Mac Equity Partners

Equity Capital Markets

HAZER GROUP LTD (HZR) Update | Background

May 2017

STORING VALUE... FOR AN ELECTRIFYING 2017

Both hydrogen ($100+bn) & graphite ($15+b) are large markets, presenting significant opportunities to Hazer who are aiming to produce, low cost, low CO_2 clean energy, hydrogen and synthetic, high purity, highly crystalline graphite.

TICKING THE BOXES FOR SCALE UP

STRATEGIC PLACEMENT | $5m raised through Mineral Resources

- Hazer Process significantly de-risked through $5m strategic placement to $2bn market cap Mineral Resources Limited
- Discussions have commenced to enter into a Joint Venture to develop commercial scale plant

CONSTRUCTION COMPLETED | Initial hydrogen and graphite produced

- Pre-pilot plant construction completed. Initial hydrogen and graphite has been produced. Pre pilot plant to be fully commissioned in July 2017

GENERAL MANAGER APPOINTMENT | Cobus Malherbe

- Cobus is a Chartered Chemical Engineer with a Masters in Chemical Engineering and 20 years of experience in oil, gas and petrochemical industries
- As general manager, Cobus will lead all development and scale up work

OFF-TAKE | Early discussions with off-take partners

- Hazer has begun discussions with potential off-take partners and has plans to send synthetic graphite samples to these groups for independent testing and market validation

BATTERY TESTING | Hazer graphite continues to outperform

- Results indicate equivalent performance to commercial synthetic graphite after 50 and 100 cycles
- Results build on already impressive initial battery testing results in Dec 2016

PAN AMERICAN HYDROGEN | Memorandum of understanding

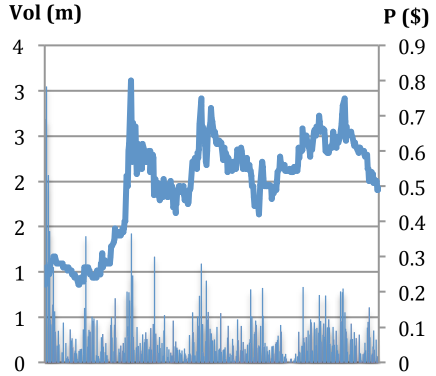
- Hazer and PAH to jointly develop a technical roadmap for integration of Hazer technology into standard hydrogen production units designed by PAH

THE HAZER PROCESS

The 'methane cracking' process offers low-CO_2 emissions at a low-cost industrial scale. Thermo-catalytic decomposition of methane has previously been researched with expensive and complex catalysts – however – due to the deactivation and effective consumption of the catalyst through the reaction, these processes are uneconomical. The innovative HAZER process instead uses a significantly less expensive catalyst and as a result can produce at highly economical margins and is ready for commercialisation. ***The two outputs of the HAZER Process, synthetic graphite and clean hydrogen are produced when natural gas is heated under pressure and in the presence of a catalyst, iron ore.***

GICS Sector	Materials
Shares on Issue (m)	76.4
IPO Share Price ($)	0.20
Post-IPO Closing Price ($)	0.22
Current Share Price ($)	0.51
Market Cap ($m)	38.9
Cash ($m)	9.38
Debt ($m)	0
Enterprise Value ($m)	29.58

PERFORMANCE SINCE LISTING



KEY PEOPLE

Rick Hopkins	Non-Exec Chairman
Geoff Pocock	Managing Director
Danielle Lee	Non-Exec Director
Terry Walsh	Non-Exec Director
Andrew Cornejo	Chief Technical Officer
Cobus Malherbe	General Manager – Process Development

KEY SHAREHOLDERS

Mineral Resources Ltd	14.2%
Geoff Pocock	5.8%
Andrew Cornejo	5.1%
University of WA	2.1%
Total Top 20	**~45.6%**

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STRATEGIC PLACEMENT TO LONG-TERM SUPPORTER MINERAL RESOURCES

A $5m placement to long-term strategic holder Mineral Resources gives significant validation to the technology and the capability of the management team to commercialise the Hazer Process. In addition, Mineral Resources are interested to work towards the establishment of a Joint Venture to develop a commercial scale synthetic graphite plant. The placement will see Mineral Resources increase their stake in Hazer to 14.2%.

In conjunction with the placement of $5m at $0.60 to Mineral Resources, a Share Purchase Plan was undertaken, successfully raising $2.1m. Shareholders on the record date of 17th March 2017 were given the opportunity to purchase up to $15,000 worth of Hazer shares at $0.60. In conjunction with the $5m placement and future cash injections from exercising of options, Hazer is fully funded for the foreseeable future.

INITIAL HYDROGEN AND GRAPHITE PRODUCTION – PRE PILOT PLANT

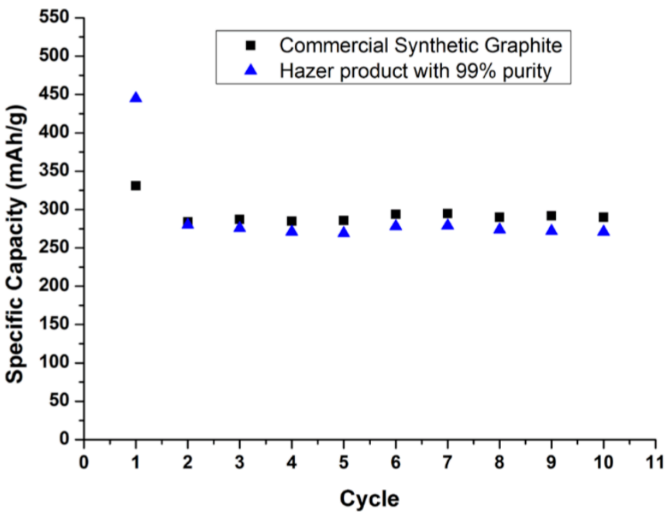
Hazer's pre pilot plant has been successfully built, with final commissioning currently underway. The pre pilot plant is significantly more advanced than the laboratory based equipment, and the progressive operation of this system will provide key information required to verify the final design of the next plant (small commercial pilot plant). At full operational ability the plant is capable of continuous operation, allowing natural gas and an iron ore catalyst to be fed into the system and subsequent graphite and hydrogen efficiently extracted and stored. Hazer has successfully produced initial quantities of hydrogen and graphite and expects to be fully operational and experimentation-ready in July 2017.

Hazer Group's pre pilot plant

HAZER'S GRAPHITE CONTINUES TO DELIVER EXCELLENT PERFORMANCE

Ongoing laboratory test work using Hazer's synthetic graphite continues to deliver excellent performance in half-cell lithium-ion batteries.

Initial battery testing conducted in early December 2016 showed that Hazer's non-optimised graphite product exceeded initial discharge specific capacity of both commercial synthetic graphite and natural graphite.



Specific discharge capacity of Hazer products vs commercial graphite

In recent longer term testing conducted in February 2017, Hazer's non-optimised graphite exhibited excellent performance over 50 to 100 cycles and across different charge / discharge rates, with virtually no loss in capacity.

- 50 cycles with reversible capacity of 280 mAh/g and 96% capacity retention (5 hours charge, 5 hours discharge)
- 100 cycles with reversible capacity of about 200 mAh/g and 98% capacity retention (1:h – 15:m charge, 1:h 15:m discharge rate)

Long-term cycling is critical to the performance of lithium-ion batteries for all applications. Hazer's most recent longer-term testing suggests that the excellent stability achieved in half-cell batteries could result in superior battery performance when tested as full cells.

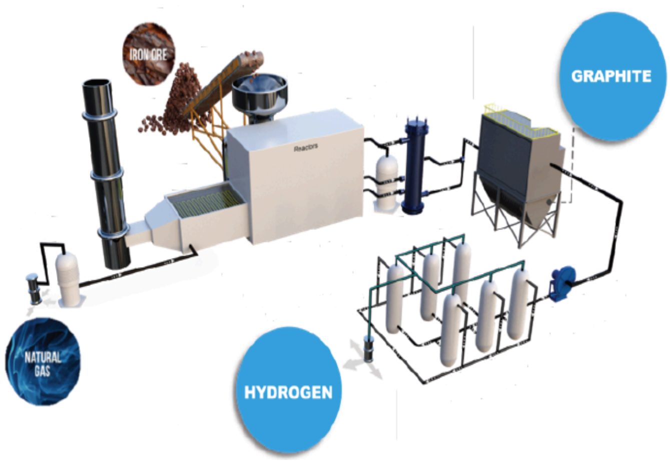
Hazer will continue to advance ongoing test work in collaboration with the University of Sydney. As larger and larger quantities of graphite are produced, the test work will move to larger scale battery testing to validate (for both Hazer's and potential off-take partner's) benefit the real world performance of Hazer's synthetic graphite.

DISCUSSION WITH POTENTIAL OFF-TAKE PARTNERS

On the 25th of January, Hazer announced it has begun discussions with potential off-take partners and has plans to send synthetic graphite samples to these groups for independent testing and market validation.

The proposed commercial prototype plant would be capable of producing hundreds of kilograms of combined hydrogen and graphite products per day. At these production rates, Hazer will be able to provide potential off-take partners with the quantities of graphite needed for larger scale battery testing.

Hazer is also investigating partnerships and other funding options to provide the construction capital that would be required for commercial prototype operation.



Schematic of a potential Hazer Pilot Plant

APPOINTMENT OF GENERAL MANAGER

Hazer has secured the services and expertise of Cobus Malherbe. In his role as General Manager Cobus will oversee all commercial development and scale up work, including the progression of the Pre-Pilot Plant. He will also oversee and be intrinsically involved in the potential establishment of the Joint Venture with Mineral Resources to develop a commercial scale synthetic graphite plant.

As a Chartered Chemical Engineer Cobus has held many senior roles with very large global oil and gas companies including Santos and Linc Energy. His expertise extends throughout engineering superintendent, technical and operations superintendent and senior process engineer (with specific expertise in catalyst research and development). Cobus is ideally placed to world with Hazer's already impressive technical and management team to take the Hazer process to the next stage of commercialisation.

MOU WITH PAN AMERICAN HYDROGEN

On the 14th November, Hazer announced it had signed a non-binding Memorandum of Understanding with Pan American Hydrogen Inc (PAH), a Texas-based global supplier of modular hydrogen generation plants, to jointly develop and commercially deploy the Hazer Process for low cost, low emission hydrogen production.

Hazer and PAH to jointly develop a technical roadmap for the integration of Hazer technology into standard hydrogen production for the US$100 billion hydrogen market.

The focus of the collaboration initially will be on small projects capable of producing ~100kg (~50Nm3H) of hydrogen per day.

This scale of plant has been identified as the initial small-scale production units necessary for distributed hydrogen vehicle refuelling systems.

Pan American has a track record of manufacturing and commissioning plants across Asia, Europe and South America within both the industrial chemical sector as well as the emerging alternative energy market.

"The potential for Hazer to offer the lowest cost hydrogen production technology globally, as hydrogen cost can be significantly reduced by credits from graphite sales "

Statement by Sergio Martinez, President of Pan American Hydrogen

A NEW ENERGY FUTURE – Lithium Ion Battery vs Hydrogen Fuel Cell

Electric Vehicles

Although traditional industries such as steel refractory and metallurgy account for the majority of demand for graphite by weight, non-traditional industries such as lithium ion battery and hydrogen fuel cells produced for use in vehicles are exhibiting extraordinary year or year growth. Demand for graphite used as anode material in lithium ion batteries is set to increase by 200% in the next four years. Most importantly, these high growth avenues are demanding *high purity, highly crystalline, spherical graphite*.

The electric car market is growing 10 times faster than its dirty gasoline equivalent. The global electric vehicles market is projected to grow at an impressive CAGR of 15.6% from 2016-2030. Nearly every major car manufacture in the world has an electric vehicle either in production or at an advanced concept stage.

Tesla Motors P100D

Hazer is in the unique position to potentially leverage its ability to produce synthetic graphite at a very low price point to supply the burgeoning electric vehicle market.

Price is the Limiting Factor

The major factor limiting large scale, high volume production of lithium ion batteries suitable for use in vehicles and home energy storage is the supply, and therefore price of graphite. Technological progress and economies of scale are critical to move towards cost parity with conventional internal combustion engines. A lithium ion battery contains more graphite than it does lithium. The ability to supply large amounts of synthetic graphite at a significantly lower price per tonne is the desired outcome of commercializing the Hazer Process.

What ever the future energy needs of the world, be it graphite for electric cars/home battery storage or hydrogen for use in fuel cells, Hazer is in a position to supply these valuable energy inputs through an environmentally friendly process and at a lower price point.

Hydrogen Fuel Cell Vehicles

Unlike fossil fuels, hydrogen represents a truly clean energy fuel, as combustion generates energy without CO_2 or other emissions. Hydrogen is exceptionally "energy dense" – 1kg of hydrogen can generate significantly more energy than a kilogram of other fuels. In comparison to electric vehicles, hydrogen fuel cell powered vehicles take less time to refuel (5-10 minutes) and overcome some of the limitations on total range capable using battery powered vehicles.

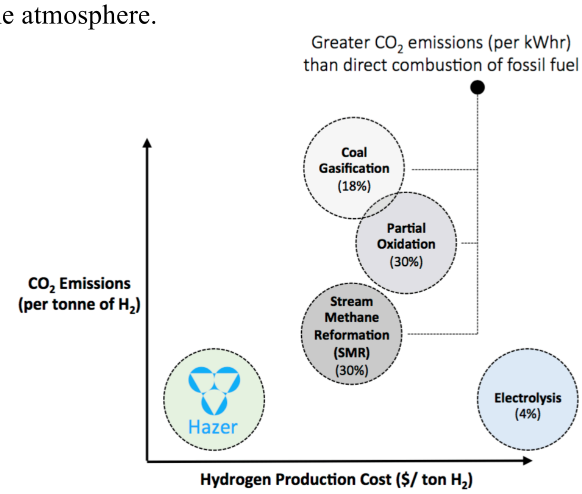
In light of hydrogen's favorable properties and the current limitations of electric vehicles a number of car manufacturers are heavily investing in hydrogen production, fuel cells and refueling networks.

The Hydrogen Economy

Japan has invested significantly in hydrogen, strongly believing it to be the clean energy source capable of replacing current oil derived energy. However, current methods of producing hydrogen are either high in green house gas emissions or very expensive. Recent media interest stemming from Kawasaki Heavy Industries and Shell's desire to ship hydrogen produced from brown coal in Australia's Latrobe Valley, and the CSIRO's membrane technology for extracting hydrogen from ammonia for use in fuel cells has thrust hydrogen and the hydrogen economy into mainstream conversation.

Traditional hydrogen markets

Ammonia and petrochemical refining industries are the biggest users of hydrogen, together accounting for over 90% of hydrogen demand globally. Captive hydrogen is produced on site through traditional steam methane reforming processes. Not only is this process costly, it also releases significant amounts of CO_2 into the atmosphere. A Hazer Plant could indicatively replace current hydrogen generation plants to save on the input cost of hydrogen as well as releasing significantly less green house gases into the atmosphere.



BACKGROUND | THE GRAPHITE MARKET

Graphite is a stable form of Carbon that, unlike diamond or coal, is an exceptionally good conductor of heat and electricity, and is soft and slippery making it ideal as a lubricant in many industrial processes. Its key uses range from refractory steel fabrication, automotive and aerospace industries and batteries.

Supply

The graphite market is broadly split into natural (mined) graphite and synthetic graphite produced from other carbon or hydrocarbon feedstock. Synthetic graphite is the larger market segment representing about 60% by mass and over 90% by value.[2] Synthetic processes can make graphite which is of high purity (99.95%), consistent quality and can be engineered to suit particular applications. Most synthetic processes use petcoke to manufacture, attracting prices as high as US$20,000/tonne. These processes are very energy intensive, potentially high cost. Naturally occurring graphite is found in three forms:

1. **Vein**: only 4000tpa, the purest form but consisting less than 1% of natural graphite market by mass due to rare occurrence.
2. **Flake**: high-purity flake graphite demand is overtaking the amorphous variety as emerging new technology applications such as batteries and flexible graphite products are beginning to represent a significantly larger portion of graphite market end users. Average grades of around 10%- 12% graphite although reach as high as 60% graphite. The graphite in these deposits can reach between 85% and 98% carbon through downstream purification. There are three primary sizes of flake graphite: fine (-100 mesh), medium (+100 mesh) and large flake (+80 mesh). Most consumers prefer to use high-grade, large-flake graphite for their products commanding between US$1400-3000/t.[3]
3. **Amorphous**: very fine flake, lowest value, metamorphosed coal/carbon rich sediments. At 30% graphite, the amorphous variety is used for lower-value applications and amounts to 50% of the total natural graphite market commanding US$600-800/t.[4]

In addition to synthetic graphite, specialty graphite such as spherical graphite, nanotubes and graphene, can be manufactured from normal graphite feedstocks and command high premiums.

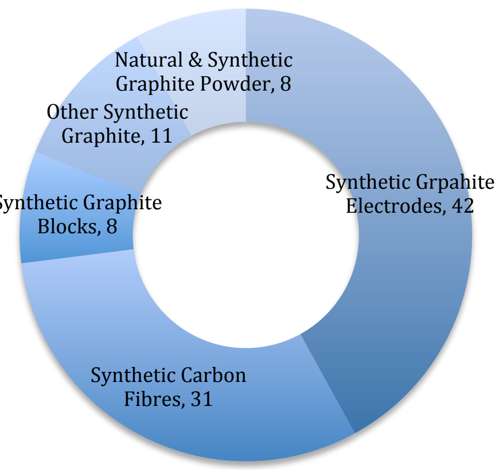
Market Size

The synthetic graphite market is of a similar size to the natural graphite market (~1.5Mtpa), but because products are more valuable (upwards of US$10,000/t) is worth an estimated US$12 billion.[2]

The natural graphite market (1.2Mt/yr) is of similar size but worth significantly less at approximately US$1B/yr. Annual consumption is split approximately 50% amorphous and 50% flake, with 75% of graphite production coming from China, though exports are expected to decline: In 2011 China applied a 20% export duty on graphite on top of the existing 17% VAT, resulting in a 30.7% drop in annual exports to February 2012.

The combined graphite market size is therefore circa US$13 billion.

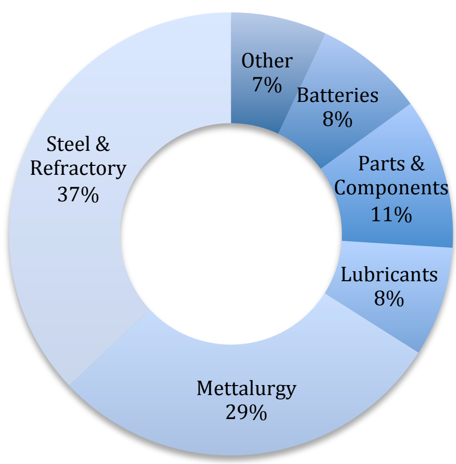
Supply of Graphite by Value[2]



Applications

Synthetic graphite has a number of applications ranging from lithium ion batteries, fuel cells, super-capacitors, carbon fiber and graphite blocks.

Demand for Natural Graphite by Application, 2011[5]



BACKGROUND | HYDROGEN MARKET

Methods of Production

Industrial hydrogen production is dominated by fossil fuel based reforming technologies. These methods all result in significant carbon dioxide production as a co-product of the hydrogen synthesis reaction unless expensive carbon capture and storage (CCS) technologies are also incorporated. The various production methods are:

- Steam reforming of natural gas: (also known as steam-methane reforming or SMR) steam reacts with methane at 700–1,100°C in the presence of catalysts to yield carbon monoxide and hydrogen. The carbon monoxide is then reacted with additional steam, generating carbon dioxide. SMR is the least expensive and most popular hydrogen production method (accounting for 48% of the market[2]), and has the lowest carbon emissions compared to other processes using fossil fuels.
- Partial oxidation of hydrocarbons: heavy hydrocarbons such as diesel fuel and residual oil are partially oxidised with oxygen and steam to yield hydrogen together with carbon oxide by-products. The process is much like SMR, but using a heavier feedstock, resulting in a more significant greenhouse gas emission profile. It is the second largest production process (30% of the market) and is favoured in locations where hydrocarbons are plentiful and natural gas is unavailable.
- Gasification of coal: hydrocarbon fuels such as coal and heavy residual oils are reacted with a deficit of oxygen to produce a mixture of carbon monoxide and hydrogen at 1,200–1,350°C. It is the third largest production process in the market (18%), and is expected to increase in market share due to the wide availability and low prices of coal worldwide.
- Electrolysis of water: electricity can be passed through water to decompose it into oxygen and hydrogen. Hydrogen is not produced on a large scale by this process due to the high costs of energy, materials and labour.

If the energy required for the process can be harnessed from clean or renewable energy sources, this approach can generate 'clean' hydrogen, enabling overall clean energy generation. However, the energy value of the hydrogen produced is less than the energy required to generate the hydrogen. This limits the application of the approach to systems where there is a surplus of energy or where the hydrogen can be used as an energy transport medium. It is the smallest production process segment at 4% of the market.[2]

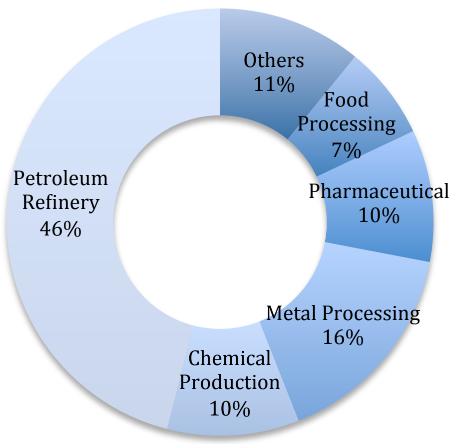
Market Size

The hydrogen generation market is estimated to be worth US$104 billion,[2] growing at between 5-6% per annum for the next 5 years.[7] This reflects a size of 64 million tpa.[2] On the basis of production and delivery, the hydrogen market is segmented into merchant production and captive production. Captive production is the largest production segment in the hydrogen market, where hydrogen is produced for direct use onsite, and distribution of hydrogen is not required. It is mainly used in petroleum refining and ammonia production. Demand for captive hydrogen is largely dependent on these industries. Merchant hydrogen production, a much smaller segment of the global hydrogen market, refers to hydrogen that is produced and then delivered to other locations as an industrial gas. It is mainly used in the production of hydrogen peroxide, ammonia, toluenediamine, and synthesis gases such as methane. It is also used in the food and beverage processing industry for the hydrogenation of fats and oils, to manufacture float

Applications & Market Growth

The petroleum industry and ammonia production industries are the primary end-users for hydrogen, together accounting for over 90% of global hydrogen production. Secondary end-user industries for hydrogen include chemical manufacturing (methanol), food processing, pharmaceuticals, and metal processing industries.

Demand for Hydrogen by Application, 2014[6]



Hydrogen is also used as a fuel in its own right, as the cornerstone of the growing 'hydrogen economy'. Hydrogen has the greatest energy density per unit mass of any fuel, although lower energy density on a volume basis due to hydrogen's extremely low physical density. However, its application in energy markets is constrained by existing production methods which are not clean, cost effective or energy efficient.

KEY RISKS

- Technology Risks: Notwithstanding the patents pending and the successful lab-scale results, the HAZER Process is still in its development stage. There is significant risk with respect to the company's ability to develop and scale the process economically, as outlined in its commercialization plan.
- Capital Risk: the Company does not expect to earn profits on its technology through its development stage, meaning development is subject to investor funding availability until commercialization sees it produce positive cash flows. The Company's ability to attract such additional capital as it might require is subject to a number of factors including general capital market conditions and investor appetite for risk generally, as well as risk appetite for investment in sectors relating to Hazer's operations, namely graphite and hydrogen.
- Input Cost Risks: the HAZER process is heavily reliant on natural gas as its main input and as a result is exposed to fluctuations in its price which could affect profitability.
- Key Personnel Risk: the Company is dependent on the ability of management to advance the HAZER Process, and loss of personnel could impede its ability to do so.
- Intellectual Property: will be sought to be extended in respect of the technology, however there is a risk that the Company's attempts to secure IP protection through either patents or trade secrets arrangements may not be successful. Failure to adequately maintain suitable IP protection may enable other companies to more effectively compete with the Company and may impact the Company's future operations including revenue and profitability.

REFERENCES

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