

## Talga Pilot Processing Facility Expands in Germany

**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](http://www.talgaresources.com)

### Corporate Information

ASX Code **TLG**

Shares on issue **146.3m**

Options (unlisted) **21.3m**

### Company Directors

**Keith Coughlan**

Non-Executive Chairman

**Mark Thompson**

Managing Director

**Grant Mooney**

Non-Executive Director

**Stephen Lowe**

Non-Executive Director

- **Commissioning of larger scale (Phase 2) processing equipment commenced**
- **New production cells installed with expanded capacity to accept 50kg graphite feed each - optimisation of process test-work on track**
- **Samples delivered to various industry collaborators across key target markets accelerating product testing and further process development**
- **Sample supply agreement reached with a US based Lithium-ion battery development corporation**
- **Next stage Lithium-ion battery test programs commenced in Germany and UK**
- **Strategy to develop and test products and prototypes enhanced by Talga graphene and graphite**

Advanced materials company, **Talga Resources Ltd** ("Talga" or "the Company")(ASX: TLG), is pleased to provide an update on its operations and to announce that wet commissioning of its Phase 2 pilot scale test facility in Germany has commenced.

Phase 2 is an expansion of and improvement on Talga's Phase 1 equipment and involves processing shaped raw graphite ore from Talga's Swedish deposits in slabs up to 50kg in weight each (up from 10kg previously). Additional modified cells have been installed to increase total capacity of the facility to 365kg ore feed at a time.

The production process begins by 'unzipping' layers of graphite at an atomic level from Talga's raw ore slabs in custom designed electrochemical exfoliation cells, followed by proprietary recovery and concentration stages. At full commercial scale, the process aims to deliver industrial volumes of high quality product, at competitive prices.

The Phase 2 expansion is an important operational milestone as Talga continues to scale up and optimise its processing technology, enabling Talga to provide higher volume and tailored sample materials for specific industry based testing.

Talga uses the industry feedback to identify the products and optimal processing parameters required in the scale up of its pilot test-work facility in Germany. After successful process scale up, Talga envisages constructing its full-scale commercial production facility near its Swedish deposit ("Vittangi Project").



Talga Managing Director Mark Thompson said “*Commencement of Phase 2 commissioning is an exciting milestone for Talga, marking a transition from setting the foundations and achieving a better understanding of the fundamentals that impact graphene manufacturing – at a scale well beyond that possible in a laboratory*”.

### **Commercialisation Plan**

Talga’s scoping study (see ASX:TLG 9 Oct 2014) highlights the potential for a low capex (~AUD \$30m) and short payback (1.4 years) graphite mining operation.

Prior to anticipated full scale mining in Sweden, Talga aims to develop graphene and graphite product specifications hand in hand with industry, and identify applications that improve the performance of existing materials using current manufacturing techniques. The Company intends to work with industries that can benefit through the availability of large volumes of high-quality, cost effective graphene and graphite and then work with a small number of partners to develop high volume production that meet their product needs.

### **Rudolstadt Pilot Test-work Facility**

Talga’s project development initiatives are advancing as it continues to make progress with respect to processing know-how and commercial developments. Processing capabilities at Talga’s Rudolstadt based test-work facility in Germany continue to be optimised as the production scale-up continues.

Talga initially contemplated staged development milestones as processing facilities evolved with increasing scale and automation (Phase 1, 2, 3). To fine tune process parameters, Talga has been relying on a single 10kg feed Phase 1 exfoliation cell. As previously announced, Talga has designed and constructed larger Phase 2 cells, which are now being commissioned.

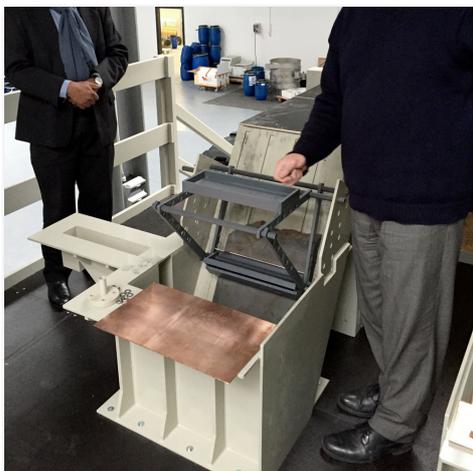
### **Phase 2 Commissioning**

The Phase 2 pilot test-work facility expansion uses two larger, semi-continuous cells with 50kg feed capacity each. Wet commissioning of the Phase 2 cells is underway and equipment for the following recovery and concentration stages is being constructed for delivery through April-June period. Figure 1 below shows the platform that houses the Phase 2 exfoliation cells and ancillary equipment.

Additionally, Talga has installed and is wet commissioning further Phase 1 cells, which have been modified to be larger and able to hold multiple ore slabs per cell. This will result in the Phase 2 facility being able to process up to 365kg of graphite at a time, comprising ore slabs of 10kg, 15kg and 50kg in weight (see Figure 2).

The increased production capacity will provide Talga with the means to generate larger and/or multiple samples for different applications and end user requirements, while completing its primary goal to further optimise scalability of the process technology. In this regard, each sample

**Figure 1.** Phase 2 exfoliation cell platform and cell just prior to commissioning, Rudolstadt.



run will go through exfoliation, recovery and concentration stages, followed by characterisation of materials to provide detailed specifications to collaboration partners and potential customers.

Further, Talga is progressively securing more technical resources, process know how and equipment in-house, which will lead to more timely turnaround times for process development, sample preparation and product characterisation.

### Samples and Products

To date, Talga has prepared and delivered a broad range of samples to customers across a range of industries (see Figure 3). The focus is on markets with large volume capacity whose graphene applications either already exist (and can be improved with Talga's materials), or new applications that have short paths to commercialisation.

Partnering has been critical to narrowing down key target markets and Talga will now focus on early commercialisation opportunities in up to four applications in four different markets; namely

- energy storage and generation;
- composites;
- coatings; and
- construction products.

Key collaborations within each target market will generate prototypes, performance data and scientific publications, ultimately providing the alignment of products and demand when commercial production commences in Sweden in future.

To date each potential application for graphene requires a tailored processing pathway to assist successful incorporation of the material into a product. As key products are identified, fewer customised products will be made, process deviations will become fewer and processing parameters (electrolytes, current, exfoliation speed, yields, overall recoveries, byproduct specifications) become less variable with steady state production.

### Lithium-ion Battery Test-work

Talga has historically focussed on the use of its graphene and graphite materials in large scale industrial markets such as coatings, construction and composites. Until recently, research into potential applications within the energy market had been quite preliminary.

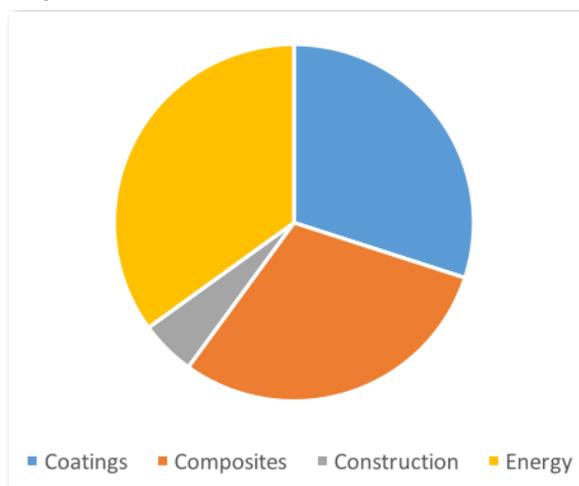
As a result of recent positive test results using Talga graphite in Lithium-ion ("Li-ion") battery anodes (see ASX:TLG 17 Feb 2016) and follow up interest from industry participants, the Company is now conducting further test-work and investigating commercialisation opportunities within the energy market (in addition to coatings, construction and composites).

Applications within the energy market can be classified into two broad sectors with a range of technologies, namely, "production" (e.g. fuel cells, solar panels) and "storage" (e.g., solid state and flow batteries, thermal storage). Applications for use of Talga graphite and graphene across both these sectors are currently being investigated.

**Figure 2.** Phase 2 50kg ore slabs for exfoliation.



**Figure 3.** Distribution of Talga samples across target markets to date.



## Sample Supply Agreement

Talga has entered into a sample supply agreement with a USA based Li-ion battery developer under which Talga will provide graphite for performance testing in its emerging Li-ion battery technology. Results will be shared by both parties. The agreement was reached after due diligence was conducted on recent Talga test data following a meeting and a confidentiality framework established in 2015.

Sample materials will be manufactured at Talga's pilot test-work facility in Rudolstadt, Germany and testing is expected to commence in the June 2016 quarter.

## Next Stage Test Programs

New programs testing Talga micrographite and graphene in Li-ion battery anodes have commenced at the Centre for Advanced Electronics Dresden, Germany ("CAED") and the Energy Innovation Centre - University of Warwick, United Kingdom ("EIC").

The EIC is a facility for the development of new battery chemistries from concept to fully proven traction batteries, at quantities suitable for industrial scale testing. It includes a £13m Battery Materials Scale-Up Pilot Line, battery characterisation laboratory, aggressive-testing chambers and an electric/hybrid drive test facility (see Figure 4).

The EIC program will comprise larger scale tests of Talga graphite in the main types of Li-ion anode chemistries used by industry. In parallel, the CAED program will explore aspects of Talga raw material for further potential uses in Li-ion and other types of battery.

## Micrographite

As part of its collaborations with companies that have graphene product development programs, Talga has had specific requests to be supplied with micrographite (graphite particles having a lateral dimension less than 40 micron) and graphene intermediate materials (graphite particles comprising more than 10 layers graphene but less than the thousands of layers found in standard flake graphite).

Extensive due diligence on the market for micrographite and graphene intermediates has identified a number of applications currently using these materials. According to a confidential commissioned research report, the total market for micrographite from natural resources (outside China and ignoring spherical graphite for Li-ion batteries) is approximately 120,000tpa. Consumption is dominated by Japan, the USA and central Europe which consume around 30,000tpa each.

Today's commercial production of micrographite predominantly requires energy-intensive mechanical milling to consistently achieve the required size. The smaller the particles the higher the market price.

Test work by Talga has confirmed that the majority of its Vittangi graphite particle distribution occurs naturally below 40 microns with most being below 10 micron.

Talga's scoping study assumes the majority of its commercial scale graphite output would be sold into the low priced 'amorphous graphite' market. However investigations are underway to ascertain how much of this material could be sold into the higher priced micrographite market.

**Figure 4.** Part of the Energy Innovation Centre facilities - University of Warwick.



## Next Steps

Future milestones for Talga in 2016 include:

- Commissioning Phase 2 equipment recovery and concentration stages through April- June;
- Advancing commercial relationships and seeking endorsement and validation from well known industrial brand names;
- Receiving results of product development/prototypes in key sectors;
- Permitting and feasibility studies progressing in Sweden; and
- Lithium-ion battery test work results

For further information, visit [www.talgaresources.com](http://www.talgaresources.com) or contact:

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

## About Talga

**Talga Resources Ltd** ("Talga") (ASX: TLG) is an advanced materials company with patent pending technology to produce industrialised supply of graphene and micrographite sourced from its 100% owned natural graphite ore deposits in Sweden. Talga's unique deposits and proprietary processes provide a potential path to high quality production that overcomes cost and volume barriers to supply, thereby unlocking commercial applications. Micrographite as well as graphene platelets are being manufactured for industry partners at Talga's German pilot scale testwork facility.

The Company's processing technique relies on Talga's unique natural source and bypasses the need for traditional milling. Pristine particle morphology is maintained and significant operational and capital expenditure benefits are anticipated. Talga has the opportunity to be a global leader with respect to pricing, volume and quality of graphitic advanced materials in key sectors like construction, coatings, energy and composites.