

***talga***

*unearthing tomorrow*

## **General Meeting Presentation**

**27 July 2016 Perth, Australia.**

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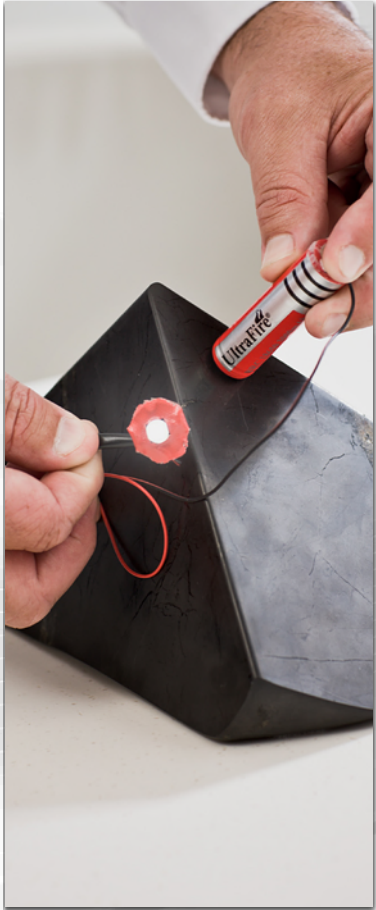
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# Meeting introduction (video)

- ▶ **Corporate update: recent placement/new investors**
- ▶ **Business summary & strategy update**
- ▶ **Swedish operations update**
- ▶ **German operations update**
- ▶ **Highlights and upcoming events**



# Corporate Update



- ▶ Placement and rights issue of listed options (TLGOA) completed June-July 2016 raised total **~\$10.9M**
- ▶ Enables **scale up** of next phase of Talga's operations, **accelerated** commercial development and future funding mechanisms
- ▶ Placement cornerstoned by Norwegian family office, **Smedvig Group** who invest in fast-growing innovative businesses, backing ambitious teams with the potential to become **market leaders**
- ▶ **Strategic Scandinavian** long term investor with co-investor relationships to Pallinghurst, Posco, AMCI Capital, Temasek, Energy and Minerals Group and others
- ▶ Extensive **due diligence** completed across Talga operations by successful quality investing group



# Corporate Snapshot



## Capitalisation Summary 26 July 2016 (AUD\$)

|  |               |
|--|---------------|
| Shares on issue <b>TLG</b>                       | <b>181.9M</b> |
| Listed Options <b>TLGOA</b> (\$0.45 : 31 Dec 18) | <b>44.9M</b>  |
| Unlisted Options <sup>1</sup>                    | <b>24.8M</b>  |
| Market Capitalisation (undiluted @ \$0.295)      | <b>\$54M</b>  |

## Top 5 Shareholders <sup>2</sup>

|  |              |
|--|--------------|
| Smedvig G P Ltd                        | <b>10.8%</b> |
| Lateral Minerals Pty Ltd (M.Thompson)  | <b>7.8%</b>  |
| Kamberg Investments Ltd                | <b>3.3%</b>  |
| Yandal Investments Pty Ltd (M. Creasy) | <b>3.0%</b>  |
| Pelmer Securities S A                  | <b>2.5%</b>  |

## Board

Managing Director - **Mark Thompson**  
Chairman - **Keith Coughlan**  
Non-Executive - **Grant Mooney**  
Non-Executive - **Stephen Lowe**  
Cash approximately **~\$12 million**. Nil Debt.

## ASX: TLG year to date share price



<sup>1</sup> Various expiry and strike prices \$0.42-\$0.65    <sup>2</sup> Holdings rounded to nearest decimal point, as at 21 July 2016

# Board and Management Introduction



**Mark Thompson**  
*Managing Director*

+25 years international industry experience in mineral exploration and mining management. Member of the Australian Institute of Geoscientists and the Society of Economic Geologists, guest Professor in Mineral Exploration Technology at Chengdu University of Technology and the Southwest University of Science and Technology in China. Mr Thompson currently serves as a Non-Executive Director of Phosphate Australia Ltd.



**Keith Coughlan**  
*Non-Executive Chairman*

+30 years' experience in stockbroking/funds management. Largely involved in the funding and promoting of resource companies listed on the ASX, AIM and TSX. Advised various companies on the identification/acquisition of resource projects and previously employed by one of Australia's then largest funds management organisations. Mr Coughlan is currently the managing director of ASX listed European Metals Holdings Limited.



**Grant Mooney**  
*Non-Executive Director*

Mr Mooney has extensive experience in resources and technology markets. Has served as Director and Company Secretary to several ASX listed companies including Director of renewable energy developer, Carnegie Wave Energy Ltd, Barra Resources Ltd, Phosphate Australia Ltd and Wild Acre Metals Limited. Mr Mooney is a member of the Institute of Chartered Accountants Australia.



**Stephen Lowe**  
*Non-Executive Director*

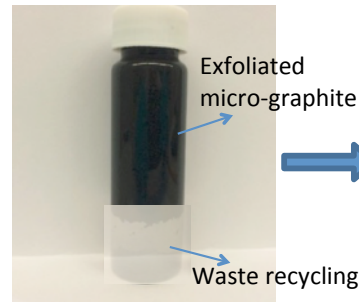
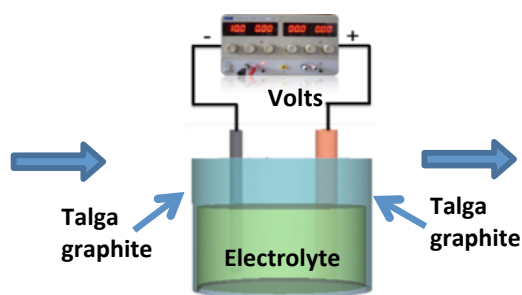
Mr Lowe's background is in business management and taxation and he has over 18 years' experience consulting to a range of corporate and high wealth clients. Mr Lowe is currently a non-executive director of Corizon Resources Ltd and Windward Resources Ltd and a former Chairman and non-executive director of ASX 200 company Sirius Resources NL. Mr Lowe is a Fellow of the Taxation Institute of Australia and a Member of the Australian Institute of Company Directors.

# Graphene and Graphite Production Technology

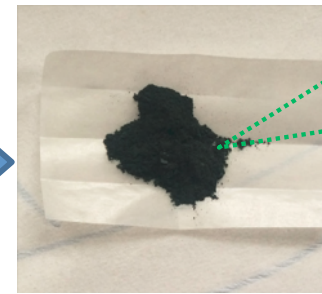
Talga raw ore  
25.3% graphite



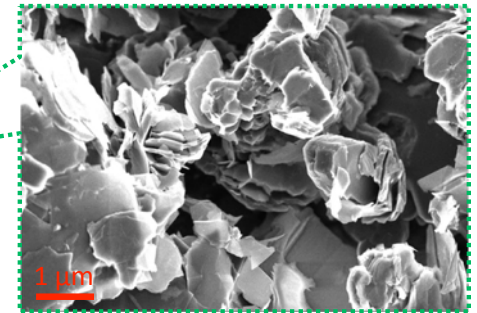
Talga Graphite  
(raw ore)



Single Stage  
Concentrator



Dried micro-graphite  
(carbon content: 93 wt %)

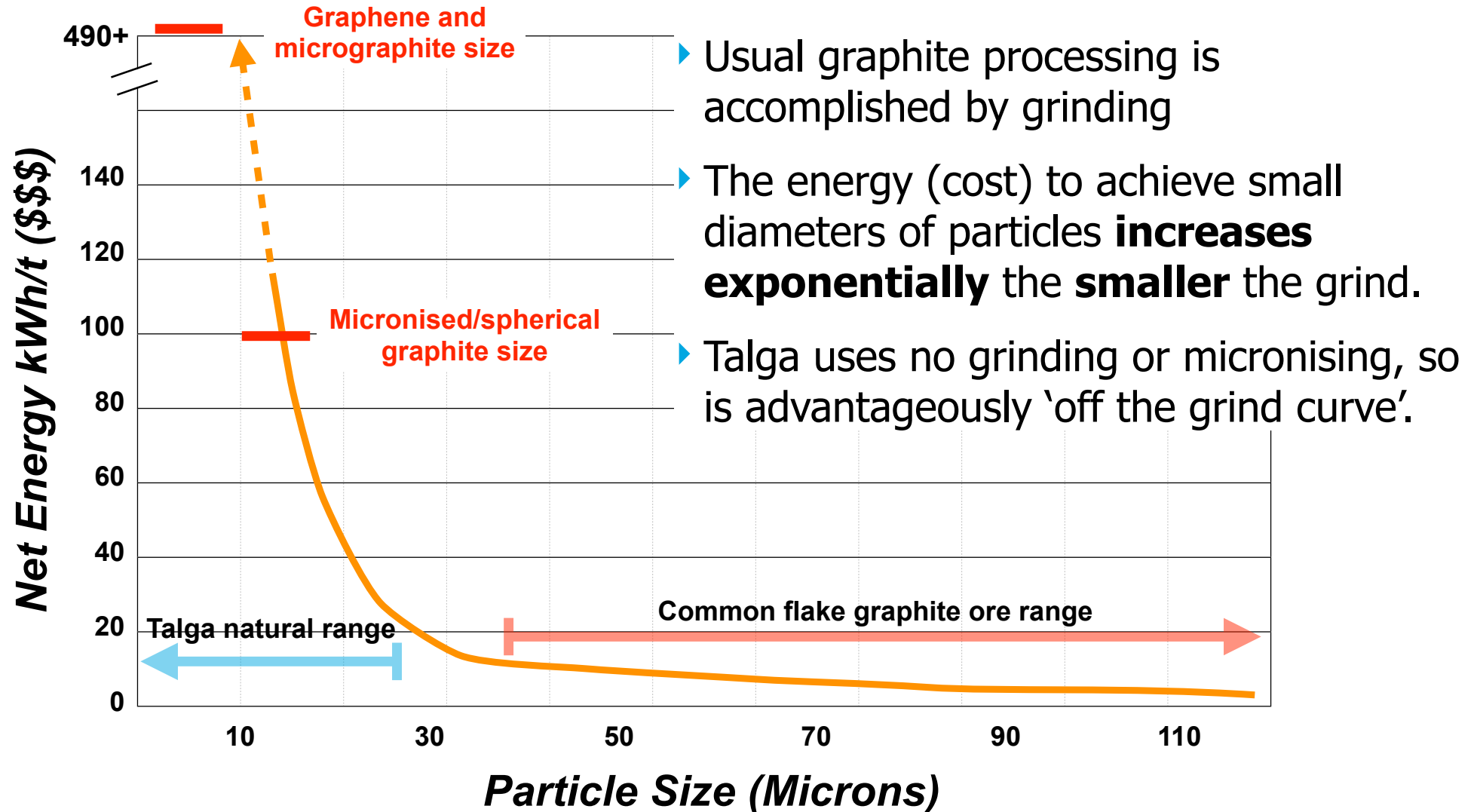


SEM image

- ▶ Patent pending technology liberates **graphene and micrographite** directly from **raw ore**
- ▶ **Process** requires **no crushing, no grinding, no jet milling**
- ▶ Makes **ultrafine** and **ultrathin** size particles **without** rounded edges, a type of material not previously available **economically** at this **scale**
- ▶ Lowers **energy, costs** and **emissions of graphene production**
- ▶ Higher **performance** in applications



# Advantage over Peers - Grinding/micronising



Ball mill grind to 80% passing size (microns) using 9mm ball media. Published mine data.

# Talga Projects and Markets

## PRODUCTS AND APPLICATIONS

### GRAPHENE

**vFLG = Very Few Layer Graphene (1-3 sheets)**  
Flexible electronics, Water membranes, Bio-tech

**FLG = Few Layer Graphene (2-5 sheets)**  
Sensors, Conductive ink, Li-Air batteries

**MLG = Multilayer Graphene (3-10 sheets)**  
Functional coatings, Composites, Plastics

**GNP = Graphene Nano Platelets (10-150 sheets)**  
Functional coatings, Fuel cells, Cement and road additives

### GRAPHITE

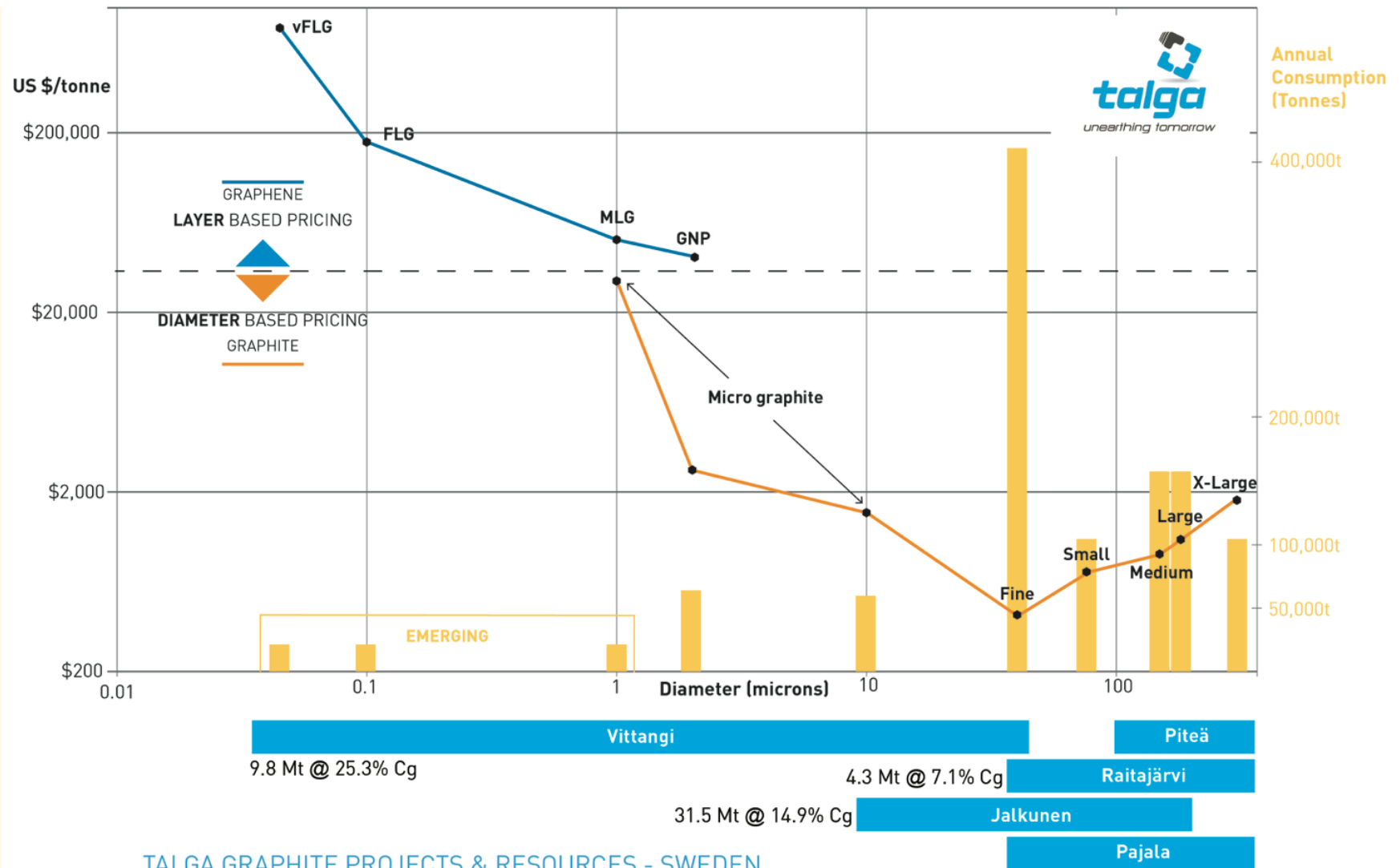
**Micro to X-Large = Flake graphite (>3,000 sheets)**

**Micro** - Insulation and construction products, Lubricants, Pencils, Flame retardants, Additives, Li-Ion batteries

**Fine** - Refractories

**Small-Large** - Recarburisers, Li-Ion batteries

**X-Large** - Various industrial uses



# Graphene Products Business Strategy

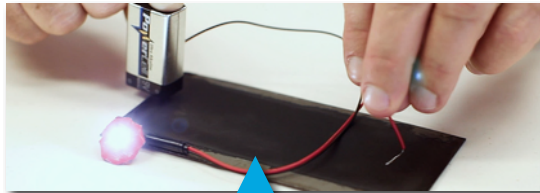


*Dr Siva Bohm at Talga Advanced Materials GmbH, Germany*

- ▶ Plan to manufacture targeted 'fit for purpose' graphene **products** to complement supply of raw graphene and graphite materials
- ▶ Potential **licence** income streams with third parties using **patent-protected** Talga products and systems
- ▶ Strategy to realise revenue opportunities during **pilot processing stage**, prior to full-scale production
- ▶ New **Chief Technology Officer** Dr Siva Bohm appointed to lead product development
- ▶ Phase 2 pilot test work and team **expanding supply capability** and design to further upscale
- ▶ Product, as opposed to raw material, testing will allow more rapid in-house and industry partner testing campaigns, field and benchmarking trials to demonstrate tangible outcomes and commercial progress



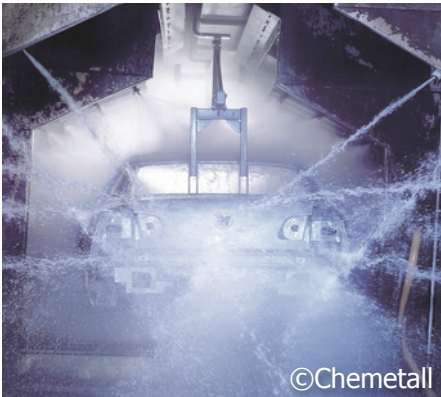
# Commercialisation Platform



- ▶ Work to date includes collaborations with universities and major corporations, as well as sample/product analysis and feedback.
- ▶ Talga now has sufficient development, people and scale to make value-added products and formulations, protecting intellectual property around those and moving to a higher level relationship with customers.
- ▶ Value-added products will reduce roadblocks such as material handling difficulties and delays on raw material testing results
- ▶ Marketing patent protected products and systems creates opportunities to licence the systems for both superior margins and shorter path to market
- ▶ New product focus extends work programs already undertaken and underway, however approach is now structured and supports revenues in the shortest possible timeframe

# Target Product Sectors

## Coatings



### Corrosion Protection

Market Size: \$11B (2013)

Metal pretreatments for steel, aluminium, zinc and magnesium. Anti-corrosion and anti-fouling coatings

## Energy

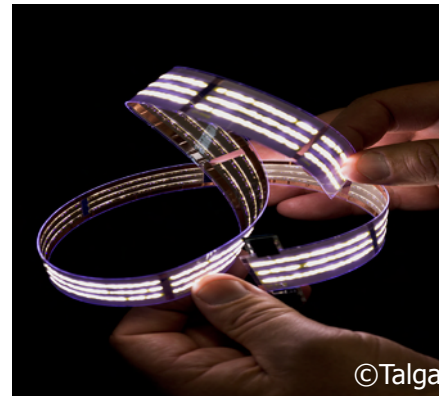


### Batteries & Membranes

Market Size: \$24B

Batteries, \$17B Membranes  
Conductive materials for Li-ion & Flow batteries. Filters and separators for Fuel Cells, desalination and other industrial uses

## Conductives



### Conductive Ink

Market Size: \$18B (2015)

Printable conductive ink for circuits in solar photovoltaics, packaging, pharmaceuticals, wearables and hybrid polymers (plastics)

## Construction



### Concrete

Market Size: \$450B (2012)

Conductive concrete for snow-free roads, driveways, underfloor-heating and other functional concrete



# Product - Conductive Ink

Printed conductive ink - PV Panels

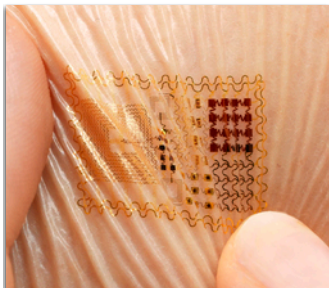


- ▶ **Current** conductive ink market relies on nano-silver and carbon black which are high cost and have limited functionality
- ▶ Demand for silver in solar industry **78 million ounces** in 2015, **up 23%** over 2014\*
- ▶ Graphene conductive ink can be lower cost and higher performing in some applications
- ▶ Emerging markets abound across packaging, wearable and pharmaceutical markets
  - ▶ Talga is developing a conductive ink targeting these markets in addition to making hybrid conductive polymers (plastic) to enable lighter electric vehicles, thereby increasing **range** and **performance**
  - ▶ Preliminary tests with industry **promising**, expanded programs being scoped

Packaging



Medical



Automotive



\* <http://investorintel.com/technology-metals-intel/silvers-cleantech-appeal-burnished-by-solar-power-boom/>



# Product - Cement Additive for Conductive Concrete



Municipal level road heating installation



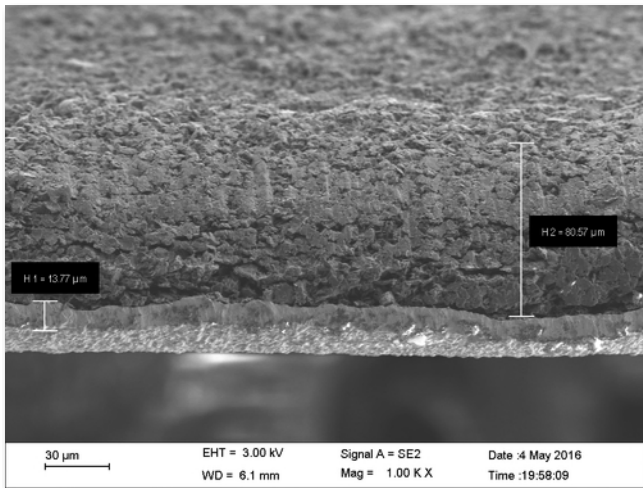
Domestic driveway heating installation

- ▶ Talga has been collaborating with a European cement company to produce a graphene additive to make concrete **conductive**
- ▶ This would enable low voltage electric current to cause **warming** throughout the material without the need for high maintenance 'tube and wire' systems
- ▶ **Large volume** markets exist for **ice and snow-free** roads/ rail crossings, bridges, footpaths, outdoor stairs and airport aprons as well as underfloor heating and driveways
- ▶ Initial sample testwork has **commenced** and looking to undertake research with European university to provide trial data to support industry adoption and further partnerships
- ▶ Graphene oxide has been shown to increase concrete **strength** similar to carbon nanotubes (eg, Edencrete) and this shall also be investigated secondarily to conductivity

# Product - Li-ion Battery anodes and Coatings



*Talga test battery anode preparation*



*Talga test battery anode section*

- ▶ Unique methods used to create Li-ion 'coin cell' batteries using Talga material, can be **scaled up** for future roll to roll anode preparation
- ▶ No grinding and micronising costs
- ▶ **Max Planck Institute** and **TU-Dresden** tests highlight less process steps used by Talga in achieving  $\sim 360\text{mAh/g}$  Li-ion battery anode graphite
- ▶ Further tests underway on larger scale programs at EIC Warwick UK and with battery manufacturer in USA
- ▶ At Warwick fabrication of the battery anodes has been successful and performance testing has commenced for longevity (up to 1,000 charge-discharge cycles) which takes time
- ▶ Aim to move to larger pouch type cells relevant to many larger scale applications

# Talga's Europe Operations



## Product Development and Research

- ▶ Technical Uni of Dresden/Max Planck
- ▶ Friedrich-Schiller-University Jena
- ▶ Associate Member EU Graphene Flagship

## Industry in local area

- ▶ Potential end users



## German Operations

*Talga Advanced Materials GmbH*

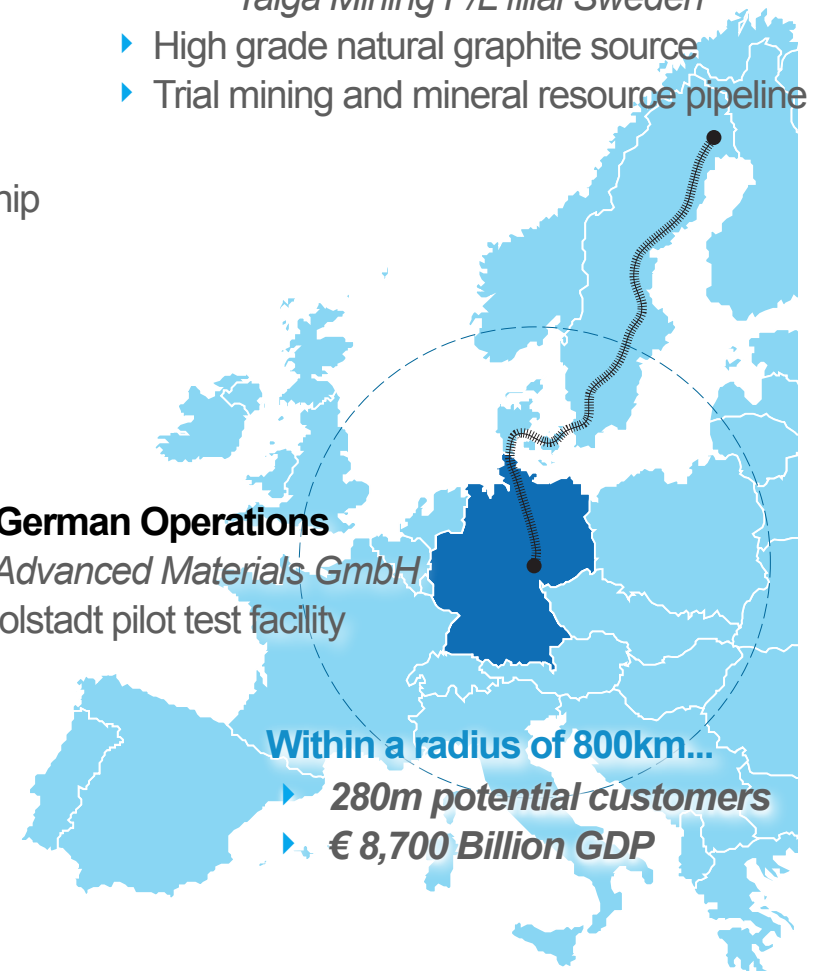
- ▶ Rudolstadt pilot test facility

**Within a radius of 800km...**

- ▶ 280m potential customers
- ▶ € 8,700 Billion GDP

## Consultants

- ▶ General Research GmbH
- ▶ Conduit to research, industry, local finance





# Sweden Operations



- ▶ **100% ownership** of **five** graphite projects in Sweden containing **multiple deposits and resources**
- ▶ Graphite deposit pipeline includes **full range** of graphite flake sizes from graphene to jumbo flake
- ▶ Current JORC compliant Mineral Resources\*

| Project           | Tonnes            | Graphite Grade  |
|-------------------|-------------------|-----------------|
| <b>Vittangi</b>   | <b>9,800,000</b>  | <b>25.3 %Cg</b> |
| <b>Jalkunen</b>   | <b>31,500,000</b> | <b>14.9 %Cg</b> |
| <b>Raitajärvi</b> | <b>4,300,000</b>  | <b>7.1 %Cg</b>  |

- ▶ Current JORC compliant Exploration Targets\* 0-100m Depth

| 0-100m       | Tonnes                 | Graphite (%Cg) |
|--------------|------------------------|----------------|
| <b>Total</b> | <b>136-250,000,000</b> | <b>18-25</b>   |

*Note: The Exploration Target is based on a number of assumptions and limitations with the potential grade and quantity being conceptual in nature. There has been insufficient exploration to estimate a Mineral Resource Estimate in accordance with the JORC Code and it is uncertain if future exploration will result in the estimation of a Mineral Resource.*



# Vittangi Graphite Project



Ore Bench Level 25 July 2016

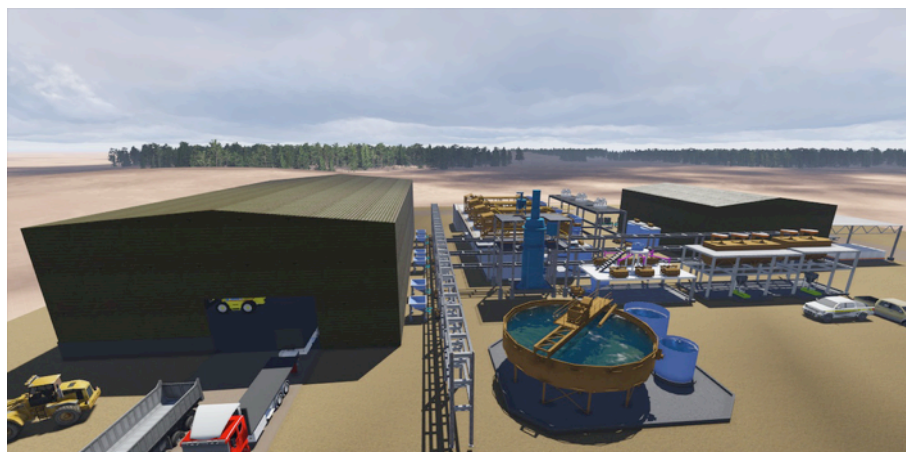


# Trial Mining 2016



- ▶ **Innovative** and **low environmental impact** graphite ore mining technique
- ▶ **Improved mining efficiencies** by adopting larger, tailor-made and automated ore block cutting equipment
- ▶ This campaign scheduled to be complete by **30 September 2016** with permit valid to 2018
- ▶ Target ~2,500 tonnes in 2016 to **feed upscaled** pilot test work and product development
- ▶ Provides **quality data** for planning inputs
- ▶ Blocks to be stored in **Sweden** and delivered to pilot test plant as required

# Sweden Development



| Items                             |           | Base Case |
|-----------------------------------|-----------|-----------|
| Plant throughput                  | (tpa)     | 250,000   |
| Diluted Feed Grade                | (%)       | 23.6*     |
| Graphite production               | (tpa)     | ~46,000   |
| Graphene production               | (tpa)     | ~1,000    |
| Life of Mine Strip Ratio          | W:O       | 4:1       |
| Graphite price assumption         | (USD\$/t) | 480       |
| Graphene price assumption         | (USD\$/t) | 55,000    |
| Capital cost                      | (AUD\$m)  | 29.3      |
| Mine Life                         | (years)   | 19.7      |
| Discount Rate                     | (%)       | 12        |
| Pre Tax Net Present Value (NPV)** | (AUD\$m)  | ~490      |
| Payback from construction start   | (years)   | 1.4       |

\*Feed grade after mining dilution factors. \*\* Pre-tax and other impositions but including state and private royalties.

- ▶ Following successful scale up in Germany, full scale development planned for Sweden
- ▶ 2014 Scoping study<sup>a</sup> ~20 years 250,000 tpa ore producing approximately **40,000t** graphite, **6,000t** micrographite and **1,000t** graphene
- ▶ Low **capital cost A\$29.3m** as no crushing/grinding circuit and ancillaries
- ▶ **Conservative** assumptions - work since 2014 supports approach and does **not** require graphene to be financially robust
- ▶ Exploitation licence work and permitting underway iterative with **process technology** and **customer development** milestones
- ▶ **Drill testing** of resource extensions and regional deposit pipeline planned commence **August 2016**

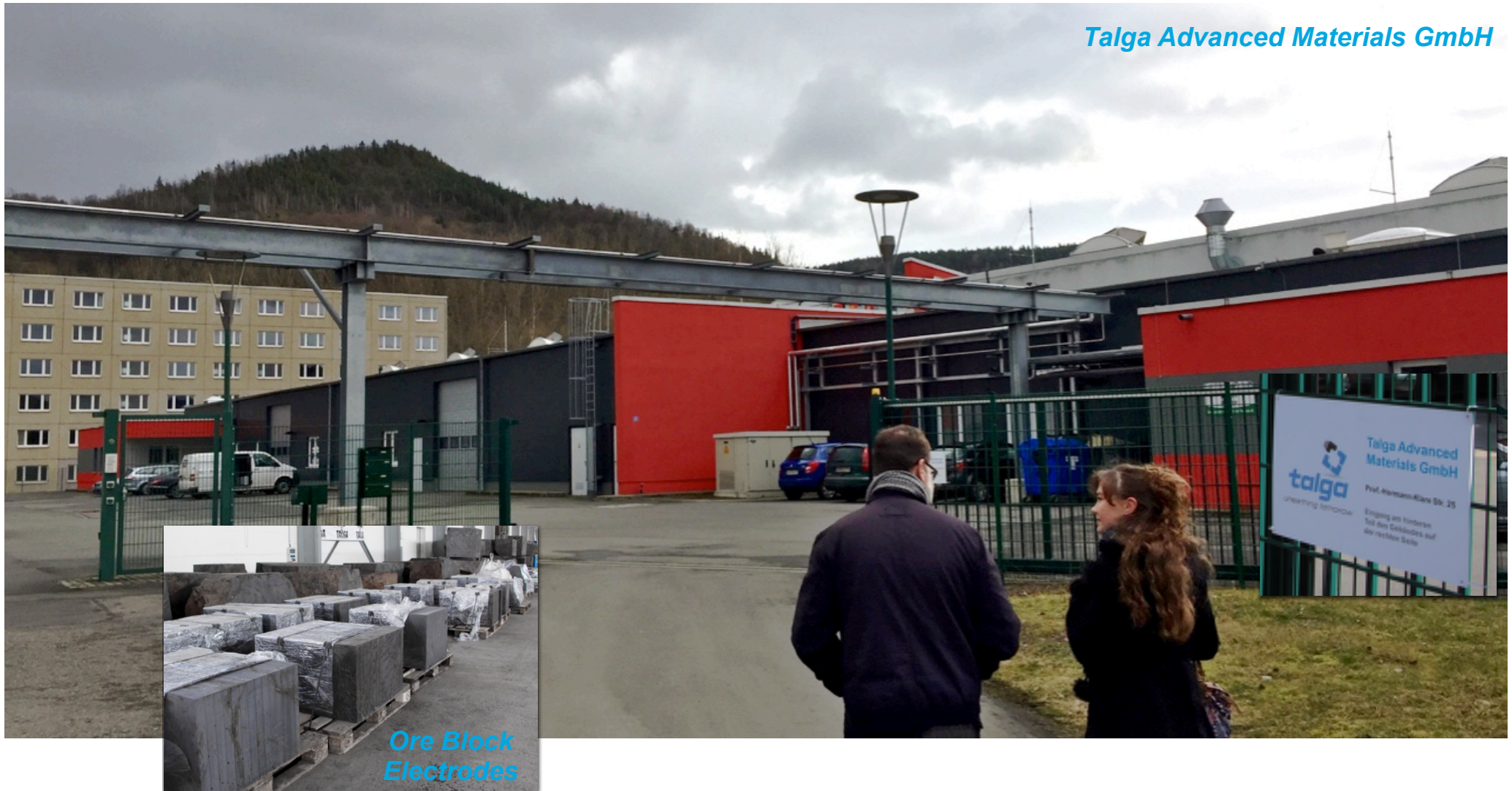
<sup>a</sup> For details see Scoping Study released to ASX 9 October 2014. No material parameters have changed since that date.



# Germany Operations - Talga Pilot Test Facility



*Talga Advanced Materials GmbH*



# Pilot Test Plant Expansion

- ▶ **Pilot test-work underway** in Talga's facility in Rudolstadt, Germany (9 full-time employees) using trial mined Vittangi graphite ore
- ▶ **3 phases** to upscaling process - first phase (10kg feed/cell) **complete**, second phase (total 365kg feed) commenced commissioning April 2016 and beneficiation section being brought **online**
- ▶ Focus previously on samples now on **commercial product development** and customer relationships - range of graphene to micro-nano graphite products being delivered to industry and program partners now
- ▶ Future full scale processing planned to shift from Germany to **Sweden** once statutory permitting completed - process commenced.

*Phase 2 pilot test platform*



*Portion of graphene coating product for customer test program, Talga Advanced Materials GmbH*





# Talga Highlights and Upcoming Newsflow



- ▶ World's **highest grade** graphite JORC or NI43-101 **mineral resource**
- ▶ World first processing technology for **industrial scale** graphite and graphene production potential
- ▶ **Well funded** to **expand** graphite supply and pilot test-work facility to enable **product development** and commercialisation opportunities
- ▶ Sweden: Trial mining underway and **drilling to commence** in **August** on Nunasvaara North resource definition and regional targets
- ▶ Germany: Pilot plant phase 2 commissioning **completion**
- ▶ Product development phases: **Results** of in-house, academic and industry testing program results including but not limited to **coatings, batteries** and conductive ink **products** along with related **patents** and **customer development** news indicating commercial milestones.

# Appendix 1



## JORC Mineral Resources and Exploration targets

*Nunasvaara JORC (2012) Mineral Resource<sup>1</sup> (10% Cg cut-off)*

| JORC 2012 Classification | Tonnes           | Graphite (%Cg) |
|--------------------------|------------------|----------------|
| Indicated                | 6,900,000        | 24.2           |
| Inferred                 | 2,900,000        | 28.1           |
| <b>Total</b>             | <b>9,800,000</b> | <b>25.3</b>    |

*Jalkunen JORC (2012) Mineral Resource (5% Cg cut-off)*

| JORC 2012 Classification | Tonnes            | Graphite (%Cg) |
|--------------------------|-------------------|----------------|
| <b>Inferred</b>          | <b>31,500,000</b> | <b>14.9</b>    |

*Raitajärvi JORC (2004) Mineral Resource<sup>1</sup> (5% Cg cut-off)*

| JORC 2004 Classification | Tonnes           | Graphite (%Cg) |
|--------------------------|------------------|----------------|
| Indicated                | 3,400,000        | 7.3            |
| Inferred                 | 900,000          | 6.4            |
| <b>Total</b>             | <b>4,300,000</b> | <b>7.1</b>     |

*Talga Graphite Exploration Targets<sup>2</sup>*

| Project              | Exploration Target | Tonnes (0-100m Vertical Depth) |                    | Graphite (% Cg) |           |
|----------------------|--------------------|--------------------------------|--------------------|-----------------|-----------|
|                      |                    | Min.                           | Max.               | Min.            | Max.      |
| Vittangi             | Nunasvaara         | 62,400,000                     | 93,600,000         | 20              | 30        |
|                      | Kotajärvi          | 16,640,000                     | 30,160,000         | 20              | 25        |
|                      | Maltosrova         | 20,800,000                     | 52,000,000         | 20              | 25        |
| Jalkunen             | Tiankijokki        | 2,600,000                      | 5,200,000          | 15              | 25        |
|                      | Nybrännan          | 5,200,000                      | 10,400,000         | 20              | 30        |
|                      | Suinavaara         | 2,600,000                      | 5,720,000          | 15              | 25        |
|                      | Lautakoski         | 26,000,000                     | 52,000,000         | 15              | 25        |
| Subtotal             |                    | 136,240,000                    | 249,080,000        | 19              | 27        |
| <b>Rounded Total</b> |                    | <b>136,000,000</b>             | <b>250,000,000</b> | <b>18</b>       | <b>25</b> |

1 Note: This information was prepared and first disclosed under the JORC code 2004. It has not been updated since to comply with the JORC code 2012 on the basis that the information has not materially changed since it was last reported. The Company is not aware of any new information or data that materially affects the information included in the previous announcement and that all of the previous assumptions and technical parameters underpinning the estimates in the previous announcement have not materially changed.

2 Note: The Exploration Target is based on a number of assumptions and limitations with the potential grade and quantity being conceptual in nature. There has been insufficient exploration to estimate a Mineral Resource Estimate in accordance with the JORC Code and it is uncertain if future exploration will result in the estimation of a Mineral Resource.



# Appendix and Statements



## References

#) see <http://www.techmetalsresearch.com/metrics-indices/tmr-advanced-graphite-projects-index/>

\* see Industrial Minerals Natural Graphite report 2012, unpublished internal reports for Talga, and Scoping Study released to ASX 9 October 2014.

NB) any data not specifically referenced is based on personal communications with industry participants where appropriate and/or unpublished technical research.

## Cautionary Statement

The scoping study referred to in this report is based on low level technical and economic assessments, and is insufficient to support estimation and economic assessments, and is insufficient to support estimation of Ore Reserves or to provide assurance of an economic development case at this stage, or to provide certainty that the conclusion of the scoping study will be realised. The Company confirms that all material assumptions and technical parameters underpinning the scoping study results and projections in this release continue to apply and have not materially changed. The use of the word "ore" in the context of this report does not support the definition of 'Ore Reserves' as defined by the 2012 Edition of the 'Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves'. The word 'ore' is used in this report to give an indication of quality and quantity of mineralised material that would be fed to the processing plant and is not to assumed that 'ore' will provide assurance of an economic development case at this stage, or to provide certainty that the conclusion of the scoping study will be realised.

## Competent Person's Statement

The information in this report that relates to Exploration Results and Exploration Targets is based on information compiled and reviewed by Mr Simon Coxhell, a consultant to the Company and a member of the Australian Institute of Mining and Metallurgy and Mr Mark Thompson, who is an employee of the Company and a member of the Australian Institute of Geoscientists. Mr Thompson and Mr Coxhell have sufficient experience which is relevant to the activity which is being undertaken to qualify as a "Competent Person" as defined in the 2012 Edition of the "Australasian Code for Reporting of Exploration Results, mineral Resources and Ore Reserves" ("JORC Code"). Mr Thompson and Mr Coxhell 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. 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 2012 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.