

# Strengthening the Anode Supply Chain

November 2019



**SYRAH** RESOURCES

# Establishing a position in the anode supply chain

Leveraging the globally significant Balama asset to develop an integrated battery anode material and industrial products business



Balama a globally significant resource

Size of Balama ore Reserve, > 50 year mine life<sup>1</sup>, and high Reserve grade (16% total graphitic carbon) enables participation in long term EV growth

Balama Open Pit Mining Operation



Vertical integration

Value added processing of flake graphite to active anode material by Syrah enabled by long mine life at Balama

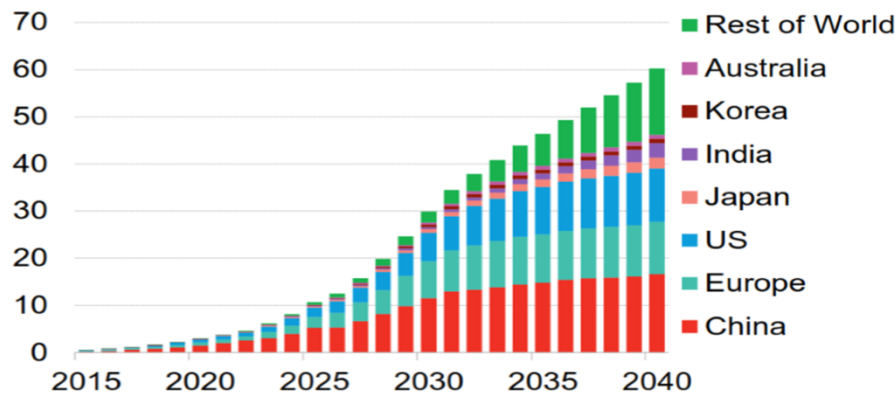
Syrah's downstream processing of flake graphite in Louisiana



Global mega trend

Decarbonisation of the transport sector, via Lithium-ion battery powered electric vehicles (EV), is gaining momentum

Annual passenger EV sales forecast by region (million cars per year)

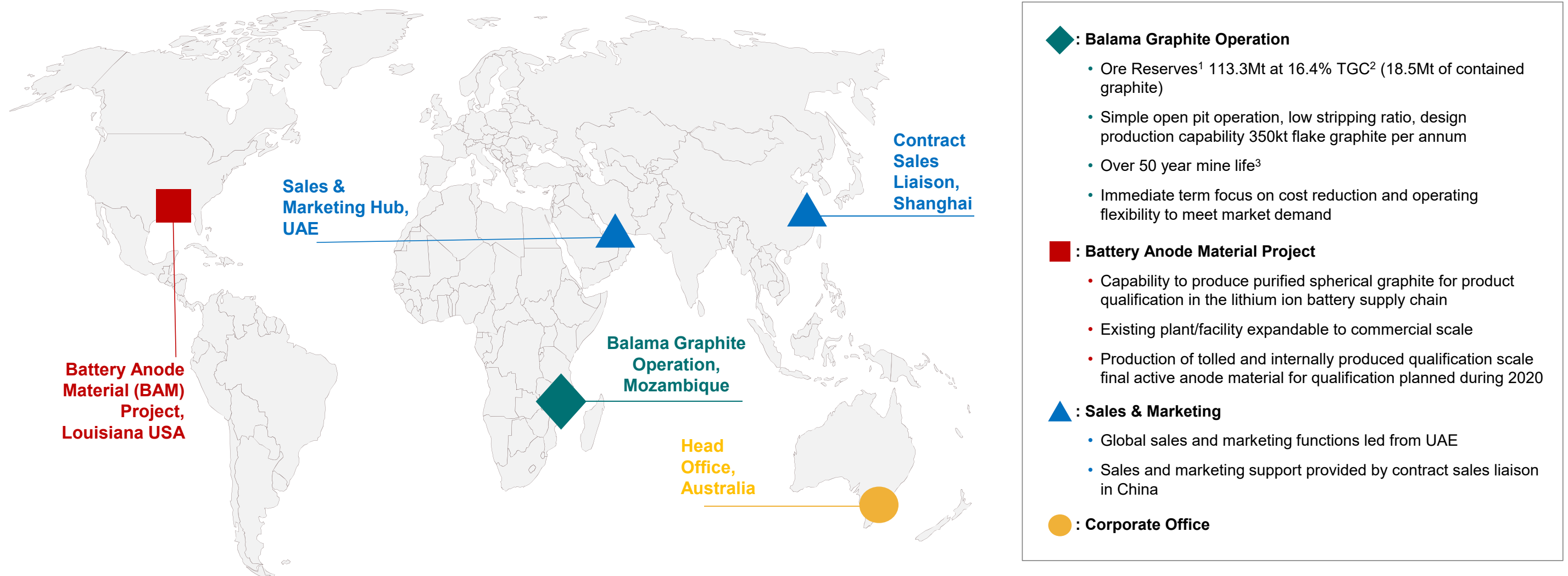


Source: Bloomberg New Energy Finance Long-Term Electric Vehicle Outlook 2018

1. Life of mine based on current 113.3Mt Graphite Ore Reserves being depleted at 2Mt throughput per annum. Refer to ASX announcement 29 March 2019 "Graphite Mineral Resources and Ore Reserves Update". All material assumptions underpinning the production target in this announcement continue to apply, other than as updated in subsequent ASX announcements

# Where we participate in the anode supply chain

A global business to service the growing demand for natural flake graphite - a critical battery raw material



1. Refer to ASX announcement 29 March 2019 "Graphite Mineral Resources and Ore Reserves Update". All material assumptions underpinning the production target in this announcement continue to apply, other than as updated in subsequent ASX announcements

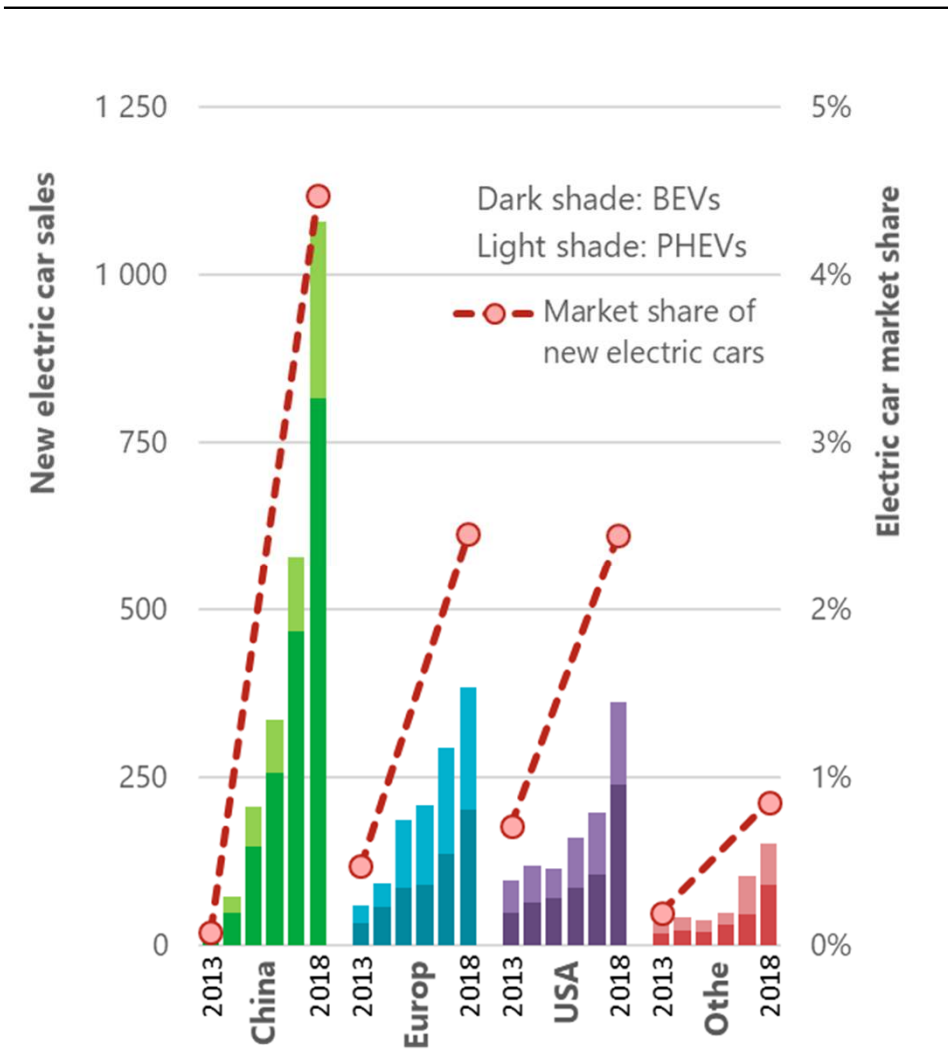
2. TGC = Total Graphitic Carbon

3. Life of mine based on current 113.3Mt Graphite Ore Reserves being depleted at 2Mt throughput per annum.

# Demand for critical battery raw materials is growing

China EV growth will continue to be a key market for natural flake graphite demand, Europe and USA will also be significant markets

## China, Europe & USA key EV end markets



## Battery raw materials are of strategic importance



**The Central People's Government of the People's Republic of China<sup>1</sup>**  
“Accelerating the cultivation and development of energy-saving vehicles ... a strategic measure to accelerate the transformation and upgrading of the automobile industry, foster new economic growth points and international competitive advantages”



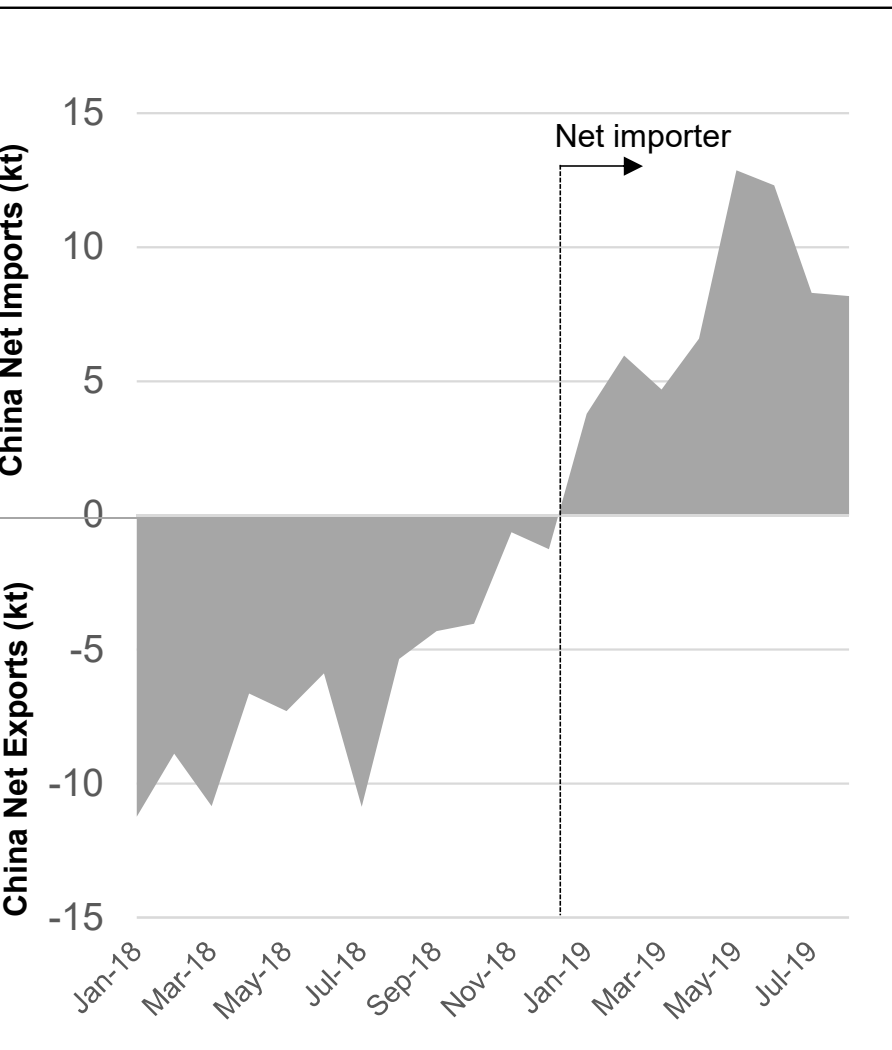
**European Commission, Brussels, 9.4.2019 COM(2019) 176 final**  
“Driven by the ongoing clean energy transition, demand for batteries is expected to grow very rapidly in the coming years, making this market an increasingly strategic one at global level”



**Office of Energy Efficiency & Renewable Energy<sup>2</sup>**  
“As we look to the opportunity of domestic battery manufacturing as this market grows, one challenge for the United States is that the United States is not a large producer of minerals such as lithium, manganese, cobalt, or graphite—all important components of today’s lithium-ion batteries”

1. Notice of the State Council on Printing and Distributing the Development Plan for Energy Saving and New Energy Vehicle Industry (2012-2020) Guofa [2012] No. 22  
<https://www.energy.gov/eere/articles/advancing-us-battery-manufacturing-and-domestic-critical-minerals-supply-chains>

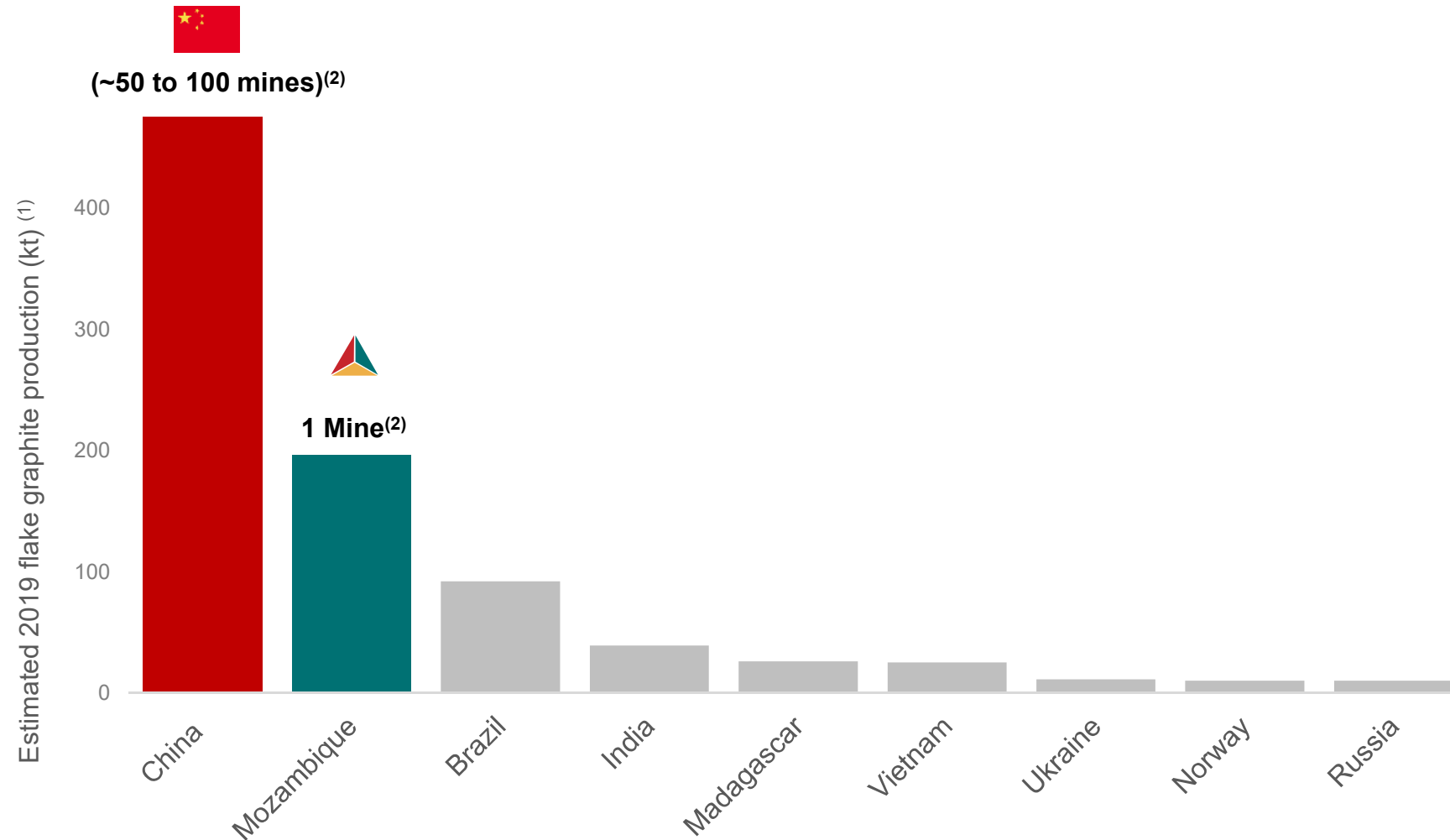
## China a net importer of flake graphite



Source: Qizheng Information Technology Co., Ltd. “Other regions” mainly from privately owned Madagascan mine

# Balama an alternate supply proposition

Balama provides an alternate and complementary supply proposition to existing domestic China supply to meet growing demand



(1) Source Benchmark Mineral Intelligence, June 2019

(2) Estimated number of mines in China a Syrah estimate. Benchmark Minerals Intelligence forecasts that Balama Graphite Operation will account for 98% of Mozambique production

**When evaluating sources of supply, Chinese consumers likely to consider:**

- Quality consistency (carbon grade, impurities)
- Price
- Production consistency (seasonality)
- Base load volumes
- Supply lead times (delivery time)
- Payment terms (days payable)
- Transaction simplicity (import administration, FX)

# Flake graphite pricing dynamics evolving

Syrah expects prices for natural graphite into the battery market to become globally integrated

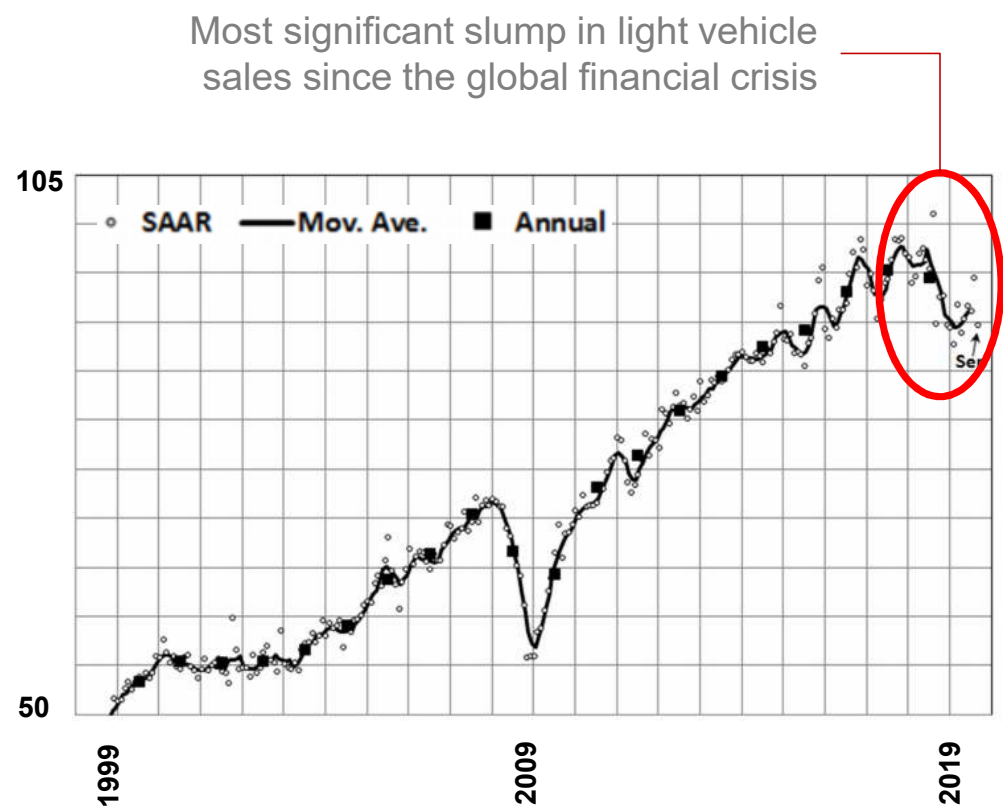
- Transition to global pricing will provide increased pricing transparency, which will assist to induce global supply in an orderly manner over the long term
- As demand growth continues, product grade, quality, and consistent supply availability will provide further price differentiation opportunity

China Flake Graphite Market Balance		China Market Dynamics	Pricing Dynamic
Net Exporter		Demand<Supply	Product pricing and differentiation must be significant enough for domestic customers to adsorb VAT and inland logistic costs of imported material
		Demand>Supply	
Net Importer		Demand<Supply	International pricing parity switches, VAT and inland logistics absorption from seller to buyer or quality differential opens
		Demand>supply	

# Several factors have caused a near term market imbalance

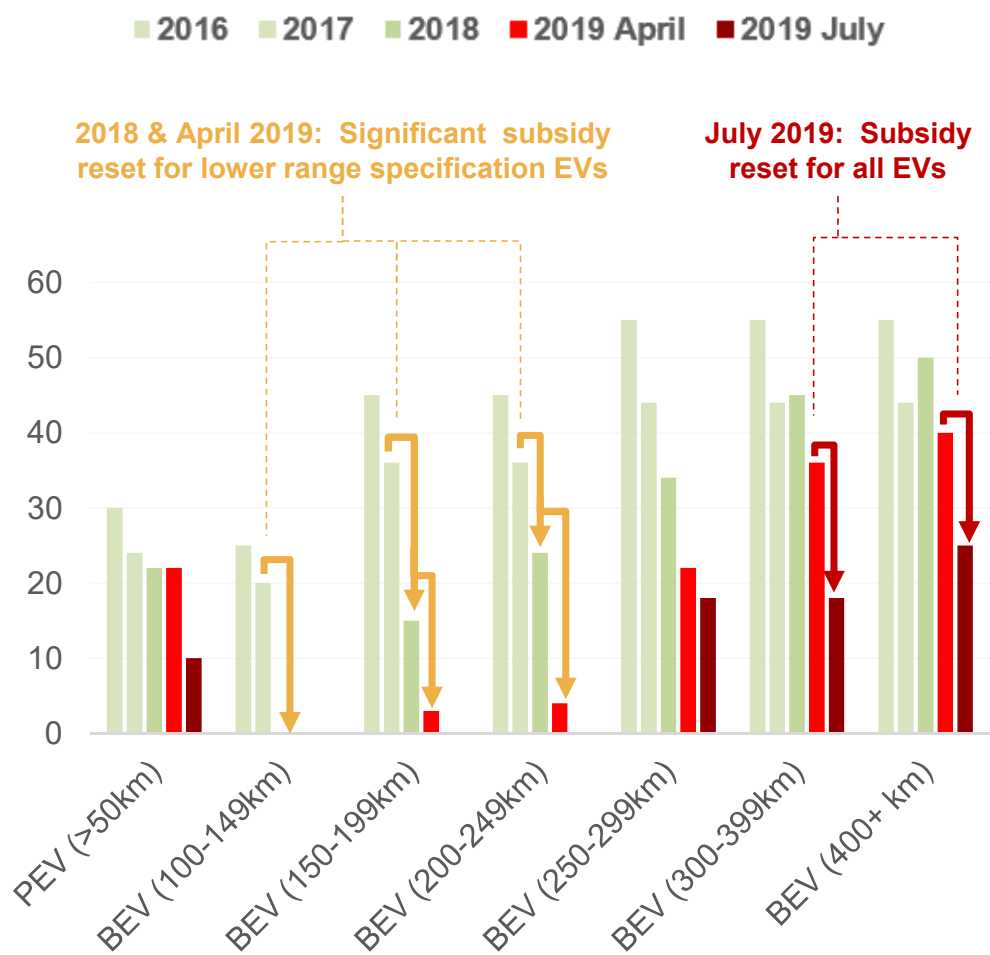
Demand factors and increased supply availability have led to a near term market imbalance in critical battery raw materials

Weak Global Light Vehicle Sales (millions)



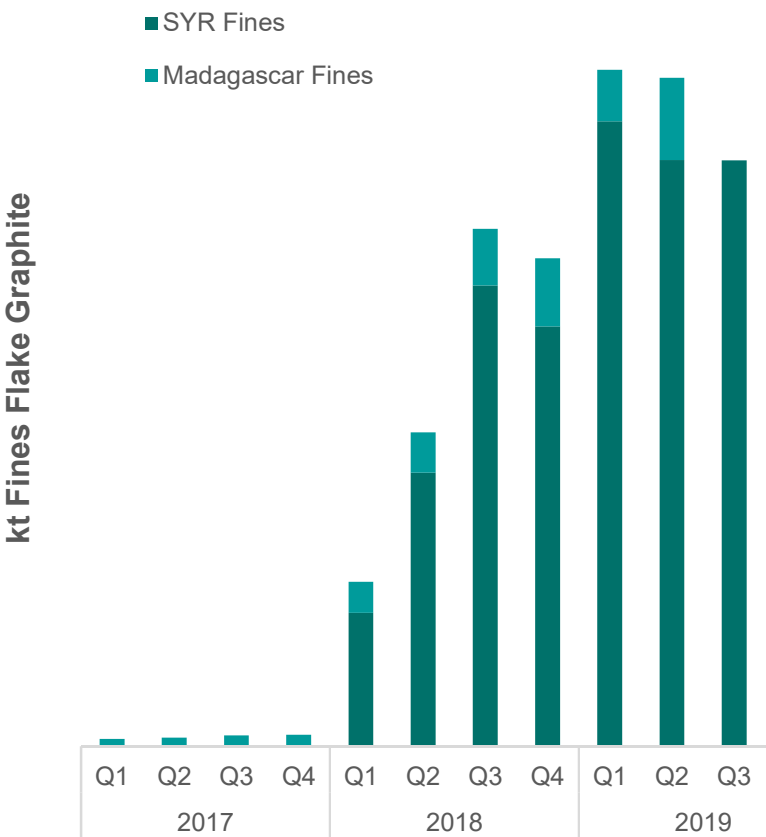
Source: LME Automotive Global Light Vehicle Sales Update 2019

China Central Government EV Subsidy Reductions



Source: Data from ev-volumes.com. Quoted data sources by ev-volumes.com, The ICCT, Interact Analysis, Curious Elephant, EV volumes DC

Increased Natural Graphite Supply

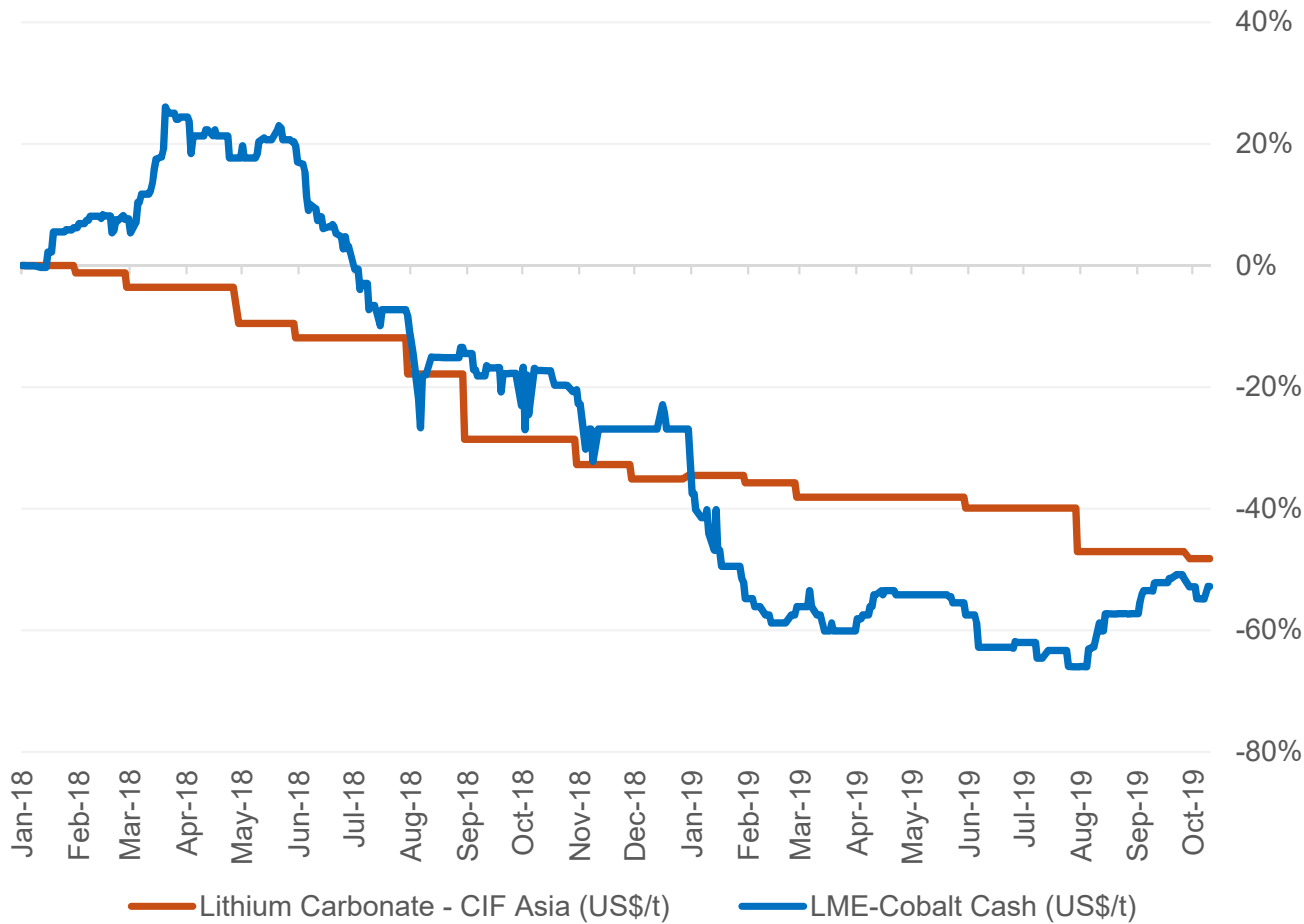


Source: Roskill, Qizheng Information Technology Co., Ltd, Syrah analysis  
Note: Madagascar production data post Q2 2019 yet to be published  
Assumptions : Madagascan quarterly production split 70% coarse to 30% fines

# Current market dynamics not isolated to flake graphite

Other battery raw materials not immune to current market dynamic, supply response being observed across sector

Lithium Carbonate and Cobalt Prices Since January 2018 <sup>(1)</sup>



(1) Source: S&P Global

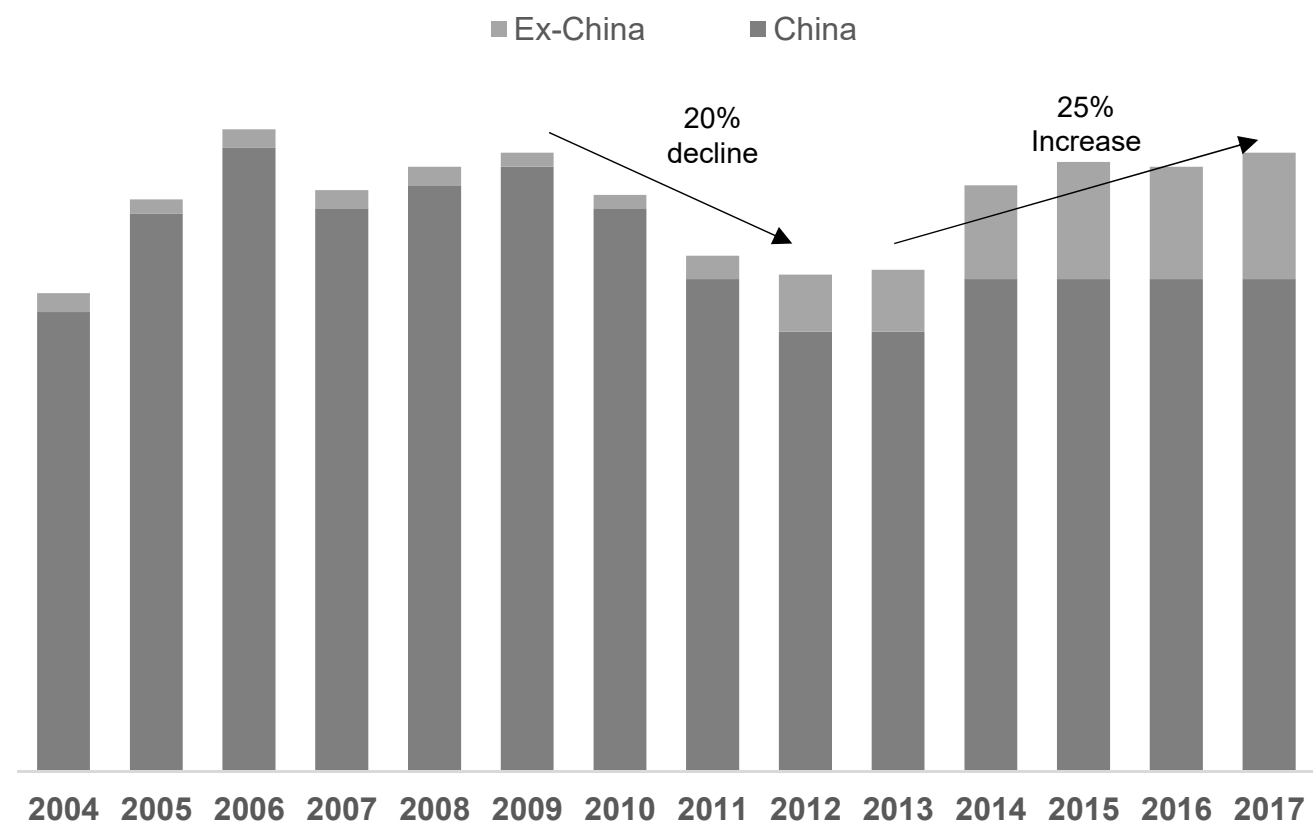
USDCNY Since January 2018



# Market re-balance phases common in smaller markets

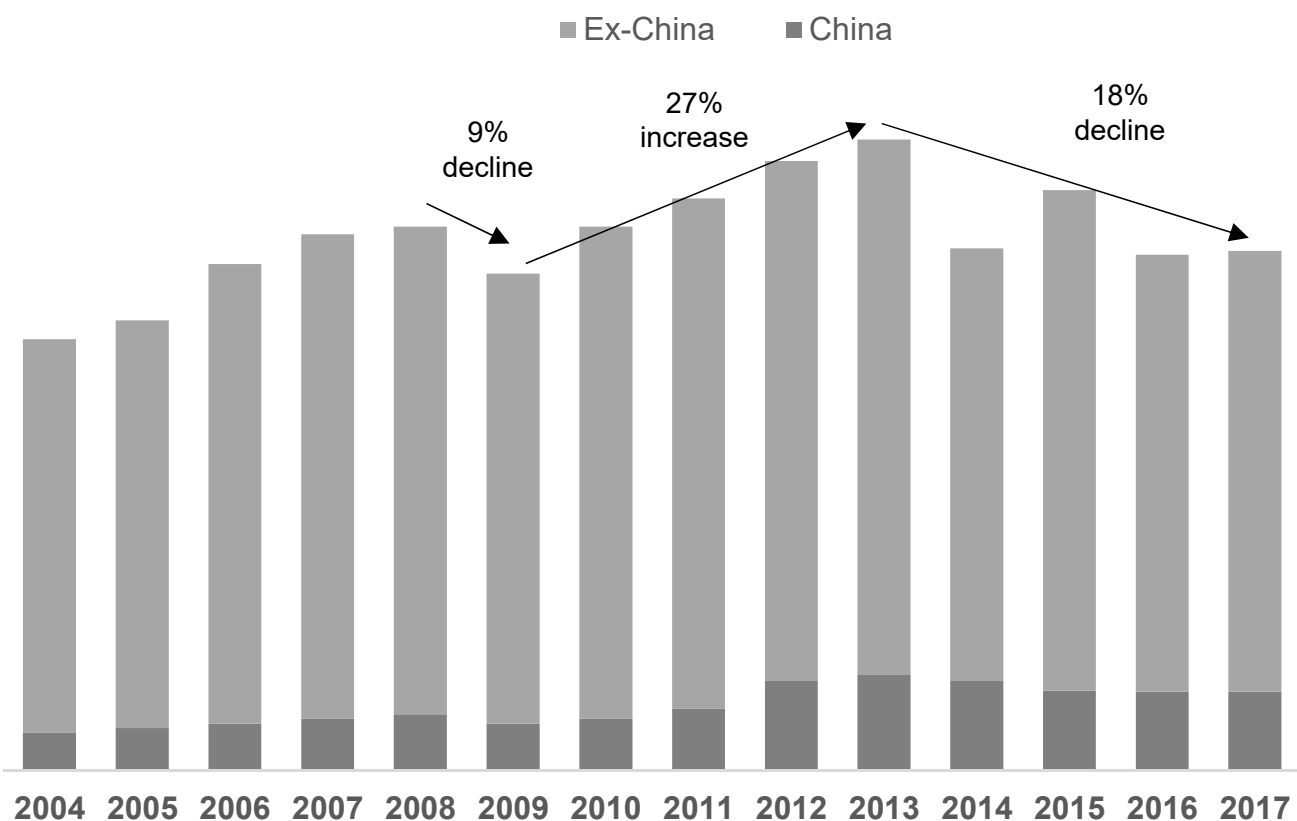
Supply variations normal in industrial markets, current battery material supply/demand dynamic not unique

World Rare Earth Mine Production (metric tons of rare-earth oxide equivalent)<sup>1</sup>



(1) Source: USGS

World Ilmenite Production (metric tons)<sup>1</sup>



(1) Source: USGS

# Adapting Balama to the market

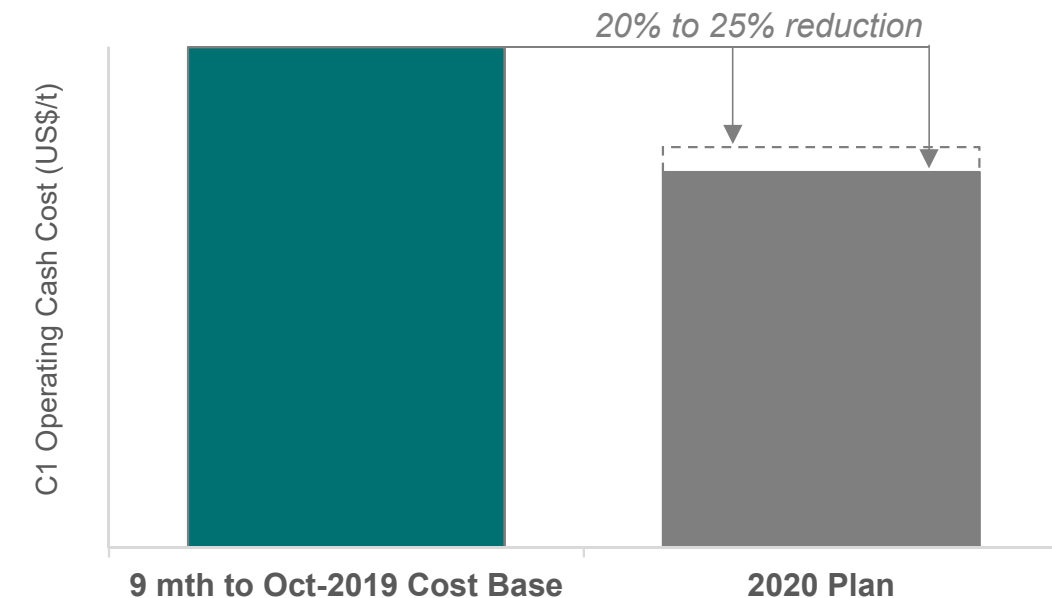
## Adapting Balama operations to current market conditions – balancing lower cost against continued ramp-up



Photo: Balama Graphite Operation- drying and screening

- Plant operating methodology adapted to lower demand – optionality retained to enable ramp-up as demand increases (higher asset utilisation)
- Cost base review undertaken, 20% to 25% cost reductions identified and in progress
- ESG principles and commitment to best practices uncompromised
- Planned 2020 production 120kt - 150kt subject to market demand, plant design capacity 350ktpa

### Indicative C1 unit costs @ 15 kt production per month



# Committed to active anode material production in the USA

Long-term commitment to value added processing of flake graphite to active anode material enabled by long mine life at Balama

Mar 2018	May 2018	Aug 2018	Sep 2018	Dec 2018	Q1 2019	Q4 (YTD) 2019	Ongoing (to end 2020)
Syrah precursor <sup>1</sup> testing and benchmarking completed	Vidalia BAM site purchase agreement	Vidalia BAM site purchase completed	Phase 1 Commercial scale study completed	First production of unpurified spherical graphite using Balama feed (5kt pa milling capacity installed)	Customer qualification of unpurified spherical graphite commenced	First production of purified spherical graphite using Balama feed (qualification scale capacity installed)	<ul style="list-style-type: none"> <li>Operate Vidalia, Louisiana plant                             <ul style="list-style-type: none"> <li>Qualification of spherical graphite</li> <li>Ongoing product development and commercialisation through 2020</li> </ul> </li> <li>Produce active anode material for qualification via installation of pilot scale furnace at Vidalia and tolling</li> <li>Complete Feasibility Study optimisation for Vidalia expansion post product qualification</li> <li>Assess options for partnering:                             <ul style="list-style-type: none"> <li>Strategic</li> <li>Financial</li> </ul> </li> </ul>

Vidalia milling circuit



Vidalia purification circuit



1. Precursor materials refer to unpurified and purified spherical graphite

# Establishing a key position in the anode supply chain

Leveraging the globally significant Balama asset to develop an integrated battery anode material and industrial products business



## Balama a Globally Significant Resource

- Globally significant flake graphite resource:
  - Ore Reserves<sup>1</sup> 113.3Mt at 16.4% TGC2 (18.5Mt of contained graphite)
  - Simple open pit operation, low stripping ratio, design production capability 350kt flake graphite per annum
  - Over 50 year mine life<sup>2</sup>
- Near term focus to adapt Balama market conditions:
  - Focus on cost reduction
  - Optionality for volume upside when market conditions improve
- Commitment to safety, health, environmental and community outcomes uncompromised through restructure



## Vertical Integration

- Capability to produce purified spherical graphite for product qualification in the lithium ion battery supply chain
- Production of tolled and internally produced pilot scale final active anode material for qualification planned during 2020
- Existing plant/facility expandable to commercial scale
- Assessing options for strategic, technical and/or financial partnering



## Global Mega Trend

- Decarbonisation of the transport sector, via Lithium-ion battery powered electric vehicles (EV), is gaining momentum
- SYR remains a pure play graphite company with direct exposure to the global mega-trend of decarbonisation and battery development

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