

# Decarbonising with Green Hydrogen

Energy & Mines Perth, Sept 2022





## LPG

Bottling scales, carousel, automation, technology and parts/services

## CNG

Gas compression, dispensing, vehicle integration and parts/services

## Hydrogen

Production and refueling, alkaline & PEM technology and storage & transport

## Biogas & RNG

Upgrading technology, compression and transport technology.

## Transport & Storage

High pressure fixed storage & mobile pipelines for CNG, biogas, hydrogen

ENGv IS PROUD TO EXCLUSIVELY REPRESENT & PARTNER WITH:



## About ENGV & Pacific Energy

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ENGV Pty Ltd was established in 2013 as a full service provider to meet the needs of customers in gas compression, upgrading, storage, vehicles & bulk transport (natural gas, LPG, hydrogen, biomethane, & landfill gas). This includes the supply and maintenance of CNG & hydrogen refuelling stations, CNG and LNG vehicle & bulk trailers, conversions and fit-outs and the supply of vehicle and conversion parts. We operate and maintain over 30 24/7 gases refuelling/compression sites around Australia.

**People:**

Our staff have over 150 years' combined experience in the gas transport, storage and refuelling technology in both Australian and international markets.

**Technology:** The best in the world or at least equivalent to it.

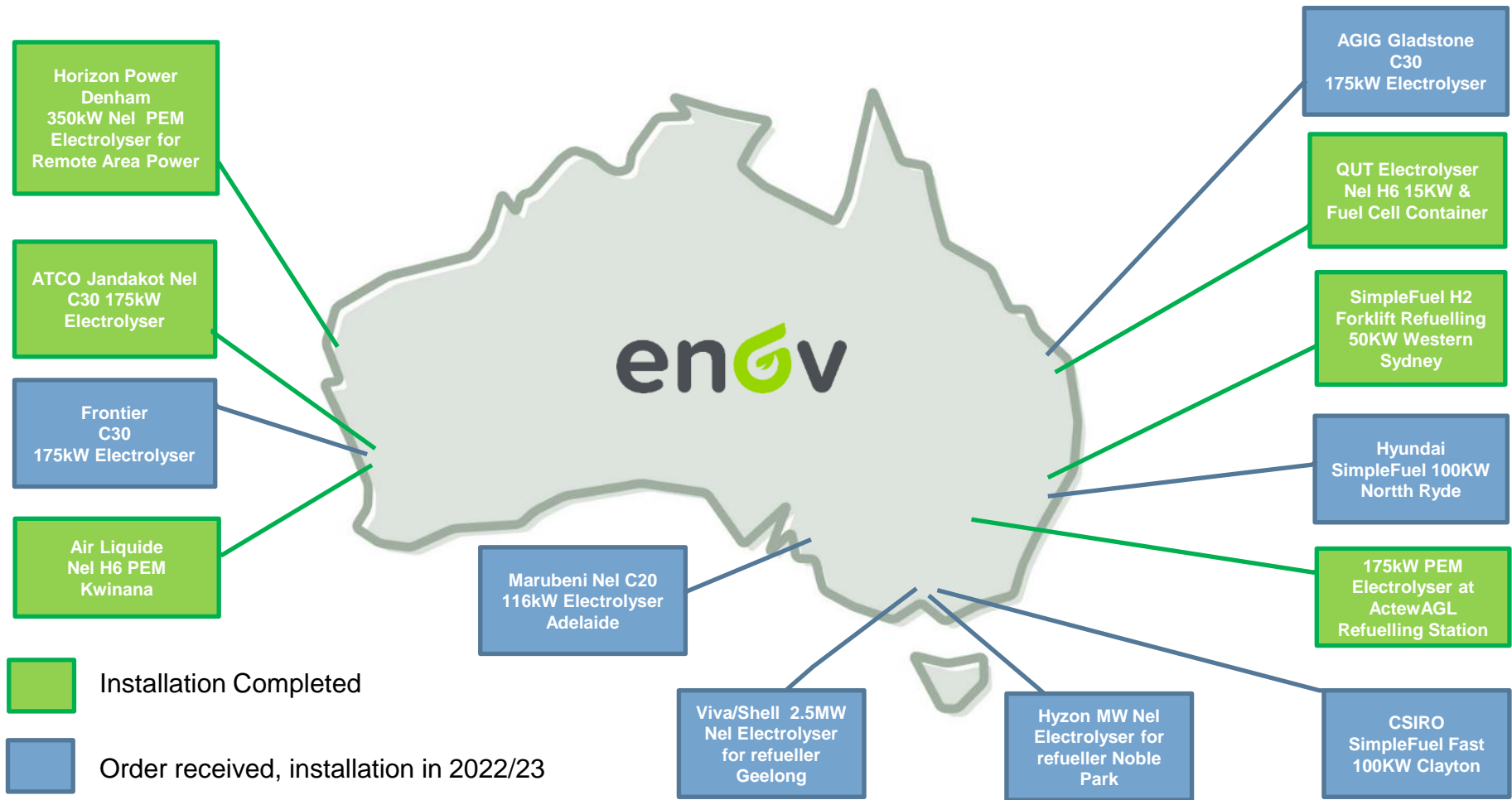
**Pacific Energy Group**

ENGV was acquired by Pacific Energy in July 2022. As one of Australia's leading producers of sustainable distributed energy, Pacific Energy Group owns and operates 47 power station facilities around Australia, with contracted capacity of more than 650MW.

Pacific Energy Group is the only sustainable distributed energy provider in Australia with internal capability to provide and integrate all renewable energy technology and services, including solar, wind, battery, LNG and green hydrogen, as well as traditional gas and diesel fired generation.



# Our National Electrolysis Footprint – Nel Partnership (7 built, 6 in process)



# How can green hydrogen support mining's decarbonisation goals for mobility?

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- Hydrogen is available and disruptive.
- Global technology providers are available and rapidly expanding
- Government policy is supportive and evolving
- There is a problem and H2 is a part of the solution....
- However – it is a gaseous fuel..not liquid or electrical and this will require a shift in thinking and operations.
- Up until 2 years ago the missing ingredient was vehicles. This is now changing with almost every OEM vehicle manufacturer public stating their intention to have H2 appliances/vehicles/engines
- .
- We just need to act and start small and grow.

# Electrolysis – long term agreement for Aus and NZ expansion

## PEM and Alkaline Water Electrolysis Technology from Nel.

- Global leaders with over 3,500 operational electrolyzers
- Over 100 years electrolysis experience
- Successful partnership with ENGV to deploy technology in Australia



**PEM Electrolysis (USA)**  
2,700+ systems installed



**Alkaline Electrolysis (Norway)**  
800+ systems installed



**H2 Refuelling (Denmark)**  
50+ systems installed  
*Not currently available for ANZ market*



## Mining Truck (Mogalakwena South Africa 2021)

- Using Nel's Alkaline electrolyser
- $700\text{Nm}^3/\text{h}$  -  $1,510\text{kg}/\text{day}$  ~3.5MW
- Replace diesel-fueled mining trucks to the world's largest hydrogen fuel cell mining haul trucks
- Truck will operate at Anglo American's Mogalakwena Platinum Group Mine in South Africa
- Electricity to power the electrolyser will come partly from the grid and partly from a local solar farm.
- If successful, over 400 mine haul trucks could be rebuilt to use hydrogen fuel (10,000 globally).

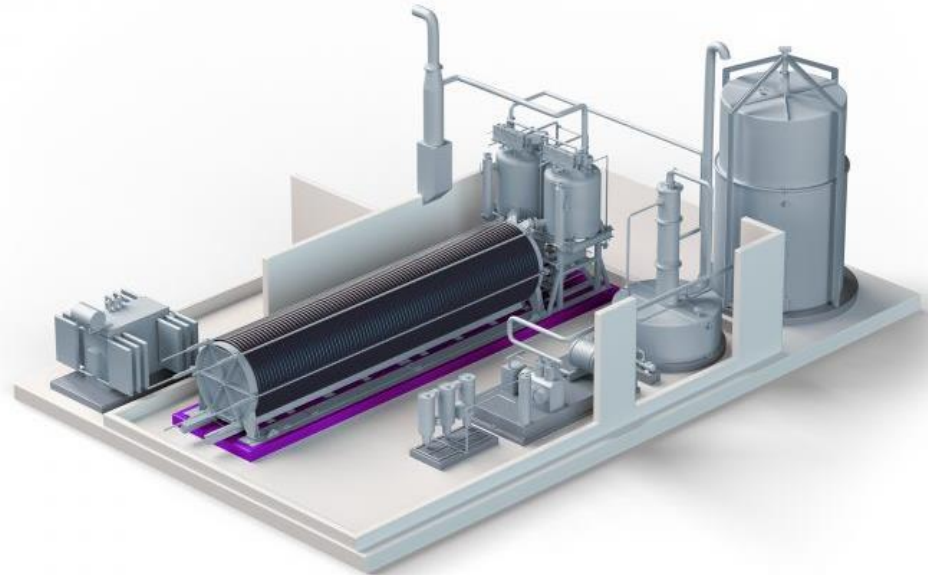


Source: Anglo American, Mogalakwena North - Central Pit



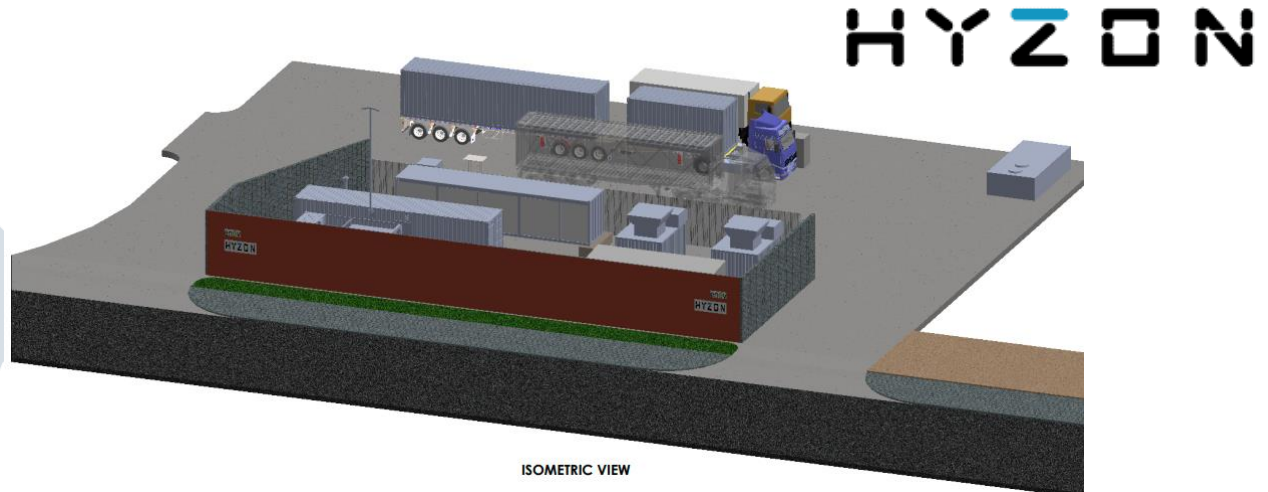


from <1 to >8,000 kg/day production  
able to deliver 100+ MW systems

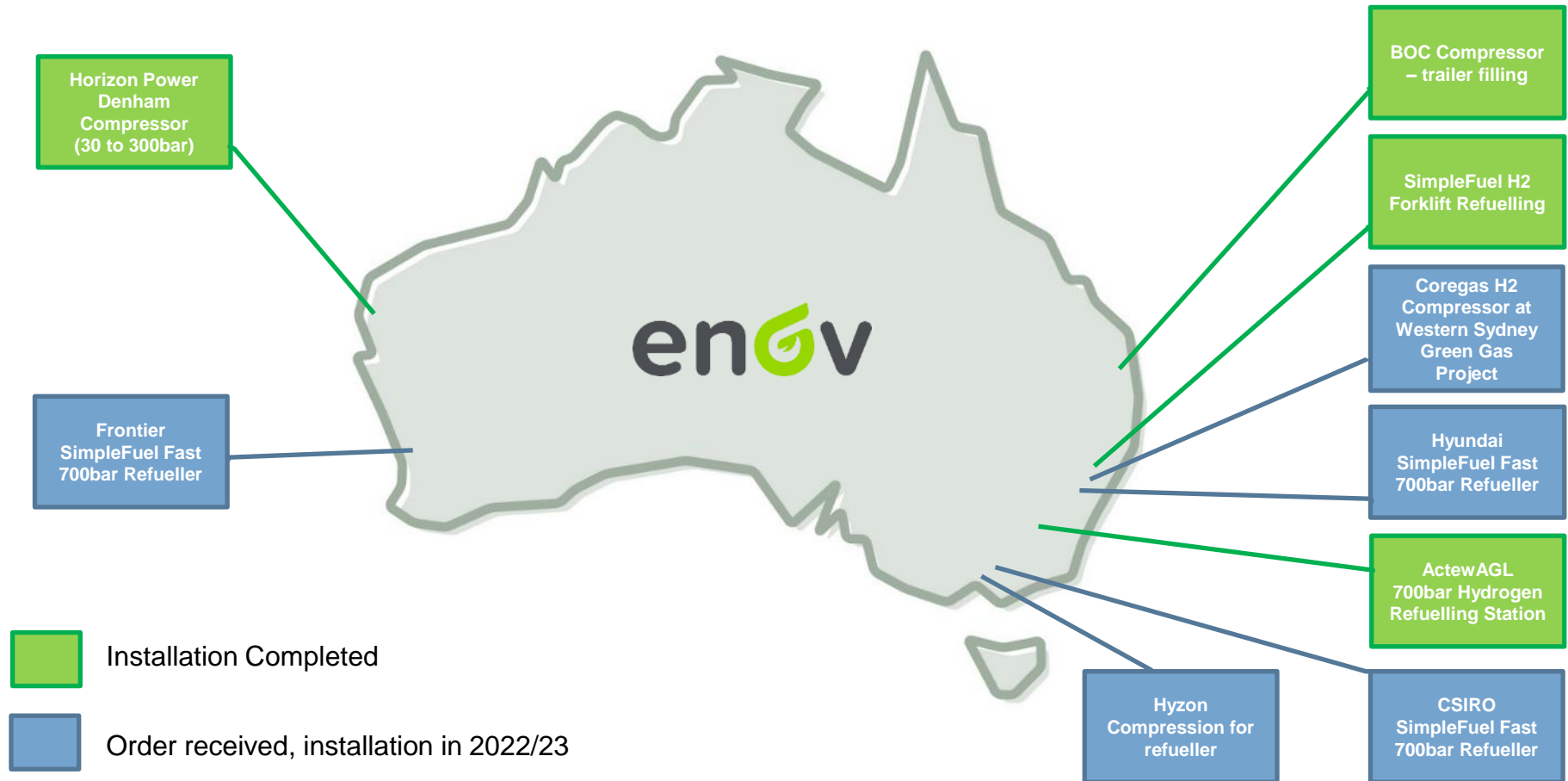




# ENGv has 2 x 2.5MW Electrolysers under development in Australia for truck refuelling: 1000kg per day refuelling



# Our National Footprint – Hydrogen Compression & Refuelling



## Our H2 Solutions: Compression & Refuelling

PDC Machines is a leader in hydrogen compression and refuelling solutions.

- Best-in-class global field service
- Parts inventory, overnight shipping
- 90,000 sq. ft. In PA, 20 CNC machines
- ISO 9001:2015 certified
- 98% on-time delivery



**SimpleFuel Hydrogen Appliance**  
10 systems installed



**Hydrogen Refueling Stations (HRS)**  
1<sup>st</sup> Public H2 refuelling station in Australia

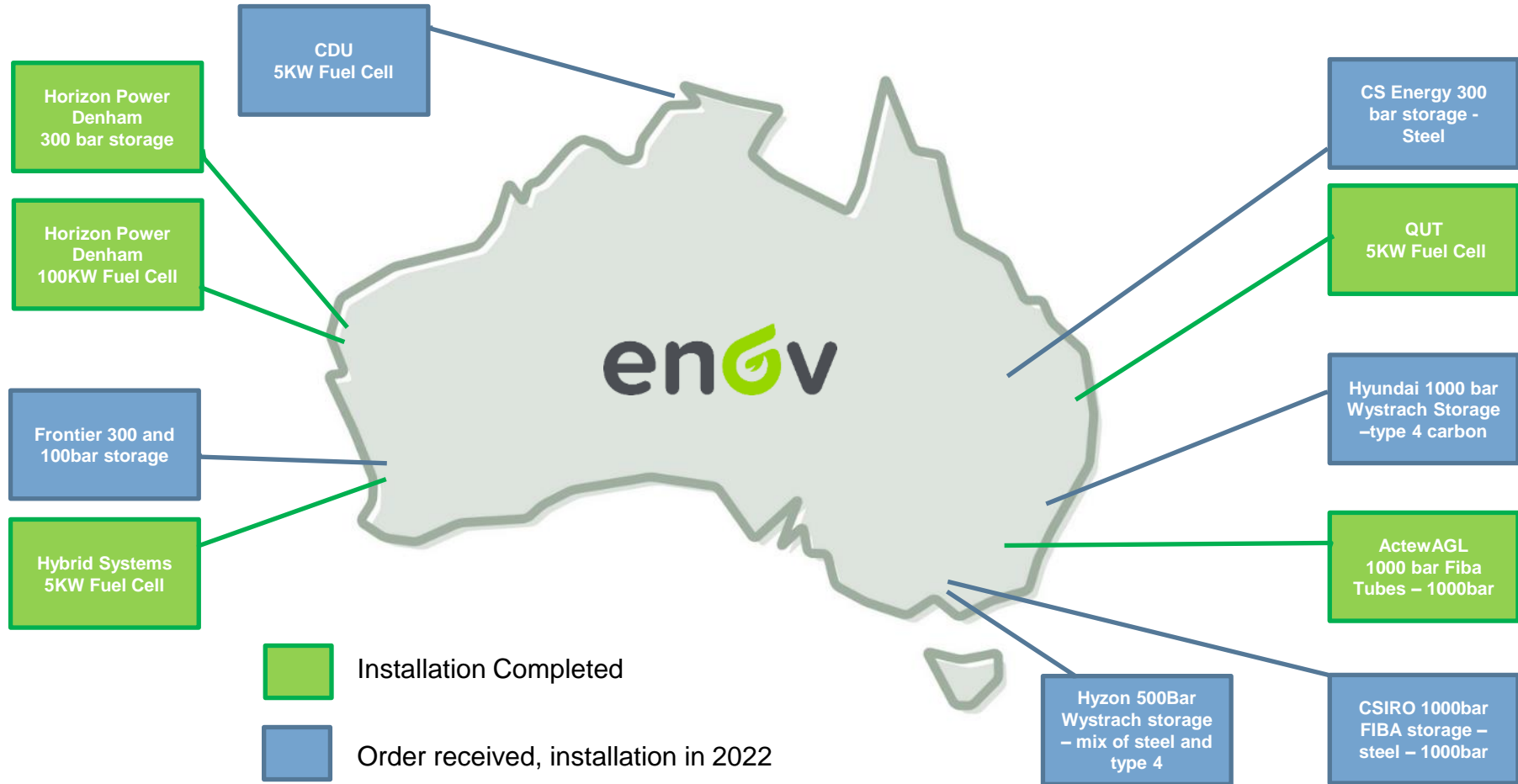


## Project: Deutsche Bahn





## Our National Footprint – Hydrogen Bulk Storage & Fuel Cells



**Compact and Powerful**

designed to accomplish compact integration together with high power output

**High efficiency**

The stack and system is designed to offer high efficiency

**Fast ramp-up time**

The system has a robust design for fast, dynamic and stable load operations







## true zero emissions

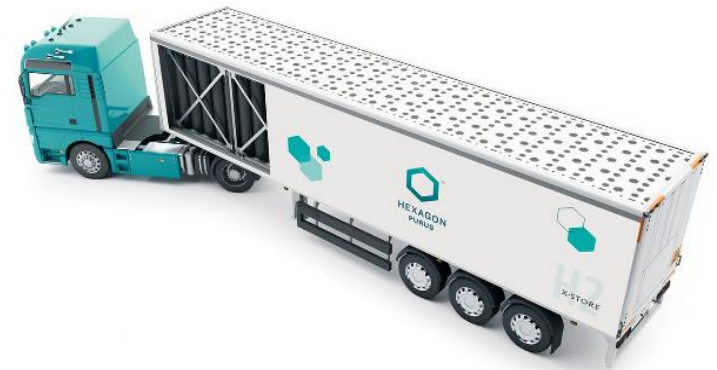
STATIONARY SOLUTIONS | PARTNERSHIP OFFERINGS



# Storage, MEGCs & Transportable Refuelling

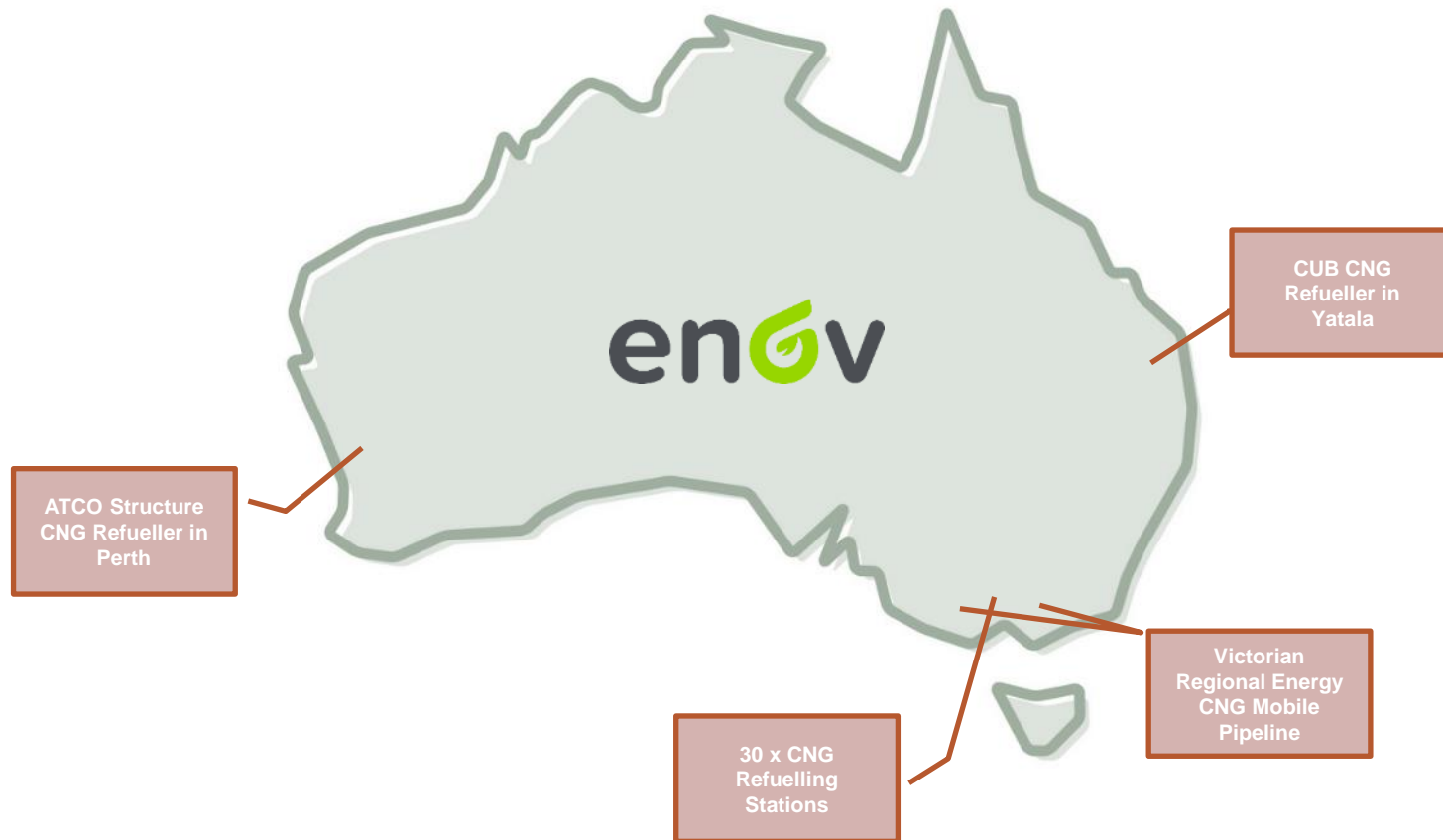


Fixed Storage – 300,500 and 1000bar options



MEGCs – 300,380 and 500 bar (9 already deployed in Australia for CNG at 250bar)

# CNG/RNG/Biogas Compression, Refuelling & Transportation



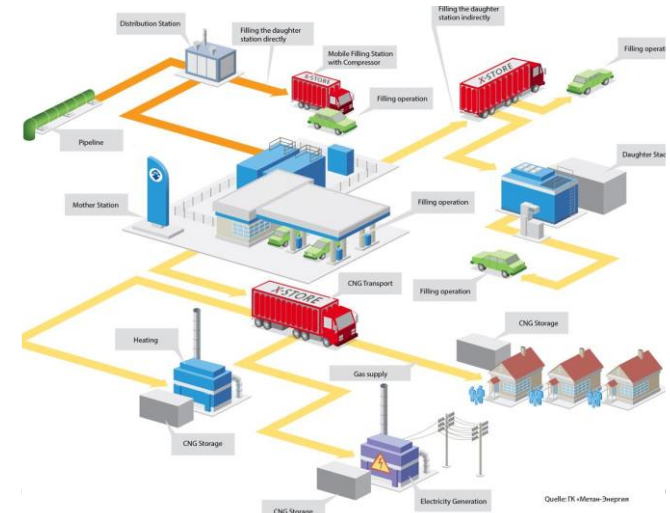


## RNG/CNG Installations: Mobile Pipeline Supply & Distribution for Regional Towns in Australia

Supply of 11 units MOBILE PIPELINE® to 10 regional townships and off-pipeline customers in Victoria – Robinvale, Swan Hill, Kerang, Nathalia, Maldon, Marong, Heathcote, Lake Entrance, Orbost and Terang.

Project owner: TasGas

\$84m project was supported by the Victorian Government which included reticulating gas in the 10 towns (completed by Enwave Energy).



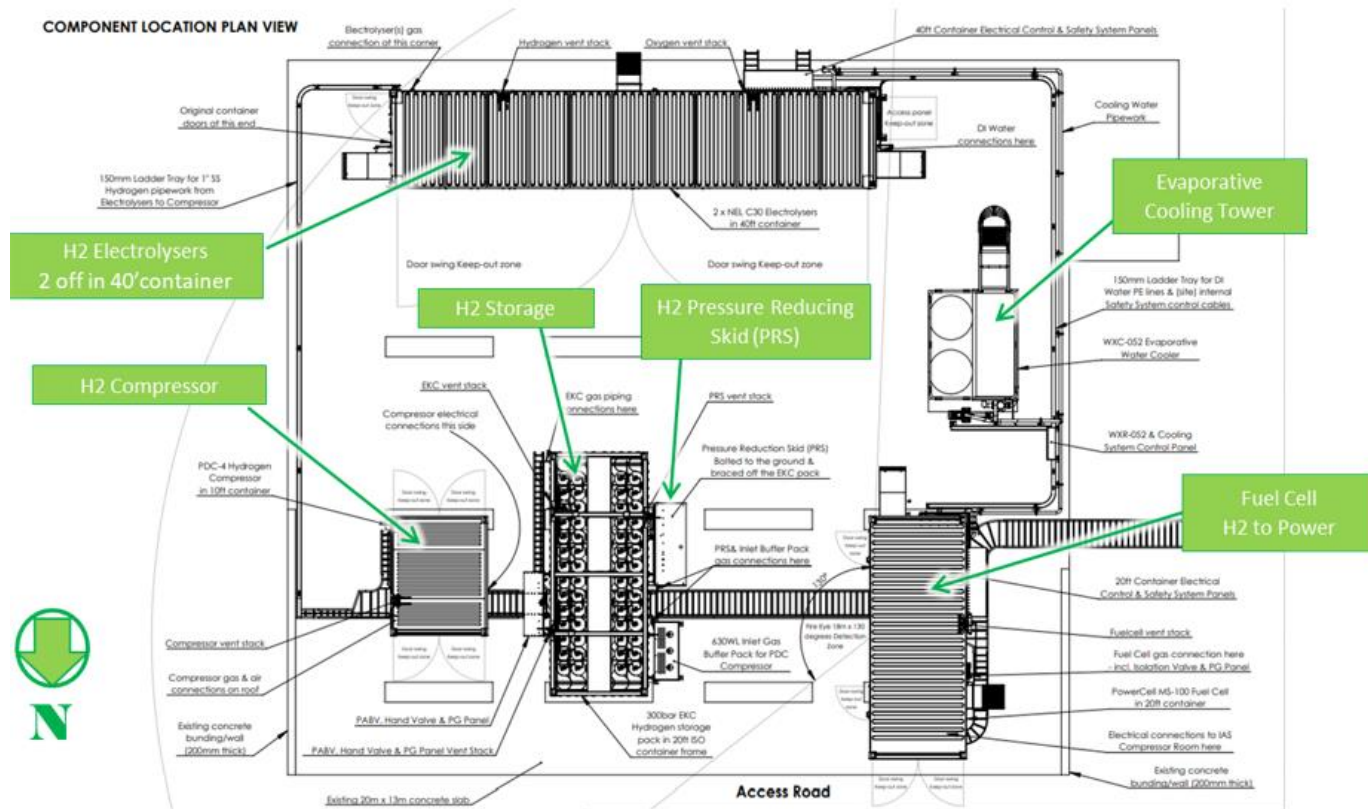


## Case Study: Joint project with Pacific Energy – H2 Microgrid Denham, WA





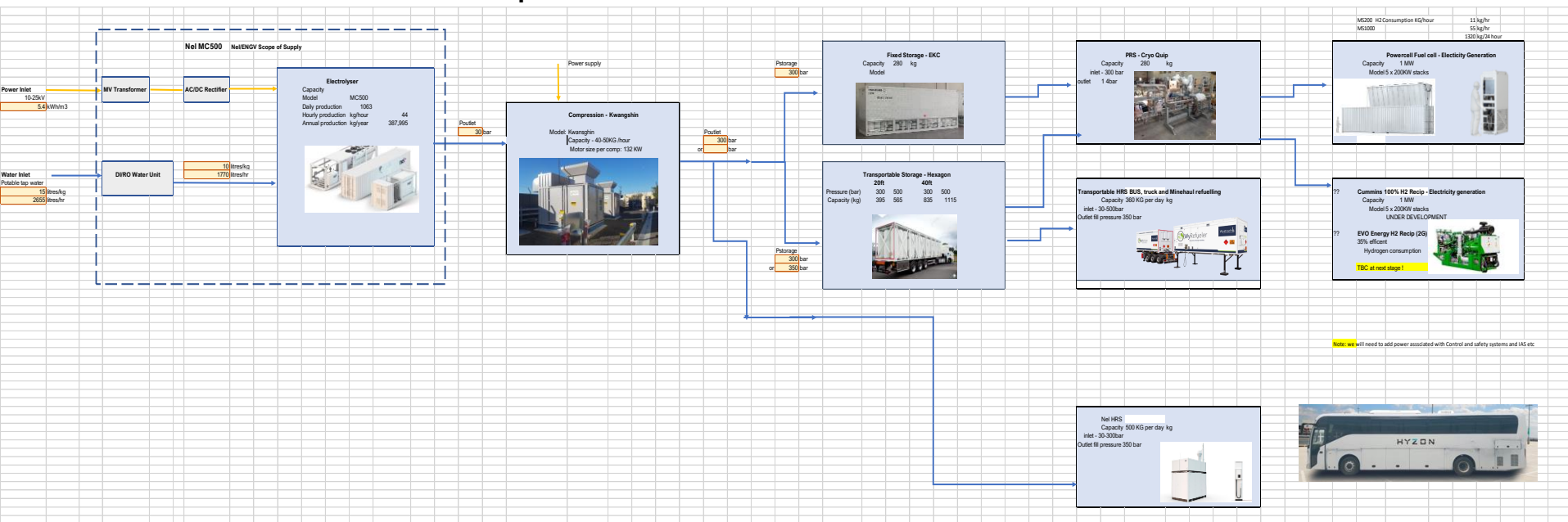
# H2 Microgrid Denham WA Power to Power Application Layout



## Future Mine Hubs – our intention, capability and plans

Pacific Energy now has the full BOO and we can provide H2 in a \$/KG into the appliance or vehicle...please come talk to us !

Our DNA is based on long term relationships with 95% uptime - we understand that downtime is not acceptable.



Sean Blythe  
CEO - ENGV  
Ph 0429 821 666  
[sblythe@engv.com.au](mailto:sblythe@engv.com.au)



Part of the **Pacific Energy Group**