



## Syrah confirms robust economics for large-scale Active Anode Material production at Vidalia

### Highlights

- Bankable Feasibility Study (“BFS”) confirms strong business case for Syrah’s natural graphite Active Anode Material (“AAM”) production at Vidalia facility in USA
- Completion of BFS allows commercial discussions for project development to progress with potential offtake partners and financiers
- Syrah has commenced Front End Engineering and Design (“FEED”) for an initial 10ktpa AAM facility at Vidalia in Q1 2021, with Detailed Design to follow
- The BFS also considers a 40ktpa AAM production scenario in preparedness for expansion beyond 10ktpa and to assess the economic benefits of scaling production
- Syrah continues to progress qualification activities via toll treatment of purified spherical graphite (anode precursor) to AAM for testing with interested customers
- Syrah is on track to become the first commercial vertically integrated producer of natural graphite AAM outside of China, serving the growing US and European markets.

Syrah Resources Limited (ASX: SYR) (“Syrah” or “Company”) is pleased to announce completion of a BFS for expansion of its natural graphite AAM facility in Vidalia, Louisiana, USA (“Vidalia”) as it continues to execute its strategy of becoming the first vertically integrated producer of natural graphite AAM outside of China.

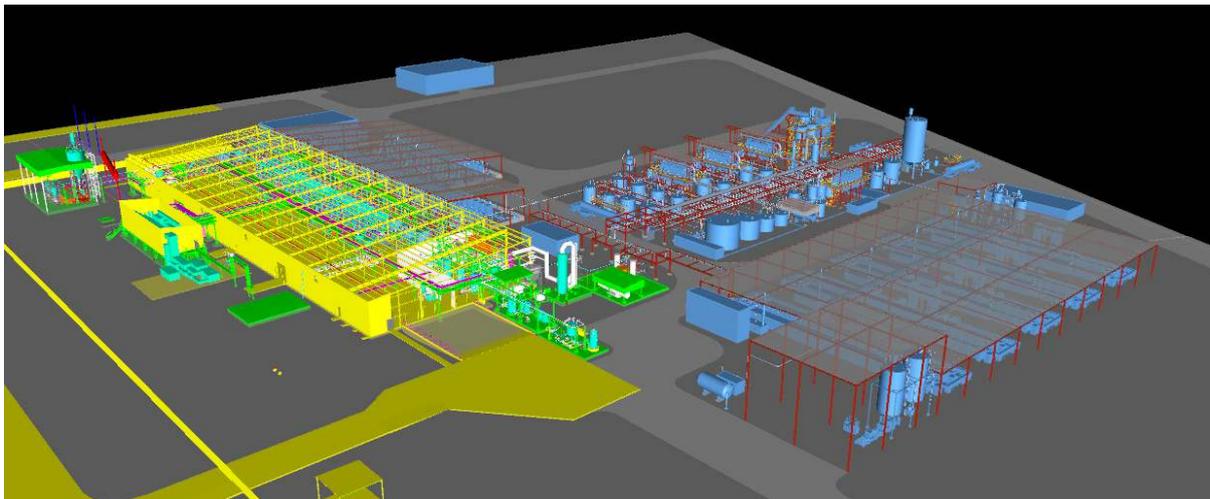


Figure 1: 3D model of Vidalia 10kt per annum expansion

**Syrah Managing Director and CEO Shaun Verner, said,** “*The BFS confirms strong positive economics for commercial scale natural graphite AAM production at Vidalia, with robust operating margins implied compared to current observed spot natural graphite AAM prices, which are arguably at*

*the low point of the cycle. Vidalia vertically integrated with Balama presents a unique value proposition: scale; independence and localisation with USA battery production; critical mineral security; and ESG auditability back to the graphite source. The completion of the BFS further enhances engagement with potential offtake customers, financiers, and Government, and represents an exciting milestone in the execution of our USA and vertical integration strategy, which commenced in 2016.”*

The BFS confirms that 10ktpa of AAM production can be achieved via expansion of existing plant and infrastructure within Syrah’s existing 25-acre industrial site. The BFS included a review of effluent discharge plans, to ensure large-scale AAM production at Syrah’s site in Vidalia will comply with all regulatory requirements, including environmental.



Figure 2: Clockwise from left: Overview of Syrah's Vidalia property and surrounds; Syrah's Vidalia facility Northeast looking southwest; Syrah's Vidalia facility south looking north

Syrah’s site in Vidalia is well located for large-scale AAM production with proximity to potential customers; access to key utilities (water/gas/power); proximity to an established petrochemical industry which provides access to key consumables; a skilled workforce; and adjacent barge/port access to the Mississippi River.

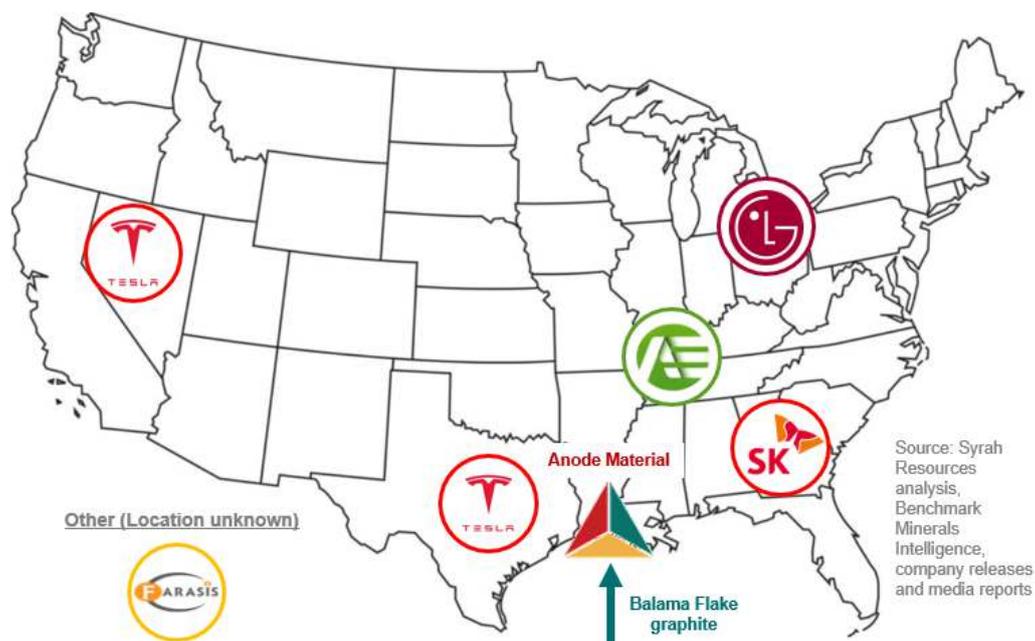


Figure 3: Location of Vidalia and planned/existing battery production capacity in the USA

Syrah's Vidalia facility can produce 5,000 metric tonnes per annum (5ktpa) of unpurified spherical graphite and 0.2ktpa of purified spherical graphite to battery specification. Installation of a furnace in Q1 2021 will enable the capability to produce 0.2ktpa of natural graphite AAM, and will represent the furthest progressed ex-China vertically integrated production of natural graphite AAM globally. Syrah established this installed asset base to facilitate product qualification with potential customers, which requires demonstration of capability to produce natural graphite AAM that is representative of commercial-scale production. Syrah has invested US\$56m<sup>1</sup> to date in de-risking market entry into the battery anode supply chain, including construction and operation of the existing asset base in Vidalia and technical product development.



Figure 4: Installed plant at Vidalia. Left: Milling, Right: Environmental scrubber

Syrah committed the capital for the current installed asset base at Vidalia for purposes of product qualification after extensive bench and pilot scale de-risking steps from 2016.

Table 1: Summary of project de-risking milestones

Date	Milestone
Dec 2020	<b>BFS confirms robust economics for large scale AAM production at Vidalia</b>
Oct 2020	First production of AAM (toll treated) using anode precursor from Vidalia
Jul 2020	First production of purified spherical graphite to battery specification from Vidalia
Dec 2018	First production of unpurified spherical graphite at Vidalia
Sep 2018	Pre-Feasibility study completed for large scale AAM production at Vidalia
Aug 2018	Vidalia site purchase completed
Mar 2018	Benchmarking of AAM produced from Balama graphite completed
Dec 2017	Pilot scale test work program completed
Nov 2016	Syrah announces plans to establish commercial scale facility in Louisiana
Apr 2016	Bench scale test work program initiated

<sup>1</sup> As at 30 June 2020

Syrah intends to initially expand natural graphite AAM production capacity at Vidalia to 10ktpa, and then increase in line with growing market demand. To this end, the BFS assessed both the initial market entry 10ktpa plant size, and a larger scale 40ktpa plant. A summary of key capital and operating cost outcomes of the BFS are provided in Table 2.

Table 2: Summary of BFS outcomes

Metric	Unit	10kt pa Facility	40kt pa Facility
Annual processed natural graphite	ktpa	18	73
AAM production	ktpa	10	40
By-product production	ktpa	8	33
By-product price	US\$/t	250	250
Capital cost estimate <sup>2,3</sup>	US\$m	138	477
Operating cost estimate (all-in) <sup>3</sup>	US\$/t AAM	3,149	2,704

Figure 5 shows robust operating margins are implied compared to current observed China domestic spot natural graphite AAM prices<sup>4</sup> when the Vidalia plant is scaled to 40ktpa capacity and beyond.

### Operating Cost - US\$/t AAM

**Observable Natural Graphite Spot AAM Price<sup>4</sup>: US\$5,471/t**



Figure 5: Operating cost outcomes and public observable natural graphite AAM prices

<sup>2</sup> Exclusive of: owners' costs associated with the expansion to 10ktpa, estimated at approx. US\$4m to first production for 10ktpa facility; working capital; and, ongoing cost associated with product qualification and technical product development activities

<sup>3</sup> Capital and operating cost estimates to accuracy of  $\pm 15\%$  and  $\pm 30\%$  for 10ktpa and 40ktpa respectively

<sup>4</sup> Price is the midpoint of "domestic/mid-range" natural graphite anode material price reported by China Industrial Association of Power Sources as of 27 November 2020 - <http://www.ciaps.org.cn/>. Prices converted at 6.58 USDCNY as of 27 November 2020.

Operating cost estimates as shown in Table 2 and Figure 5 are an all-in cost, including transport of natural graphite feed from Syrah’s Balama Graphite Operation in Mozambique and delivery of finished natural graphite AAM to potential customers. The operating cost estimates assume natural graphite cost of US\$400/t (FOB Nacala), which reflects an approximate all-in cost of production at Balama at full plant utilisation<sup>5</sup>.

Given the strong economics of large scale AAM production at Vidalia implied by the BFS, Syrah is continuing with FEED for the initial 10ktpa facility, which is expected to be completed in Q1 2021. Commitment to a Detailed Design phase will be required after completion of FEED to maintain continuity of the project. The project development pathway beyond Detailed Design will be informed by strategic/financial partnerships and end customer commitments.

Table 3: Ongoing project stage duration and expenditure

Project Phase	Duration (Months)	Capital (US\$m)
Completion of FEED <sup>6</sup>	3	2
Detailed Design	8	10
Construction and Commissioning	23	126
<b>Total</b>	<b>34</b>	<b>138</b>

Benchmark Minerals Intelligence forecast 145GWh battery production capacity in USA by 2024 and 226GWh in 2029<sup>7</sup>. Syrah estimates that this battery production would require 85kt and 133kt of natural graphite AAM in 2024 and 2029 respectively<sup>8</sup>. The planned market entry volume of 10ktpa from Vidalia represents a modest 12% of this forecast 2024 USA demand, with scope to expand production to meet growing market demand. Europe would also be a potential available export market for Vidalia production. Benchmark Minerals Intelligence forecast 257GWh and 425GWh of battery production capacity in 2024 and 2029 respectively, which Syrah estimates would require 151kt and 250kt of natural graphite AAM in 2024 and 2029 respectively.

In parallel with progression of FEED for the 10ktpa facility, Syrah continues to progress qualification preparation and activities with cell manufacturers and automakers via toll treatment of purified spherical graphite (anode precursor) to natural graphite AAM in the immediate term, and then from a furnace installed at Vidalia in Q1 2021. Consistent with the Company’s internal focus on production from Vidalia and cash preservation initiatives, the current phases of work under the Cadenza Innovation Development & Services Agreement have concluded.

<sup>5</sup> All-in cost of Balama production (FOB Nacala) an approximation based on next 30 years of the mine plan at Balama and full utilisation of the processing plant at design capacity.

<sup>6</sup> Project phase durations and capital costs assume continuity of phases. FEED is in progress from date of this ASX release, duration of 3 months to completion as per Table 3 is from December 2020

<sup>7</sup> Benchmark Minerals Intelligence July 2020 Megafactory Assessment

<sup>8</sup> Assumes 1.2kt of graphite AAM per GWh and anode natural vs synthetic graphite anode mix 49/51.

Syrah's near-term AAM production, qualification and project activities and milestones are outlined in Figure 6, with a focus on supply chain and customer interaction to underpin development and funding progress.

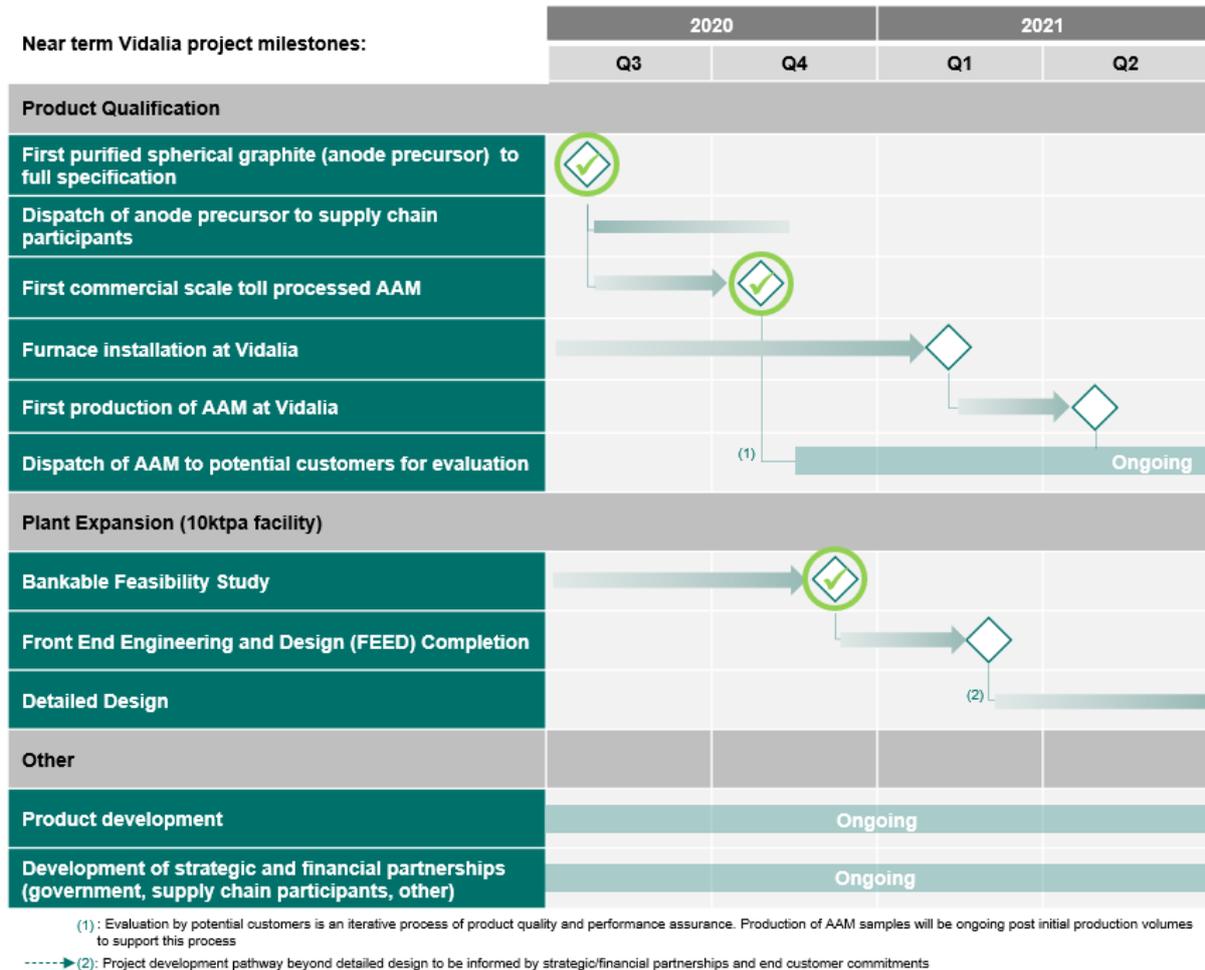


Figure 6: Near term milestones

## **This ASX release was authorised on behalf of the Syrah Board by**

Shaun Verner, Managing Director

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### **About Syrah Resources**

*Syrah Resources Limited (ASX code: SYR) (Syrah) is an Australian-based industrial minerals and technology company. Syrah owns and developed the Balama Graphite Project (Balama) in Mozambique. Balama transitioned to operations with sales and shipments to a global customer base, including battery anode producers, from the start of 2018. Balama production is targeted to supply traditional industrial graphite markets and emerging technology markets. Syrah is also progressing its downstream battery anode material project in Vidalia, Louisiana, USA (Vidalia) to vertically integrate with feed from Balama. Syrah aims to become the first vertically integrated producer of natural graphite active anode material outside of China.*

### **Forward Looking Statement**

*This document contains certain forward - looking statements. The words "expect", "anticipate", "estimate", "intend", "believe", "guidance", "should", "could", "may", "will", "predict", "plan", "targets" and other similar expressions are intended to identify forward - looking statements. Forward - looking statements in this document include statements regarding: the timetable and outcome of the equity offer and the use of the proceeds thereof; the capital and operating costs, timetable and operating metrics for the Balama Project; the viability of future opportunities such as spherical graphite, future agreements and offtake partners; future market supply and demand; and future mineral prices. Indications of, and guidance on, future earnings and financial position and performance are also forward - looking statements. Forward - looking statements, opinions and estimates provided in this document are based on assumptions and contingencies which are subject to change without notice, as are statements about market and industry trends, which are based on interpretations of current market conditions.*

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