

# QUARTERLY ACTIVITIES REVIEW FOR THE PERIOD ENDING 31 MARCH 2017

# Talga Resources Ltd ABN 32 138 405 419

1st Floor, 2 Richardson St, West Perth, WA 6005 T: +61 8 9481 6667 F: +61 8 9322 1935 www.talgaresources.com

#### **Corporate Information**

ASX Codes **TLG**, **TLGOA**Shares on issue **181.9m**Options (listed) **44.9m**Options (unlisted) **28.7m** 

# Company Directors Keith Coughlan

Non-Executive Chairman

# Mark Thompson Managing Director

**Grant Mooney**Non-Executive Director

# Stephen Lowe Non-Executive Director

#### **OVERVIEW**

Australian technology minerals company, Talga Resources Ltd (**ASX: TLG**) ("**Talga**" or "**the Company**") is pleased to report its activities for the quarter ending 31 March 2017. Highlights included:

#### **COMMERCIAL DEVELOPMENT**

- Talga product development strategy in action across four key sectors: Coatings, Energy/Batteries, Construction/Concrete, Polymer Composites.
- Coatings strategy delivers through Joint Development Agreement signed with Chemetall, a global business unit of BASF Coatings Division, to codevelop and commercialise graphene-enhanced metal surface coatings. Agreement validates coatings product strategy and represents a conditional offtake courtesy of graphene product supply arrangement.
- Energy/Battery strategy delivers Joint Development Agreement executed with Zinergy UK Limited to co-develop and supply graphene conductive inks for electrodes in the world's thinnest, flexible printed batteries. Lithiumion battery test-work continues at the UK's renowned research institution, Warwick University in Coventry.
- Polymer composite and construction/concrete strategies underway with concrete prototype test results (post the period end) demonstrating impressive thermal conductivity performance (see ASX: 10 April 2017).
- Talga grants 'option to purchase' over Bullfinch gold project.

#### **ORE SOURCE AND PROCESSING**

- High grade drilling results from the Vittangi graphite project support revised JORC (2012) resource estimate.
- Multi-tiered cobalt evaluation programs underway using modern techniques across historic and new prospective zones.
- Talga continues advance its German test-work facility and processing to secure commitments for materials/value added products, scale-up engineering/design and provide data for feasibility studies.
- · Permitting and feasibility studies advancing.

# **CORPORATE**

- Appointment of new Chairman with recognised and strongly regarded experience driving technology commercialisation outcomes across a range of sectors complementary to Talga's industry targets.
- Establishment of Talga Technologies Limited in Cambridge, UK.



#### **COMMERCIAL DEVELOPMENT**

# Talga Graphene Products Business Strategy

In July 2016, Talga launched its graphene products business strategy. The strategy is a cornerstone to future success and identifies four key industry sectors where Talga graphene and graphite raw materials and products have the highest potential to create revenues and long term sustainable profits. A number of targeted products (dispersed, functionalised and/or formulated) are already under development and the list will grow as Talga's team, facilities and capabilities expand. Talga's product business strategy is currently delivering 'fit for purpose' graphene based product samples to targeted development partners, like Chemetall, part of BASF.

Talga's product development strategy received significant validation during the quarter with the Chemetall JDA and associated graphene supply arrangement. Talga aims to use the Chemetall agreement as a model to progress product and commercialisation developments in its other three target markets (energy/batteries, construction/building materials and polymer composites), where Talga has demonstrated early prototype successes and has established mature dialogues and product testing collaborations with potential customers.

Developments in the coatings sector are the first of what is targeted to be a raft of 'real world' graphene products and industry partnerships that highlight Talga's ability to execute on its strategy. Each circumstance varies, however Talga is looking to follow a similar development road-map across products where it secures internal, peer and academic validation for products before advancing towards developing product prototypes. With prototype performance data in hand, industry partnerships and larger scale development can occur with those that are closest to the market place.

## Coatings - Agreement with Chemetall, part of BASF

During the quarter Talga signed a Joint Development Agreement ("**JDA**") with Chemetall, a global business unit of BASF Coatings Division, to co-develop and commercialise graphene-enhanced metal surface coatings (the "**Agreement**").

Under the terms of the Agreement, Talga and Chemetall will cooperate to develop Talga value-added graphene products for use in Chemetall surface treatment products. The JDA aims to set new industry standards for eco-friendly, high performance, corrosion resistant surface treatments (estimated metal protective treatments market size c. USD\$10.4B).

The Agreement is a significant milestone in Talga's transition from development into commercialisation and concludes extended negotiations and graphene product sample testing with Chemetall.

Disclosable terms to the Agreement include:

- a two (2) year product development phase where Talga graphene test-work product samples will be sold to Chemetall; and
- a five (5) year exclusive graphene supply arrangement where Chemetall shall purchase graphene solely and exclusively from Talga in the event that jointly developed products are commercialised (in addition to product development samples).

Note: should jointly developed products be commercialised inside the 2 year product development phase, then the graphene supply arrangement would be triggered immediately at that point in time.

The first step in advancing the JDA is the preparation of functionalised formulations for incorporation with Chemetall products and testing to commence in Q2 2017. Talga will, via its UK-subsidiary, Talga Technologies Limited ("TTL"), prepare products and interface with Chemetall technical staff to fulfil work program outcomes and deliverables. The work program includes integration work with Chemetall at their premises near Frankfurt in Germany. Sale of Talga graphene formulations (first revenues) will begin with delivery of first product samples.

## Energy/Batteries - Joint Development Agreement with Zinergy UK Limited

Talga also signed a JDA with Zinergy UK Ltd ("**Zinergy**") to co-develop and supply graphene conductive inks for electrodes in the world's thinnest, flexible printed batteries. Under the terms of the JDA, Talga and Zinergy will collaborate to develop and trial graphene-based conductive ink formulations in components of the patented Zinergy ultra-thin printed battery. The development program is due to run for an initial 12 month period and will see each company contribute and retain its own intellectual property.

The market for flexible, light weight and often disposable but eco-friendly batteries is growing rapidly and Talga's co-development with Zinergy will target a cost-value and performance solution for the mass production of printed power. Flexible form factor and ultra-low weight printed batteries create functionality for a range of electronic products within fast growing markets associated with smart packaging, portable electronics, wearables, radio frequency identification devices (RFID) and sensors (broadly described as the 'Internet of Things').

The alliance aims to expand Talga's potential for significant growth in the field of energy storage and shares close links with past and current battery test programs already underway at the Warwick Manufacturing Group ("WMG") Energy Innovation Centre. The conductive 'ink' materials to be tested represent variants of Talga's graphene value-added products currently being developed for metal coatings and water-based eco-friendly lithium-ion battery anodes.

#### Energy-Batteries - Lithium-ion Battery Test-work Program

Talga's is undertaking a lithium-ion ("Li-ion") battery test-work program at the WMG Energy Innovation Centre, University of Warwick, UK and has received highly encouraging results to date. Research investigations began with preliminary half coin-cell test-work. Preliminary results were then replicated and advanced during full coin cell anode tests at the WMG and now water based anode formulations (inks) are being tested in larger, pouch battery cells and also full coin cells matched with common industrial Li-ion battery cathodes.

Talga is using graphene nano platelets ("GNP's") in advanced anode formulations that are designed to improve the anode capacity and high rate performance by almost 30% compared to standard spheronised graphite anodes.

In addition, the focus is on the elimination of currently used toxic chemicals such as N-methylpyrrolidone ("NMP") which adds significant cost to the manufacturing of Li-ion batteries due the requirement for solvent recovery systems and high temperature drying conditions. Talga aims to achieve this by creating water based (aqueous) formulations which are cost effective, environmentally friendly and align with the general roadmap for various battery manufacturers setting up giga-factories, especially in highly regulated regions like Europe and the USA. Talga's aqueous graphene based formulations will also be tested under roll-to-roll coating conditions which are suitable for commercial scale battery anode manufacture.

During the last quarter, Talga commenced initial coin cell tests using pouch cell formulations with industry standard NMP solvents. Charge-discharge cycling is underway and when final data has been analysed and interpreted it will be announced. The results will precede the start of the water based anode pouch cell testing.

# Grant of Option over Bullfinch Project

During the quarter, Talga granted GBM Investments No.1 Pty Ltd ("**GBM**") an exclusive three month option to purchase its 100% owned Bullfinch gold project (the "**Option**"). The Bullfinch project is located approximately 400km East of Perth in the Yilgarn region of Western Australia.

GBM is a privately owned Australian company with a range of minerals assets and interests. The Option was executed during the quarter by both parties and a non-refundable AUD\$50,000 deposit was received by Talga.

The Option must be exercised within a three month due diligence period. Execution of the Option 'exercise notice' will trigger completion of the sale/purchase agreement and payment of AUD\$350,000,

being the balance of the purchase price. Talga will retain a 1% gross royalty payable on the net smelter return of minerals extracted from the Bullfinch project in perpetuity.

#### **Industry and Academic Partners**

In addition to a range of commercial discussions which are now at various stages of maturity, Talga has made strong in-roads into broadening the awareness of the Company's activities through a range of stakeholder interactions in Europe, including highly influential academic institutions and state-backed funding groups. As part of the above, Talga is working on a range of European funding opportunities as a single applicant and also as a member of industry-led consortia looking to secure funding calls related to specific graphene product research and commercialisation.

# ORE SOURCE AND PROCESSING

# Vittangi Drill Results and Resource Update

During the quarter Talga reported high grade graphite results from drilling completed at the Company's 100% owned projects located in north Sweden. The assays were undertaken on drill core collected from the last two holes of a 2016 drilling program at the Nunasvaara North deposit (part of the Vittangi project)(refer to ASX: 6 December 2016).

Subsequent to the end of the quarter, the drill results from the Nunasvaara North deposit were used to revise the global JORC (2012) mineral resource estimate ("**MRE**") at Vittangi and announced 27 April 2017. Highlights of the new MRE include:

# The global MRE now stands at 12.3Mt @ 25.5%Cg for 3.1Mt of contained graphite based on a 17%Cg lower cut-off.

- 25% increase in total resource tonnes and contained graphite over previous resource estimate of 9.8Mt @ 25.3%Cg based on a 10%Cg lower cut-off.
- Maintains positon as world's highest grade graphite mineral resource and reflects progressive growth of deposits with minimal exploration.

#### 87% of the global MRE now classified as Indicated.

- Doubles JORC Indicated tonnage from MRE used in 2014 scoping study.
- Provides confidence in quality and consistency of graphite mineralisation
- Enables inclusion of more strike extensive zone for mining permitting purposes and economic studies, with more flexibility for development options.

The global MRE includes a high grade domain of 2.0Mt @ 32.6% Cg for 652,000t contained graphite based on a 30%Cg lower cut-off.

 Higher grade zone starting from surface offers potential early stage boost to any development.

Mineralisation in MRE present from surface to approximately 220m depth and is open along strike and at depth.

Further growth in scale available if required.

#### **Cobalt Evaluation Programs**

During the quarter Talga commenced a multi-tiered evaluation of its cobalt bearing projects in North Sweden. Talga is now actively advancing a range of cobalt prospects across multiple project areas, and in particular the cobalt rich Kiskama iron oxide copper gold ("**IOCG**") deposit. The evaluation campaign, to be completed in stages during Q2 2017, will include the following activities:

- 1. Kiskama project historic core sampling and assaying;
- 2. Metallurgy to determine cobalt, copper and gold recovery at Kiskama; and
- 3. Cobalt assessment across other Talga projects using historic exploration and drilling data.

Talga's primary focus remains the development of its graphite projects however there is a strong case to advance cobalt mineral opportunities following:

- Positive cobalt, copper and gold results from drillhole at the Lautakoski project (refer ASX: 20 October 2016)
- Industry recognition regarding the critical nature of non-conflict cobalt supplies
- Strong increases in cobalt prices.

In particular, Talga aims to secure sufficient data to support next stage commercial and development decisions on these projects.

Talga has previously announced positive results regarding the use of its graphite and graphene in Liion batteries and continues test-work in this area. Cobalt is similarly a vital ingredient in the Li-ion battery supply chain and it would be commercially advantageous for the Company to further explore participation in this sector.

# German Test-work Facility

The Rudolstadt test-work team continue to deliver positive outcomes which support ongoing process flow-sheet engineering design, samples for industry development programs and critical data for internal feasibility studies.

Numerous internal R&D test programs have been running in parallel to one another and the outcomes from these programs are improving efficiencies and supporting future process scale-up. As the process scales-up, the stages will seamlessly integrate as Talga moves away from batch style processing to automated 'steady state' processing.

During the period Talga has benefited from the expertise of full time project and plant managers who have guided the processing team and its consultants to a range of successes across exfoliation cell design, power and exfoliation efficiency, beneficiation trials, purification process analysis, and characterisation. Together with feedback from industry partners, Talga has a 'real world' feedback loop to innovate, optimise efficiencies and minimise process bottlenecks.

Talga has appointed specialist metallurgical development company, Core Group, to review and advise with respect to further flow-sheet configuration, next stage semi-continuous design and feasibility inputs. The yet to be finalised Phase 3 will increase sample production for customers and will provide improved process and quality control under a steady-state process basis.

Progressive scale ups will allow Talga to better assess the economic and technical parameters of full scale development. Talga continues to optimise the flowsheet and tailor product specifications using a step wise approach that factors in the likely growth of the graphene market. Current test facility and subsequent pilot scale—ups form part of the broader ongoing feasibility process which is progressing through the 'option analysis' stage. Permitting for the Phase 3 has also commenced in association with the relevant government departments in Germany and the state of Thuringia. Final design and cost estimates for phase 3 are now in progress and expected to be completed for approval in June.

# Mine Permitting

Following Talga's 2016 trial mining campaign in Northern Sweden, the Vittangi project site has been fully rehabilitated. There is now sufficient ore that can be used to complete the necessary process testing and scale up exercises in Germany and potentially beyond.

Environmental consultants were engaged during the period to assist the Company in its preparation of hydrological modelling and waste stockpile management plans for the full scale mine.

Baseline environmental surveys will recommence next quarter as part of the exploitation permit process. The applications for the exploitation licence require an environmental impact assessment to be launched in addition to a pre-feasibility study ("**Options Analysis**").

The local indigenous Sami group were also engaged during the period in the preparation of a Reindeer Impact Assessment Report that will accompany the exploitation application.

#### Feasibility Studies

Using the actual consumption and operating costs from current Phase 2 test-work, a financial model has been prepared that outlines equipment and capital cost estimate. Various engineering consultancy groups were also engaged during the quarter to assist with the analysis of for future mining, infrastructure, logistics and process plant locations as part of the option analysis. This includes a 'Location Study' which has been initiated to find the optimal location for the full scale processing facility and potential prior pilot and semi-commercial facilities in Sweden.

Talga is fast becoming a European growth story with the majority of its staff, operations and largest shareholders now Europe based. This fact, together with the commencement of the Company's mine feasibility study preparations, has triggered a range of very successful consultation and pre planning processes that will be ongoing with Swedish decision makers and influencers.

# **CORPORATE**

# Appointment of Terry Stinson as Chairman

Talga appointed industrial technology commercialisation expert, Mr Terry Stinson as non-executive Chairman. Mr Stinson is the current CEO and Managing Director of ASX listed Orbital Corporation Limited (ASX:OEC). Mr Stinson has an impressive career history and outstanding commercial pedigree with specialist skills covering Strategic Planning and Management, Sales and Marketing, Mergers, Acquisitions, International Collaborations, Productivity Improvement Initiatives, Manufacturing, Research and Development, and Senior Executive and Board Leadership contributions across numerous industries (refer ASX: 9 February 2017).

# Talga Technologies Limited

During the quarter, final regulatory steps were completed in the set-up of Talga's wholly owned UK product development subsidiary, Talga Technologies Limited ("TTL"), located in Cambridge. The UK team comprises Talga's Chief Technology Officer and Manager R & D who cover 'materials' and 'energy storage' developments respectively. TTL has access to a range of facilities including the advanced testing and characterisation laboratories of Cambridge University. Talga's graphene product prototyping, formulation design, test-work and sample preparation will be carried out via TTL in the UK.

#### Presentations, Media and Investor Relations

Talga management have recently participated in a range of investor relations events, including presenting to Australian and international industry and investor events. This schedule included, but was not limited to, presentations, meetings and interviews during the TechKnow Invest Roadshow in Sydney and Melbourne in March and interviews with the Australian Broadcasting Corporation.

#### **TENEMENT INTERESTS**

As required by ASX listing rule 5.3.3, refer to Table 1 for details of Talga's interests in mining tenements held by the Company. No new joint ventures or farm-in/farm-out activity occurred during the quarter.

For further information, visit <u>www.talgaresources.com</u> or contact:

Mark Thompson
Managing Director
Talga Resources Ltd
T: + 61 (08) 9481 6667

Dean Scarparolo Company Secretary Talga Resources Ltd T: + 61 (08) 9481 6667

#### **About Talga**

Talga Resources Ltd (ASX: TLG) is a technology minerals company enabling stronger, lighter and faster products for the coatings, battery, construction and carbon composites markets using graphene and graphite. Talga has significant advantages owing to 100% owned unique high grade conductive deposits in Sweden, a pilot test facility in Germany and in-house graphene product technology. Testing of Talga materials and products is underway with a range of corporations including industrial conglomerates Tata and BASF subsidiary Chemetall, UK listed Haydale and German based Jena Batteries.

### **No New Information**

To the extent that announcement contains references to prior technical information, exploration results and mineral resources; these have been cross referenced to previous market announcements made by the Company. These had been disclosed to JORC 2012 standard. Unless explicitly stated, no new information is contained. The Company confirms that it is not aware of any new information or data that materially affects the information included in the relevant market announcements that assumptions and technical parameters underpinning the relevant market announcement continue to apply and have not materially changed.

TABLE 1
Tenement Holdings

Project/Location	Tenements	Interest at end of quarter	Acquired during quarter	Disposed during quarter
Jalkunen Project Norrbotten County, Sweden	Jalkunen nr 1 Jalkunen nr 2 Jalkunen nr 3 Kursuvaara Lautakoski nr 1 Lautakoski nr 2 Lautakoski nr 3 Nybrännan nr 1 Nybrännan nr 2 Suinavaara nr 1 Suinavaara nr 2 Tiankijoki nr 1	100% 100% 100% 100% 100% 100% 100% 100%		
Kiskama Project Norrbotten County, Sweden	Kiskama nr 1	100%		
Masugnsbyn Project Norrbotten County, Sweden	Masugnsbyn nr 1	100% 100%		
Pajala Project Norrbotten County, Sweden	Jukkasvaara nr 2 Lautakoski nr 4 Lehtosölkä nr 3 Liviövaara nr 2 Piipiönjoki nr 1 Suinavaara nr 3 Suinavaara nr 4	100% 100% 100% 100% 100% 100%	100% 100% 100% 100% 100%	
Piteå Project Norrbotten County, Sweden	Gråliden nr 2 Önusträsket nr 2	100% 100%		
Raitajärvi Project Norrbotten County, Sweden	Raitajärvi nr 5	100%		
Vittangi Project Norrbotten County, Sweden	Maltosrova nr 2 Maltosrova nr 3 Mörttjärn nr 1 Nunasvaara nr 2 Vathanvaara nr 1 Vittangi nr 2 Vittangi nr 3 Vittangi nr 4	100% 100% 100% 100% 100% 100% 100%		
Bullfinch Project Western Australia	E77/2139 E77/2221 E77/2222 E77/2251 P77/4106	100% 100% 100% 100% 100%		

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