

# Overview of initiatives and opportunities to engage

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Australian Hydrogen Council



# AHC members

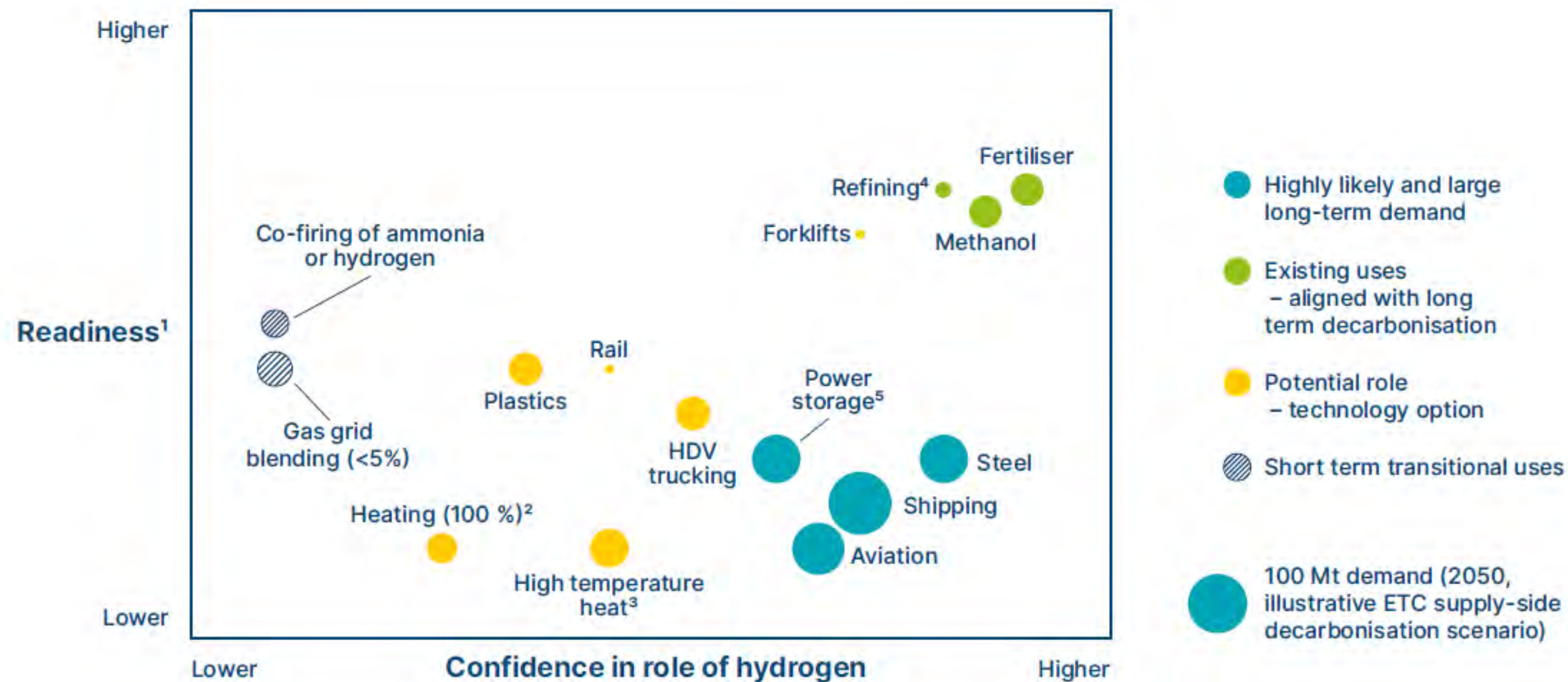
As of March 2022

AHC has 93 members

- All are companies
- Range of sizes and locations
- Highest industry representation is from the energy sector, with other main categories of technology, transport and consulting



# Potential hydrogen uses

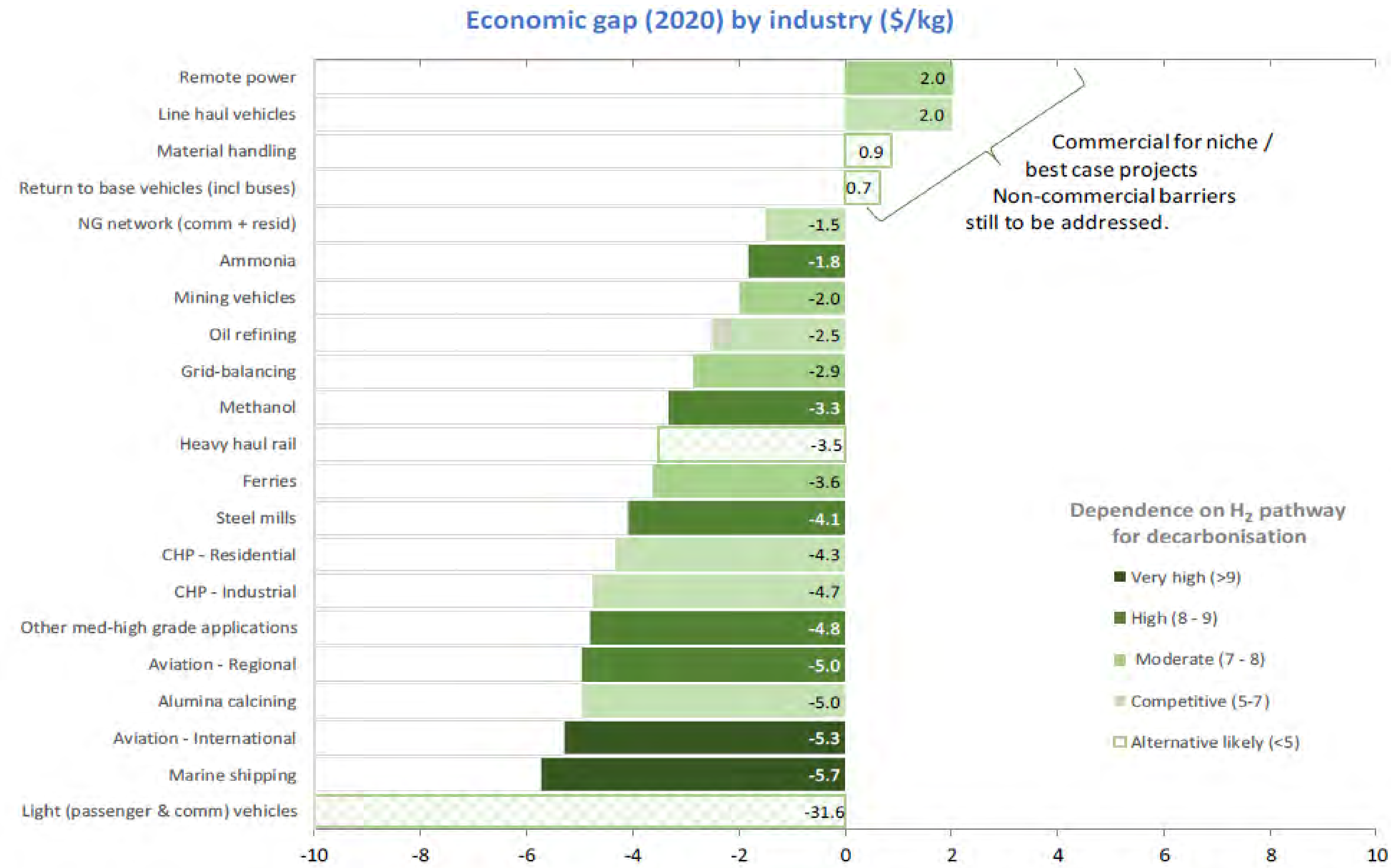


NOTES: <sup>1</sup> Readiness refers to a combined metric of technical readiness for clean hydrogen use, economic competitiveness and ease of sector to use clean hydrogen. <sup>2</sup> 'Heating (100%)' refers to building heating with hydrogen boilers via hydrogen distribution grid, <sup>3</sup> 'High temperature heat' refers to industrial heat processes above ca. 800°C <sup>4</sup> Current hydrogen use in refining industry is higher due to greater oil consumption. <sup>5</sup> Long-term energy storage for the power system.

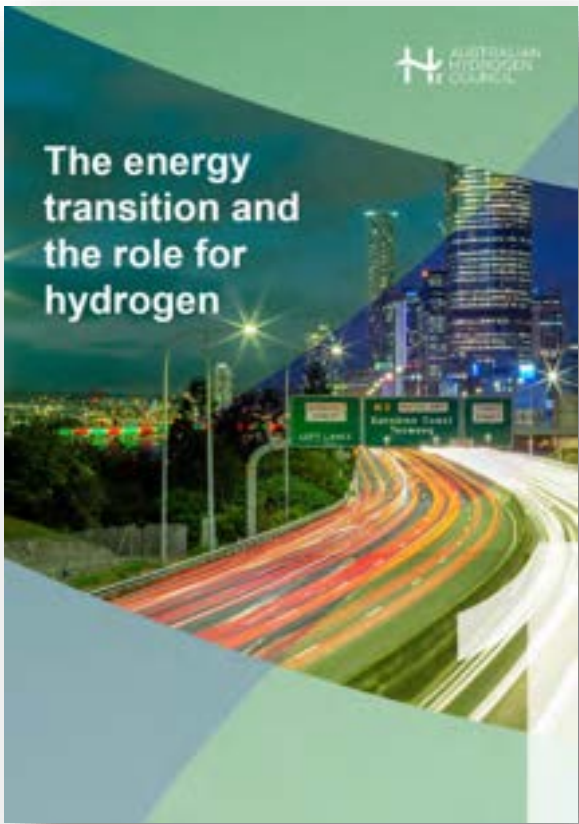
Multiple potential uses of hydrogen in a low carbon economy, some of which can provide early 'off take' for clean hydrogen. SOURCE: Energy Transitions Commission (2021), page 17.



# Potential hydrogen uses



Economic gap (2020) by industry (\$/kg), SOURCE: Advisian (2021), page 12.





# Hunter region priorities

## DEPLOY AND SCALE 2025 – 2035

### STAGE 1



Hydrogen Production from:  
100 MW + Electrolyser



Investment:  
(\$150M+)



### STAGE 2



Hydrogen Production from:  
1 GW + Electrolyser

Investment:  
(\$1bn+)

## PROSPER 2035+



Hydrogen Production from:  
5GW + Electrolyser



Investment:  
(Approx \$2.5bn+)

#### TARGET APPLICATIONS AND USE CASES

##### Chemical Feedstock

Commence feasibility for green hydrogen as a feedstock for industrial production including ammonia and fertiliser manufacturing.

##### Gas Networks

Commence feasibility to blend with natural gas for industrial use. Pilot blending of green Hydrogen from 5% to 10% into existing pipeline infrastructure.

##### Power Generation and Regional Opportunities

Explore and pilot remote power generation applications as a substitute to diesel.

##### Fuels and Mobility

Commence building "Back to Base" Green Hydrogen production and refueling infrastructure. Pilot supply applications include forklifts, public transport, heavy vehicles, and rail.

#### TARGET APPLICATIONS AND USE CASES

##### Heavy Industry

Decarbonisation of heavy industry and manufacturing including production of locally produced green aluminium through firm renewable electricity.

Direct use of hydrogen either as a heat source or a reductant or in ammonia and fertiliser production, industry and manufacturing.

##### Transport and Mobility

Expand on the Stage 1 initiatives to include shipping and additional mobility operations at the Port of Newcastle. This could include ferries, tugs, dredging equipment.

Work with ship manufacturers to develop a ammonia and/or methanol fuel based engine for the industry.

Leverage international partnerships to enable hydrogen passenger fuel cell for train services.

Collaborate with the Hunter's existing logistics operators utilising industrial transport corridors and networks to provide extensive pathways and infrastructure for transportation of large mass, high mileage vehicles.

##### Chemical Feedstock

P2X applications including aviation fuels, biomethane production from domestic and commercial waste converting directly to hydrogen.

#### TARGET APPLICATIONS AND USE CASES

##### Technology Scaleup

Scaling up the activities underway with view towards regional economic objectives including exports of green ammonia, liquid hydrogen, fertilisers, and other green hydrogen derivatives to key markets.

##### Green Steel Manufacturing

Supported by large-scale renewable energy, reduced electrolyser costs and low-cost hydrogen distribution and storage enable a large domestic and export-scale, green steel manufacturing industry.

##### Power Generation and Regional Opportunities

Production of renewable hydrogen close to the sources of solar, wind and potentially pumped hydro and transport via the construction of pipelines to the Port of Newcastle for export in various forms namely liquefied state, ammonia and other derivatives.

Hydrogen as stored energy for power generation and electricity grid balancing services.

Piped hydrogen to other areas in the State with offtake spurs.

##### Chemical Feedstock

Diverse P2X applications including aviation fuels, biomethane production from domestic and commercial waste converting directly to hydrogen.



Hunter Hydrogen Roadmap, SOURCE: Committee for the Hunter, lunch 23 November 2021.

# Where is the industry?

## Relationships

- Bipartisan political support
- General community support/indifference
- International agreements in place
- Increasing industry and port MoUs
- 18 clusters



## Project funding and progress

- >\$1.6 bn in government funding
- 82 projects in Australia (see HyResource)
- 7 hubs to be announced soon



## Cross cutting work

- Work programme for standards and regulations, including the guarantee of origin
- Skills analysis
- Public communications development, increasing consideration of social licence needs
- Supply chain analysis, including electricity and storage needs





# Export ambitions abound



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## \$4 billion industry response to hydrogen hubs

28 March 2022

The Hunter and Illawarra Hydrogen Hubs have received a major boost with more than \$4 billion in potential investment proposed in response to a recent call for expressions of interest.

Acting Premier Paul Toole said this huge commercial interest shows how much the regions are set to benefit with renewable energy and new low carbon technologies.

"Hydrogen Hubs will provide huge economic benefits for the Hunter and Illawarra, helping to secure jobs of the future," Mr Toole said.

"It also represents a huge export potential for our state, with the international market for green hydrogen expected to meet 24% of the global energy demand by 2050, estimated to be worth \$900 billion."

Treasurer and Energy Minister Matt Kean said the overwhelming response includes private sector plans to develop up to 5900MW of electrolyser capacity, more than eight times our 700MW target.

"The market has spoken. This is an overwhelming level of commercial interest and it shows our policies are sending the right signals to energy investors, making NSW the go to state for energy investment," Mr Kean said.

"Twenty-one individual projects have told us they want to produce almost 268,000 tonnes of green hydrogen each year, which is enough to fuel 26,000 trucks. Hydrogen is integral to decarbonising many parts of the economy, including heavy industry and heavy transport."

The NSW Government has committed \$70 million to accelerate the development of Hydrogen Hubs in New South Wales, starting with the Hunter and Illawarra.

Hydrogen Hubs will be pivotal in helping NSW scale up the emerging green hydrogen industry by working with industry to support innovation and minimise the cost of infrastructure. To learn more see [Developing hydrogen hubs for NSW](#).

Tags: [Energy](#) [Hunter](#) [Illawarra](#)



FEBRUARY 10 2022 - 10:05AM

## Exports key to future hydrogen economy

Marion Rae

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## Victoria's renewable hydrogen industry to open export market opportunities

02 Mar, 2021

Victoria will invest in a renewable hydrogen industry to advance the development of the potentially game-changing energy technology.

Key to this investment is Victoria's Renewable Hydrogen Industry Development Plan, which sets out a blueprint for how the Victorian Government will lead and support a suite of outcomes to drive the development of a renewable hydrogen sector.

Premier of Victoria  
The Hon Daniel Andrews

Home > Ship Of Future Carries Hydrogen Export Project Forward

## Ship Of Future Carries Hydrogen Export Project Forward

21 January 2022

The world's largest hydrogen export pilot program has reached a significant milestone with the arrival of the first purpose-built liquefied hydrogen carrier, the *Suiso Frontier*, in the Port of Hastings.

RenewablesSA



## Hydrogen in South Australia

Home / Hydrogen in South Australia

South Australia has the wind, sun, infrastructure and skills to be a world renewable hydrogen supplier.

## Central Queensland: a future hydrogen export powerhouse

27 November 2020

Queensland has taken another step towards becoming a green hydrogen production and export powerhouse, with the formation of a consortium between Queensland-owned Stanwell Corporation and Japanese energy company Iwatani Corporation, Japan's largest hydrogen supplier.

## Gladstone to lead Queensland's future green hydrogen industry

ABC Capricornia / By Rachel McGhee  
Posted Thu 25 Jun 2020 at 7:34am

## Northern Territory Renewable Hydrogen Strategy

The Territory has embraced an aspirational target of net-zero emissions by 2050 and hydrogen can play a critical role in achieving this target.

The Territory is positioning itself to be at the forefront of the developing hydrogen industry and aspires to be an international scale renewable hydrogen technology research, production and downstream manufacturing centre.

## Goals to achieve by 2030

- WA's market share in global hydrogen exports is similar to its share in LNG today.
- WA's gas pipelines and networks contain up to 10% renewable hydrogen blend.
- Renewable hydrogen is used in mining haulage vehicles.
- Renewable hydrogen is a large fuel source for transportation in regional WA.

## \$117.5 million to progress two renewable hydrogen hubs

25/11/2021 7:00 AM

- McGowan Government puts \$117.5 million on the table to secure two Western Australian hydrogen hubs
- Renewable hydrogen hubs in the Pilbara and Mid-West would put WA at the forefront of the new industry
- Hubs would create about 2,000 jobs around the State
- Application submitted for matching funding from the Commonwealth Government

McGowan Government will invest up to \$5 million to attract Federal funding for viable hydrogen hubs in the Pilbara and West to drive Western Australia as a global energy powerhouse.



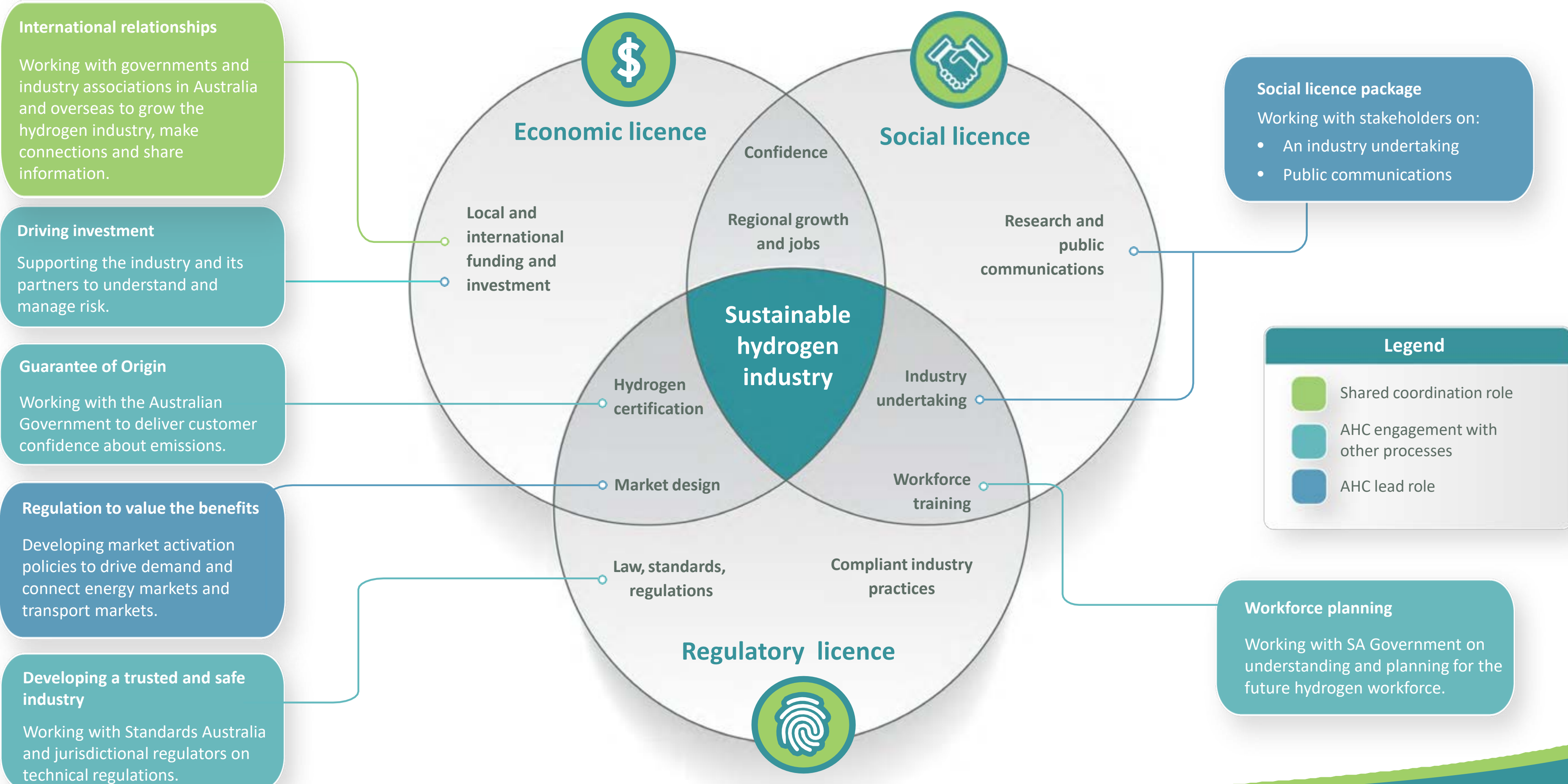


# The issue of scale





# Policy priorities





# Question compendium

- Includes all questions and answers
- Can be filtered in different ways to meet different needs
- Used as the basis for a potential future communications toolkit
- Will be shared with anyone who is communicating about hydrogen

A	B	C	D	E	F	G	J	L
#	Stakeholder group	Topic category	Secondary lens - Stakeholder value	Hydrogen value chain	Part of the economy	Economy detail	Question	Answer
	General	Basics	Basics	All	All	All	What is the National Hydrogen Strategy?	Released in December 2019, the National Hydrogen Strategy promotes a clean, innovative and competitive hydrogen industry and seeks to position Australia as a major global player by 2030. The Strategy was developed through extensive consultation with industry, hydrogen experts and community stakeholders. The strategy commits to using hydrogen in Australia's gas networks and as a transport fuel, supporting physical hydrogen 'hubs', skills and training for those working with hydrogen leading the development of hydrogen certification schemes and supporting a coordinated national approach to regulation and development.
	General	Basics	Basics	Use	Transport	Fuel cell	What does a fuel cell do?	Fuel cells generate electricity through an electrochemical reaction, not combustion. Within the fuel cell, hydrogen and oxygen are combined to create electricity, heat, and water. Fuel cells never deplete or need recharging. Instead, they require a steady supply of hydrogen that the fuel cell combines with oxygen to provide the power. Hydrogen fuel cells are being developed to power a wide range of vehicles: cars, trucks, heavy haulage vehicles, forklifts, tractors, and buses. Fuel cells can also provide power to homes and businesses, as well as provide power stability for hospitals, grocery stores, and data centres. Fuel cells are zero emission and the only products are water, electricity, and heat. Because there are no moving parts to a fuel cell, it operates silently and reliably. They are also more efficient than internal combustion engines or steam turbines. Additionally, they can be combined into stacks, for large scale applications.
	General	Basics	Basics	Use	Transport	Fuel cell	How does a fuel cell work?	A fuel cell works in the opposite way to an electrolyser. Composed of two electrodes (a cathode and an anode) separated by an electrolyte membrane, a hydrogen fuel cell works the following way: •Hydrogen gas enters the fuel cell through the anode. In the anode, the atoms of hydrogen create a chemical reaction with a catalyst, splitting into protons and electrons. At the same time, oxygen from the atmosphere enters the fuel cell via the cathode. (The catalyst, typically made of platinum particles, facilitates the chemical reaction). •There is a porous electrolyte membrane between anode and cathode. The positively charged protons pass through the membrane to the cathode and the negatively charged electrons are forced through a circuit generating electricity. •In the cathode, the oxygen and protons then combine to produce water.



# Some references

- <https://research.csiro.au/hyresource/>
- <https://www.industry.gov.au/data-and-publications/australias-national-hydrogen-strategy>
- [www.ga.gov.au/scientific-topics/energy/resources/hydrogen](http://www.ga.gov.au/scientific-topics/energy/resources/hydrogen)
- <https://arena.gov.au/renewable-energy/hydrogen/>
- [www.H2council.com.au](http://www.H2council.com.au)

