

## PRE-PILOT PLANT UPDATE – ACHIEVEMENT OF SUCCESSFUL ON-LINE CATALYST INJECTION

- **First successful injection of fresh catalyst (iron-ore) into operating Hazer reactor**
- **This milestone by-passes the need for semi-continuous operation**
- **Successful graphite production with raw purity levels of 87%**
- **Next generation reactor design underway to increase graphite production and purity**

**PERTH, AUSTRALIA 22<sup>nd</sup> November 2017:** Hazer Group Ltd (“Hazer” or “the Company”) (ASX:HZR, HZRO) is pleased to announce it has successfully demonstrated on-line injection of iron ore catalyst into the Pre-Pilot Plant, marking a significant step towards de-risking the scale-up of the technology.

This represents the first time that fresh catalyst has been introduced to the reactor while maintaining temperature and pressure conditions for production of hydrogen and graphite, and is a key process condition necessary for continuous operation of the Hazer process.

These positive results have alleviated Hazer’s need to pursue the semi-continuous stage, where catalyst is injected prior to operation, and will enable Hazer to implement significant design improvements in the development of a next generation reactor system.

Hazer’s operations since commissioning the Pre-Pilot Plant have also demonstrated preliminary success in ejection of graphite from the reactor, thus partially demonstrating initial “fully continuous” operation. The Pre-Pilot Plant has also generated valuable information on process operations, and has shown significant improvements across a range of parameters including run time, conversion rates, reaction selectivity and fluidisation behaviour.

Hazer Group Managing Director Geoff Pocock said: “This is a key achievement for the Company, and we are extremely excited by this demonstration of catalyst addition while maintaining underlying reaction conditions. This milestone positions us for implementing further improvements in our next generation reactor design, and significantly de-risks the commercial implementation of the Hazer Process. “



*Hazer's technical team checking systems at the Company's Pre-Pilot Plant.*

### **GRAPHITE PRODUCTION RATES AND PURITY:**

Graphite production volumes have increased by over 50% since commissioning, with peak production rates as high as 1kg per day of graphite and 0.35kg per day of hydrogen. Further design improvements are expected to increase these peak values as well as enable higher production rates for extended periods of time.

Initial operations have also seen production of raw graphite purity as high as 87%, in line with previous laboratory results, and with clear scope for improvement as reactor design is further optimised. These initial purity levels are extremely encouraging, as Hazer previously demonstrated the production of 99.95% ultra-high purity synthetic graphite from raw graphite of similar purity levels (86%).

In addition, key physical characteristics of the graphite produced in the Pre-Pilot Plant are similar to that of previously produced, laboratory scale samples, and are within the range of characteristics for standard lithium-ion battery uses.

### **HIGH REACTION SELECTIVITY AND VERY LOW PRESENCE OF UNWANTED BY-PRODUCTS:**

Gas analyses confirm that the Hazer process is highly selective towards the production of hydrogen and graphite as primary products, with very low production of unwanted by-products (including CO, CO<sub>2</sub> and other hydrocarbons).

Initial results indicate:

- Hydrogen production selectivity at ca. 97 mole-%
- Graphite production selectivity of ca. 99 mole-%

These results are highly encouraging as unwanted side reactions are a common problem in process scale up, especially as processes are taken out of laboratory settings. Side reactions and unwanted products can cause substantial downstream issues or process optimisation hurdles.

### **NEXT GENERATION REACTOR TO INCREASE PRODUCTION AND PURITY:**

Hazer is now undertaking the design and implementation of a second-generation reactor system, with plans to implement these improvements in conjunction with a staged reactor scale-up process.

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This second-generation Pre-Pilot Plant is anticipated to enable superior performance across a range of parameters including fluidisation performance, heat management necessary for increased graphite and hydrogen production and operating run times, as well as optimisation improvements to increase raw graphite purity.

These improvements and the commissioning of the second-generation reactor are expected to be completed in the middle of 2018.

**[ENDS]**

**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.

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