

hazergroup.com.au

ASX:HZR

# Hazer Group Ltd

*Analyst Site Visit*

*Monday, 9 October 2023*





# Disclaimer

**Important information** This presentation has been prepared by Hazer Group Limited (“Hazer” or “the Company”)

**Summary Information** This document contains a summary of information about Hazer Group Limited and its activities that is current as at the date of this document unless otherwise stated. The information in this document is general in nature and does not contain all the information which a prospective investor may require in evaluating a possible investment in Hazer or that would be required in a prospectus or a product disclosure statement prepared in accordance with the Corporations Act 2001 or the securities laws of any other jurisdiction. The information in this document should be read in conjunction with the Company’s other periodic and continuous disclosure announcements lodged with the ASX.

**No Liability** The information contained in this document has been prepared in good faith by the Company however no guarantee, representation or warranty expressed or implied is or will be made by any person (including the Company and its affiliates and their directors, officers, employees, associates, advisers and agents) as to the accuracy, reliability, correctness, completeness or adequacy of any statements, estimates, options, conclusions or other information contained in this document. No person other than the Company is responsible for the preparation of this document. To the maximum extent permitted by law, the Company and its affiliates and their directors, officers, employees, associates, advisers and agents each expressly disclaims any and all liability, including, without limitation, any liability arising out of fault or negligence, for any loss arising from the use of or reliance on information contained in this document including representations or warranties or in relation to the accuracy or completeness of the information, statements, opinions, forecasts, reports or other matters, express or implied, contained in, arising out of or derived from, or for omissions from, this document including, without limitation, any financial information, any estimates, forecasts, or projections and any other financial information derived therefrom. Statements in this document are made only as of the date of this document unless otherwise stated and the information in this document remains subject to change without notice. No responsibility or liability is assumed by the Company or any of its affiliates (or their directors, officers, employees, associates, advisers and agents) for updating any information in this document or to inform any recipient of any new or more accurate information or any errors or mis descriptions of which the Company and any of its affiliates or advisers may become aware.

**Financial data** All amounts are in Australian Dollars (AUD) unless otherwise indicated. A number of figures, amounts, percentages, estimates, calculations of values and fractions in this presentation are subject to the effect of rounding. Accordingly, the actual calculation of these figures may differ from the figures set out in this presentation. Readers should be aware that a number of terms used in this presentation including ROI, NPV, net cash generation, operational cash expenditure, IRR and actual and budgeted commitments are categorised as non-IFRS information prepared in accordance with ASIC Regulatory Guidance 230 (Disclosing non-IFRS financial information), nor does it purport to be. This information has not been audited and is based on management estimates and not on financial statements prepared in accordance with applicable statutory requirements. Accordingly, readers should treat this information with appropriate caution. This information is for illustrative purposes only. This non-IFRS financial measures do not have a standardised meaning prescribed by Australian International Financial Reporting Standards (AIFRS) or the Australian Accounting Standards (AAS) and, therefore, may not be comparable to similarly titled measures presented by other companies, nor should they be construed as an alternative to other financial measures determined in accordance with AIFRS. Moreover, the disclosure of such non-IFRS financial measures in the manner included in this Presentation and the announcement to which it is attached may not be permissible in a registration statement under other securities acts. Although the Company believes that these non-IFRS / non-GAAP financial measures assist in providing additional meaningful information to readers in measuring the financial performance and condition of the Company’s business and underlying drivers, readers are cautioned not to place undue reliance on any non-IFRS / non-GAAP financial measures included in this Presentation and the announcement to which it is attached.

**Forward Looking Statements** Statements contained in this document or made during or in connection with this presentation, including but not limited to those regarding the possible or assumed future production, costs, projected timeframes, performance, dividends, returns, revenue, exchange rates, potential growth of Hazer, industry growth, commodity or price forecasts, or other projections and any estimated company earnings are or may contain or comprise forward looking statements. Forward looking statements can generally be identified by the use of words such as ‘project’, ‘foresee’, ‘plan’, ‘expect’, ‘aim’, ‘anticipate’, ‘believe’, ‘estimate’, ‘may’, ‘should’, or similar expressions. Forward looking statements including all statements in this presentation regarding the outcomes of preliminary and definitive feasibility studies, projections, guidance on future earnings and estimates are provided as a general guide only and should not be relied upon as an indication or guarantee of future performance. Although the Company believes that the expectations reflected in such forward-looking statements are reasonable, these statements relate to future events and expectations and as such involve known and unknown risks and significant uncertainties, many of which are outside the control of the Company. Actual values, achievements, results, performance, actions and developments of the Company may differ materially from those projected, expressed or implied by the forward-looking statements in this document. Such forward looking statements speak only as of the date of this document. There can be no assurance that actual outcomes will not differ materially from these statements. To the maximum extent permitted by law, the Company and any of its affiliates and their directors, officers, employees, agents, associates and advisers disclaim any obligations or undertaking to release any updates or revisions to the information in this document to reflect any change in expectations or assumptions do not make any representation or warranty, express or implied, as to the accuracy, reliability or completeness of the information in this document, or likelihood of fulfilment of any forward looking statement or any event or results expressed or implied in any forward looking statement and disclaim all responsibility and liability for these forward looking statements (including without limitation, liability for negligence). Nothing in this document will under any circumstances create an implication that there has been no change in the affairs of the Company since the date of this document. Accordingly, you should not place undue reliance on any forward-looking statement.

**Not Financial Product Advice** This document does not constitute financial product advice or take into account your investment objectives, taxation situation, financial situation or needs. This document consists purely of factual information and does not involve or imply a recommendation of a statement of opinion in respect of whether to buy, sell or hold a financial product. An investment in the Company is considered to be speculative in nature and is subject to known and unknown risks, some of which are beyond the control of the Company. Before making any investment decision in connection with any acquisition of securities, investors should consult their own legal, tax and/or financial advisers in relation to the information in, and action taken on the basis of this document.

**Acceptance** By attending a presentation or briefing, or accepting, accessing or reviewing this document you acknowledge, accept and agree to the matters set out above.

**Authorisation** This document has been authorised for release by the Board of the Company.

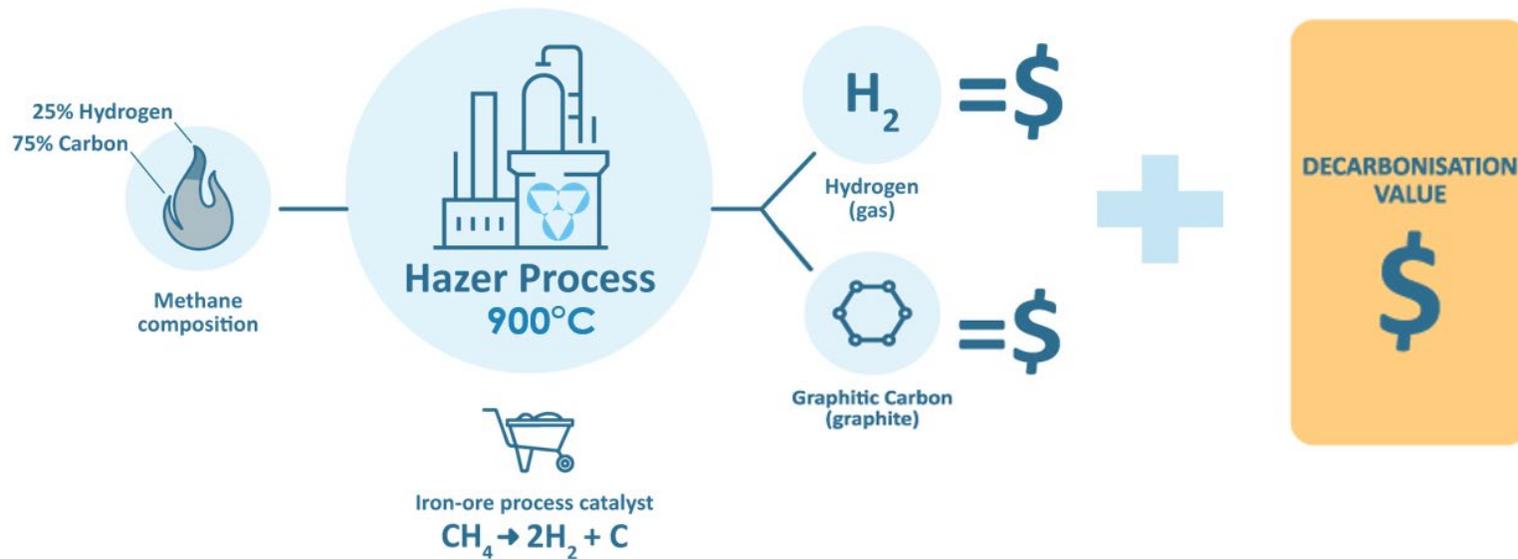
# Corporate Overview



# 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





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



HazerGroup™

**MONETISE & GROW**

**Strategy:**

- Commercial scale projects in multiple jurisdictions under license agreements
- Expand global portfolio

**Enablers:**

- Japan & EU Production Facilities
- New Business Projects

**SCALE-UP**

- Partnerships and scale-up into the target markets of North America, Asia and Europe
- Application in hard-to-abate industries

- 25x Canadian Scale-up
- Japan & France Initially 10 ktpa\*

**COMMERCIALISE**

- Leverage advanced technology readiness into new projects
- Commercial Demonstration Plant (CDP)

- CDP Ready For Start-up 2H 2023
- Secure graphite offtake

**Our Vision**

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

\* Refers to thousands ('000) of tonne per annum



# Key Activities

	CY2023		CY2024
	H1	H2	H1
Commercial Demonstration Plant (100 tpa)	Procurement, Fabrication, Engineering & Installation		
		Ready for Start-up	
		Today	
		Targeted Production & Testing Program	
Hazer-Fortis 2,500 tpa Canada Plant	FEED Studies in Canada and Targeted FID 		
New Potential Projects in Target Markets	  Identify New Commercial Projects Japan France		
		Japan & France Project Development Plans	
Mitsui & Graphite Market Development	Developing Market for Hazer Graphite		Offtake Agreement
Corporate Updates	 ARENA Grants	 R&D Rebates	 Corporate Access Events
			ARENA Grants



# Hazer Investment Highlights





# Investment highlights

Low cost, low emissions H<sub>2</sub> production technology company positioned to play a leading role in global decarbonisation

1 

Low-cost, Low-emissions, Proprietary Technology

2 

Compelling Economics & Returns

3 

Global Tier-1 Partnerships Across Strategic Markets

4 

Advanced Technology Readiness & Proven Scale-up

5 

Clear Commercial Pathway & Capex-lite

6 

Graphite Production Diversifies Earnings

7 

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

8 

Government & Policy Support





# 1 Low cost & low emissions hydrogen

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

## Existing Technologies

### Steam Methane Reforming (SMR)

#### Significant CO<sub>2</sub> emissions

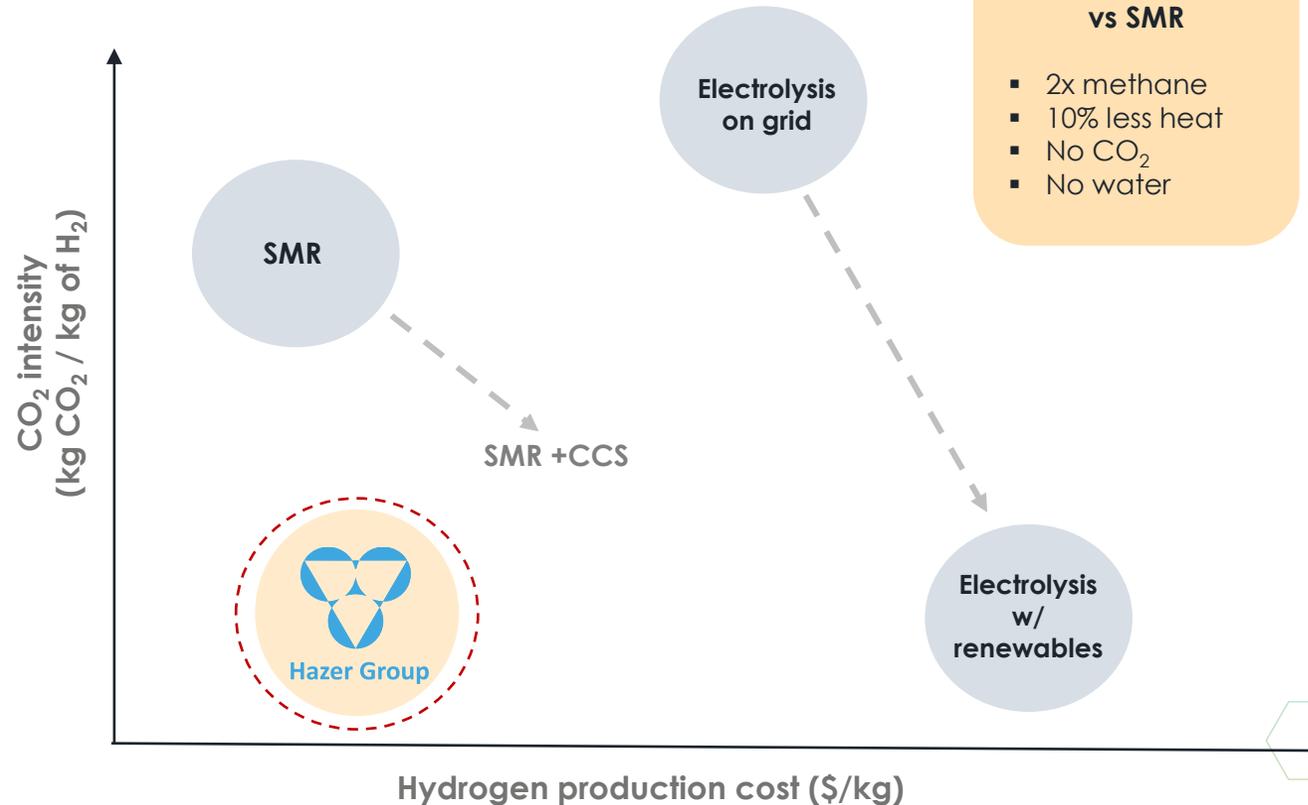
- Most widely used process for H<sub>2</sub> generation (~95%)
- High CO<sub>2</sub> emissions
- Requires CCS\* to address emissions



### Electrolysis

#### Energy intensive process

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



\*CCS = Carbon Capture & Storage. Requires geological formations for CO<sub>2</sub> sequestration

# 1 “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



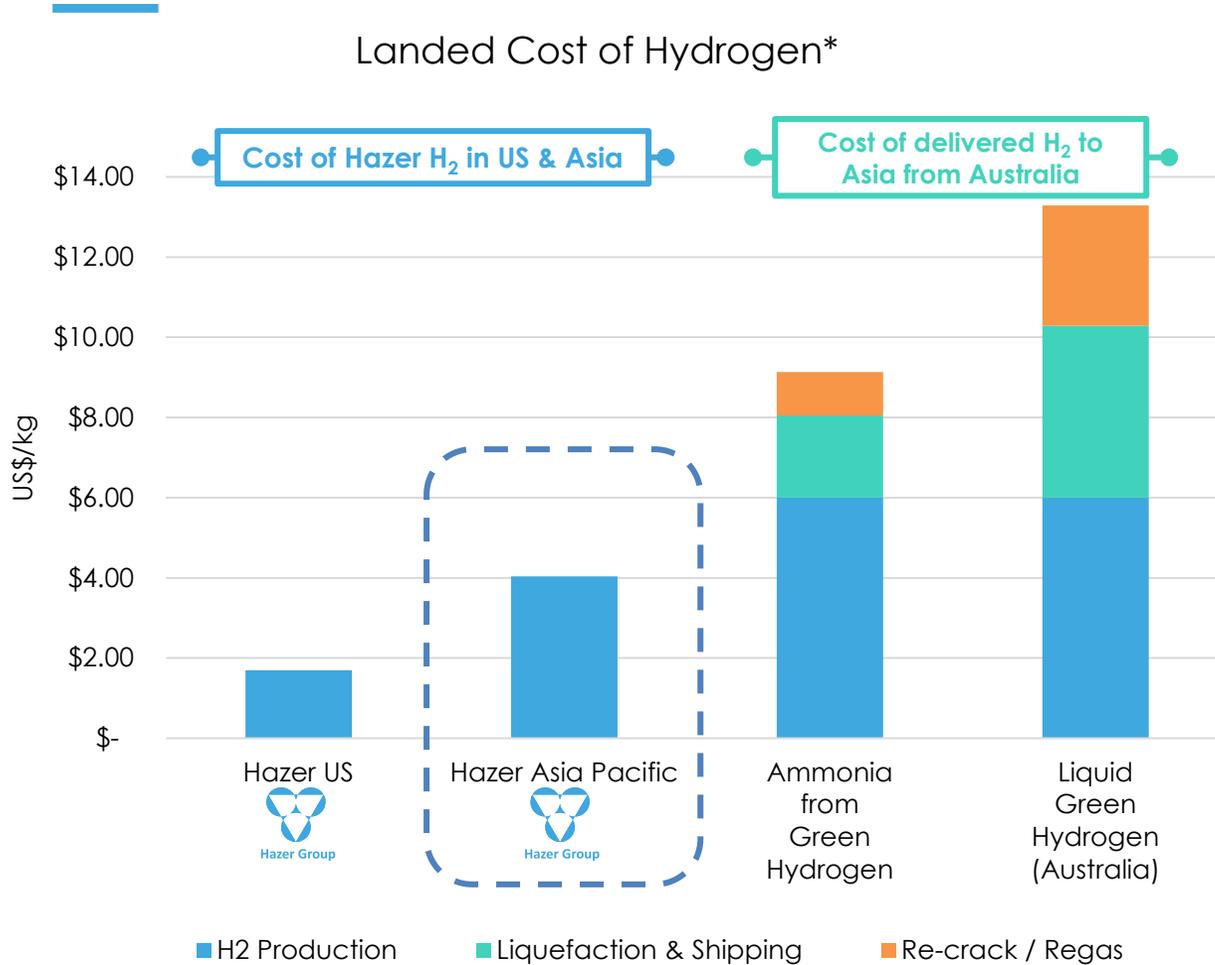
Conceptual design of Hazer facility co-located with 3<sup>rd</sup> party refinery  
(Source: stock image not Hazer infrastructure)

- 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





## 2 Delivered cost of H<sub>2</sub> – Hazer competitive advantage



- Hazer co-located at existing infrastructure eliminating requirement for shipping
- Ammonia is transportable however reconversion technology immature and potentially expensive
- Liquefied H<sub>2</sub> technology (-253 °C) not available today and economic viability challenged
- Hazer in North America significantly cheaper with low-cost gas and power

\* 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 26.



# 3 Global partners & projects

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





# 4 Advanced technology readiness

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

(<1g\* batch)



2007–2013

- Bench scale testing**
- University of Western Australia
  - Concept evaluation

(<100g\* batch)



2016–present

- Scaled up bench test**
- University of Sydney
  - Catalyst kinetics and process research

(~1Kg\* batch)



2017

- Bench scale fluid bed**
- University of Sydney
  - Conceptual testing of fluidised bed concept

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



2017–2021

- Pilot Plant**
- Sydney and Perth
  - Fluidised bed with optimized conditions and catalyst injection

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



2022-2023

- Commercial Demonstration Plant (CDP)**
- Perth, Australia
  - End-to-end continuous plant with biogas feed
  - Start up planned 2023

**Project Development Pipeline**

- FORTIS BC
- CHIYODA CORPORATION
- CHUBU Electric Power
- ENGIE

2025+

- Key Projects**
- Canada
  - Chubu, Japan
  - Montoir-de-Bretagne, France

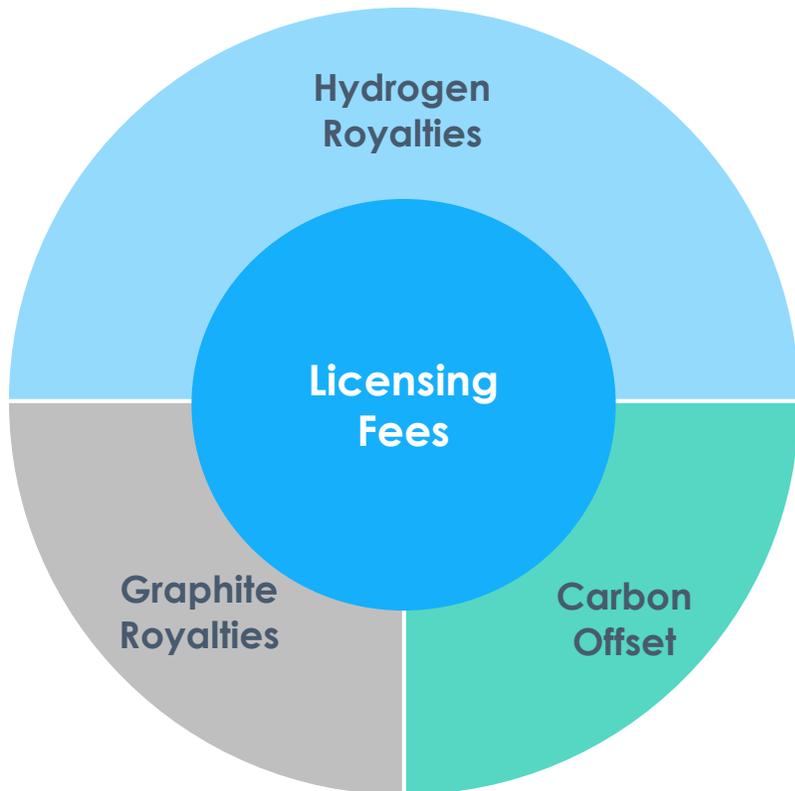
**Strategic Focus**

hazergroup.com.au

\*Combined product scale \*\*CDP planned start up 2023

## 5 “Capex-lite” business model enables early free-cashflow

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





6

# 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
- MOU signed to jointly investigate the market for Hazer graphite
- Exploring possible customers & applications in Asia-Pac, Northern America, Europe and Middle East



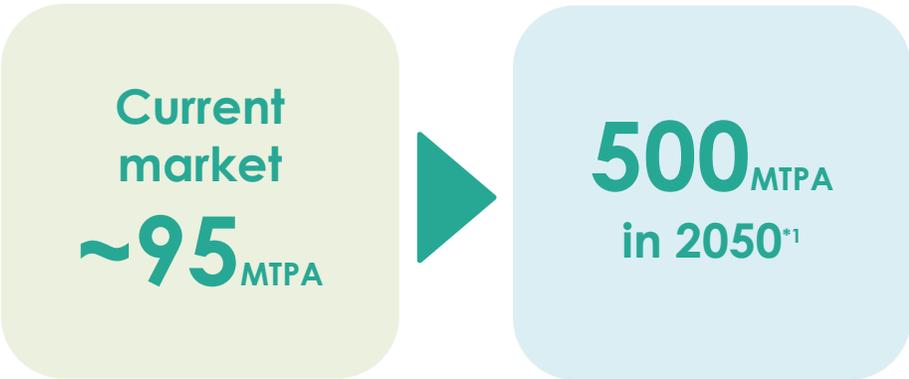
MITSUI & CO.





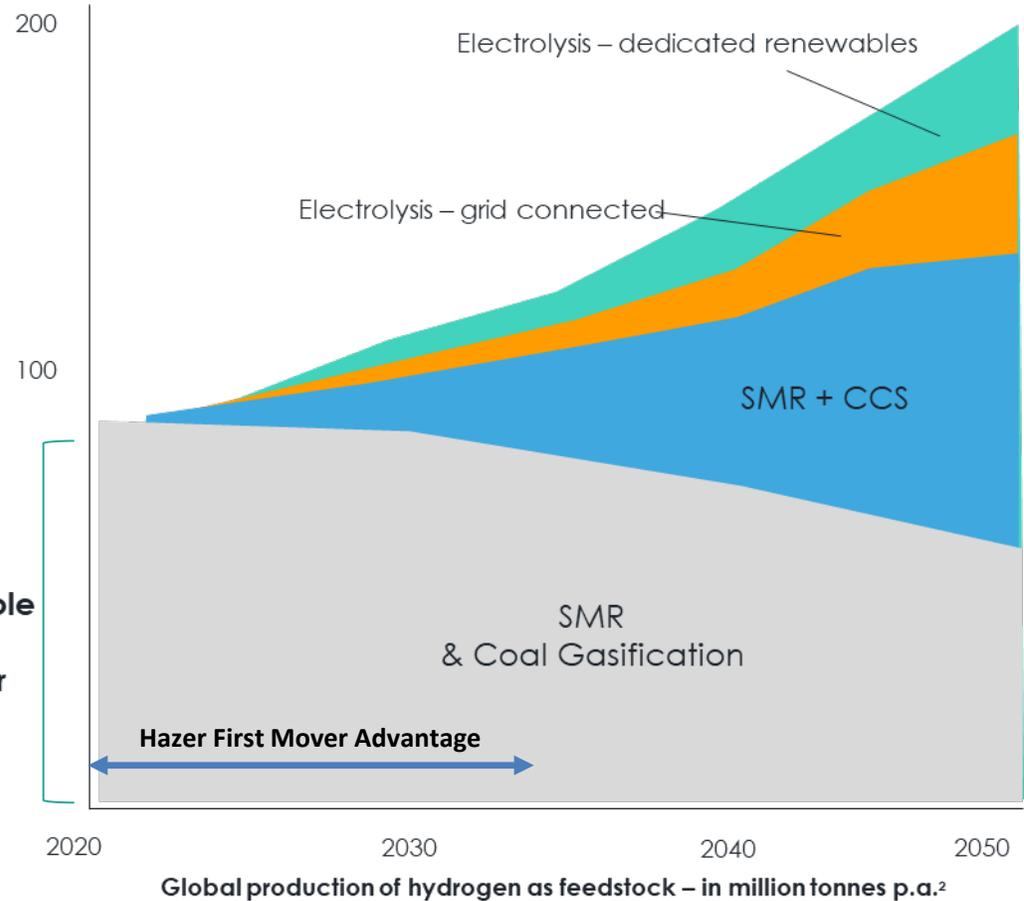
# 7 Building leading position in a rapidly growing market

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



© Getty Images

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':

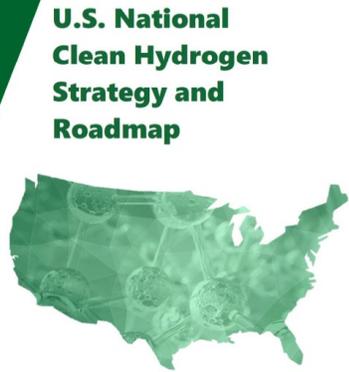
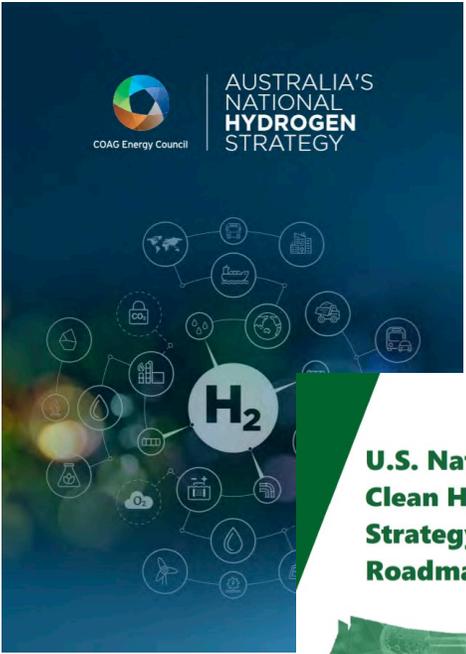
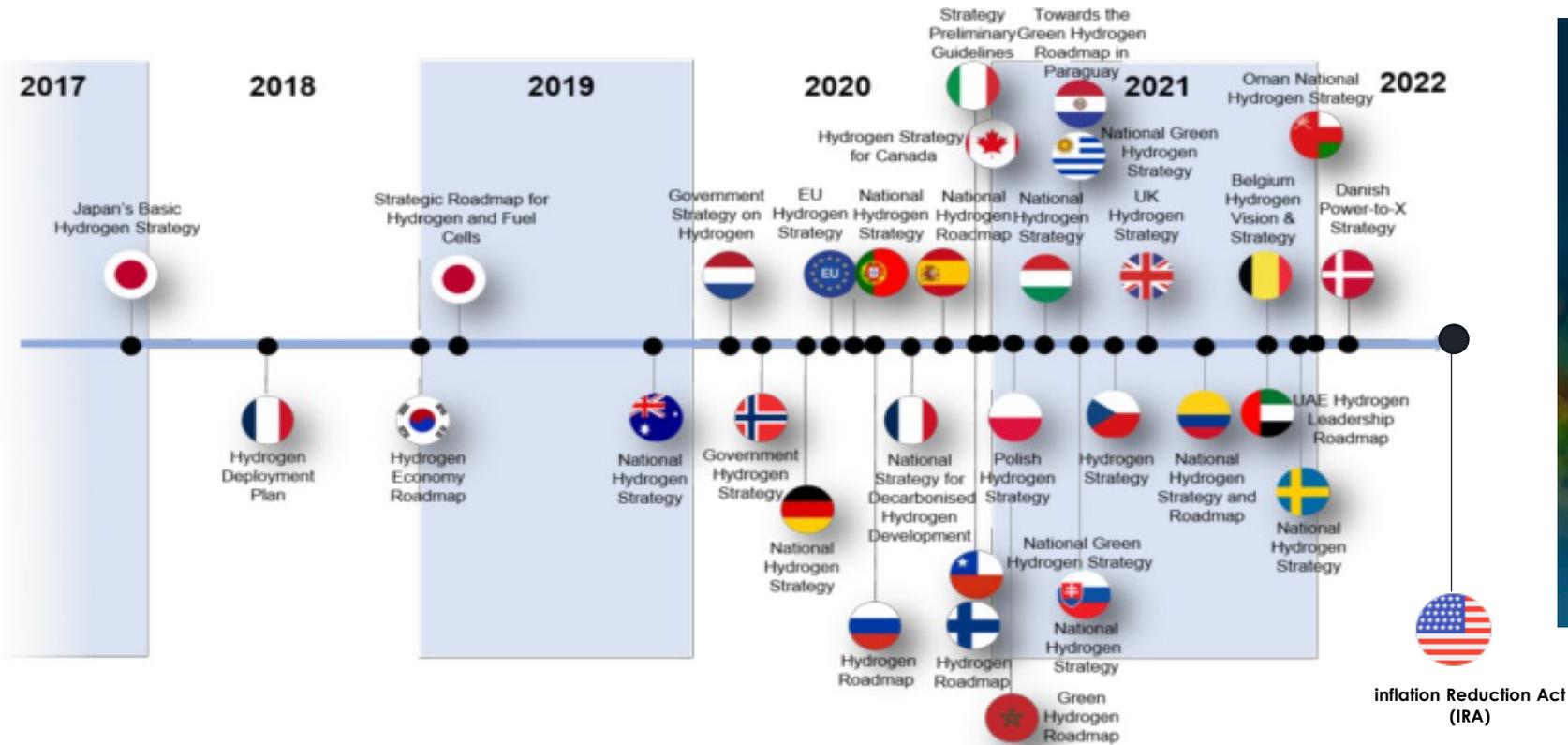
<https://www.dnv.com/news/hydrogen-at-risk-of-being-the-great-missed-opportunity-of-the-energy-transition-226628>





# 8 Global policy action gaining momentum

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



Source: Various sources; data compiled by Goldman Sachs Global Investment Research

# Commercial Demonstration Plant (CDP)



# Commercial demonstration plant confirming scalability

The first fully-integrated demonstration plant of the Hazer Process



CDP Site, Perth, Australia

## Project Summary

- 100 tpa H<sub>2</sub> and ~380 tpa graphitic carbon
- Carbon negative process with biogas feedstock
- Construction & Phase 1 commissioning completed June 2022
- Ready for startup on-track for 2023.
- Fully funded with ~\$9.4 million grant funding awarded by Australian Renewable Energy Agency (ARENA)



Australian Government  
Australian Renewable  
Energy Agency

**ARENA**



# CDP on track for start-up in 2023

## Key Milestones to Ready for Start-up (RFSU)

- ✓ Phase 1 plant construction
- ✓ Phase 1 commissioning, testing & debugging
- ✓ Heat exchanger materials delivery
- ✓ Mark-1 reactor forging & heat treatment
- ✓ Hot construction planning and contracts
- ✓ Start-up approvals and permits

On-track

- ✓ Hot equipment fabrication and installation
- ✓ Commissioning, RFSU and production

✓ Completed    ✓ On-track

## Latest Updates

- ✓ Heat exchanger successfully installed
- ✓ Reactor fabrication nearing completion
- ✓ CDP start-up on-schedule



Reactor successfully heat-treated and preparing for final machining and assembly



# Leveraging CDP into new commercial projects

## Commercial Demonstration Plant (CDP)



**Demonstrate Continuous Operation**

- Performance testing & process optimization
- Inform commercial design reliability requirements

**Validate Scale-up Performance**

- Confirm reactor performance to validate commercial scale design

**Hazer Graphite Production**

- High volume samples for product qualification
- Marketing arrangements

## New Commercial Projects

**FORTIS BC**

**CHIYODA CORPORATION**

**CHUBU Electric Power**

**MITSUI & CO.**

**ENGIE**



# Project Pipeline

Partnerships and scale-up into target markets



# Overview of key scale-up development projects



**BC, Canada**



**Nagoya, Japan**



**Montoir, France**

<p><b>Description</b></p>	<ul style="list-style-type: none"> <li>Utilises existing fuel terminal site</li> <li>H<sub>2</sub> to be used in gas blending and other industrial applications</li> </ul>	<ul style="list-style-type: none"> <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 style="list-style-type: none"> <li>Existing LNG import terminal site identified</li> <li>H<sub>2</sub> as fuel for power generation, industry feedstock and mobility</li> </ul>
<p><b>Partners</b></p>		 	
<p><b>Expected H<sub>2</sub> Production</b></p> <ul style="list-style-type: none"> <li>Phase 1</li> <li>Phase 2</li> </ul>	<p>2,500 tpa 100,000+ tpa</p>	<p>2,500 - 10,000 tpa Up to 100,000 tpa</p>	<p>2,500+ tpa 50,000+ tpa</p>
<p><b>Hazer Operating Model</b></p>	<p>Project partner &amp; licensing</p>	<p>Licensing</p>	<p>Licensing</p>
<p><b>Targeted Start-up (phase 1)</b></p>	<p>2025</p>	<p>2027-2028</p>	<p>2027-2028</p>





# HazerGroup™

▼  
**Hazer Group Ltd**

ASX:HZR

**Investor Relations Enquiries:**

[contact@hazergroup.com.au](mailto:contact@hazergroup.com.au)

**Media Enquiries:**

[hhowlett@we-worldwide.com](mailto:hhowlett@we-worldwide.com)



[hazergroup.com.au](http://hazergroup.com.au)



# 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 Liquefied 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 11 – Delivered Cost of H2 – Hazer Competitive Advantage

1. Hazer US and Asia Pacific costs of H2 - Company analysis and projections, modelling using an average feedstock gas price for North America of US\$2.20/MMBTU, and US\$12.80/MMBTU for Asia Pacific, ~US\$400/tonne graphitic carbon revenue [offset against operating expense]. Learning curve of 30%.
2. Assume a single pass configuration (no PSA) with value ascribed to unreacted methane (e.g power generation or gas blending use case)
3. Green ammonia cost - Source IRENA, 2020 NH3 costs of US\$720-\$1,400/tonne, mid-point being \$1,060/tonne. H2 equivalent is US\$6.00/kg:  
<https://www.futurebridge.com/industry/perspectives-energy/green-ammonia-an-alternative-fuel/#:~:text=Cost%20of%20green%20ammonia&text=The%20current%20Price%20of%20green,%2C%20to%20%24%20310%20per%20tonne.>
3. Green hydrogen production cost - Source: IEA Global Hydrogen Review 2022, p.92. 2021 Wind Onshore and Solar PV average price of US\$6/kg.
4. Shipping of ammonia and liquid hydrogen – Source: IEA Global Hydrogen Review 2022 & Energy Technology Perspectives 2023. Costs of shipping ammonia expected at \$1.9-2.2/kgH2 (average \$2.05/kg), LH2 \$2.0-3.7/kgH2 (average \$2.85/kg): <https://www.hydrogeninsight.com/innovation/iea-ammonia-and-lohc-will-be-cheaper-options-for-shipping-hydrogen-than-liquefied-h2-even-with-reconversion-costs/2-1-1387346>
5. Ammonia re-crack to H2 - The cost of re-cracking ammonia to hydrogen is estimated to be € 1/kg / US\$1.08/kg: <https://pubs.rsc.org/en/content/articlehtml/2021/se/d1se00345c>
6. Green hydrogen production cost - Source: IEA Global Hydrogen Review 2022, p.92. 2021 Wind Onshore and Solar PV average price of US\$6/kg.
7. Green Hydrogen liquefaction - Unit costs of liquefaction system for hydrogen 1.44 \$/kg LH2: <https://www.sciencedirect.com/science/article/abs/pii/S0360319919311127>
8. Green Hydrogen Load-out & Receiving Facilities - ~US\$3/kg. Australian Hydrogen Market Study Sector Analysis Summary, May 2021, CEFC, p.84.

