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Hydrogen: coming to a stovetop near you?

Speakers:
Alison Reeve, *National Hydrogen Strategy*
Peter Harcus, *Jemena Gas Networks*
Craig Memery, *Public Interest Advocacy Centre*
Tony Wood, *Grattan Institute*

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Australian Government

COAG Energy Council

NATIONAL HYDROGEN STRATEGY UPDATE

Alison Reeve | Taskforce Leader

July 2019

industry.gov.au/hydrogen

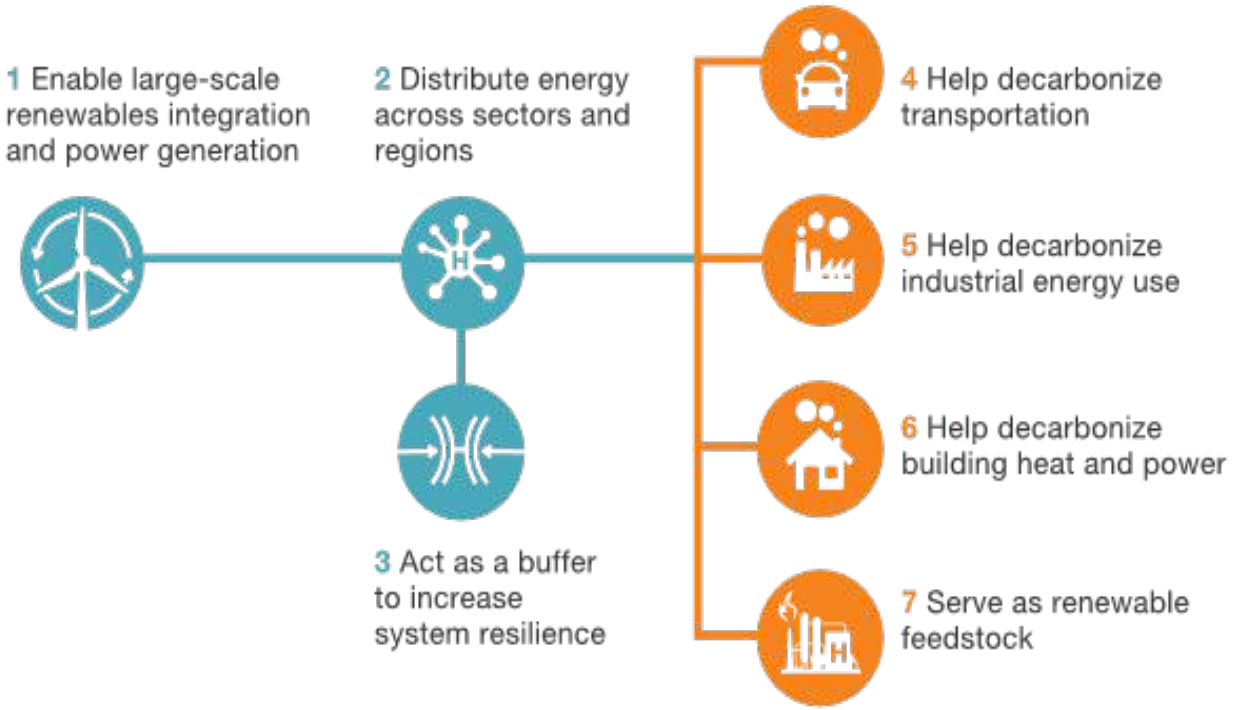
Outline

Why hydrogen?

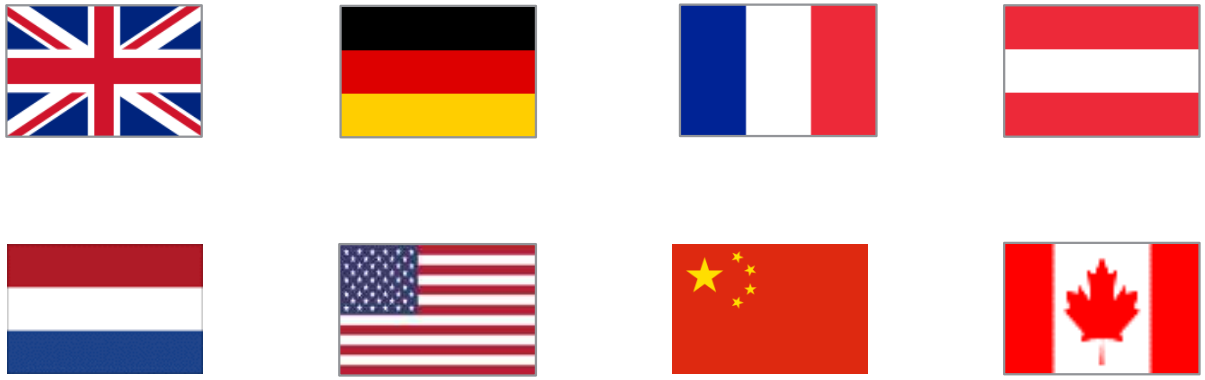
Why Australia?

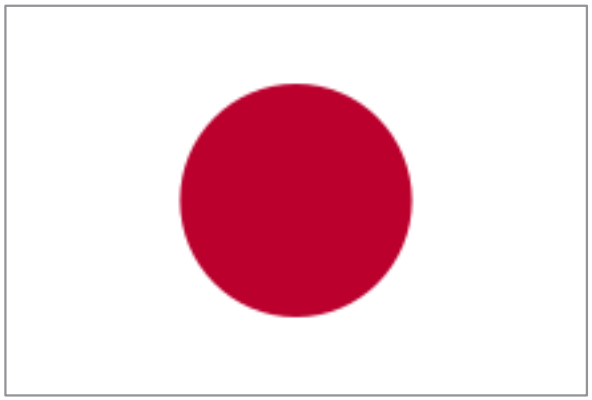
Coming to a stovetop near you?

Why Hydrogen?



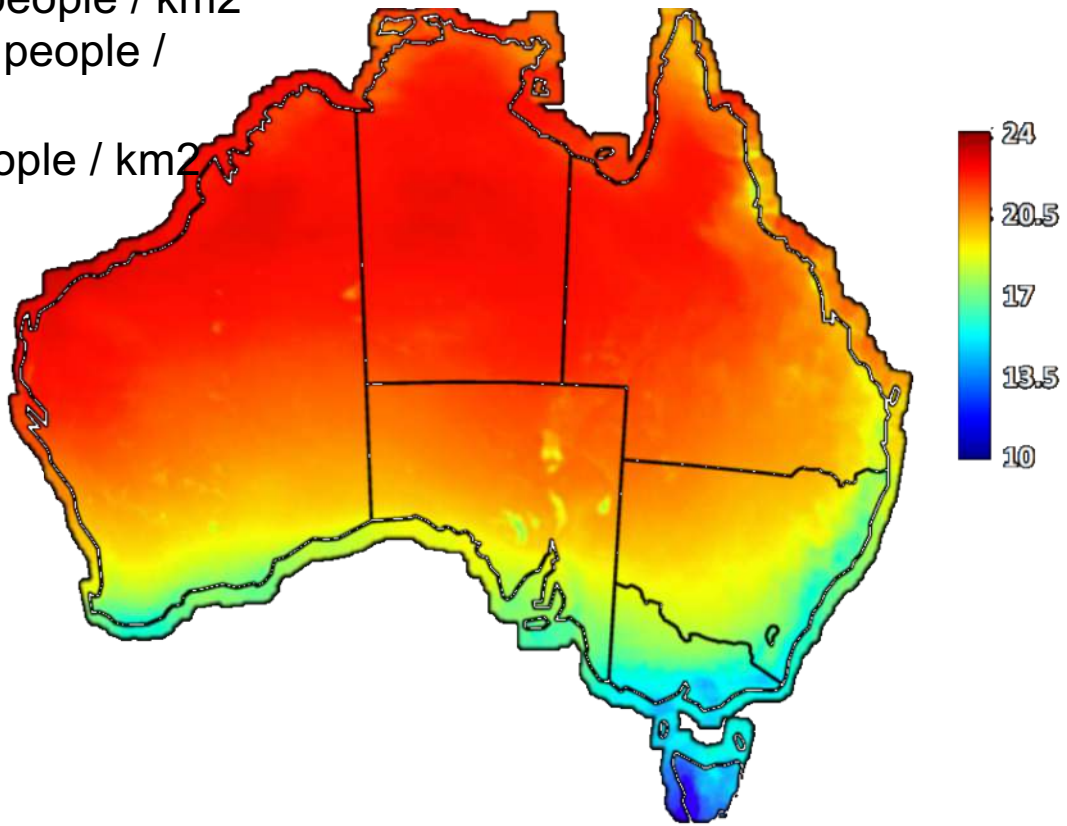
Why now?





Why Australia?

JP: 336 people / km2
KR: 636 people / km2
AU: 3 people / km2

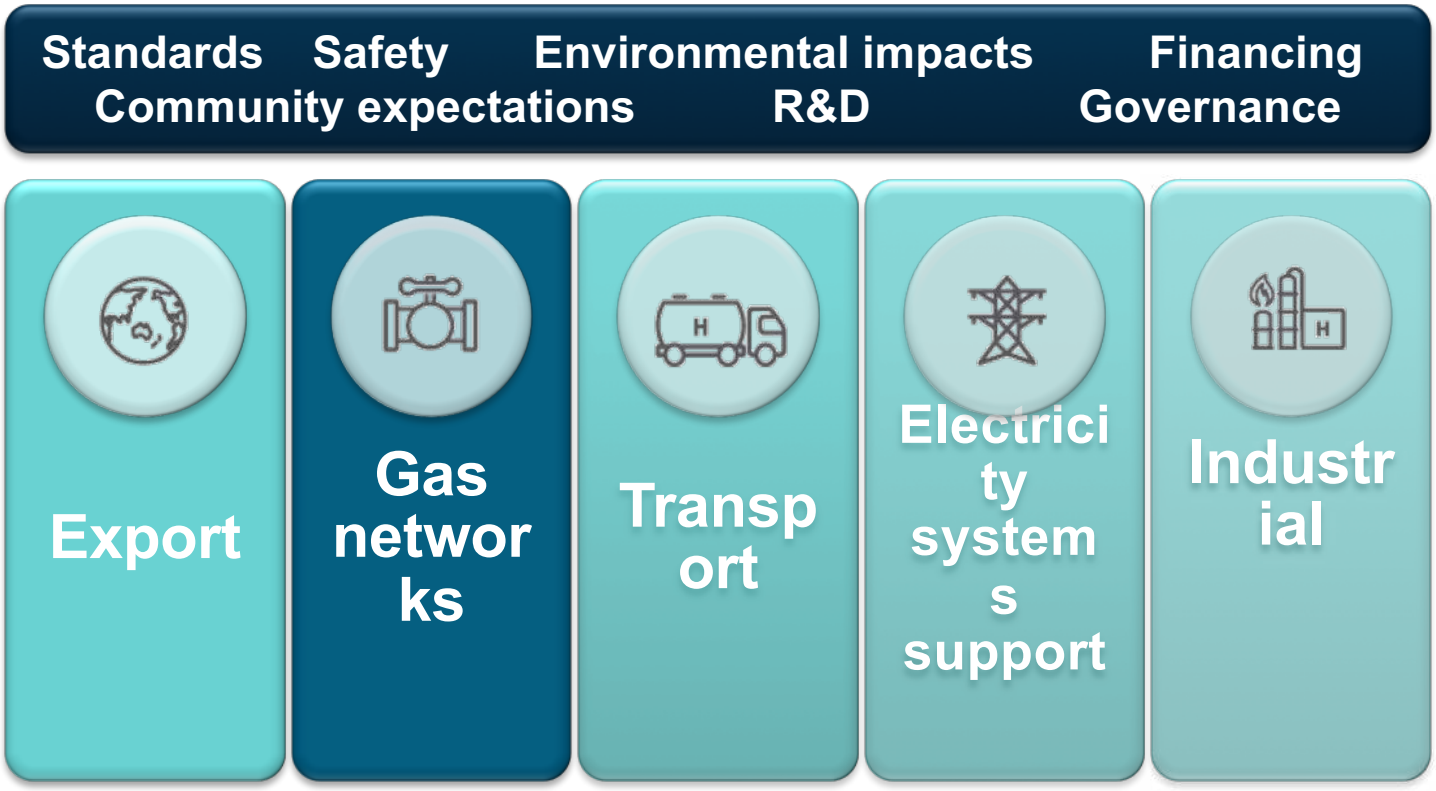


National strategy

"The COAG Energy Council seeks to support the development of a clean, innovative and competitive hydrogen industry that benefits all Australians and is a major global player by 2030."

COAG Energy Council

What will be in the national strategy?



Three big questions

1

Is it technical possible?

Is Australia's gas infrastructure physically suitable for a blend or 100% hydrogen?

2

Will users accept it?

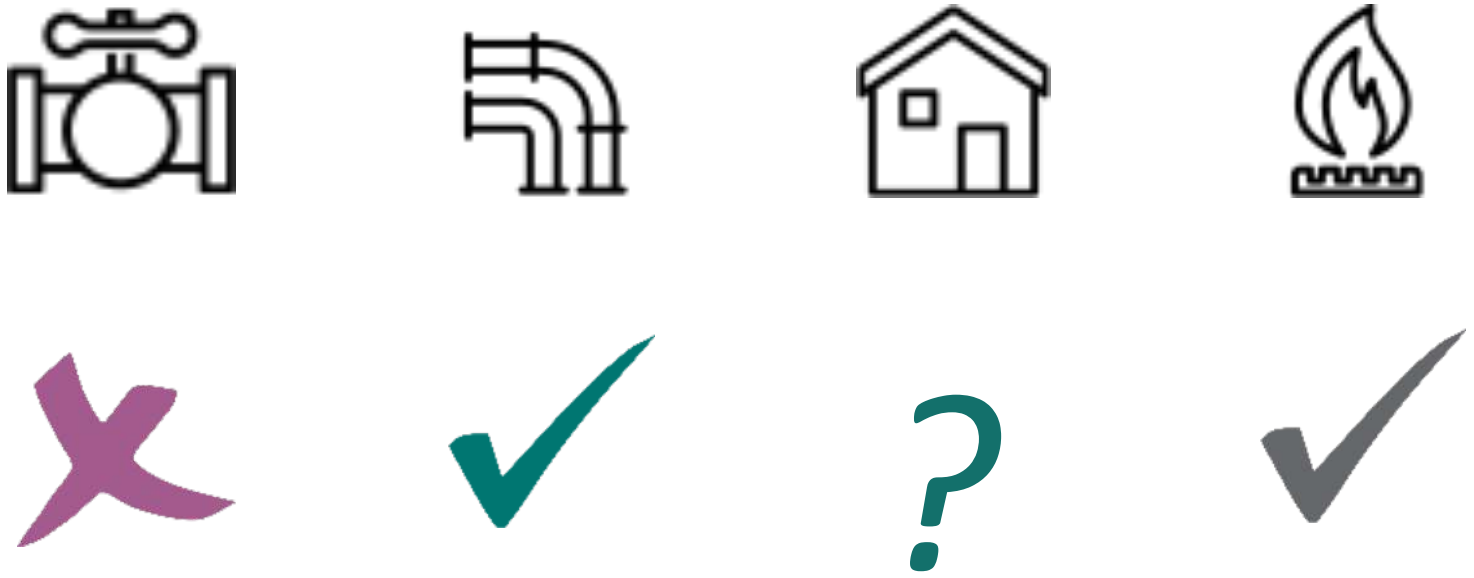
Are consumers happy to use some hydrogen for cooking, heating, furnaces, feedstock and other uses?

3

Do the economics stack up?

What does the cost look like, now and in the future, and who bears that cost?

Is it technically possible?



Will consumers accept it?

"I'd have some concerns about safety issues"

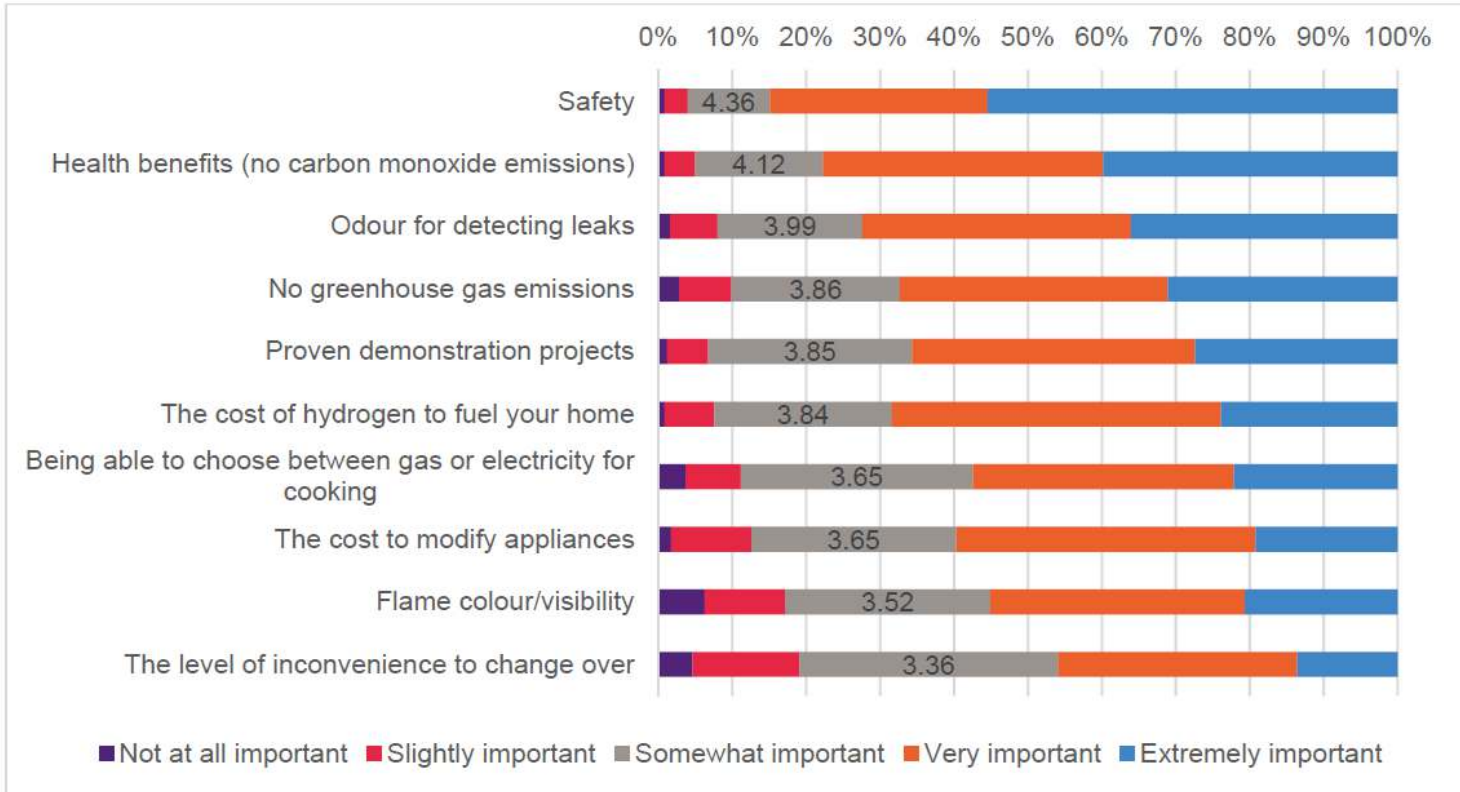
"it sounds great if it's a practical swap"

"I think the government would have to offer subsidies"

"I want to know more about the environmental impacts"

Source: Lambert, V & Ashworth, P 2018, 'The Australian public's perception of hydrogen for energy', University of Queensland, St Lucia

Will consumers accept it?



Source: Lambert, V & Ashworth, P 2018, 'The Australian public's perception of hydrogen for energy', University of Queensland, St Lucia

Do the economics stack up?

To summarise…

1

Is it technical possible?

A cautious yes, for blending

2

Will users accept it?

As long as it's appropriately regulated, good for the environment and cost impacts are minimised

3

Do the economics stack up?

We don't know… yet…

Australian Government

COAG Energy Council

Register for updates

www.industry.gov.au/hydrogen

Contact us

hydrogen@industry.gov.au

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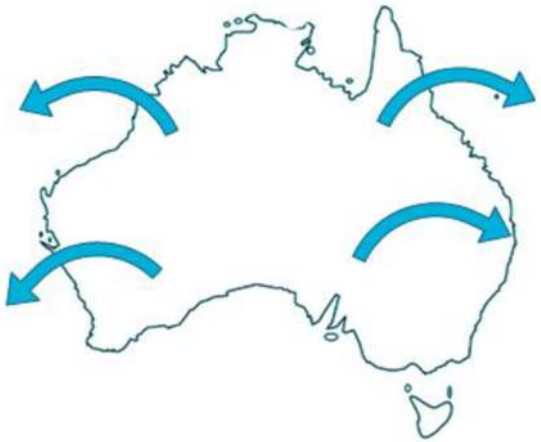
Hydrogen – Coming to a stovetop near you?

A gas network perspective

Peter Harcus
GM Asset Management Jemena

The hydrogen market is on the move

- Rapid expansion of centralised renewable generation forecast to hit 50% by 2025
- Demand for inter seasonal storage
  - high levels of residential PV installations leading to local distribution constraints
  - European experience demonstrates at levels above 30% there will be significant period of excess power generation
- Demand for renewable energy globally, with supply constraints in some countries
- Cost competitive, scalable renewable energy supply and high capacity factors
- Australia is an established energy exporter and has existing port infrastructure
- A pathway to cost competitive industry is now foreseeable



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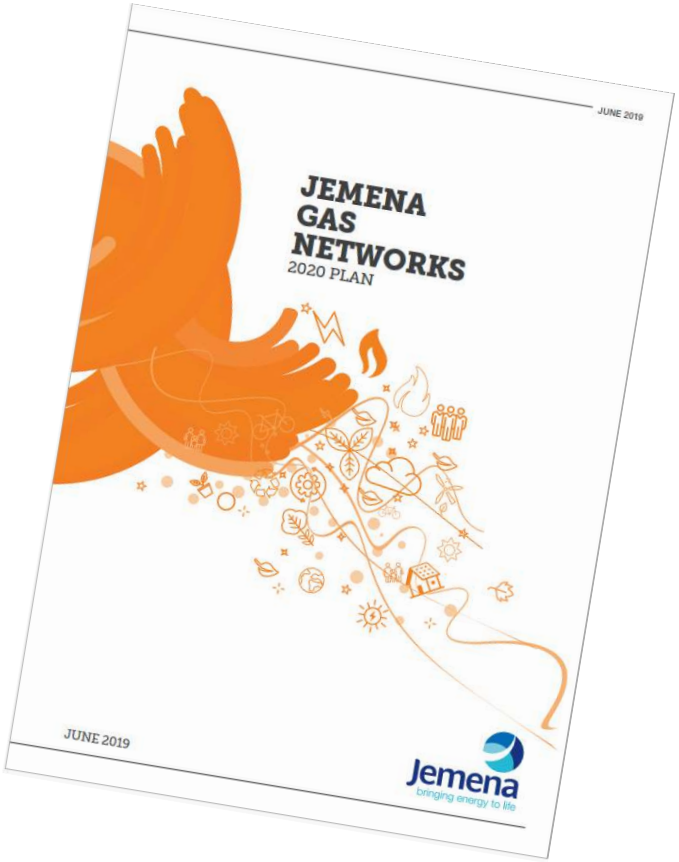
What customers have told us

- Energy affordability should be our priority
- They want continued access to gas in the near and medium term
- They see the gas network as an insurance policy against 100% electrification/decarbonisation
- One word - Optionality



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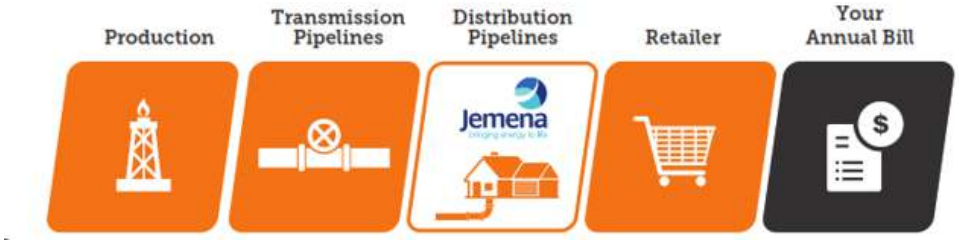
Hydrogen and the Gas Network

- Optionality for lower cost energy system decarbonisation
- Potential source of zero carbon gas (in addition to Biomethane)
- Inter-seasonal storage for excess renewable electricity production, through the substitution of natural gas
- Decarbonising the stationary and transportation energy supply systems



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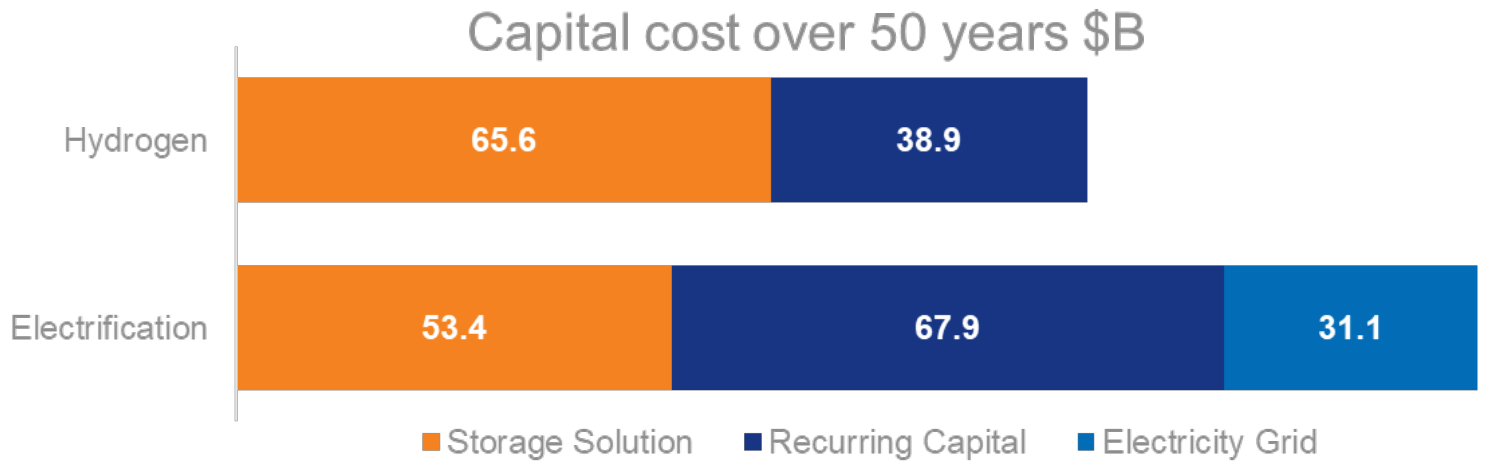
The economic case for hydrogen in Australia's energy market

- Hydrogen enables an integrated gas and electricity energy system
- 30% higher cost of electrification of Australia's gas demand:
  - Battery replacements required to achieved 50 year asset life
  - Increased peak electricity demand requires significant network augmentation



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*2030 Australian Gas Demand 399 PJ, Deloitte Access Economics 2017, ACOLA 2017, US EIA, Nel

Hydrogen can play an important, complementary role in the 2050 energy system

Segments	Key subsegments	Relative importance by 2050[1]	Complementary decarbonization solutions
Transportation	▪ Large cars (fleets) and taxis ▪ Trucks and buses ▪ Light commercial vehicles ▪ Trains	39% 22% 30% 9%	▪ Battery-electric vehicles ▪ Plug-in hybrid electric vehicles ▪ Electrified trains
Heating and power for buildings	▪ Hydrogen blending for heating ▪ Pure hydrogen grids for heating	2% 16%	▪ Electrification of heating via heat pumps ▪ Energy efficiency measures ▪ Biogas/biomass
Industry energy	▪ High-grade heat	23%	▪ Demand side and energy efficiency measures ▪ Electrification ▪ Biogas/biomass ▪ Carbon capture
Industry feedstock	▪ Ultra-low-carbon hydrogen as feedstock for – Ammonia, methanol – Refining ▪ Feedstock in steelmaking (DRI) ▪ Combined with CCU in production of olefins and BTX	100% 80% 20% 30%	*For steel:* ▪ Coke from biomass ▪ CCS on blast furnace *For CCU:* ▪ Carbon storage
Power generation	▪ Power generation from hydrogen ▪ Flexible power generation from hydrogen	2% 55%	▪ Biogas ▪ Post-combustion CCS ▪ Batteries

Western Sydney Hydrogen Gas Trial

Schedule

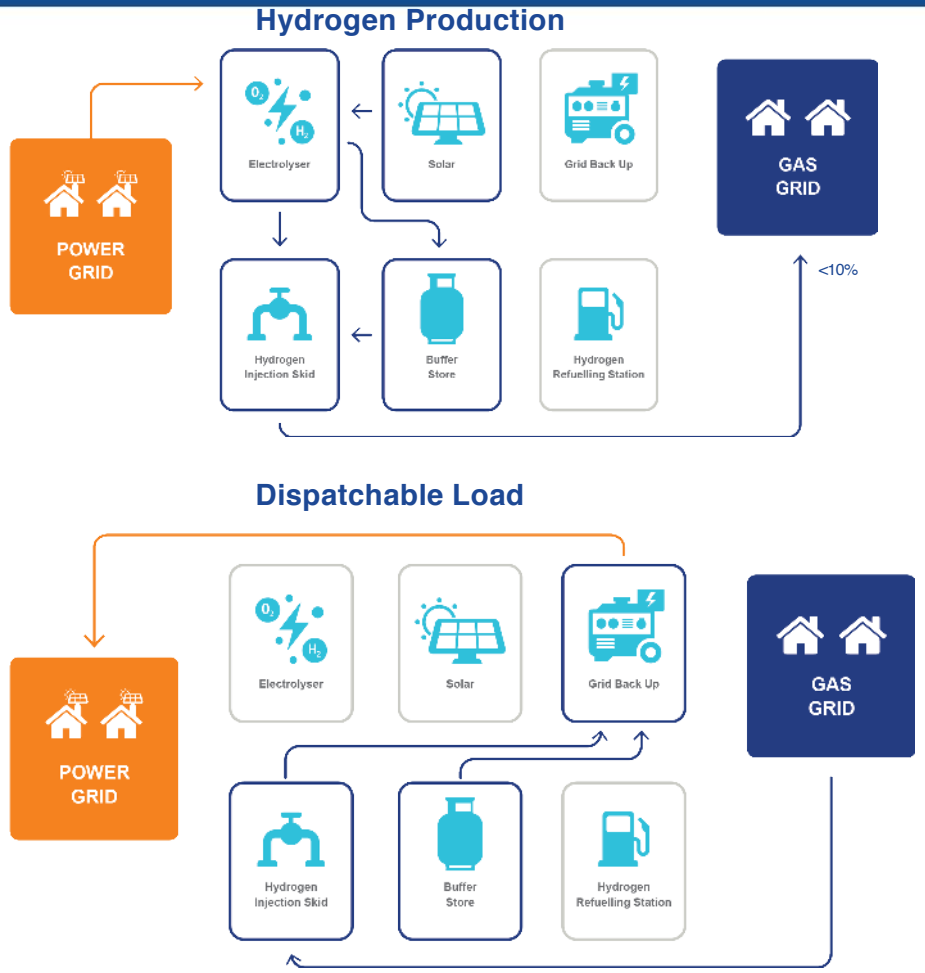
- 18 month design and construction
- 5 year trial

Budget

- $15million (co-funded with ARENA)

Location

- Western Sydney



Project components

- 500kW Electrolyser
- H_2 grid injection skid
- H_2 test and demonstration facilities
- Onsite Power Generator
- H_2 Buffer Storage
- H_2 Refueler
- Rainwater collection and potable water

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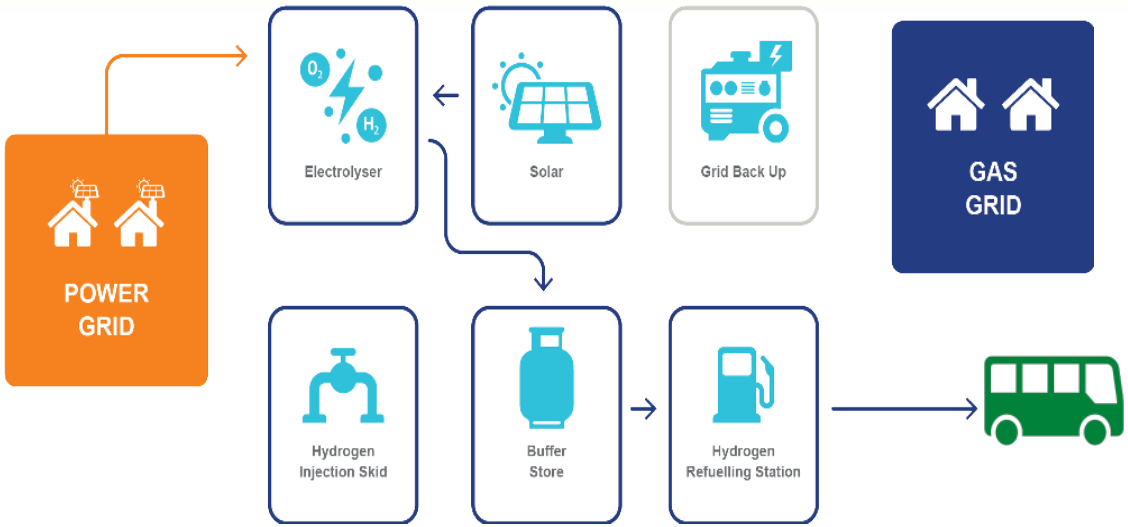
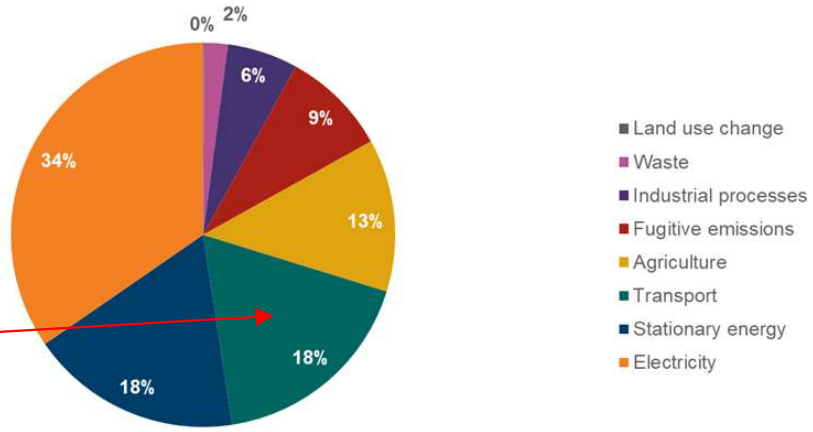
An opportunity for industry collaboration



Australian Greenhouse Emissions by Industry



Source: Department of the Environment and Energy, 2017

- "Hydrogen offers an opportunity for optimisation of renewable energy use between the electricity, gas and transport sectors (i.e. 'sector coupling')" [1]
- Jemena's Green Gas project provides an opportunity to provide zero emission fuel to the transport industry and the transport industry provides an early target market to support scalable hydrogen investment and infrastructure.
- [1] *(Hydrogen Roadmap, CSIRO, 2018)*

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