

## **HAZER SIGNS MOU WITH PRIMETALS TECHNOLOGIES**

A JOINT VENTURE OF MITSUBISHI HEAVY INDUSTRIES AND SIEMENS

- **Hazer executes MoU with Primetals Technologies Austria GmbH, a leading global engineering company and solution provider for the metals industry**
- **Hazer and Primetals Technologies to jointly investigate utilising the Hazer Process to reduce the cost and environmental impact of steel production**
- **Collaboration could accelerate commercialisation of the Hazer Process and deployment of Hazer's technology within a new market**

**PERTH, AUSTRALIA; MONDAY 16<sup>TH</sup> OCTOBER:** : Hazer Group Ltd ("Hazer" or "the Company") (ASX:HZR, HZRO) is pleased to announce that it has signed a non-binding Memorandum of Understanding ("MoU") with Primetals Technologies Austria GmbH ("Primetals Technologies"), a joint venture of Mitsubishi Heavy Industries and Siemens, to jointly investigate the commercial and technical viability of utilising the Hazer technology in the steel industry.

Under the terms of the MoU, Primetals Technologies and Hazer will jointly develop a roadmap to investigate the viability for the Hazer Process to increase the energy efficiency and reduce the environmental impact of steel production – A Project called "Hazer, Steel, Carbon Capture and Methanol Project" or "HSCCM Project".

Both parties will work towards engineering a Technology Package, whereby hydrogen produced by the Hazer Process could be used for steel production with minimum carbon footprint, i.e. for direct reduction of iron ore and/or for the production of methanol. In addition, the graphite by-product from Hazer's hydrogen production could be used as an alternative reductant or carburiser in the steel making process.

Managing director Geoff Pocock said "Hazer is excited by the opportunity to integrate into the steel industry, reducing both costs and greenhouse gas emissions associated with this massive market. Primetals Technologies is the ideal partner for us to explore these options, as they have decades of experience in these markets, as well as significant engineering expertise in scale up of production systems and commercially deploying them in this market. This background makes the group an ideal co-partner for Hazer, and we are looking forward to working in partnership with both Primetals Technologies and Mineral Resources Ltd on the ongoing commercialisation of the Hazer technology".

Dr. Alexander Fleischanderl, Technology Officer Up-Stream for Primetals said "The Hazer Process is a fascinating vision and an excellent paradigm how the carbon footprint can be minimized cross various industries. Clearly a win-win for the steel industry, the chemical industry, the e-mobility and the climate."

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## **Hazer and the Steel Industry:**

Hazer and Primetals Technologies have identified a number of potential applications for the Hazer technology to be commercialised within the steel industry. The initial focus is on three core opportunities:

### **1 - Carbon Capture and Utilisation; Methanol Production**

The production of steel is a major contributor to greenhouse gas emissions globally, and in a number of global markets, especially Europe, the industry is under increasing regulatory pressure to reduce emissions. A potential cost-effective means of reducing emissions is Carbon Capture and Utilisation (CCU), whereby CO<sub>2</sub> emissions can be captured and chemically converted to valuable downstream products, including methanol or synthetic liquid fuels.

A key component of many CCU systems is the production of hydrogen, at a suitable cost and with little or no CO<sub>2</sub> emissions (as CO<sub>2</sub> emissions from hydrogen production would significantly offset the CO<sub>2</sub> reductions effected by the CCU process). Methanol is a favoured target product for CCU systems, as methanol production from CO<sub>2</sub> and hydrogen (known as the syngas process) is the predominant production method globally.

### **2 - Hydrogen as alternative reductant of iron ore**

A significant portion of CO<sub>2</sub> emissions in steel production arise from the reduction process of iron ore using carbon-based reductants; primarily coal. Alternative hydrogen-based reduction processes have been considered historically, but rely on the availability of low cost and low emission hydrogen production (as CO<sub>2</sub> emission reductions from hydrogen-based steel production would be offset by CO<sub>2</sub> emissions from the associated hydrogen production).

Hazer's low emission hydrogen production has the potential to therefore enable the use of hydrogen as an alternative to carbon-based reducing agents, significantly reducing the CO<sub>2</sub> footprint of steel production.

### **3 - Potential for graphite as alternative to coal in the steel making process**

A third area of investigation is for the use of graphite produced by the Hazer process to be used as a co-reductant for steel making, reducing the need for coking coal and providing a bulk outlet for lower grade graphite concentrates produced from the Hazer process.

The graphite could also act as a carburiser, providing the necessary carbon content for steel. Currently steel products range in carbon content from 0.05% to 4% by mass, and this carbon can be added through a variety of sources, including graphite.

The Hazer Process can make raw graphite at purity ranging from 80 to 95%, with the principal impurity being the iron residue from the iron ore used as a catalyst. As such, this material could be an ideal reductant or carburiser for the steel industry; this would in effect provide a new bulk tonnage market for low grade graphite produced by the Hazer process where beneficiation and delivering product for higher value graphite applications is not commercially feasible.

A possible flowsheet for a Hazer plant integrated into steel production, using Hazer to supply any of hydrogen for CCU (methanol production), hydrogen for direct reduction or graphite as an alternative reductant is shown in Figure 1 on the following page.

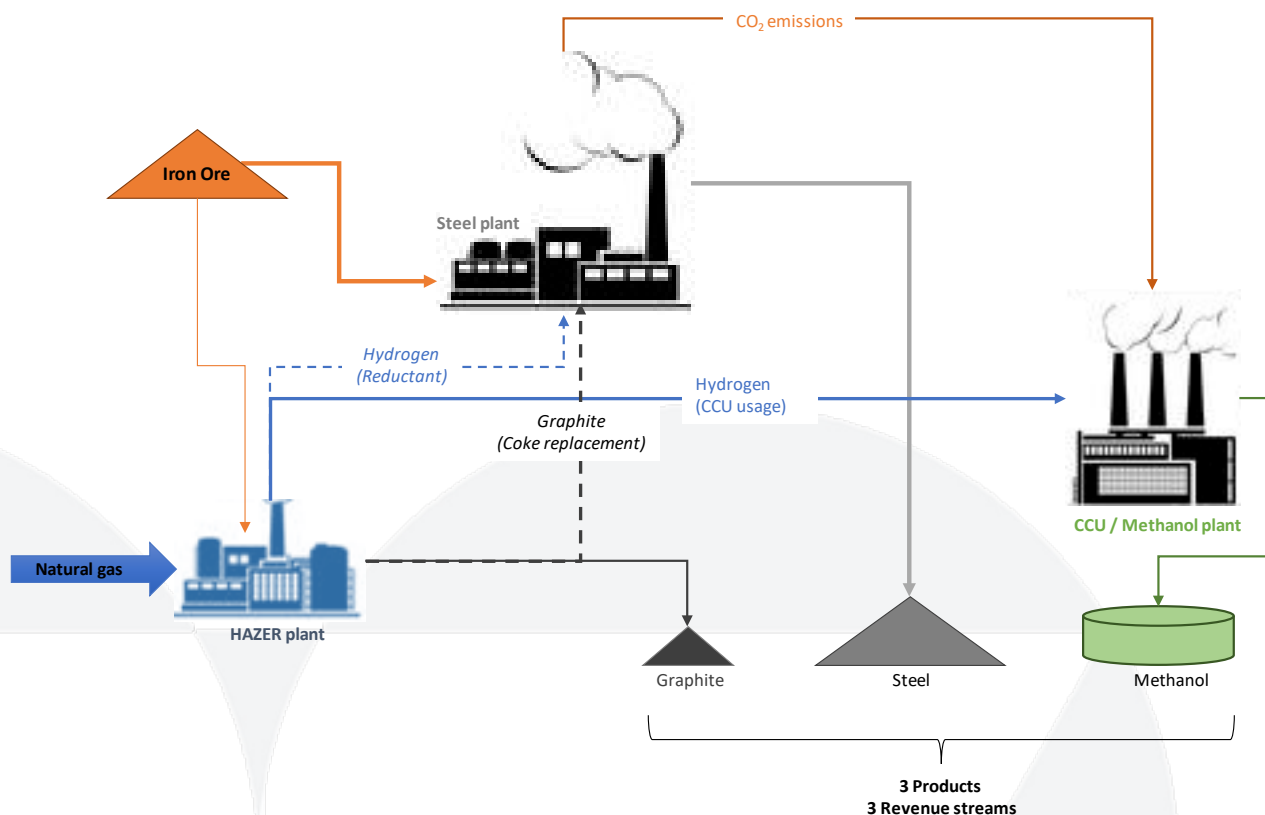


Figure 1 – Indicative flowsheet of Hazer plant integrated into steel production

## Collaboration Process and Outcomes:

Initially, the focus of this collaboration will be the exchange of technical information and the joint development of the necessary Technology Roadmap, to be then formulated through a binding Joint Development Agreement in early 2018. The Joint Development Agreement will focus on necessary feasibility studies as well as undertaking front end engineering and development of a commercial prototype plant.

If successful in developing a commercially viable Technology Package, Hazer has agreed to sign a worldwide exclusivity agreement, providing Primetals Technologies with exclusive rights to use the Hazer Technology for HSCCM Projects, plant building and operation licenses, on commercial terms to be agreed. This license would be complementary to the commercial license negotiated with Mineral Resources Ltd for high grade graphite production.

If successful, this anticipated arrangement would accelerate the commercial development of the Hazer technology substantially, as well as accelerating the commercial deployment of the Hazer technology within a new market.

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## ABOUT HAZER GROUP LTD

Hazer Group Limited (“Hazer” or “The Company”) is an ASX-listed technology development company undertaking the commercialisation of the Hazer Process, a low-emission hydrogen and graphite production process. The Hazer Process enables the effective conversion of natural gas and similar feedstocks, into hydrogen and high quality graphite, using iron ore as a process catalyst.

## ABOUT PRIMETALS TECHNOLOGIES

Primetals Technologies was founded by Mitsubishi Heavy Industries and Siemens in 2015 to drive innovation in the field of metals production, following on from decades of innovation by Primetals Technologies’ predecessor entities, Siemens VAI and Mitsubishi-Hitachi Metals Machinery. Primetals Technologies are a full-line provider across the metal production value chain, from raw materials to finished product, and provide metals producers with tailored solutions and plant equipment. Current focus areas for Primetals Technologies include new ecological solutions, advanced process analysis and optimization.

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