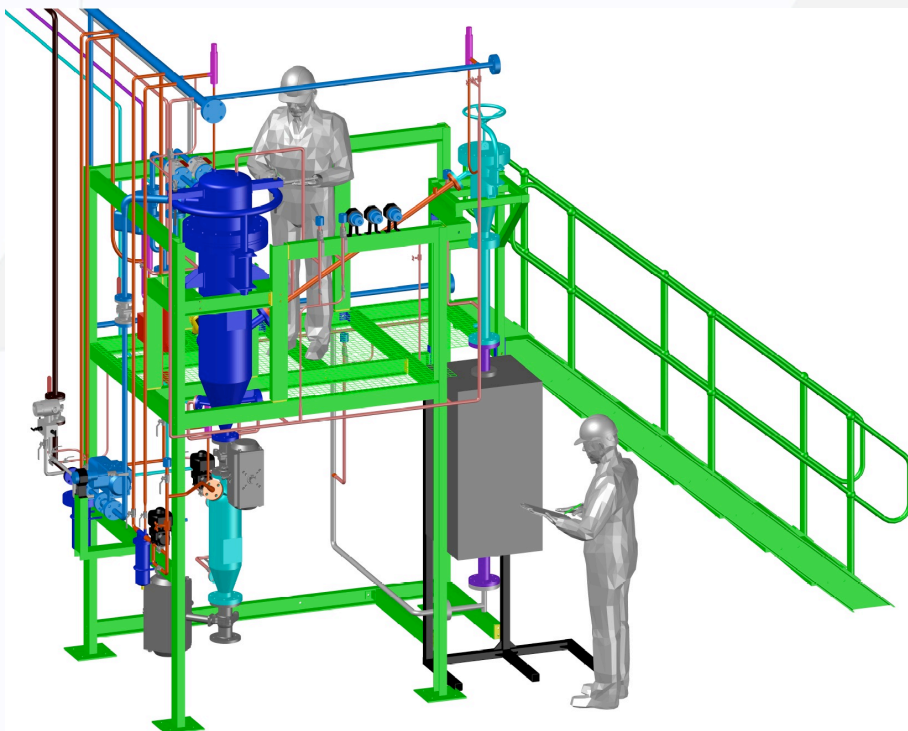


## PRE-PILOT PLANT & SCALE UP UPDATE

- Construction of Hazer's pre-pilot plant facility begins as the company progresses into the next phase of commercialisation and scale-up
- First non-laboratory plant to show scalability and operation of the Hazer Process
- Designed for multiple operating process methods, including full continuous operation with on-line catalyst (iron ore) ingress and graphite ejection.
- Construction and commissioning of the plant (first graphite production) in Q1 2017

**PERTH, AUSTRALIA; 25<sup>th</sup> JANUARY 2017:** Hazer Group Ltd ("Hazer" or "the Company") (ASX:HZR, HZRO) is pleased to provide the market with an update on the construction of the company's pre-pilot plant facility and the ongoing scale-up stages and timelines.

Hazer has now commenced the construction of its pre-pilot facility (as described in the company's announcement to the ASX on 26<sup>th</sup> October 2016). This plant is a key stage in the development of the Hazer process, and is the first stage in Hazer's transition from laboratory-based standard equipment to a custom-designed and constructed plant.



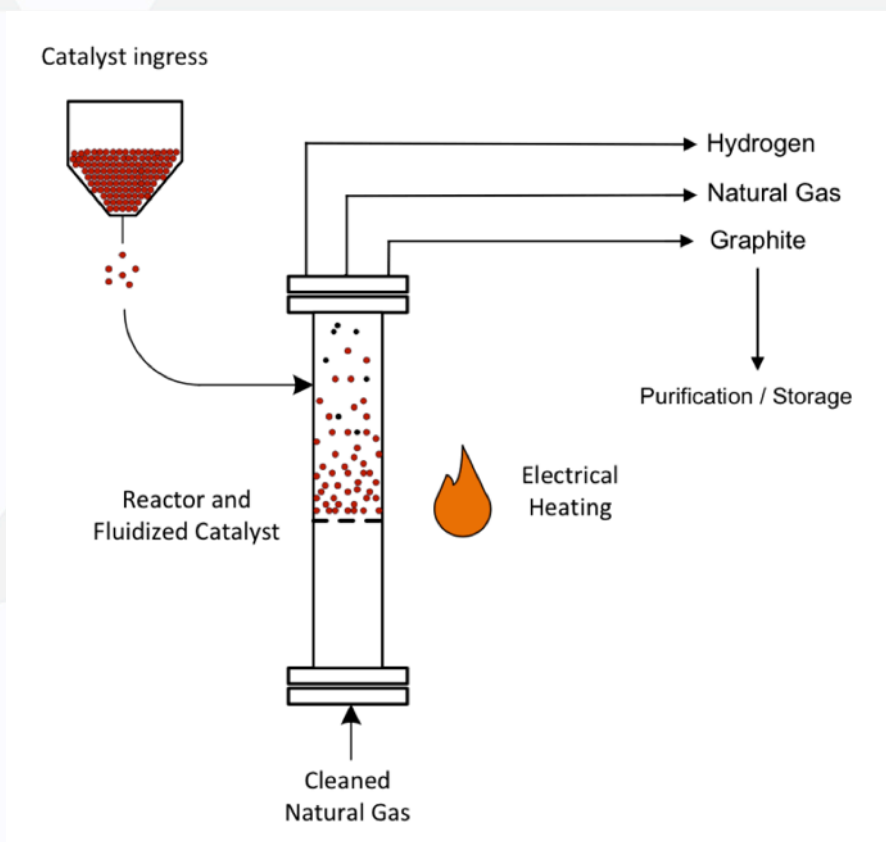
*\* CAD rendering of Hazer Groups pre-pilot plant*

Kemplant, Hazer's strategic chemical engineering partner, is leading the design and fabrication of the pre-pilot plant and Metro Engineering, a key supplier of industrial gas equipment, has agreed to allow Hazer to construct the plant within their secure industrial location based in St Mary's, Sydney.

The pre-pilot plant is designed to be versatile and to allow for multiple operating process methods across the full range of temperature and pressure conditions using an innovative modular design. In the final mode of operation the system will be able to feed in fresh catalyst as well as capture the graphite produced during operation, at capacities exceeding the current lab-scale units.

This 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). The key improvements at full function compared to the previous stage are:

- Multiple processing methods of operation and operational flexibility
- High pressure, temperature and gas flow capability to allow for full system optimization
- Upgraded graphite capture system to allow for greater extraction efficiency
- Capability to eject graphite during operation
- Capability to inject catalyst into the system during operation





*\*Work beginning on Hazer's pre-pilot plant facility at St Mary's Sydney*

This facility has been fully funded from Hazer's ongoing R&D budget and the total costs for the plant, including construction and commissioning costs will be finalised upon completion. Hazer is also in early stage discussions with a number of potential off-take partners and plans to send synthetic graphite samples produced from this facility to these groups for independent testing and market validation.

## HAZER PROCESS – SCALE UP PROGRESSION

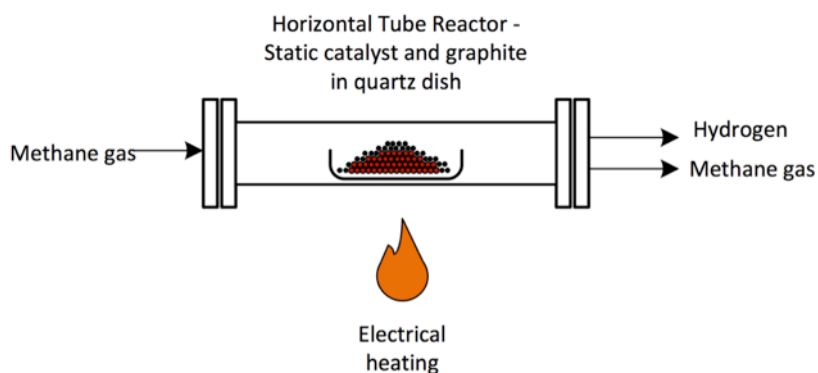
Prior to IPO, four key development stages were identified necessary to develop the Hazer technology into full-scale commercial plants, where each stage incrementally increasing in size and complexity in manageable segments. Two of the four stages have now been completed; with the third stage (pre-pilot plant) currently under construction. An overview of the various scale up stages and timelines are illustrated below.

### STAGE 1 - STATIC BED REACTOR (FULLY COMMISSIONED)

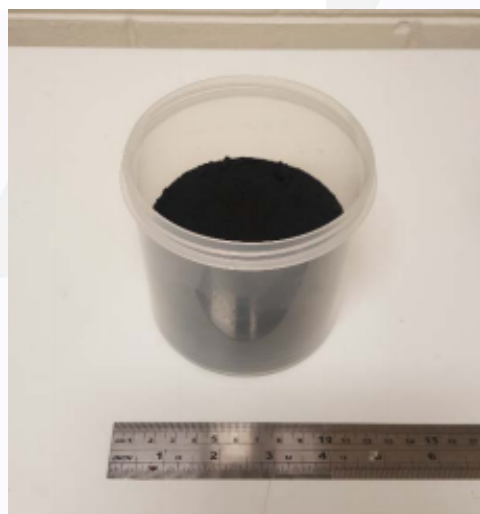
The first stage of Hazer's scale up process was the commissioning of a Static Bed Reactor (SBR) to enable the rapid synthesis and testing of different graphite products; which can be altered significantly by changing the reaction conditions and catalyst properties. The SBR sees methane (the main constituent of natural gas) pass over a static dish containing powdered catalyst (iron ore) within a horizontal tube reactor at elevated temperatures and pressures.

Reaction conditions were adjusted to assess the resulting structures and purity of the graphite product, as well as generate preliminary data on the reaction kinetics under different conditions. Through the initial SBR systems, Hazer increased graphite production capacity by some 50x compared to pre-IPO capacity.

Stage 1 - Static Bed Reactor System



\* Hazer's Static Bed Reactor



\*SBR produces 10s of grams of graphite

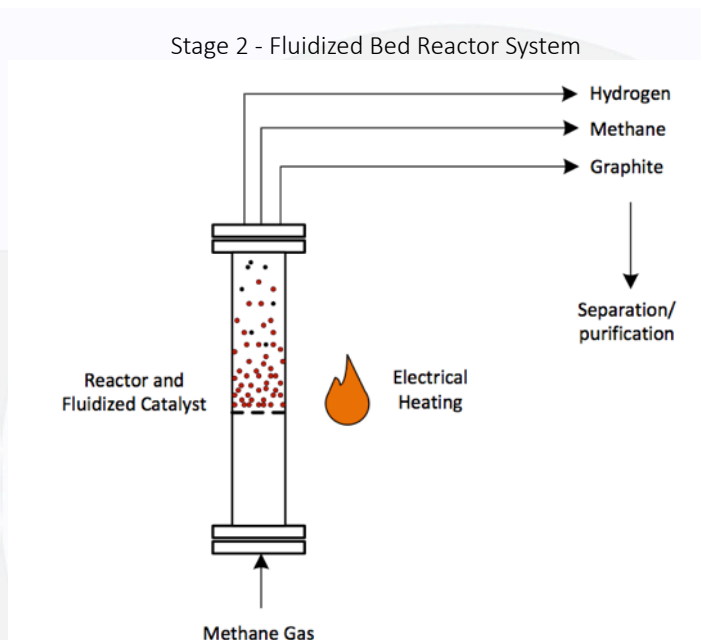


## STAGE 2 - FLUIDIZED BED REACTOR (FULLY COMMISSIONED)

A Fluidized Bed Reactor (FBR) is a reactor system that is used extensively in large scale industries to perform a variety of multiphase chemical reactions, where a fluid (gas or liquid) is passed through solid particles (often catalyst), making them behave as though they were a fluid (or “fluidization”).

The FBR utilized by Hazer in Stage 2 operates at elevated temperatures and atmospheric pressure in semi continuous fashion. The upward flow of methane gas fluidizes the catalyst particles, enabling the reaction to proceed more effectively than in the previous static bed reactor systems.

Hazer commissioned its FBR system in early 2016 and has enabled fluidization studies to be conducted to assist in the design of the subsequent scale up stages. This system was successful at producing graphite at reaction rate up to 1.5kg per day, representing a 5000x increase in pre-IPO capacity.



\* Hazer's Fluidized Bed Reactor



\*Top down view when in operation



\*1KG of graphite produced per day

## STAGE 3 - PRE-PILOT PLANT (Q1 2017)

The current phase in the on-going scale up process is the pre-pilot plant (mentioned on page 1-3), which will enable the final verification of the design for the larger commercial scale pilot plant.

#### STAGE 4 - SMALL COMMERCIAL PROTOTYPE PLANT (2018)

Following commissioning and operation of the pre-pilot plant, Hazer intends to construct a prototype small scale commercial hydrogen and graphite plant, which will include all upstream and downstream gas processing necessary for commercial hydrogen applications, such as in fuel cell vehicles. The intended scale of this stage represents functional commercial scale for the Hazer process, and Hazer is in discussions with a number of parties for off-take agreements for this initial prototype commercial unit, and is also investigating partnerships and other funding options to provide the construction capital that would be required for this scale operation.

This proposed commercial prototype plant would be a larger version of the pre-pilot plant, inclusive of all the common gas processing stages available in common industrial hydrogen production plants, such as steam methane reforming (SMR). The capacity of this plant is expected to be in the order of hundreds of kilograms per day of combined hydrogen and graphitic products; discussions with a range of hydrogen market users and other groups have identified this scale as ideal for many hydrogen-to-energy projects including distributed vehicle refuelling systems, and successful development of this prototype commercial plant would then enable widespread commercial deployment of this scale production plants.

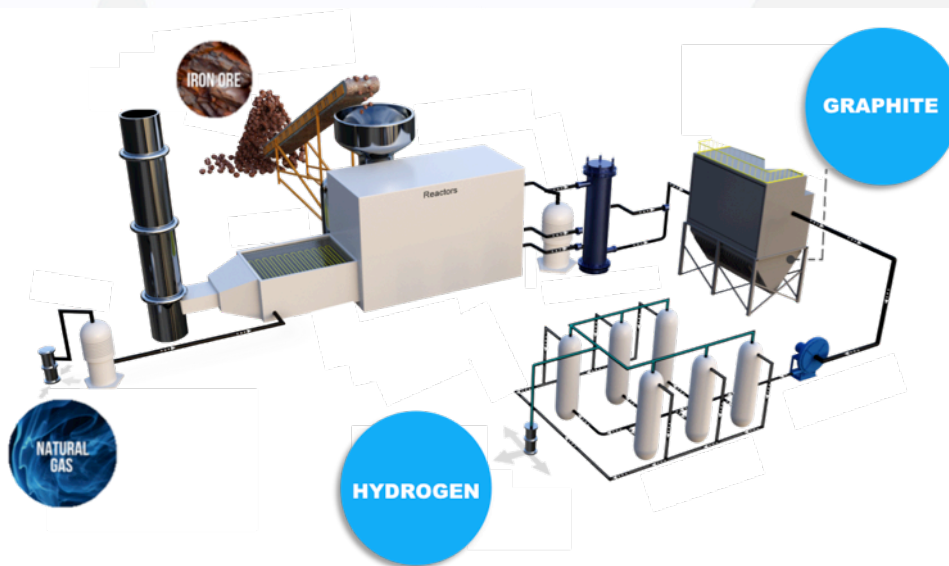
This small commercial prototype plant would also function as a pilot plant for increased scale production plants which would be potentially capable of producing hundreds of tonnes of products per day, as currently undertaken by traditional natural gas to hydrogen plants.

Geoff Pocock, Hazer's Managing Director, commented:

*"We are delighted by the rapid progress that Hazer has made over the past 12 months, and to be building our first non-laboratory production plant so rapidly after IPO is a sign of the simplicity and robustness of the underlying Hazer technology. This plant will enable Hazer to more effectively engage with commercial partners and demonstrate the core Hazer value proposition."*

Dr Andrew Cornejo - Hazer's Chief Technical Officer also commented;

*"Hazer is progressing rapidly on the commercial up-scaling of the Hazer process, through use of known and tested approaches, such as fluidized bed reactors. The design and construction of the pre-pilot plant is a major milestone that we believe will show the scalability and versatility of the Hazer process to deliver valuable products to both the global graphite and hydrogen markets"*



*\*Schematic of a potential Hazer Pilot Plant capable of producing hundreds of kg's of combined hydrogen and graphite per day*

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**[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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