

TALGA RESOURCES

Annual General Meeting 24th of November 2017 | Perth, Australia

FLG concentrated 2x

talga

RU17061_4

Talga Advanced Materials GmbH Prof-Hermann-Klare-Straße 25 7407 Rudolstadt

tagg unearthing tomorrow



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ANNUAL GENERAL MEETING 2016-17 A Transformative Year

- Graphene product business strategy implemented
- Creation of Cambridge product development team & facilities
- Industry partnerships include global leaders in product sectors
- German processing plant continues successfully scaling up
- Graphene and graphite products succesfully developed across target sectors Energy (Batteries), Construction (Concrete), Coatings and Polymer Composites (Epoxy)
- Graphite resources in Sweden increased in size, grade, status
- Cobalt projects activated and expanded to take advantage of growth opportunities in EU battery sector
- Board and management strengthened
- Capital requirements met for planned activities through successful equity issues and gold asset sales
- Share price doubled over year and company market value exceeds \$120m







CORPORATE SNAPSHOT

FINANCIAL INFORMATION

Share price (ASX code TLG) (23-November-17)	A\$0.575
52 week low / high	A\$0.26 / A\$0.915
Shares outstanding ^{1,2}	202.4m
Market Capitalisation	A\$116.4m
Cash (30-Sep-17)	A\$16.2m
Debt (30-Sep-17)	Nil
Enterprise value	A\$100.2m

Source: IRESS, company filings. As at 23 November 2017.

1 Excludes 44.9m listed options (TLGOA) with exercise price A\$0.45 and expiring 31 Dec 2018

2 Excludes 33.5m unlisted options (mostly employees and directors) with exercise price range up to A\$1.02 and expiry date range 4 Oct 2018 to 17 Dec 2020



SHARE PRICE PERFORMANCE

Share price (A\$) 12 months

Volume (m)



MAJOR SHAREHOLDERS

Smedvig - Scandinavian based family office	12.6%
Mark Thompson - Managing Director	7.1%
HSBC Custody Nominees (Australia)	3.9%
Pelmer Securities	3.8%
Citicorp Nominees	3.7%
J P Morgan Nominees (Australia) Ltd	3.6%
Kamberg Investments	3.1%







BOARD AND MANAGEMENT

Substantial commercialisation experience with some of Australia's best known innovation and development projects







Terry Stinson Non-Executive Chairman

Mark Thompson **Managing Director**

Grant Mooney Non-Executive Director



Managed the manufacturing division of the outboard marine propulsion products for a privately held US\$1bn multinational.



Oversaw the evolution of Carnegie Wave Energy from 2008 as it developed innovative renewable energy solutions in Australia.



Managed the company from 2000 to 2002 including the introduction of several new sales products.





Steve Lowe Non-Executive Director

Ola Mørkved Rinnan Non-Executive Director



Oversaw the company during the discovery and development of one of the largest Cu/Ni discoveries in Australia in the last 30 years.



Has led Orbital since 2008 and successfully secured a breakthrough deal with Insitu Inc. (Boeing) for the supply of global unmanned aerial vehicle propulsion systems worth up to A\$120m over a 3 year period.





TALGA OPPORTUNITY

project to mass produce graphene and related products



- Own 100% of a unique and large graphite source in tier 1 mining and technology materials destination - Sweden
- Mining doesn't require drilling or blasting of ore 100% owned processing technology
- Not constrained to one market big value proposition to remove a supply and pricing bottleneck across multiple large markets
- new functionality today
- End users currently validating the products and strategy to deliver business case
- Talga's markets totally different to flake graphite players with exception of batteries
- Talga is doing it now, not just talking about it



Technology minerals company commercialising the worlds highest grade natural graphite

Business model revolves around making real world products perform better and with









TALGA OPERATIONS

Vertically integrated operations provide economic advantages





100%-owned graphite project near Kiruna in Northern Sweden Unique ore able to be used directly as anode in electrochemical





TALGA OWNS 3 OF THE WORLD'S TOP 10 GRAPHITE RESOURCES*

- Talga has pipeline of high grade graphite deposits where nature has paid for the crystallising of the carbon
- Largest graphite resources in Europe
- Lower eco-footprint than standard deposits and close to existing infrastructure in safe Tier 1 investment destination - Sweden
- Focus is on margins and massive natural or technical advantage, not resource tonnes for tonnes sake

Balama West Ativa Balama West Mualia Balama East Kookaburra Gully

Balama North Nicanda Hill Wilclo South

> **Balama West Other** Merelani East Mousseau West

Graphite Creek Balama North Cobra Plains McIntosh Target 1

Note: The Exploration Target is based on a number of assumptions and limitations with Bissett Creek 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.

Source http://www.techmetalsresearch.com/metrics-indices/tmr-advanced-graphite-projects-index/ *By grade. See Appendix for graphite Resource details.

Average Grade of Graphite Resource (graphitic carbon C%)





UPSTREAM SOURCE: UNIQUE GRAPHITE ORES

100%-owned upstream asset which is the world's highest grade JORC/NI43-101 graphite mineral resource

- Talga flagship Vittangi graphite project located 20km east of LKAB's iron ore mine and railhead at Svappavaara, Sweden
- World's highest grade JORC/NI43-101 compliant graphite resource, Nunasvaara
- Wide, uniform mineralisation starts at surface can support >20 year mine life and more for industrial scale production

JORC compliant Mineral Resources

Project	Tonnes	Graphit
Vittangi	12,300,000	25.5
Jalkunen	31,500,000	14.9
Raitajärvi	4,300,000	7.1

JORC compliant Exploration Targets

0-100m Depth	Tonnes	Graphi
Total	136-250,000,000	18

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.

See Appendix for resource details. Note: Talga owns multiple graphite JORC resources and deposits in different stages of exploration and development.



e Grade %**C**g %**C**g %**C**g

te (%Cg) 8-25







GEOLOGY ADVANTAGE

Ore blocks are conductive enough to use as electrodes without processing







TALGA OPERATIONS SUMMARY ON VIDEO





For video see <u>https://youtu.be/G7dndP7NGco</u>

WHAT IS GRAPHENE?

constrained only by volume and cost of production, not applications.



Graphene is an extraordinary material whose commercialisation pathway has been

- **Graphene** is the thinnest substance ever made atomic layers of crystalline carbon which constitute *graphite*
- When small particles of graphene are used as an additive (mixed into a material) it can impart superior strength, lightness, conductivity or enhance functionality
- But technical specification is less relevant than how it works in a product
 - Once standards or performance demonstrated, industry wants production volume reality, repeatability and a sustainable long term source with a 'clean' supply chain



MARKET OPPORTUNITY FOR GRAPHENE

targeted products across 4 key industry sectors



Construction additives

Advantages

Improves strength, durability and impermeability Imparts electric and thermally conductive properties Reduces concrete used and

decreases industry CO2 emissions

Enables underground power transmission cables, underfloor heating, road and bridge snow melting and de-icing

Immediate market opportunity

US\$17bn specialty concrete



Energy storage (batteries)

Advantages

Enables higher performance a lower cost Li-ion, flow and alkaline batteries.

Flexible, printable batteries for 'Internet of Things' and 'Wearable' devices

Lower toxic footprint by enabli water-based battery chemist

Lower cost fuel cells

Immediate market opportunity

US\$24bn battery market

Market size sources: Reports from IDTechX, Freedonia, www.corrosion.org, Market and Markets, Future Markets Insight, BCC research, www.energy.gov, www.cam.ac.uk



In addition to raw materials, Talga is focused on the manufacture and commercialisation of



Talphene™ enhanced coatings



	Advantages
nd	Eco-friendly alternative to toxic
	chromium based coatings
or	Lower cost and superior performance with reduction in zinc, copper, phosphate, zirconia
ing	Corrosion protection increased by up to 74% for mild steel
ry	Eco-friendly marine anti-fouling

Immediate market opportunity US\$22bn corrosion protection sector within global US\$120bn



Carbon fibre composites/resins

Advantages

Stronger and lighter epoxy resin systems for carbon fibre and polymer composites

Enables lightning strike protection and EM shielding in carbon fibre planes and EV's

Replaces copper heating elements/wires to reduce weight of EV's

Immediate market opportunity US\$18bn composites sector

PRODUCT DEVELOPMENT ROADMAP





"Technology Readiness Level" reflects where the product is in the process towards validation



PRODUCT DEVELOPMENT

prototype testing followed by external validation with end users

Product Development

- Talga's UK team, based in Cambridge, focuses on developing value-added graphene and micrographite products for key enduser markets
- Products developed by Talga are important to unlock value-add margins (as distinct from 'raw' graphite and graphene revenue)
- Talphene[™], is the brand of Talga graphene enhanced products





Talga has in-house 'value added' product development capabilities – starts with internal

- leading partners to accelerate the commercialisation of its graphene and micrographite products
- Resources are shared and various intellectual property Talga's developments



COATING PRODUCT - ANTI CORROSION

over chrome-containing reference



After 1,500hrs accelerated corrosion (salt spray)

Commercial chromecontaining reference









In ASTM-standard salt exposure tests Talga graphene formulation improves performance



Published: Graphene Anti corrosion coating: Flatchem, 1 (48) 9/2016 See ASX:TLG 22 September 2016 **16**









COATINGS PRODUCT DEAL - CHEMETALL

Talga is advancing higher performance coatings with graphene as eco-friendly alternative to chromium, zinc and copper for giant global coatings market

- Joint Development Agreement ("JDA") with **Chemetall**, a global business unit of **BASF** Coatings Division, to co-develop and commercialise graphene-enhanced coatings
- Aim for eco-friendly, high performance, corrosion resistant surface treatments (estimated addressable) market size c. USD\$10.4B)





- Disclosable terms to the Agreement:
 - 2 year product development phase
 - •5 year exclusive graphene supply arrangement
- Commercial confidence precludes regular updates or performance details, but development is underway and progressing well, with sales of samples under the agreement commenced.



Epoxy based coatings dominate steel protection for marine exposed infrastructure

COATING PRODUCTS -EPOXY RESIN-BASED COATINGS

Successful first stage test-work completed on two-pack epoxy polymer resins for the large volume marine coating market.

Improved performance attributes includes higher corrosion resistance, mechanical strength and abrasion resistance compared to control epoxy top-coat and zinc-rich primer epoxy coatings

160% improvement in tensile strength **80%** improvement in abrasion resistance **2x** orders magnitude improvement in corrosion resistance

Patent lodged over Talga's graphene enhanced epoxy formula and dispersion technology



Positive initial test results of epoxy coatings formulated using Talga's graphene and dispersion technology

Tensile Testing Graph



Strain



COATING PRODUCTS - EPOXY MARKET

More than coatings - Epoxy resins are used widely across industry in many adhesives, electronic insulations and carbon fibre reinforced plastics (composites)



Global market

Epoxy sector consumes approx. 2.5 million tonnes of epoxy resins

Protective Coatings

Sector estimated to be valued at USD\$7.8 billion (2016) and projected to reach USD\$9.9 billion by 2021

Applications

Internal concrete flooring, urban construction products and steel anti-corrosion applications for marine exposed infrastructure etc.

Demand Boost

Increasing industrialization boosting demand for urban infrastructure & automotive materials using epoxy based protective products

Key Players

BASF SE, Mitsubishi Chemical Corp., Sherwin Williams Co., Akzo Nobel Coatings among others

COMPOSITES PRODUCTS Stronger epoxy resins for carbon fibre composites in aerospace and automotive

- and wind turbine sectors

Graphene additives are demonstrated to make epoxy resin systems stronger, lighter or more functional (conductive)

Epoxy resins is used to make carbon fibre composites, a lightweight material widely used in aerospace, automotive

- Current market looking for less weight (for less fuel use in planes) plus conductivity (for lightning protection, de-icing) or EM shielding)
- Emerging markets in textiles, plastic and fibres for 'wearable' technologies & 3-D printing
- Talga prototype tests are underway at TWI near Cambridge

GRAPHENE AEROSPACE PRODUCTS

Lighter, stronger, multi-functional components increase range and decrease emissions/km travelled

ENERGY PRODUCTS – LITHIUM ION BATTERIES

Talga is positioning to supply higher performance/lower cost conductive additives and materials for Li-ion, flow and alkaline batteries with more eco-friendly manufacturing

ROLL-TO-ROLL MANUFACTURE OF LI-ION BATTERY ELECTRODES

Global market

Li-ion market growing rapidly with government legislation and consumer trend to eco-friendly power and transport

Talga micrographite

and GNP's in Li-ion batteries requires less harmful processing steps

Targeting improved

Li-ion with less toxic eco-impacts by enabling water-based chemistry and lower manufacturing inputs

Industrial style

Li-ion 'pouch' cell testwork and commercial-style roll to roll anode formulations underway

Test programs

for new-gen Li-ion batteries to be pursued

EUROPEAN BATTERY GIGAFACTORIES

Talga placed to supply fast growing battery supply chain in Europe

- **Global battery** manufacturing capacity set to double by 2021
- **Multiple** Li-ion "Gigafactories" underway or planned in EU
- **Cobalt and Graphite** are on EU critical minerals list, with mandate to develop independent supply
- **Majority** of battery minerals are currently imported into Europe from Africa (cobalt) or China (graphite)
- **Talga's** graphite and cobalt-related deposits in Sweden represent an important potential supply for EU companies

Li-ion Anode Processing Steps

PROCESS ADVANTAGE - BATTERIES Talga's patent pending technology liberates conductive material from raw graphite ore, skipping processing steps required by peers

higher performance with less manufacturing steps = lower eco-impact

<u> </u>	<u> </u>
-	+

- **Unmilled** Talga graphite shows promising results of **420mAh/g**, higher capacity than graphite theoretical limit **372mAh/g**
- **Excellent stability** with 99.9% coulombic efficiency and low capacity loss (reversible capacity >99.5%)
- Graphene is more conductive than graphite, enabling faster charging and longer life cycle, and will play a large role in batteries going forward.
- **Goldman Sachs** estimate an Rmb6.3bn (US\$0.9bn) addressable market by 2025 for graphene in batteries

NEW BATTERY PROGRAMS

UK automotive industry, Electrical Vehicle legislation and the 'Faraday Challenge'

- **814,000 people** are employed by the UK automotive industry
- UK legislation to ban petrol and diesel cars by **2040**
- **'Faraday Challenge'** UK government's £246m commitment, over the next four years, towards funding of design, development and manufacture of battery technologies for vehicle electrification.
- Aim to shift UK auto manufacturing across to low-CO2 emission products now and capture domestic and export market share, along with next-gen technology and strategic economic advantages

Source: The Society of Motor Manufacturers and Traders Ltd "Motor Industry Facts " July 2017

TALGA AND THE 'FARADAY CHALLENGE'

Talga participated in several consortia-led battery research applications under the UK Government's £246 million 'Faraday Challenge' funding program.

- Applications covering a total of 3 research programs
- Talga being the lead in two programs and a participant in the other
- Significance of participation for Talga:
 - Positioning as a stakeholder in the downstream battery sector
 - Big industry partnerships
- Participants include: prestigious automotive manufacturer, pioneering battery technology company, world leader in technology engineering, international speciality chemicals company, leader in sustainable technology and top UK universities.
- Results are expected to be announced by the UK government soon

Thermal concrete in underground power line application

electric power lines

CONSTRUCTION PRODUCTS - CONCRETE

Talga's succesful trial of thermally conductive concrete shows promise with a fast growing and potentially bulk volume market

High strength concrete bridge, Sweden

Concrete graphene mix

CONSTRUCTION PRODUCTS - CONCRETE High strength concrete

strength

demand

Graphene added to concrete **improves**

- **Applications** include high rise buildings, road and rail infrastructure
- **Urbanisation** and requirements for lower volume/lower emissions is driving

Strengthens concrete at low loadings so can be lower cost in some applications

26% INCREASE IN FLEXURAL STRENGTH

14% INCREASE IN COMPRESSIVE STRENGTH DIN 12 390-3

SUMMARY - TALGA OPPORTUNITY

Technology minerals company commercialising mass produced graphene and products

Potential best-margin,

large-volume supplier of graphene and Substantial commercialisation experience

World's highest grade

graphite resource

Uniquely placed to own graphene supply chain

Source: Global JORC/NI43-101 Graphite Resources by Grade. See Technology Metals Research Advanced Project Graphite Index http://www.techmetalsresearch.com/ 29

Rapidly transitioning

towards monetisation, maiden revenues commenced in 2017

JSTRIAL **SCALE GRAPHENE** PARTNER

In-house product development collaborating with industry majors

Formal agreements with well-capitalised commercialisation partners

COMPANY DIRECTORY Talga Resources Ltd has subsidiaries in UK, Sweden and Germany

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Talga Technologies Limited | Cambridge, UK

Unit 15-17 Cambridge Science Park, Milton Road, Cambridge CB4 0FQ, UK

APPENDIX AND STATEMENTS

Competent Person's Statements

The information in this document that relates to exploration results is based on information compiled by Amanda Scott, a Competent Person who is a Member of the Australian Institute of Mining and Metallurgy (Membership No.990895). Amanda Scott is a full-time employee of Scott Geological AB. Amanda Scott has sufficient experience, which is relevant to the style of mineralisation and types of deposits under consideration and to the activity which has been 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). Amanda Scott consents to the inclusion in the report of the matters based on her information in the form and context in which it appears.

The information in this report that relates to Graphite Resource Estimation for the Vittangi Project is based on information compiled by Oliver Mapeto and reviewed by Albert Thamm. Both Mr Mapeto and Mr Thamm are consultants to the Company. Mr Mapeto is a Member of both the Australian Institute of Mining and Metallurgy (Membership No.306582) and Australian Institute of Geoscientists (Member No 5057) and MR Thamm (Member No 203217) is a Fellow Member of the AusIMM.

Both Mr Mapeto and Mr Thamm have sufficient experience relevant to the styles of mineralisation and types of deposits which are covered in this document and to the activity which both are 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 Mapeto and Mr Thamm consent to the inclusion in this 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 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 Iron Ore Resource Estimation and Graphite Resource Estimation for the Jalkuen and Raitajärvi Projects 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.

Cautionary Statement

Any data on 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 and economic assessments. 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.

GRAPHITE JORC RESOURCES AND EXPLORATION TARGETS

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Inferred 900,000 6.4	Inferred	900,000 6.4	
Total 4,300,000 7.1 Rounded Total 136,000,000 250,000,000 18	Total	1,300,000 7.1	

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.

