Battery Anode Material

24 November 2017
Shaun Verner – SYR Managing Director & CEO
Dr Christina Lampe-Onnerud – CEO Cadenza Innovation and SYR Non-Executive Director
Disclaimer

This presentation is for information purposes only. Neither this presentation nor the information contained in it constitutes an offer, invitation, solicitation or recommendation in relation to the purchase or sale of shares in any jurisdiction. This presentation may not be distributed in any jurisdiction except in accordance with the legal requirements applicable in such jurisdiction. Recipients should inform themselves of the restrictions that apply in their own jurisdiction. A failure to do so may result in a violation of securities laws in such jurisdiction. This presentation does not constitute financial product advice and has been prepared without taking into account the recipient's investment objectives, financial circumstances or particular needs and the opinions and recommendations in this presentation are not intended to represent recommendations of particular investments to particular persons. Recipients should seek professional advice when deciding if an investment is appropriate. All securities transactions involve risks, which include (among others) the risk of adverse or unanticipated market, financial or political developments.

Certain statements contained in this presentation, including information as to the future financial or operating performance of Syrah Resources Limited (Syrah Resources) and its projects, are forward-looking statements. Such forward-looking statements: are necessarily based upon a number of estimates and assumptions that, whilst considered reasonable by Syrah Resources, are inherently subject to significant technical, business, economic, competitive, political and social uncertainties and contingencies; involve known and unknown risks and uncertainties that could cause actual events or results to differ materially from estimated or anticipated events or results reflected in such forward-looking statements; and may include, among other things, Statements regarding targets, estimates and assumptions in respect of metal production and prices, operating costs and results, capital expenditures, ore reserves and mineral resources and anticipated grades and recovery rates, and are or may be based on assumptions and estimates related to future technical, economic, market, political, social and other conditions. Syrah Resources disclaims any intent or obligation to update publicly any forward looking statements, whether as a result of new information, future events or results or otherwise. The words “believe”, “expect”, “anticipate”, “indicate”, “contemplate”, “target”, “plan”, “intends”, “continue”, “budget”, “estimate”, “may”, “will”, “schedule” and other similar expressions identify forward-looking statements. All forward-looking statements made in this presentation are qualified by the foregoing cautionary statements. Investors are cautioned that forward-looking statements are not guarantees of future performance and accordingly investors are cautioned not to put undue reliance on forward-looking statements due to the inherent uncertainty therein.

Syrah Resources has prepared this presentation based on information available to it at the time of preparation. No representation or warranty, express or implied, is made as to the fairness, accuracy or completeness of the information, opinions and conclusions contained in the presentation. To the maximum extent permitted by law, Syrah Resources, its related bodies corporate (as that term is defined in the Corporations Act 2001 (Cth)) and the officers, directors, employees, advisers and agents of those entities do not accept any responsibility or liability including, without limitation, any liability arising from fault or negligence on the part of any person, for any loss arising from the use of the Presentation Materials or its contents or otherwise arising in connection with it.
Purpose and Contents

**Purpose**

Provide further detail about our Battery Anode Material strategy (BAM) strategy and progress

Outline the Syrah Resources and Cadenza Innovation testing, benchmarking and product development scope

Explain what is important in BAM properties and performance

Share some Balama graphite preliminary performance testing and benchmarking results

**Contents**

Syrah Resources’ progress and strategy

Battery Anode Material market overview – Cadenza Innovation

BAM properties and performance measurement, preliminary results – Cadenza Innovation

Syrah Resources next steps
Balama has produced first saleable graphite

- Production of first bagged saleable flake graphite at Balama
- Flake graphite grade in excess of 95% fixed carbon
- Construction essentially complete
- Process plant optimisation underway
Syrah Resources overview

<table>
<thead>
<tr>
<th>Corporate &amp; Development</th>
<th>Natural Graphite</th>
<th>Battery Anode Material</th>
<th>Optionality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australian Stock Exchange: SYR</td>
<td>The world’s largest and one of the lowest cost flake graphite mines</td>
<td>Aim to be the first integrated BAM producer outside of China</td>
<td>Balama expansion the lowest cost incremental tonne of supply</td>
</tr>
<tr>
<td>S&amp;P/ASX200 index member</td>
<td>World class ore grade of 17%</td>
<td>Capture additional cash margin and establish key position in the supply chain of global battery market</td>
<td>Battery Anode Material expansion; when market conditions suitable</td>
</tr>
<tr>
<td>Market capitalisation ~US$990m¹</td>
<td>Mine life of over 50 years</td>
<td>Targeting sales into USA domestic market as well as exports to other major battery making regions</td>
<td>Processing of vanadium by-product</td>
</tr>
<tr>
<td>Moving from project to operations</td>
<td>World’s largest graphite supplier by 2018 and ~40% global market share by 2020</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Target cash flow positive H1 2018</td>
<td>CY18 production of 160 - 180kt²</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>CY19 production of 250 - 300kt</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Focus of today

- Moving from project to operations
- Target cash flow positive H1 2018
- Aim to be the first integrated BAM producer outside of China
- Capture additional cash margin and establish key position in the supply chain of global battery market
- Targeting sales into USA domestic market as well as exports to other major battery making regions
- Collaboration with industry leaders

---

(1) As at 22 November 2017
(2) Refer to ASX announcements titled “Syrah finalises Balama Graphite study and declares maiden ore reserve” released on 29 May 2015, “Syrah increases Balama Reserves and awards Laboratory Contract” released on 15 November 2016. All material assumptions underpinning the production target in these announcements continue to apply and have not materially changed.
Production of BAM is a key foundation of our strategy and value proposition to shareholders

<table>
<thead>
<tr>
<th>Strategic Goals</th>
<th>Logic</th>
<th>Enablers</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Be the pre-eminent supplier of flake graphite</td>
<td>• Industrial for baseload demand</td>
<td>• Low cost</td>
<td>• First saleable product this month</td>
</tr>
<tr>
<td></td>
<td>• Lithium-ion battery market growth</td>
<td>• High quality</td>
<td>• First revenue in early 2018</td>
</tr>
<tr>
<td></td>
<td>• Diversification in the global supply chain</td>
<td>• Large volume</td>
<td></td>
</tr>
<tr>
<td>Be the first integrated battery anode material producer outside China</td>
<td>• High value-add product</td>
<td>• Electric vehicle market growth</td>
<td>• Qualification product in Q2 2018</td>
</tr>
<tr>
<td></td>
<td>• First mover advantage</td>
<td>• Energy storage</td>
<td>• Commercial product in Q4 2018</td>
</tr>
<tr>
<td></td>
<td>• Diversification in the global supply chain</td>
<td>• Consumer goods</td>
<td></td>
</tr>
<tr>
<td>Maximise value of other options</td>
<td>• Large scale deposit</td>
<td>• Expansion of Balama mine</td>
<td>• Options under development</td>
</tr>
<tr>
<td></td>
<td>• Lithium-ion battery market growth</td>
<td>• Battery anode material expansion</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Vanadium</td>
<td>• Processing Vanadium</td>
<td></td>
</tr>
</tbody>
</table>

Our Values and People underpin how we execute our strategy

Deliver value for stakeholders and shareholders
BAM production in USA provides global battery supply chain a strategic and valuable alternate source of anode material

Syrah Resources’ value proposition

- **Natural Flake Graphite**
  - Kt, supply composition
  - Syrah Resources (Mozambique)
  - Syrah decreases raw material supply risk

- **Battery Anode Material**
  - Kt, capacity composition
  - Syrah Resources (USA)
  - No diversification without Syrah’s BAM products

- **Anode**
  - GWh, capacity composition
  - Korea
  - China
  - Low level of diversification

- **Battery Factory**
  - GWh, capacity composition
  - USA
  - Korea
  - Japan
  - Europe
  - China
  - High level of diversification

- **Electric Vehicle**
  - GWh, demand composition
  - USA
  - Europe
  - China
  - High level of diversification

Source: Syrah Resources
Blending natural and synthetic graphite in anodes enables a balance of performance and cost.

Natural graphite penetration expected to increase due to the large cost advantage over synthetic graphite.

Anode composition by major anode producer:

- Natural: 55%
- Synthetic: 30%

Natural graphite expected to increase penetration in the anode due to the large cost advantage over synthetic graphite.
BAM strategy driven by detailed value-in-use assessment, product development, and commercial relationships

There are four key elements to our strategy...

<table>
<thead>
<tr>
<th>Research</th>
<th>Louisiana</th>
<th>Products</th>
<th>Commercial</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Service agreement with Cadenza Innovation to provide internal capability for intellectual property development</td>
<td>• Build BAM capacity to provide supply security and diversification benefit in global auto and battery supply chain</td>
<td>• Uncoated spherical graphite for established market participants</td>
<td>• Leverage existing and establish new relationships to move down the value chain</td>
</tr>
<tr>
<td>• Highlight quality and value in use of Balama graphite through testing and benchmarking</td>
<td>• Be located in one of the major auto making regions</td>
<td>• Moving towards coated spherical graphite and other BAM options</td>
<td></td>
</tr>
</tbody>
</table>

We are working through a detailed project plan

- Complete benchmarking and testing
- Complete infrastructure installation of first 5kt line
- Produce uncoated spherical graphite
- Product roadmap determines further plant development
- Target production of 10ktpa of BAM products

And targeting multiple BAM products...

Battery Anode Material

- Uncoated spherical graphite
- Coated spherical and other BAM products
Syrah has engaged Cadenza Innovation to benchmark material and fast-track cost-effective and competitive BAM

Cadenza Innovation is providing battery anode testing and product development services to Syrah Resources.

A joint team is established and operating in the USA, focused on:

- State of the art laboratory testing and benchmarking of Balama graphite
- Carbon processing expertise
- Established Li-Ion industry experience and manufacturing networks
- For rapid anode product development
Battery Anode Material (BAM) – Cadenza Innovation
Multiple market segments are being disrupted by the improving performance and lowering cost of lithium-ion batteries

**Portable Power**
- Lithium-ion cell demand growing to $16Bn by 2018
- Requirements: dependable run time, fast charge, safe

**Transportation**
- EV market for lithium-ion batteries expanding to $30Bn by 2020; $175B by 2025
- Requirements: Extended range, safe, affordable

**Utility**
- Lithium-ion batteries will be one technology with a clear and possibly extraordinary growth trajectory estimating $30B by 2020 to $400B by 2030
- Requirements: Compact & modular, reliable, safe, affordable

**Military**
- Lithium-ion battery demand driven by growing need for transport, surveillance & communications
- Requirements: lightweight, safe, long-life, rugged, green

Source: Cadenza Innovation
The PV boom was underestimated by nearly all and helped create new players and new partnerships to facilitate market growth.

Global policy, sales momentum and industry investment continue to build for the electric vehicle market

Government regulations driving change

EV fleet surpassed 2 million in 2016, ~1 million more to be added in 2017

Traditional OEMs responding to EV development and competition

- Invest up to $24 billion to produce more than 3 million EVs pa by 2026
- Has sold 100,000 EHP/HEV in each of the last 3 years
- EVs to be 15-20% of sales by 2025
- All sales to be EV/PHEV by 2019
- 50% of sales to be EV/PHEV by 2020
- 80% of core models to be EV/PHEV by 2023
- 20% of EU sales to be EV/PHEV by 2020
- 65% of all sales to be EV/PHEV by 2030
- 31 new models and 350,000 EV/PHEV sales by 2020
- Partnering with Nissan/Renault to launch 12 new EV/PHEV models by 2022
- 10 EV/PHEV models by 2020
- 13 EV/PHEV models by 2022, including F-150 hybrid

Global Electric Vehicle Leaders
Over 500,000 full electric cars and trucks planned

Leading Chinese EV car and bus producer

Battery factory capacity expansion is a global trend; China leading the development

Source: Bloomberg
Graphite will maintain dominance for the foreseeable future and natural graphite will increase market share as cost pressure increases.

<table>
<thead>
<tr>
<th>Artificial Graphite</th>
<th>Natural Graphite</th>
<th>Silicon Alloy Anodes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anode material</td>
<td>Anode material</td>
<td>Emerging but mixed with</td>
</tr>
<tr>
<td>xEV, grid</td>
<td>xEV, portable electronics</td>
<td>graphite presently</td>
</tr>
</tbody>
</table>

### more energy

### better cycle life

#### Key issues
- **Artificial Graphite**
  - High cost
  - High graphitisation energy use

- **Natural Graphite**
  - Low temperature performance
  - Historical environmental impact

- **Silicon Alloy Anodes**
  - Cycle life
  - Electrode expansion/cell dimensional stability
  - Low first cycle efficiency

#### Mitigating solutions
- **Artificial Graphite**
  - Mix with natural graphite
  - Develop graphitization process

- **Natural Graphite**
  - Surface coating/modification
  - Particle morphology design

- **Silicon Alloy Anodes**
  - Si-nano-particles composite
  - Mix with larger percentage of natural and/or artificial graphite
  - Limit discharge cut-off voltage

Source: Cadenza Innovation
Many variables are being tested to allow Syrah Resources to better understand the performance of Balama graphite in the anode.

<table>
<thead>
<tr>
<th>Physical &amp; Chemical</th>
<th>Composition</th>
<th>Structural</th>
<th>Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Size Distributions</td>
<td>• Elemental</td>
<td>• Crystallinity</td>
<td>• Specific capacity</td>
</tr>
<tr>
<td>• Morphology</td>
<td>• Moisture</td>
<td>• Graphitisation</td>
<td>• First cycle efficiency</td>
</tr>
<tr>
<td>• Surface area</td>
<td>• Ash content</td>
<td>• Crystallite size</td>
<td>• Cyclability</td>
</tr>
<tr>
<td>• Porosity</td>
<td></td>
<td></td>
<td>• Rate capability</td>
</tr>
<tr>
<td>• Tap density</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Spring back</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Adhesion</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Electrolyte absorption</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Benchmarking Data Based on Cadenza Innovation Laboratory Testing
At x6000 magnification, purified, and purified & coated Syrah BAM material show similar surface morphology.
Purified & coated Syrah BAM material shows similar surface morphology to anode material from a global tier 1 anode maker.
Syrah’s BAM highlighted a competitive capacity and efficiency, with stable initial cycling.

**Capacity and efficiency**

**1st cycle charge/discharge curve**
XRD results indicate a high degree of crystallinity

**X-ray diffraction (XRD) spectrum of Syrah pitch-carbon coated sample**

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Average</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>$d_{002}$ (Å)</td>
<td>3.3579</td>
<td>0.0003</td>
</tr>
<tr>
<td>Degree of Graphitisation (%)</td>
<td>95.48</td>
<td>0.32</td>
</tr>
<tr>
<td>Lc (002) (nm)</td>
<td>40.969</td>
<td>0.871</td>
</tr>
</tbody>
</table>
Syrah’s BAM highlighted a competitive capacity and efficiency, with stable initial cycling

Early trial of purified, pitch-carbon-coated BAM
- 360 mAh/g (C/20 rate)
- Conclusion: as expected from a low-temperature process

Early trials of chemically purified, non-coated BAM
- tests at 366-370 mAh/g (C/20 rate)
- Conclusion: no further heat treatment needed

Early trials of unpurified BAM
- tests at 340-360 mAh/g (C20 rate)
- Conclusion: a highly ordered precursor material
The Balama mine produces a superior precursor material, which Syrah/Cadenza are now refining into multiple BAM product options.
As the global Li-ion battery market is expanding, carbon anode material focus increases - Syrah / Cadenza to update in March 2018
Battery Anode Material (BAM) – Next Steps
Testing and benchmarking continues; product development roadmap aligned with Louisiana facility; commercial discussions

- Louisiana BAM plant development progressing to plan – site, permitting, long lead items, services all on track

- Installation from Q1 2018, targeting earliest qualification material – first products known, next phase products researched

- Testing, benchmarking, and product development options in conjunction with Cadenza to continue in 2018

- March 2018 delivery of product roadmap and next phase of development plan

- Ongoing technical and commercial discussions with potential customers

- Exploration of other potential commercial relationships underway