ASX/Media Release

17 November 2016

Syrah announces Downstream Strategy Update

Syrah Resources (ASX.SYR) is pleased to announce that we will be updating our investors, and releasing an accompanying presentation, on the Company's downstream strategy via a conference call today at 10:30am AEDT.

Conference call details

Australian Toll Free Number:	1800 175 864
Hong Kong Toll Free Number:	800 963 435
UK Toll Free Number:	080 8234 1368
US Toll Free Number:	185 5823 0291

Please join the meeting 10 minutes prior to the start time and enter the participant passcode 2051 4708 followed by hash (#).

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About Syrah Resources

Syrah Resources Limited (ASX code: SYR) is an Australian-based industrial minerals and technology company. Syrah is currently constructing the Balama graphite project (Balama) in Mozambique, with commissioning scheduled to commence in Q2 2017. Balama will be the leading global producer of high purity graphite. Balama production is targeted to supply traditional industrial graphite markets and emerging technology markets. Syrah has successfully completed extensive product certification test work with several major battery producers for the use of Balama spherical graphite in the anode of lithium ion batteries.

SYRAH RESOURCES

Downstream Strategy

17 November 2016

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Agenda

- Introduction
- Size of the Downstream Opportunity
- **The Downstream Strategy**
  - Understanding the Customer
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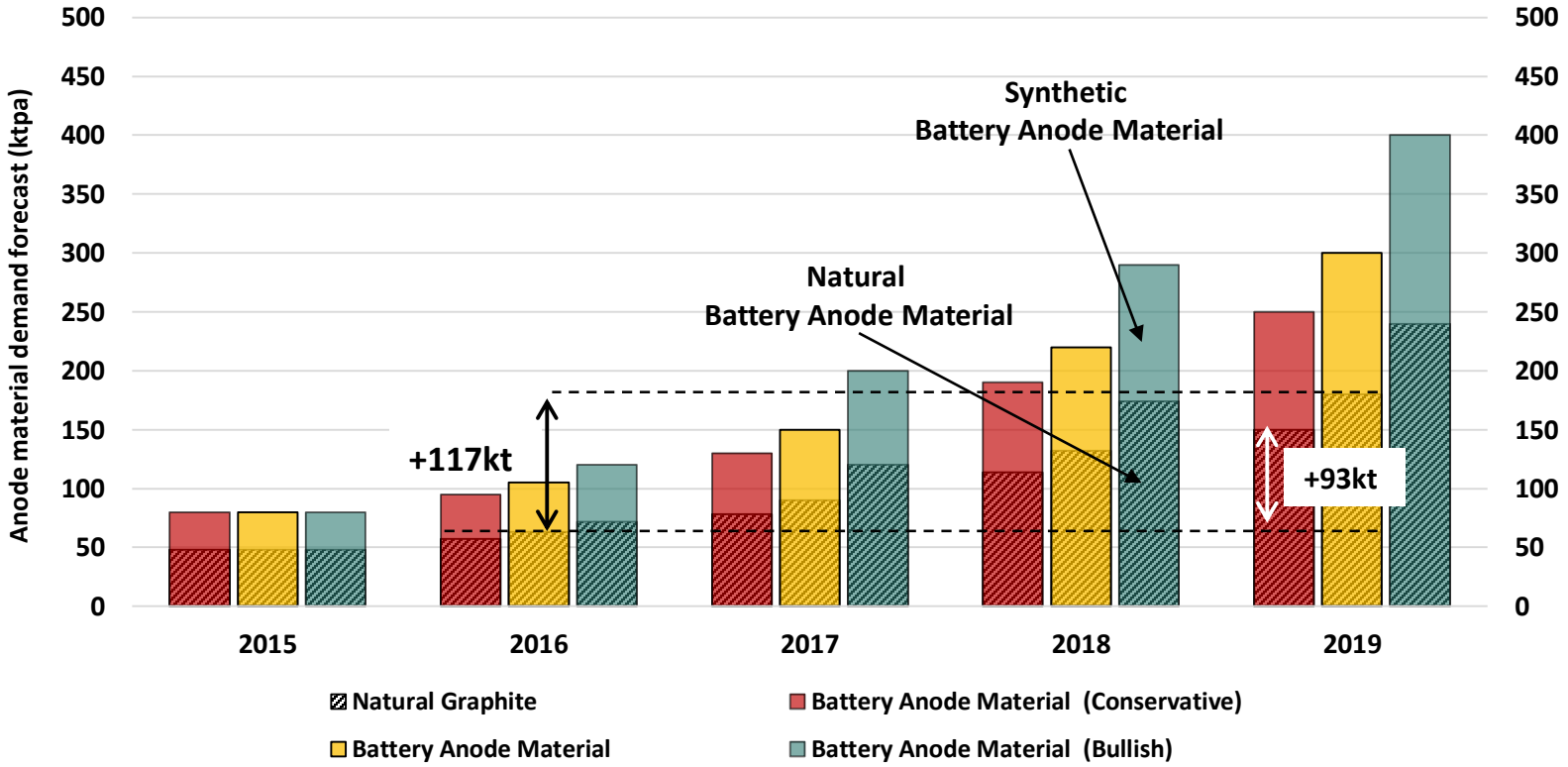
Size of the downstream opportunity

Tolga Kumova

Battery anode material (BAM) demand projections far exceed supply; 117kt shortfall by 2019 when the Commercial Plant is in full production



(1) Benchmark Minerals, September 2016
(2) 1 tonne of anode material = 1 tonne of spherical graphite
(3) 2 tonnes of flake graphite is required to produce 1 tonne of spherical graphite

EV targets set by manufacturers underpins this demand

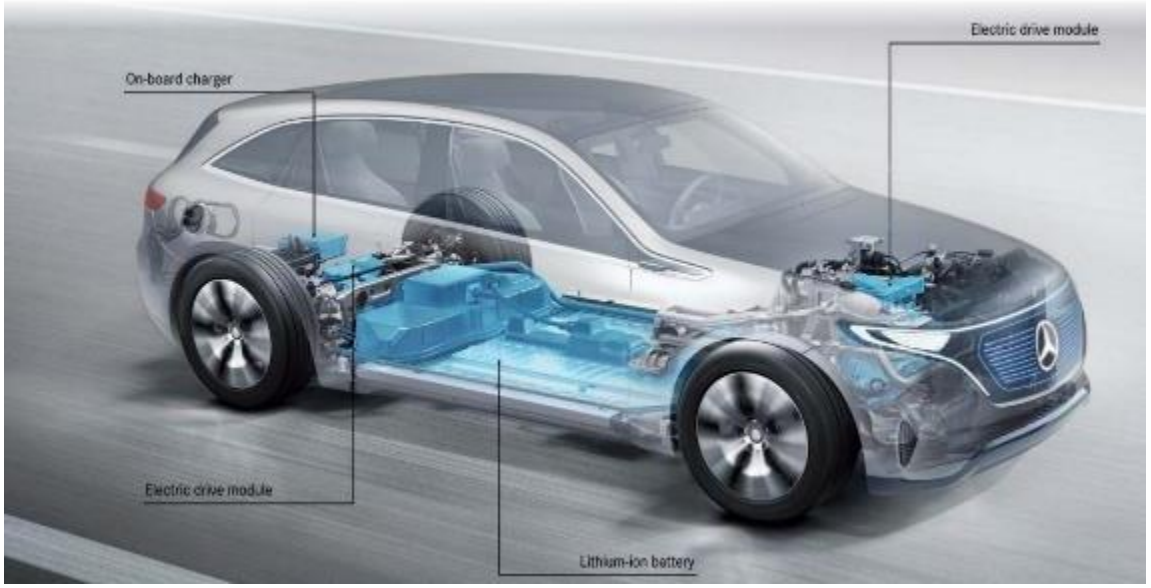
- Total global car sales are expected to exceed **100 million vehicles** by **2025**
- The shift from internal combustion engines towards EV is being accelerated by **global automakers**, and **Chinese Government EV production targets**
- Leading car makers are targeting between **15%** to **25% of sales** to be **electric vehicles** (EVs) by **2025**
- Growth in **graphite demand** is primarily **driven** by the adoption of EVs
- An average of **50kg** of **graphite BAM** per regular electric vehicle will be required (1.2kg per kwh)

*This equates to approximately **1 million tonnes per annum** of graphite anode material required by 2025.*

Battery cell manufacturing capacity is rapidly growing, but requires more supply of high quality graphite

"Volkswagen and Mercedes-Benz parent company Daimler, which combined sell 13 million vehicles a year, predict electrics will account for between 15% and 30% of all vehicle sales by 2025"

The Australian 14 November 2016



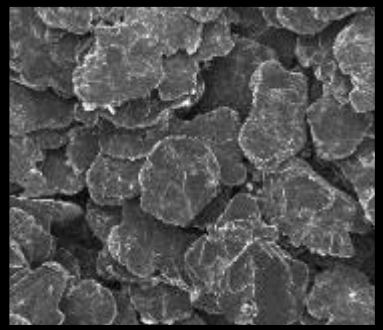
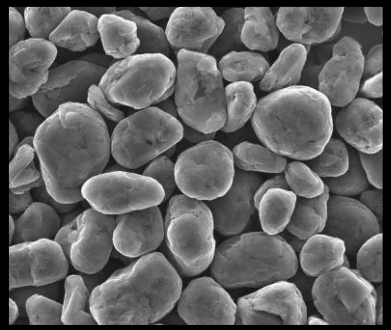
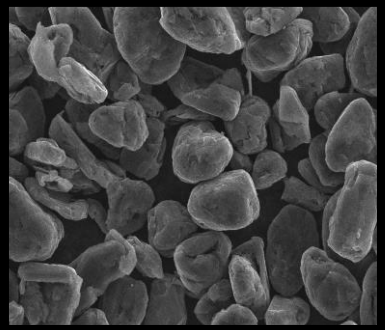
Source: Daimler Corporate Presentation, Fall 2016

Ongoing growth in energy storage will further increase demand

The Tesla Powerwall 2… "may be the cheapest lithium ion battery for the home ever made when deliveries start in January." – Bloomberg New Energy Finance

"the benefits of advanced battery technology are endless…"
– Mercedes-Benz Energy

Opportunity to participate in and grow the entire graphite value chain

	Flake Graphite	Uncoated Spherical	Coated Spherical
Products			
Cost	US$300/t	US$2,300/t(1)	US$3,200/t(2)
Price	US$600/t - US$1,200/t(3)	US$3,000/t - US$4,500/t(3)	US$7,000/t - US$10,000/t(1)
Key Markets	Refractories, lubricants, industrial products, recarburisers, lead acid batteries & expanded graphite.	Emerging energy market is the major near term driver – lithium ion batteries for energy storage and electric vehicle applications.	

(1) Based on Syrah's market inquiries
(2) Syrah internal economic assessment – refer to ASX announcement dated 18th June 2015 for coated figures
(3) Based on Benchmark Minerals 2016 price data for 15µm (D50) spherical graphite product

Downstream overview

- **EV production** will drive significant **near term demand** for graphite anode material
- **>100,000 tonnes per annum** of **incremental natural graphite BAM**[1] is expected to be required by **2019**
- **Opportunity** for Syrah to **participate** in the **entire supply chain**, from mine to anode material; **improving product consistency** for end customers
- Potential to **capture additional margins** via **downstream** processing

(1) Equivalent to >200,000 tonnes of flake graphite feed material assuming a 50% production yield.

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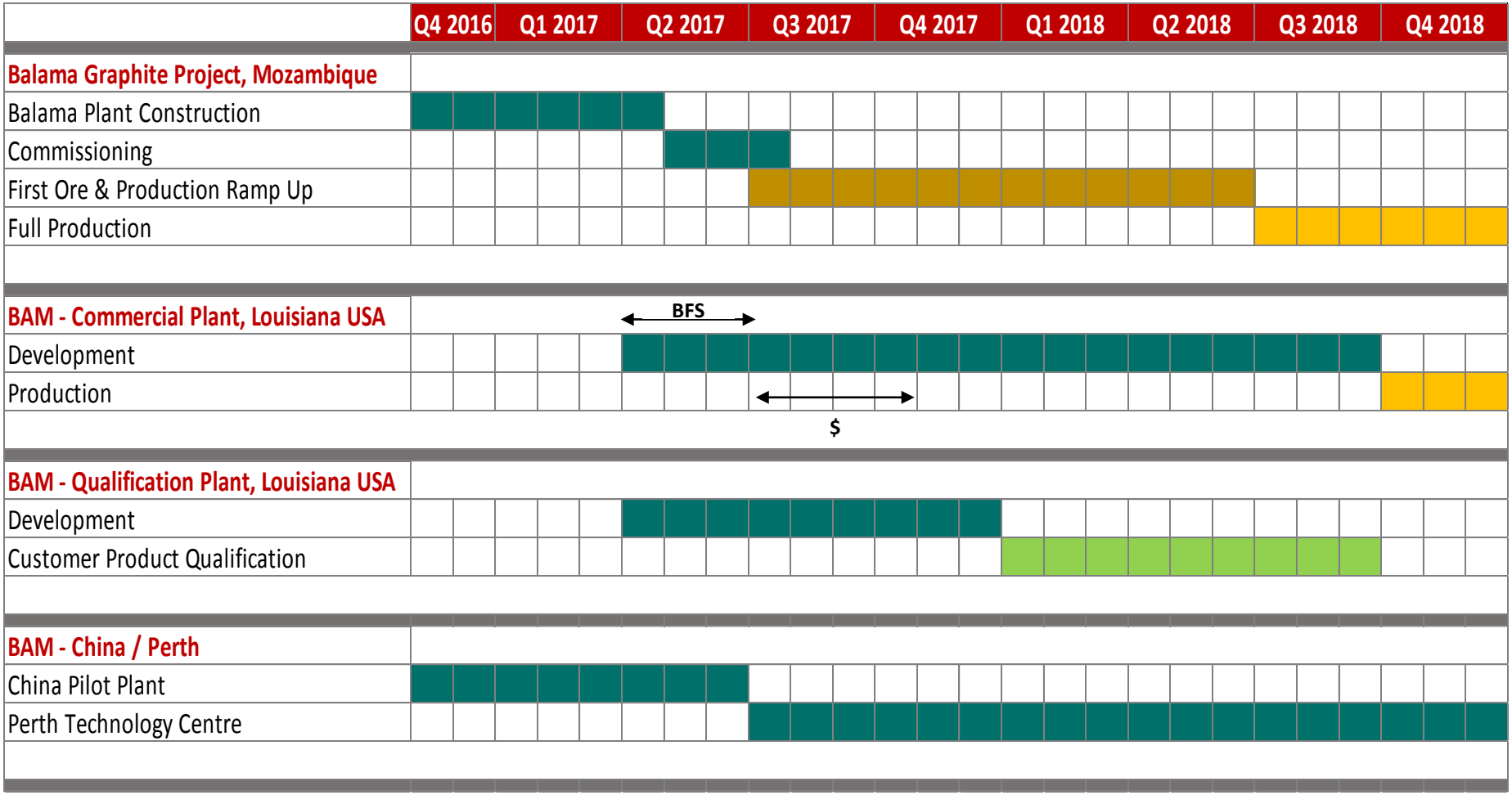
The downstream strategy

Jim Askew

Our BAM strategy will deliver qualified battery anode material to customers during Q4 2018



A vertically integrated strategy to capture and shape the market opportunity quickly

- Syrah will pursue a **multi-channel sales strategy** with a presence in **flake** and **battery anode material** markets
- **Balama** scheduled for **commissioning** in **Q2 2017,** production **ramp up** in **Q3 2017**
- Develop a **Commercial Plant** to supply the battery anode market:
  - Initial 20ktpa Louisiana, United States, **Commercial Plant** with approvals and permits for a **60ktpa** capacity, using **proven technology** and **processes**
  - **Advanced discussions** with an **experienced**, **leading Engineering Firm** to provide technical and engineering support for a **Product Qualification Plant** in **Louisiana** to accelerate sales and cash flows from the Commercial Plant
- Currently conducting **test work** and generating **BAM product samples** at a **Pilot Plant** in China

- **Technology Centre** being established in **Perth** for process training, product optimisation and R&D

- **Commercial discussions** with customers underway regarding **sales** into the **spherical graphite** and **by-product markets** for Balama -100 mesh graphite prior to production commencement at the Commercial Plant

- Medium term outlook to establish an **additional Commercial Plant** in **Asia** that meets demand requirements and optimises profitability

*This strategy **accelerates cash flows** and **profitability** from downstream processing whilst **minimising risk**.*

Opportunities and risk management

- Significant **global supply deficit** in **BAM grade graphite**
- Securing natural graphite as a **key component** in lithium ion battery anodes
- **Proximity** to **customers** to fulfil existing offtake agreements and **convert the sales pipeline**
- **Product Qualification Plant** will **accelerate** our ability to meet **customer qualification**; shortest **pathway** to **risk mitigated** positive **cash flows**
- Provides us with a **strong market position** and **deep capacity** to supply a **base load** material

*Underpinned by our **excellent test results** which demonstrate that we **meet customer needs**.*

Establishing an initial large scale Commercial Plant in Louisiana has a number of advantages

- **Proximity** to customers based in the Americas
- **Fast approval and permitting** process
- **Strong** government support and **incentives**
- **Availability** and **cost** of **key inputs** such as acids and a low cost, reliable source of water and power
- Access to a **skilled workforce**, experienced in operating industrial plants
- **Ample space** for **expansion** of the Commercial Facility
- Proximity to **excellent infrastructure** (rail, road, river and port)

Commercial Plant buildout strategy

- **Approvals** and **permits** for **60ktpa** capacity:
  - Initial capacity of ≥20ktpa of uncoated spherical graphite
  - Rapid, low risk, incremental modular capacity increases of 10ktpa, up to 60ktpa
- **Close collaboration** with relevant authorities and leading engineering expertise, currently shortlisting optimal **site locations**
- **Bankable Feasibility Study (BFS)** will commence in **H1 2017**
- **Debt finance** will be sought in parallel with the **BFS**
- **Commissioning** scheduled for **Q3 2018**

Establishing a Louisiana Product Qualification Plant will accelerate commerciality

- Currently in **advanced discussions** with a **US Engineering Firm** to provide technical and engineering support for a **Product Qualification Plant**
- The plant will consist of a **single full scale production line**
- **Necessity** for a Qualification Plant:
  - Satisfies customers' **timing** requirement for **commercial scale product qualification** (minimum 6 month period) prior to issuing Product Purchase Orders
  - **Accelerates sales and cash flows** from the **Commercial Plant** by allowing product qualification to occur **prior** to the commencement of **full production**
  - Pathway to early **cash flows** through **sales** to **Hairong Morgan** for coating Louisiana product in China

*USA based **Product Qualification** will **accelerate sales** and **cash flows** from the Commercial Plant by **fast tracking product qualification** by customers*

A Perth based Technology Centre to provide sales and marketing data and optimise process development

- Currently specifying **design**, coordinating **spheroidisation** of material and **purification tests**
- Syrah's **spherical graphite milling machines** in **China** will be relocated to **Perth** in **mid-2017**:
  - **Process training** – early training and manual preparation for future operators of the Commercial Plant
  - **Optimisation development** – ongoing test work to optimise product yields, quality and consistency
- Building out our **proprietary data-bank** which aids our **marketing** and **product development** efforts

*Perth based **Technology Centre** focused on process training and optimisation development.*

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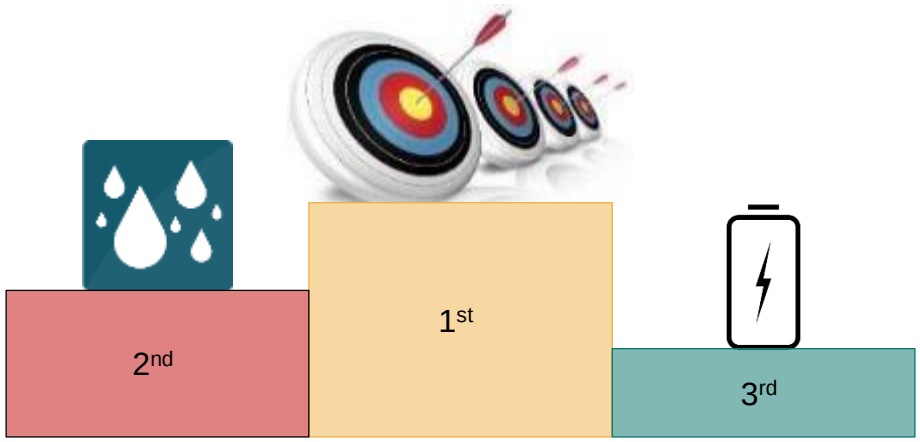
Understanding the BAM market

- The battery market is highly **competitive**
- Majority of **financial risk** is borne by battery producers and original equipment manufacturers
- Drives **strict product and manufacturing process qualification** (5M)[1] through the entire supply chain
- **Quality assurance** will be defined and continuously monitored by the customer
- **Failing** to meet **specification** will lead to rejection and may require **re-qualification**
- **Collaborating** with customers to produce **tailored made product** is the key to success

(1) Refer Slide 23 for further discussion

What are our customers' priorities?

- **Safety and reliability** is paramount to battery cell manufacturers
- **Battery materials** largely determine battery cell **performance** and **safety**
- For this reason, product and processes require **extensive qualification periods** (5M)
- Within the BAM space, the **key** ranked customer **priorities** are:
  - **Product Consistency**
  - **Moisture Content**
  - **Electrochemical Performance**
- **Customer test work** to date on Balama spherical graphite has **satisfied** the above three criteria



Product consistency is dictated by Total Quality Management (TQM) requirements

The **manufacturing process qualification** must be met using the **5M total quality management** philosophy, or equivalent.

Otherwise known at the **Ishikawa Diagram** or 5M + E principles.

The 5 pillars (+ E) of this TQM method for qualification are[1]:

1. **M**an-Power
2. **M**ethodology
3. **M**achinery
4. **M**aterials
5. **M**anagement

E. **E**nvironment/Surroundings

(1) Refer to Appendices for 5M definitions

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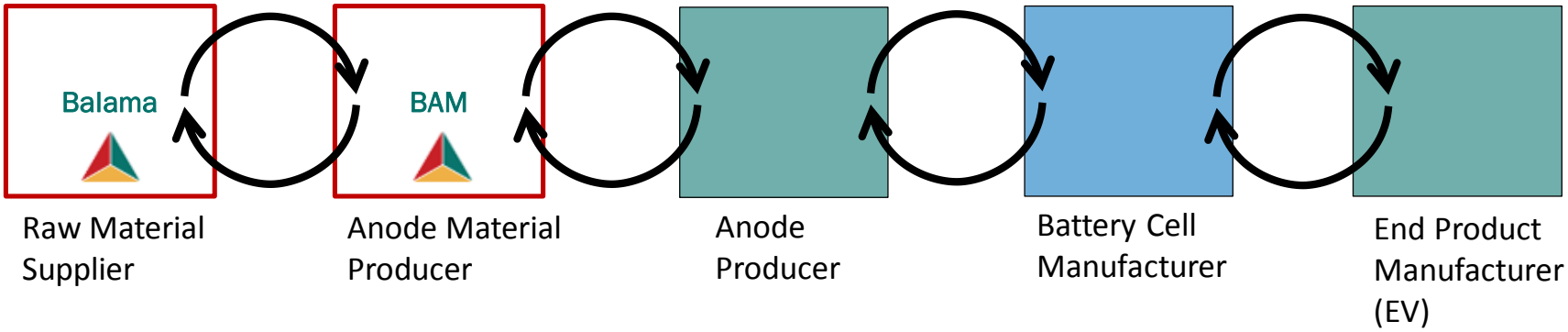
Syrah BAM Sales Pipeline Status

Customer	Contact made	Product test requested/ in progress	Test Result positive	Second Stage Product Test-work	Requested TQM[1] Sample	Statement of Sales Intent under development	Offtake Agreement Signed[2]
Marubeni	50,000 tonnes per annum [3]						
Hairong Morgan	9,000 tonnes per annum [3]						
Other Customers	Commercial Discussions Ongoing						

(1) TQM = Total Quality Management (i.e. 5M+E)
(2) Conditional or Unconditional
(3) 59ktpa BAM equates to approximately 120ktpa of required feed flake graphite concentrate

Why does product qualification take time?

- **Demonstrating consistency** in product across the qualification period places Syrah in a **strong position**
- Observed **demand pressure on raw material supply** is assisting in building relationships and facilitating collaboration with key customers



Vertically integrated qualification is core to placing product into the supply stream

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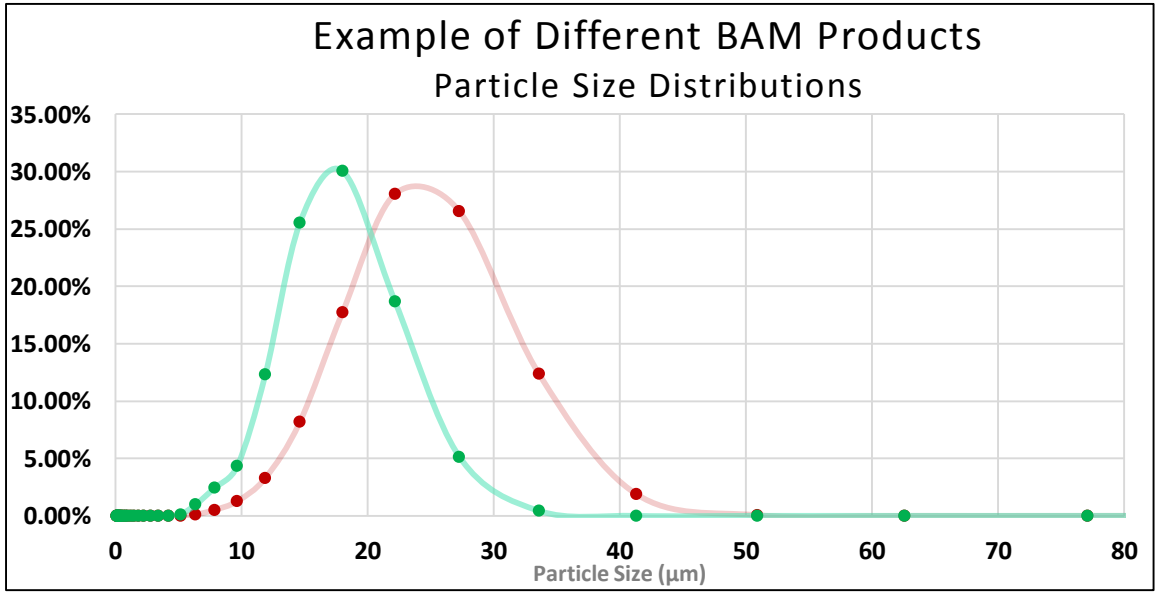
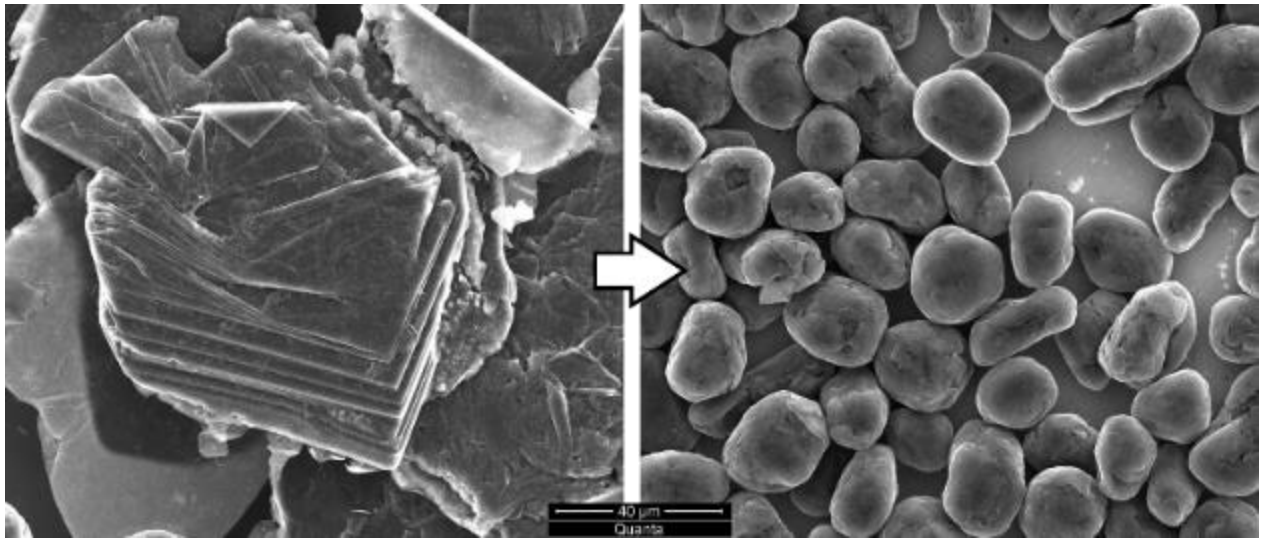
BAM products

- **Spherical graphite** is produced in **different size fractions** for **different market segments** within the lithium ion battery space
- Product size distributions range from **10µm** to **30µm**
- **Customer specification sheet** requirement usually have **very tight tolerances**



Processing flakes into spheroids

- Graphite flake **particle size reduction**[1] is necessary to achieve a **high end product**
- Syrah's spherical graphite has a **tighter particle size distribution** and density when compared to competing products



Flake Graphite **Spherical Graphite**

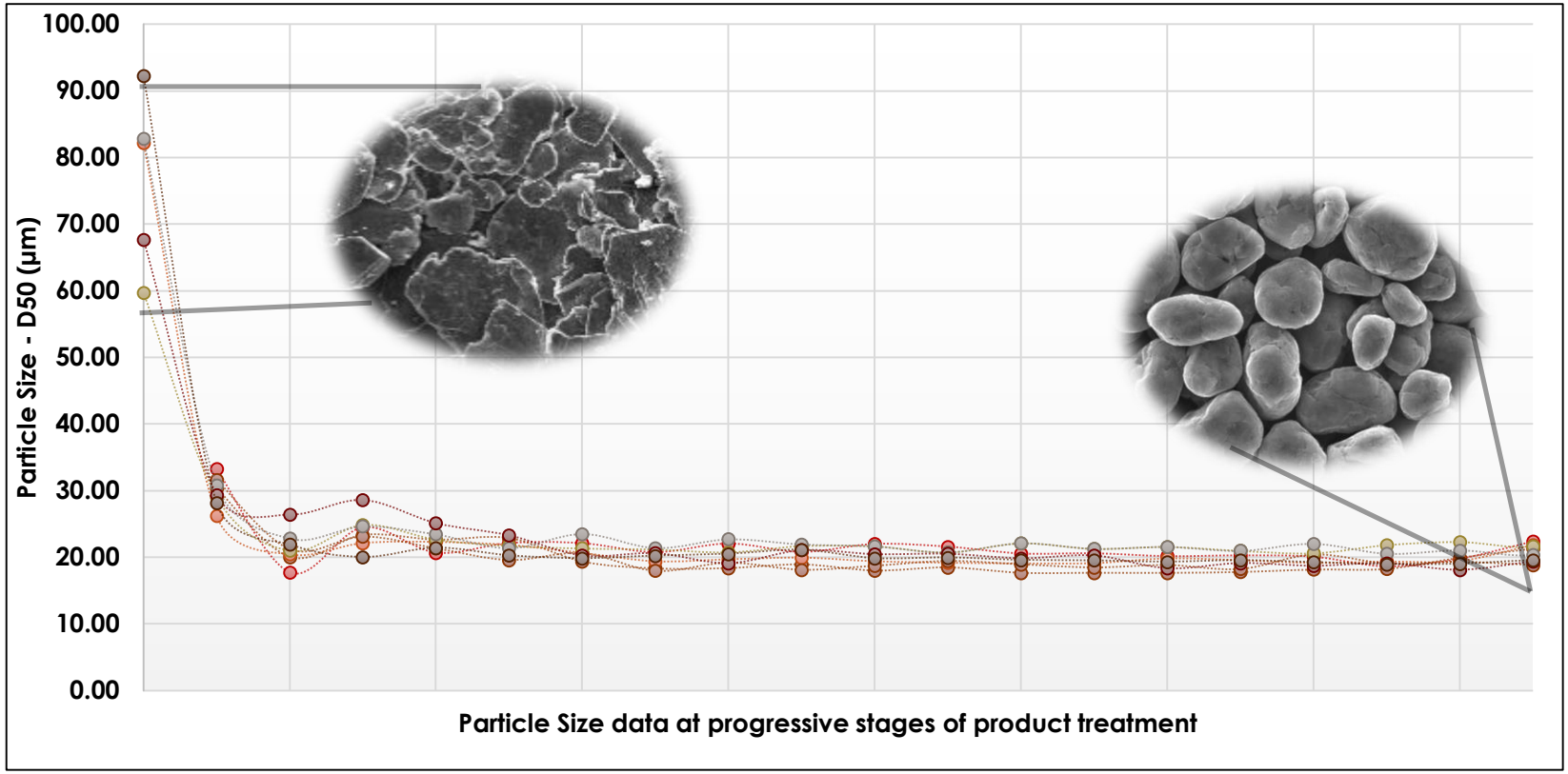
(1) Refer Appendices for production process flow chart

Syrah's Spherical Graphite Pilot Plant, China

- **Pilot Plant** established in China during **July 2016** consisting of 3 milling machines and chemical purification systems
  - Generate **product samples** for customers
  - Build the internal data book for **product definition**
  - Determine **process sensitivities**
  - Conduct **variability test work**

Milling machines

Consistent product outcomes through Syrah's test work



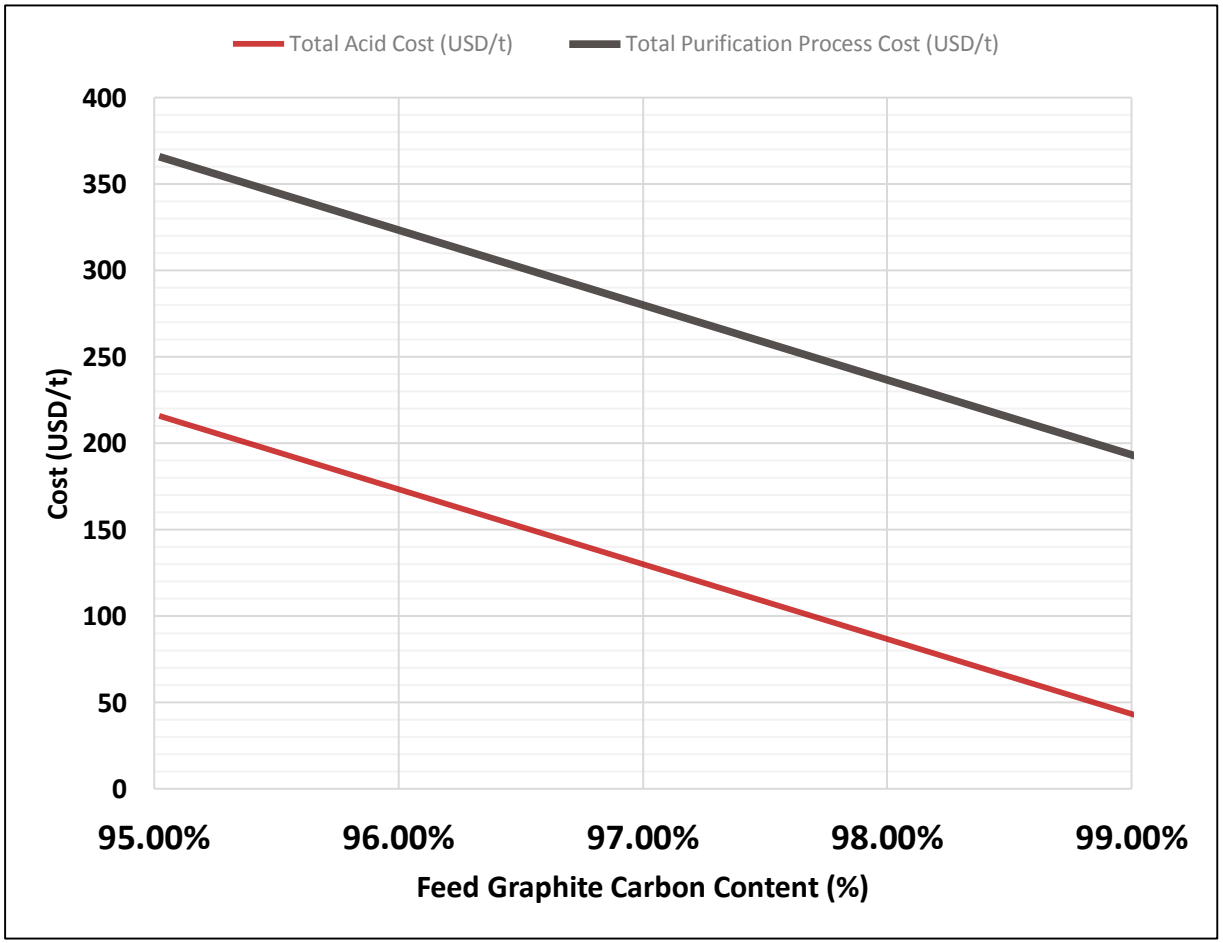
- **Confidence** in **proven production process**
- Data supports **high degree of product consistency**

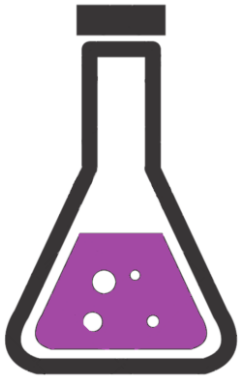
Purification methods

- **Anode active materials** must have a purity (fixed carbon content) of at least **99.95%**
- **Purification** can be done by either **chemical** or **thermal** treatment
- Determining the method used is primarily based on **reducing operating costs**
- **Acid leaching** purification is the primary method used across Asia

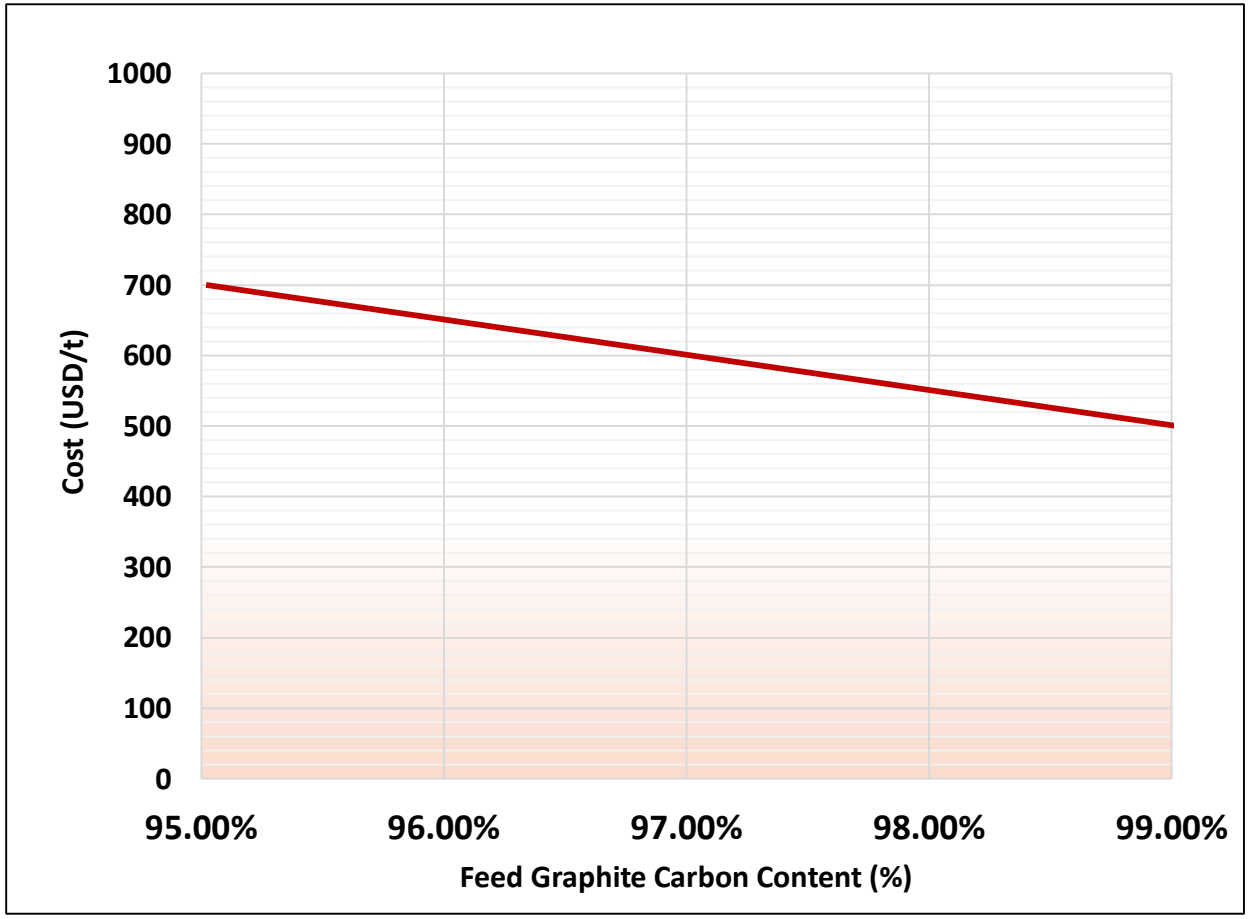
or

Chemical purification cost estimate





Thermal purification cost estimate



Potential increase in Balama concentrate grade will reduce downstream costs

- **Attrition cells** have been added to the Balama process flow sheet:
  - Potential for **96.5%** to **98.8% TGC concentrate** to be produced across a **range of flake sizes**
  - A **higher concentrate grade** will also **reduce** the downstream **processing costs** of battery anode material production by **decreasing acid consumption**
  - **Minimal** estimated **incremental capital** and **operating costs**
  - **Installation** of this equipment will be **readily integrated** into the **existing flow sheet and plant**

*The **additional investment** we have made in the Balama Project will **increase** the **quality** of **feedstock** for and **reduce** the **cost** of **downstream** spherical graphite production.*

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Balama Project update

- Rapidly developing the **world class** Balama Project located in **Mozambique**
- World's largest graphite **Ore Reserves** (JORC 2012) of **114.5 Mt** at **16.6% TGC**
- Balama Project remains **on schedule** for **commissioning** in **Q2 2017**
- **Plans** are in place to **mitigate interruptions** to the construction with the upcoming **wet season**

*Balama will be the **solution** for end users demanding a **consistent** and **high quality** source of supply.*

Construction progress – November 2016

Clockwise from top left:
1. Ore bin construction
2. Recycle crusher
3. Primary milling – scrubber installation
4. Thickener

Construction progress – November 2016

Clockwise from top left:
1. Filtration
2. Flake drying area
3. Plant workshop
4. Plant and equipment lay down area

Mozambique debt restructure

- On 25 October 2016, the **Mozambique government** officially acknowledged their inability to pay the next instalments of their debts (~US$10b), and have called for a **restructuring** of **payments** and new financial aid from the International Monetary Fund (IMF).

- This was driven by:

  - **Depreciation** of the **metical** by approximately 70% against the USD over the course of 2016, having already depreciated by 36% in 2015

  - **Inability** to provide **sufficient FX resources** for the economy to limit inflationary pressure and volatility

  - **Substantial decline** in **foreign reserves** due to an increase in external debt payments in a depreciating currency environment, combined with lower foreign direct investment inflows and weaker export growth

- Lazard Ltd and White & Case LLP has been hired to oversee **meetings** with **creditors** to **restructure terms** on its debt to qualify for a resumption of IMF aid.

- **Targeting** implementation of an agreed **debt resolution strategy** by **January 2017**

- Mozambique's **long-term growth prospects** are still **promising** on the back of progress in the development of its nascent energy sector

- The Mozambique's government **payment capacity** is therefore **expected** to **significantly increase** after **2021**, subject to a **timely implementation** of the **offshore gas projects**

- **No impact** on the development of the **Balama Project**; **Mozambique government** remains **fully supportive**

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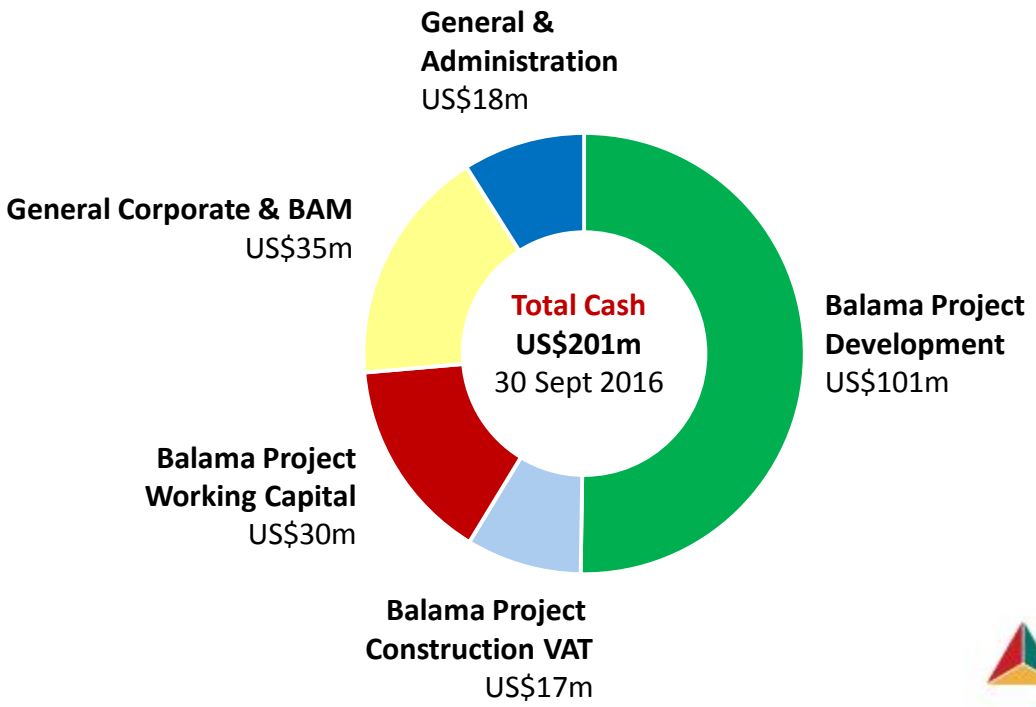
Financial Update

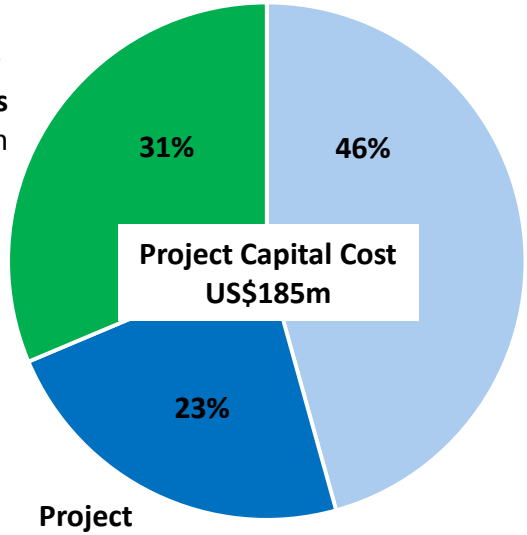
Solid balance sheet with no debt

- **Fully funded** to deliver the development of the **Balama Project**
- **US$30 million** to fund **working capital** requirements for the Balama Project through to positive cash flows across a range of reasonable assumptions
- Cash reserves of **US$35 million** to fund progression of the group's **General Corporate and BAM**



Balama Project development

Balama Project Capital Expenditure[1]



- Remains on schedule to commence **commissioning** in **Q2 CY2017**
- **Detailed design** and major **procurement** activities **completed**
- Major **construction packages awarded** and now well underway
- Project **enhancements** implemented to **improve product quality** for traditional graphite and downstream BAM markets

(1) As at 30 September 2016

Additional contingency funding

Work has commenced on arranging a **revolving debt facility** provisionally between **US$30m** and **US$50m** for the Balama Project purely as a **conservative contingency** measure during **commissioning** and **production ramp-up**.

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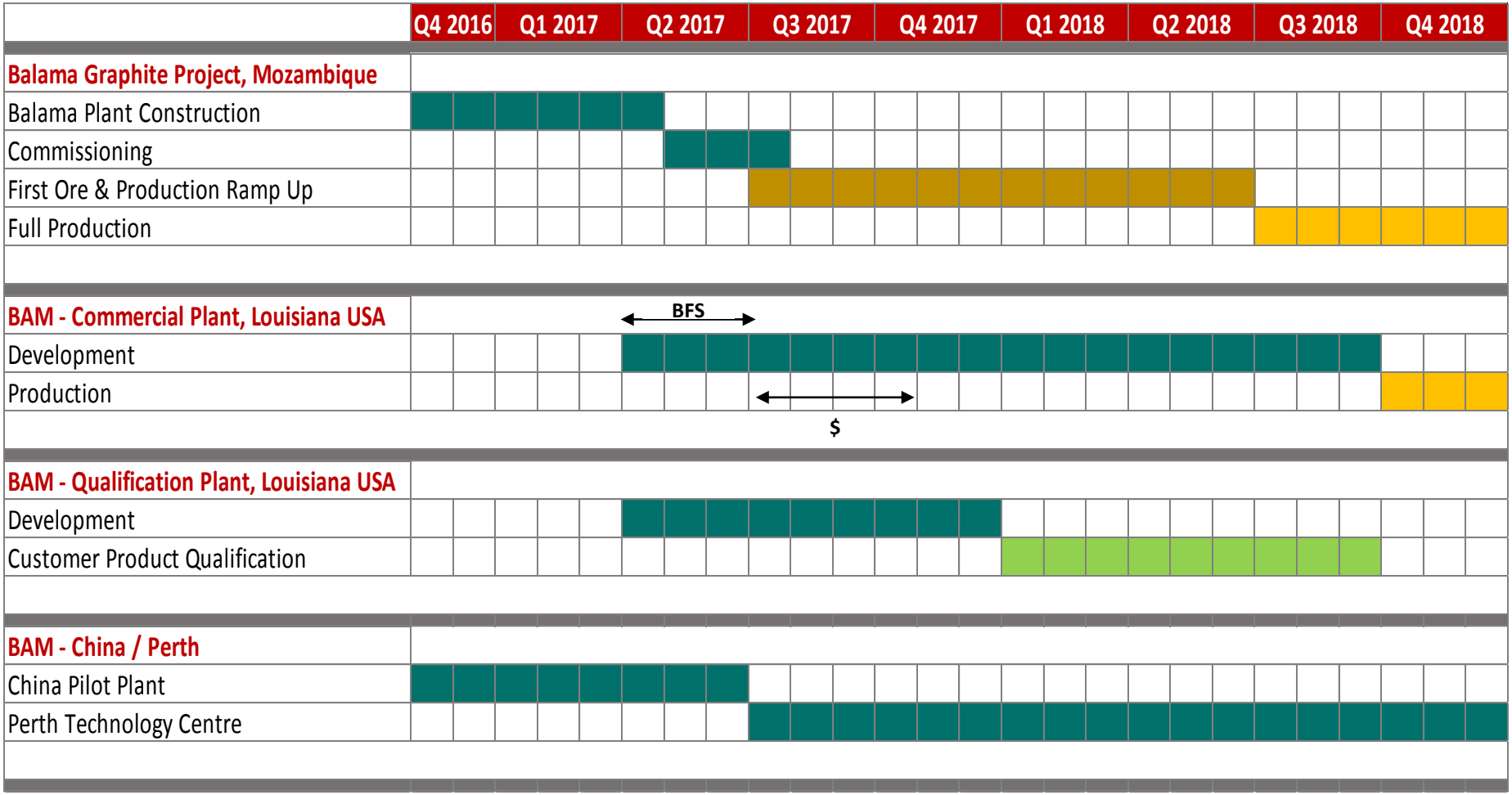
Timetable recap



Summary

- Focussed on the development of an initial **Commercial Plant** in Louisiana, with approvals and permits for a **60ktpa capacity**
- A **Product Qualification Plant** will **accelerate** the pathway to **sales** and **cash flows** by allowing product qualification to occur prior to production from the Commercial Plant
- Ongoing **development** and **test work** at the Perth-based **Technology Centre**
- **Commercial discussions** with customers underway regarding **sales** into the **spherical graphite** and **by-product markets** for Balama -100 mesh graphite prior to production commencement at the Commercial Plant
- Balama Project remains **on schedule** for **commissioning** in **Q2 2017**
- Significant potential for **higher concentrate grades** from Balama to **reduce downstream processing costs**
- Solid Balance Sheet with **no debt**, **fully funded** to deliver the Balama Project

Key contacts

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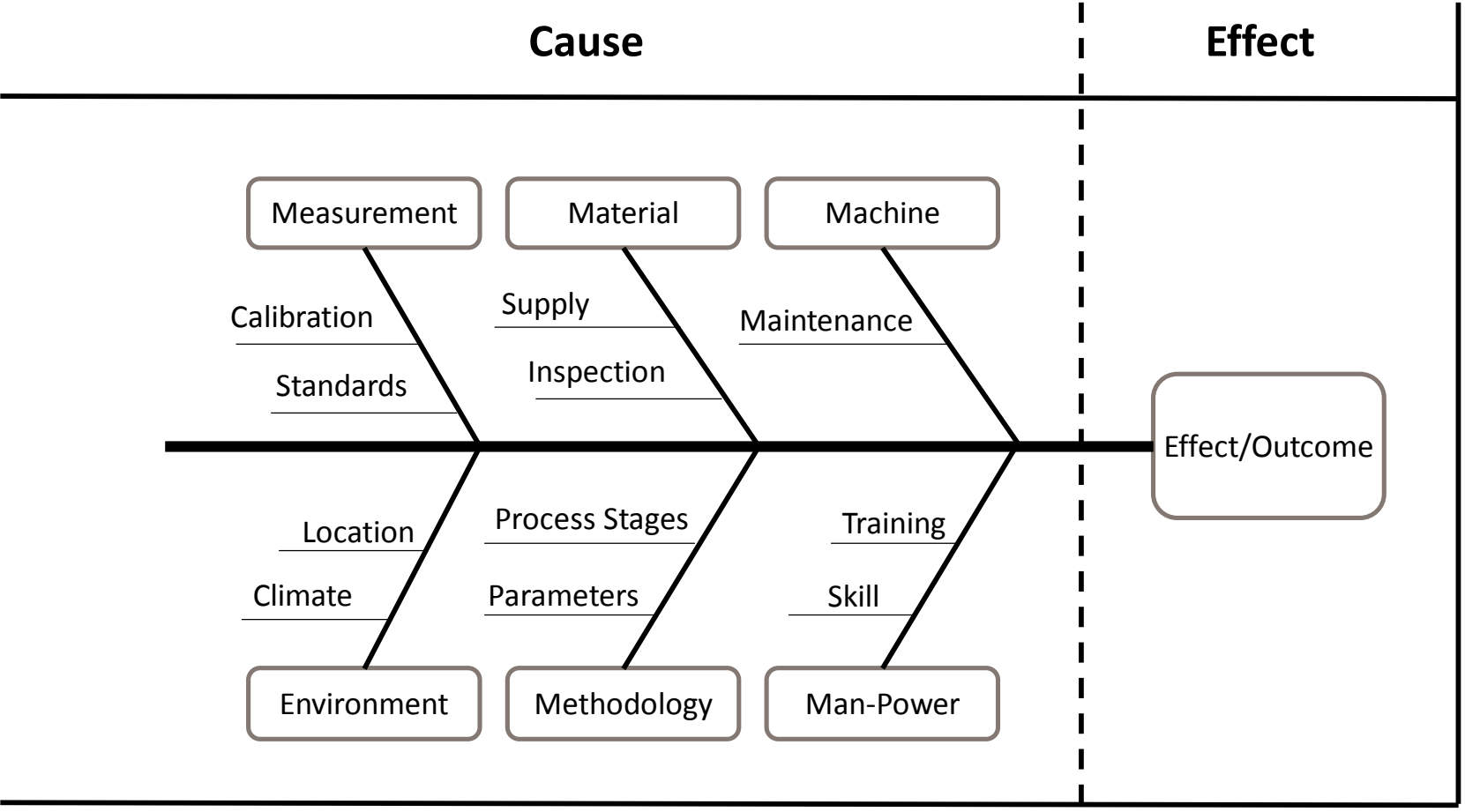
Appendices

5M Total Quality Management



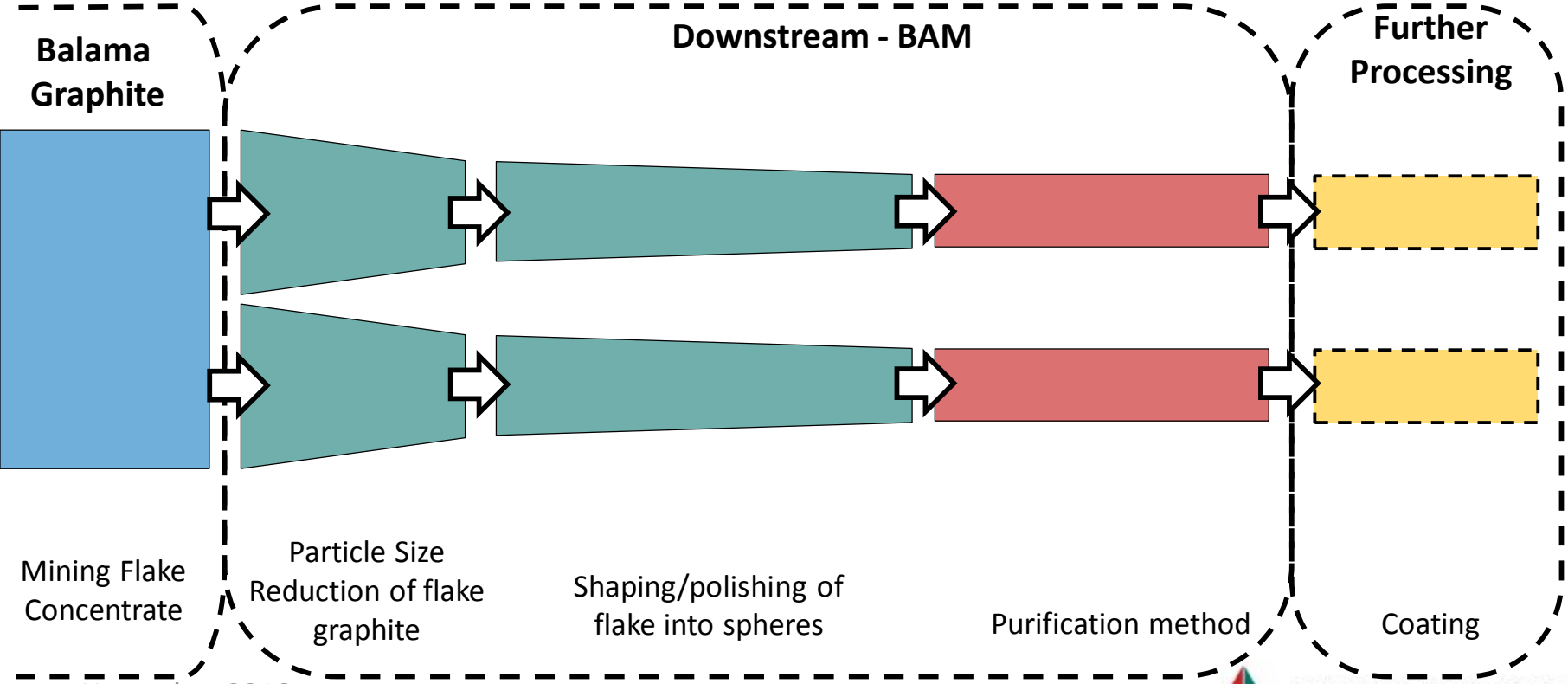
5M definitions

5M Total Quality Management

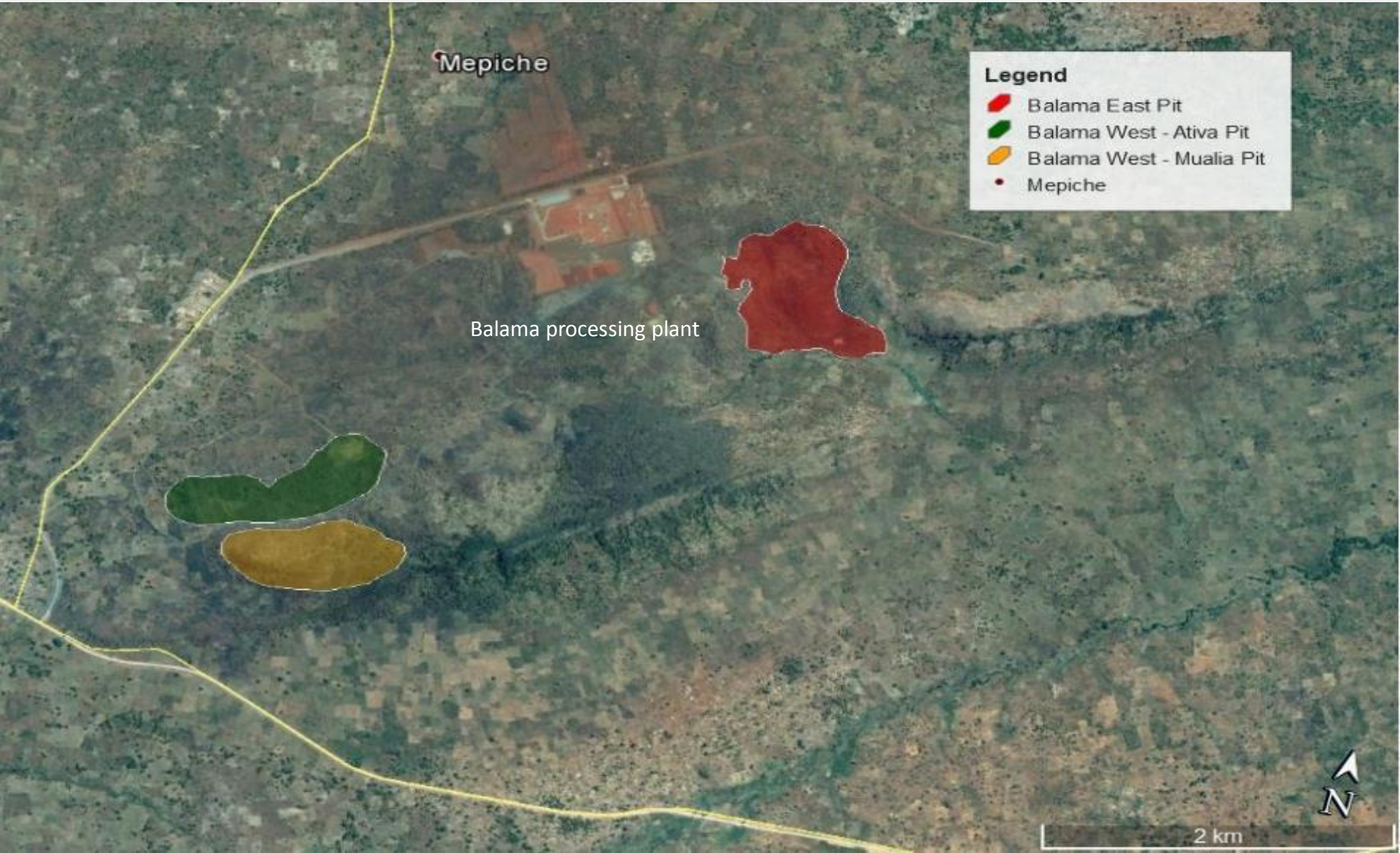
- **Manpower**
  - the causes that can be attributed to the people working on the process
- **Methodology**
  - Operational and procedural causes that may effect the product or issue trying to be solved
- **Materials**
  - potential causes due to the materials used, such as the difference between two suppliers of the same material
- **Machine**
  - causes due to the machines or the equipment in the process
- **Measurement**
  - causes that are more related to sampling, calibration and standards used across the manufacturing process
- **Mother Nature/ Environment**
  - causes that are related to the local surroundings such as external temperature or humidity.

Anode material production process

- For a vertically integrated natural graphite producer
- Spherical graphite anode production capacity is modular



Location of the Balama Ore Reserves



Balama Ore Reserves compared to Australian and Canadian listed comparables