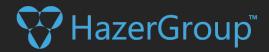
hazergroup.com.au ASX:HZR

# **Hazer Group**

**Bell Potter Unearthed** 

14 February 2024







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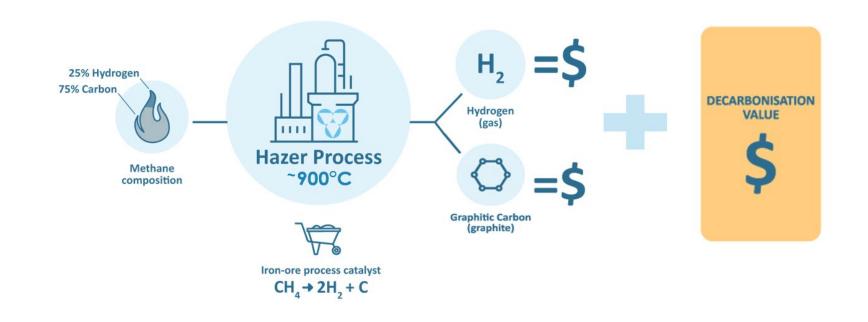
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## Hazer's competitive technology advantage

Innovative low emission, low-cost methane pyrolysis technology producing clean hydrogen and graphite

- Hazer Group Limited is a technology development company undertaking the commercialisation of the Hazer Process
- The Hazer Process enables low temperature conversion of natural gas and similar methane feedstocks, into hydrogen and high-quality graphite, using iron ore as a process catalyst







## Commercial Demonstration Plant achieves first H<sub>2</sub>

Worlds first fully-integrated demonstration of Hazer's technology



CDP Site - Perth, Australia

### **Project Summary**

- First hydrogen and graphite achieved in Jan 2024
- Carbon negative process with biogas feedstock
- 100 tpa  $H_2$  and ~380 tpa Hazer graphite
- Performance test program to be executed in 1H CY24 to validate commercial readiness
- \$9.4 million grant funding awarded by Australia Renewable Energy Agency (ARENA)









## Leveraging CDP into new commercial projects

Targeting commercial deployment readiness in 2024

#### Commercial Demonstration Plant (CDP)



CDP Site - Perth, Australia

### **Hydrogen and Graphite Production**

- Produce clean hydrogen
- High-volumes of graphite for product qualification

### **Continuous Operation**

- Reliability over extended operation
- Solids handling demonstration

### Scale-up validation

- Validate equipment scale-up design parameters
- Reactor options for commercial scale

#### **New Commercial Projects**







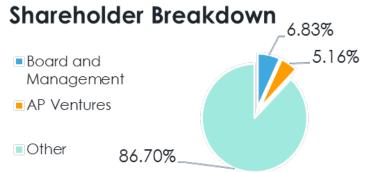




## Corporate overview

### **HZR:ASX Share Price History**





### Capital Structure as at 30 January 2024

Share price	\$0.65
Market capitalisation (AUD)	\$127 million
Shares on issue	201,090,670
Cash as at 31 Dec 23	~\$11 million
Debt as at 31 Dec 23	\$0 million
Enterprise value	~\$116 million
Capital /grant money invested to date	~\$105 million



## Executing scale-up strategy in hard-to-abate sectors



### **Our Vision**

Provide a unique climate technology to transform industry and contribute to a sustainable future for the next generation

## Aligning with UN Sustainable Development Goals



Producing clean hydrogen from methane reducing emissions and accelerating the energy transition



Innovative climate technology decarbonising hard-to-abate sectors





Partnering with global corporations and governments in support of climate action





## 2024 strategic priorities

Multiple near-term catalysts to unlock value in our technology

Commercialising Technology

- CDP online and complete test program to validate commercial readiness
- 2 Advance Hazer Graphite offtake opportunities

Accelerate Scale-up

- Deliver Canada commercial arrangements and project development decision
- 4 Progress France and Japan commercial projects

Growth & Monetisation

- Advance strategic partnerships in hard-to-abate sectors incl. green steel
- 6 Continue to assess licensing deals and other strategic opportunities





## Investment highlights

Low cost, low emission hydrogen production technology, well positioned to play a substantial role in global decarbonisation.



Rapidly Growing H<sub>2</sub> Demand

2



Low-cost, Lowemissions, Proprietary Technology 3



Compelling Economics & Returns





Global Tier-1 Partnerships Across Strategic Markets





Advanced Technology Readiness & Proven Scale-up (6)



Clear Commercial Pathway & Capex-lite

7



Graphite Production Diversifies Earnings

8



Government & Policy
Support



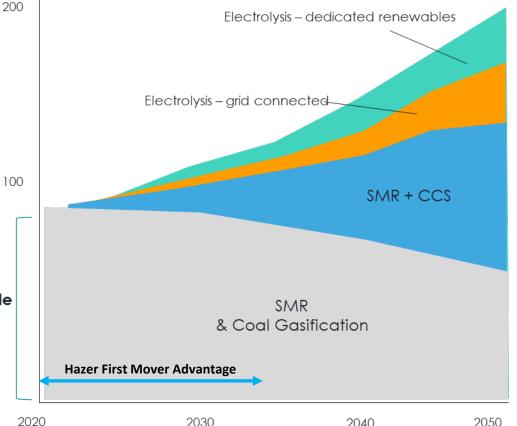
## Building leading position in a rapidly growing market

Hydrogen will play a key role in the decarbonisation of hard-to-abate sectors

Current **500**<sub>MTPA</sub> market ~95<sub>MTPA</sub> in 2050\*1



Today's Addressable Market for Hazer



<sup>1</sup>International Energy Agency (IEA) - The Future of Hydrogen, June 2019: https://www.iea.org/reports/the-future-of-hydrogen <sup>2</sup>DNV (June 2022) – 'Hydrogen forecast to 2050':

2020

2040

2050

Global production of hydrogen as feedstock – in million tonnes p.a.<sup>2</sup>

**Methane Pyrolysis** 





Hazer well positioned as a low-cost, low-emissions hydrogen technology

### **Existing Technologies**

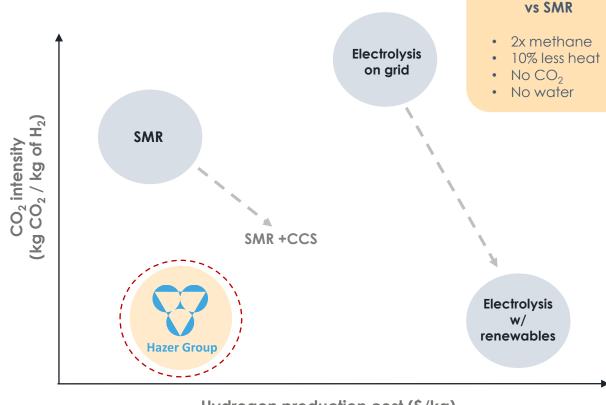
### Steam Methane Reforming (SMR) Significant CO<sub>2</sub> emissions

- Most widely used process for H<sub>2</sub> generation (~95%)
- High CO<sub>2</sub> emissions
- Requires CCS\* to address emissions



### Electrolysis Energy intensive process

- 7x more energy intensive than SMR
- Only low emission if 100% renewable energy
- Requires significant water and renewable energy





## <sup>2</sup> "Plug-in" technology using existing infrastructure

End-use deployment and application of the Hazer Technology eliminates H<sub>2</sub> transport risk and reduces cost



Conceptual design of Hazer facility co-located with  $3^{\rm rd}$  party refinery (Source: stock image not Hazer infrastructure)

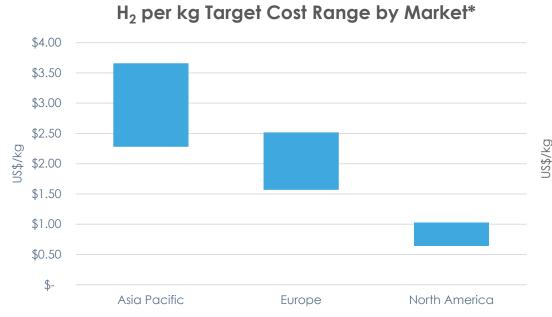
- Eliminates requirement for hydrogen transportation cost and risk
- Co-located with end-user infrastructure
   such as LNG facilities, refineries etc.
- Ability for shared services and lower operating cost model



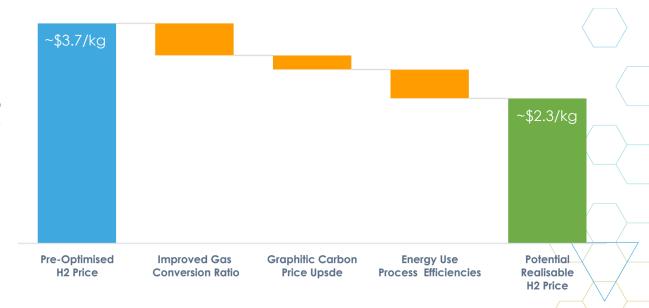
## Cost ambition

### **Competitive Hydrogen Cost in Target Markets:**

- Cost of Production correlates strongly with feedstock gas and power prices
- Targeted H<sub>2</sub> cost per kg therefore varies across target markets
- Cost-competitive with clear pathway to optimize further through learning curve and other operating efficiencies



### Asia-Pacific Potential Cost Optimisation Example



<sup>\*</sup> Company aspirations that should not be read as forward-looking statements. See disclaimer - slide 2 and assumptions & notes - slide 28. No assurance that actual outcomes will not differ materially from these amounts.



## 4 Global partners & projects

Tier-1 partners developing commercial projects in North America, Europe and Asia-Pacific





# Advanced technology readiness

Rapid development since company founding and advancing Tech Readiness Level (TRL)

**Project Development Pipeline** 

(< 60kg/hr\* continuous\*\*)









(~1Kg\* batch)



(~<2 kg/hr\* semi-continuous)

2007-2013

2016-present

(<100g\* batch)

2017

2017-2021

#### Bench scale fluid bed

- of fluidised bed concept

#### **Pilot Plant**

- Sydney and Perth
- Fluidised bed with optimised conditions and catalyst injection

2022-2024

#### Commercial Demonstration Plant (CDP)

- Perth. Australia
- End-to-end continuous plant with biogas feed
- Operational in 2024

2025+

### **Key Projects**

- Canada
- Chubu, Japan
- Montoir-de-Bretagne, France

(<1g\* batch)



Bench scale testing

- University of Western Australia
- Concept evaluation

### Scaled up bench test

- University of Sydney
- Catalyst kinetics and process research

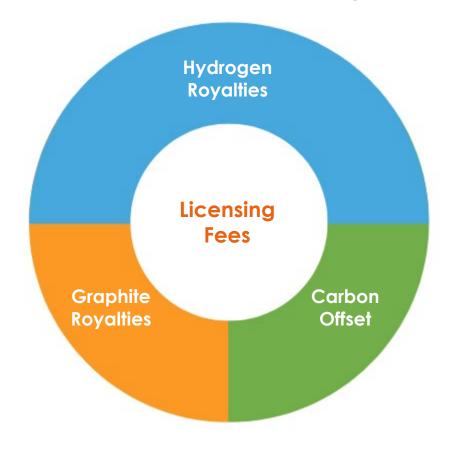
- University of Sydney
- Conceptual testing

\*Combined product scale





Hazer business plan premised on licensing and royalty revenues avoiding large-scale capex exposure



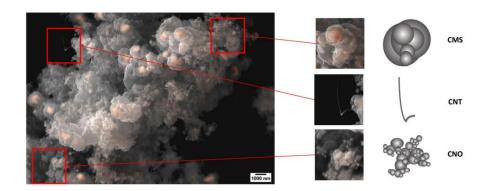
- One technology, two valuable markets
- Flexible combination of license fees and royalties
  - Fixed annual license fees commensurate with plant size
  - Royalties a percentage of H<sub>2</sub> and graphitic carbon revenues
- "Capex-lite" approach



## Graphite production diversifies earnings

A synthetic, low emissions product with differentiated morphology and properties

- Highly structured vs amorphous carbon black
- Iron inclusions produce magnetic graphite
- Low production emissions
- Up to 95% graphite purity
- High thermal & electrical conductivity
- Low sulphur & low ash content



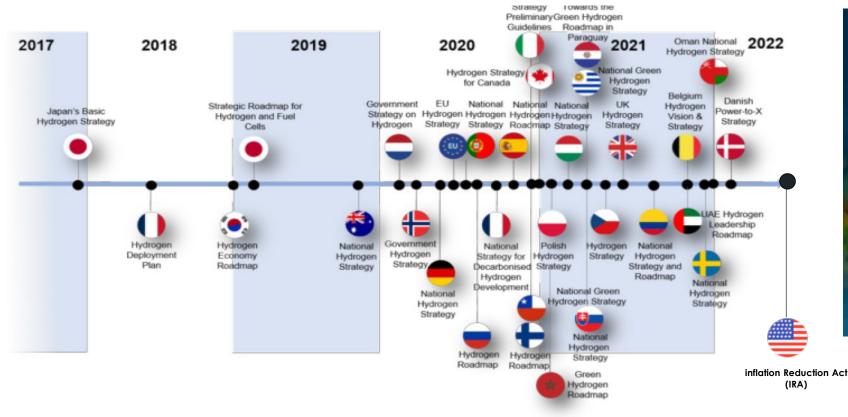
### Mitsui MOU

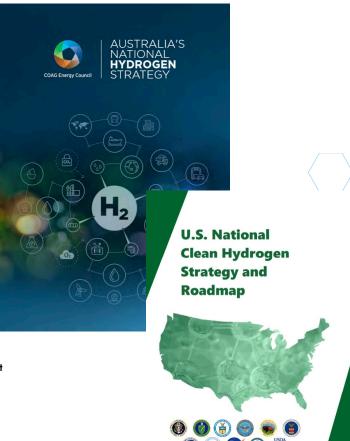
- A leading international trading and investment group based in Japan
- Collaboration advanced after positive feedback from several potential customers
- MITSUI & CO.
- High confidence markets identified are steel making and chemicals industries
- Next phase includes testing of larger samples from Hazer's CDP



## Global policy action gaining momentum

Hydrogen strategies expected in countries representing over 80% of global GDP by 2025









## Hazer target markets focus on Hard-To-Abate sectors

End-use deployment and application of the Hazer Technology eliminates H<sub>2</sub> transport risk and reduces cost



### **Decarbonise** Steel Making



- H<sub>2</sub> will be increasingly used in steelmaking process as reductant and heat input
- Hazer graphitic carbon potential to displace numerous solid carbon needs in steel industry

### Feedstock Refining



- Hazer H<sub>2</sub> output used as feedstock for refining / petrochemicals & fertiliser
- Reduced carbon footprint for process

## **Energy**Mobility / Power



Global initiatives to use

H<sub>2</sub> as a mobility fuel (via
fuel cells) and clean power
generation



## Overview of key scale-up development projects



BC, Canada



Nagoya, Japan



Montoir, France

Description	<ul> <li>New site options in progress</li> <li>Likely H<sub>2</sub> to be used at site location</li> </ul>	<ul> <li>Existing LNG import terminal or power station site</li> <li>H<sub>2</sub> as fuel for power generation, industry feedstock and mobility</li> </ul>	<ul> <li>Existing LNG import terminal site identified</li> <li>H<sub>2</sub> as fuel for power generation industry feedstock and mobility</li> </ul>
Partners	FORTIS BC	CHUBU CHIYODA CORPORATION	engle
Expected H <sub>2</sub> Production • Phase 1 • Phase 2	2,500 tpa 100,000+ tpa	2,500 - 10,000 tpa Up to 100,000 tpa	10,000+ tpa 50,000+ tpa
Hazer Operating Model	Licensing	Licensing	Licensing
Targeted Start-up (phase 1)	2026-2027	2027-2028	2027-2028



## Growth ambition – 10 plants in 10 years

Potential for over 500 KTPA of Hazer installed H<sub>2</sub> capacity across target markets by 2035

### 2024 Current Portfolio

### **Current Plant Pipeline**

- 1. North America Burrard and other US
- 2. Asia-Pacific Japan Chubu / Chiyoda project
- 3. Europe Engie project
- 4. Ongoing discussions across all target markets

### 2035 Aspired Portfolio



<sup>\*</sup> Company aspirations should not be read as forward-looking statements. Hazer does not yet have reasonable grounds to believe the aspirational portfolio will be achieved. See disclaimer - slide 2 and assumptions & notes - slide 43.





### Abbreviations and units used

ARENA Australian Renewable Energy Agency

CCS Carbon Capture & Storage

CDP Commercial Demonstration Plan

FID Final Investment Decision

IRR Internal Rate of Return

KTPA thousands of tonne per annum

LNG Liquified Natural Gas

MOU Memorandum of Understanding

MMBTU Million British Thermal Units (A thermal unit of measurement for Natural Gas)

MTPA millions on tonne per annum

PDP Project Development Plan

PFS Pre-Feasibility Study

ROI Return on investment

SMR Steam Methane Reforming

TPA tonne per annum





## Assumptions and notes

#### Slide 15 - Cost Ambition

Sources: Company analysis and projections, modelling a range of notional outcomes:

- 1. Feedstock gas Asia Pacific US\$12/mmbtu, Europe ~US\$8.5/mmbtu, North America ~US\$2.5/mmbtu
- 2. ~US\$400/tonne graphitic carbon revenue, offset against operating expenses.
- No Government funding, tax incentives or debt funding upside benefit included.
- 4. Learning curve of 30% is applied to the low-end cost estimate to reflect process engineering, operating, maintenance, logistics and other expected efficiencies. Rationale for inclusion: https://hbr.org/1964/01/profit-from-the-learning-curve
  Learning curve applicable to construction projects(closest analogue). Supports ranges of 60-95% (inverse being 5-40%): https://www.fgould.com/americas/articles/applying-learning-curve-theory-construction-cost/
- 5. Assumes that the Commercial Demonstration Plant demonstrates that the Hazer process technology is effective at producing graphitic carbon and high purity hydrogen consistently and reliably as has occurred in prior smaller size pilot projects