## RESOURCES TALGA RESOURCES LTD GRAPHITE PROJECTS UPDATE **15 OCTOBER 2013**



### 200 kta

European natural graphite consumption

2.1MtTotal JORC contained graphite

2-3 km Distance to sealed road

20-25km Distance to rail

1-2 days Delivery time to market

100% **Owned by Talga** 

22% **Corporate Tax Rate** 





\* Cover picture; Outcropping graphite at Nunasvaara.

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### **Executive Summary**

- Talga Resources Ltd ("Talga") is a mineral exploration & development company listed on the Australian Stock Exchange ("ASX") since July 2010.
- The Company wholly owns multiple graphite, iron ore and copper/gold projects in Sweden gained through the acquisition of a Teck Resources subsidiary in 2012, as well as Australian gold assets owned since listing.
- Talga's graphite deposits include the world's highest grade JORC resource of 7.6Mt at 24.4% graphite "Cg" at Nunasvaara, plus a coarse flake graphite JORC resource of 4.3Mt at 7.1% Cg at Raitajärvi. An additional 117-178Mt at 17-23% Cg in JORC compliant exploration targets<sup>1</sup> provides further scope for increasing resources if required.
- Placement and board changes complete. Entitlement Offer fully under-written and **soon to close** (16th October).
- Funds to enable material catalysts, including economic studies on two graphite projects and further finance expected from divestment of gold and iron projects.







### **Corporate Overview**

### **Board of Directors**

Keith Coughlan*	Non-executive Chairman	Perth
Mark Thompson	Managing Director	Perth
Piers Lewis	Non-executive Director	Perth

#### \* Appointed 26 Sept 2013

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Capitalisation Summary	
Ordinary Shares ASX:TLG	63.6M
Unlisted Options <sup>1</sup>	3.75M
Cash at end of June 2013	\$0.6M
Debt	\$0.0M
Market Capitalisation @ \$0.05	\$3.4M

Top Shareholders (+3%) at 20 September 2013				
Lateral Minerals Pty Ltd (Mark Thompson)	14.3%			
Yandal Investments Pty Ltd	4.2%			
Kin Chun Wong	4.1%			
United Overseas Service Management Ltd	4.0%			
Hereford Group Ltd	3.3%			

#### **Top 20 own 53.2%**

<sup>1</sup>2.75m @ 40c director exp 30.11.2014, 0.5m @ 35c employee exp 21.7.2015, 0.5m @ 45c employee exp 3.10.2016



### What is Graphite?

- Graphite is a shiny grey mineral that can occur in **nature** when carbon in rocks becomes crystalline.
- Graphite consists of parallel sheets of carbon atoms in a hexagonal array and requires considerable pressure and temperature to form. A single sheet is called graphene.
- Graphite has unique properties including very high thermal and electrical conductivity.
- Graphite is used in thousands of applications and products with major consumption by the steel and manufacturing industries.
- Graphite is finding new markets from new uses in products as diverse as insulation panels and battery/energy technologies.











### Natural graphite market

- Natural graphite market (1.0Mt/yr) worth US\$1B/yr with main consumption in steel and refractories, batteries, automotive parts and lubricants.
- Annual consumption is split approximately 45% for microcrystalline flake (particle size <75 micron; also called **amorphous** in the trade) and **55%** for macrocrystalline flake (>75 micron size, also generically called just **flake**).
- Graphite is most commonly sold as a concentrate by private contract and therefore prices are not transparent. Industry prices are surveyed and published by Industrial Minerals magazine.
- Graphite price is determined by particle (flake) size, carbon content (purity) and in some products; shape. Most natural graphite is sold to traders who upsell to refiners/purifiers, polishers and shapers before it is retailed to end user.
- Historical graphite market growth related to diverse industrial demand of 3-5% annum; new markets growing 7-10% annum.

#### Volume Comparison of Natural Graphite Market







### **New Demand Driver**

- Graphite is a significant component of many types of battery, particularly Li-ion.
- Battery grade graphite is currently made by shaping and treating large flake graphite.
- Commonly there is 10x more graphite than lithium in a Li-ion battery anode.
- Rapid growth; global graphite-rich anode materials market US\$500M (2012), up from US\$375M (2011)\*.
- Electric vehicles currently use 10kg to 90+kg
  graphite per vehicle in batteries alone.
- Increased mobility of energy, storage devices, graphene and other new technologies offer a carbon age that is expected to impact positively on future demand for natural graphite.





### **Graphite Price Trending Above Historic Levels**



After record prices in 2011-12 prices for all graphite types declined but stabilised far above long term historical levels. Price forecast by *Industrial Minerals* shows expected trends Note that price falls and trends are correlated but not all intact but the larger volume market types have traded above graphite types declined at the same rate due to diversity of **expected** levels since forecast in Dec 2012. market segments and changes in supply from China.









## Why Graphite is News?

- 80% of world's natural graphite supply (including 95% of world's amorphous graphite supply) is from China.
- Increasing state control/mine consolidation and higher domestic consumption have resulted in lower exports from China.
- Costs increasing in China under higher export tariffs, taxes and labour costs.
- The apparent supply risk now being addressed by importing countries. Graphite is classified a "Strategic Mineral" by USA, UK and EU government agencies.



Of the world's natural graphite supply is mined in China (including 95% of world amorphous graphite)



## **China Changes**

- Increased domestic demand and rising costs have cut exports, in some graphite types as much as 50% from 2011-12.
- Government has taken ownership of some fields and consolidation has decreased production. Eq. The amorphous graphite mines in Hunan that were responsible for over 90% of world supply closed for several years now, may produce at 10% of historic rate in future. Depth of development (450m underground) and thin nature of seams (2-5m) means higher costs in future = less supply.
- Signs of similar consolidation in coarse flake producing districts.
- Post-GFC freight rates are returning to normal, cutting margins on exports. Price gap on graphite sold in coastal China compared to **CIF Europe highest in 10 years.**

**Closed graphite mines in Lutang, Hunan Province after government consolidation.** 



Photo M Thompson/Talga Oct 2012



## Sweden is Proximal to Major Graphite Markets

- EU consumes 20% of world's natural graphite production, and imports 95% of its needs (vast majority from China).
- EU has classified graphite as a "critical raw material".
- EU graphite consumers looking for new reliable supply outside of China.
- Sweden is currently a major supplier of iron ore, copper, gold and other minerals to the EU markets and is a historic graphite producer.
- Graphite deposits in Sweden can enjoy a distinct order/ delivery time advantage compared to China and other jurisdictions.

### **Europe Natural Graphite Imports**



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Ranked 2<sup>nd</sup> best mining jurisdiction in world by Fraser Institute 2012-13 Corporate tax rate 22%, Mineral Production tax 0.2%. Established bulk commodity infrastructure with open access rail, road and ports. Low cost power from hydroelectricity and nuclear grid. • Well established quality mining province with highly skilled workforce, neighbouring producers and support industries. Fennoscandian Shield hosts world-class mineral deposits but remains under-explored relative to peers.

The 36Mtpa 'Aitik' Cu-Au mine, northern Sweden.



### **Direct Road and Rail Advantages**

- Graphite projects located **proximal** to high quality **sealed** roads and open access heavy haulage railway.
- Option to road/rail direct to major customers as Sweden links to mainland Europe markets.
- Potential \$100-200/tonne cost advantage on delivered graphite compared to shipments from China or other jurisdictions.









### **Shipping Options**

- Port of Luleå is the largest dry bulk handling port in Sweden.
- Current draught 11.8m with 30m fairway (up to Panamax).
- Deepening to 15.0m with 50m fairway in 2016.
- Currently exporting 9Mt annum including magnetite concentrates.
- Spare capacity; Quay length up to 770m currently available.
- All year access. MoU with Talga for graphite concentrate export of up to 80kt annum.





### **Talga's Swedish Graphite Projects**

- 100% ownership of five graphite projects with multiple deposits offering a **full range** of market **size** specifications.
- Two advanced stage projects in the development pipeline. These are drilled to JORC Indicated status and preliminary economic studies are underway;
  - Nunasvaara is a microcrystalline flake deposit with the highest resource grade in the world. It is located within the Vittangi project.
  - Raitajärvi is a coarse flake deposit with 49% of flake classified large to jumbo size.
- Piteå is our third high priority project; At an earlier stage of drilling but exceptionally well located and contains predominantly XL-size (jumbo) flake graphite.







### Vittangi Project (Nunasvaara)

- Located in Kiruna mining district of northern Sweden, discovered 1898 and declared a state mining field 1929.
- Seven exploration permits covering 313.7 km<sup>2</sup>
  contain multiple graphite deposits, the main focus being *Nunasvaara*.
- Ideal location provides favourable logistics:
  3km to highway and grid power,
  15km to town, 23km to railway.
- Testwork by state-owned companies pre-1992 included geophysics, trenching and diamond drilling.
- Since 1992 privatisation of mineral sector the area was held by 'majors' exploring for copper-gold. No modern work on graphite potential prior to Talga drilling 19 diamond drill holes in July 2012.



### Nunasvaara Graphite Deposit

- Current total JORC resource 7.6Mt @ 24.4% Cg.
- Mineralisation commences at surface. Current strike 1.2km and open; average true width over strike 20m (range 10-50m). Drilled to 165m depth and remains open.
- Predominantly microcrystalline graphite for bulk volume industrial market. China exports have dropped, prices 60% above long term average.
- Utilisation of the resource is aided by exceptional grade, open-pit bulk mining option, low-cost grid power and nearby road/rail/port options.
- Potential 10+ year mine life at 400ktpa milling rate to produce 50-70ktpa concentrate defined from first drill program.
- A scoping study has commenced, with first phase pit optimisation and mine scheduling work completed.
   Product specification studies, metallurgy and final economic inputs are pending. Results expected 13Q4/14Q1.



Nunasvaara Mineral Resource (10% Cg lower cut-off grade) Nov 2012

JORC	Tonnes	Grade	Contained
Classification	(Mt)	(%Cg)	Graphite (ton
Indicated	5.6	24.6	1,377,600
Inferred	2.0	24.0	480,000
Total	7.6	24.4	1,857,600





### **Nunasvaara Section 1800N**





### Nunasvaara growth potential

- Nunasvaara graphite unit extends over 15km strike. Talga rock chips average 26.2% Cg with grades up to 46.7% Cg.
- Less than 8% of graphite unit drill tested to date.
- Additional JORC Exploration Target<sup>1</sup> of 34-51Mt @ 20-25% Cg for 0-100m portion only defined along strike. Further satellite deposits exist nearby.

Project	Exploration Target <sup>1</sup>	Tonnage Range (Mt)	Grade Range (%Cg)
Vittangi	Nunasvaara	34-51	20-25
	Mörttjärn	10-16	15-20
	Maltosrova	2-3	20-30
<b>Total 0-1</b>	00m depth	46-70Mt	15-25%Cg

<sup>1</sup> Exploration Targets: The estimates of exploration target sizes in this announcement are in accordance with the guidelines of the JORC Code (2004) and should not be misunderstood or misconstrued as estimates of Mineral Resources. The potential quantity and quality of the exploration targets are conceptual in nature and there has been insufficient exploration to define a Mineral Resource and it is uncertain if further exploration will result in the determination of a Mineral Resource.







### **Raitajärvi Graphite Project**

- Advantageously located 2km from the Överkalix -Övertorneå Highway and grid power, 25km to town and railway, 130km to port.
- Two exploration permits covering 17 km<sup>2</sup>.
- Historically defined graphite deposit discovered 1974-78. SGU geophysics defined three large elongate conductors within a 6 x 1.5km area.
- Trenching and drilling revealed coarse flake graphite at surface, with potential for open-pit style development.
- Diamond drilling includes 20 historic holes for 1,242m by SGU and 28 Talga holes (2013) for 3,606m.
- Raitajärvi deposit has been designated an Area of National Interest for minerals by the SGU. The Designation affords protection, to the extent possible, against competing land use and measures that may hinder future potential mineral extraction.



Coarse flake graphite in surface trench

Road and grid power running through project



## Raitajärvi Large Flake Deposit

- Current total JORC resource of 4.3Mt @ 7.1% Cg.
- A high proportion of resource is coarse flake and at Indicated status.
- 87% of graphite flake size >100 micron (" $\mu$ m") and 49% >200 $\mu$ m.
- Historic metallurgical tests produced excellent results with graphite concentrate grading **90-94% C** from simple (unoptimised) flotation and **99% C** in basic enrichment test.
- Potential 10+ year mine life at 400ktpa milling rate to produce **25ktpa coarse flake graphite concentrate**. Scoping study planned to commence.
- Growth potential: Less than 25% of EM anomaly drill tested. See ASX:TLG release 4 Feb 2013 for more details.

*Raitajärvi graphite flake size (historic drill sample microscopy, n=87)* 

Deposit	< 100µm	100-200µm	200-400µm	>400
Raitajärvi	13%	38%	38%	119

#### Raitajärvi Mineral Resource (5% Cg lower cut-off) Aug 2013





JORC	Tonnes	Grade	Containe
Classification	(Mt)	(%Cg)	Graphite (
Indicated	3.4	7.3	246,400
Inferred	0.9	6.4	60,900
Total	4.3	7.1	307,300



![](_page_20_Picture_16.jpeg)

![](_page_20_Picture_17.jpeg)

### Piteå Jumbo Flake Project

- Located on sealed road 50km from port of Piteå and adjacent to grid power.
- 3 historic drillholes targeting base metals intercepted coarse flake graphite within a 4 x 1km EM anomaly.
- 70-90% of flake graphite at Piteå exceeds 300 µm size ("jumbo").
- Such large flake graphite is premium product gaining higher prices.

Drill Sample	100-300	300-600	> 600
	μm	μm	μm
<i>ÖNU89001</i> 27.2m	10%	50%	40%
<i>ÖNU89001</i> 44.2m	10%	70%	20%
<i>ÖNU89002</i> 53.6m	20%	70%	10%
<i>ÖNU89002</i> 103.0m	20%	70%	10%
<i>ÖNU89002</i> 107.6m	30%	60%	10%

![](_page_21_Figure_6.jpeg)

![](_page_21_Picture_7.jpeg)

### **Future Growth Pipeline**

- Talga owns multiple advanced stage graphite deposits defined by historic diamond drilling, mapping and geophysics.
- A total of 117-178Mt JORC compliant exploration targets' are defined across the projects.

Project	Exploration Target <sup>1</sup>	Tonnage Range (Mt)	Grade Range (%Cg)
	Nunasvaara	34-51	20-25
Vittangi	Mörttjärn	10-16	15-20
	Maltosrova	2-3	20-30
Raitajärvi	Raitajärvi	7-9	6-10
Jalkunen	Lautakoski	39-52	19-27
	Jalkunen	13-26	13-18
	Tiankijokki	2-3	17-23
	Nybrännan	5-10	20-25
Paiala	Lehtosölkä	4-6	8-14
Гајата	Liviovaara	1-2	18-30
Total 0-1	00m depth	117-178Mt	17-23%Cg

![](_page_22_Figure_4.jpeg)

![](_page_22_Picture_5.jpeg)

### Jalkunen Graphite Project

- Multiple conductors with significant graphite intercepted in historic drilling.
- Highlights include: Lautakoski 45m @ 19.4% Cg and 9m @ 35.0% Cg Jalkunen 51m @ 15.4% Cg Tiankijokki 26m @ 27.7% Cg
- Graphite flake size ranges <50 400 μm
- Drilling and geophysics define JORC compliant total Exploration Targets<sup>1</sup> of 59-91Mt @ 18-24% Cg.
- Exploration Target only estimated for 0-100m.
- Quantity and quality of graphite occurences, shallow depth and favourable locations offer clear potential for massive additional scale to be added in future.

![](_page_23_Figure_7.jpeg)

## **Pajala Graphite Project**

- The Pajala project contains two graphite prospects defined by historic drilling.
- Lehtosölkä Prospect
  - 5 historic diamond holes by SGU, best intercept **19.5m** @ 7.5% Cg. Contains coarse flake graphite with bimodal size distribution around 100  $\mu$ m and 300-400  $\mu$ m, with 20% of flake observed >400  $\mu$ m ("jumbo").
- Liviövaara Prospect
  - 13 historic diamond holes by SGU and Anglo, targeting Cu-Au sulphides. Best graphite intercepts: 4.6m @ 39.9% Cg and 8.4m @ 30.2% Cg, flake size range <50 μm - 100 μm.

![](_page_24_Picture_6.jpeg)

![](_page_24_Figure_10.jpeg)

![](_page_24_Picture_11.jpeg)

### Indicative Path to Next Graphite Milestones

Activity		2
ACTIVILY	<b>Q2</b>	
Nunasvaara Geophysics	$\checkmark$	
TCL Sweden Ltd Acquisition	$\checkmark$	
Nunasvaara Drill Phase 1		
Nunasvaara Results & Resource		
Nunasvaara Scoping Study		
Drilling Raitajärvi Phase 1		
Raitajärvi Results/Resource		
Raitajärvi Resource		
Marketing Deal/Offtake Option		
Raitajärvi Scoping Study		

![](_page_25_Picture_2.jpeg)

![](_page_25_Figure_3.jpeg)

![](_page_25_Picture_4.jpeg)

![](_page_25_Picture_5.jpeg)

### **Talga Investment Highlights**

Grade	High grade graphite resources provide opp
Sweden	Operating in a <b>top mining jurisdiction</b> with Extremely <b>low cost power</b> , <b>port agreement</b>
<b>Product Suite</b>	Multiple deposits cater for demand from ul
Demand	Strong commodity price outlook, expandir
Scale	Large inventory and growth pipeline. No a
Advanced	Advanced stage with economic studies co
Cheap	Talga is <b>undervalued</b> relative to peers, parti- and <b>transport cost advantages</b> of being pro
Capitalisation	Recent placement and underwritten entitle shares on issue remain tight; <b>84.8M TLG ord</b>
Board	<b>Experienced MD</b> . Recent board restructure recent capital raising process.
Newsflow	Upcoming news anticipated includes prelines strategic partnerships/marketing and diverse

![](_page_26_Picture_2.jpeg)

- ortunities for low capex, high margin production.
- producing infrastructure on the doorstep of European markets. in place and **direct road/rail** options.
- trafine to jumbo flake end-users.
- ng applications and significant Europe demand.
- ttempt to flood the market; focus is on **profitability**.
- **mmenced** on JORC Indicated resources
- cularly given the potential low capex, high margin production oximal to markets.
- ment offer will provide funds to complete milestone catalysts yet post transactions.
- resulting in Mr. Keith Coughlan becoming **new Chairman** during
- ninary economic studies on Nunasvaara and Raitajärvi, pivotal estment of gold and iron ore assets.

![](_page_26_Picture_13.jpeg)

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# RESOURCES

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## **Contact details:**

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Highway upgraded to highest load capacity in Europe, which passes through Talga's Vittangi project area. Photo Mark Thompson/Talga

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### Appendices

### Talga Asset Structure and JORC Resources

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Talga Min

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![](_page_28_Picture_5.jpeg)

![](_page_28_Picture_6.jpeg)

![](_page_28_Picture_7.jpeg)

**Nunasvaara** Graphite Mineral Resource @ 10% Cg lower cut-off Nov 2012

Classification	Tonnes	Graphite
Classification	(Mt)	(%Cg)
Indicated	5.6	24.6
Inferred	2.0	24.0
Total	7.6	24.4

**Raitajärvi** Graphite Mineral Resource @ 5% Cg lower cut-off Aug 2013

Classification	Tonnes	Graphite
Classification	(Mt)	(%Cg)
Indicated	3.4	7.3
Inferred	0.9	6.4
Total	4.3	7.1

SOURCES LTD	
00%	
ning Pty Ltd	
00%	
ning Pty Ltd (Sweden)	IRON

![](_page_28_Picture_13.jpeg)

Deposit	Tonnes	Grade	IOPC Catag
	(Mt)	%Fe	JURC Calego
Vathanvaara	51.2	36.0	Inferred Reso
Kuusi Nunasvaara	46.1	28.7	Inferred Reso
Mänty Vathanvaara	16.3	31.0	Inferred Reso
Sorvivuoma	5.5	38.3	Inferred Reso
Jänkkä	4.5	33.0	Inferred Reso
Masugnsbyn	87.0	28.3	Indicated Reso
Masugnsbyn	25.0	29.5	Inferred Reso
Total	235.6	30.7	

![](_page_28_Picture_15.jpeg)

![](_page_28_Figure_16.jpeg)

![](_page_28_Picture_17.jpeg)

#### Graphite market size classification.

Trade Name	microns	US Mesh Size
Amorphous/Ultrafine	<10	na
<b>Amorphous/Fine</b>	10-75	-200
Small	75-150	200-100
Medium	150-180	100-80
Large	180-300	80-50
XL/Jumbo	>300	50+

Source: Industrial Minerals Natural Graphite Report 2012 cross referencing various sources. Many terms are proprietary or mixed use; there are few if any industry standards in naming principles.

### **Common natural graphite concentrate** product sizes, grades and prices

Size (microns)	Size US Mesh	Purity % C	Quote US \$/tonne
300+	50+	94-97	>1800
100 200	180-300 80-50	94-97	1350
100-300		90	1200
	100-80	94-97	1200
150-180		90	1025
		85-87	900
75 150	200-100	94-97	1050
/5-150		90	850
-75	-200	80-85	525

Source: Industrial Minerals Magazine Aug 2013.

Most prices FCL, CIF European Port.

Note prices averaged from low-high range and selected as common commercial products where natural graphite sold as concentrate. Many specialty grades with much higher prices are traded but do not represent the bulk of market demand.

![](_page_29_Picture_8.jpeg)

![](_page_29_Picture_9.jpeg)

### **References & Qualified Persons**

<sup>1</sup> **Exploration Targets**: The estimates of exploration target sizes in this announcement are in accordance with the guidelines of the JORC Code (2004) and should not be misunderstood or misconstrued as estimates of Mineral Resources. The potential quantity and quality of the exploration targets are conceptual in nature and there has been insufficient exploration to define a Mineral Resource and it is uncertain if further exploration will result in the determination of a Mineral Resource.

#### **Competent Person's Statement**

The information in this report that relates to Exploration Results is based on information compiled and reviewed by Mr Darren Griggs and Mr Mark Thompson, who are members of the Australian Institute of Geoscientists. Mr Griggs and Mr Thompson are employees of the Company and have sufficient experience which is relevant to the activity which is being undertaken to qualify as a "Competent Person" as defined in the 2004 Edition of the "Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves" ("JORC Code"). Mr Griggs and Mr Thompson consent to the inclusion in the report of the matters based on this information in the form and context in which it appears. The information in this report that relates to Resource Estimation is based on information compiled and reviewed by Mr Simon Coxhell of CoxsRocks Pty Ltd. Mr Coxhell is a consultant to the Company and a member of the Australian Institute of Mining and Metallurgy. Mr Coxhell has sufficient experience relevant to the styles of mineralisation and types of deposits which are covered in this document and to the activity which he is undertaking to qualify as a Competent Person as defined in the 2004 edition of the "Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves" ("JORC Code"). Mr Coxhell consents to the inclusion in this report of the matters based on this information in the form and context in which it appears.

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![](_page_30_Picture_7.jpeg)