

# Bernstein Annual Strategic Decision Conference

Shaun Verner, Managing Director and CEO

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# Syrah is leveraging the globally significant Balama asset to develop an integrated battery anode material and industrial products business

- 1 Global mega trend, the decarbonisation of economic growth continues**
  - Decarbonisation of the transport sector, via Lithium-ion battery powered electric vehicles (EV), is gaining momentum
- 2 Demand for natural graphite is in a growth phase to support the manufacturing of Lithium-ion batteries**
  - Market transition toward greater value for fine flake graphite expected
- 3 Syrah is now operating the largest natural graphite mine in the world**
  - Syrah established position as the key exporter of natural graphite globally, and first major exporter to China in <2 years
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  - Structural market adjustment occurring: China now a net importer, through major demand growth for Syrah material
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  - Major environmental and cost advantage of starting with a higher grade fines product





## Development of the Lithium-Ion Battery, Electric Vehicle and Graphite Markets

# Policy restriction on internal combustion engine (ICE) vehicles is driving a transition to Electric Vehicles (EV) – China and Europe leading the charge

	2020	2025	2030	2035	2040
<b>2018</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>		<b>2040</b>
Europe already has >130 low emission zones and >70 access regulation zones	China targets 2 million EV sales by 2020	Athens, Madrid, Mexico City and Rome redirect diesel access  EU tightens EV target to 20% of total sales by 2025 Norway bans sales of gasoline and diesel cars	Fossil Fuel Free Street Declaration: Twelve cities <sup>1</sup> with >32 million people commit to no ICE vehicles in their streets  Denmark, Germany, Ireland, Israel, Netherlands and Slovenia plan to implement or consider 100% zero emission vehicle sales targets by 2030  India considering 30% target		France, Italy and UK plan to target 100% zero emission vehicle sales  Sri Lanka aiming for 100% zero emission vehicle fleet

## Positive outlook for increased deployment of electric vehicles

- Leading countries in electric mobility use a variety of measures such as fuel economy standards and incentives to change consumer behaviour
- Policy support is being extended to address the strategic importance of the battery technology value chain
- Private sector response to public policy signals confirms the escalating momentum for electrification of transport
- Lithium-ion battery manufacturing undergoing major investments to expand production

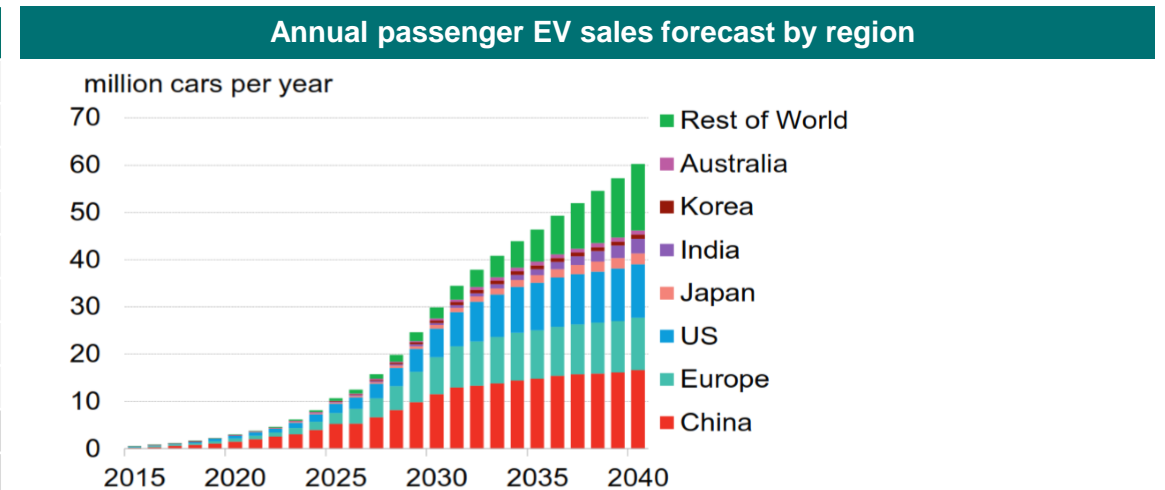
(1) Fossil Fuel Free Street Declaration was signed by the following twelve cities - Auckland, Barcelona, Cape Town, Copenhagen, London, Los Angeles, Mexico City, Milan, Paris, Quito, Seattle and Vancouver



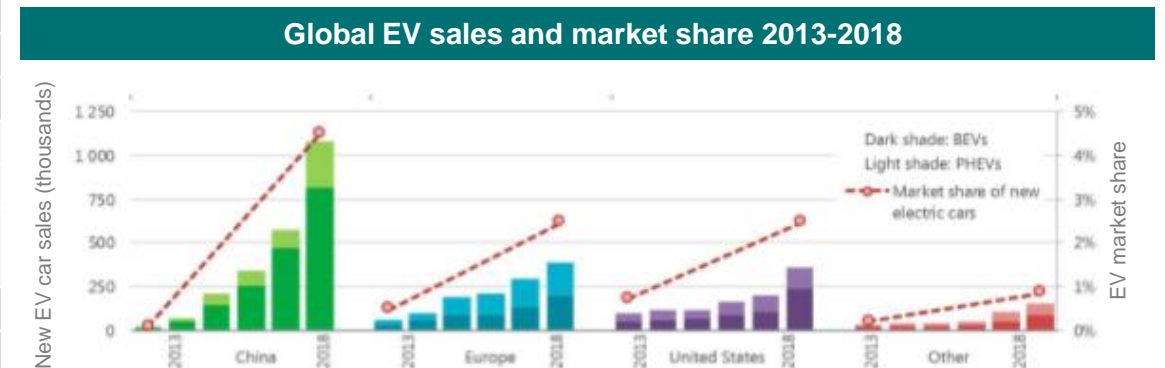
# Private sector response to public policy signals, confirms positive momentum for electrification of transport; aggressive automotive targets

Region	OEM	Electric Vehicle Strategy / Targets
China	BYD Auto	500k units in 2020, from 248k in 2018
	BAIC Group	500k units in 2020, no ICE engines by 2025
	SAIC Motor	600k sales by 2020
	JAC Motors	30% of fleet by 2025
	Zotye Auto	60% of fleet by 2020
	Chery	200k unit sales in 2020
	Changan Automobile	300k unit sales by 2020, no ICE models by 2025
	Geely	600k unit sales by 2020
Europe	BMW	15-25% of fleet by 2025
	Daimler	25% of fleet by 2025, <b>including new USA EV production</b>
	Volkswagen	2-3 million globally by 2025, including JV with Ford for EVs in USA
	Jaguar	50% of fleet sales by 2020
	Peugeot	80% of models to be electrified by 2023
	Fiat Chrysler Automobiles	EV models across all brands, no diesel by 2022
USA	Tesla	1 million units p.a. by 2020, from 245k in 2018
	General Motors	150k unit sales in China by 2020, 500k by 2025
	Ford	70% of China sales by 2025, including a JV with VW for electrified vehicles
Japan	Nissan	25% of EU sales by 2020
	Toyota	10 new BEVs in early 2020s
	Honda	65% of fleet sales by 2030
Korea	Hyundai	300k unit sales by 2020

Source: Company announcements



Source: Bloomberg New Energy Finance Long-Term Electric Vehicle Outlook 2018

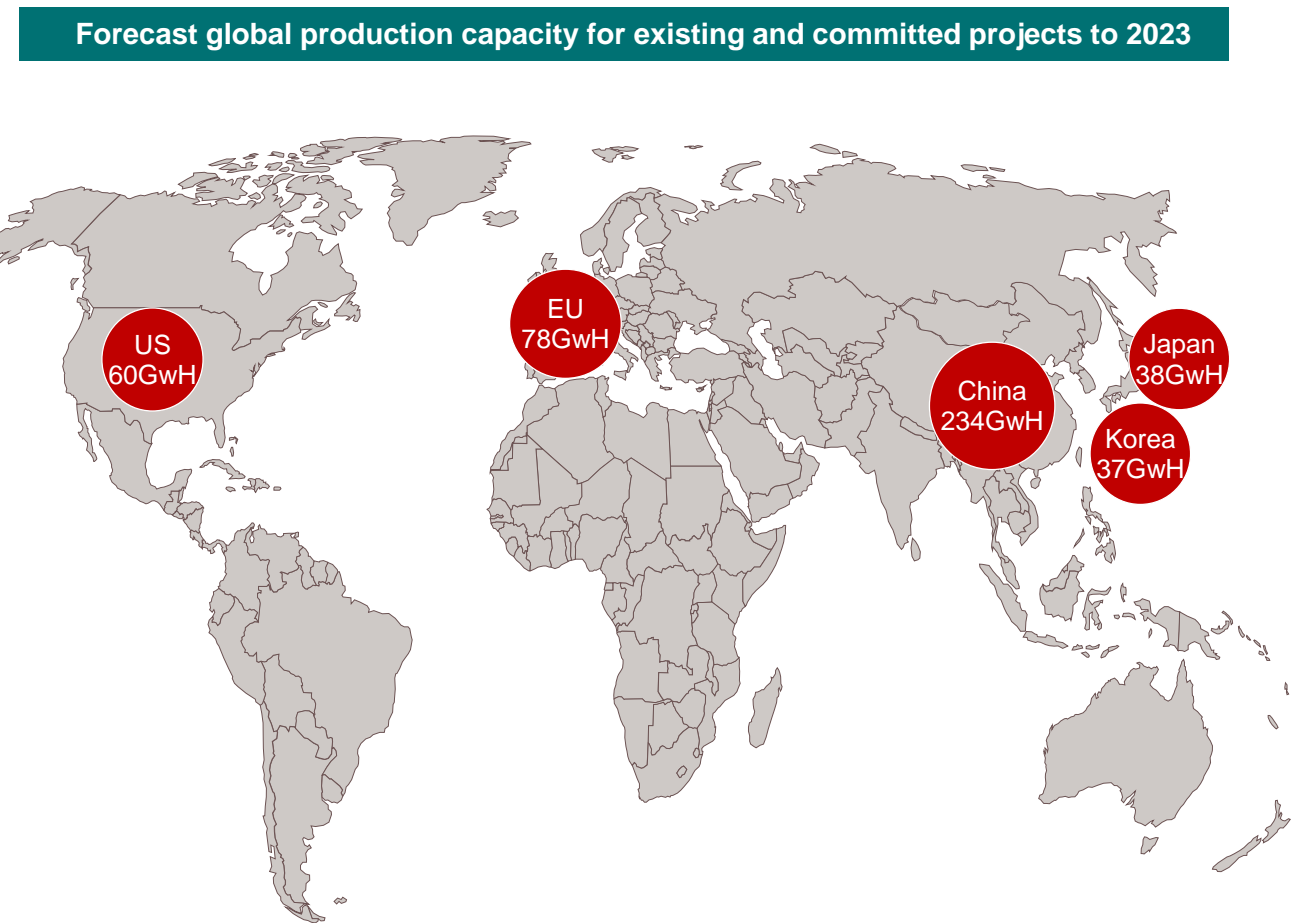


Source: International Energy Agency May 2019



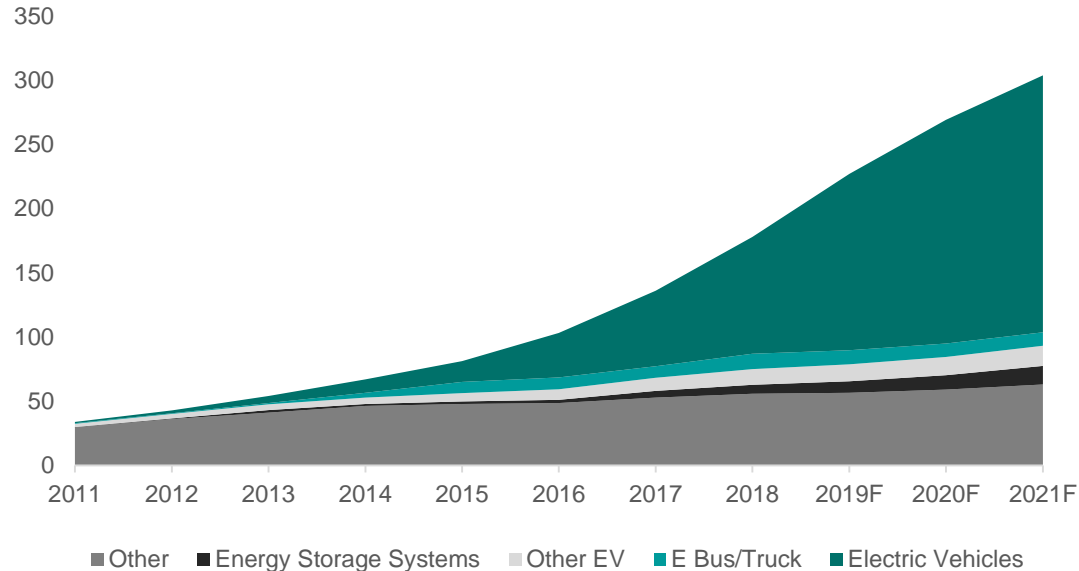
# Lithium-ion battery manufacturing capacity expansion is being driven by major investment in Asia, Europe and the USA

Origin	OEM	Transport Sector Battery	Major Customers
China	CATL	16GWh produced in 2018, 50GWh planned by 2020	BAIC Group Geely
	BYD Auto	9GWh produced in 2018, 16GWh planned by 2020	BYD Auto
	Gotion	6GWh current capacity, 2.5GWh planned by 2020	BAIC Group JAC Motors
	Lishen Battery	2GWh produced in 2018, 20GWh planned by 2020	Hyundai
	Boston Power	4GWh current capacity, 4GWh to be added in 2019	Chery
	A123 Systems	1GWh current capacity	
	OptimumNano	12GWh current capacity, targeting 20GWh by 2020	
	China Aviation Lithium Battery	~1GWh produced in 2018, targeting 15GWh by 2020	Zotye Auto
	BAK Battery	~1.5GWh produced in 2018, targeting 15GWh by 2020	
	Microvast	11GWh under construction, capacity to reach 15GWh by 2020	Fiat Chrysler Automobiles
Korea	Farasis Energy	2.5GWh capacity in 2018, 10GWh planned by 2020	BAIC Group
	Automotive Energy Supply Corporation	8GWh capacity in 2018	Nissan
	Samsung	3GWh produced in 2018, 20GWh planned by 2020	BMW Volkswagen
Japan	LG Chem	7GWh capacity in 2018, 100GWh planned by 2020	Ford General Motors Fiat Chrysler Automobiles
	SK Innovation	Targeting 10GWh by 2020, <b>including a new plant in USA</b>	Daimler
Japan	Panasonic	20GWh produced in 2018, 50GWh capacity planned by 2020	Tesla Toyota Ford Honda



# Li-ion battery market growth provides a highly attractive outlook for natural graphite, even at conservative EV penetration levels

Global Li-ion Battery Demand (GWh)

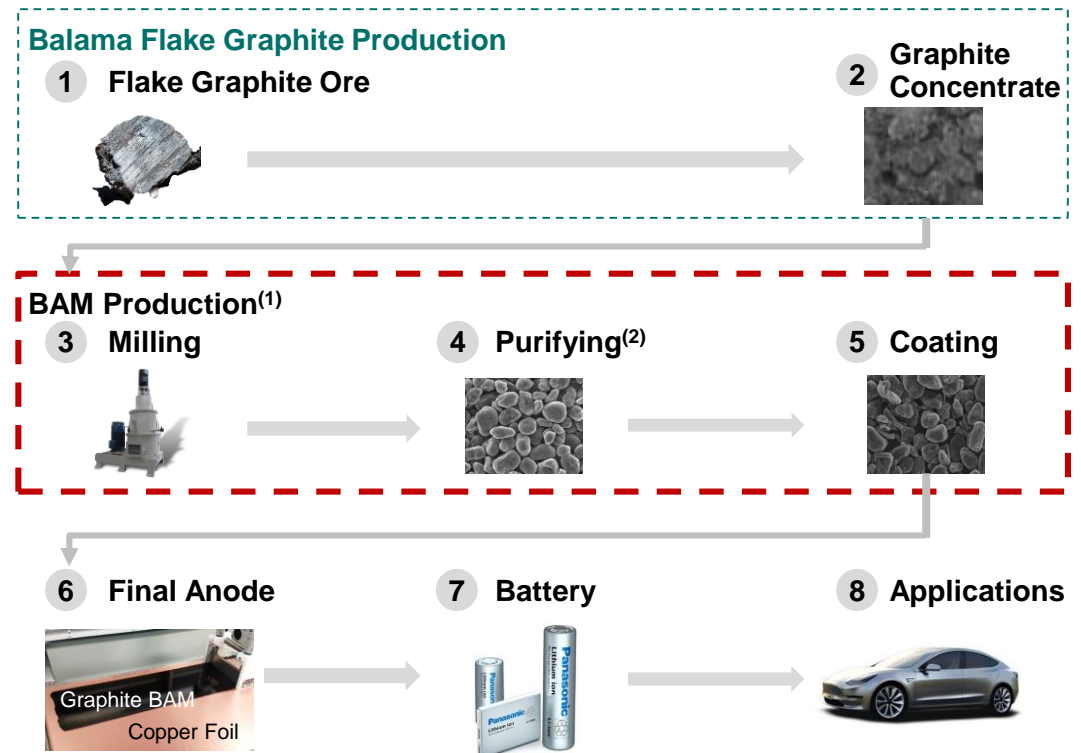


- Auto industry expected to account for majority of Li-ion battery demand
- Battery EV driving growth with CAGR >30% 2019 – 2030
- Increasing share of commercial vehicle demand expected into 2030

Source: ITRI/ISTI (2019/04)

- (1) Syrah's Battery Anode Material (BAM) plant in Louisiana will initially have 5kt per annum of milling capacity and batch scale purification capability  
(2) Purifying can be achieved chemically or thermally. Plan is for Syrah Battery Anode Material plant to be capable of chemical purification

Lithium-ion battery supply chain – Natural Graphite

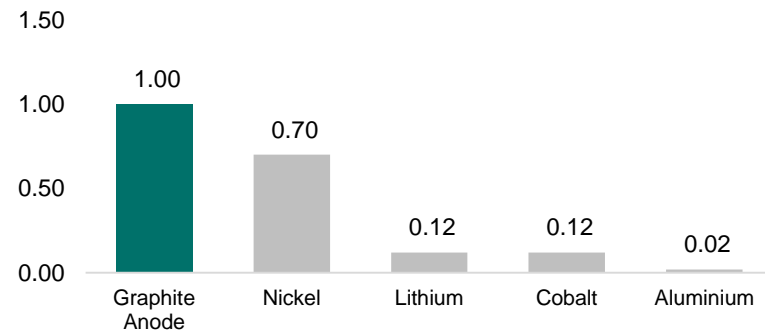




# Graphite anode composition and mass in a Lithium-ion battery is consistent and largely agnostic of cathode chemistry

## Nickel Cobalt Aluminium (NCA)

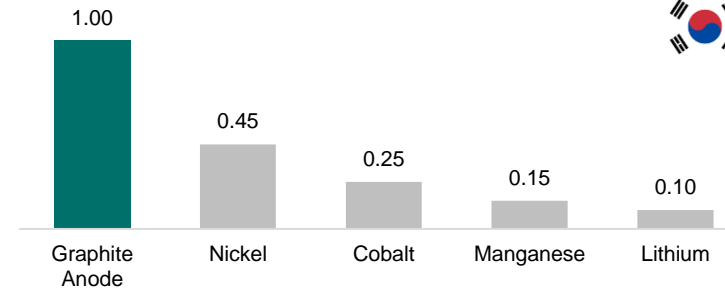
Kg per kWh



Preferred by



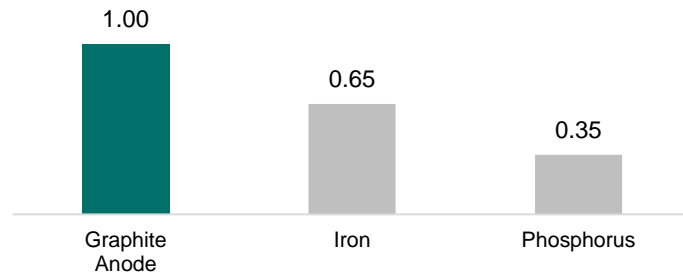
## Nickel Manganese Cobalt (NMC<sup>1</sup>)



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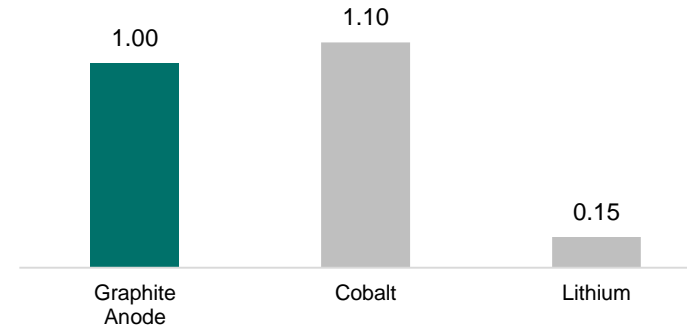
## Lithium Iron Phosphate (LFP)



Preferred by



## Lithium Cobalt Oxide (LCO)



Preferred by



■ Anode  
■ Cathode Materials

Source: Syrah Resources  
Each kg of natural graphite anode material requires ~>2kg of natural flake graphite  
(1) NMC 523 Chemistry

# A consistent, high quality natural graphite source can contribute to Lithium-ion battery cost reduction and improved performance

## Car OEM Targets – battery performance, cost and safety

Customer Value:

- Driving range
- Cost

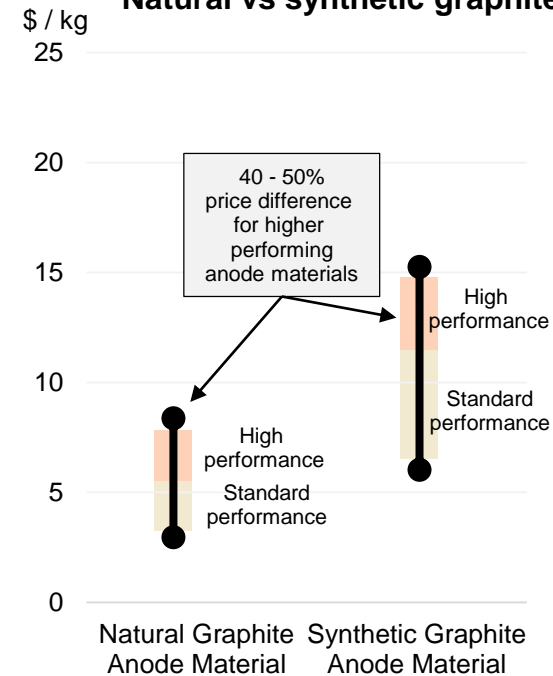


Competitiveness indicators

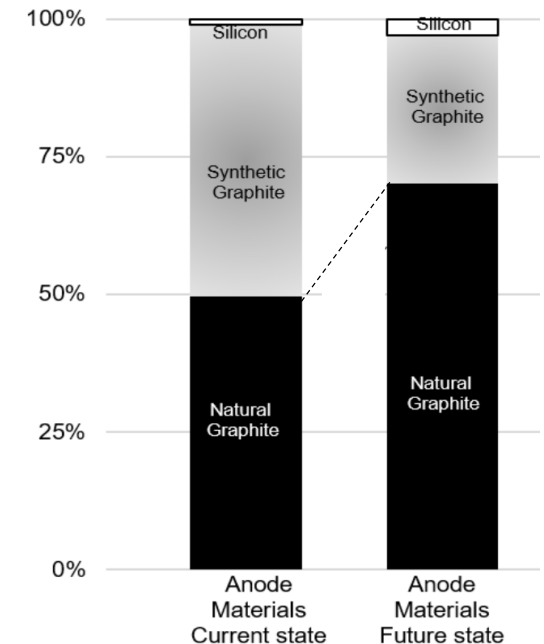
- Energy Density
- Energy Cost

- Energy/power balance, mass-market push to drive down cost, and demands
  - Higher capacity
  - Lower input costs
- Natural graphite remains lower cost than synthetic graphite
- Natural graphite has a favourable energy density whilst synthetic graphite provides cycle life advantages
- <5% silicon (Si) and carbon graphite anode with Si subject to ratio and volume control

## Natural vs synthetic graphite

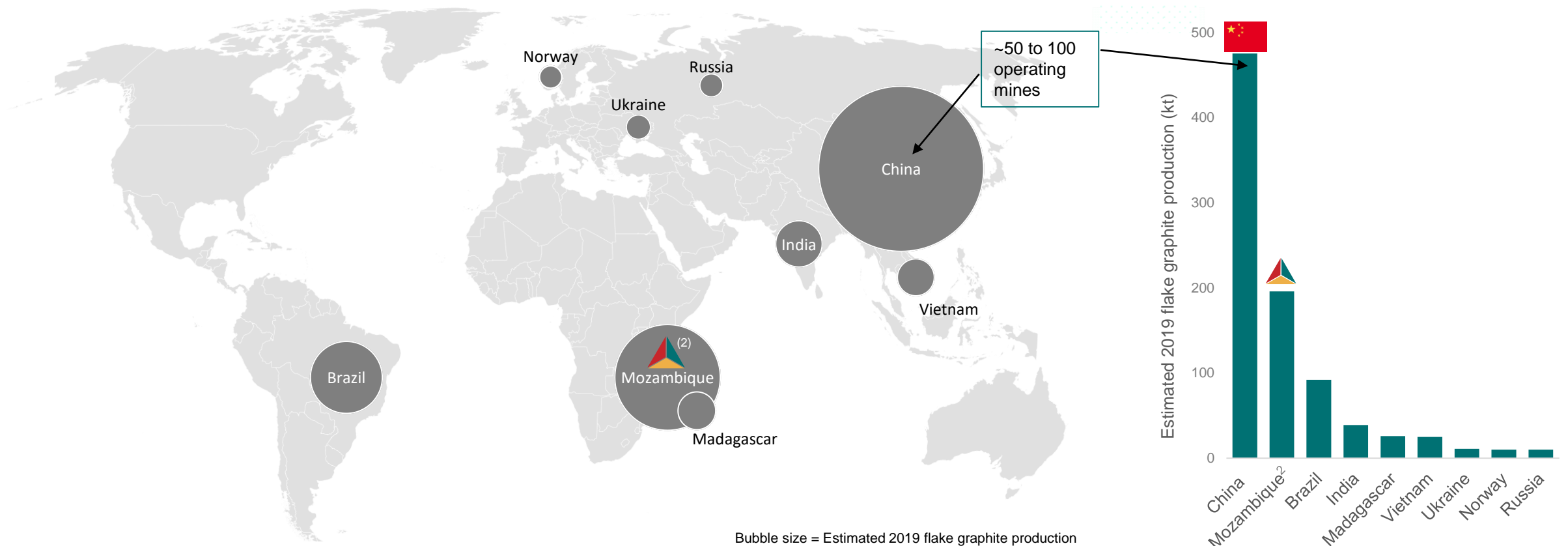


## Anode composition



# Syrah's Balama operation is now the largest integrated global producer of natural graphite, providing strategic and complementary ex-China supply

Estimated 2019 global natural flake graphite production (kt)<sup>1</sup>

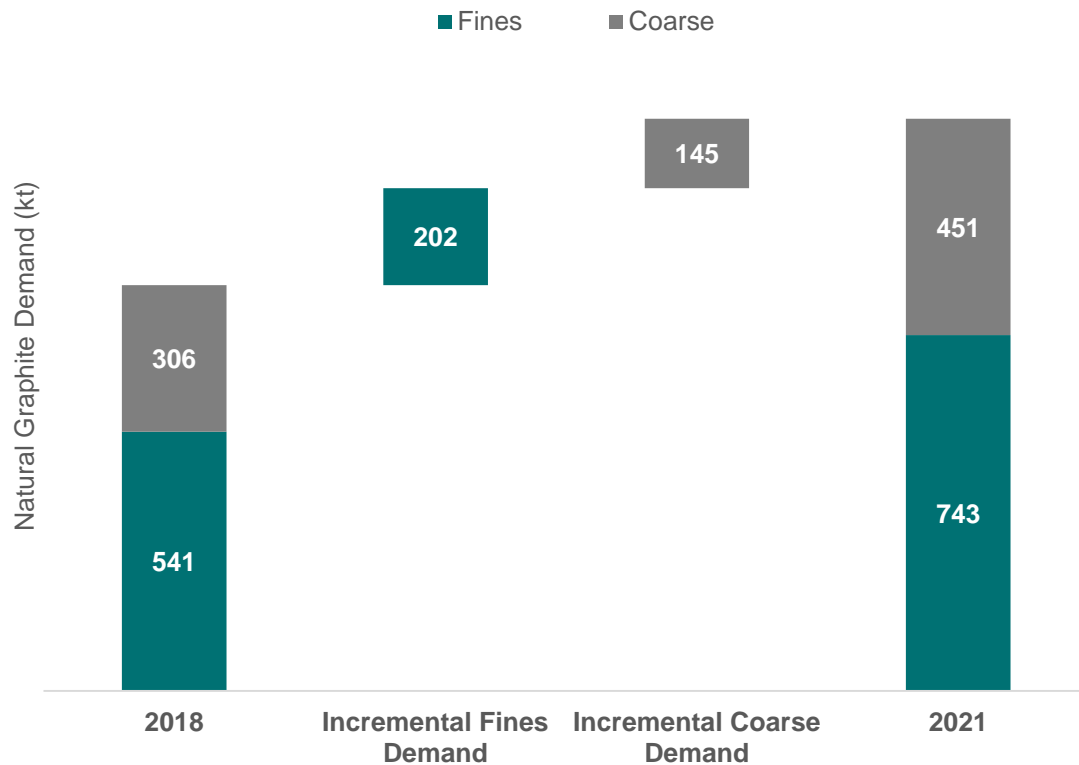


(1) Source (bubble chart and bar chart): Benchmark Mineral Intelligence, June 2019

(2) Benchmark Minerals Intelligence forecasts that Balama Graphite Operation will account for 98% of Mozambique production



# Natural graphite demand growth is driven primarily by increasing battery anode material demand



## Fine Flake Graphite

- Fines market growth driven by demand from anode producers to support the increased capacity of Lithium-ion factories and the objective to lower overall product costs
- Fine flake (-100 mesh size fraction) material remains the major natural graphite material used in anodes
- Balama produces majority fines with average fixed carbon grade of 95%

## Coarse Flake Graphite

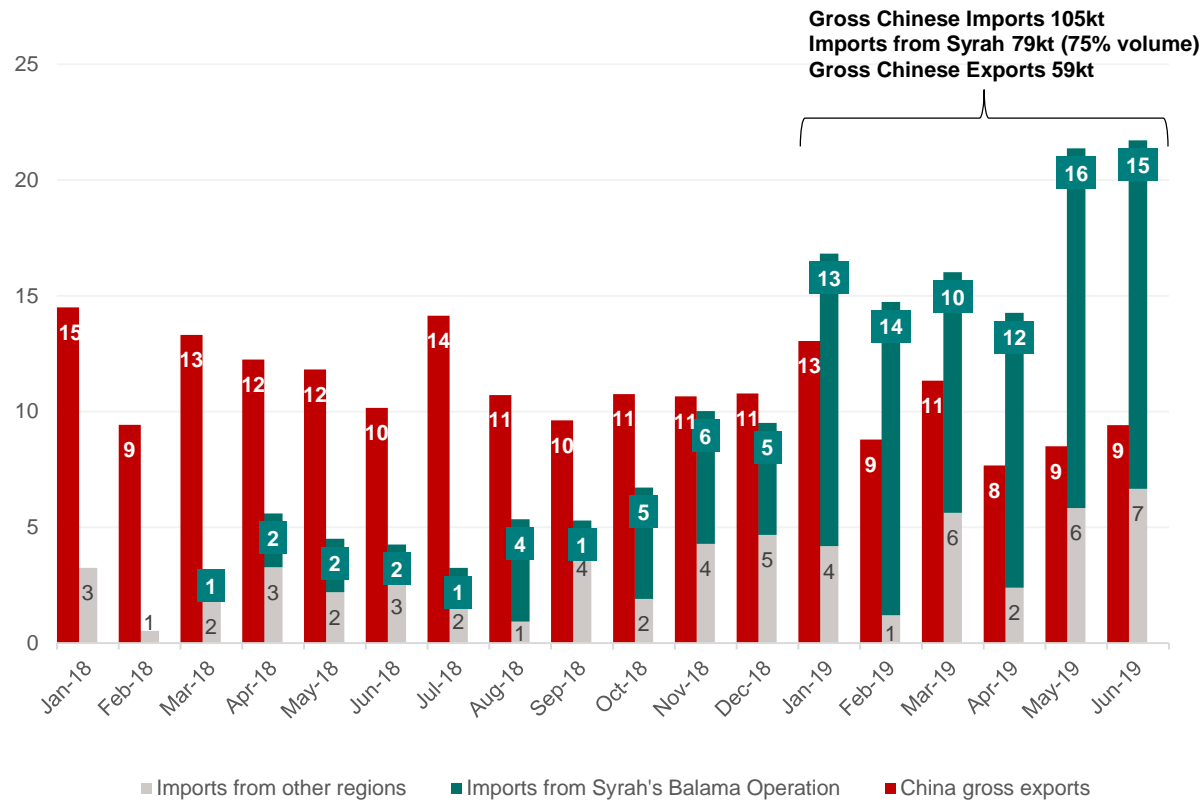
- Coarse flake demand growth driven by expandable / foils / insulation,
- Growth in demand from a lower base



# China commenced natural graphite import in 2018, and has rapidly progressed to a net importer – a fundamental market shift

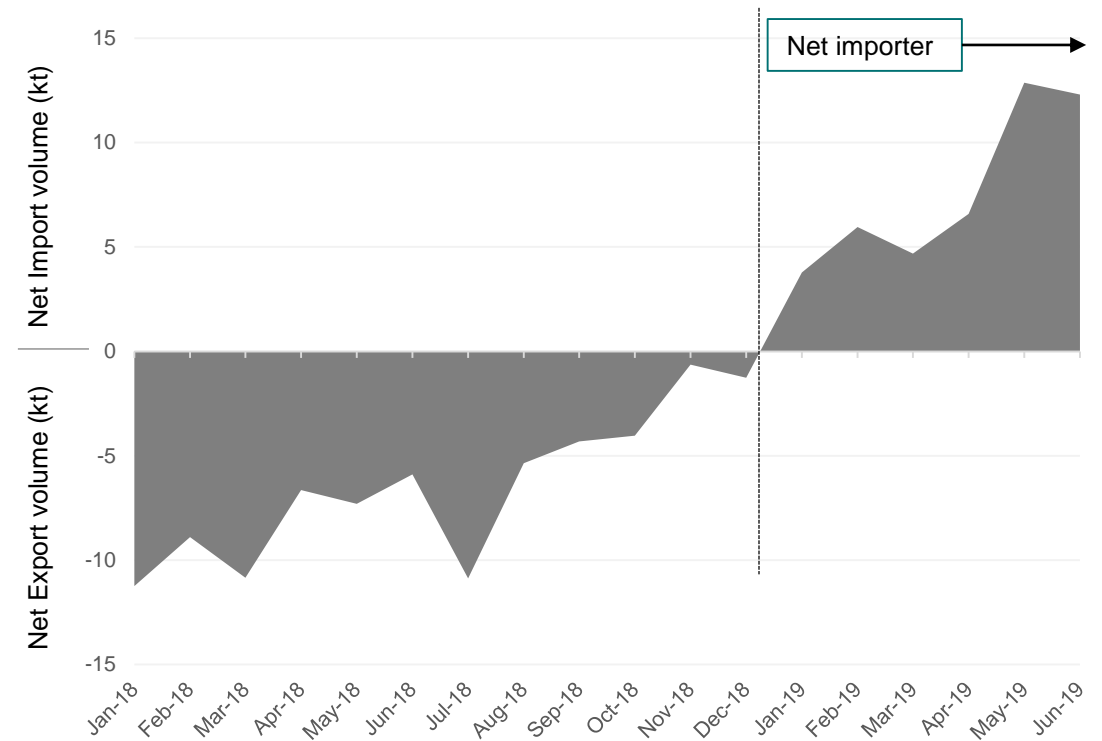
## China graphite import growth mainly from Syrah

China natural graphite imports vs exports gross volumes (kt)



## China transitioned to net graphite importer in January 2019

China net graphite (exports)/imports (kt)



Source: Qizheng Information Technology Co., Ltd  
"Other regions" mainly from privately owned Madagascar mine



SYRAH RESOURCES



## Company Overview



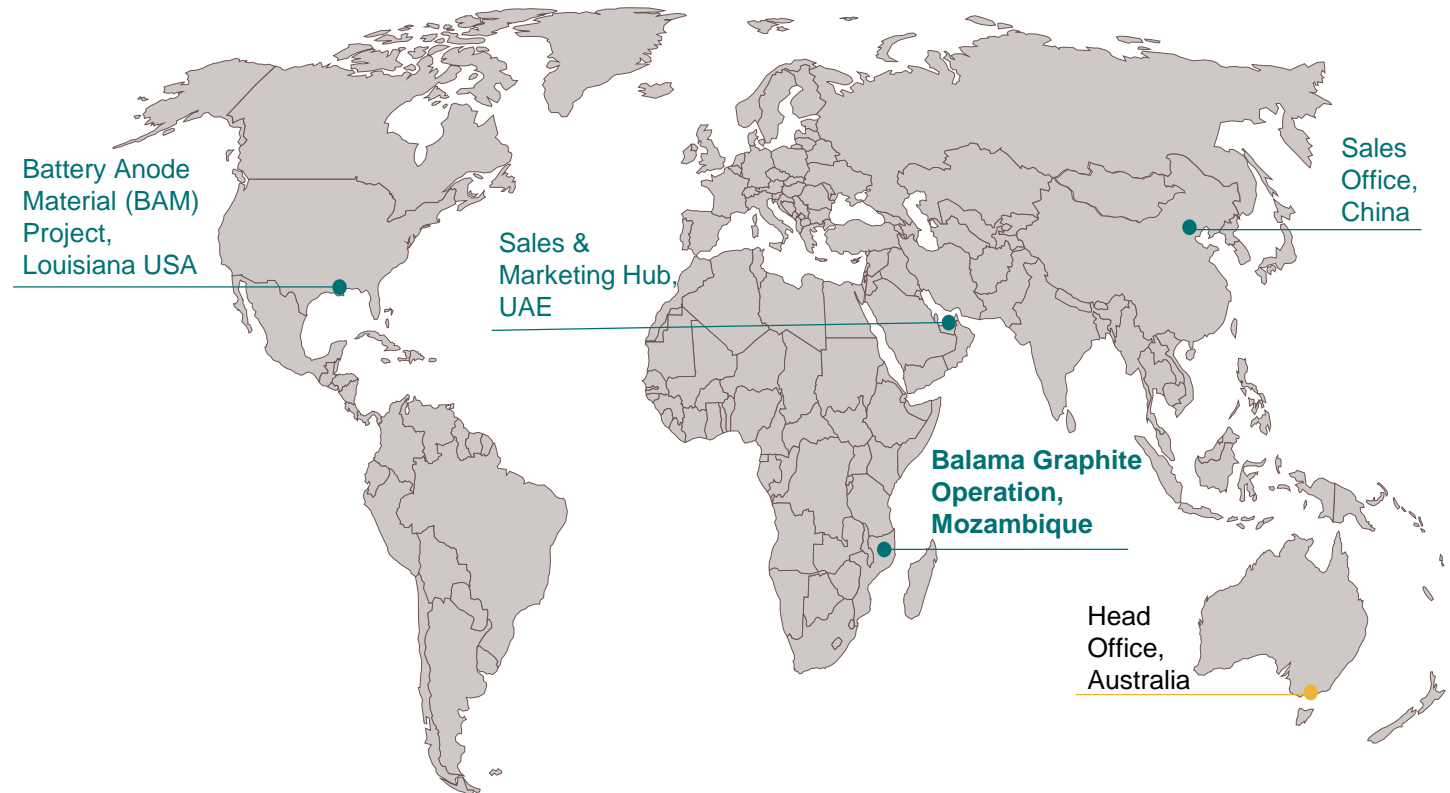
Photo: Bagged Balama Graphite Product

# Company Overview (ASX:SYR)

## The world's first major graphite development in a generation

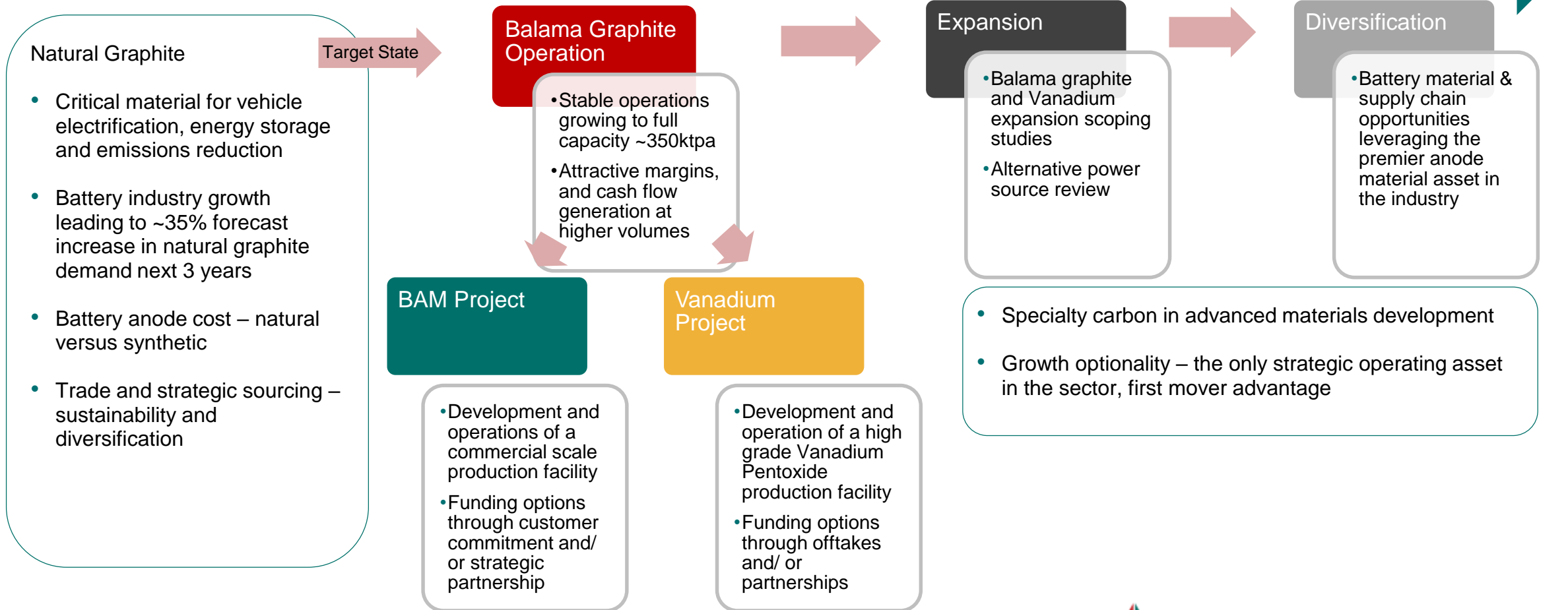
### Highlights

- Exposure to high growth Lithium-ion battery market
  - Graphite is key material in battery anodes
  - High quality product, with product range weighted toward Lithium-ion battery market
- Developed, owns and operates the Balama Graphite Operation
  - Life of mine ~ 50 years
  - Produced >100kt in first year of operations (CY2018) to become world's largest producer
  - Expected to produce >150kt in 2019
  - Major exporter to China's battery segment
  - Significant Vanadium Resource opportunity
- Battery Anode Material Project in USA
  - Strategic value in ex-China production
  - First integrated natural graphite BAM facility outside China
  - Customer qualification commenced



# Subject to evolving market and price dynamics, Syrah has a clear view of the opportunities presented through a 5 year strategic growth plan

Syrah's 5 year strategic plan targets significant shareholder value creation





# Balama Graphite Operation – a Tier 1 producing asset:

## The world's largest integrated natural graphite mine and processing plant

Balama Graphite Operation	
Location	Cabo Delgado Province, Mozambique
Life of Mine <sup>1</sup>	~50 years
Mining	Simple open pit mining, low strip ratio
Processing	Conventional – includes crushing, grinding, flotation, filtration, drying, screening and bagging
Plant capacity <sup>2</sup>	2Mtpa ore throughput, ~350ktpa graphite concentrate
Product	94% to 98% fixed carbon graphite concentrate
C1 cost <sup>3</sup>	Forecast ~ US\$330/t as plant optimised and at full capacity

Milestones	
Dec 2018	Balama produced >100kt in 2018, becoming the largest producer globally
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 <sup>4</sup>			
Classification	Tonnes (Mt)	TGC <sup>5</sup> (%)	Graphite (Mt)
<b>Total Resources</b>	<b>1,423</b>	<b>10</b>	<b>146.7</b>
- Measured	24.3	17.6	4.3
- Indicated	379	11.2	42.4
- Inferred	1,020	9.8	100.0
<b>Total Reserves</b>	<b>113.29</b>	<b>16.36</b>	<b>18.5</b>
- Proved	5.39	17.20	0.9
- Probable	107.9	16.32	17.6



*Balama process plant*

- (1) Life of Mine based on 113.3Mt Graphite Ore Reserves being depleted at 2Mt of mill throughput per annum  
 (2) Ramp up to full capacity subject to market demand  
 (3) Cash operating cost Free on Board (FOB) Nacala, excluding government royalties and taxes  
 (4) Refer to ASX announcement 29 March 2019  
 (5) TGC = Total Graphitic Carbon



# Syrah is committed to sustainable operations – focussing on enduring safety, health, environmental and community outcomes

## Health & Safety

- Strong safety record, TRIFR 0.3 as at 30 June 2019
- ISO:45001 Occupational Health and Safety Management Systems certification
- Malaria screening program



*Employee health screening*

## People

Balama employees as at 30 June 2019

- 96% Mozambican nationals
- 55% from local host communities
- 20% female



*Balama operations employees*

## Environment

- ISO:14001 Environmental Management Systems certification
- Environmental Monitoring compliance with over 200 licence conditions
- Tailing Storage Facility Governance Framework implemented in line with industry leading practice



*Chipembe Dam restoration*

## Community and Government

- Balama Professional Training Centre (BPTC) operational
- Mining Agreement finalised with Government of Mozambique (Sept 2018)<sup>1</sup>
- Ongoing community initiatives such as clean water programs



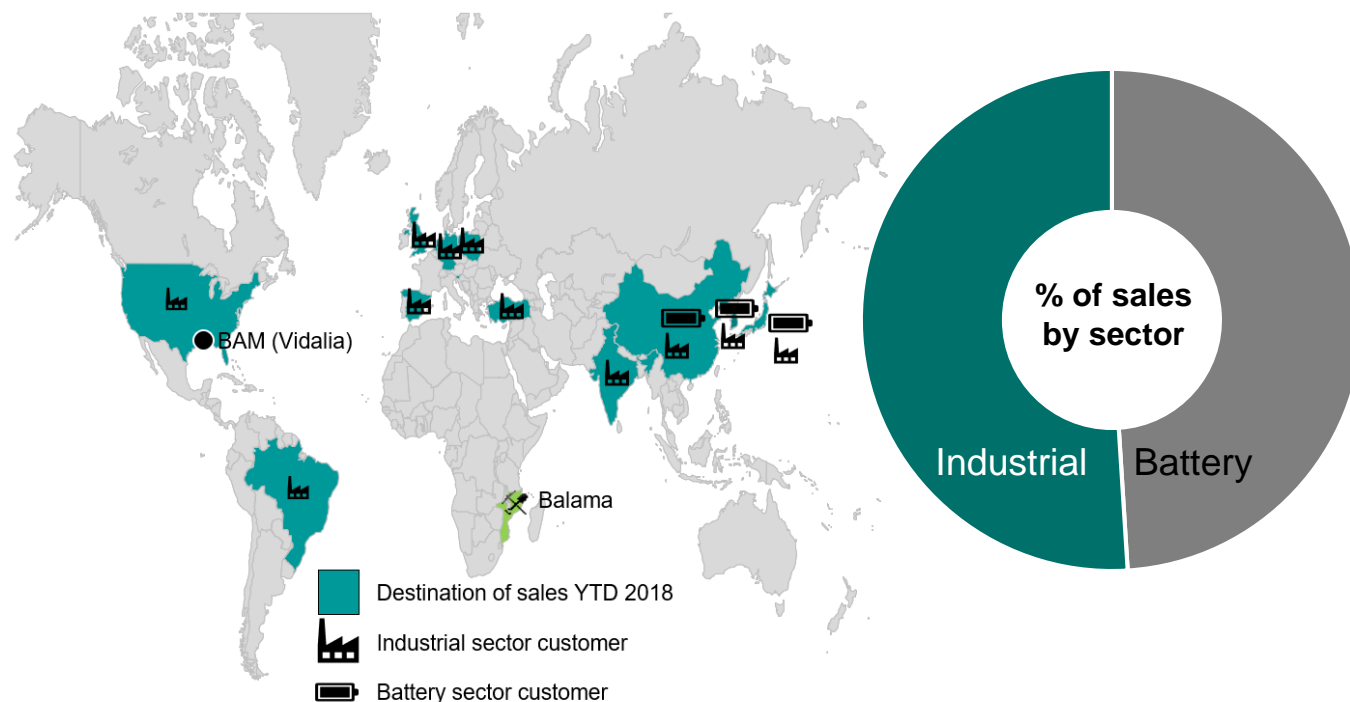
*BPTC inaugural student intake April 2019*

(1) Refer to ASX announcement 27 September 2018



# Syrah's diversification of customers across country, market sector and contract type provides regular and global price discovery

## Sectorial and Geographical Sales Diversification



Country	Contract Type	Pricing Mechanism	Products <sup>1</sup>
	Term, Spot and Repeat Spot	Spot, quarterly and annual	Fines and Flake
	Repeat Spot	Spot	Fines and Flake
	Term and Repeat Spot	Spot	Fines and Flake
	Term and Repeat Spot	Fixed and Spot	Fines and Flake
	Term and Repeat Spot	Fixed and Spot	Fines and Flake
	Repeat Spot	Spot	Fines and Flake
	Term	Spot	Fines
	Repeat Spot	Spot	Flake

Source: Syrah Resources, pie charts reflective of sales volumes (tonnes)

(1) Flake mesh sizes range +50, +80, +100. Fines mesh size -100

# Natural Graphite Market – a disaggregated market in the midst of global supply/demand balance and pricing integration, seeing major disruption

Natural Graphite	China	Ex-China	Current global natural graphite market	Demand Growth
<b>Fines</b> (-100 mesh)	Marginal pricing influenced by China domestic balance	Pricing reflects incentive for China to export	~600kt Balanced to surplus	High off large base
<b>Coarse</b> (+50, +80, +100 mesh)	In line with international markets	International market prices	~150kt Balanced to surplus	Low to medium off small base

## Differentiated pricing while China market in fines surplus



## International parity pricing as market balance shifts to deficit



## China fines pricing

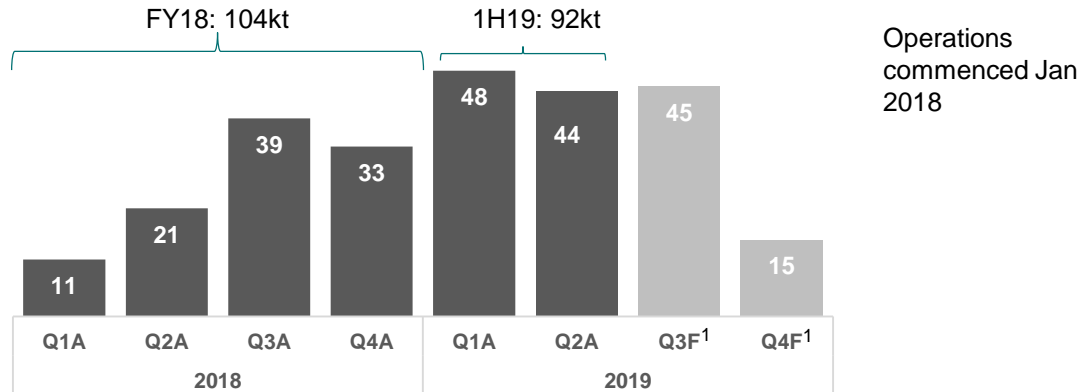
- Ex-China market pricing determined by incentive price for export from China
- China is currently net exporter of natural graphite fines therefore initial imports must compete with domestic prices adjusted for VAT and inland logistic costs
- China fines pricing expected to reflect rebalancing of domestic market to net importer over next two years
- Syrah has established significant Chinese market position in preparation for that shift
- Even before the shift a pricing premium is expected as Syrah continues to demonstrate quality, performance and reliability value in use differentials
- As balance shifts, inducement of additional high quality volume into China ports drives pricing
- International pricing parity switches VAT and inland logistics absorption from seller to buyer



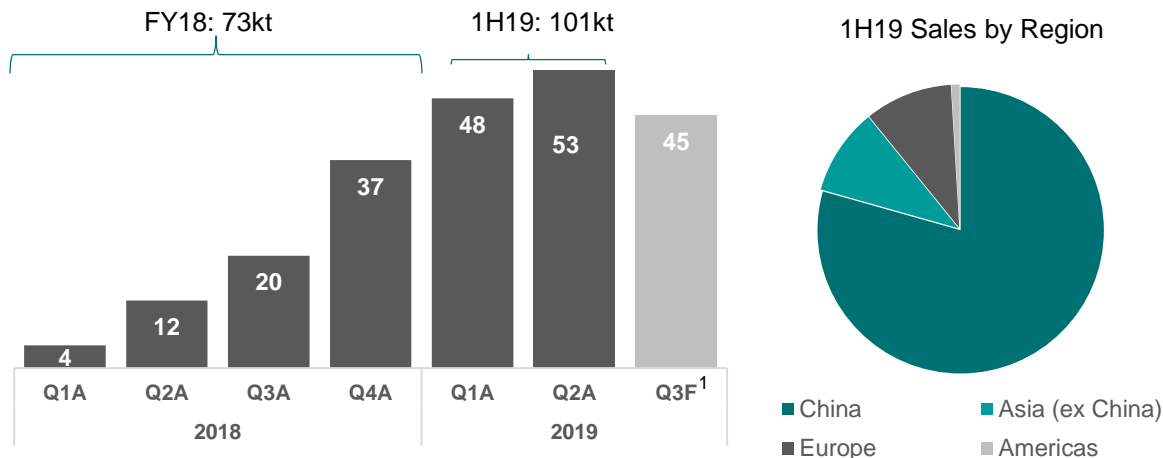


# Operational Summary and Update – Syrah faces a significant pricing and volume challenge in the short term, but is taking clear action

## Production (kt)



## Sales (kt)



## Operational Update<sup>1</sup>

- Sudden and material decrease in spot prices in China
  - Depreciation of CNY and Chinese inventory level concerns
  - Potential for further weakening of prices into Q4 2019
- In response to current market conditions, Syrah will
  - Orderly reduction of production volume to end Q3 2019 to ~45kt total
  - Significantly reduce production in Q4 2019 to ~5kt per month
  - Undertake an immediate cost reduction review
  - Deliver a strategic and operational review for 2020<sup>2</sup>
- Cash and available liquidity provides opportunity to adjust near term production
  - Cash forecast as at 30 Sept 2019 ~ US\$60 million
  - Additional liquidity available taking balance to ~US\$100 million
  - No debt

(1) Refer to ASX announcement 10 September 2019

(2) Update to be released on 22 October 2019





## Battery Anode Material (BAM) Strategy

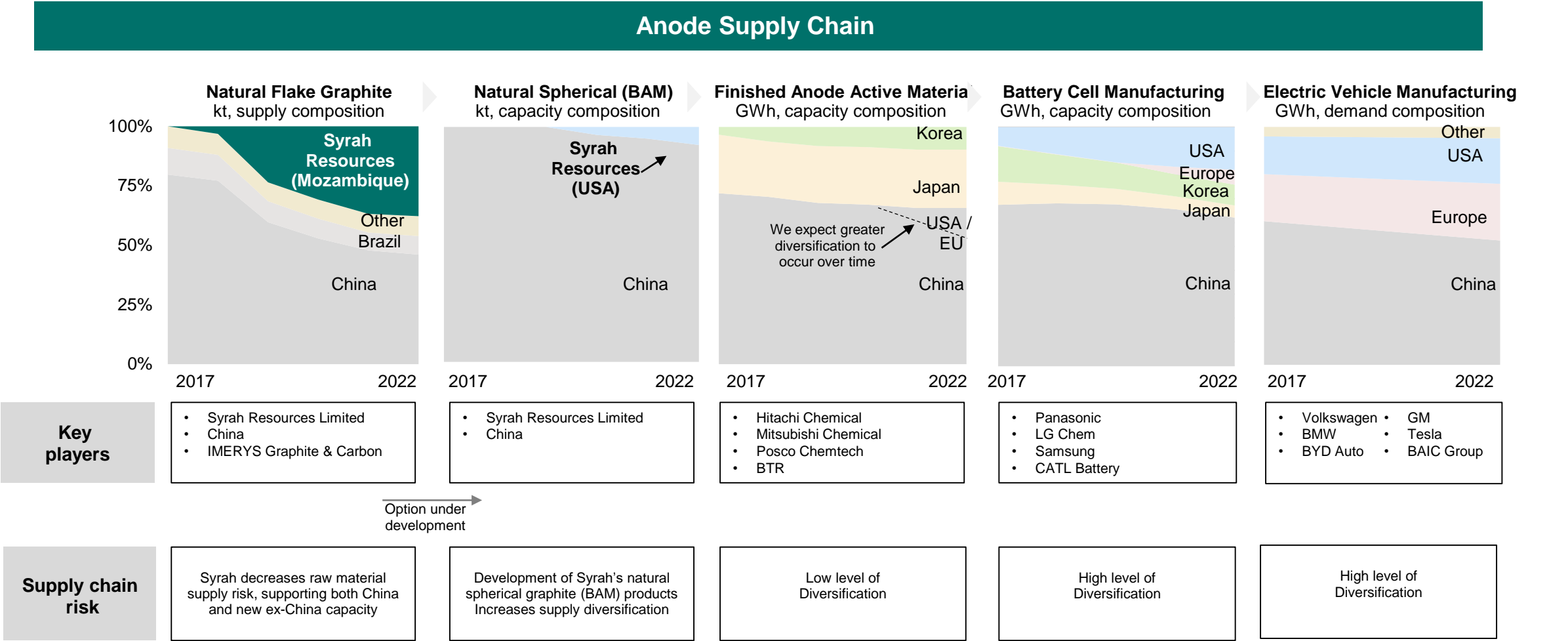


Photo: Syrah's BAM plant in Louisiana



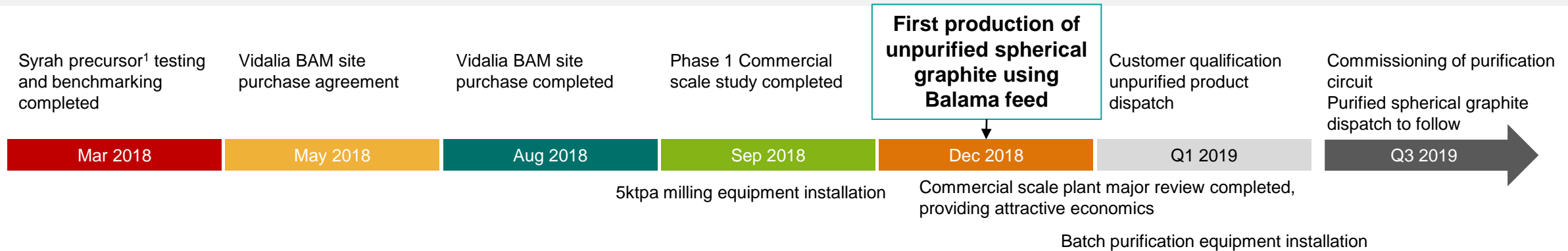


# BAM production from Syrah could provide a strategic alternate source of anode material to the ex-China Lithium-ion battery industry





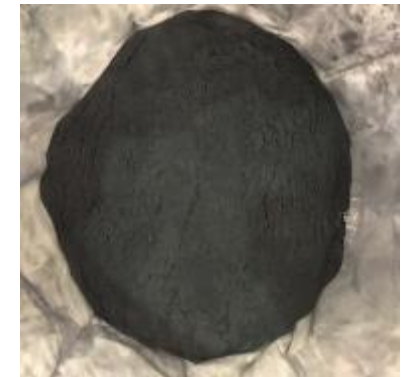
# Syrah's Vidalia (USA) Battery Anode Material plant is key for market progression, qualification, product and strategic partnership development



Vidalia milling equipment



Intermediate storage bins, product bagging line, leach tank and filter press



Milled unpurified spherical graphite for customer qualification

(1) Precursor materials refer to unpurified and purified spherical graphite

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