the volume weighted average price of a lithium-ion battery pack in just nine years and more to come.

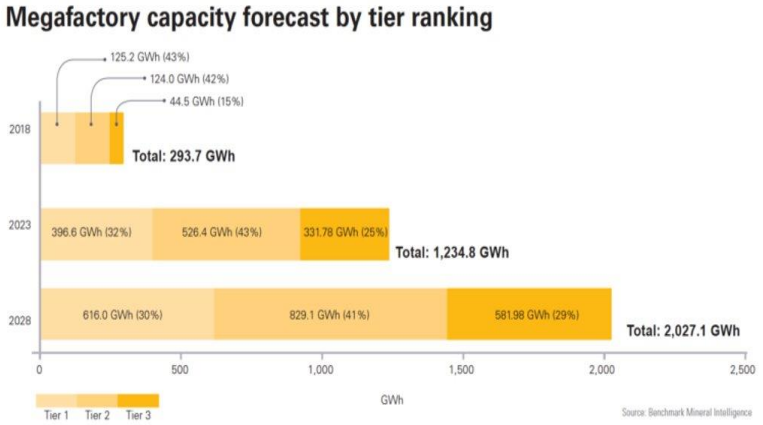
Over 2 million electric vehicles were sold in 2018 up from just a few thousand in 2010 and there is no sign of slowing down.

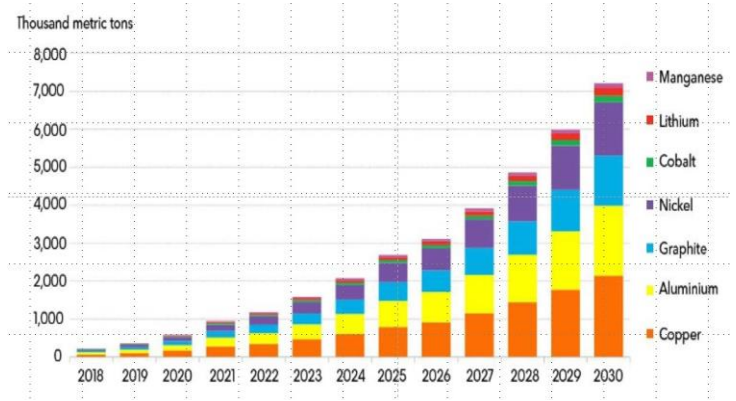
Bloomberg NEF expect annual passenger EV sales to rise to 10 million per year in 2025, 28 million in 2028 and 56 million by 2040.

# Electric vehicle supply chain demands

## More EV's, more batteries, more battery factories, more battery materials




Demand for premium high capacity long life lithium-ion batteries is expected to grow ten-fold by 2030

There are now 99 megafactories in the pipeline with over 2,000 gigawatt hours (GWh) of capacity in the industry's pipeline for 2028.

Demand for premium high capacity long life battery materials is expected to grow ten-fold by 2030

# Battery anode materials

| | Artificial graphite | Natural graphite | Graphite w/silicon additive | Silicon Dominant |
|---|---|---|---|---|
| **Application** | • Best for long life applications<br>• xEV and Grid | • Best for low cost applications<br>• Portable electronics | • Commercial application limited 3% - 10% | • Unproven<br>• Very limited application |
| **Energy** | | | | **More energy** |
| **Life** | **Longer Life** | | | |
| **Other factors** | • High energy use and associated cost | • High chemical use or higher energy cost | • Low cycle life<br>• High expansion<br>• Low efficiency | • Very low cycle life<br>• Extreme expansion<br>• Very low efficiency |
| **Solutions** | • Surface coatings<br>• Particle morphology<br>• Blending<br>• Additives | • Surface coatings<br>• Particle morphology<br>• Blending<br>• Additives | • Surface coatings<br>• Particle morphology<br>• Limit % silicon<br>• Limit voltage | • Unproven<br>• Work in progress |

NOVONIX = PURE graphite Anode Materials + MOUNT DROMEDARY graphitePROJECT + NOVONIX Battery Technology Solutions + DALHOUSIE UNIVERSITY

# Battery anode materials

PUREgraphite Anode Materials

## Answer to a common question about our PUREgraphite business

**Question:** What is the difference between a natural graphite concentrate produced from a graphite mine and what is manufactured by NOVONIX's PUREgraphite business in the USA?

**Answer:** PUREgraphite manufacturers battery anode material which is a more refined product than graphite concentrate.

- Natural graphite concentrate is not ready to go into a lithium-ion or an alkaline battery.
- Natural graphite concentrate has many uses and one is as a precursor material that can converted into a **"Battery Ready"** material via a series of complex (often proprietary) and expensive manufacturing process steps
- The value of "Battery Ready" natural graphite based anode material is typically **5 to 10 times higher** than natural graphite concentrate from a mine and it is typically customized for a customer and battery applications
- "Battery Ready" anode material is also made from **artificial** graphite made from materials such as coal or petroleum coke
- The value of "Battery Ready" **synthetic** (**artificial** graphite based) anode material is typically **10 to 20 times higher** than natural graphite concentrate from a mine and it is also typically customized for a customer and battery application
- PUREgraphite is a "Battery Ready" anode material manufacturer and has capability to manufacture synthetic, natural and blended battery anode products to meet customer requirements, and
- The name **"PUREgraphite"** is a brand name for our graphite based battery materials and reflects the ultra high purity of our material being 99.999%+ pure. By comparison natural graphite concentrate from a mine averages around 95% purity

# New intellectual property

- As high-technology manufacturer and supplier, NOVONIX is investing in intellectual property and new disruptive technologies with short-to-medium term commercialisation potential
- Intellectual property development is undertaken via a significant in-house team, and via the contract R&D arrangements with Dalhousie University previously announced
- NOVONIX is investigating simple, material-efficient and environmentally friendly technologies with significant commercial potential for the global battery sector, and other industries
- New intellectual property technologies have commercial application in the cathode, anode and electrolyte markets, and potential applications in other sectors
- Early interest from potential major commercial partners

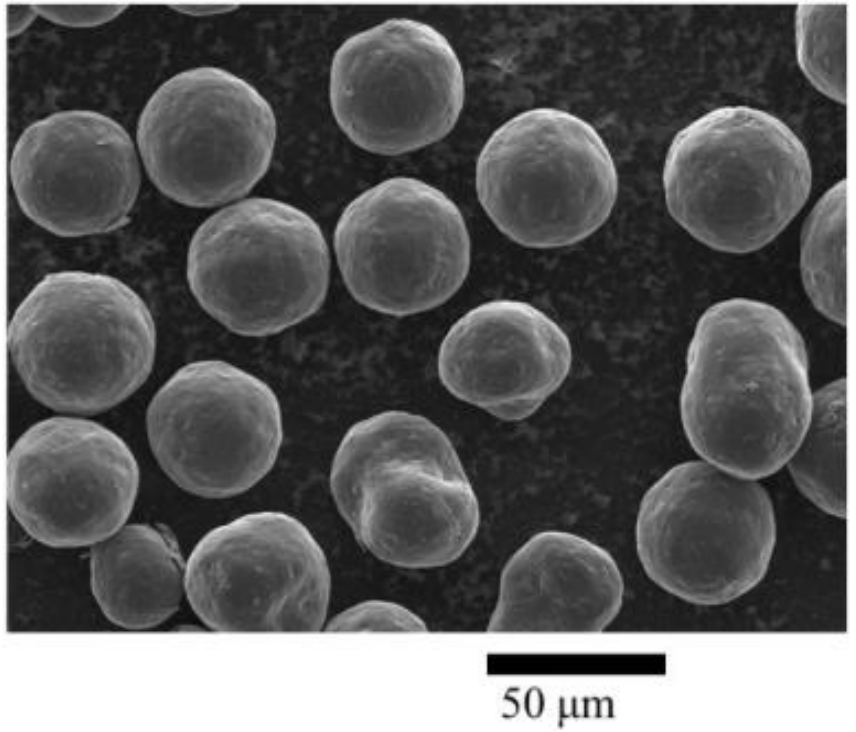
*Photo: Dr Chris Burns COO NOVONIX and Professor Mark Obrovac of Dalhousie University inspecting the electrode coating line at the NOVONIX battery cell pilot line.*

# Patent application filed for particle aggregation technology

NOVONIX
Battery Technology Solutions

**Dry process to aggregate small particle precursor formulations into larger spherical particles with improved properties that are useful for lithium-ion batteries and other applications** (Filing date: 29 August 2019)

- The technology underlying this patent application was developed by Professor Mark Obrovac and his team at Dalhousie University with intellectual property rights assigned exclusively to Novonix under previously announced broad research sponsorship agreement
- The invention involves a dry processing method for aggregating precursor particles into larger product particles with improved properties
- The product particles are useful in applications requiring uniform, smooth, spherical, or rounded particles such as for electrode materials in lithium batteries and other applications
- The method is simple, material-efficient, environmentally friendly and advantageous for industrial use because of the minimisation of waste material, excellent particle shaping and elimination of solvents in the process
- While the aggregation technology is at pre-commercialisation phase, NOVONIX is focused on its significant potential for the battery and other industries
- Novonix is investigating how to apply and scale the technology for commercial manufacturing of new cathode and anode products for the battery industry

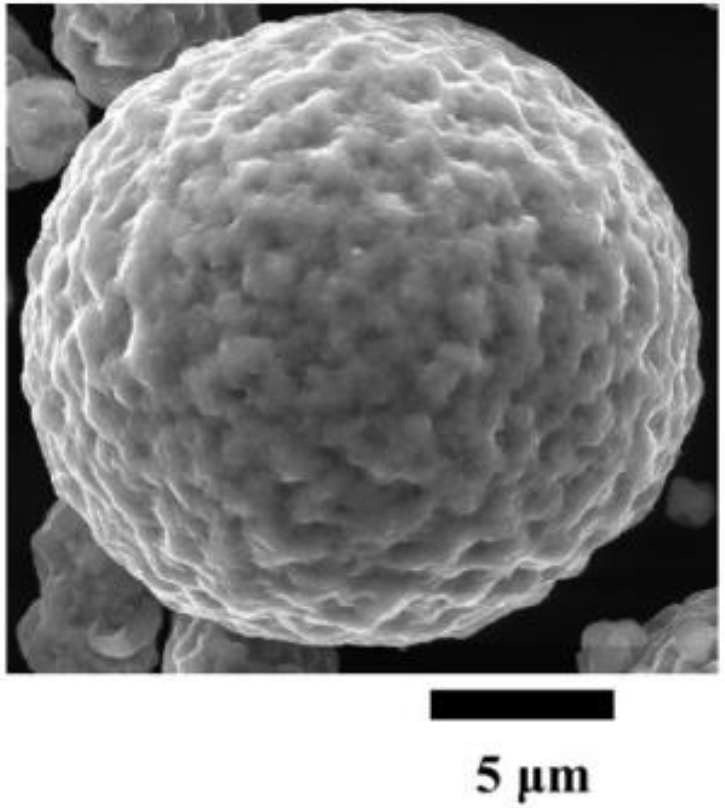


# Patent application filed for improved battery materials

NOVONIX
Battery Technology Solutions

## Dry process for modifying and coating polycrystalline particles to make improved materials for batteries applications (Filing date: 27 March 2019)

- The technology underlying this patent application was developed by Professor Mark Obrovac and his team at Dalhousie University with intellectual property rights assigned exclusively to Novonix under previously announced broad research sponsorship agreement
- The invention involves improved polycrystalline particulates, methods for modifying the surface of the particulates, and lithium insertion cathode and rechargeable lithium batteries comprising such particulates
- The surface layer of polycrystalline particulates are smoothed and coating layers can be applied with both coated and uncoated products showing improved performance in battery applications
- The method is simple, material-efficient, environmentally friendly and advantageous for industrial use because of the elimination of solvents
- While the photocrystalline particle modification technology is at pre-commercialisation phase NOVONIX is very excited about its potential for the battery and other industries
- Novonix is investigating how to apply and scale this technology for commercial manufacture of new cathode and anode products for the battery industry



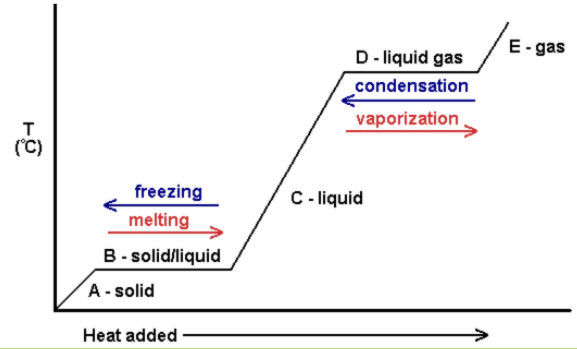
# Differential Thermal Analysis (DTA)

## DTA Overview

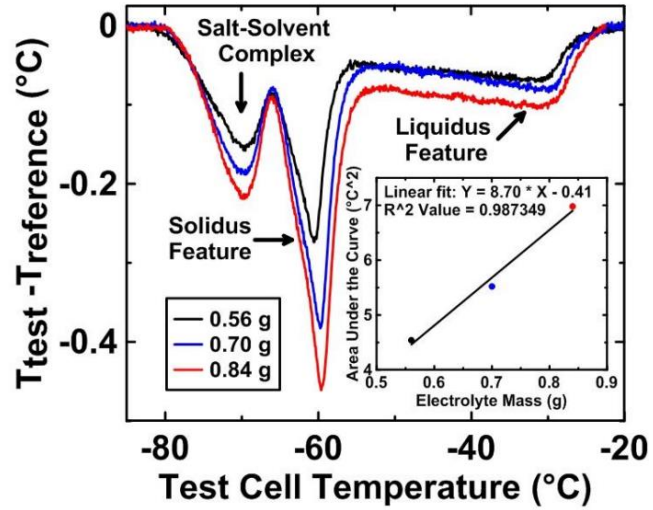
- **Differential thermal analysis (DTA) is a non-destructive method for studying the liquid electrolyte in a cell**
- As cells cycle, the liquid electrolyte composition and amount can change. This will be seen as specific changes in the DTA signals, which can help track the changes in electrolyte over the cell's lifespan
- Patent protected

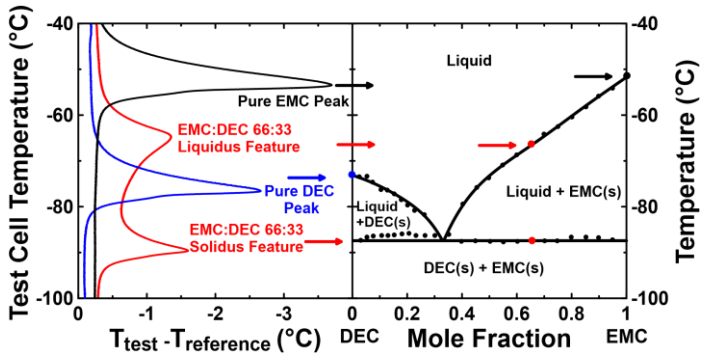

## DTA Theory

- Energy is required for phase transitions from solid to liquid or liquid to gas
- With constant heat flow, the sample temperature remains constant across a phase transition (plateau)
- The length of the plateau is proportional to the amount of substance present.
- DTA tracks these phase transitions by **measuring the temperature difference between the sample of interest and an inert reference**




## DTA Output



# FY2020 outlook

- Commissioning the PUREgraphite Phase 1 Commercial Plant (500 tpa capacity)
- Announcement of first off-take contract for PUREgraphite anode with battery maker
- Commercial production ramp-up at PUREgraphite to 500 tpa rate
- Delivery of first PUREgraphite anode commercial product to customer
- Announcement of subsequent PUREgraphite collaborations and off-take contracts
- Ongoing PUREgraphite product and process improvement and development
- Preparation for rapid PUREgraphite expansion
- Filing of provisional patents for new battery materials and manufacturing methods
- Strong growth in cell design, cell making, cell testing and materials evaluation services
- Delivery of large custom testing system for global electronics company
- Expansion of strategic DTA research and development services and sales

# Contact information

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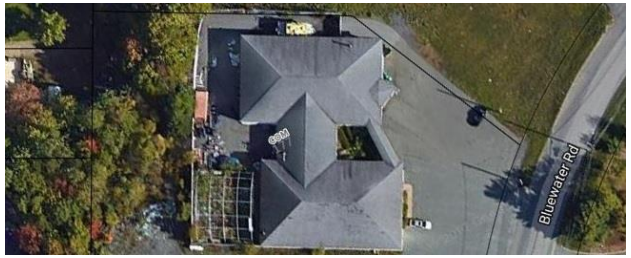
## Battery Technology Solutions

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