



Natural Graphite Active Anode Material (AAM) for Global Electric Vehicle Demand

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SYRAH RESOURCES

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Company Overview



Photo: Balama Graphite Operation

Syrah's value proposition



Electric Vehicles require graphite

- Electric Vehicle (“EV”) adoption is gaining momentum
- Anodes in lithium-ion batteries used in EVs are comprised of graphite
- ESG factors are increasingly important considerations for manufacturers and consumers



Graphite is a strategic critical mineral

- Natural graphite a critical mineral in mining and downstream processing
- Global anode supply chain is currently 100% reliant on China
- Graphite is designated as a strategic critical mineral in USA, EU & Japan



Syrah's Balama Graphite Operation is a Tier 1 asset

- Long life (>50 years⁽¹⁾) and high grade (16% TGC⁽²⁾)
- Largest integrated natural graphite mine and processing plant globally
- Significant vanadium resource at Balama presents a potential value add option⁽³⁾



Vertical Integration in USA

- Balama to be vertically integrated with an anode production plant in USA
- Syrah to provide an ex-Asia & ESG verifiable source of anode supply
- Syrah aiming to become a vertically integrated producer of natural graphite anode material

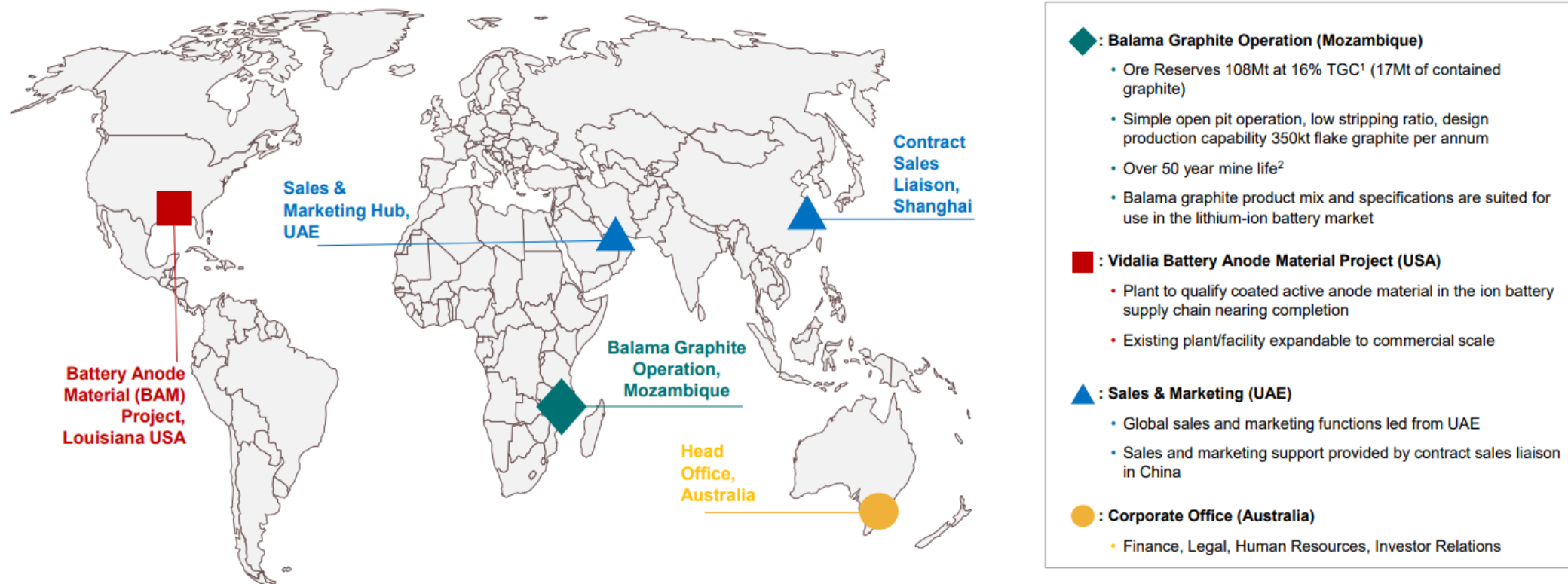
(1) Life of mine based on current 108Mt Graphite Ore Reserves being depleted at 2Mt throughput per annum. Refer to 2019 Annual report released to ASX 31 March 2020 for Reserve as at 31 December 2019. All material assumptions underpinning the Reserves and Resource statement in this announcement continue to apply, other than as updated in subsequent ASX announcements

(2) TGC = Total Graphitic Carbon

(3) Scoping study on potential to refine vanadium as per the ASX announcement dated 30 July 2014

Syrah Resources is a globally integrated natural graphite producer

A global business to service the growing demand for natural flake graphite and processed graphite-based products



1. TGC = Total Graphitic Carbon

2. Life of mine based on current 108Mt Graphite Ore Reserves being depleted at 2Mt throughput per annum. Refer to 2019 Annual report released to ASX 31 March 2020 for Reserve as at 31 December 2019. All material assumptions underpinning the Reserves and Resource statement in this announcement continue to apply, other than as updated in subsequent ASX announcements.

Balama is the world's largest integrated capacity, high quality graphite operation

Balama is Tier 1 asset. Low cost at high-capacity utilization and high quality - end to end traceability Active Anode Material (AAM)

Overview

Location	Cabo Delgado Province, Mozambique
Life of Mine⁽¹⁾	~50 years
Mining	Simple open pit mining, low strip ratio
Processing	Conventional – includes crushing, grinding, flotation, filtration, drying, screening and bagging
Plant Capacity	2Mtpa ore throughput. ~350ktpa
Product	94% to 98% fixed carbon graphite concentrate
C1 Cost⁽²⁾	Forecast ~ US\$330/t as plant optimised and at full capacity

Key Dates

Mar 2020	Temporary suspension of production at Balama Graphite Operation
Sep 2019	In response to drop in flake graphite prices, production reduced
Mar 2019	Graphite Mineral Resources and Ore Reserves Update
Jan 2019	Commercial production declared, with quarterly production of 33kt
Dec 2018	Balama produced >100kt in 2018
Sep 2018	Mining Agreement finalised with Government of Mozambique
Jan 2018	Balama transitioned to operations, global sales commenced
Nov 2017	First production of natural graphite
Jul 2016	Balama process plant construction commenced
May 2015	Feasibility study completed

Graphite Mineral Resources and Ore Reserves

Classification	Tonnes (Mt)	TGC (%)
Total Reserves	107.54	15.73
- Proved	-	-
- Probable	107.54	15.73
Total Resources	1,422	10.0
- Measured	23.5	17.5
- Indicated	378	11.2
- Inferred	1,020	9.8

Balama Open Pit



(1) Life of Mine based on 113.3Mt Graphite Ore Reserves being depleted at 2Mt of mill throughput per annum





(2) Cash operating cost Free on Board (FOB) Nacala, excluding government royalties and taxes



Market Needs

Sustainability is now a major priority for the EV supply chain

Syrah prioritizes sustainability throughout the production process from mine to anode, alongside quality and cost

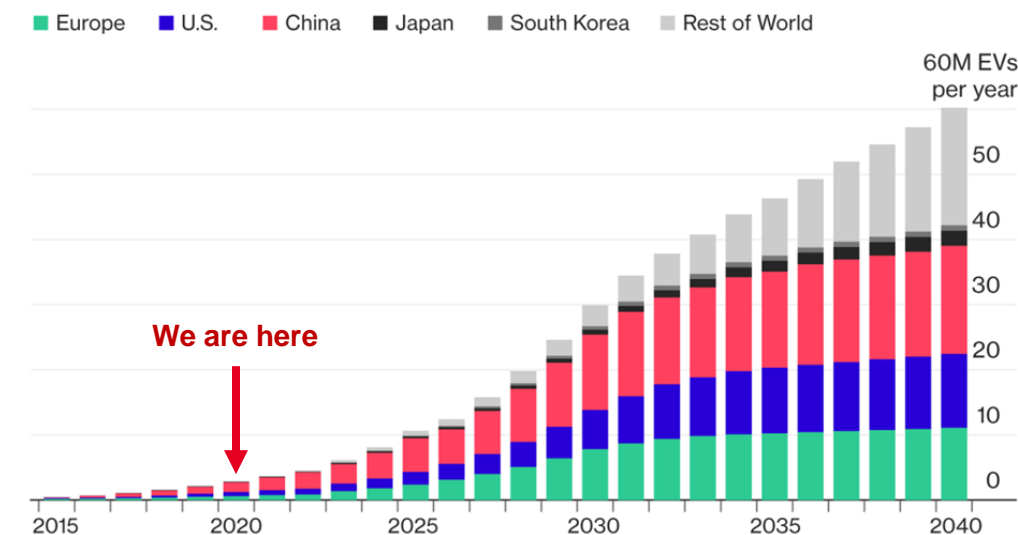
	Leading health and safety standards	<ul style="list-style-type: none">✓ ISO:45001 and ISO:14001 certification at Balama✓ Vidalia battery anode project being developed to ISO operating standards
	Best practice sustainability frameworks	<p>Sustainability frameworks based on:</p> <ul style="list-style-type: none">✓ Global Reporting Initiative (GRI)✓ United Nations Sustainable Development Goals✓ ICMM 10 Principles for Sustainable Development
	Low carbon footprint	<ul style="list-style-type: none">✓ Lower carbon footprint (Life Cycle) of natural versus synthetic graphite¹
	Auditable back to source	<ul style="list-style-type: none">✓ Anode material from Vidalia will have a single chain of custody back to the source

1. Benchmark Minerals Intelligence

The scale of projected growth (GWh/year) over the next decade is staggering

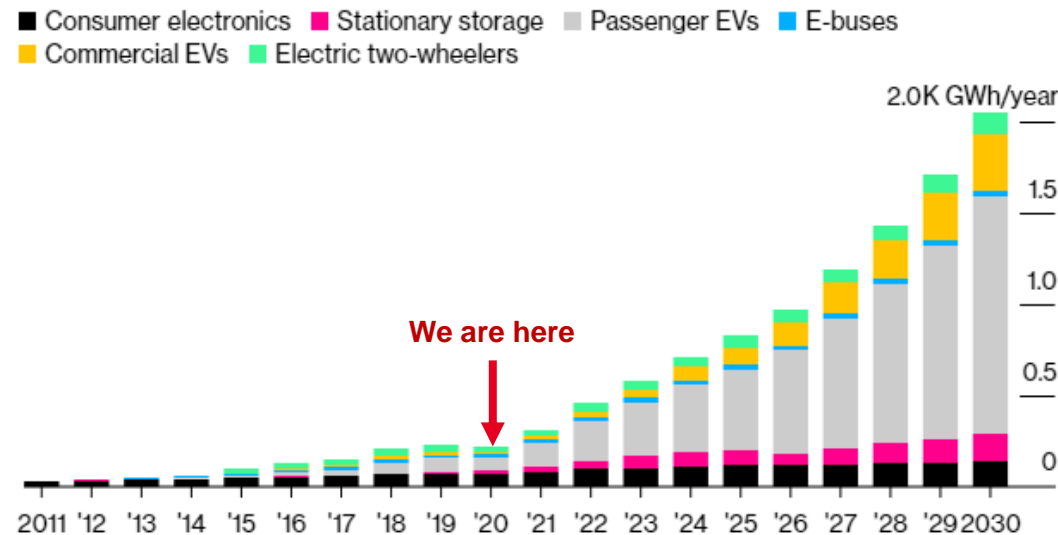
Market demand models for Li-ion energy storage requirements are continuously revised upward to 2030

Electric Vehicles a key driver of battery demand growth



Source: BloombergNEF

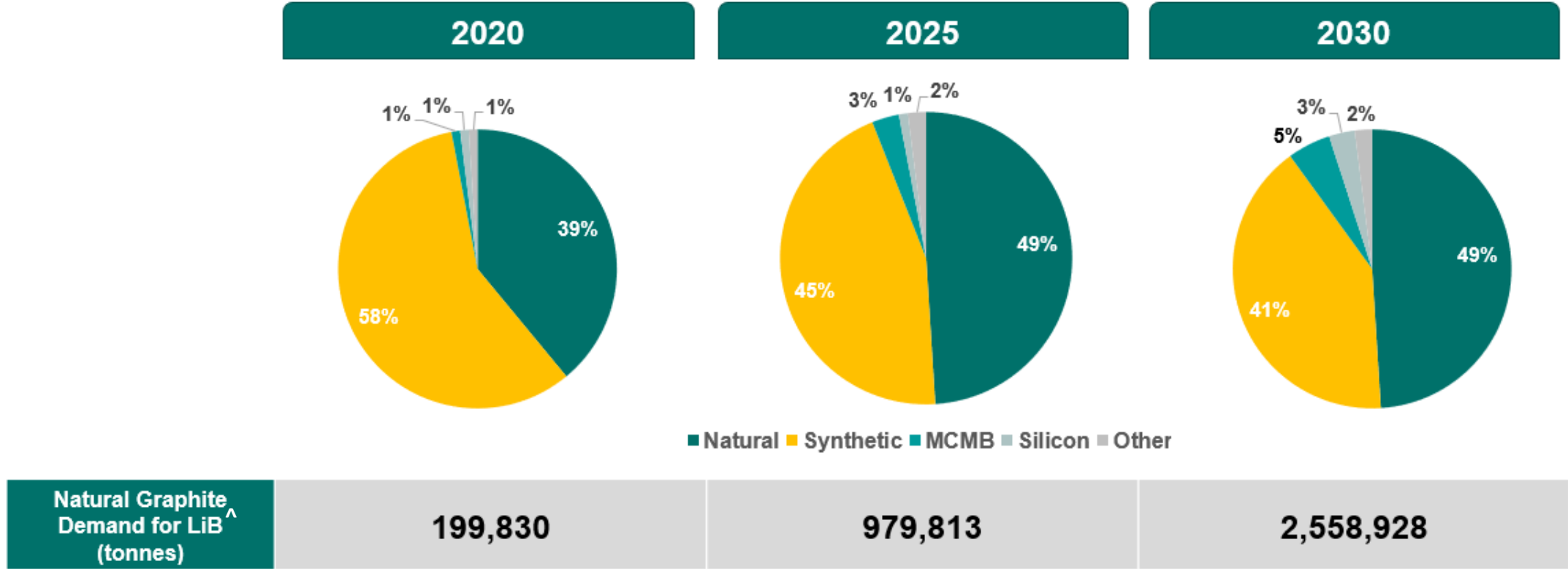
Strong growth forecast for battery demand



Source: BloombergNEF

Substantial Natural Graphite extraction and conversation capacity required

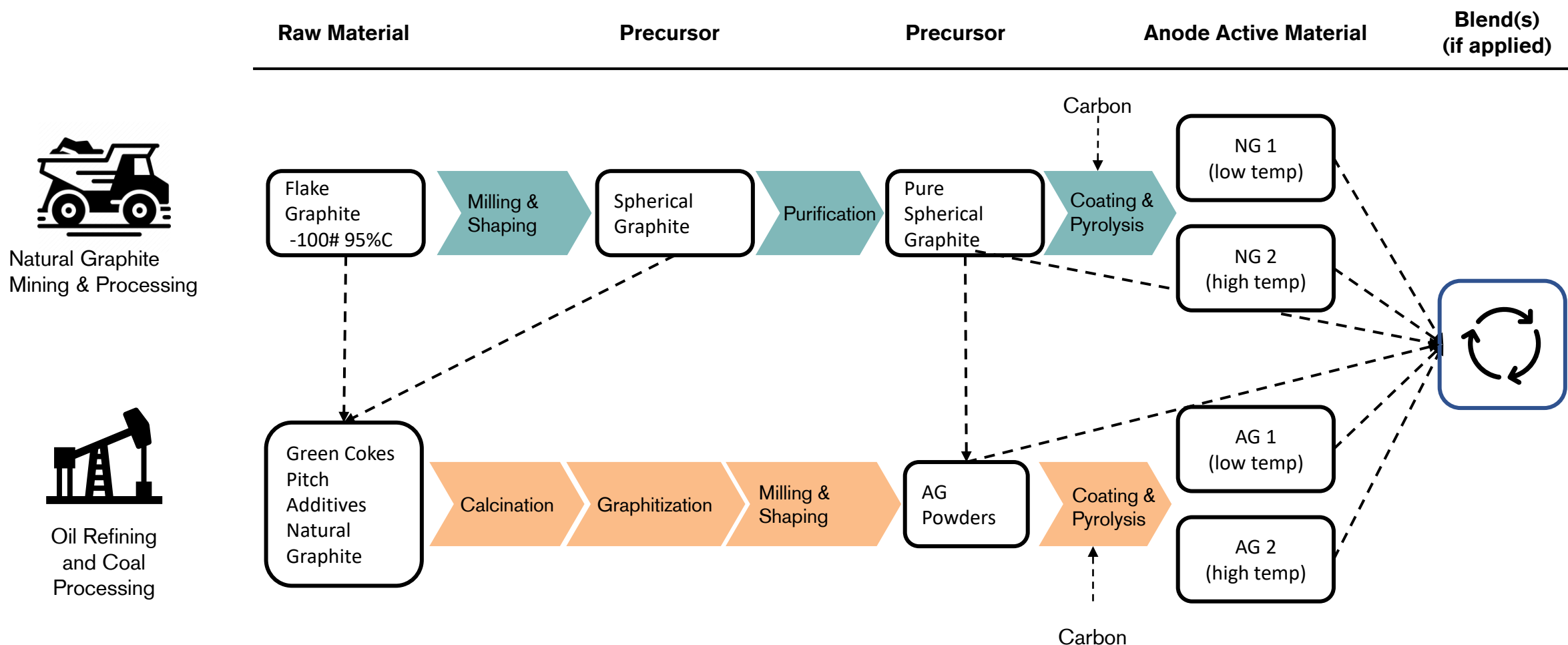
Like lithium, cobalt and nickel, Li-ion batteries are the primary growth driver for natural graphite



[^]: LiB = Lithium-Ion Batteries
Source: Benchmark Minerals Intelligence

Multiple processing routes yield differing AAM cost-performance outcomes

Synergy in performance requirements and lower cost opportunity see multiple anode precursor materials blended into final product



* Commercial mass production example blended anode material flowsheet

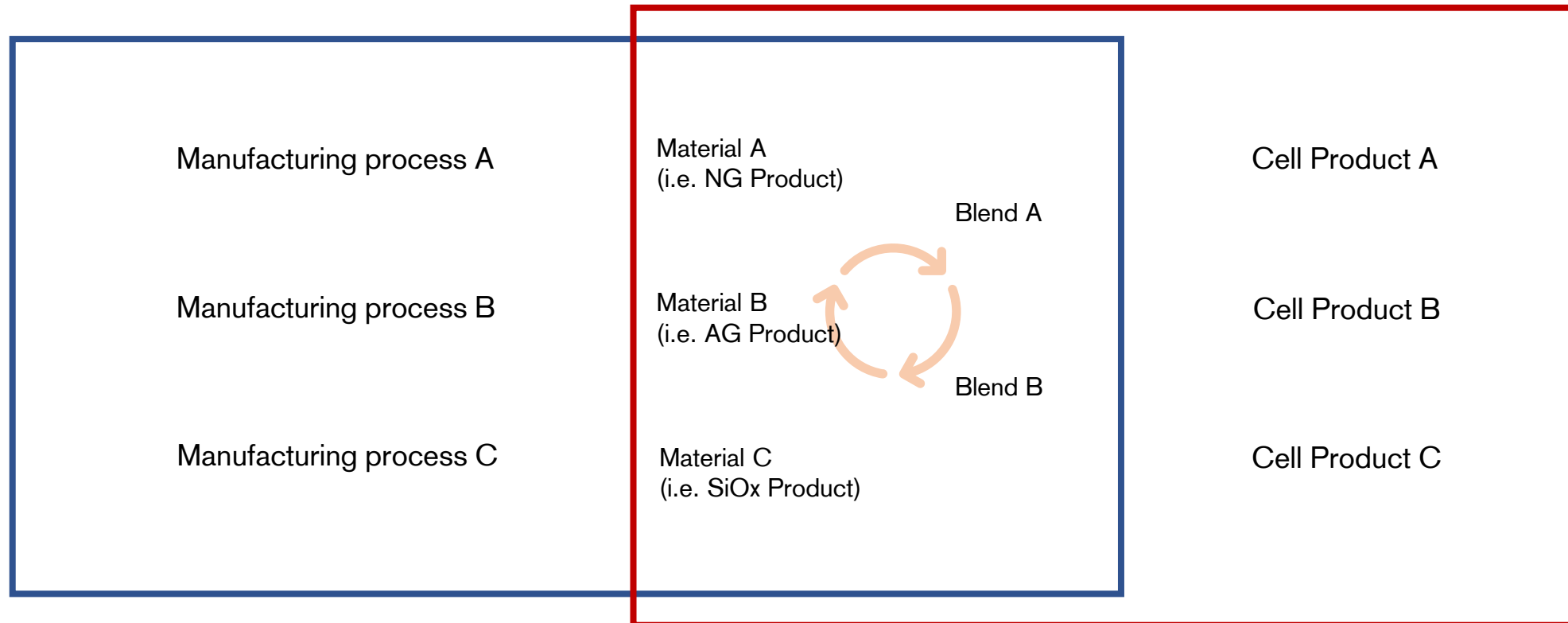
Anode Active Materials are blended to meet customer targets

Material blends are prepared either by anode supplier or cell manufacturer to meet cost and performance specifications

Anode Material Producer



Cell Producers



A low-angle, upward-looking photograph of a large industrial structure, possibly a bridge or a large building, featuring a prominent diagonal beam in the foreground and a metal walkway with yellow railings in the upper right. A solid teal horizontal banner is positioned across the middle of the image, containing the text "AAM Market Conditions" in white.

AAM Market Conditions

China currently produces 100% of global natural graphite anode precursor

China manufactured precursor is used domestically and exported to Japan and South Korea to manufacture Active Anode Material (AAM)

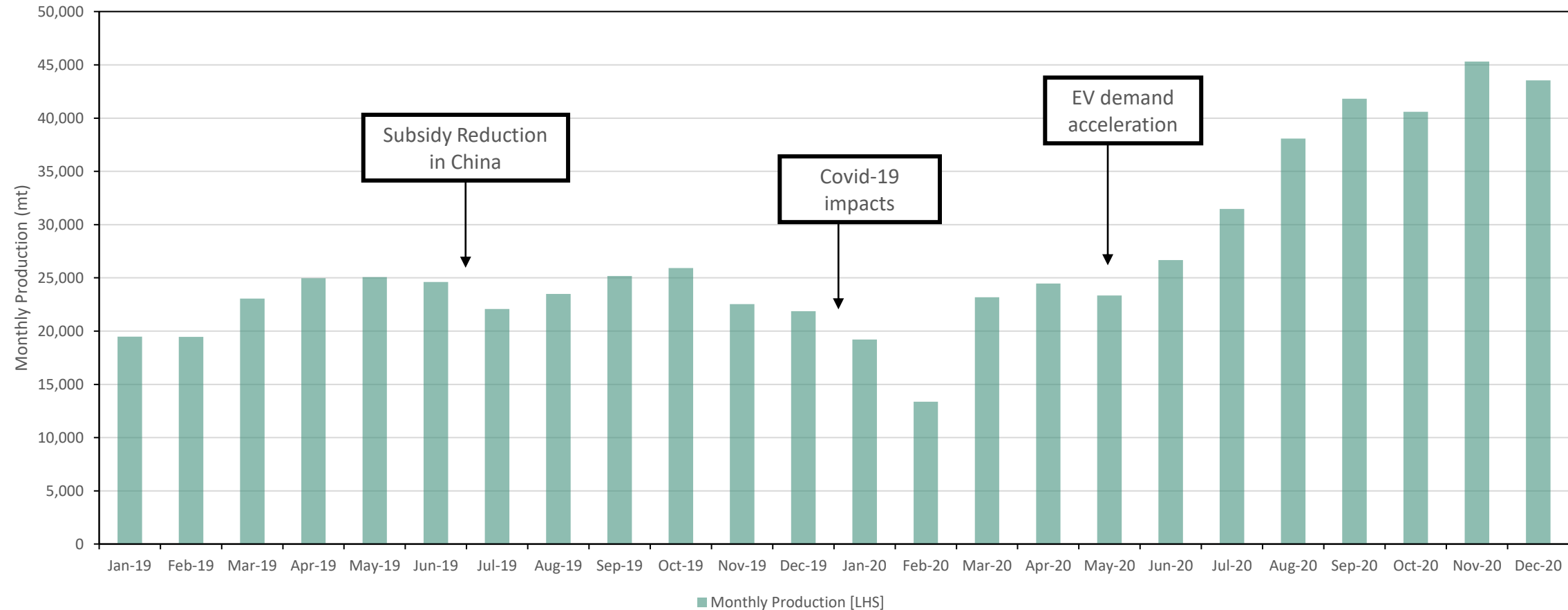


Source: Syrah Resources Internal Analysis

Accommodative policy response is seeing a significant AAM demand growth

After low growth in H2/'19 and H1/'20, monthly growth in H2/'20 has accelerated to >100% YoY growth in production volume

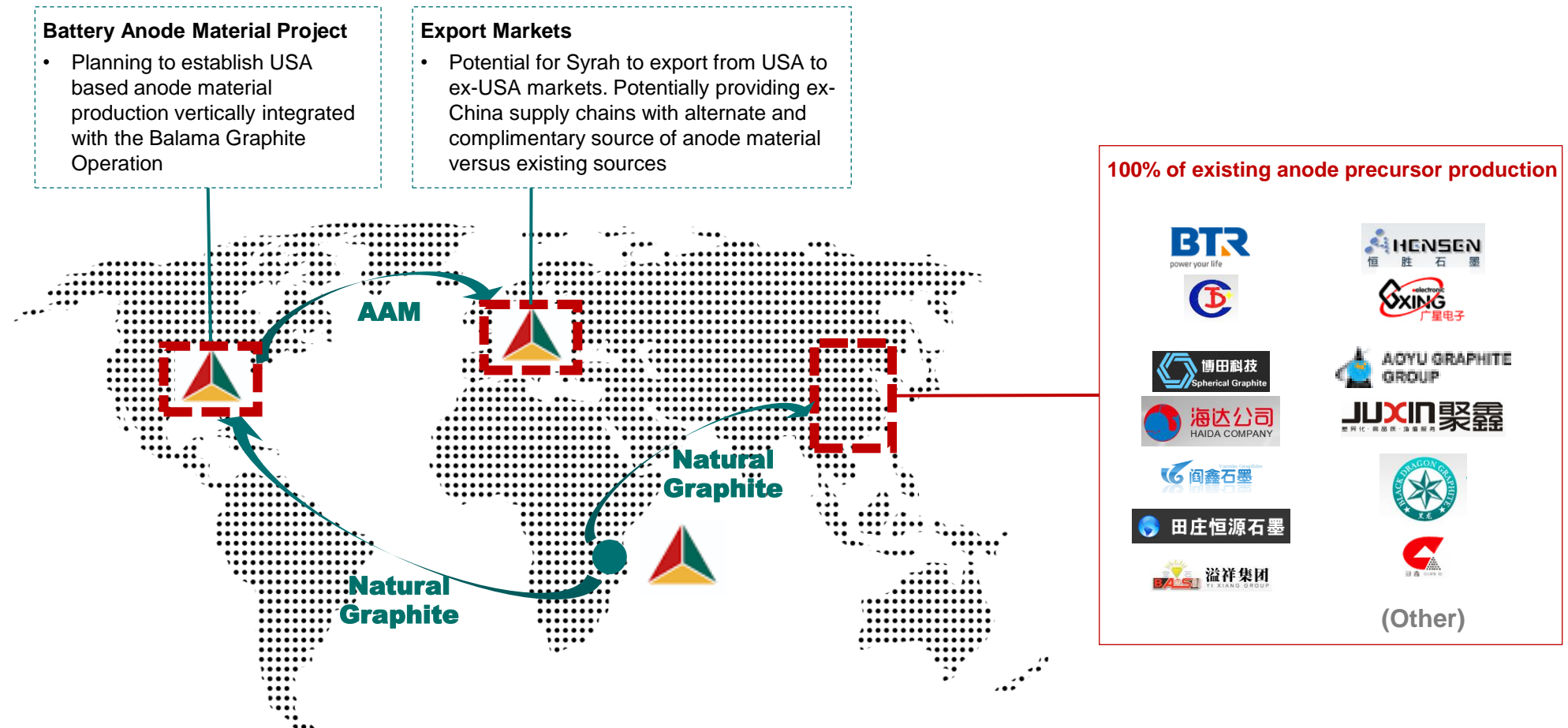
Chinese AAM Production (NG, AG, Composite)



Source: ICCSino December 2020

Syrah an alternate AAM supplier for battery supply chain participants

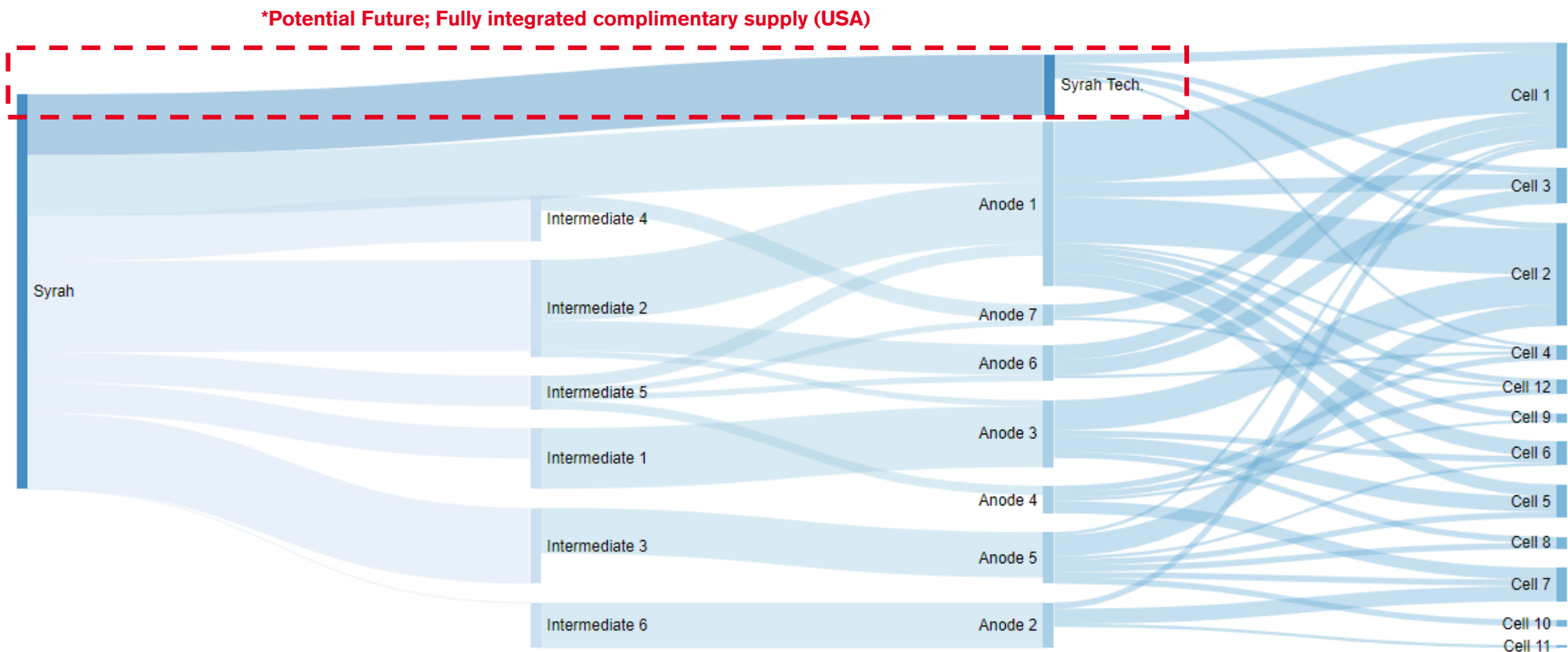
Syrah aims to provide a complementary and alternate supply proposition to existing domestic China supply to meet growing demand



Integrating a portion of the supply base can improve ESG & traceability

Targeting ease of audit and traceability to provide customers a clear and direct feedback on origins of their products

Based on est. 2019 – battery sector consumption ratio



Yield ~2:1

*: Flow of material through supply chain informed by Syrah customer base, available market data and Syrah estimates. Flow of material diagram presented as indicative of supply chain flows only.



USA Development – AAM production & performance



Photo: Syrah's AAM plant in Louisiana

Located in Vidalia, Louisiana, USA, our AAM production facility is highly scalable

Significant progress in demonstrating capability to supply commercial volume to market, in a sustainable manner

- ✓ Access to key utilities (Water/Gas/Power)
- ✓ Confirmed compliance with water and air discharge requirement from large scale commercial facility
- ✓ Options to expand facility size
- ✓ Direct barge/port access to Mississippi river
- ✓ Supportive government relations
- ✓ Access to key consumables (HF, HCL, Caustic)
- ✓ Capable workforce – initial production team in place and proximity to skilled workforce from petrochemical industries



Fully integrated, auditable supply to Vidalia, USA from Balama, Mozambique

Through vertical integration, automation and scale, is it possible to achieve sustainable cost-competitive production outside Asia

Focus to date on establishing production lines that are of adequate commercial scale to demonstrate Syrah's capability to supply ex-Asia markets (USA and Europe) with Active Anode Material that:

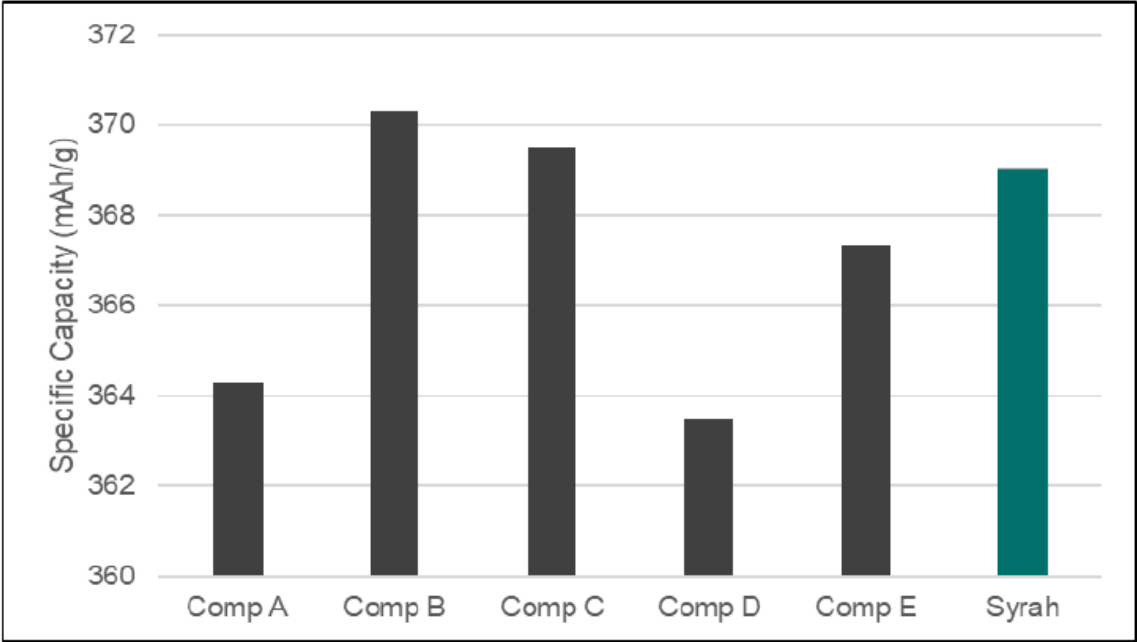
- has equivalent or superior physical and electrochemical properties to currently available material;
- is cost competitive with incumbent supply (currently 100% based in Asia); and,
- provides an environmentally superior alternative to existing production.



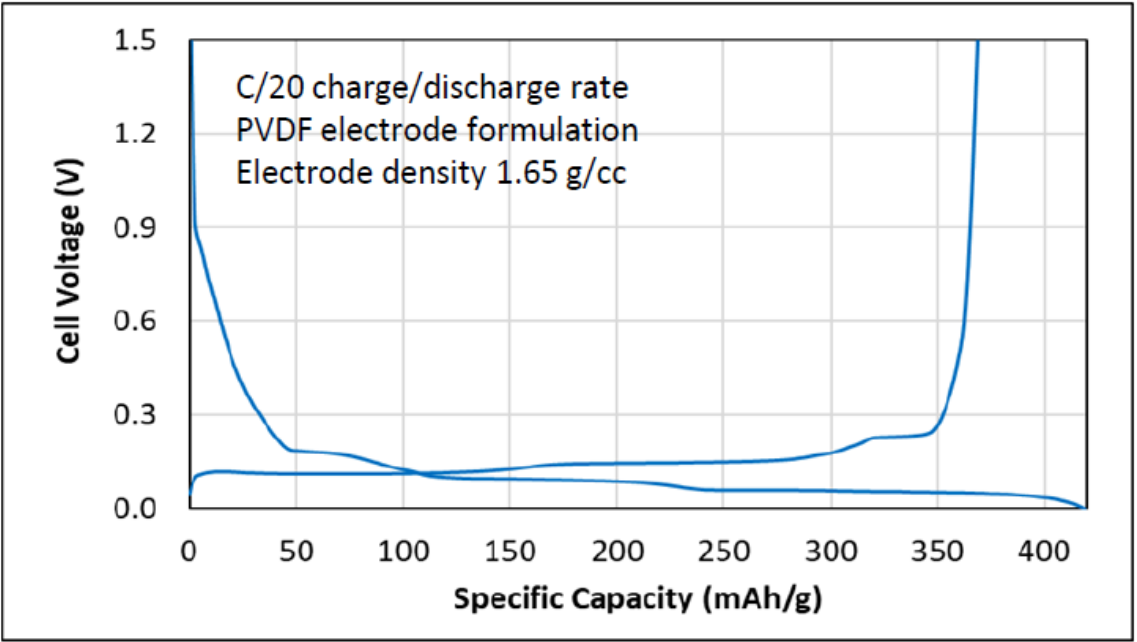
High quality AAM production generated through a leading AAM precursor

Key performance characteristics include graphite energy density, size distribution, density and morphology

Comparison of purified precursors



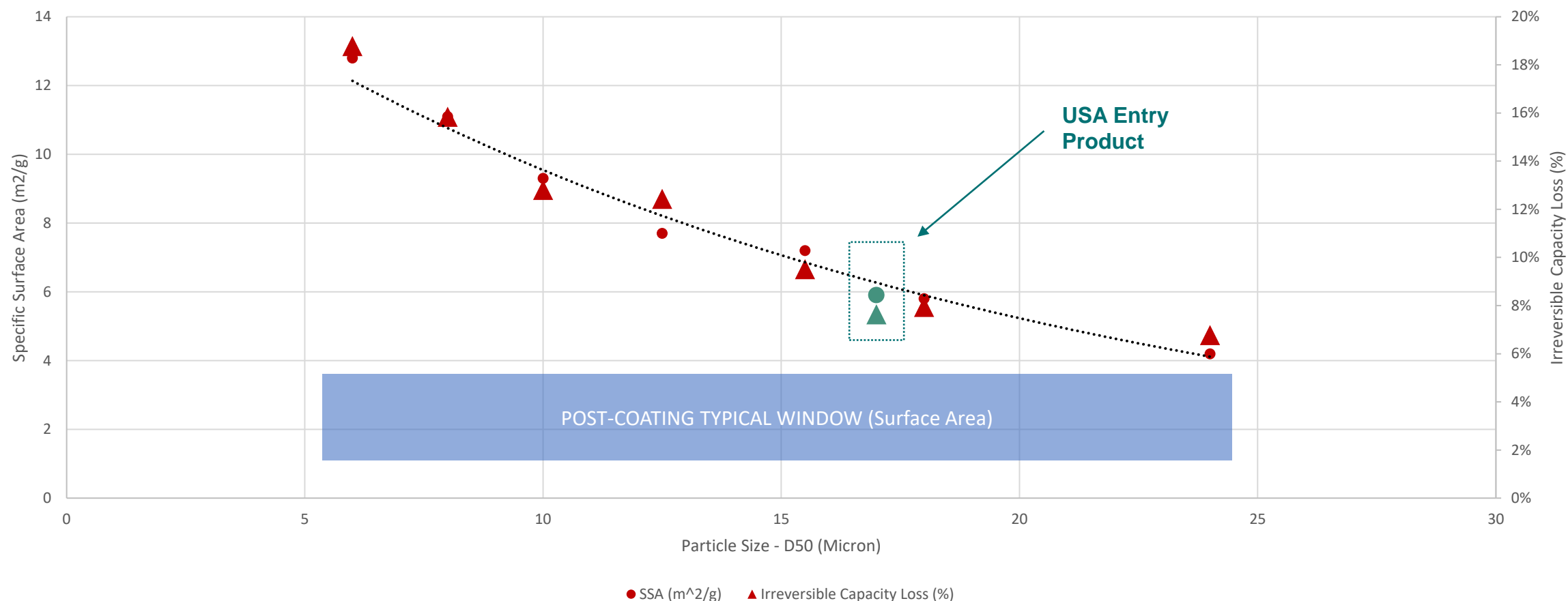
Syrah Precursor Capacity Measurement



Fundamental properties and performance levers are well understood

Stable, consistent coating and surface area optimisation reduces irreversible capacity loss and promotes cycle life

Spherical Graphite (precursor) – SEI formation
Relationship between surface area and irreversible capacity loss



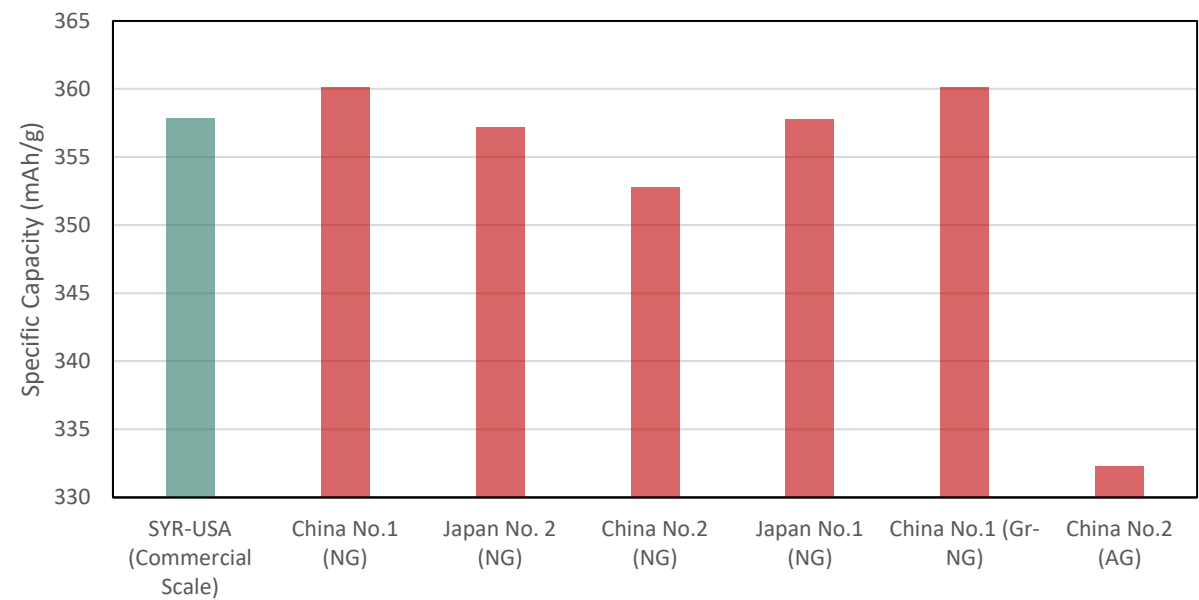
Points representing 8 different product size distributions (D50 – X-Axis)

First Cycle & Discharge Capacity performance strong against benchmark

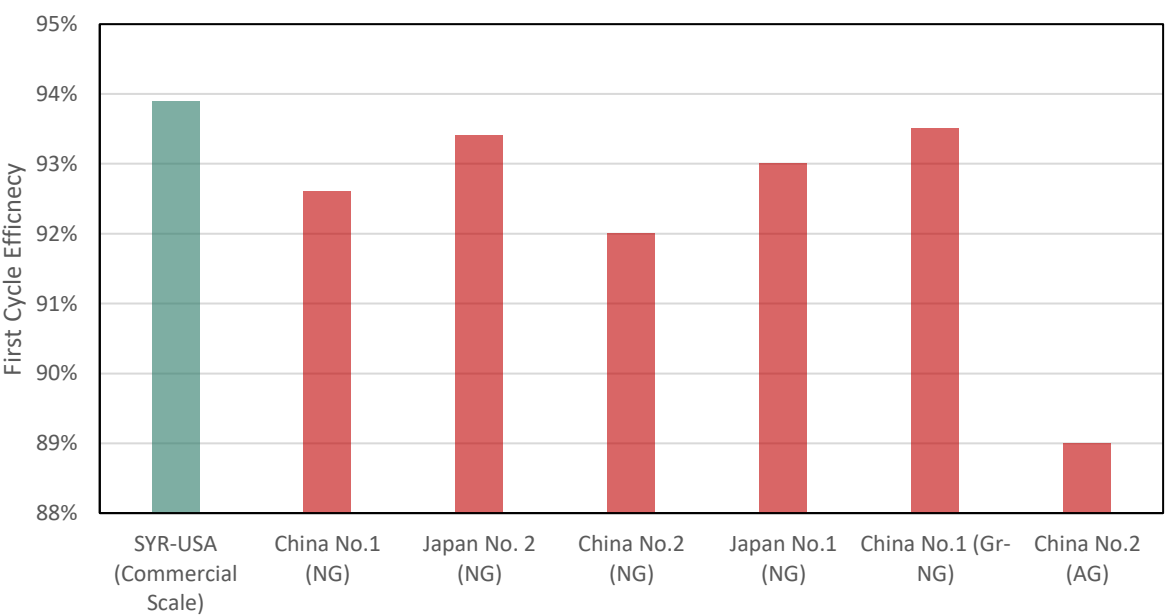
Discharge Capacity and FCE performance is in line with market leading market AAM products

Half Cell

Discharge Capacity

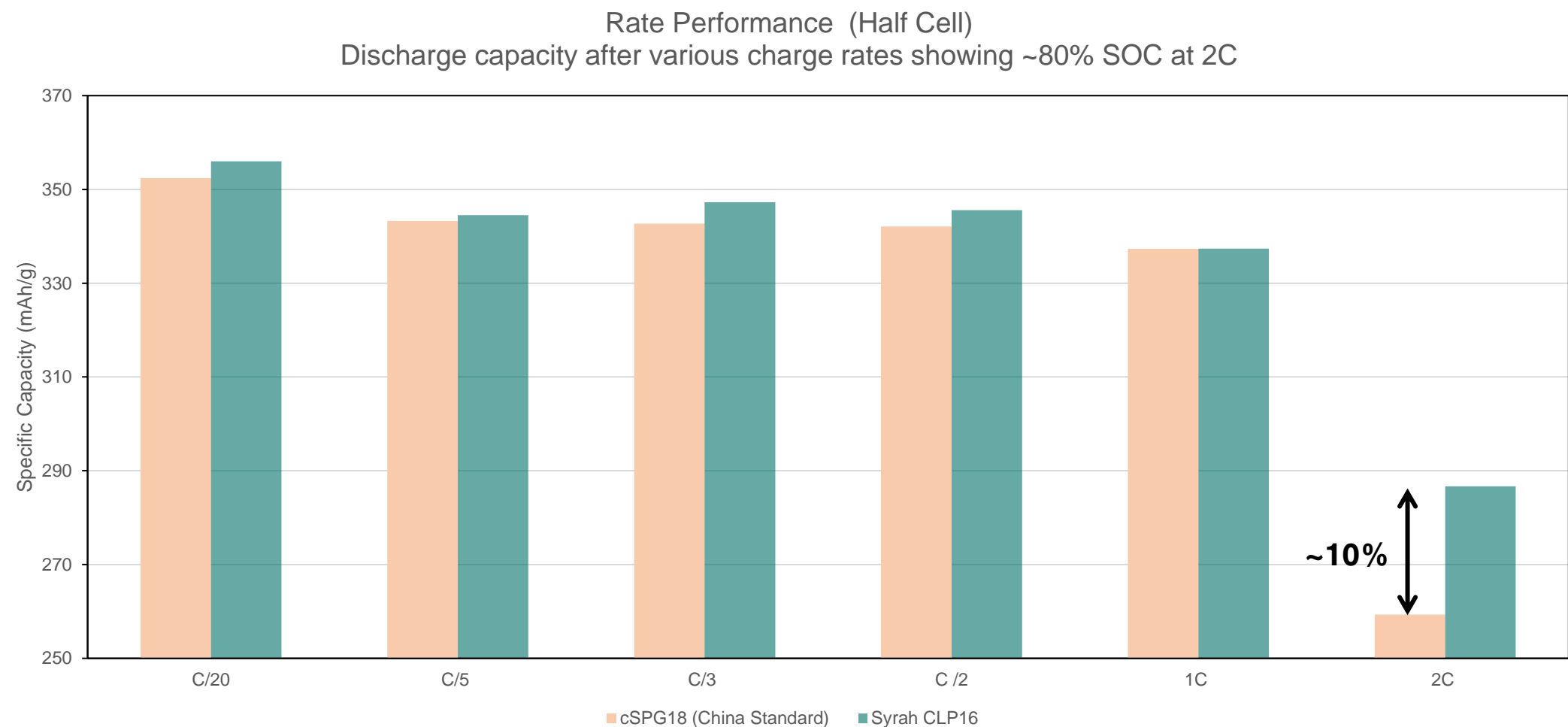


First Cycle Efficiency



Material shows moderate charge-rate advantage over benchmark

Moderate improvement in charge capacity at 2C (30min) demonstrated over the benchmark standard, all else in line

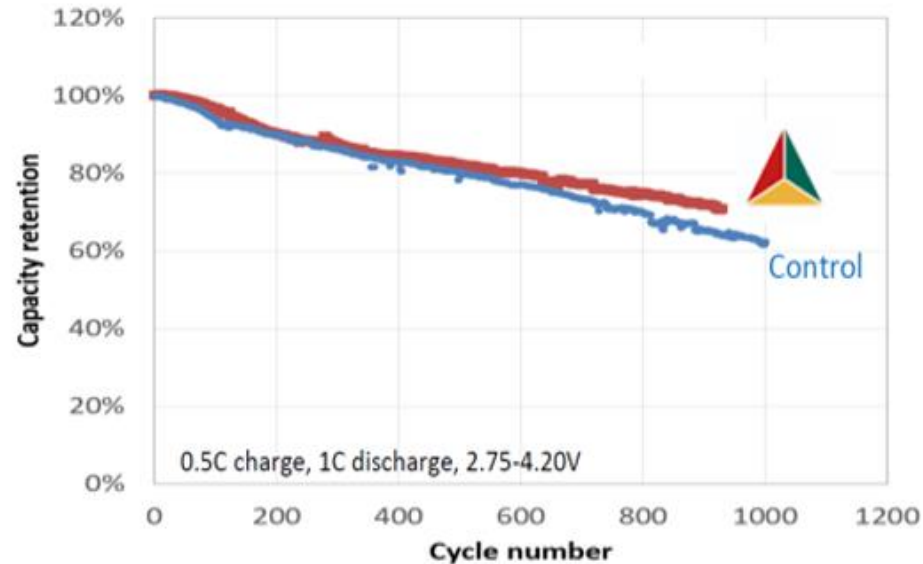


Source: Syrah performance evaluation

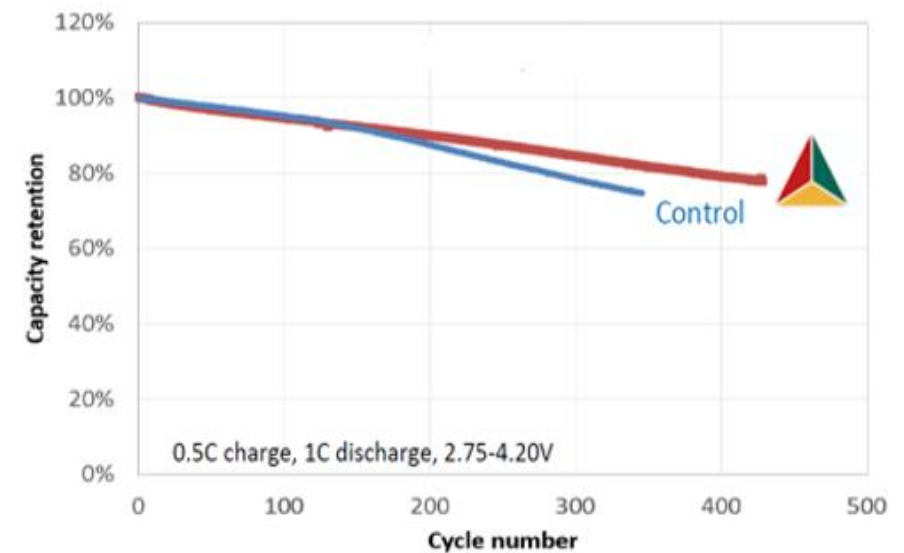
Cycle performance is moderately improved in 18650 cylindrical cells

Commercial scale production in 2.75Ah energy cells vs equivalent natural graphite benchmark

25°C



45°C

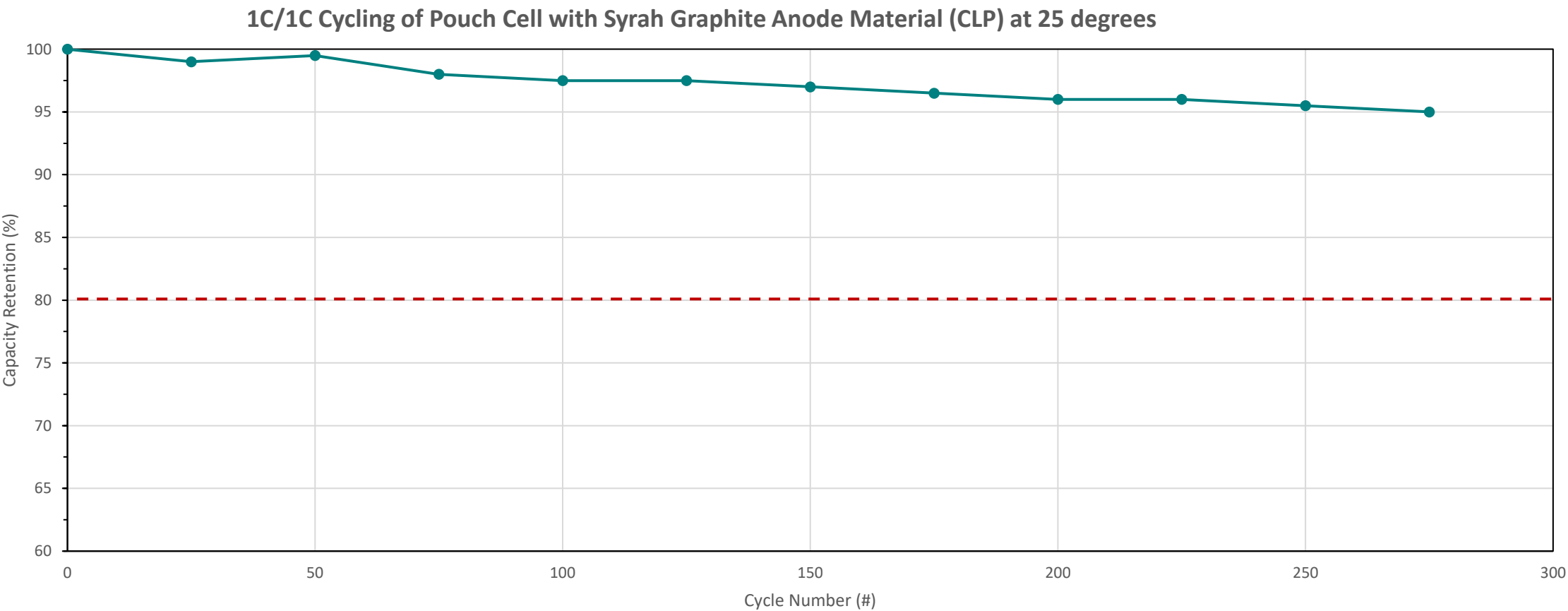


Cylindrical 18650
2.75Ah Cells
NMC532-Graphite Cells

Source: Commercial cell producer benchmark evaluation

Pouch cell cycle performance also stable, ~95% retained after 275 cycles

Cycle performance is very sensitive to battery cell design and therefore these figures are only indicative of potential

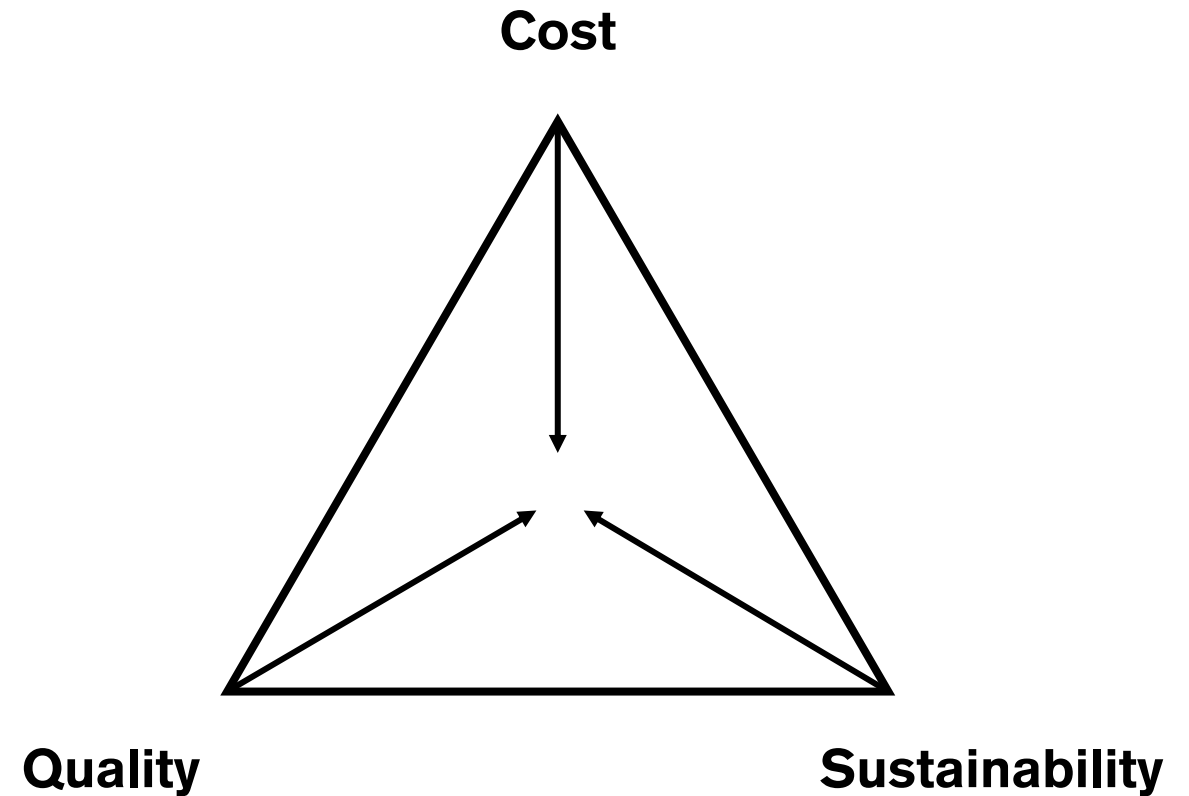


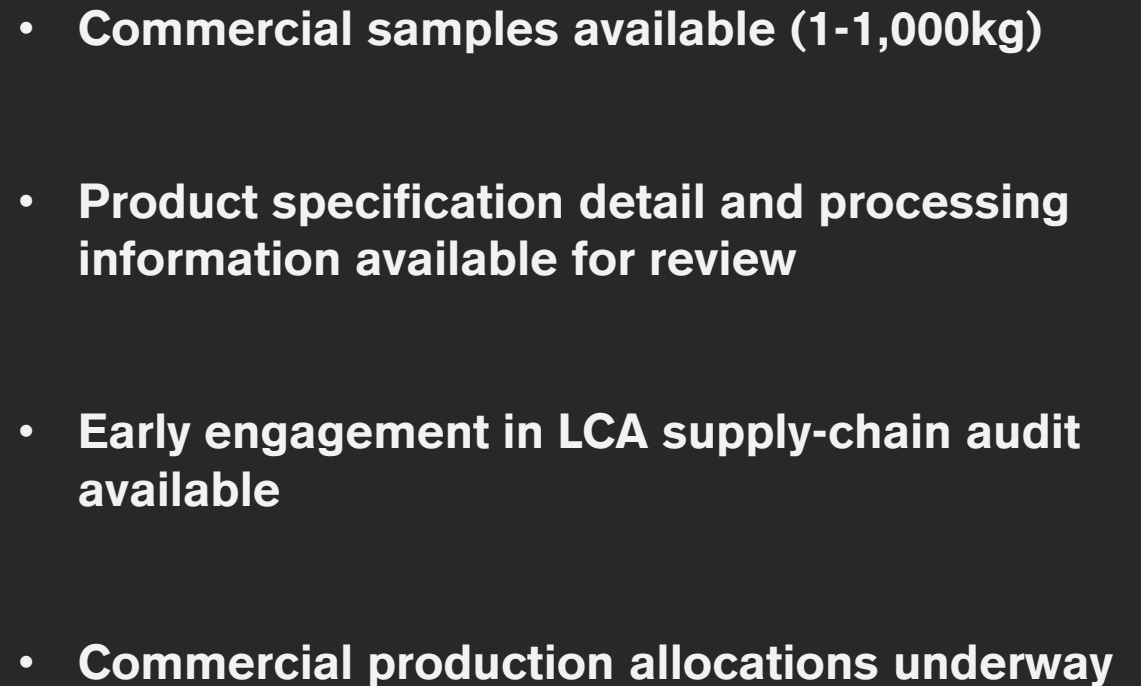
Source: Leading pouch cell producer evaluation

Syrah's market entry focus is to serve customers with proven technology

Our Product Roadmap provides mass-market cost-performance targets and product expansion to deliver sustainable return on investment

- Integrated Production outside Asia
- Cost-competitive, complimentary to China production
- Full traceability and accountability (Audit)
- Environmental Best Practice
- Health & Safety Best Practice
- Transparent
- Stable supply w/ 50+ yr Tier 1 mine-life
- First Integrated Production outside Asia
- Product roadmap based around Graphite
- Open to collaboration and co-development





SYRAH RESOURCES

NATURAL GRAPHITE MATERIALS

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