NATURAL GRAPHITE REPORT
Strategic Outlook to 2020

Data, Analysis, Forecasts

• Following on from the popular 2012 report
• Providing an update on the global supply and exploration situation
• New information on exploration and test methods
• Historical analysis and price forecasting
• How demand focus has altered with the clean energy revolution
• Graphene: commercial progression

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Natural graphite has long benefitted from demand from a variety of end markets, including refractories, metallurgy, lubricants and other carbon products. These reliable sources of demand have led to increased graphite exploration around the world over the past 100 years.

Yet it wasn’t until 2014 that this mineral hit the headlines in a big way.

The emergence of the lithium-ion (Li-ion) battery era – powered by research and development in portable electronic devices, electric vehicles (EVs) and large-scale storage solutions – has led to an increased amount of interest in battery minerals, including graphite.

Tesla Motors Inc.’s expansion plans are well known and its battery-making Gigafactory in Nevada, US, is reportedly ahead of schedule to reach its Phase 1 production capacity (sufficient for 100,000 EVs) by the end of 2015. The facility is due to ramp up to produce 500,000 units by 2020.

At full capacity, the Gigafactory is estimated to consume the equivalent of up to 120,000 tpa flake graphite, although these projections are based on assumptions about Tesla’s Li-ion battery chemistry.

Graphite exploration companies are also considering the potential for graphene, the nano-carbon material derived from natural graphite. Graphene is over 100 times stronger than steel and more conductive than copper. At the same time it is incredibly light and incredibly thin.

The updated Natural Graphite Report reviews every major graphite producing company around the world, as well as detailing global exploration activity. It also contains an in-depth focus on graphene, including its production, supply and demand.

In addition, the study will cover the following key topics:

- Graphite basics
- Exploration & testing methods
- Demand sectors
- Price forecasting

### World graphite production in 2014, by country

<table>
<thead>
<tr>
<th>Country</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brazil</td>
<td>80,000</td>
</tr>
<tr>
<td>Canada</td>
<td>30,000</td>
</tr>
<tr>
<td>China</td>
<td>780,000</td>
</tr>
<tr>
<td>India</td>
<td>170,000*</td>
</tr>
<tr>
<td>Mexico</td>
<td>8,000</td>
</tr>
<tr>
<td>Madagascar</td>
<td>5,000</td>
</tr>
<tr>
<td>Mozambique</td>
<td>30,000</td>
</tr>
<tr>
<td>Norway</td>
<td>2,000</td>
</tr>
<tr>
<td>Russia</td>
<td>14,000</td>
</tr>
<tr>
<td>Sri Lanka</td>
<td>4,000</td>
</tr>
<tr>
<td>Turkey</td>
<td>30,000</td>
</tr>
<tr>
<td>Ukraine</td>
<td>6,000</td>
</tr>
<tr>
<td>Zimbabwe</td>
<td>6,000</td>
</tr>
</tbody>
</table>

Source: USGS

(*India is probably about 1/3 of this)
Andrew Scogings, Industrial Minerals Consultant
CSA Global Pty Ltd
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Andrew Scogings graduated as a geologist in the late 1970s and started his career on underground copper mines in Zimbabwe, followed by a stint on Witwatersrand gold mines and general exploration for nickel, tin and rare earth elements (REE) in eastern South Africa. He was introduced in the late 1980s to industrial minerals while completing post-graduate MSc and PhD research on alkaline granitoid/nepheline syenite complexes in Natal, South Africa.

During the 90s Andrew was employed as a geologist and subsequently marketing manager for G&W Minerals, a leading diversified industrial minerals company based near Johannesburg.

Moving to Perth in 2002 Andrew found employment with AMCOL International, managing bentonite exploration projects in China, Turkey and Australia. During 2008 he established KlipStone Pty Ltd and has since worked on numerous industrial mineral projects including bentonite, chromite, potash, mineral sands, REE, vermiculite and graphite in countries across the globe. Andrew recently accepted a position as Principal Consultant at CSA Global, a leading geology and mining consulting company.

Emma Hughes, Special Projects Editor
Industrial Minerals Research

Emma joined Industrial Minerals in September 2012 as Deputy Editor following several years of technology research in the semiconductor, consumer technology and photovoltaics industries.

During her time at Industrial Minerals (IM), Emma has researched, written and devised editorial on all aspects on the industrial minerals supply chain, covering a wide range of minerals and markets including frac sand, bentonite, barite, soda ash, graphite, lithium and high-purity quartz. She is now the Special Projects Editor of Industrial Minerals Research.

Shruti Salwan, Analyst
Industrial Minerals

Shruti joined Industrial Minerals as a market analyst in 2012, following her previous experience of producing industrial reports on the metals, plastics and packaging markets. Prior to joining IM, Shruti worked as an industry analyst performing in-depth research and analysis, forecasting trends, and compiling data to produce detailed reports. Holding seven years’ experience with global research companies, Shruti now collects price and production data on graphite, rare earths and fluorspar and is a regular contributor to the Industrial Minerals magazine and website.

Albert Li, Analyst
Industrial Minerals

Albert joined Industrial Minerals in 2012 as a market analyst, working from the company’s Shanghai office. Prior to joining IM, Albert worked as a trader of south-east Asian minerals and for Astron Ltd as a sales engineer of Australian ilmenite, rutile and zircon.

Albert specialises in the Chinese industrial minerals market, with a particular focus on graphite and rare earths.
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