

HyP SA Overview

AGIG ESS Presentation – 22 June 2021



LEGEND

— Transmission pipelines

○ Distribution networks

■ Gas distribution area

● Storage

■ Renewable hydrogen production facility

■ Renewable hydrogen production facility under development

Customers

2.0+ million

Distribution

34,996 km

Transmission

4,319 km

Storage Facilities

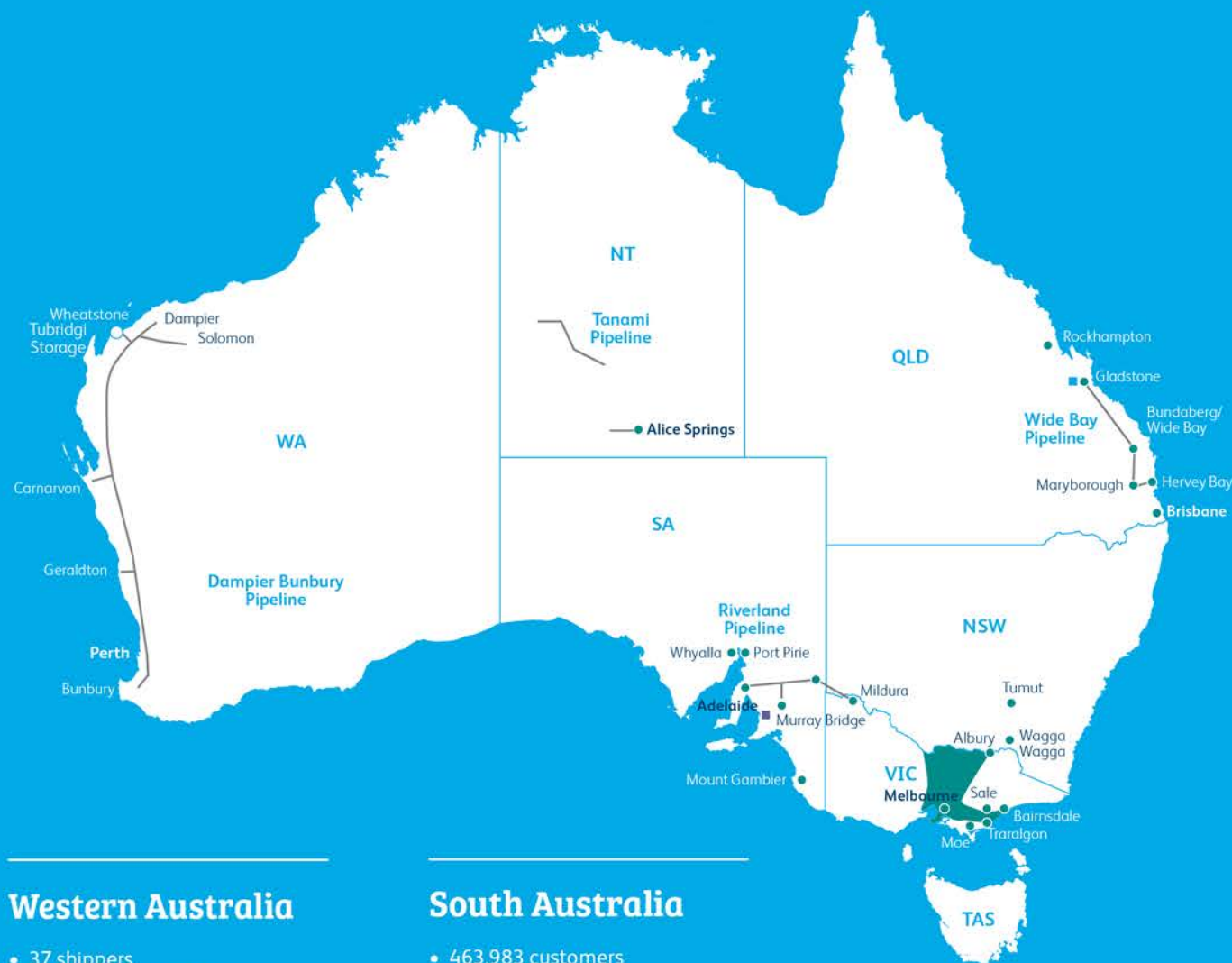
60PJ

Area

National

Asset Value

\$8.6 billion



Western Australia

- 37 shippers
- Transmission 2,337km
- 60PJ gas storage

Note: Penetration rate is an estimate of the percentage of homes connected to the gas in areas served by our networks

South Australia

- 463,983 customers
- 17GJ per annum average residential consumption
- 90%+ penetration
- Distribution 8,239km
- Transmission 480km

Northern Territory

- 1,156 customers
- Distribution 40km
- Transmission 601km

Queensland

- 107,517 customers
- 8GJ per annum average residential consumption
- 30%+ penetration
- Distribution 3,150km
- Transmission 314km

New South Wales

- 60,885 customers
- 38GJ per annum average residential consumption
- 90%+ penetration
- Distribution 2,005km
- Transmission 84km

Victoria

- 1,429,667 customers
- 52GJ per annum average residential consumption
- 90%+ penetration
- Distribution 21,562 km
- Transmission 503km

Our vision

Our vision is to be the leading gas infrastructure business in Australia...

**Delivering for
customers**



Public
Safety

Reliability

Customer
Service

**A good
employer**



Safety

Employee
Engagement

Skills
Development

**Sustainably
cost efficient**



Working
Within Industry
Benchmarks

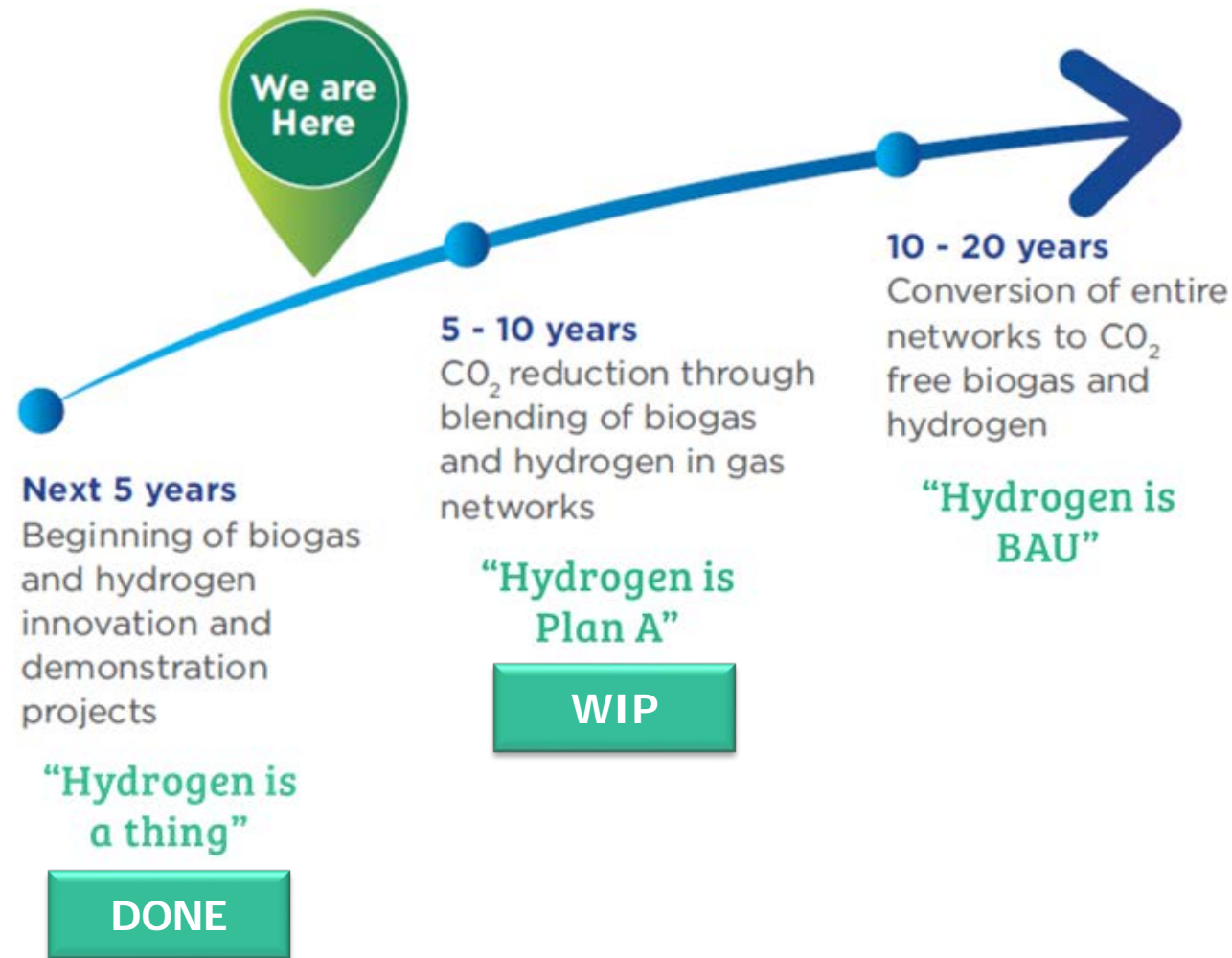
Delivering
Profitable
Growth

Environmentally
and Socially
Responsible

...achieving top quartile performance on our targets

Gas Vision 2050 | A Pathway to Decarbonisation

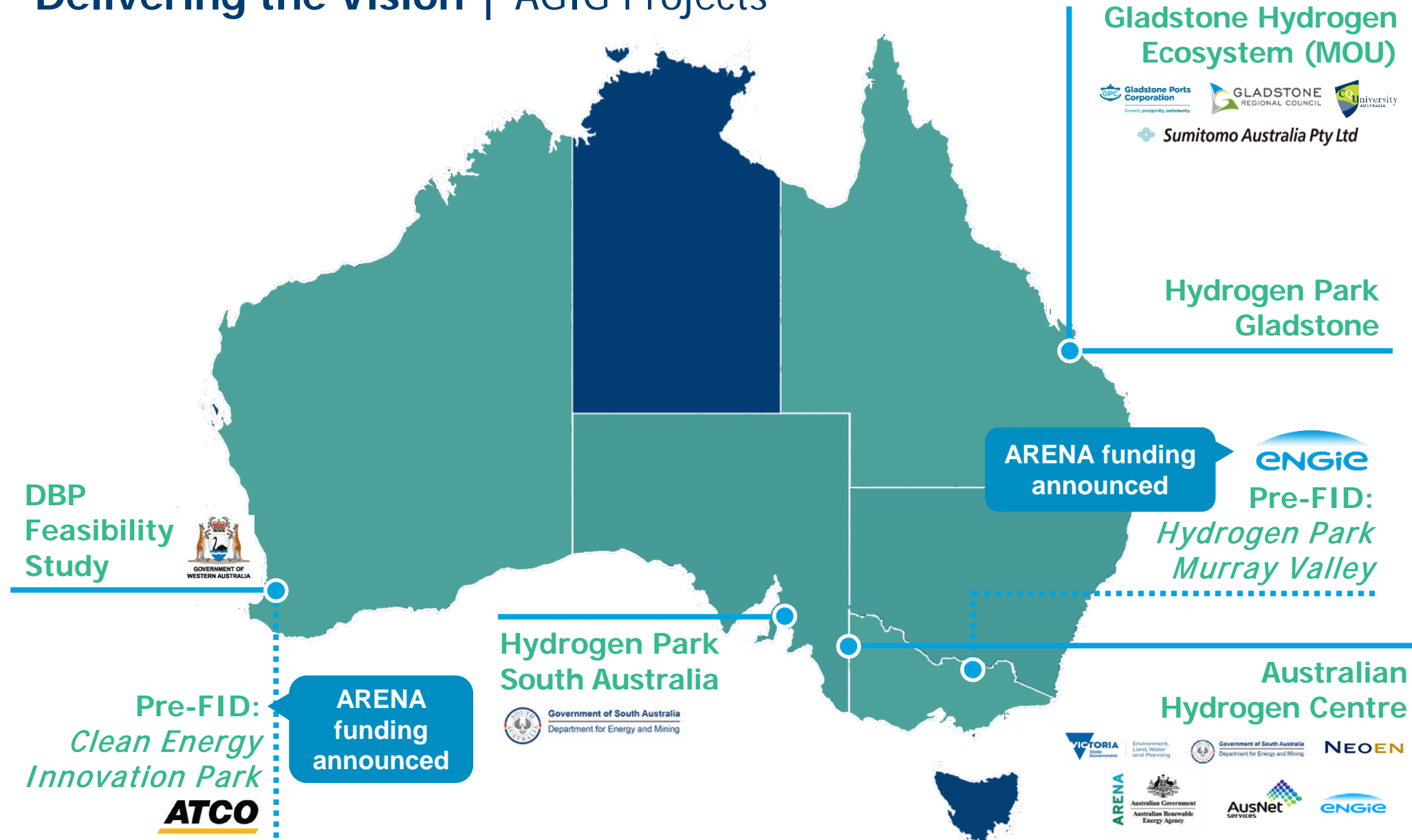
Launched in 2017, Gas Vision 2050 highlighted the role of gas today, and the trajectory for decarbonising gas into the future



Delivering the Vision | AGIG Projects

We are delivering projects across the country and across the gas value chain

To demonstrate the approach to policy makers and help drive down costs



Hydrogen Park South Australia

Project Overview

HyP SA | An Australian First and Globally Significant Project

Launched
19 May by the
South Australian
Premier

An Australian-
first supplying
networks and
industry

Targeting
expanded
blending and
refuelling



An Australian-first project of
type and scale

More than 700 homes in
the project area

A 5% renewable hydrogen blend
via the existing network

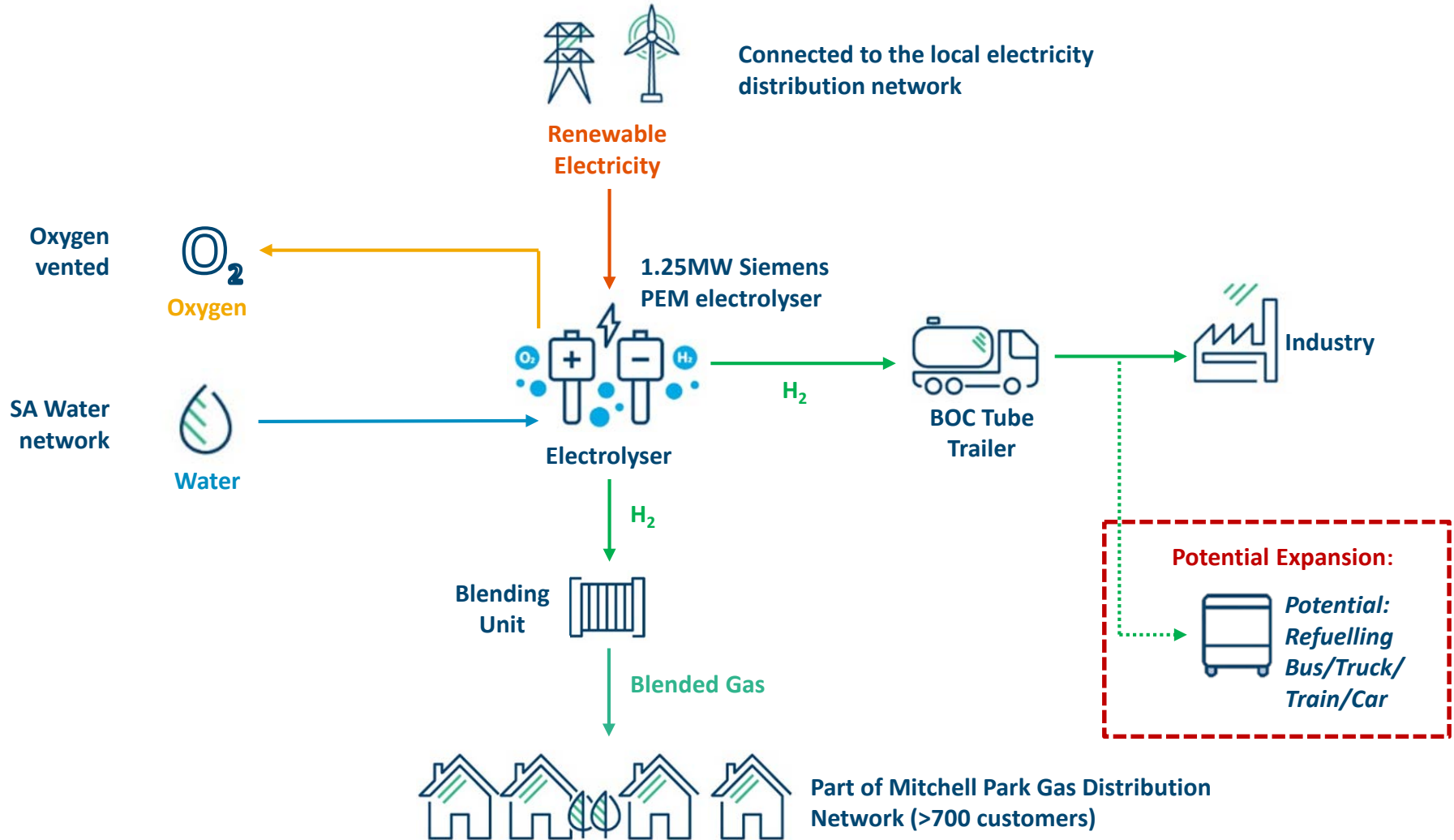
Pure hydrogen supplied to
industry via tube trailers

Potential for refuelling

Building new industry and jobs for
Australians

HyP SA | How it Works

An Australian-first integrated hydrogen project



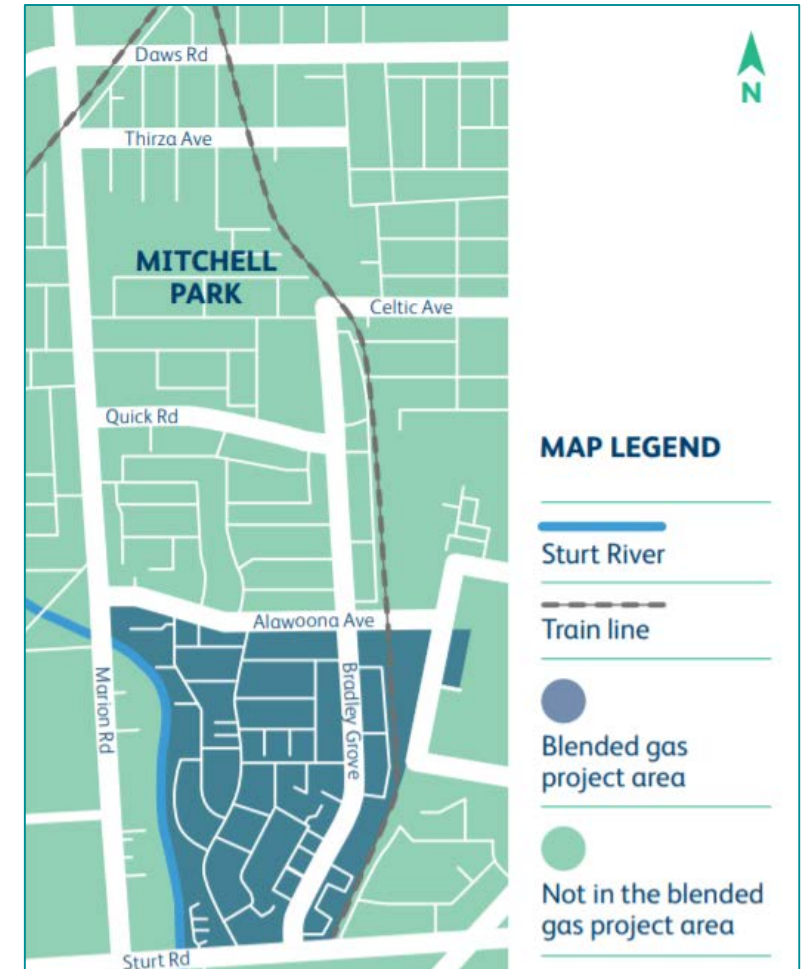
HyP SA | Project Location

Tonsley
Innovation District



Located near the old Mitsubishi Assembly Building (MAB) precinct (redeveloped as the Tonsley Innovation District)

712 households in part of Mitchell Park receiving 5% blended renewable gas



<https://tonsley.com.au/>

HyP SA | How the Facility Works – Overview



- 1 Electrical Input
- 2 Water Input and Purification
- 3 Electrolyser
- 4 Hydrogen Purification
- 5 Hydrogen Storage Tank
- 6 Gas Analyser Hut
- 7 Gas Network Blending
- 8 Tube Trailer Bay

HyP SA | How the Facility Works – Inputs



Electrical Supply

- 11kV power supply to the site
- Two Transformers with one dedicated to electrolyser
- Harmonic Filter for electrical grid stability
- Rectifier to convert AC to DC current for electrolyser stack

Water Supply

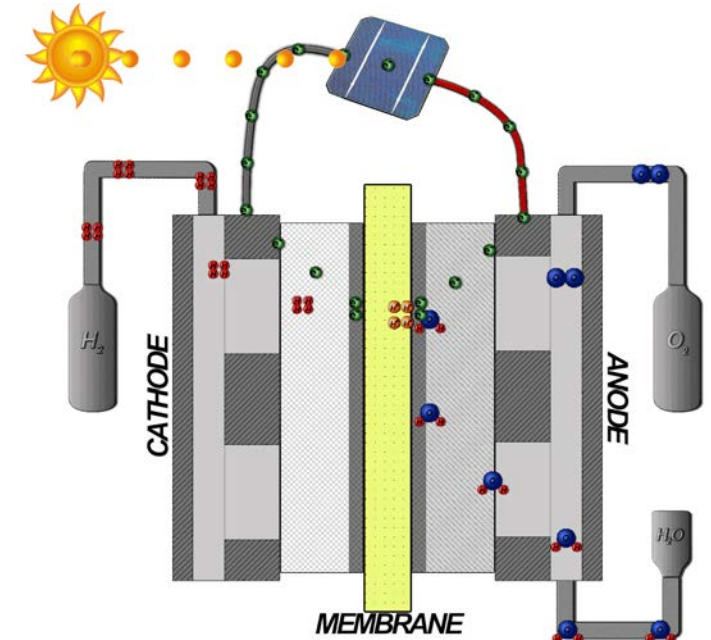
- Potable water mains supplies the site
- Treated using RO and electro-deionisation
- Specification $<1\mu\text{s}/\text{cm}^3$ demineralised water
- Total 15-20L water per kg of hydrogen
- Electrolysis stoichiometric ratio 9L water to 1kg hydrogen
- Possibilities for alternate water sources if designed



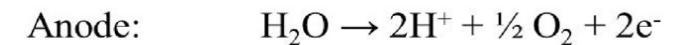
HyP SA | How the Facility Works – Electrolyser

Electrolyser

- Siemens Silyzer 200
- 1.25MW Proton Exchange Membrane (PEM) type electrolyser
- Capable of 20kg/h of Hydrogen
- Stack consists of 250 electrolytic cells
- Operates between 450-650V and up to 2240A
- Pressurised up to 35bar
- Oxygen is vented to atmosphere –future use potential



V.Ostrovskyy, 2021, Silyzer 200 System for PEM Electrolysis of Water, Siemens Energy



HyP SA | How the Facility Works Electrolyser

Electrolyser Processing Skid

- Water circulation pumps
- Gas separators
- Heat exchangers and cooling water pump
- Control temperature, pressure, level



Electrolyser Performance

- DC Stack Efficiency (LHV) between 50-65% (ratio of energy content of produced hydrogen to DC electrical energy input).
- Electrical Stack Efficiency 50-65kWh/kg of hydrogen produced

HyP SA | How the Facility Works – Purification and Network Injection

Purification

- Gas received from electrolyser >99.5%
- Target purity >99.999% purity
- Deoxygenation reactor – for oxygen removal
- Moisture adsorption columns – for water removal



Natural Gas Network Injection

- 5% renewable hydrogen blend by volume
- Supplied to >700 homes in Mitchell Park Area
- Analysers to monitor hydrogen concentration



HyP SA | How the Facility Works – Storage and Tube Trailer Facility

Storage and Tube Trailer Loading

- On site tank storage <40kg at 3500kPa
- Tube trailer loading facility of high purity hydrogen
- Trailers contain up to 400kg and average 1 trailer per week
- Tube Trailer Pressure up to 165 Bar – supplied by additional compressor



AGIG Future Hydrogen Developments

Project Overview

Next Steps | Hydrogen is a Thing

Our renewable
hydrogen
projects are BAU

Up to 5% to
>700 customers
(HyP SA, 2021)



Up to 10% to
entire small
network
(HyP Gladstone, 2022)

Hydrogen Park South Australia

- \$14.5m project, \$4.9m support from South Australian Government
- 1.25MW electrolyser
- **<5% renewable H₂ blend to >700 homes**
- **Supply to industry via tube trailer**
- Launched 19 May 2021
- Refuelling and stakeholder centre next phase



Hydrogen Park Gladstone

- \$4.2m project, \$1.7m support from Queensland Government
- 175kW electrolyser
- **<10% renewable H₂ blend to network**
- First production expected in 2022
- Residential, commercial, industrial customers
- Potential for refuelling



Next Steps | Hydrogen is 'Plan A' – Project Proposals

HyP Murray Valley (Albury Wodonga)

- Joint Venture with ENGIE
- ~\$44m project
- 10MW electrolyser
- <10% renewable H₂ blend
- First production 2023
- Co-located with waste-water treatment facility

Clean Energy Innovation Park (Perth)

- Joint Venture with ATCO
- ~\$47m project
- 10MW electrolyser
- Renewable H₂ blend
- First production 2023



2021 | 19

Up to 5% to
>700 customers
(HyP SA, 2021)



Up to 10% to
entire small
network
(HyP Gladstone, 2022)



Up to 10% to
>120,000
connections
(HyP Murray Valley
& CEIP, 2023)

Delivering the Vision | Hydrogen is Plan A – 10% Across the Networks

Stretch target: Distribution networks transitioning to renewable gas by 2040

100%
hydrogen
product from
2025

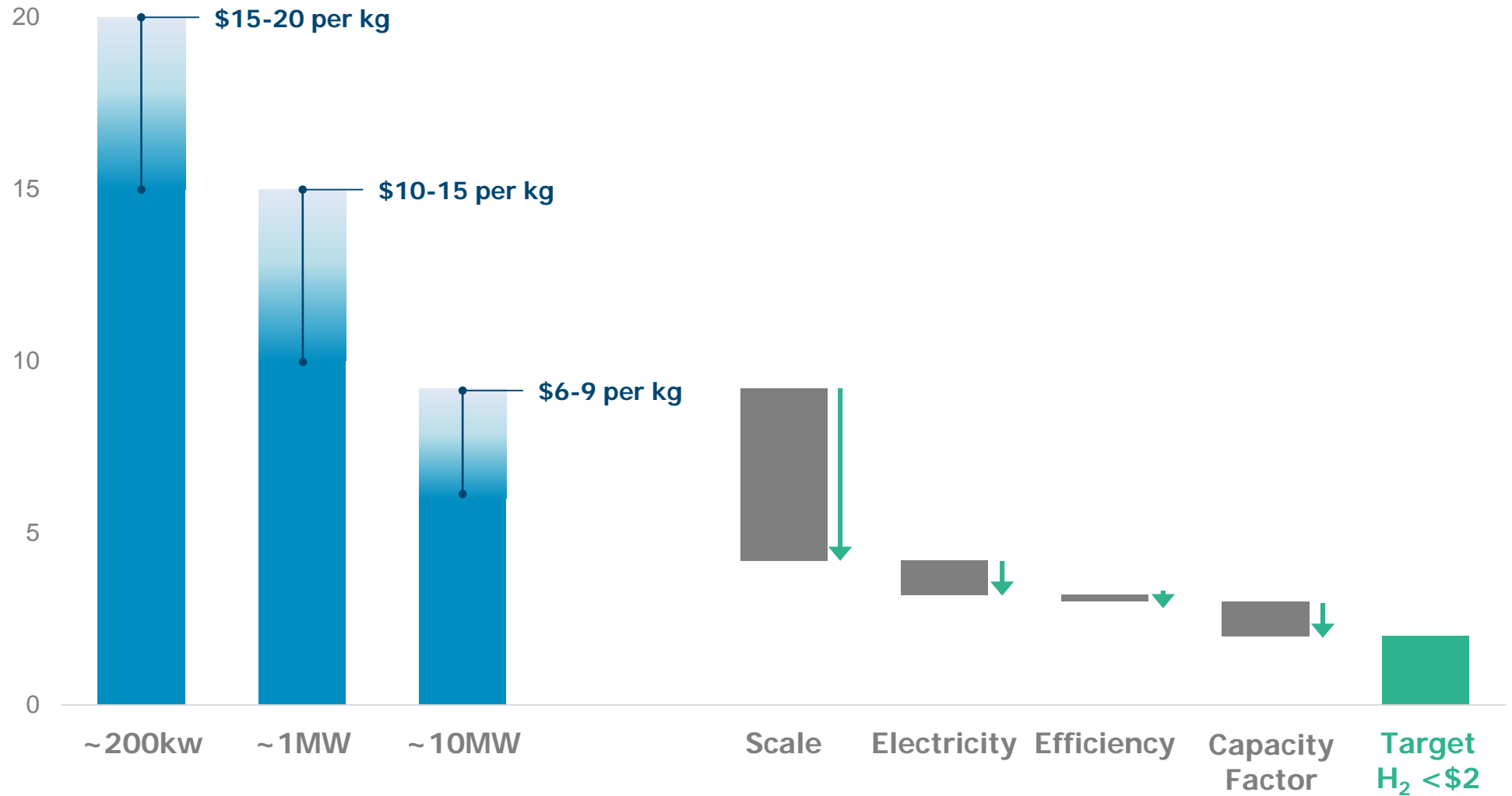
Whole system
blending by
2030

Net zero by
2050 at the
latest, ideally
2040



For our midstream and transmission business we will continue developing infrastructure solutions for our customers - natural gas and hydrogen

Next Steps | Networks Key for H₂ under \$2



Costs are already coming down with scale and learnings

H₂ under \$2 per kg is achievable by 2030

Thank You

**Hydrogen is
a sustainable,
zero emission
gas of the
future.**