



# Syrah Resources Limited

## 2013 Graphite & Graphene Conference



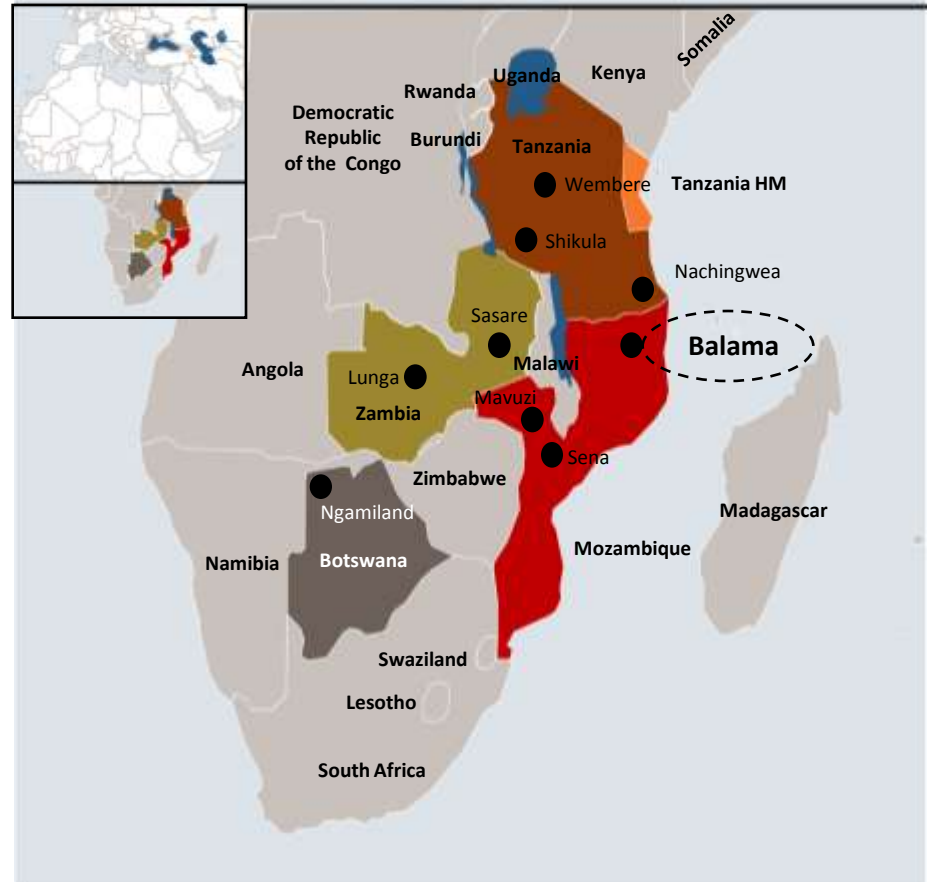
Melbourne 19 November 2013

Image: Core from Ativa Zone being logged at Balama



## Syrah Resources Overview

- ❑ Syrah has identified and proven up the world's largest graphite deposit at Balama (100%) containing high-grade zones combined with an exceptional quality product
- ❑ The graphite has excellent metallurgy with a concentrate grade in excess of 96% and 98%
- ❑ A range of graphite flake sizes from jumbo size to fine
- ❑ Potentially one of the world's largest vanadium deposits with met testwork underway. Grades comparable to the world's largest operating vanadium deposit
- ❑ Located close to key infrastructure (power, water, port) with low power costs anticipated

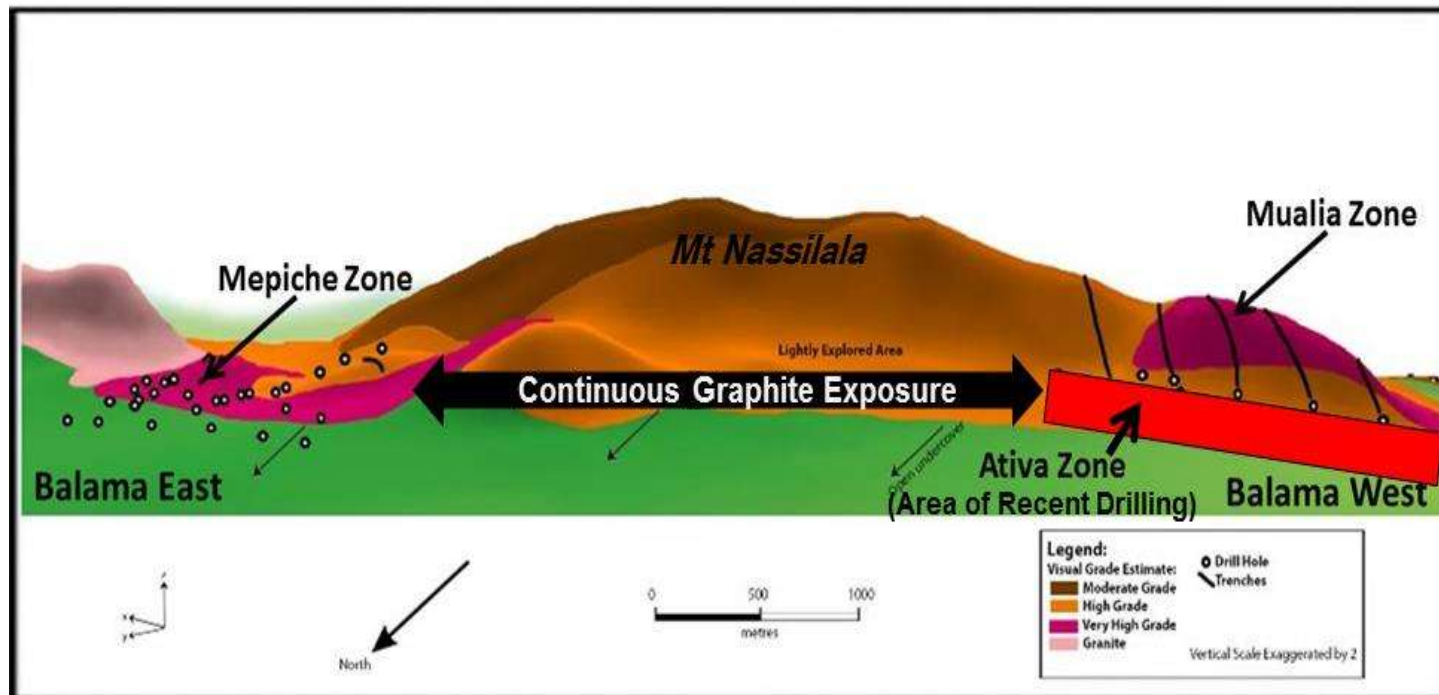


**Syrah is focused on the development of its high grade Balama graphite and vanadium project in Mozambique**



## The Balama Resource: incredibly large, growing and versatile

- ❑ Global Inferred resource of 1.15Bt @10.2% TGC and 0.23%  $V_2O_5$
- ❑ Ativa Zone – 51 million tonnes @ 19.9% TGC & 0.38%  $V_2O_5$  at a 13% cutoff grade
- ❑ Mualia Zone – 136 million tonnes at 16.6% TGC and 0.43%  $V_2O_5$
- ❑ Mepiche Zone – 145 million tonnes at 15.1% TGC and 0.43%  $V_2O_5$



The Balama Graphite resource is absolutely World Class





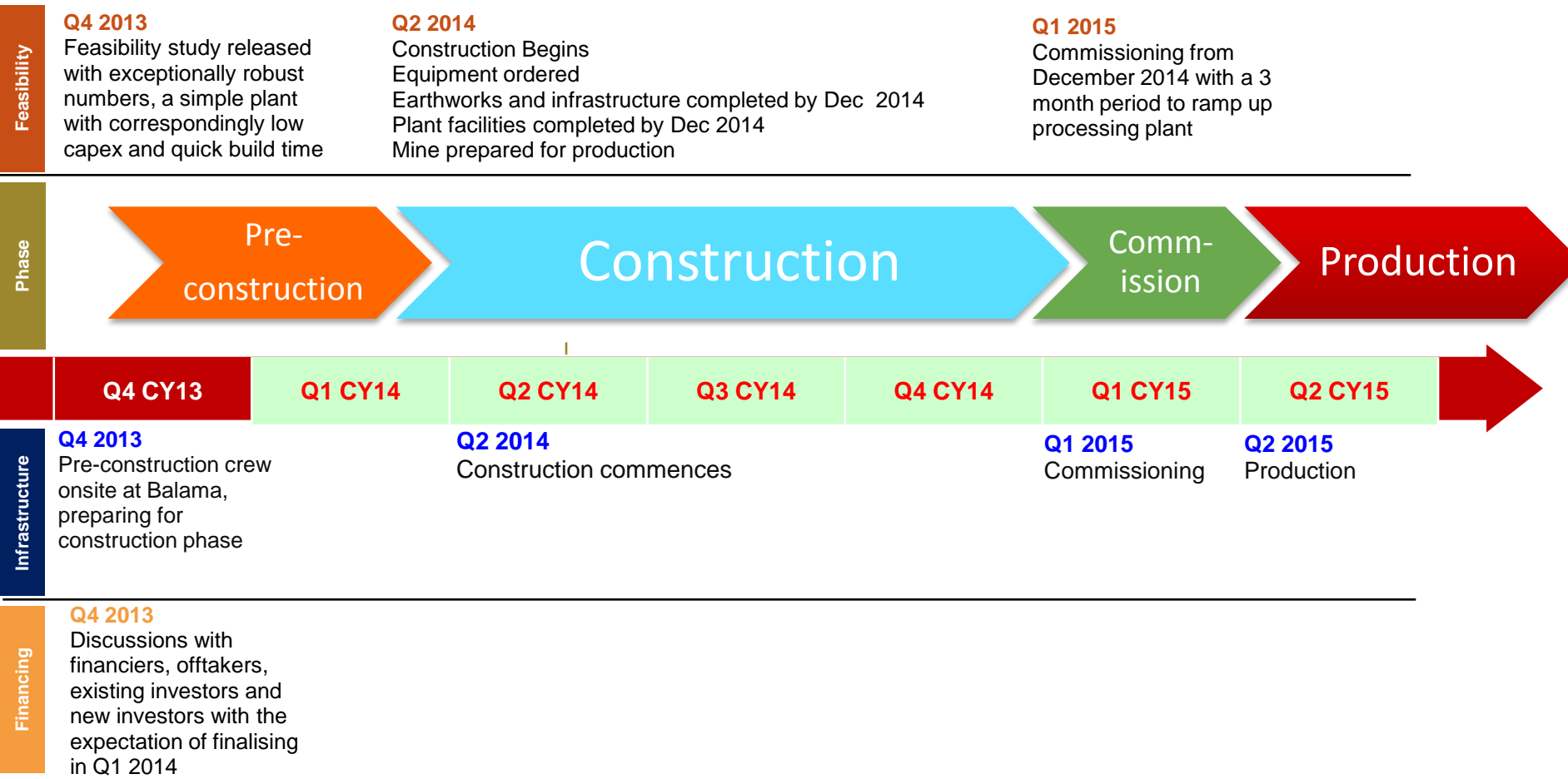
## Scoping Study results

- ✓ The Scoping study, undertaken by Snowden Mining Industry Consultants, has delivered and confirmed an exceptionally robust financial outlook for the Balama project:
  - ✓ Low capital cost of US\$91.6 million, Mine gate cost of US\$102/t, FOB costs of US\$198/t at the port of Pemba. The projected operating costs are bottom of the cost curve for graphite production
- ✓ High grade ore and simple metallurgy leads to a simple plant design. Equipment components are off the shelf, meaning straightforward construction with minimal technology risk at the commissioning phase
- ✓ Favourable infrastructure is assisting strong project economics – water, roads, power, port
- ✓ Only 1.2 Mtpa of mining required to produce 220,000 tpa of graphite concentrates

**Project economics are compelling due to high grades, simple metallurgy and favourable infrastructure**



# Our vision of the next 15 months to production



**Syrah plans to have financing in place early in 2014 and to be in commercial production in Q2 2015**



# Metallurgy

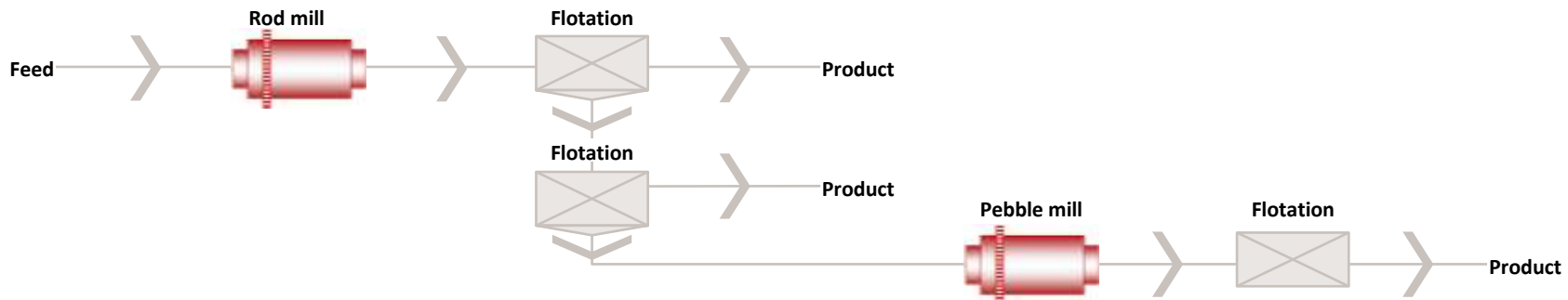
## Simple Graphite metallurgy

- ❑ Metallurgical test work has been conducted on Balama graphitic material by Mintek, specialist graphite processors and potential offtake partners
- ❑ Results show graphitic carbon concentrates will be high grade (96%-98%)
- ❑ High recoveries with low levels of ash, volatile, moisture and sulphur
- ❑ Balama orebody offers flexibility in mining - customise product for clients

## Vanadium – significant upside potential

- ❑ Vanadium is not in the current scoping study
- ❑ Initial testwork indicates that the vanadium minerals are highly amenable to clean recovery, in the form of a high grade concentrate
- ❑ Potential to sell a concentrate or upgrade to vanadium pentoxide flake

### Processing flowchart - indicative



Optimisation testwork underway to finalize plant design



<#>



## Key Infrastructure

Pemba Port

Road: Pemba to Balama

Chipembe Dam

Power Lines near Balama



- ❑ **Located within close proximity of deep water port facilities at Pemba (~240km)**
  - Third largest port in Mozambique. Ports of Africa confirmed available capacity for Balama product through Pemba Port
- ❑ **Main road connects Project to Pemba Port**
  - Sealed, well maintained road to Monte Puez (~200km). Remaining 40km currently unsealed with construction underway to seal remaining distance by end of CY2013
- ❑ **Large regional dam, Chipembe, located only 12km from the Balamba processing plant**
  - Suitable available capacity and allocation for Syrah
- ❑ **Region currently being connected to the National Power Grid**
  - Power lines currently being installed between Balama town and Monte Puez. Mozambique Government has indicated willingness to extend this supply to the Balama Project





## Community development

- ❑ Significant investment has been made in local infrastructure
  - Water bores drilled for use in neighbouring villages and Infrastructure programs commenced at Balama hospital
- ❑ Strong supporter of local economies
  - Large employer of local labour and developing training programmes to develop a local workforce
- ❑ Balama operations will invest in local agricultural development for food supplies
- ❑ Strong focus on improving local community health and education



**Syrah is working proactively to engage the local community**

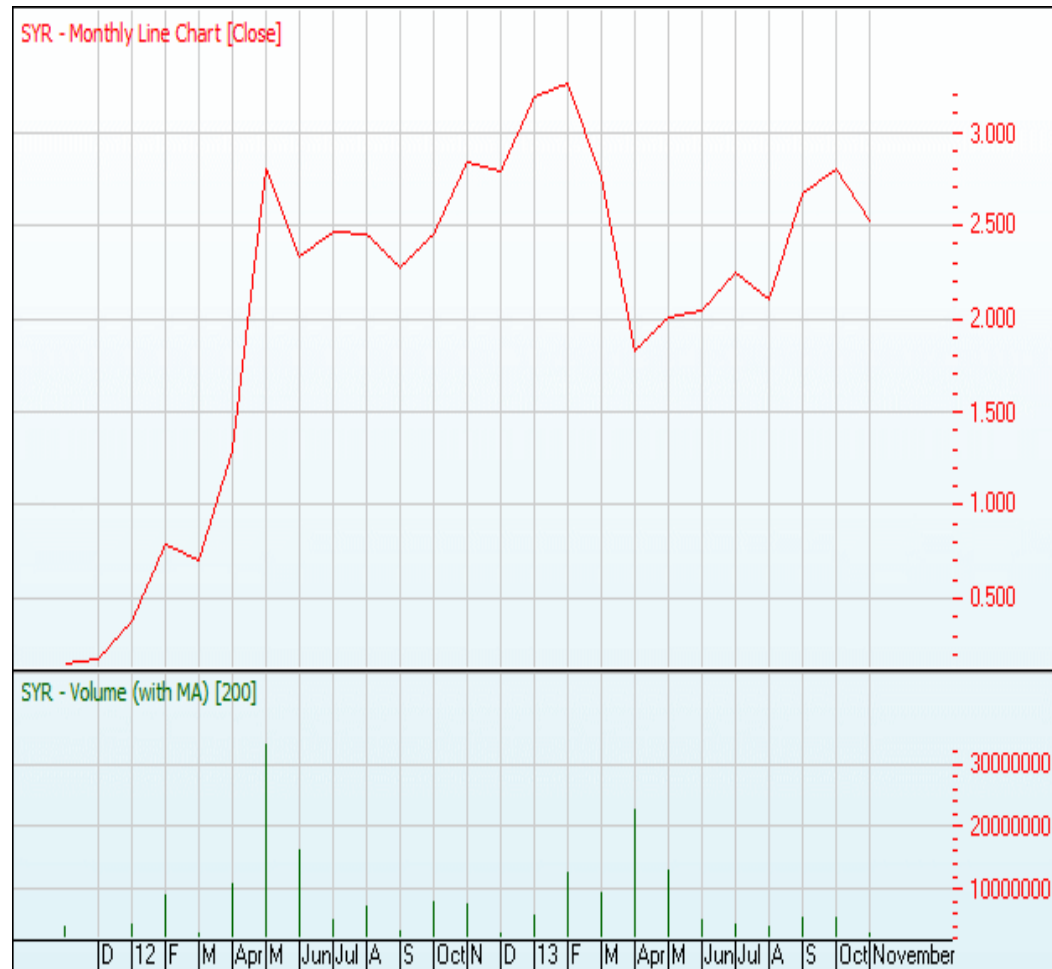


## Current capital structure

### Overview

- ❑ ASX listed
- ❑ Market capitalisation (undiluted) of A\$359 million at A\$2.42/share as at 25 November 2013
- ❑ 148,410,123 shares on issue
- ❑ 4,209,467 options on issue
- ❑ ~\$6m cash on hand at 30 September 2013
- ❑ Directors' direct and indirect interests total 31.79% of current shares on issue

### Syrah price and volume – last 2 years





## Graphite Market

Market in General and Syrah Targets & Strategies



## Definition of Graphite & Key Points

Graphite is a natural form of carbon with the chemical formula C and is characterized by its hexagonal crystalline structure.

The key point here is;

**Graphite = Carbon**





## Graphite types, applications and substitution

Application	Natural Graphite			Synthetic Graphite	
	Micro Crystalline	Flake	Vein	Secondary Synthetic	Primary Synthetic
Batteries (alkaline&Zinc Carbon)		X	X	X	X
Batteries (Li-ion)		X		X	X
Carbon Brush		X	X	X	X
Conductive Coating		X	X	X	X
Expandable Graphite		X			
Foundry Coating	X	X	X		
Friction Material	X	X	X	X	X
Fuel Cells		X		X	X
Gaskets&Seals		X			
Pencils	X	X	X		
Plastics		X		X	X
Powder Metals		X	X		X
Refractory	X	X	X		
Steel & Iron (Carbon Additive)	X	X		X	

Source: Asbury Carbon

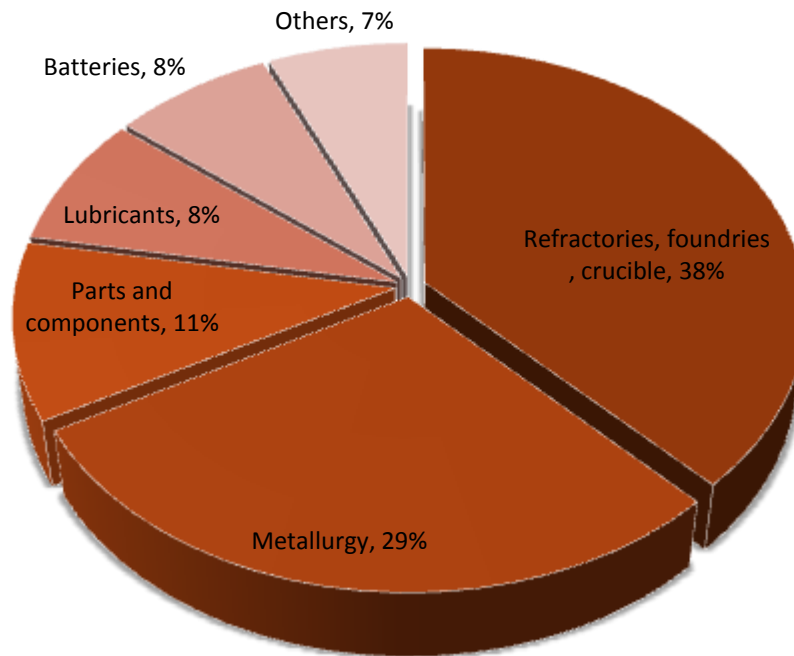


## World Natural Graphite Production Statistics

Country	Industrial Minerals		Roskill		BGS World Mineral Production		USGS Mineral Com. Summary	
	Production (2011) mt (x1000 mt)		Production (2011) mt (x1000 mt)		Production (2011) mt (x1000 mt)		Production (2012) mt (x1000 mt)	
	Flake	Amorph	Flake	Amorph	Total	Potential Flake	Total	Potential Flake
China	380	400	308	352	1,800	990	750	412.5
Brazil	96	0,0	75	0,0	89.9	49.5	75	41.25
India	35	0,0	13.5	1.5	143.5	78.9	150	82.5
N. Korea	30	0,0	100.2	30	30	16.5	30	16.5
Canada	21	0,0	25	0,0	20	11	26	26
Norway	8	0,0	8	0,0	7.8	4.2	7	7
Zimbabwe	5	0,0	1	0,0	7.2	4	0,0	0,0
Madagascar	4	0,0	4	0,0	4	2.1	5	5
Russia	2	0,0	4.6	7.4	14	7.7	14	7.7
Ukraine	1.5	0,0	8	0,0	8	4.4	6	3.3
Germany	0.3	0,0	0,0	0,0		0,0	0,0	0,0
Austria	0,0	16	0,0	0,5	0,9	0,0	0,0	0,0
Mexico	0,0	12	0,0	8	7,3	0,0	8	0,0
Turkey	0,0	0,3	0,0	0,175	0,0	0,0	10	0,0
Sri Lanka	4,2	0,0	3	0,0	3,3	1,8	4	2,2
<b>TOTAL</b>	<b>587</b>	<b>428</b>	<b>550</b>	<b>400</b>	<b>2136</b>	<b>1170</b>	<b>1085</b>	<b>604</b>
World Total		<b>1015</b>		<b>950</b>		<b>2136</b>		<b>1085</b>



## Graphite Consumption By Sectors 2011



Source: Industrial Minerals Graphite Report 2012



## Some Questions We should Ask About the Market

1. What could be the market size in General?
2. What is the current market size?
3. Who are the main actors in the market and their current situation?
4. What happened in the past?
5. What is the new markets?
6. What is the alternative markets?





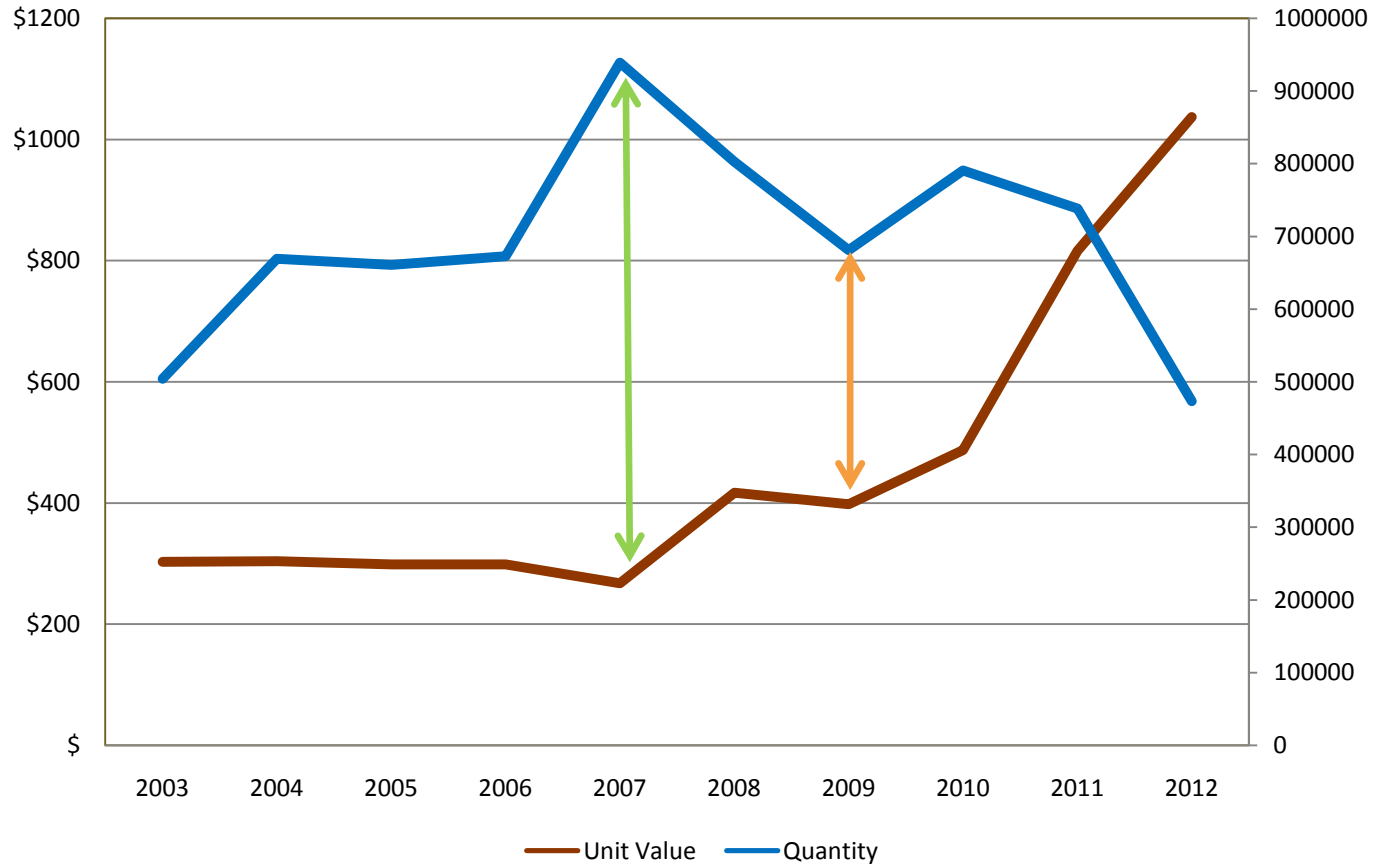
## Question 1& 2 Export Market Size

Years	Quantity Exported (metric tones)	Unit Value in US\$
2003	504,308.18	\$302.95
2004	669,274.00	\$303.99
2005	660,882.00	\$298.36
2006	672,931.00	\$298.61
2007	939,297.00	\$267.40
2008	803,015.00	\$417.18
2009	681,464.00	\$397.72
2010	790,885.00	\$487.13
2011	738,707.00	\$816.47
2012	473,468.00	\$1,037.21
2013- 1st Half	185,027.91	\$1,198.41

Source: <http://www.trademap.org>



### Quantity Exported vs Unit Value





### 3. Who are the main actors in the market and their current situation?

Major Natural graphite Exporting countries (quantity in mt)						
Reporter	2007	2008	2009	2010	2011	2012
China	670,570.00	597,349.00	458,895.00	585,483.00	444,800.00	257,722.00
Brazil	16,390.00	17,692.00	13,189.00	22,015.00	24,202.00	22,993.00
Canada	20,301.00	22,000.00	9,793.00	14,972.00	18,184.00	17,892.00
Mexico	16,083.00	13,347.00	9,379.00	11,576.00	18,300.00	21,284.00
Austria	7,319.00	8,962.00	5,192.00	9,519.00	N/A	N/A
Madagascar	5,351.00	4,899.00	3,417.00	3,782.00	3,873.00	N/A
Sri Lanka	5,152.00	5,192.00	3,018.00	3,027.00	3,341.00	N/A
Czech Rep,	4,028.00	4,075.00	2,150.00	3,154.00	4,421.00	4,126.00

Source: UN Trade Statistics



## 4. What Happened in the Past?

In 1992, two important things for the graphite market happened

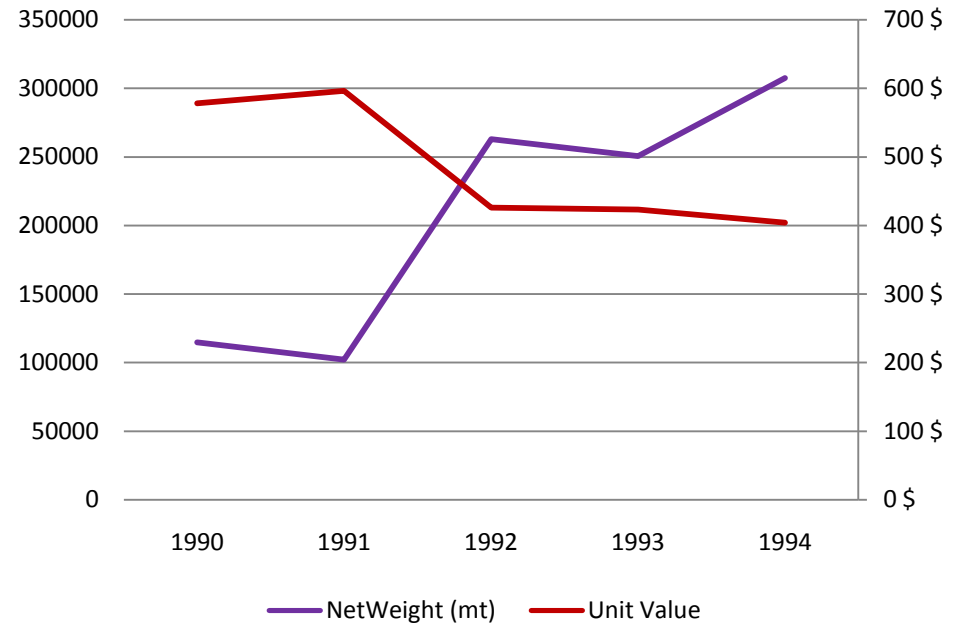
1. China entered the graphite market
2. Soviet Russia collapsed





Period	Trade Value	NetWeight (mt)	Unit Value
1990	\$66,340,617.00	114,774.79	\$578.01
1991	\$60,895,412.00	102,097.82	\$596.44
1992	\$111,954,601.00	262,860.23	\$425.91
1993	\$106,076,400.00	250,535.61	\$423.40
1994	\$124,227,851.00	307,424.76	\$404.09

### Chinese Market Entrance





## **Collapse of Soviet Russia?**

**Petroleum Coke became substitute of natural graphite**



## 5. What are the new Markets?

- **Li-ion Batteries**
- **Graphene**
- **Fuel Cells**
- **Pebble Bed Nuclear Reactors**
- **Expandable Graphite**



## 6. What are the Alternative Markets?

### Graphite Market

Natural Graphite

Synthetic Graphite

**13 Billion US\$ Market**

### Carbon Market

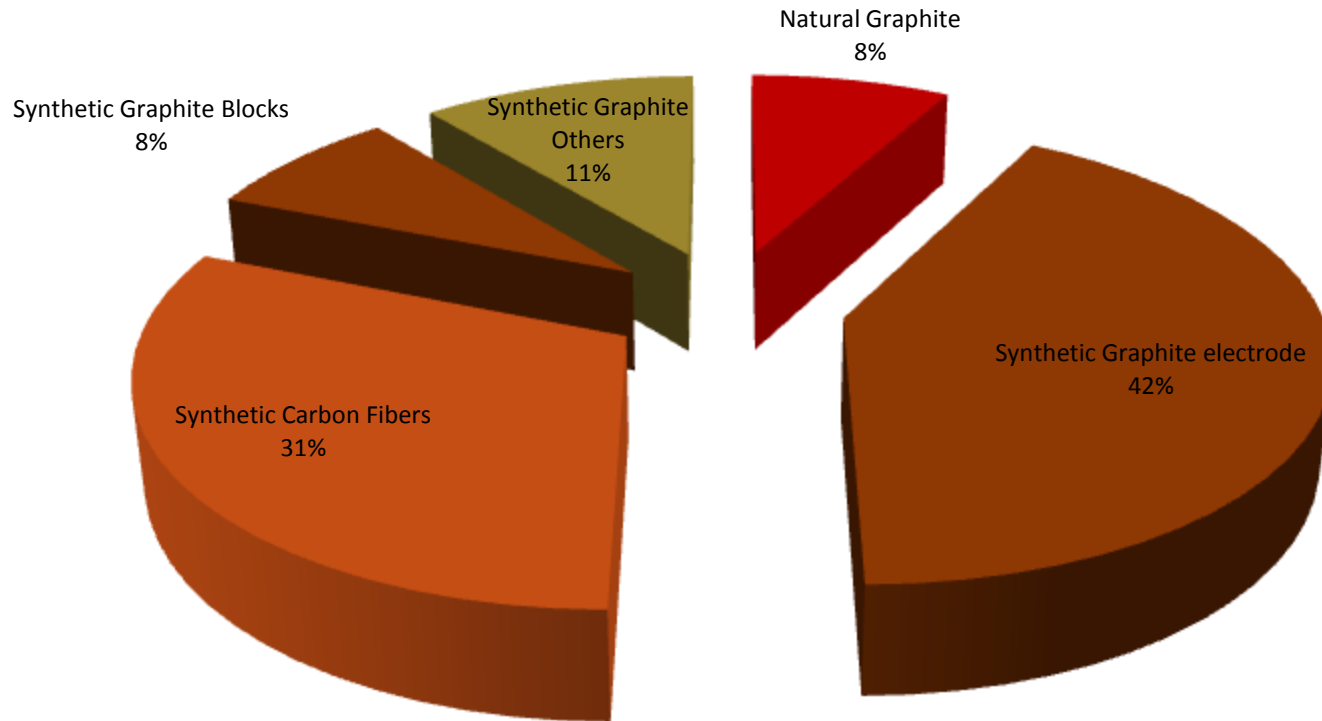
- Petroleum Coke
- Green Petroleum Coke
- Calcined Petroleum Coke
- Needle coke/Anode Grade Petroleum Coke

**24 Billion US\$ Market**



# General Outlook of Graphite Market (% in value)

## Graphite Market







## Some examples from alternative markets

- Calcined Petroleum Coke
- Graphite Electrodes
- Aluminium Anodes



## Calcined Petroleum Coke

Period	Definition	Trade Value	Trade Quantity (tonnes)	Unit Value
2011	Calcined Petroleum Coke imported (HS:271312)	\$4,537,105,000.00	7,824,424.00	\$580.00
2012	Calcined Petroleum Coke imported (HS:271312)	\$3,648,701,000.00	6,753,684.00	\$540.00

Obtained by calcining green petroleum coke at temperatures as high as 1400 °C

~ 4 billion US\$ trade value

~ 7 million tonnes trade quantity

One of the main application is in Steel Mills as carbon raiser and recarburiser



## **Synthetic Graphite Electrode**

**Trade Quantity : over 1.5 million mt/year (with considering electrodes other than furnaces over 3 million tones)**

**Total Value : 5.5 Billion US\$(est)**

**Used in Electrical Arc Furnaces (EAF)**

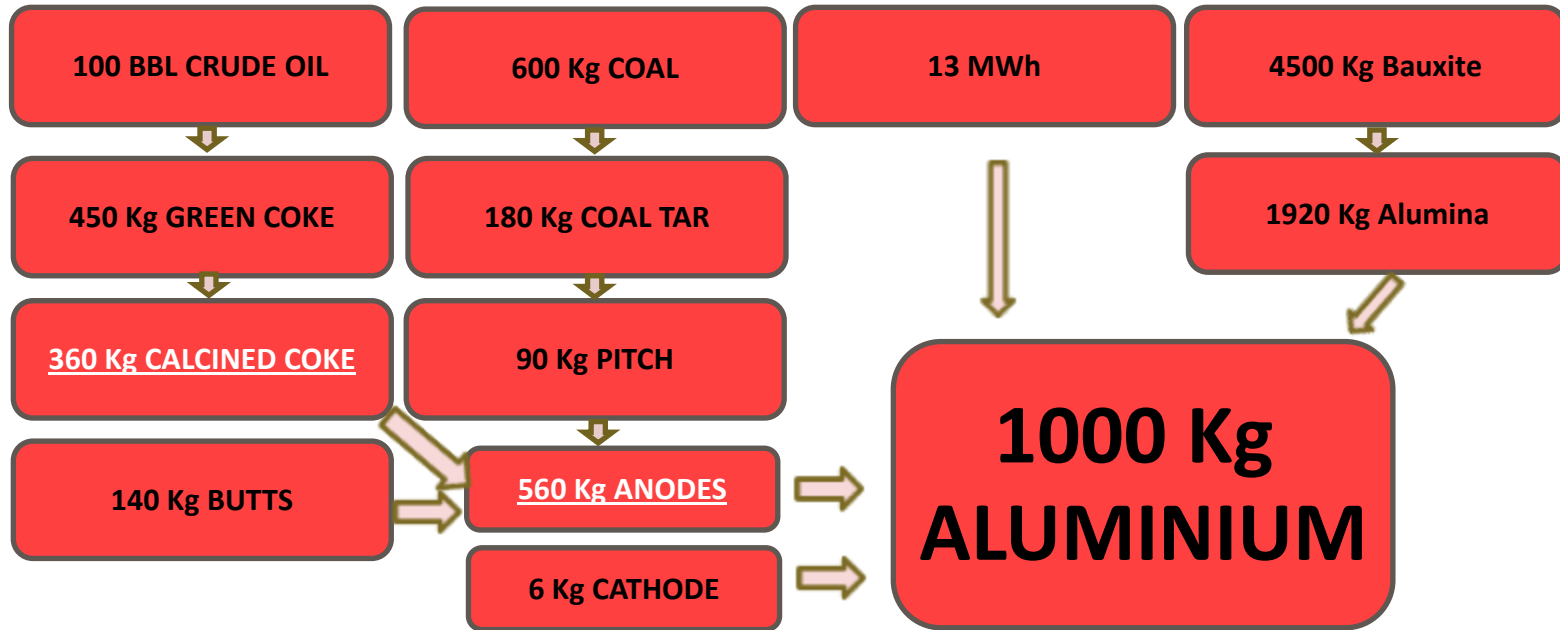
**2.5 kg Electrode consumed for 1 mt steel – 570 million tones steel produced through EAF**

**Needle Petroleum Coke is the main raw material for electrodes**



## Aluminium Production & Aluminium Anodes

50 million tones of aluminum production





## Syrah Strategies and Advantages

- **Competing with China for Traditional Markets**
  - Competitive Cost (lowest cost)
  - Premium Product
  - Consistent Quality
  - Regular Supply
- **Supplying the Alternative Markets**
  - High Quality Graphite with High Grade
  - Low impurities (Sulphur <0.01%)
  - Ability to supply large quantities
  - Price flexibility (low cost)
- **New Markets;**
  - Focus on Battery applications





# Syrah Resources Limited

Thank you

New York 26 November 2013

Image: Core from Ativa Zone being logged at Balama