



talga

unearthing tomorrow



**LOW EMISSION AND
TECHNOLOGY MINERALS
CONFERENCE** INCORPORATING THE
AUSTRALIAN URANIUM CONFERENCE

Talga Resources Ltd ASX:TLG

15 November 2016

Perth, Australia

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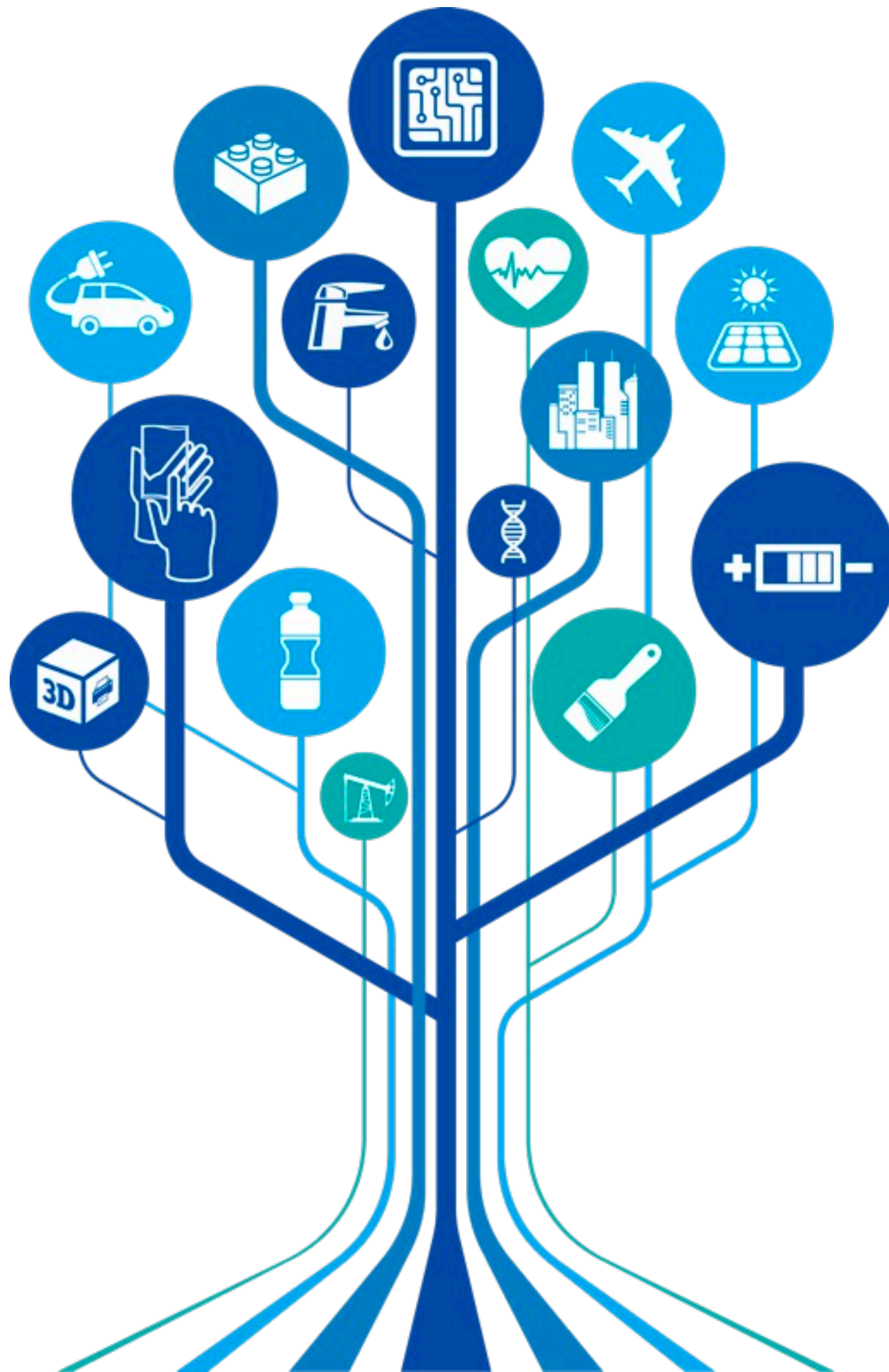
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What are Technology Minerals?



Technology minerals enable new technologies, products and applications, or make current materials more:

- ▶ **efficient** (lighter, faster, stronger)
- ▶ **functional** (conductive)
- ▶ **sustainable** (lower emissions, better chemistry/performance, improved environmental impact)

Graphite and particularly its 2-D version, **graphene**, have been shown over the last 10 years to be the most conductive, lightest, strongest and universally disruptive material additives on earth.



- ▶ Talga is an **advanced materials** company that owns the **highest grade** graphite mineral resource in the world # and has developed an innovative **process** to make the **mass production** of quality **graphene** possible.
- ▶ Talga is a listed public company on the Australian Stock Exchange (**ASX:TLG**) with operations in Sweden, Germany and UK.
- ▶ Rapidly developing **value-added product** pipeline and IP.
- ▶ Talga is positioning to play a large role in the emerging trend towards low emission **energy** production/storage and a host of technology applications enabled by graphite and graphene.

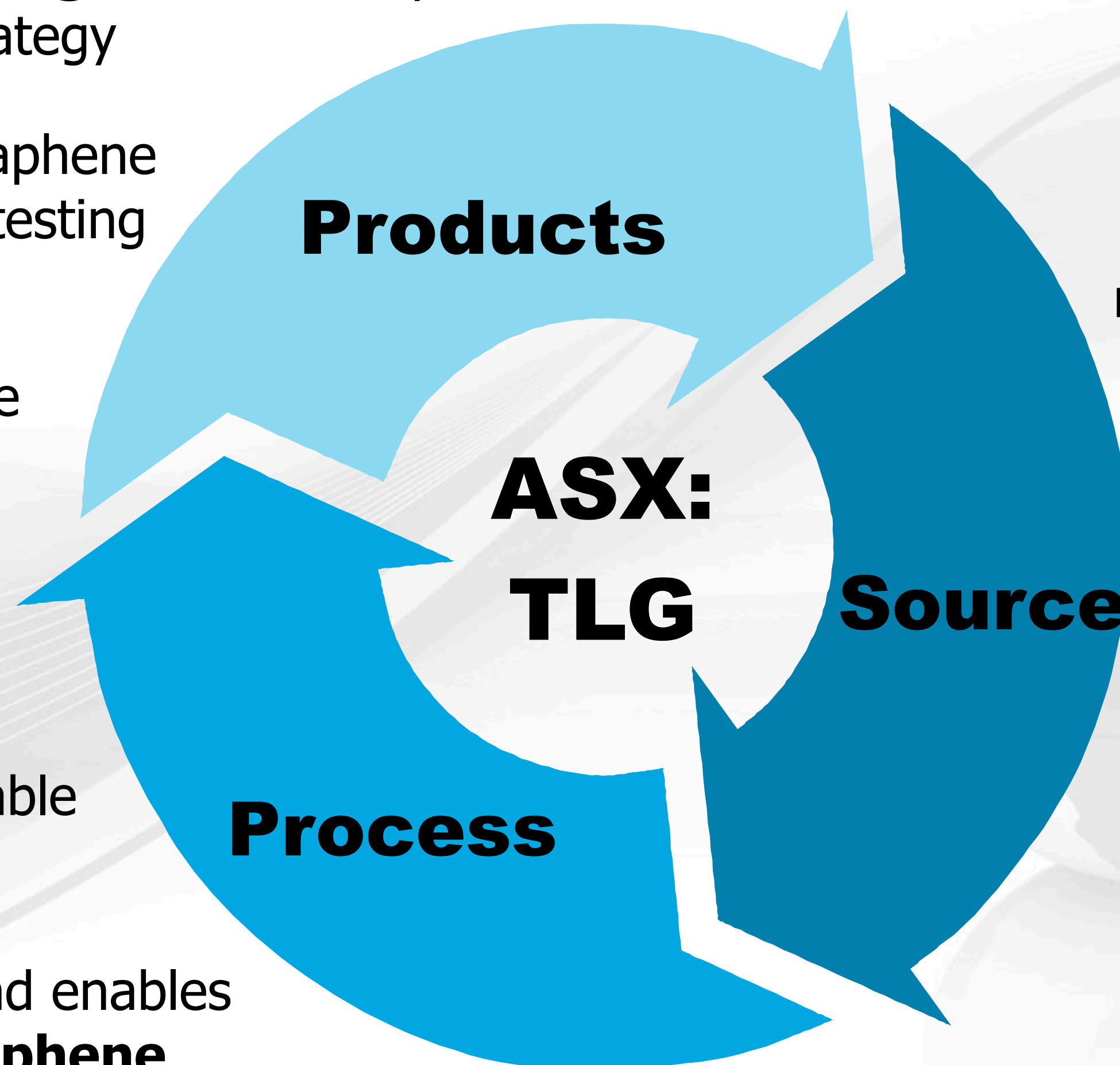
Vertically integrated ore-to-products
value add strategy

Pipeline of in-house graphene
product, IP & customer testing
underway

Multiple large volume
high growth sectors

Patent pending and scalable
process technology

No crush/grind costs and enables
high quality bulk graphene
production

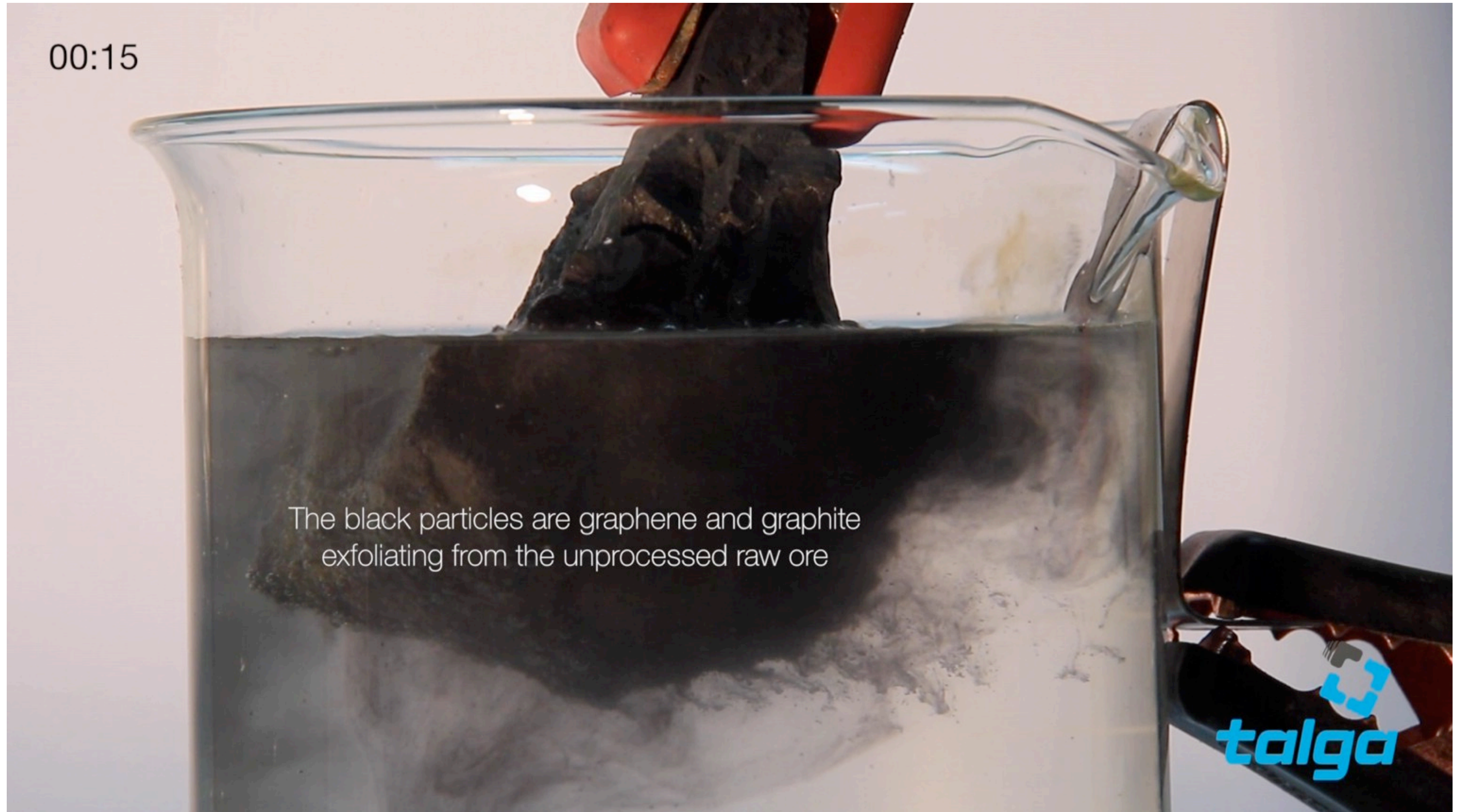


Highest grade graphite
mineral resource in the world[#]

Unique '**electrode**' ore

Top class **jurisdiction**
Sweden

Basic raw ore-to-graphene exfoliation



Capitalisation Summary 15 Nov 2016 (AUD\$)

Shares on issue TLG	181.9M
Listed Options TLGOA (\$0.45 : 31 Dec 18)	44.9M
Unlisted Options ¹	34.7M
Market Capitalisation (undiluted @ \$0.28)	\$51M

Top 5 Shareholders ²

Smedvig G P Ltd	11.3%
Lateral Minerals Pty Ltd (M.Thompson)	7.8%
Kamberg Investments Ltd	3.3%
Yandal Investments Pty Ltd (M. Creasy)	3.0%
Pelmer Securities S A	2.5%

Board

Managing Director - **Mark Thompson**

Chairman - **Keith Coughlan**

Non-Executive - **Grant Mooney**

Non-Executive - **Stephen Lowe**

Cash end Sept 2016 ~**\$10.3 million**. Nil Debt.

ASX: TLG year to date share price



¹ Various expiry and strike prices \$0.35-\$0.65

² Holdings rounded to nearest decimal point, as at 15 Nov 2016

Board and Management



Mark Thompson
Managing Director

+25 years international industry experience in minerals-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.

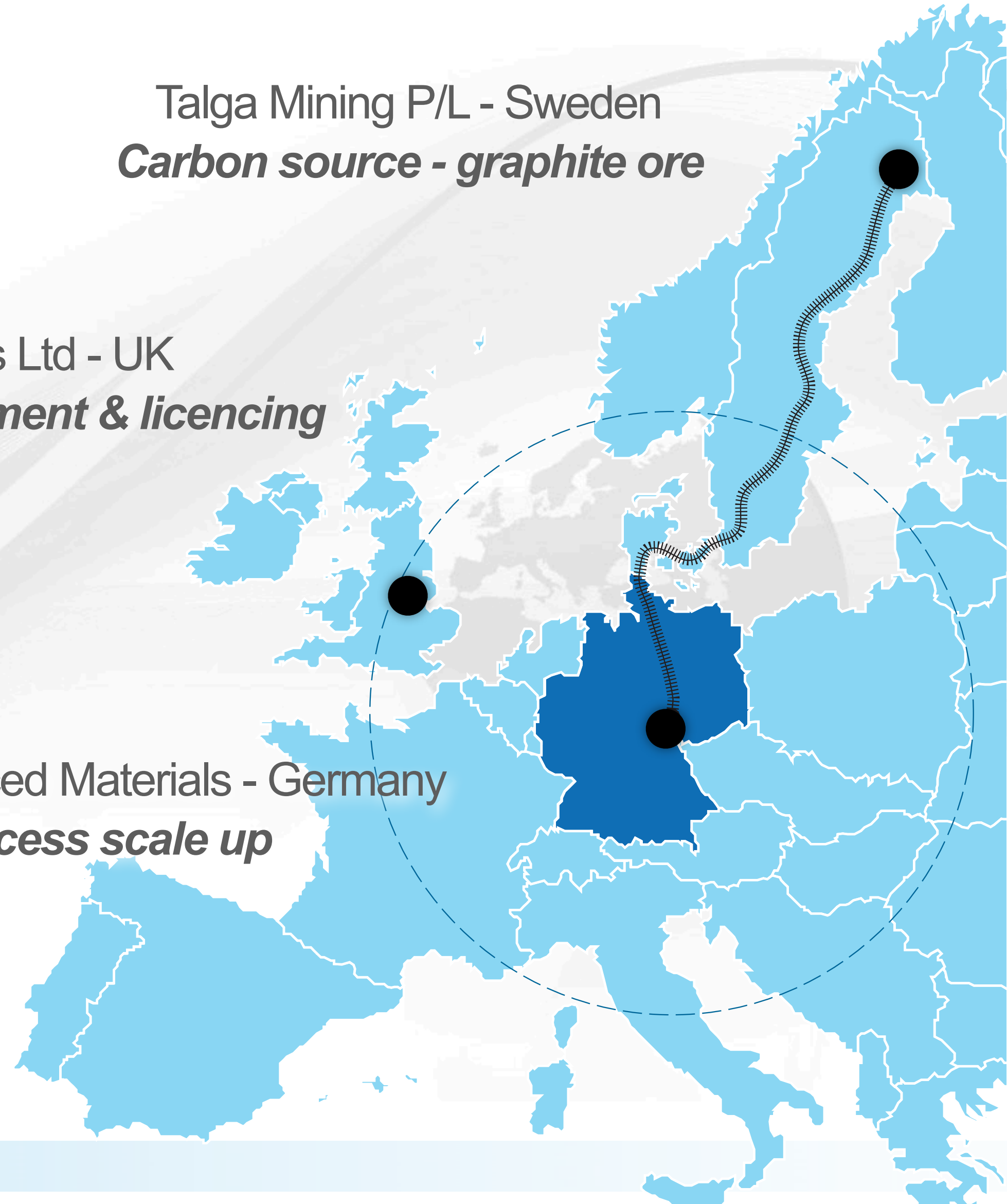


- ▶ **Talga Resources Ltd**
- ▶ Australia - Corporate HQ
- ▶ ASX code TLG, TLGOA

Talga Mining P/L - Sweden
Carbon source - graphite ore

Talga Technologies Ltd - UK
Product development & licencing

Talga Advanced Materials - Germany
Process scale up

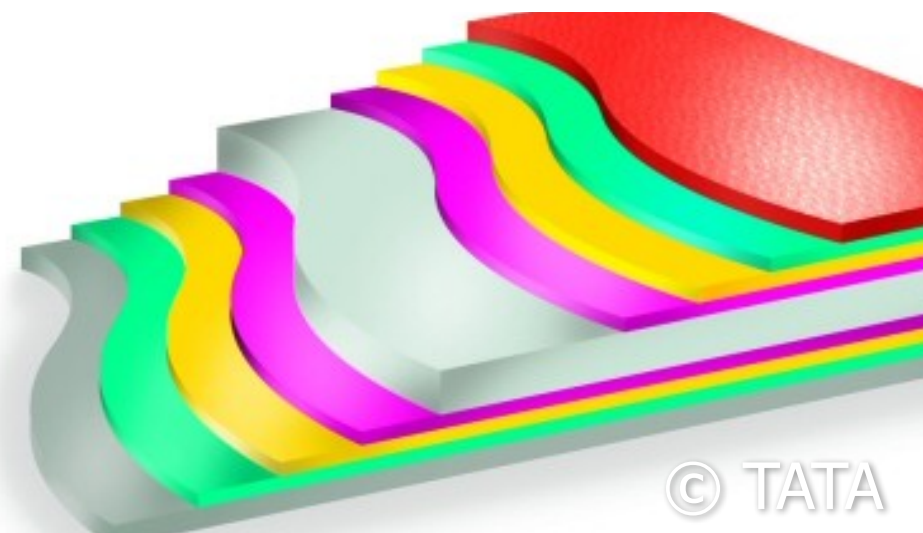


- ▶ Produce value added graphene **products** to complement supply of **raw** graphene and graphite
- ▶ Pursuit of revenue prior to full-scale production through sale of **licensing** and royalties – plus sale of raw materials
- ▶ Initially aim to replace additives in **existing products** with better performing ones ('new products' not required)



Talga CTO Dr Siva Bohm at Talga Advanced Materials GmbH, Germany with few layer graphene dispersion product

Coatings



Corrosion Protection

Market Size: \$11B (2013)

- Anti-corrosion & anti-fouling coatings
- Electric and thermally conductive inks
- Battery and fuel cell coatings
- Current market 40Mt/a

Energy

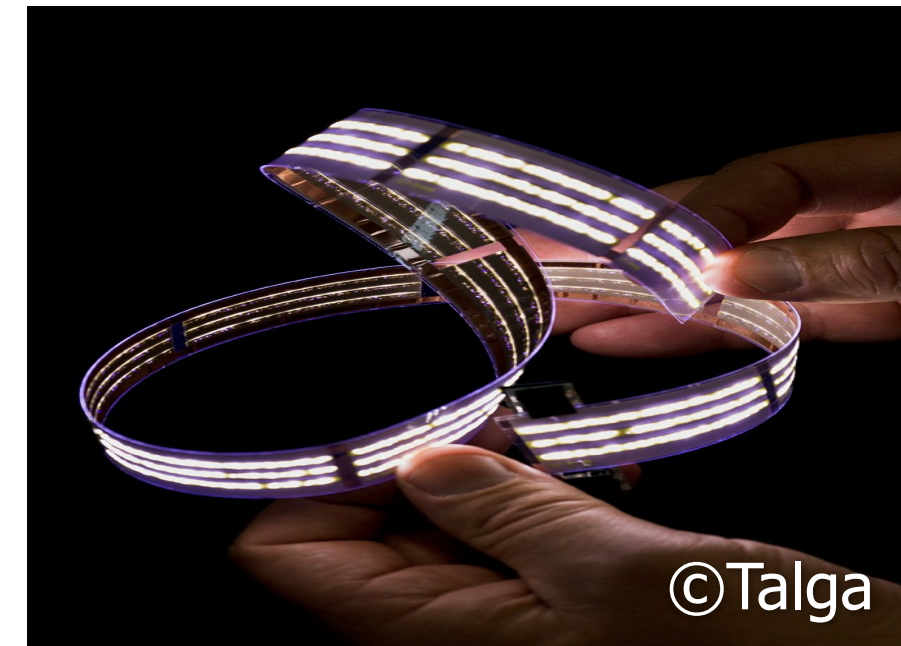


Batteries & Membranes

Market Size: \$24B Batteries, \$17B Membranes

- Li-ion batteries
- Flow batteries
- Fuel cells
- Solar panels
- Printable batteries and circuits

Conductives



Conductive Ink

Market Size: \$18B (2015)

- Flexible conductive plastics
- Stronger, lighter plastics and carbon fibre materials
- 3D printing inks

Construction



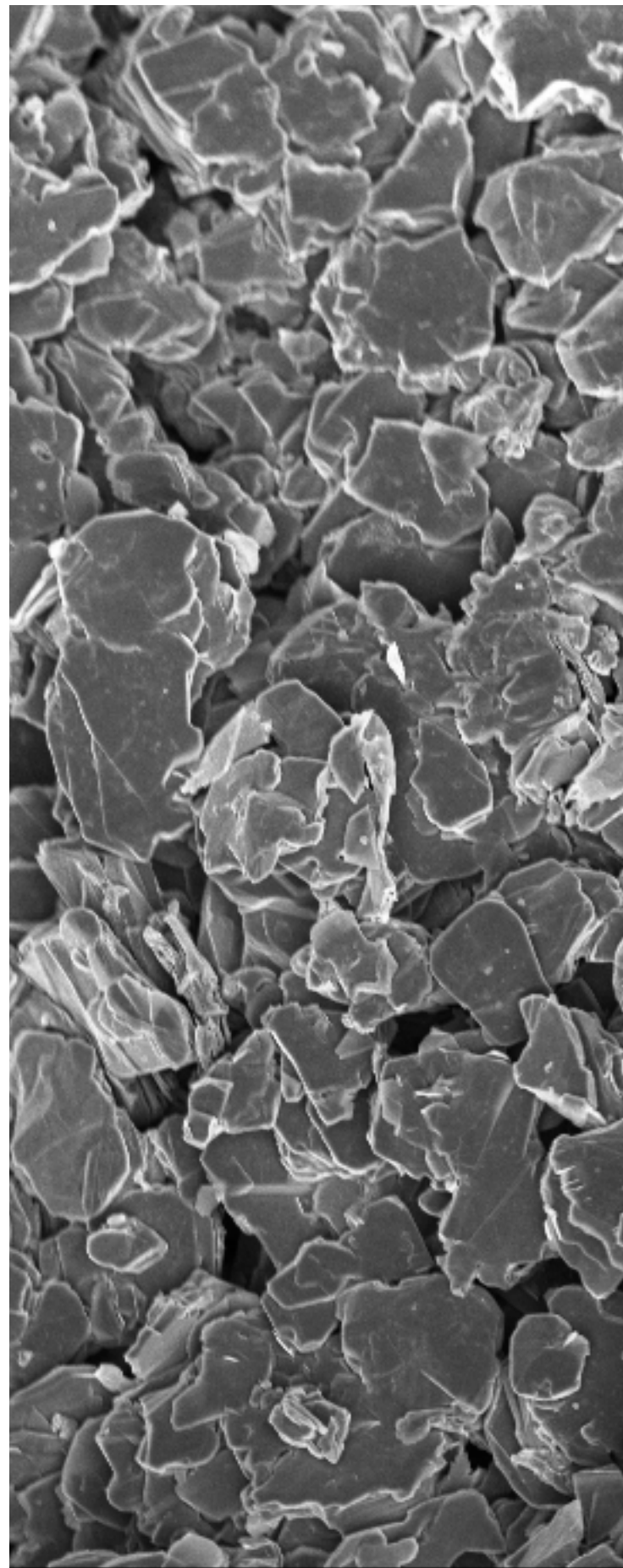
Concrete

Market Size: \$450B (2012)

- Lighter, stronger cement
- Higher performance insulation materials
- Functional (electrical or thermally conductive) glass and building materials

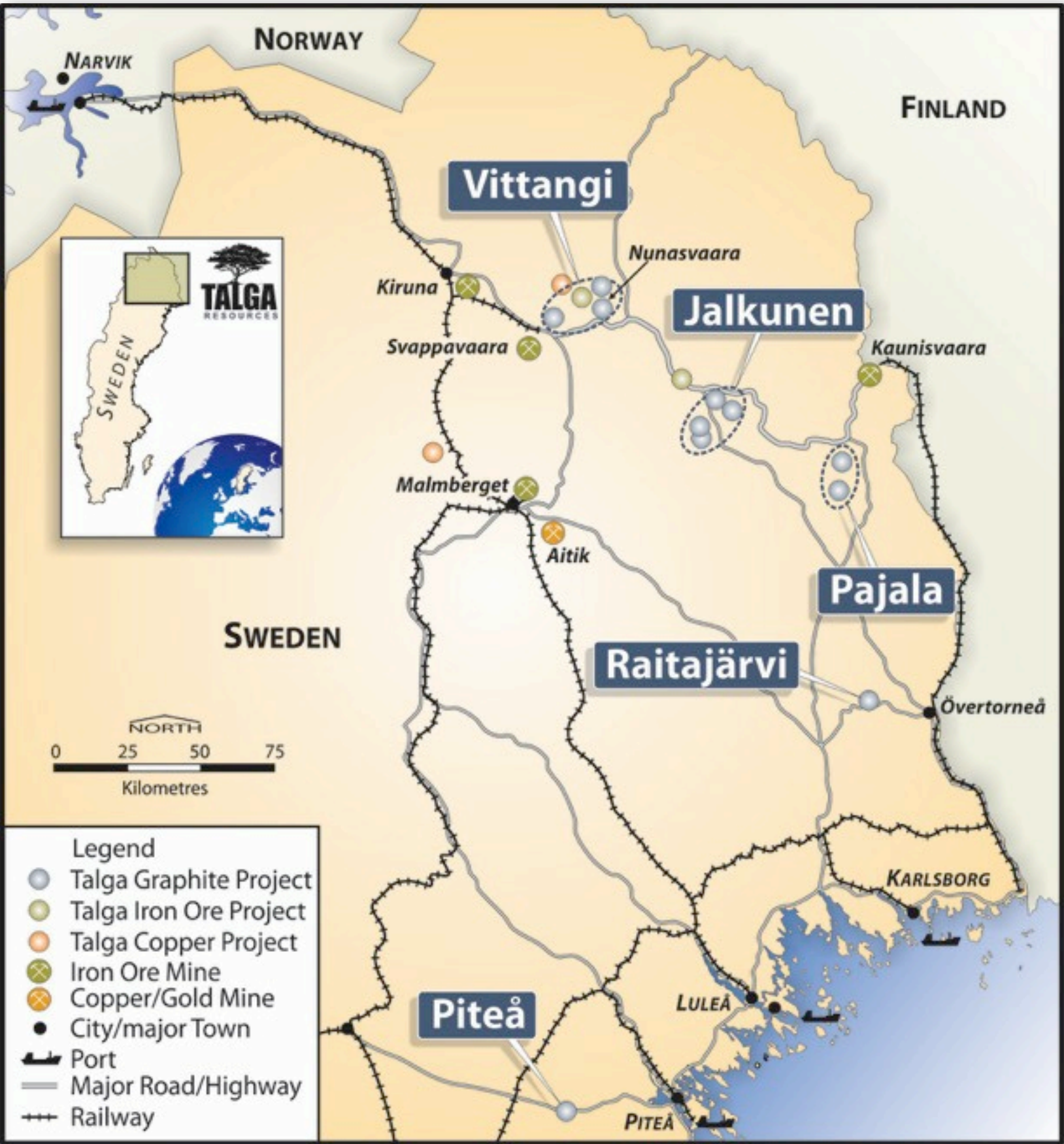
Current Collaborations





10 μm

- ▶ Products enhanced with graphene & micrographite are here (not distant possibility) – **no need to re-tool manufacturing lines**
- ▶ **Real world products** with addressable markets
- ▶ Aim to remove the **supply** and **pricing** bottleneck to 'enable' more rapid industry uptake
- ▶ **Disrupt** graphene market – even during pilot phase



- ▶ **100% ownership** of **five** graphite projects in Sweden containing **three resources and over 25 deposits**
- ▶ **Full range** of graphite flake sizes from micro to jumbo flake
- ▶ Current JORC compliant Mineral Resources*

Project	Tonnes	Graphite Grade
Vittangi	9,800,000	25.3 %Cg
Jalkunen	31,500,000	14.9 %Cg
Raitajärvi	4,300,000	7.1 %Cg

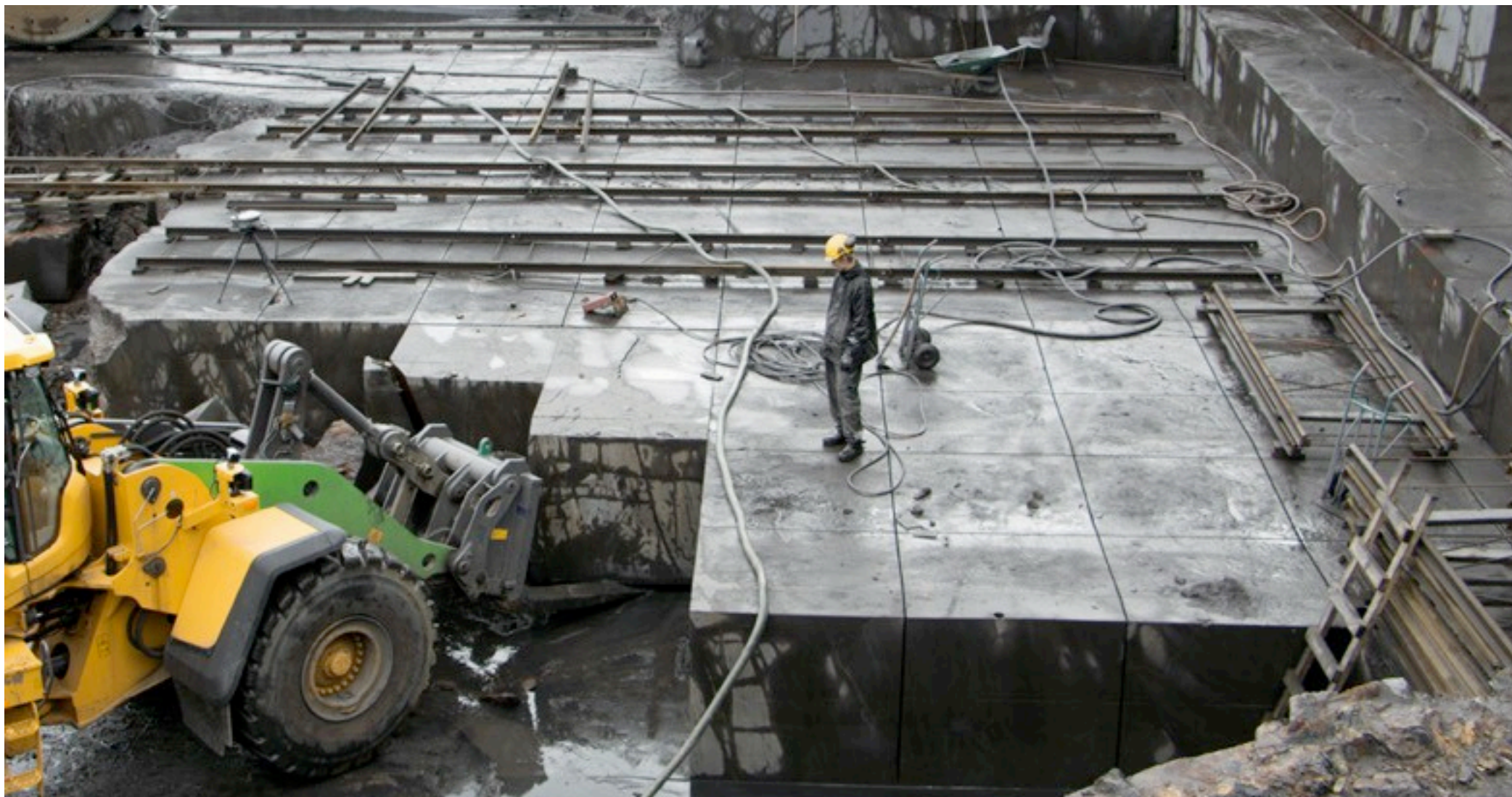
- ▶ Current JORC compliant Exploration Targets*

0-100m Depth	Tonnes	Graphite (%Cg)
Total	136-250,000,000	18-25

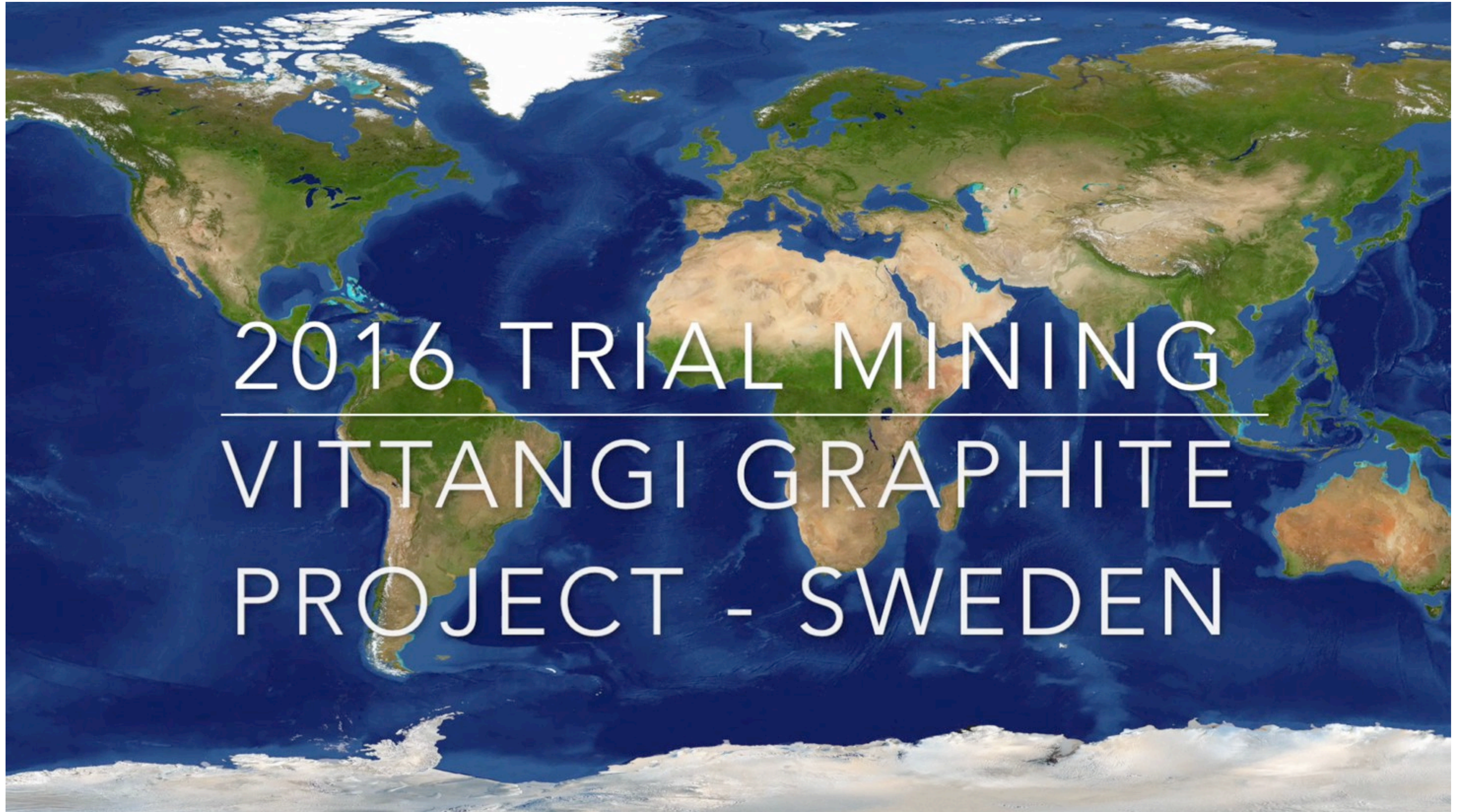
Note: The Exploration Target is based on a number of assumptions and limitations with the potential grade and quantity being conceptual in nature. There has been insufficient exploration to estimate a Mineral Resource Estimate in accordance with the JORC Code and it is uncertain if future exploration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

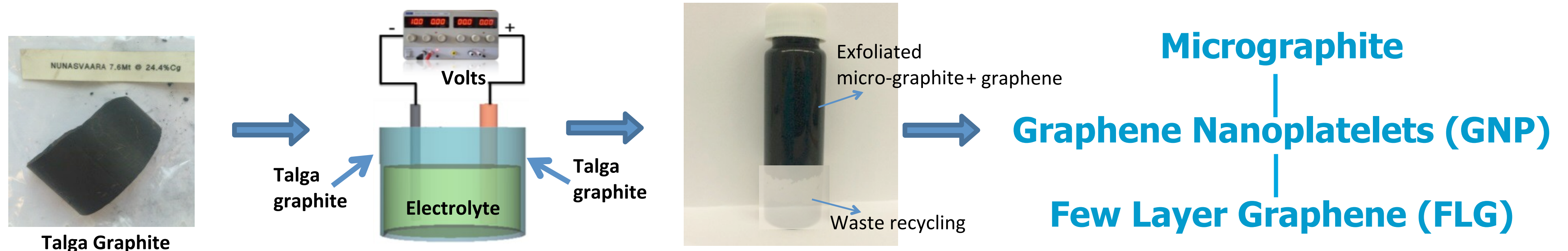
*See Appendix 1 for resource and exploration target details

Source - Vittangi Project Trial Mine 2016



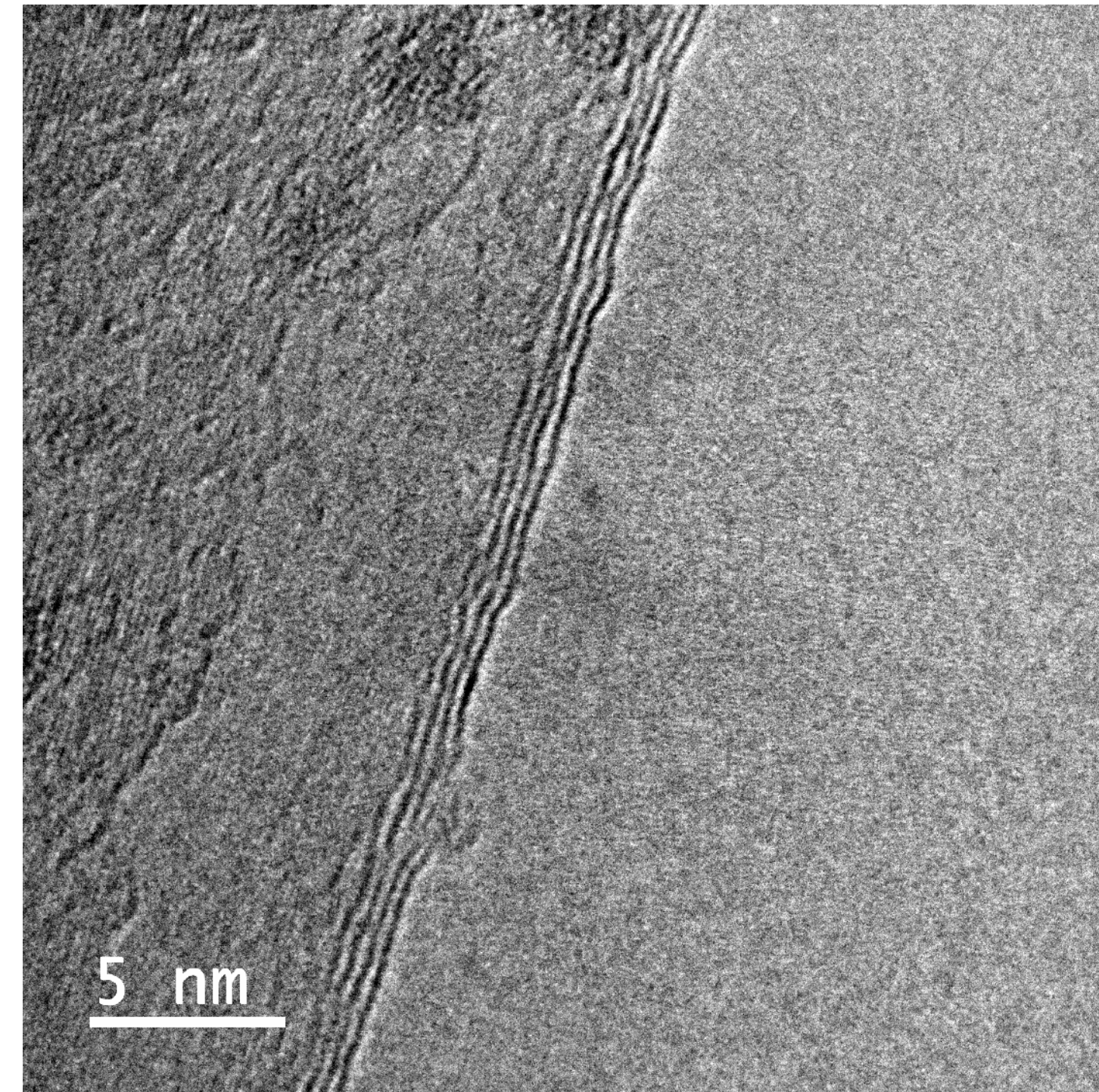
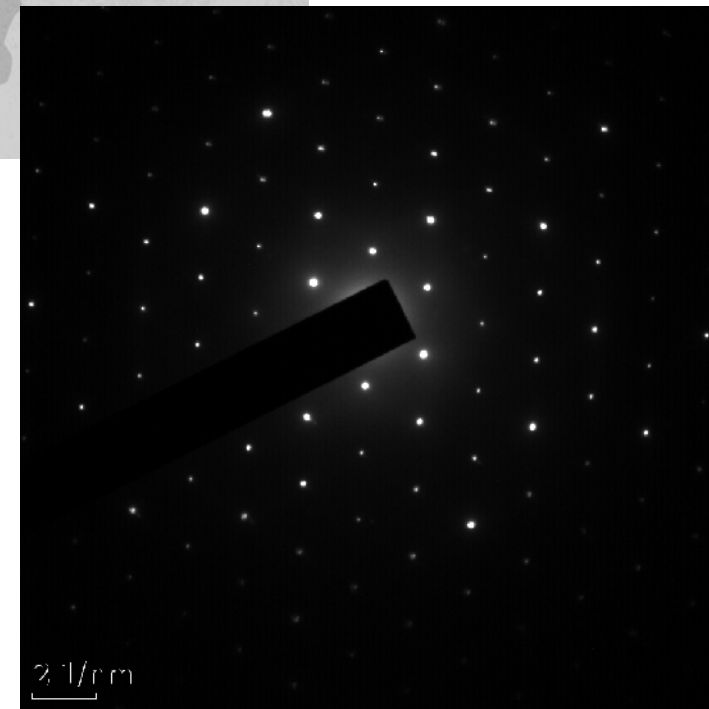
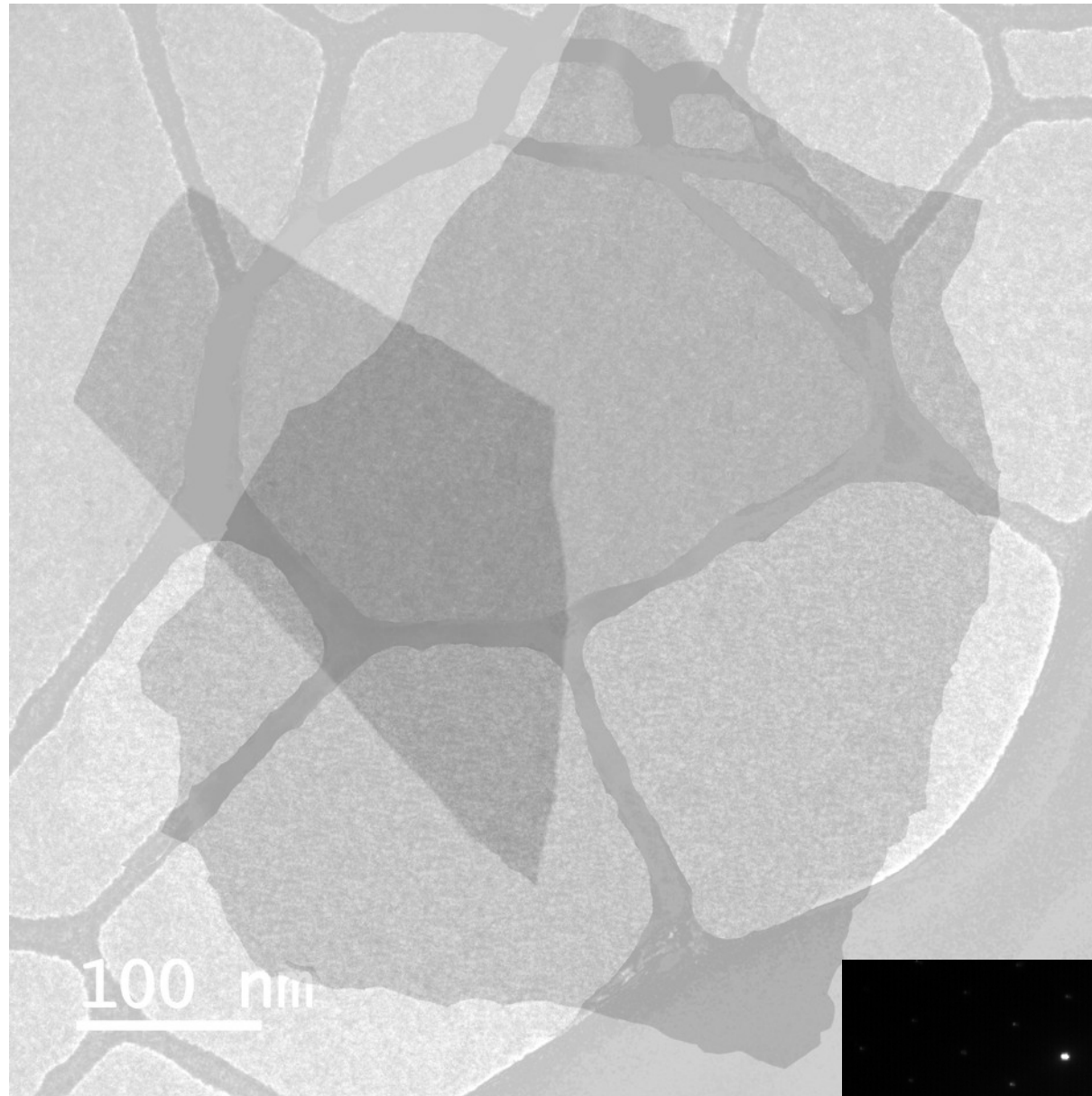
- ▶ **Innovative** graphite ore mining technique
- ▶ Extracts ore as direct use “**electrodes**”
- ▶ No ‘drill and blast’ of ore = less dust and noise/**minimise environmental impact**
- ▶ Trial of larger, tailor-made and automated ore block cutting equipment successful
- ▶ ~5,000t extracted to date to feed upscaled pilot test processing and graphene product development





- ▶ Process liberates **graphene and micrographite** directly from **raw ore**
- ▶ Requires **no crushing, no grinding, no jet milling**
- ▶ Makes **ultrafine** and **ultrathin** size particles, a type of material not previously available **economically** at this **scale**
- ▶ Lowers **energy, costs** and **emissions of graphene production**
- ▶ Higher **performance** in applications

Product - High Quality Graphene



HR-TEM and other tests confirm high quality, 1-4 layer graphene.

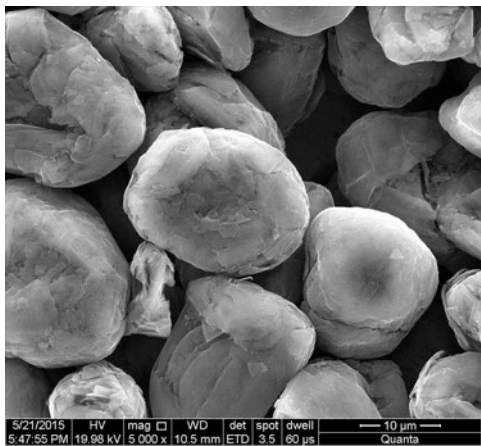
Process - Advantages for Li-ion battery materials



Spheronised Graphite

Peer Processing Steps

Crush
Grind Stages
Flotation stages
Micronisation
Purification (chemical/thermal)
Shaping (spheronisation)
Coating
Mix binder and dispersant



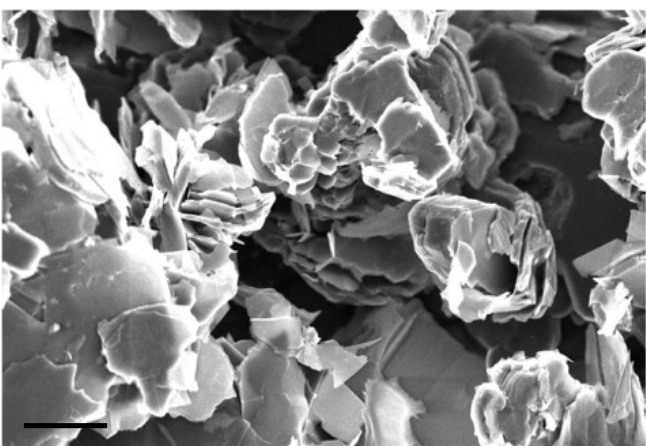
Battery average capacity ~360 mAh/g



Talga Graphite

Talga Processing Steps

Exfoliate
↓
Concentrator single stage
↓
Mix binder and dispersant

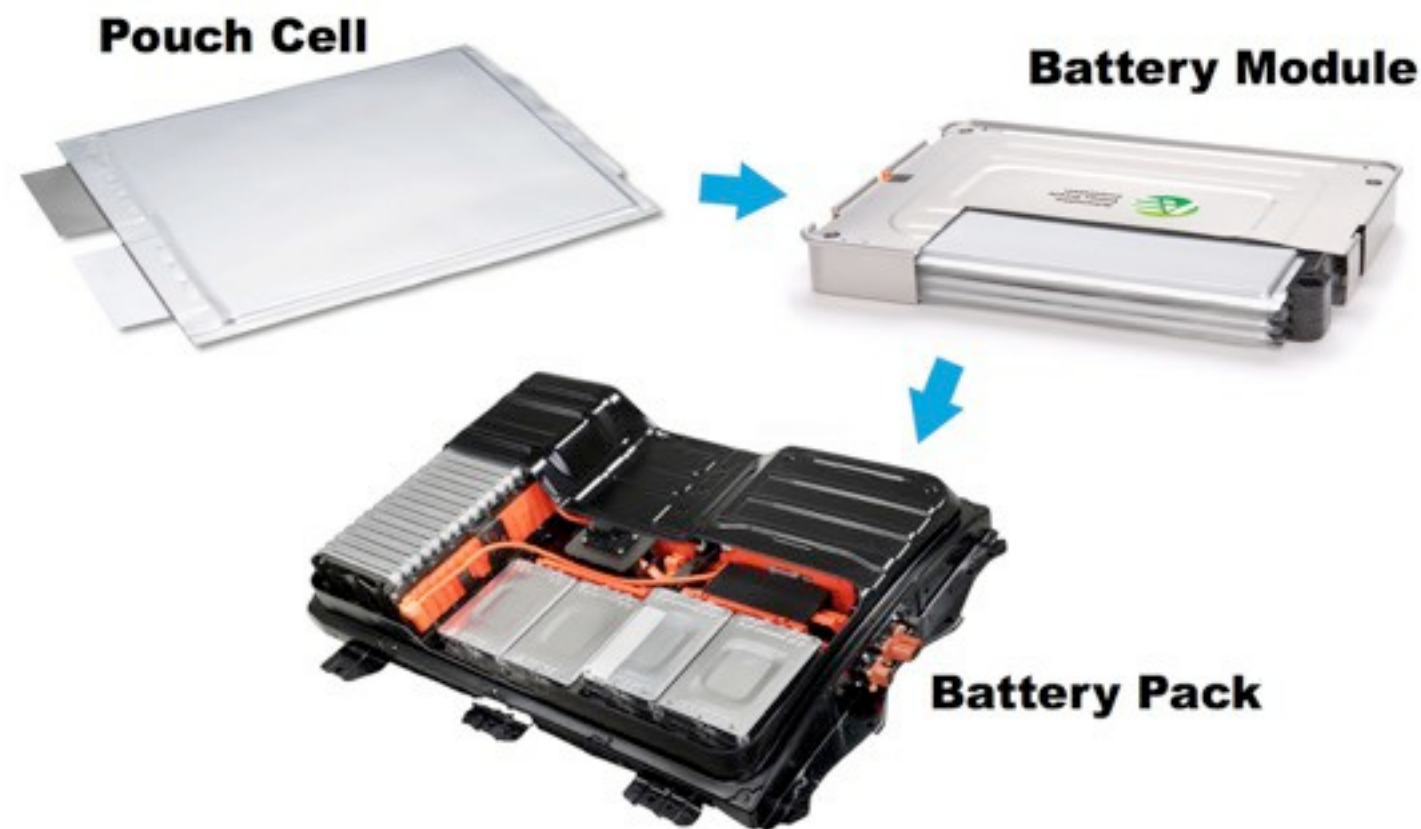


Battery average capacity ~360 mAh/g

- ▶ Ore is **directly** electrochemically exfoliated into ultrathin flakes (graphene and micrographite)
- ▶ Benefits:
 - Less processing steps
 - Potentially **lower** energy and environmental **cost**
 - Lower capex
 - Lithium battery performance equal to spherical graphite, before using higher performing graphene



Talga Li-ion anode preparation

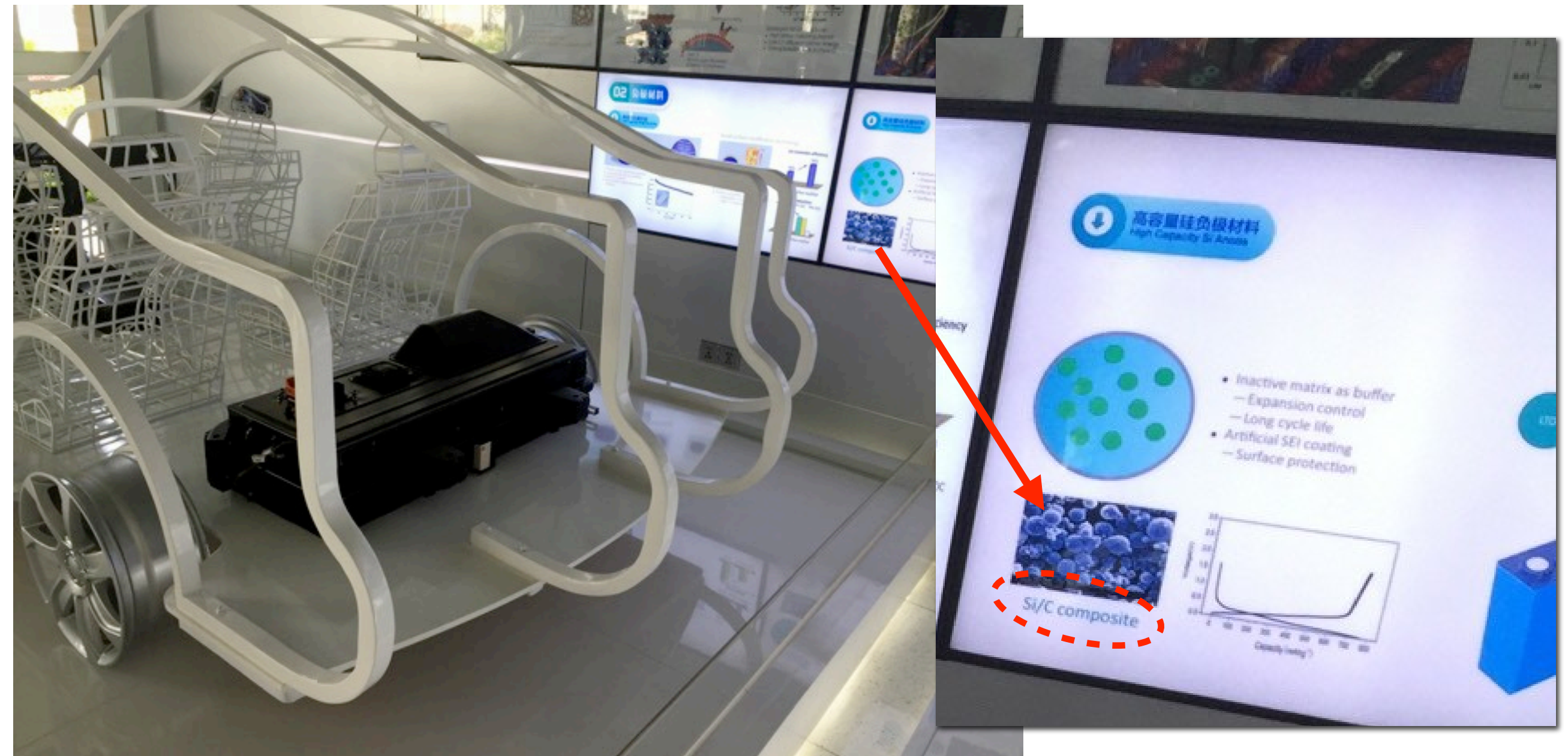


- ▶ Talga can produce graphite for Li-ion battery anodes: **No** grinding, micronising and shaping costs
- ▶ Recent tests support previous **breakthrough results** (ASX:TLG 17 Feb 2016)
- ▶ Results show **excellent stability** and greater than 99.7% efficiency without capacity fade
- ▶ Tests underway on **larger scale** programs at EIC Warwick UK and with battery manufacturer in USA
- ▶ Data supports commencing **industrial** Li-ion '**pouch**' cell testwork and commercial-style **roll to roll** anode formulations

Products - Energy: Battery technology

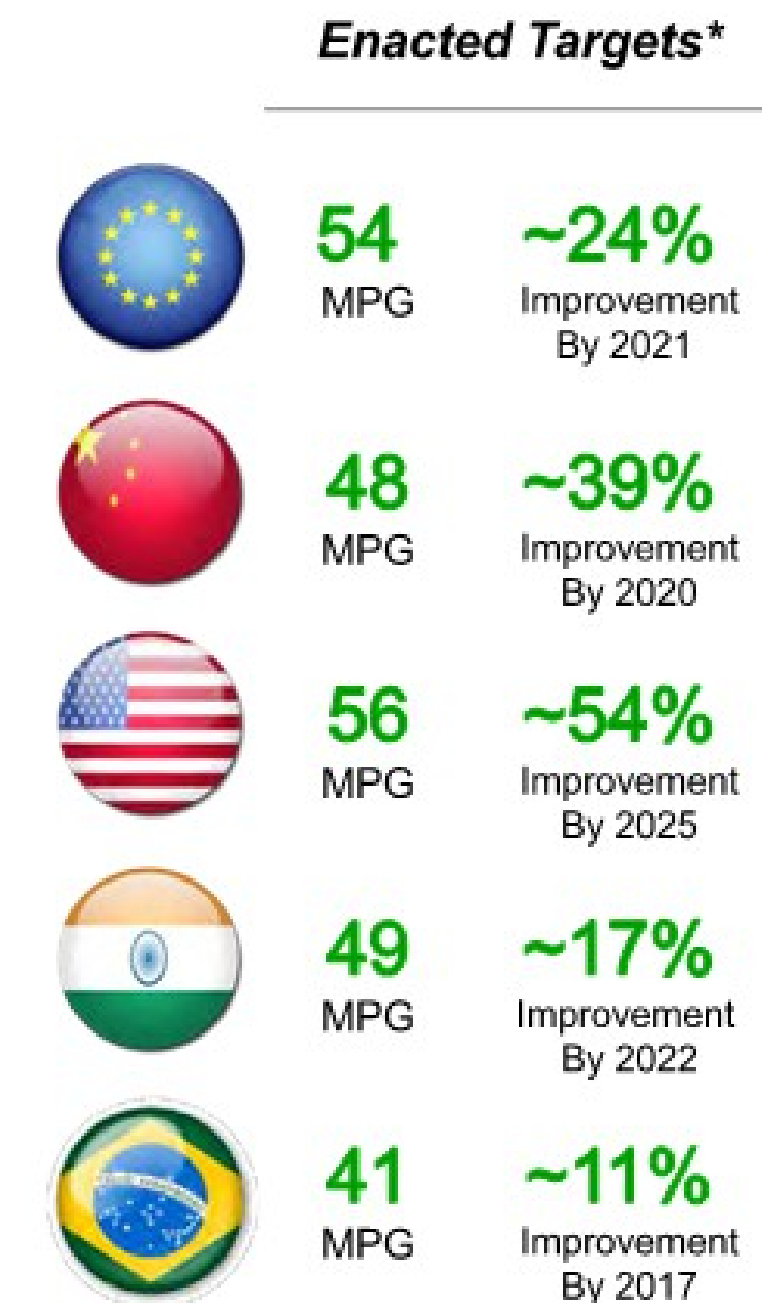
- ▶ Graphene as an additive can improve charging speed, capacity and other performance criteria.
- ▶ Graphene is more conductive than graphite so suits **current** and **emerging** battery technologies:
 - *Silicon-graphene in Li-ion*
 - *Li-Sulphur*
 - *Li-Aluminium*
 - *Li-Air*
 - *Flow batteries*
 - *Printable batteries*
- ▶ Major battery makers are testing and preparing the next generation materials - no technology trap

Live-in factory facilities of global leading Li-ion battery manufacturer, China



Silicon-graphene anode technology advertised as part of development

- ▶ Automotive emission regulations becoming **even tougher**

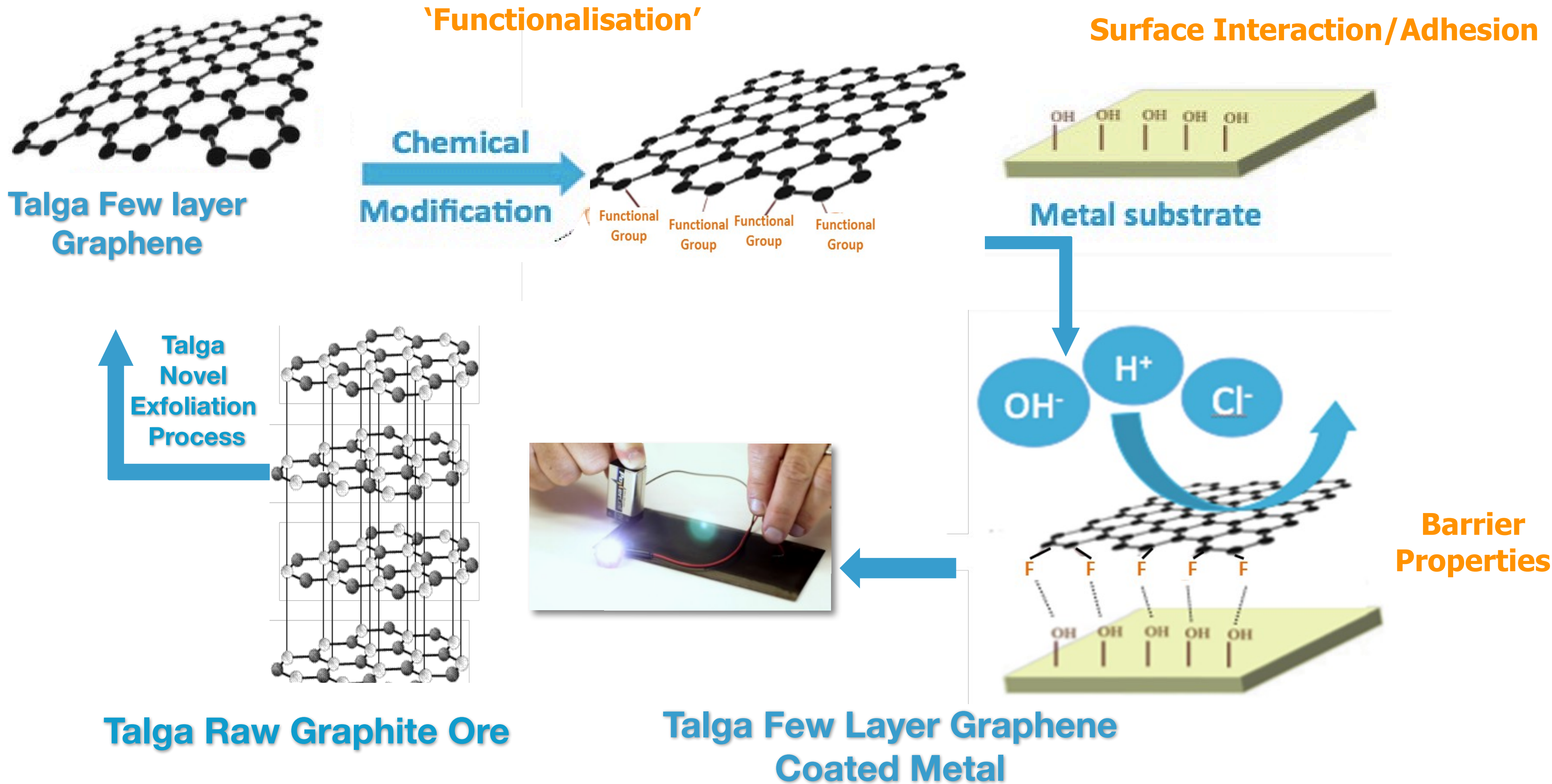


- ▶ Supply of raw material **crucial** to meeting objectives
- ▶ Driving both 'Electrification' and '**Lightweighting**' focus
- ▶ Sizeable market for graphene applications across automotive material chain including **bodies, wiring, fluids, tires** and **coatings**

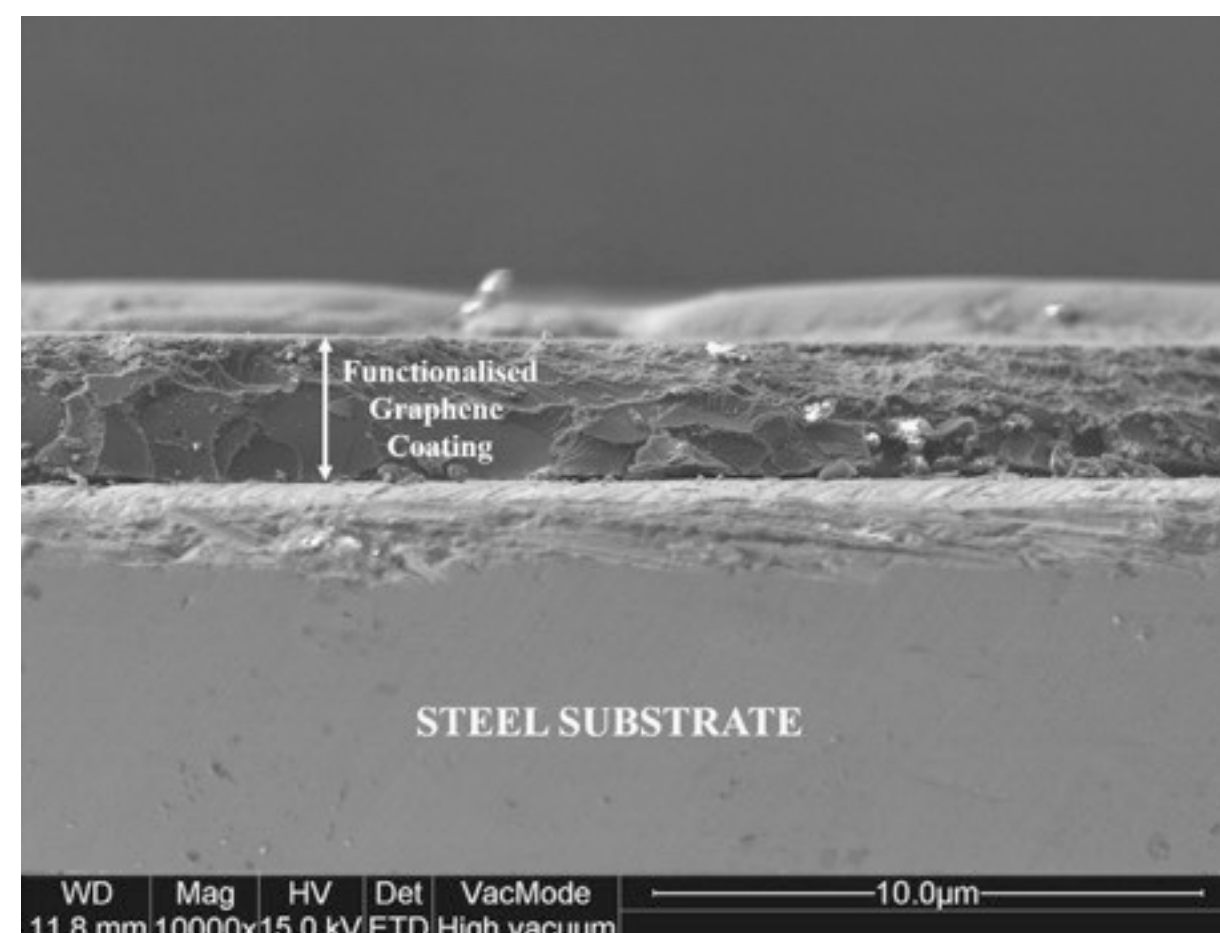
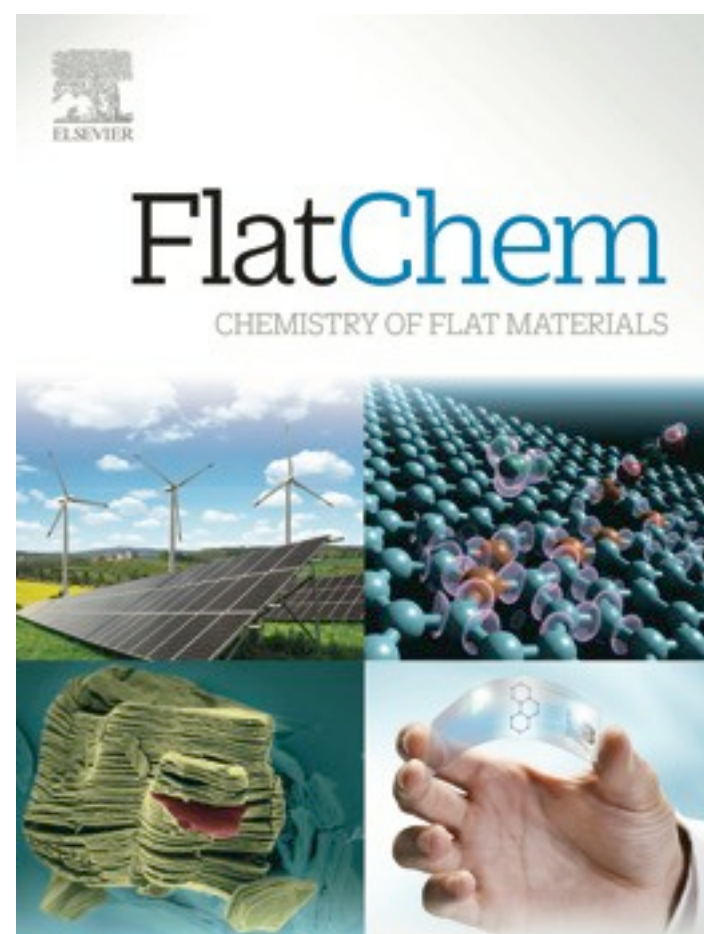
Product - Energy, Coatings, Conductives

- ▶ Graphene produces opportunity to deploy our products more widely





- ▶ Talga functionalised graphene “Talphone” anti corrosion coating **peer-review** Corrosion Evaluation
- ▶ Results show coating steel with Talga’s graphene significantly increases corrosion **protection** by up to **74%**
- ▶ Validates global potential of Talga products for large volume coatings sector



TLG Graphene significantly reduces corrosion over longer time span

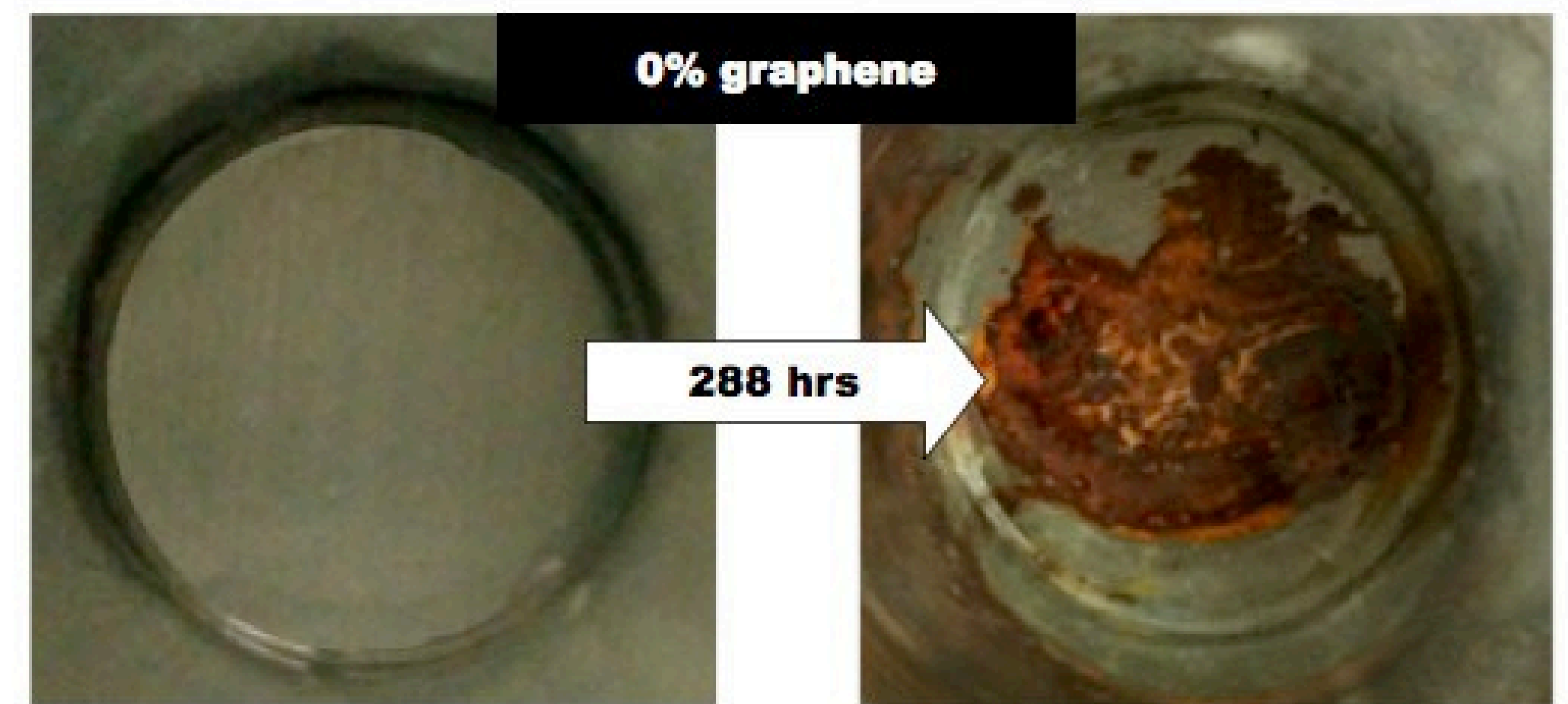
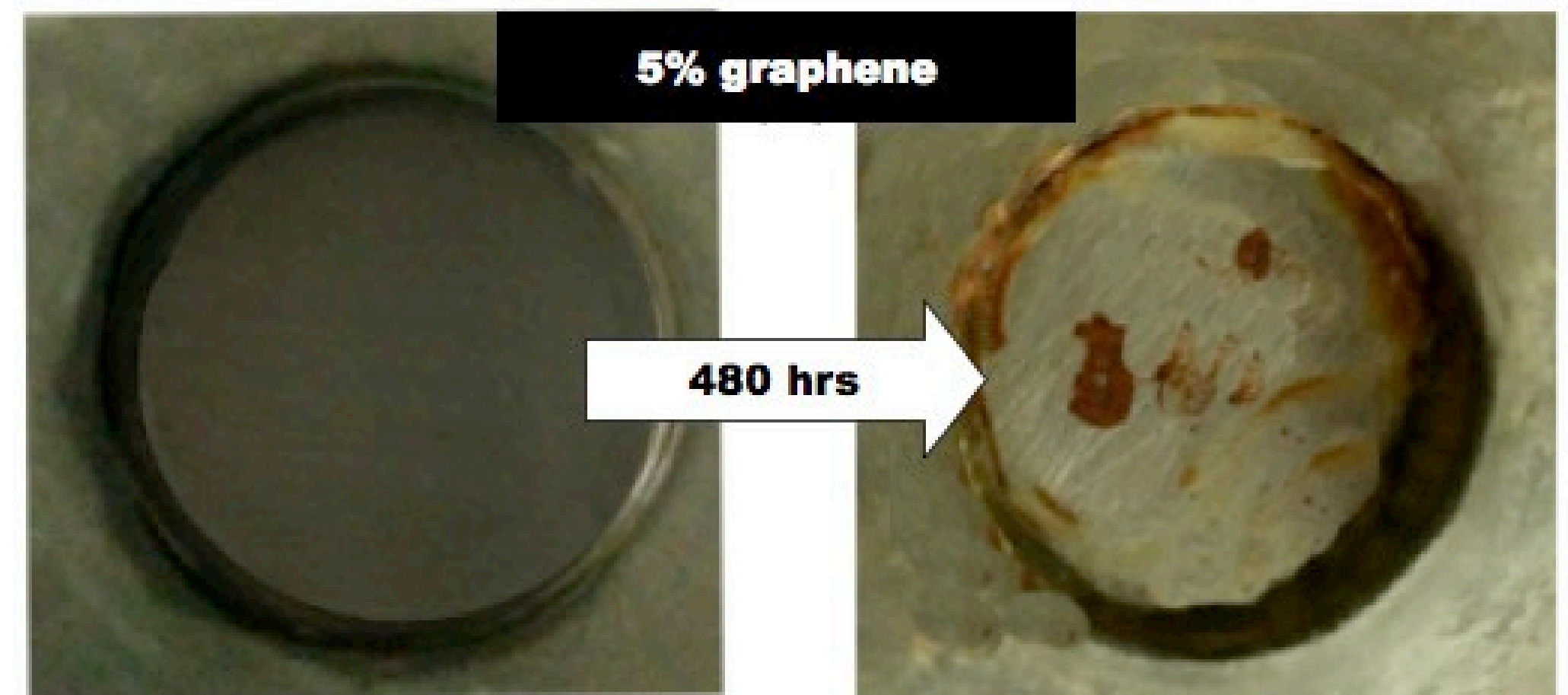
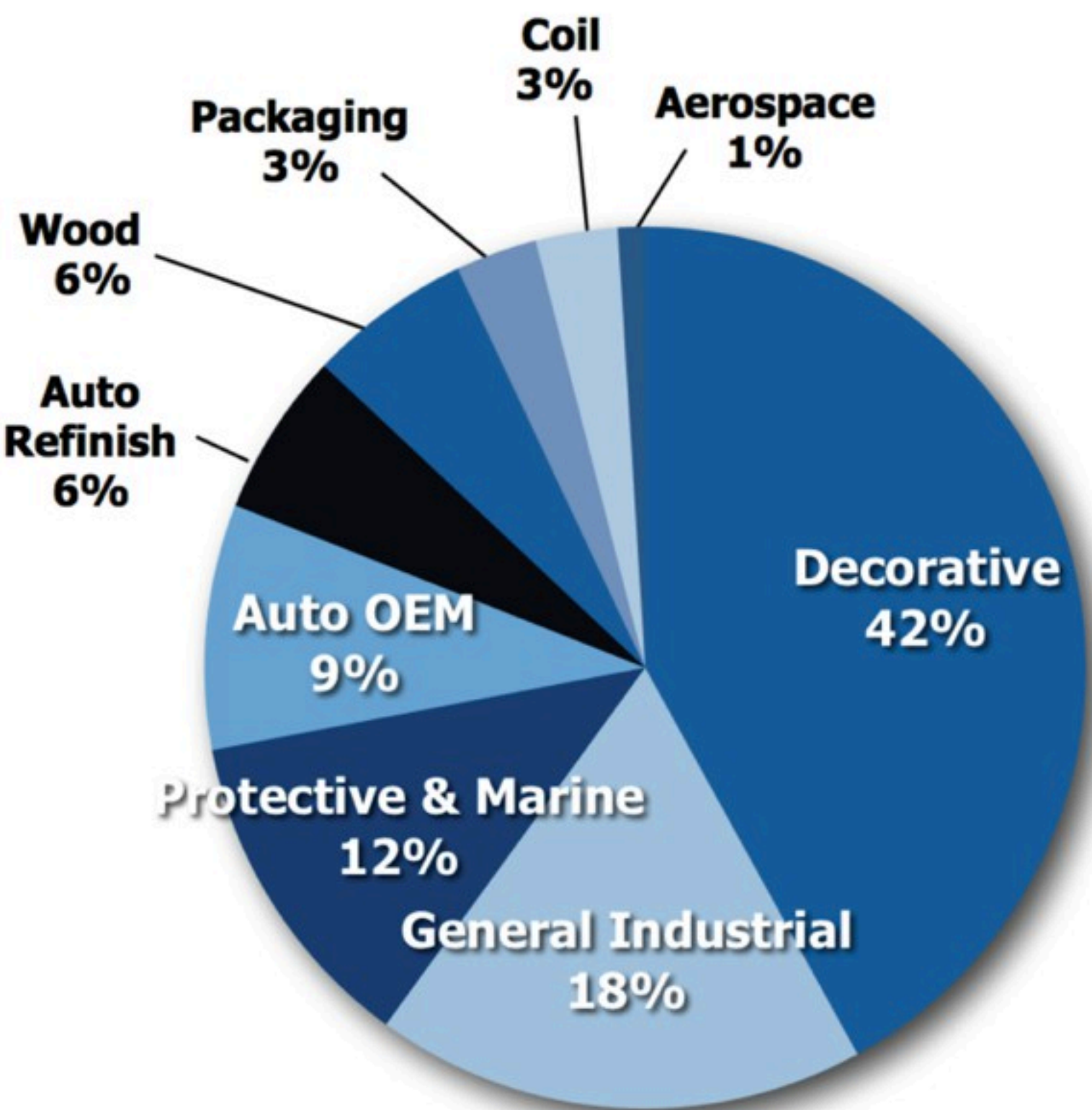


Fig 1. Paints and Coatings Global Market US\$/annum.

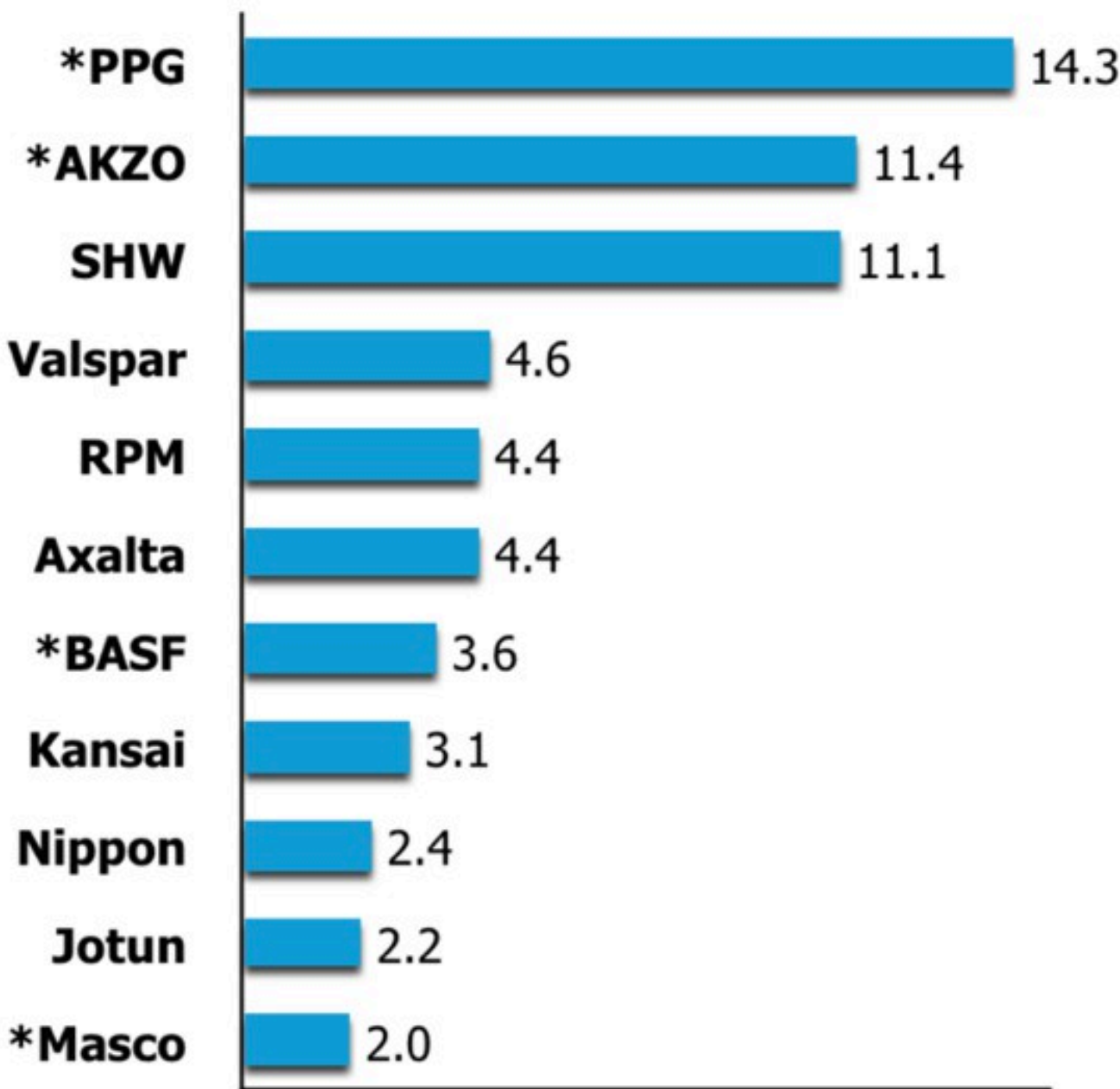
Total Paints and Coatings Market : \$120 Billion



Source: Jan 2016 Valspar Investor Presentation
after 2013 Orr & Boss, Kusumgar, Nerlifi & Growney

Fig 2. Paints and Coatings Market Leaders US\$/annum.

Global Leaders by Sales (\$Billion)



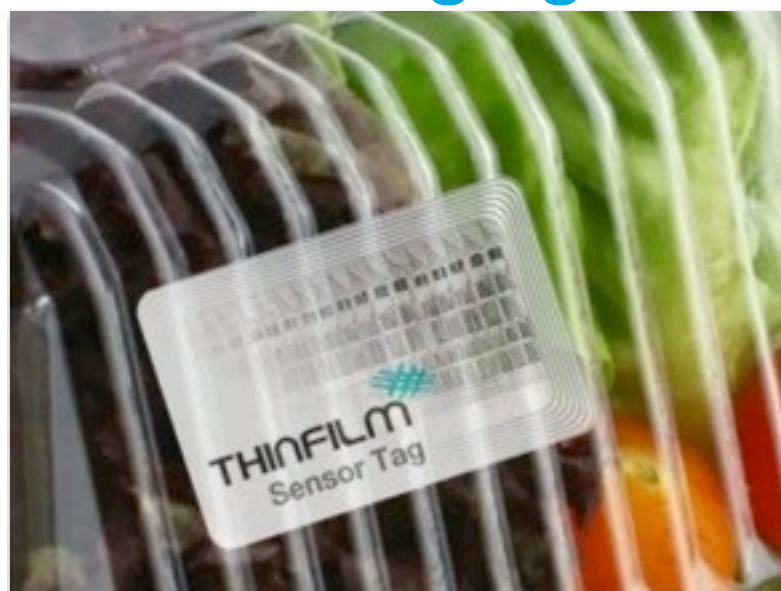
Source: Jan 2016 Valspar Investor Presentation & Company reports.
* Excludes non-coating sales

Printed conductive ink - PV Panels

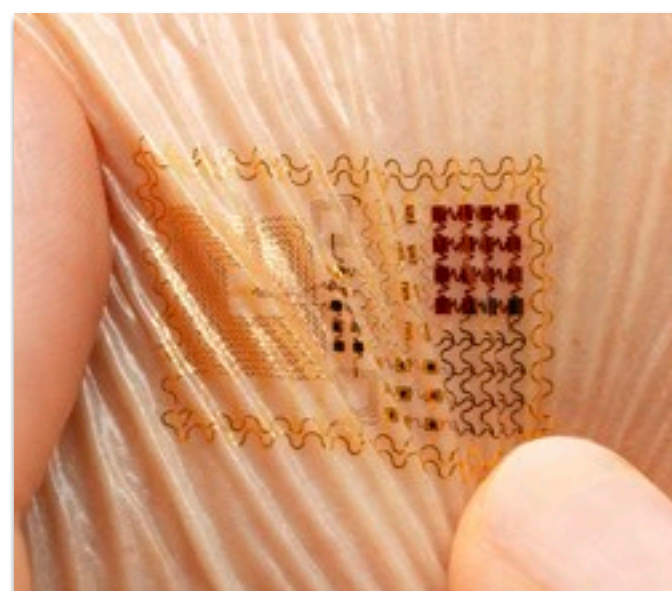


- ▶ **Current** conductive ink market relies on nano-silver and carbon black which are high cost
- ▶ Demand for silver in solar industry **78 million ounces** in 2015, **up 23%** over 2014*
- ▶ Graphene conductive ink can be lower cost and higher performing in some applications
 - ▶ Talga is developing a conductive ink targeting these markets in addition to making hybrid conductive polymers (plastic) to replace metal wiring in EV's, 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/>



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 more electrically and thermally **conductive**
- ▶ This would enable low voltage electric current to cause **warming** throughout the material without the need for high maintenance water-tubes and wired 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
- ▶ Graphene oxide has been shown to increase concrete **strength** similar to carbon nanotubes (eg, Edencrete) and this shall also be investigated secondarily to conductivity

Pilot Test Plant Expansion

- ▶ Pilot process test-work **well advanced**
- ▶ 3 phases to upscaling process – **Phase 2 just commissioned**
- ▶ **High quality** graphene output confirmed
- ▶ **~76%** of input carbon converted to graphene
- ▶ Capacity **scale up continues** towards Phase 3
- ▶ Product inputs represent the inventory for **customer samples**

Phase 2 pilot test platform



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



Some of Talga team at Phase 2 pilot plant commissioning



- ▶ Setting up of product development division (UK)
- ▶ Delivery of **products** for market testing and benchmarking
- ▶ Secure further **commercial** partnerships
- ▶ Continue **increasing scale** of pilot processing facility
- ▶ Feasibility/Permitting advances
- ▶ Test **revenue** opportunities
- ▶ Commercialise non-core assets (inc. cobalt)

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.

Graphene to Graphite Market on a Slide

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

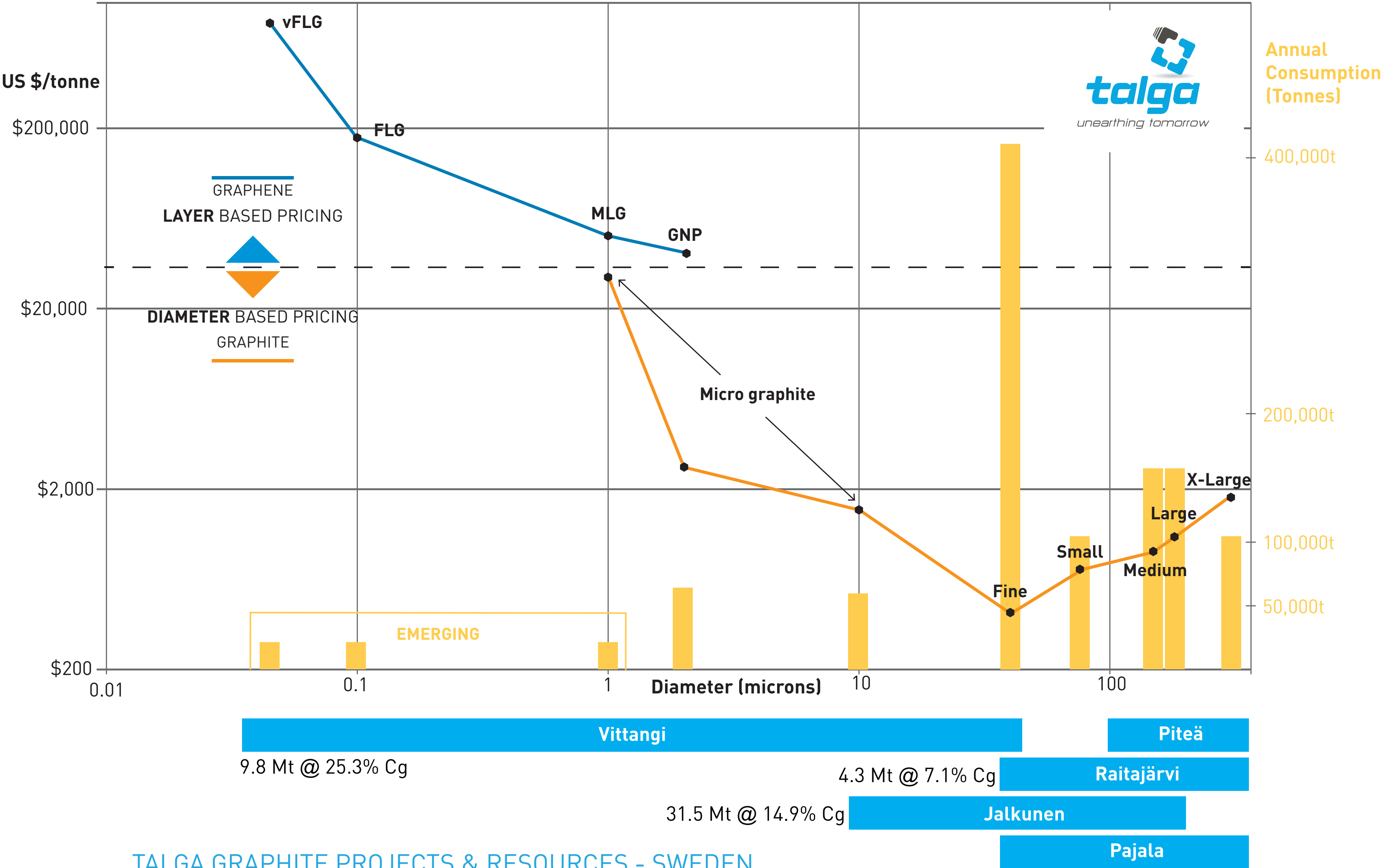
Micro to X-Large = Flake graphite (>3,000 sheets)

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



Graphite JORC Resources and Exploration Targets



Nunasvaara JORC (2012) Mineral Resource (10% Cg cut-off)

JORC 2012 Classification	Tonnes	Graphite (%Cg)
Indicated	6,900,000	24.2
Inferred	2,900,000	28.1
Total	9,800,000	25.3

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

JORC 2012 Classification	Tonnes	Graphite (%Cg)
Inferred	31,500,000	14.9

Raitajärvi JORC (2004) Mineral Resource¹ (5% Cg cut-off)

JORC 2004 Classification	Tonnes	Graphite (%Cg)
Indicated	3,400,000	7.3
Inferred	900,000	6.4
Total	4,300,000	7.1

Talga Graphite Exploration Targets ² 0-100m Depth

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
Rounded Total		136,000,000	250,000,000	18	25

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.