

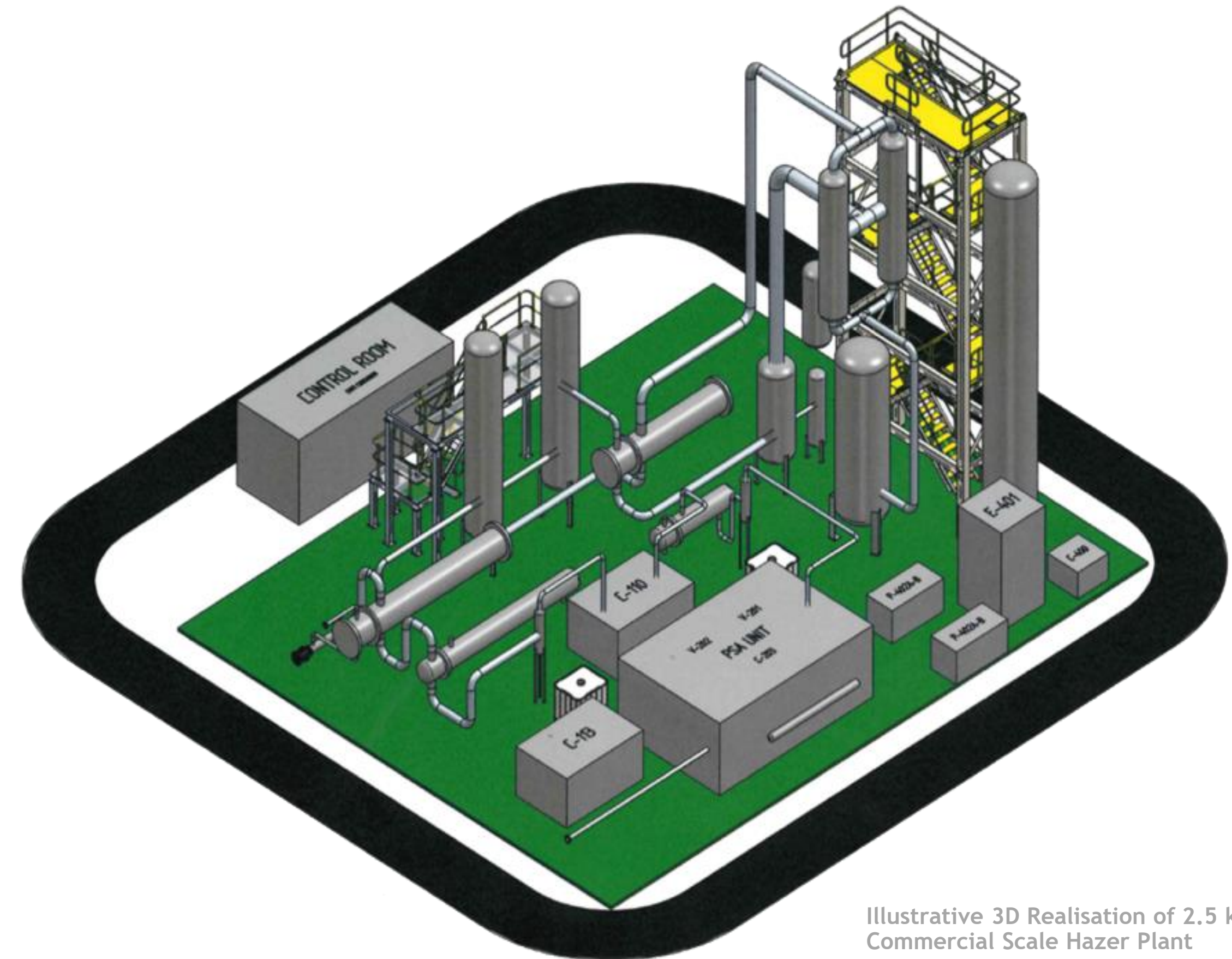
# **HAZER GROUP LTD** **ASX:HZR**

September 2019

# HAZER PROCESS

Hazer is a low cost, low emission hydrogen and synthetic graphite production technology

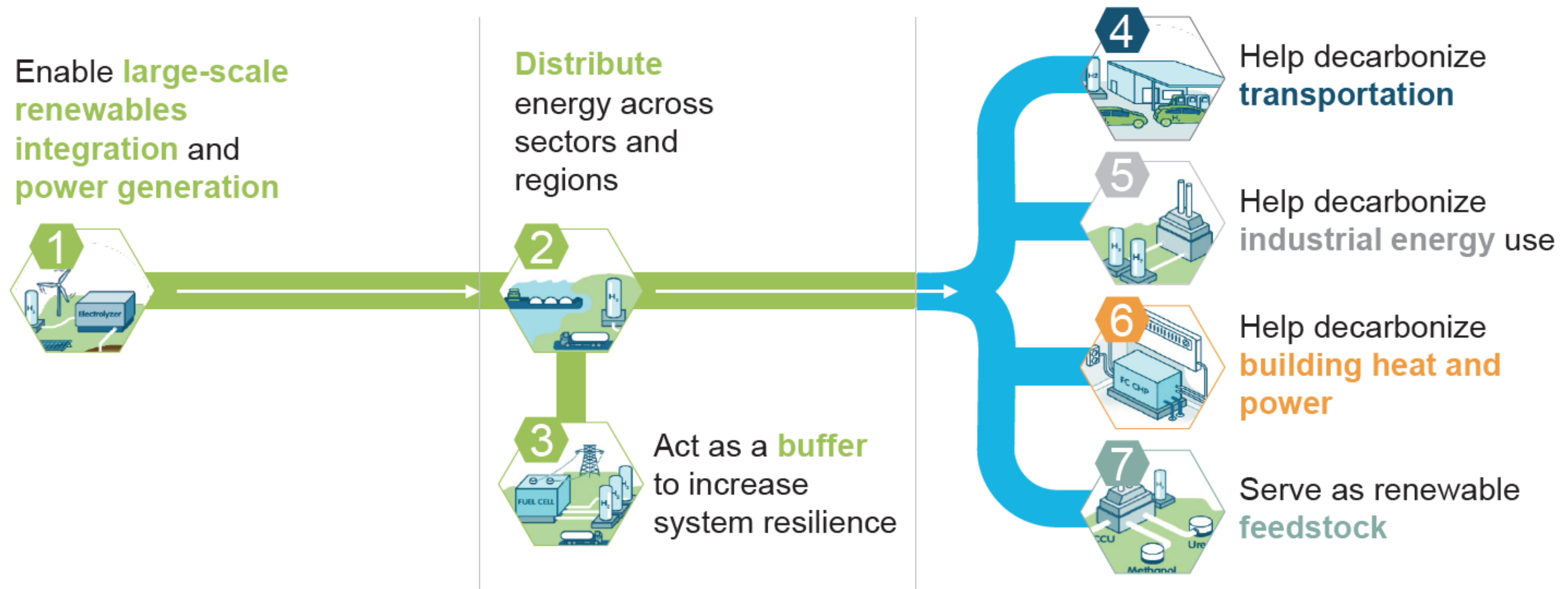
- Hazer technology – two high value products
  - ✓ hydrogen; 99.99% + purity
  - ✓ synthetic graphite; 80 – 95% TGC
- Hydrogen and graphite are both key products in a de-carbonising economy
- Premium market for hydrogen from low-emission sources emerging
- Hazer emissions are lowest of all available technologies when operated with renewable biogas as feedstock
- \$9.41million of ARENA grant funding approved



Illustrative 3D Realisation of 2.5 ktpa Commercial Scale Hazer Plant

# WHAT IS THE HYDROGEN ECONOMY?

Hydrogen is a key fuel in the transition to a low carbon economy

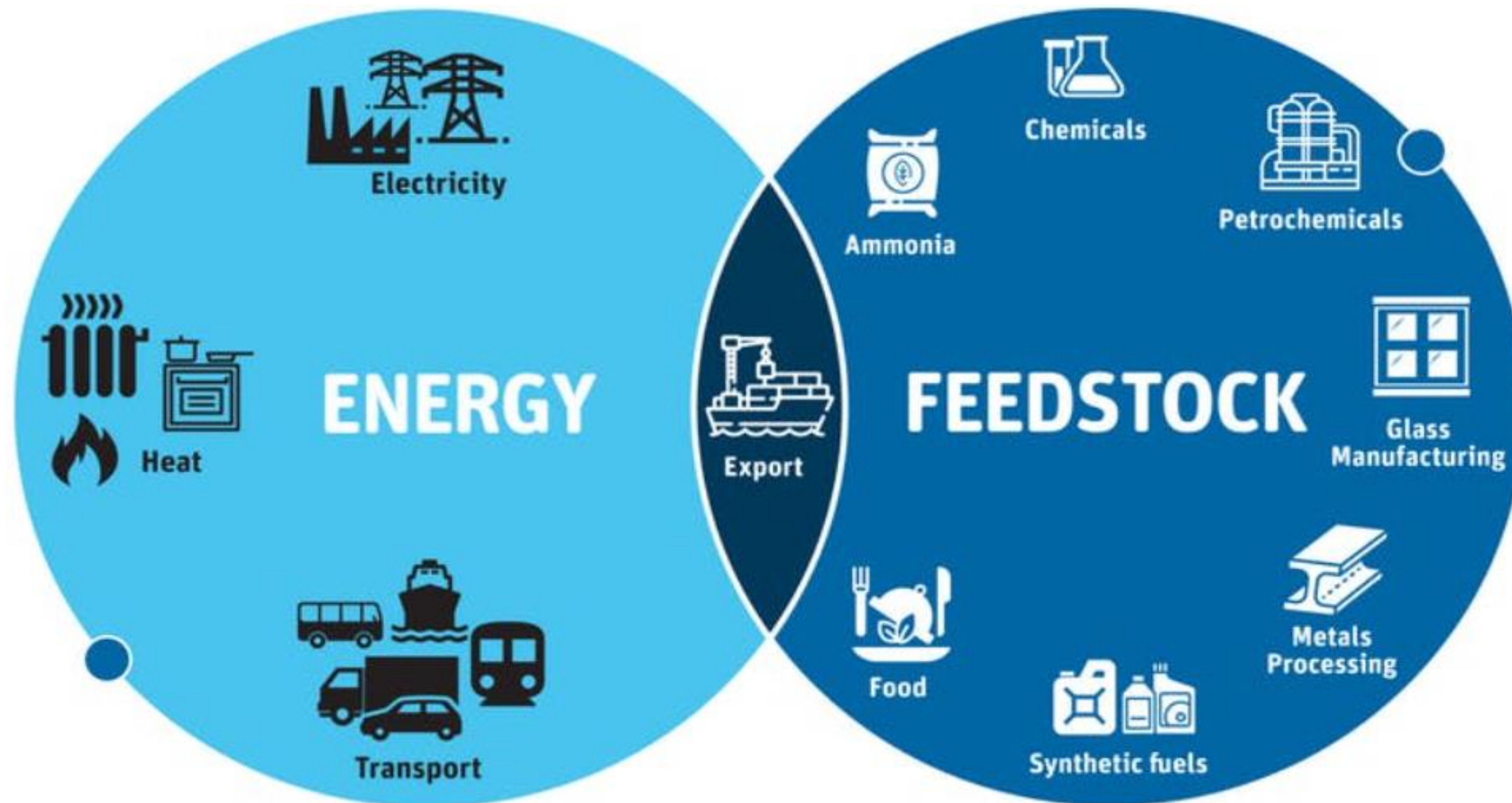


Source - Hydrogen Council, November 2019

# THE POTENTIAL

The potential for low-cost, low emission hydrogen is compelling

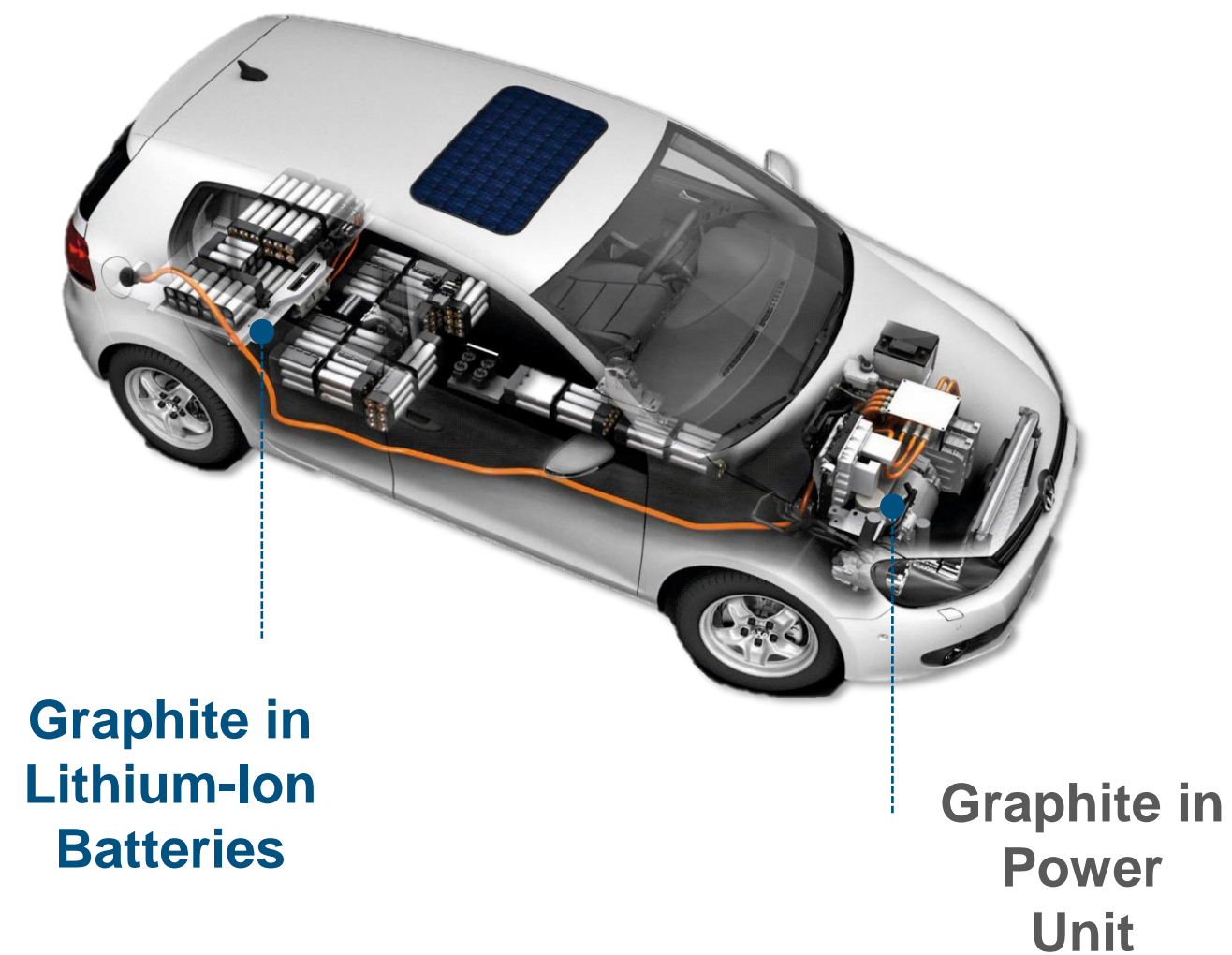
## APPLICATIONS FOR HYDROGEN



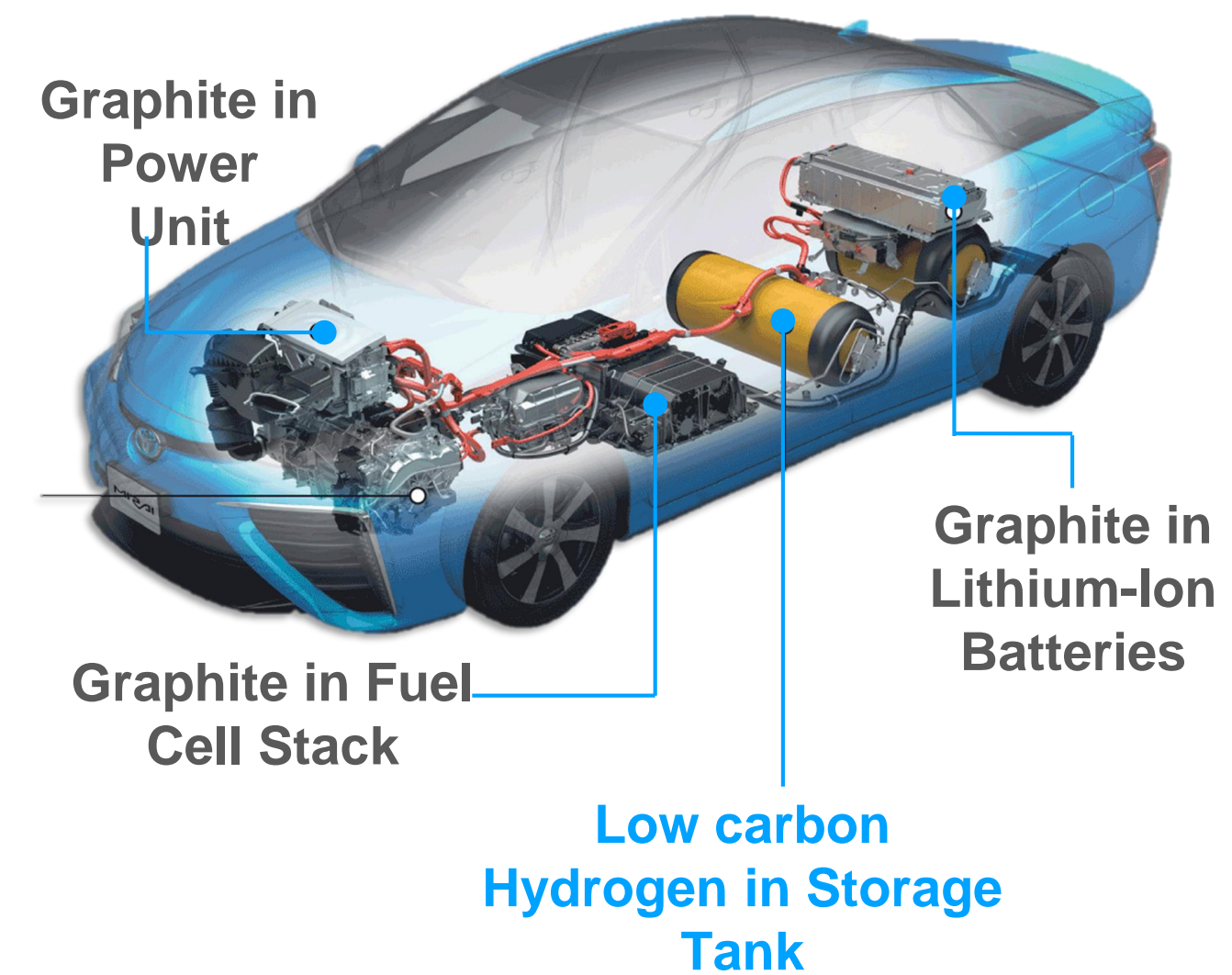
# ELECTRIC VEHICLES

Hydrogen fuel cell, battery & hybrid are all electric vehicles

## Electric Vehicle



## Fuel Cell Vehicle



# HYDROGEN FUEL CELL VEHICLES

A wide variety of hydrogen fuel cell vehicles are ready now



# HYDROGEN - A GLOBAL FOCUS

Significant global focus on developing a hydrogen economy to transition to low carbon environment



*Japan*

Target 800,000 hydrogen Fuel Cell electric vehicles and 900 hydrogen refuelling stations by 2030



*Korea*

National Hydrogen Roadmap\* targets:  
6.2 million hydrogen vehicles and 1,200 refuelling stations by 2040,  
with 2,000 Fuel Cell Buses by 2022 and 800 Fuel Cell Buses for police use by 2021



*California*

California Fuel Cell Partnership - active roll-out of hydrogen refuelling network



*Europe*

Refuelling networks under development; H2 trains operational in Germany



*Australia*

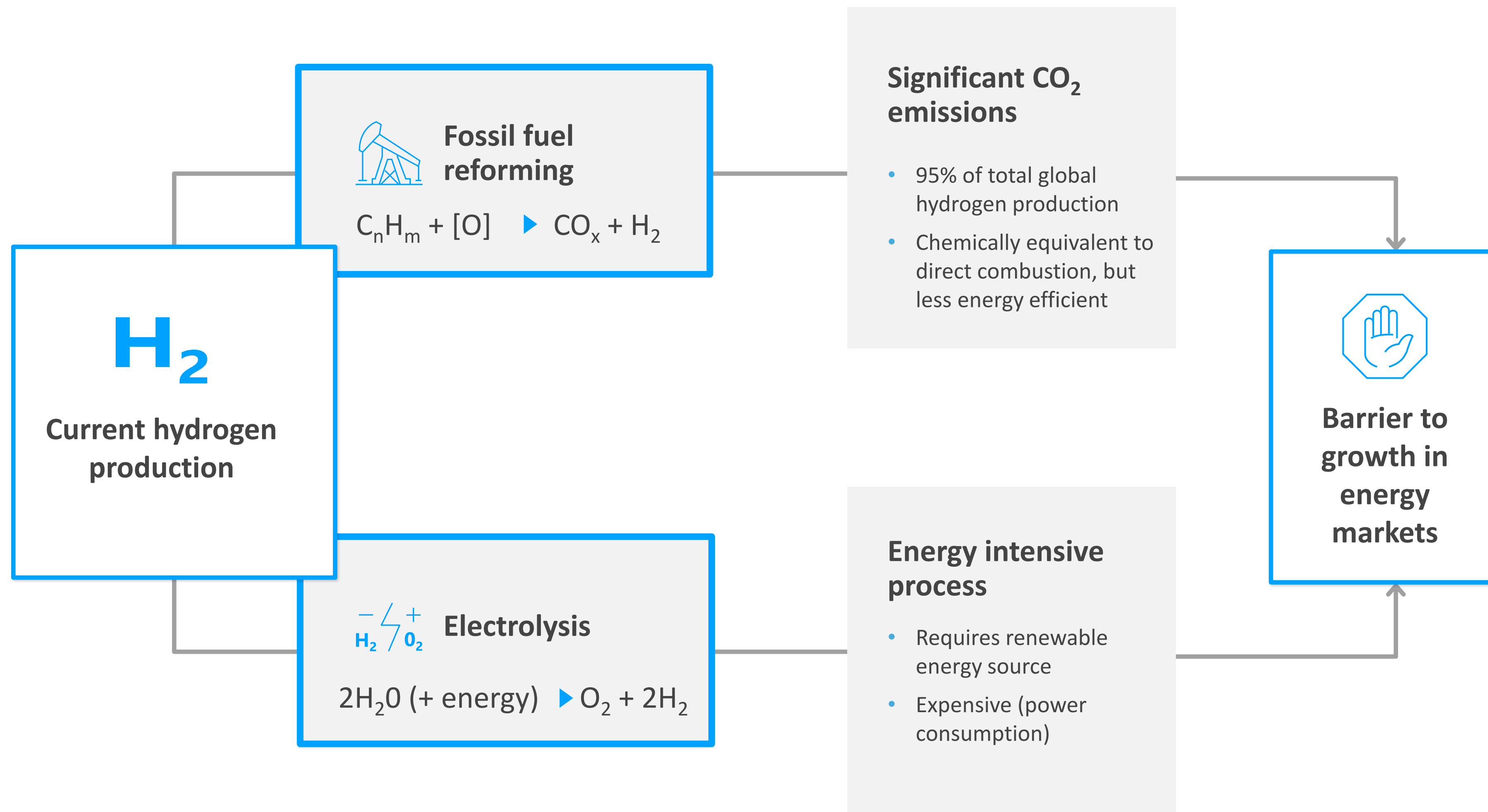
Prof. Alan Finkel – launched National Hydrogen Roadmap (CSIRO) – August 2018

COAG December 2018\* – National Hydrogen Strategy to be developed by October 2019

\* President Moon Jae-in 17 January 2019, COAG - council of Australian Governments

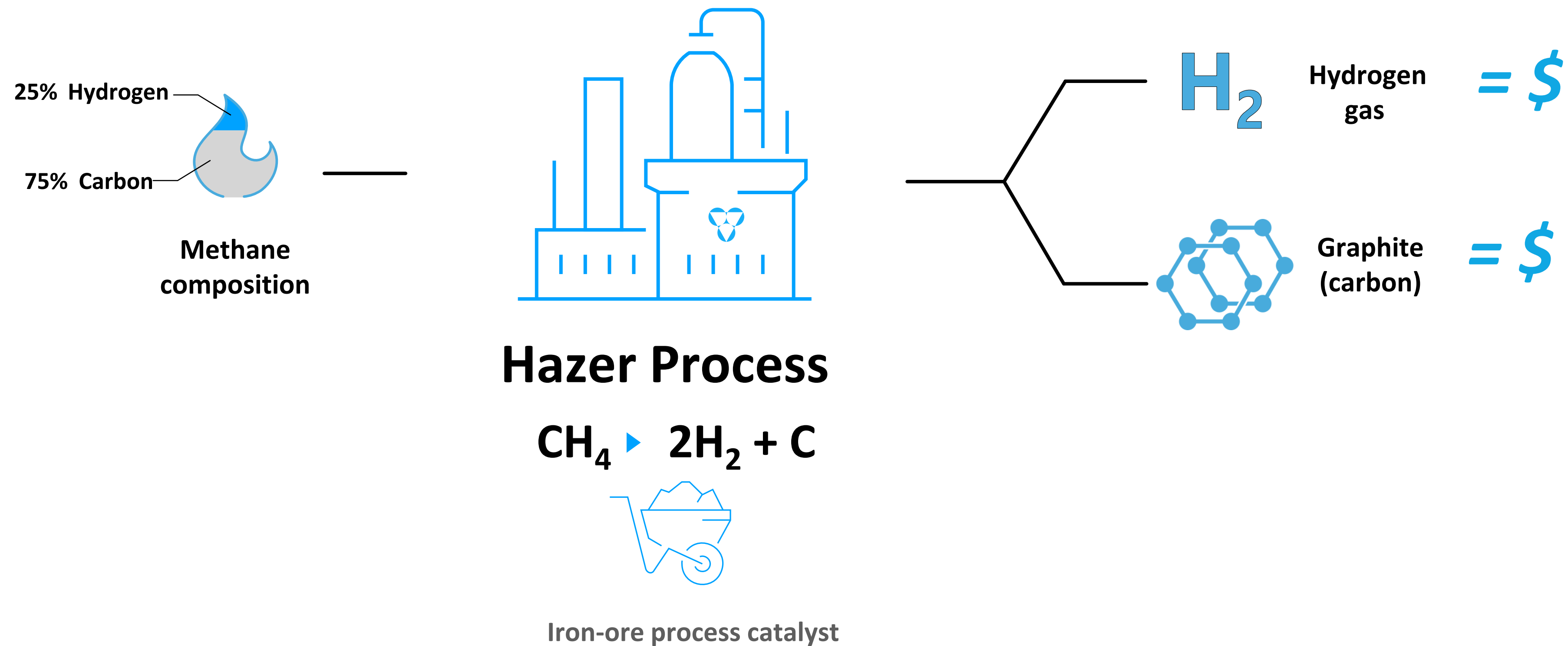
# CURRENT HYDROGEN PRODUCTION

Current technologies are variously either high emissions, large scale & centralised or expensive



# THE HAZER ADVANTAGE

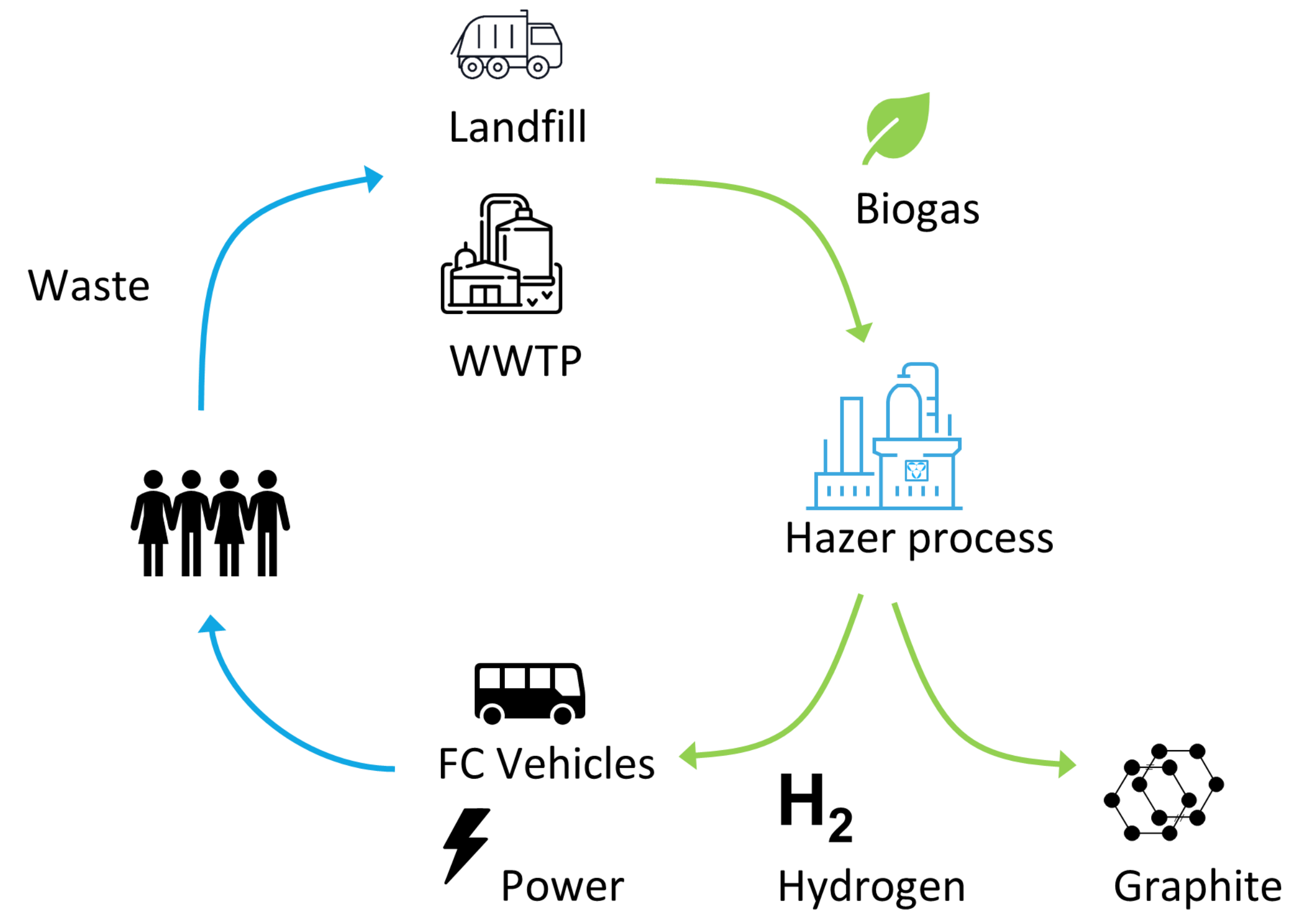
Capture full value of feedstock by producing two valuable products without creating CO<sub>2</sub> in the process



# SUSTAINABILITY

The Hazer Process has outstanding sustainable development attributes

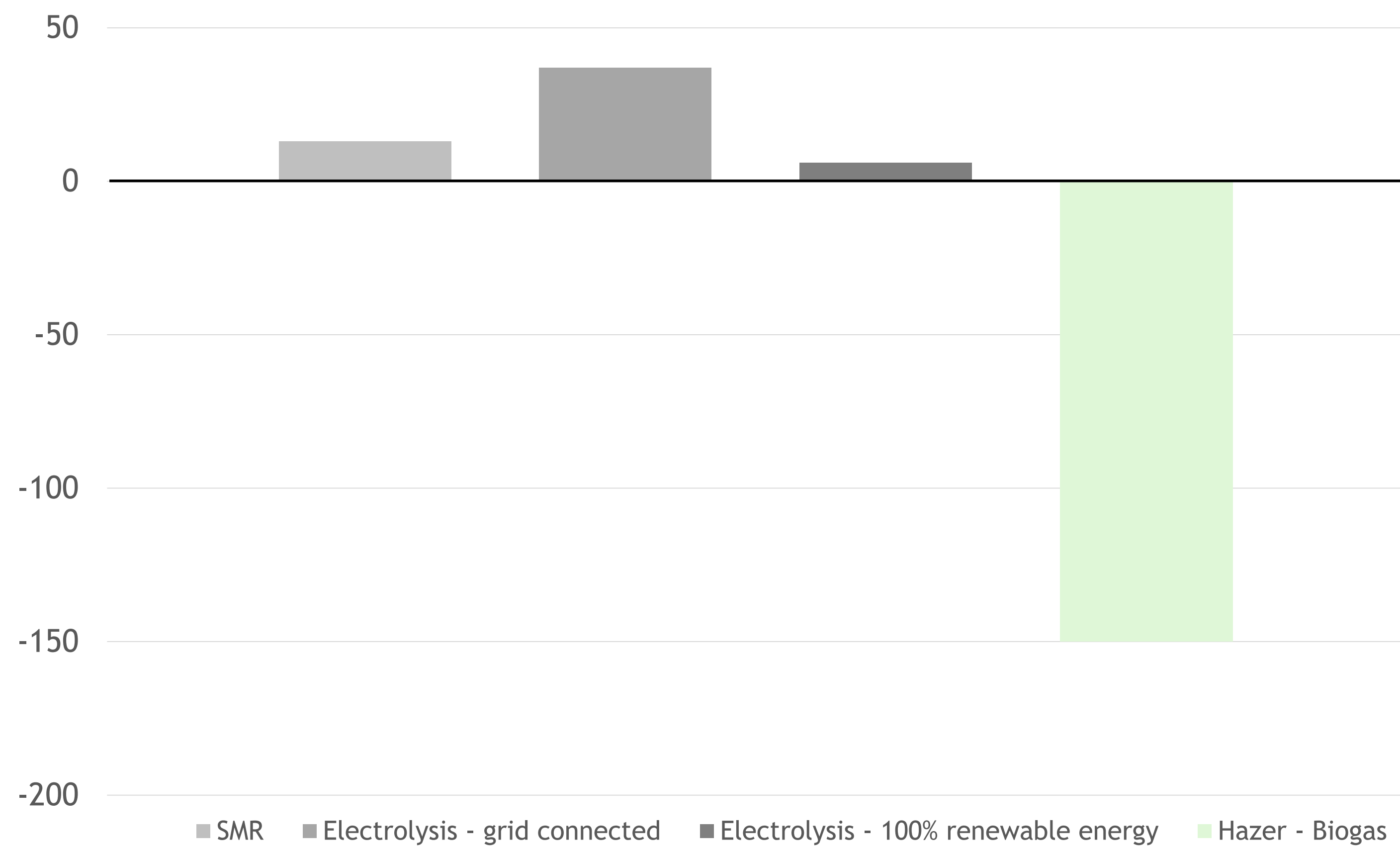
- Renewable fuel based (biogas)
- Significant carbon abatement potential\*
- Waste-to-resource / waste-to-energy
- Locally produced – close to potential customers
- Domestic and local energy source



\* *CO<sub>2</sub> abatement potential : 100 - 150 t CO<sub>2</sub>(equiv) / t Hydrogen when utilising biogas feedstock*

# CO2 EMISSION PROFILE

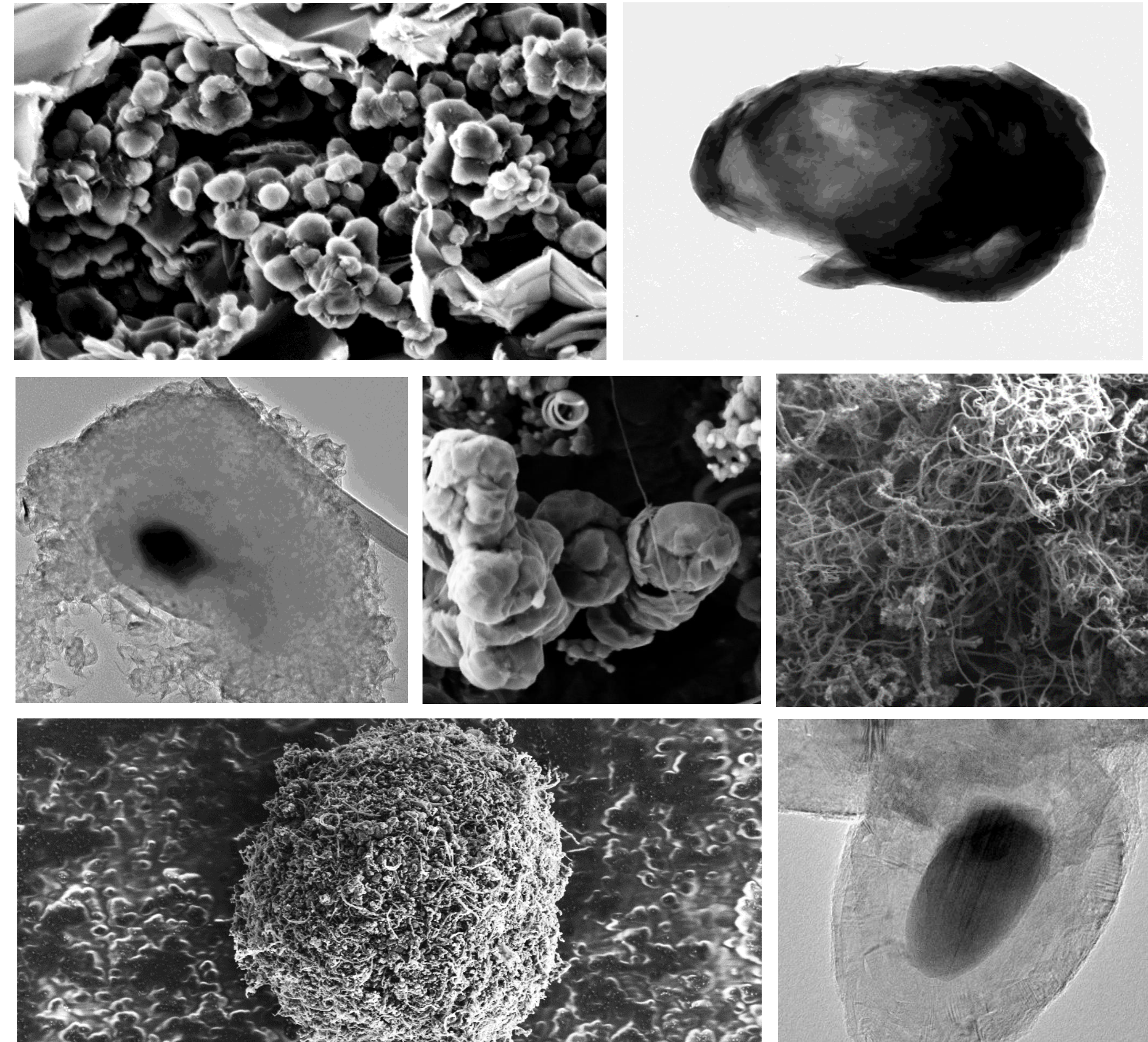
The Hazer Process has lower emissions than electrolysis with renewable biogas as feedstock



# HAZER GRAPHITE

## Versatile properties - many opportunities

- Current graphite market value in excess of US\$14 billion per annum
- Hazer graphite shows potential in a range of markets:
  - lithium-ion batteries
  - lubricants
  - activated carbon
  - carbon black
  - advanced materials
- Graphite purity ex-reactor 80 - 95% (wt)
- Purity can be increased to >99% by standard purification techniques



# HAZER TECHNOLOGY

Extensive technical development and successful pilot programs - now ready for commercial application and large scale deployment

- Significant technical development & de-risking through extensive R&D and pilot plant programs
- Two pilot plant programs successfully concluded;
  - Hazer Pressurised Fluidised Bed Reactor Pilot Plant, and
  - Mineral Resources owned Paddle Tube Reactor Plant
- FEED Study for a 100 tpa (hydrogen) Commercial Demonstration Project completed in April 2019
- Concept Study for 2,500 tpa Commercial Scale Plant completed
- Rigorous IP strategy in place; pursuing 4 patent families across 20+ jurisdictions
  - received first 2 Australian Patents in [March] and [April] 2019
- Key focus:
  - Design & construction of the Hazer Commercial Demonstration Plant



# COMMERCIAL DEVELOPMENT STRATEGY

## Hazer has a clear commercial development strategy

Strategy based on specific identified near and medium term commercial opportunities

Opportunities for Hazer to pursue BOO (build-own-operate), Licence, Strategic Alliance or JV opportunities

### **Stream 1 Hazer Commercial Development Project**

- Proves technology scale-up & demonstrates innovative commercial model
- Secures first operating site; provides platform for expansion as hydrogen market in WA grows
- Reference site for domestic and international customers

### **Stream 2 Commercial Scale projects**

- Identified commercial opportunities in premium early growth markets in Asia
- Pursue these opportunities in parallel to delivering Hazer CDP in Australia

### **Stream 3 Synthetic Graphite - Collaboration with Mineral Resources**

- Future revenue stream through royalty arrangement
- Stage 1 of Collaboration Agreement completed in August 2019

# HAZER COMMERCIAL DEMONSTRATION PLANT

First larger scale, fully integrated deployment of Hazer technology

- Proposed 100 tpa hydrogen production facility (~380 tpa graphite)
- Facility to be located at the Woodman Point wastewater treatment plant
- Waste biogas as feedstock
- May 2019 - MOU with Water Corporation
- July 2019 - Appointed Primero Group as engineering contractor under an Early Contractor Involvement scope to progress detailed design activities
- Estimated Capital cost - \$15.8 million
- Target Financial Close by end 2019 and RFSU December 2020
- CDP planned to operate for three years
- Potential to expand to a commercial operation as hydrogen markets mature



Digesters produce biogas feed for Hazer

# ARENA FUNDING

Application for up to \$9.41 million of funding under the Advancing Renewables Program approved

- Application for up to \$9.41million of grant
- Funding conditional upon negotiating and executing a Funding Agreement
- Anticipate closing Funding Agreement within 60 days
- Funding Agreement will contain conditions to draw-down
- Key Conditions:
  - Biogas Supply Agreement and Hydrogen Offtake agreements
  - Demonstration of financial capacity to deliver project

ARENA



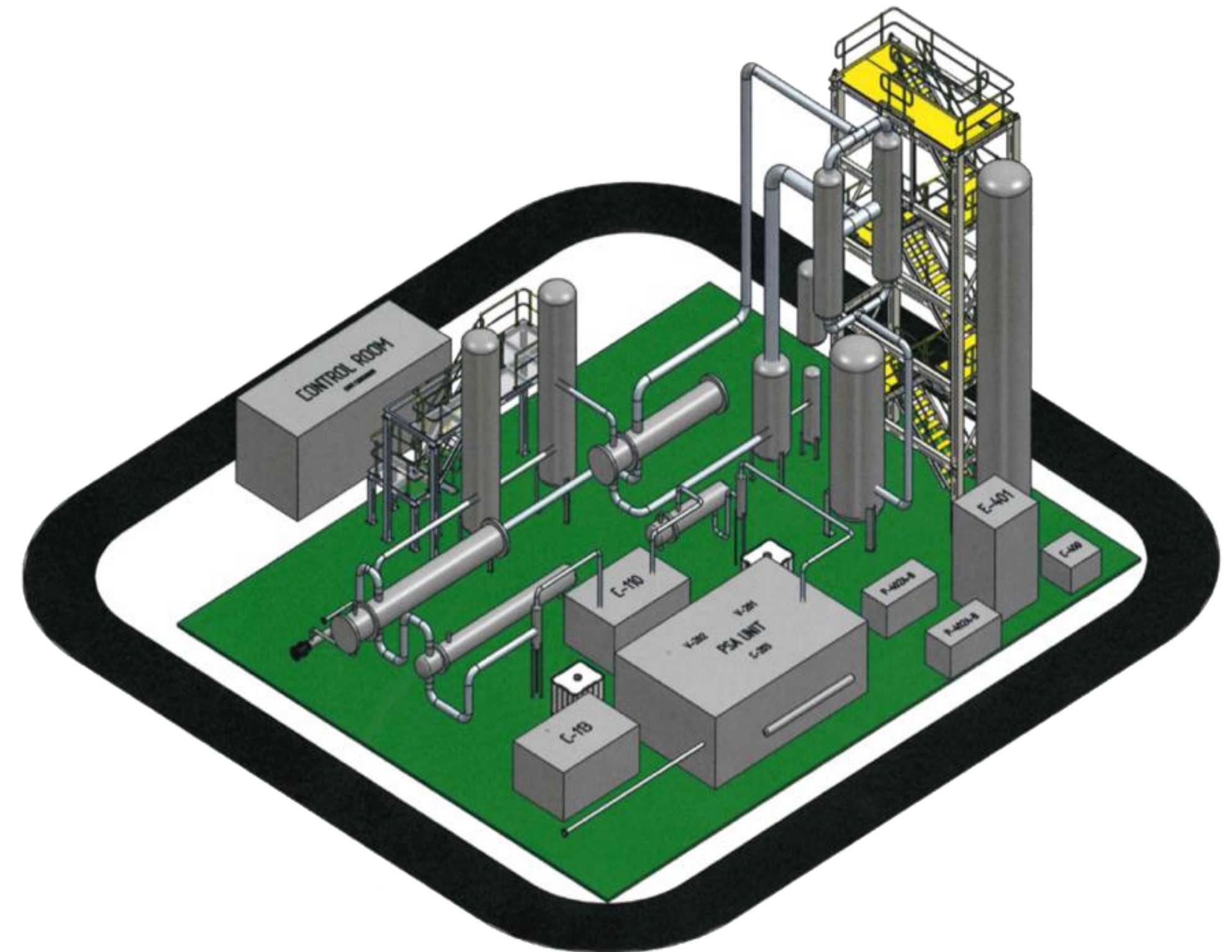
**Australian Government**

**Australian Renewable  
Energy Agency**

# INITIAL COMMERCIAL PROJECTS

Discussions have commenced with potential customers for initial commercial projects in Asia

- Concept Study for 2.5 ktpa Commercial Scale Hazer Plant completed;
  - sufficient to supply ~200 buses or ~6000 vehicle
  - CO2 abatement potential ~250 - 375,000 tpa (equivalent to 60 - 80,000 vehicles)
  - estimated capital cost \$US30 – 35 million
- Initial commercial plants likely to be between 800 – 2,500 tpa
- Targeting emerging premium low emission hydrogen opportunities in Asia and Europe
- Expect plants to be profitable and targeting a <4 year payback



# COLLABORATION WITH MINERAL RESOURCES

Strategic collaboration (ASX: MIN) to pursue high value graphite opportunities



March 2017 MIN made a A\$5M strategic investment in HZR (current holding ~11%.)

December 2017 HZR & MIN executed a binding collaboration agreement

- Hazer and MIN to collaborate to develop nominal 10,000 tpa synthetic graphite facility in WA
  - Graphite Plant to be developed in three stages
  - MIN to fully fund all stages of the commercial development.
  - Hazer to receive royalties from graphite sales
- **STAGE 1 – Pilot Plant**
    - Successfully completed production of high quality graphite in August 2019; performance targets achieved analysis of Pilot Plant Results ongoing
  - **STAGE 2 – Demonstration Plant – target 1,000 tpa (graphite)**
  - **STAGE 3 - Expansion – target production of 10,000 tpa**



# INVESTMENT SUMMARY

Hazer process is a low emission, low cost, flexible hydrogen & graphite production process

- Proprietary technology with strong IP protection
- Exposure to two high growth products - hydrogen and graphite
- Unique commercial offering for emerging premium low-emission hydrogen market
- Rigorous technology development process – ready to deliver commercial scale
- First commercial demonstration project identified – target start-up end 2020
- ARENA grant funding of \$9.41 million approved
- Initial commercial opportunities identified in premium Asian market
- Strategic collaboration with Mineral Resources – Stage 1 completed

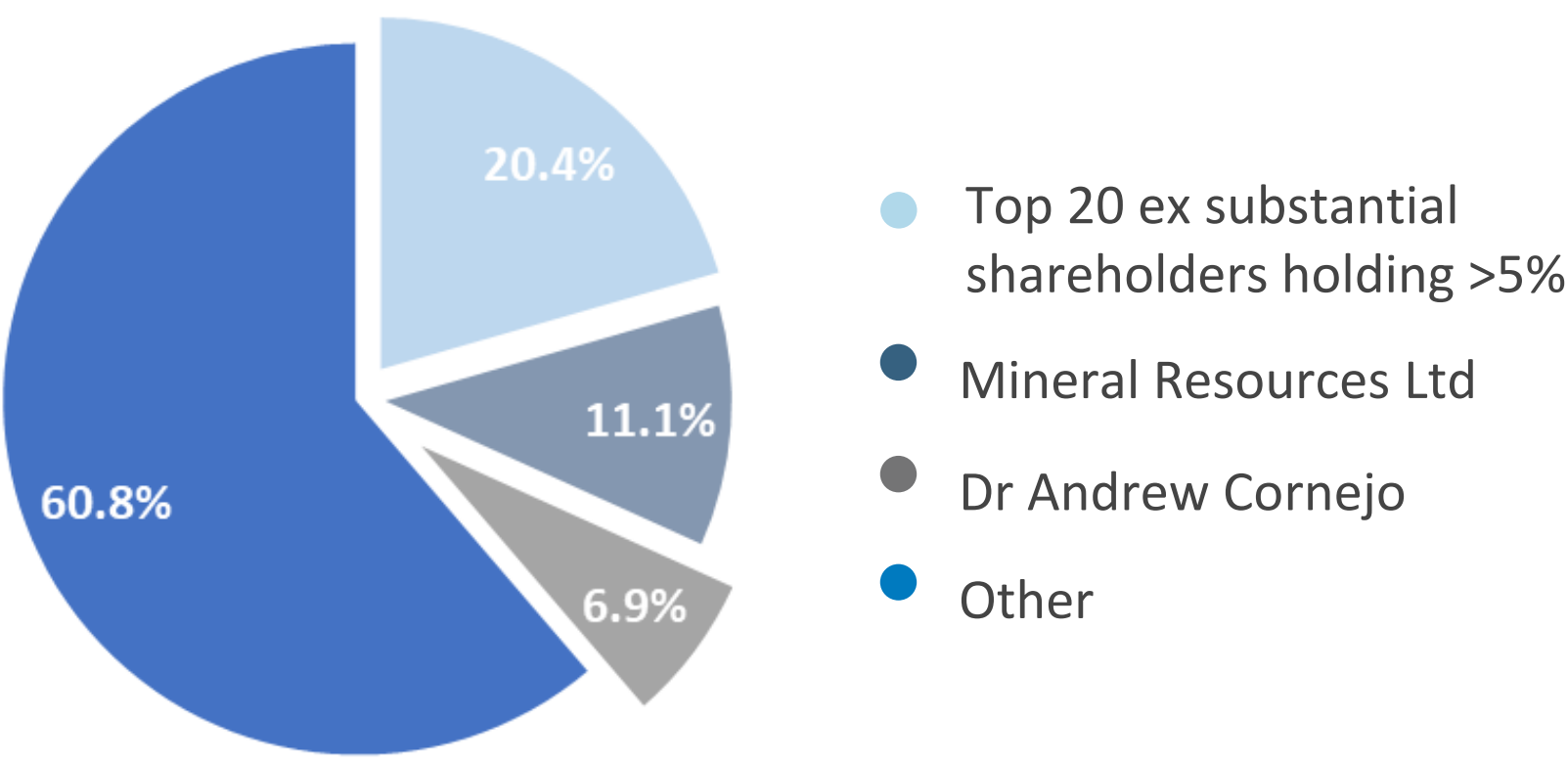
# SHARE REGISTER

Top 20 own 38%

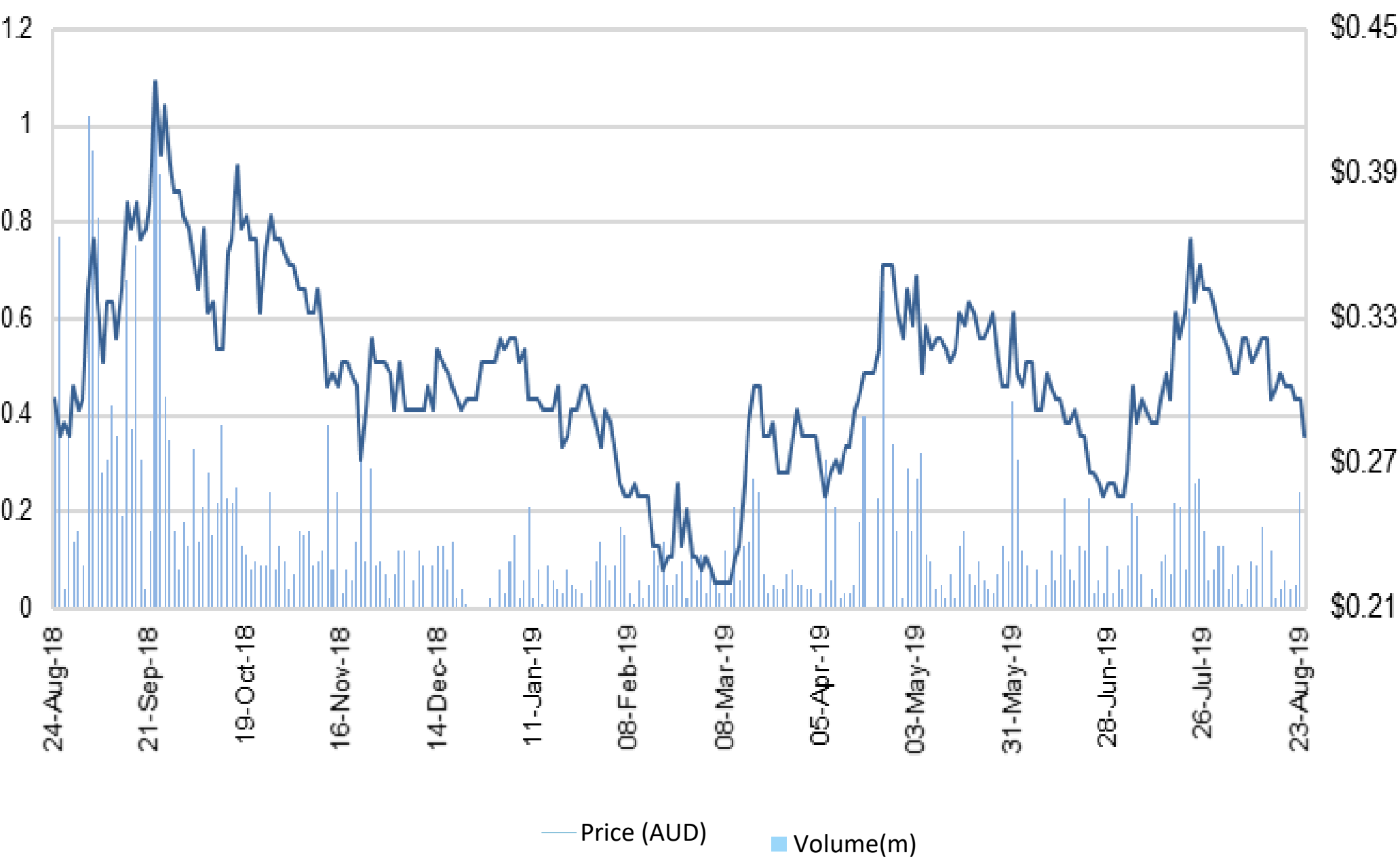
## CAPITAL STRUCTURE

Current Shares on Issue	97.26m
Market Capitalisation @\$0.30	\$29m
Cash @ 30 June 2019	\$6m
Total Options (ex prices from \$0.40 to \$1.20)	41.3m

## SUBSTANTIAL SHAREHOLDERS



## SHARE PRICE & VOLUME



# STRONG MANAGEMENT TEAM WITH PROJECT EXP.

Engineering, Technical, Marketing and Corporate expertise



**GEOFF WARD**

Chief Executive Officer &  
Managing Director

- 25 years experience in senior executive roles within the energy sector, covering operations, commodity marketing, strategy and planning, development and execution of major capital projects.
- Specialist in leading transactions in capital markets, financing, M&A and joint ventures.
- B.E Chem (Hons) and MBA.  
Member of the Australian Institute of Company Directors.



**EMMA WALDON**

CFO & Company Secretary

- 20 years experience in finance and corporate advisory roles including ASX listed companies.
- Member of the AICA a Fellow of the FSIA and a Certificated Member of the Governance Institute of Australia.



**LUC KOX**

Commercial Manager

- 20 years' experience in engineering and clean tech industries, including energy recovery from biogas.
- Extensive experience in international business development, including project finance and contract development, in particular throughout Asia Pacific region.



**MARK EDWARDS**

Chief Operating Officer

- Mechanical engineer with 25 years experience in project management, site maintenance and operation.
- Former AUA Regional Director for Light Metals division at Hatch Pty Ltd.



**DR ANDREW CORNEJO**

Co-Founder & Chief Technical Officer

- PhD; inventor of the Hazer Process.
- Co-Founder of Hazer Group Limited.
- 15 years technical engineering experience in R&D, advisory and resource development roles.



**BRADY JENKINS**

Pilot Plan Development Manager

- Metallurgist 20 years minerals processing experience.
- Strong background in commissioning and optimisation of processing operations.
- Previously led the readiness and commissioning of a start-up WA lithium mine.

# EXPERIENCED, INDEPENDENT BOARD

Commercial, Technical, Contract and Regulatory expertise



**TIM GOLDSMITH**

Chairman

- Over 20 years as Partner with global professional services group PwC.
- Leader of PwC's Mining Group, and National China Desk Practice.
- Over 30 years corporate and commercial experience across international mining and industrial business operations.



**MIKE GREY**

Non Executive Director

- 35 years' + experience in the mining sector in Gold and Iron Ore commodities.
- Chief Operating Officer, Mining Services Mineral Resources since 2009. Responsible for growing the contract mining, crushing and processing business along with developing the Company's innovation projects including synthetic graphite production through the Hazer project.



**DANIELLE LEE**

Non Executive Director

- Corporate lawyer with more than 23 years' experience shared between private law firms and the ASX.
- Main practice areas are corporate advisory, governance and equity capital markets; regularly advises on issues relating to the Corporations Act and ASX Listing Rules.



**DR ANDREW HARRIS**

Non Executive Director

- Lead Director of the Engineering Excellence Group, Laing O'Rourke.
- Professor of Chemical and Biomolecular Engineering at the University of Sydney.
- Previously the CTO of Zenogen, a hydrogen production technology company, and a co-founder of Oak Nano, a start-up commercialising novel carbon nanotube technology.

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