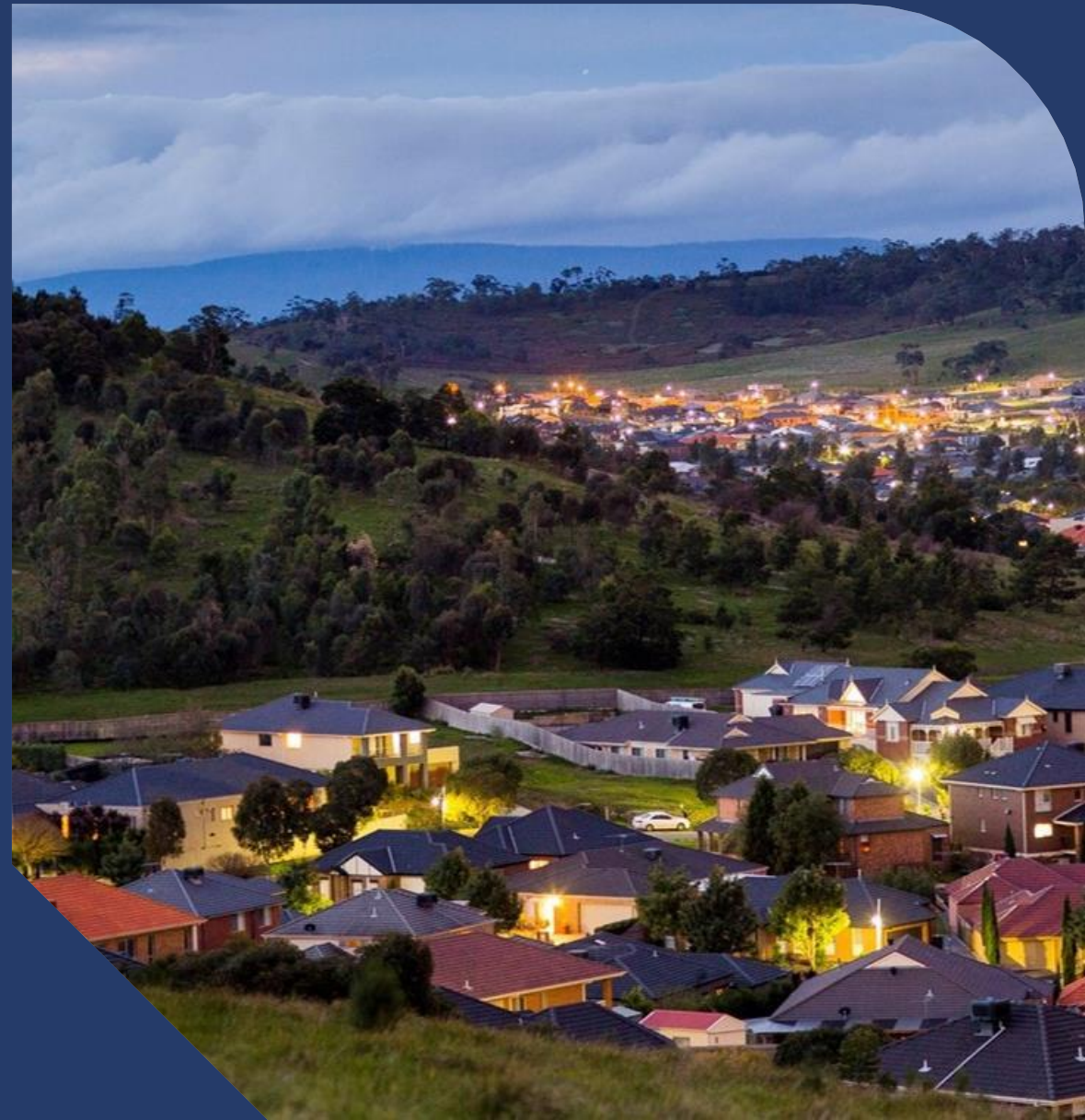


AusNet

Development Industry Briefing

The Future of Gas

Wednesday 24 August 2022



Acknowledgement of Country

The AusNet Team

AusNet

Regulation & Engagement



Tom Hallam
General Manager Regulation



Lucy Holder
Customer Engagement Manager



Sacha Albert
Engagement Coordinator

Electricity



Craig Velt
Delivery Partner Compliance Manager



Andrew Webber
Design Compliance Specialist - Central



Ross Morgan
Lead Compliance Specialist



Brian Morrison
Compliance Specialist

Gas



Arun Sharma
Lead Engineer – Asset Strategy



Lydia Markoska
PM/Estimator New Estates

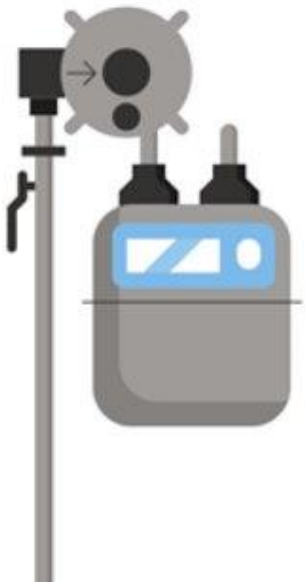


Renee Meson
Energy Project Coordinator

Purpose of Today's Briefing

To provide the development industry with an understanding of:

- The current environment for gas, including key policy and standards changes for the energy mix in new homes
- What we are hearing about how the supply chain is responding to the changes, and where uncertainties and challenges persist, and validate this with you today
- Renewable gases, and what the industry is doing to prepare for them.



Please **post questions & comments in the chat** throughout and we'll try and respond to as many as we can.



Please turn your **cameras off** and **mics on mute** unless speaking



01

Operating Environment

What's Happening Across the Gas Industry?



Commitment to Net Zero by 2050

- Decarbonising gas load & energy efficiency



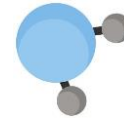
Policy / rule changes

- Vic Gov Gas Substitution Roadmap
- National Construction Code (NCC) update



High international gas prices

- Forecast to stay high, contributing to cost of living pressures



Developing renewable gases

- Trials underway
- Eventual role of renewable gas for domestic use still subject to policy and economic uncertainty



Evolving customer sentiment

- Are we reaching tipping point?

Vic Gov Gas Substitution Roadmap

The Victorian Government has released their Gas Substitution Roadmap, a component of their path to net-zero emissions

- The roadmap focuses on electrification of households, especially new houses. It does not ban gas connections, rather incentivises electrification
- There is support for hydrogen and biomethane in the hard to abate sectors, largely industry and transport
- The government will consider establishing a renewable gas scheme and renewable gas targets to help drive investment in gas substitution and guide transition planning-will report back in 2023 on development.
- The government's main goals are to deliver reduced energy bills to relieve cost of living pressures and free up gas for industrial users

Key policy changes include:

- Victorian Energy Upgrades (VEU) scheme will include new incentives for electrification and remove incentives for gas appliances from 2023
- Victorian Planning Provisions will remove the requirement for new housing developments to be connected to gas
- Introduction of 7-star standard for new homes



Most likely impact electrification of existing small customer base

Most likely impact new customer connections and demand

National Construction Code (NCC) Update

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What does it mean for energy?



NCC update means big changes for building envelope, but also significant impact on energy and appliance mix in new homes.

Incoming changes for Vic include:

- whole of home energy budget
- 7-star building standard

Transition period yet to be confirmed

Currently set to be adopted from 1 Sept 2022 with 12 months transition, but industry is advocating for longer

"The **whole of home energy budget** is a measure designed to produce long-term operational energy efficiency across the major energy consuming appliances in a home. It allows some flexibility ... One home might meet the energy budget through the use of very efficient appliances, while another might offset the use of less-efficient appliances with more onsite generation of energy."

Gary Rake, President Australian Building Codes Board (ABCB)



Decarbonising domestic natural gas consumption

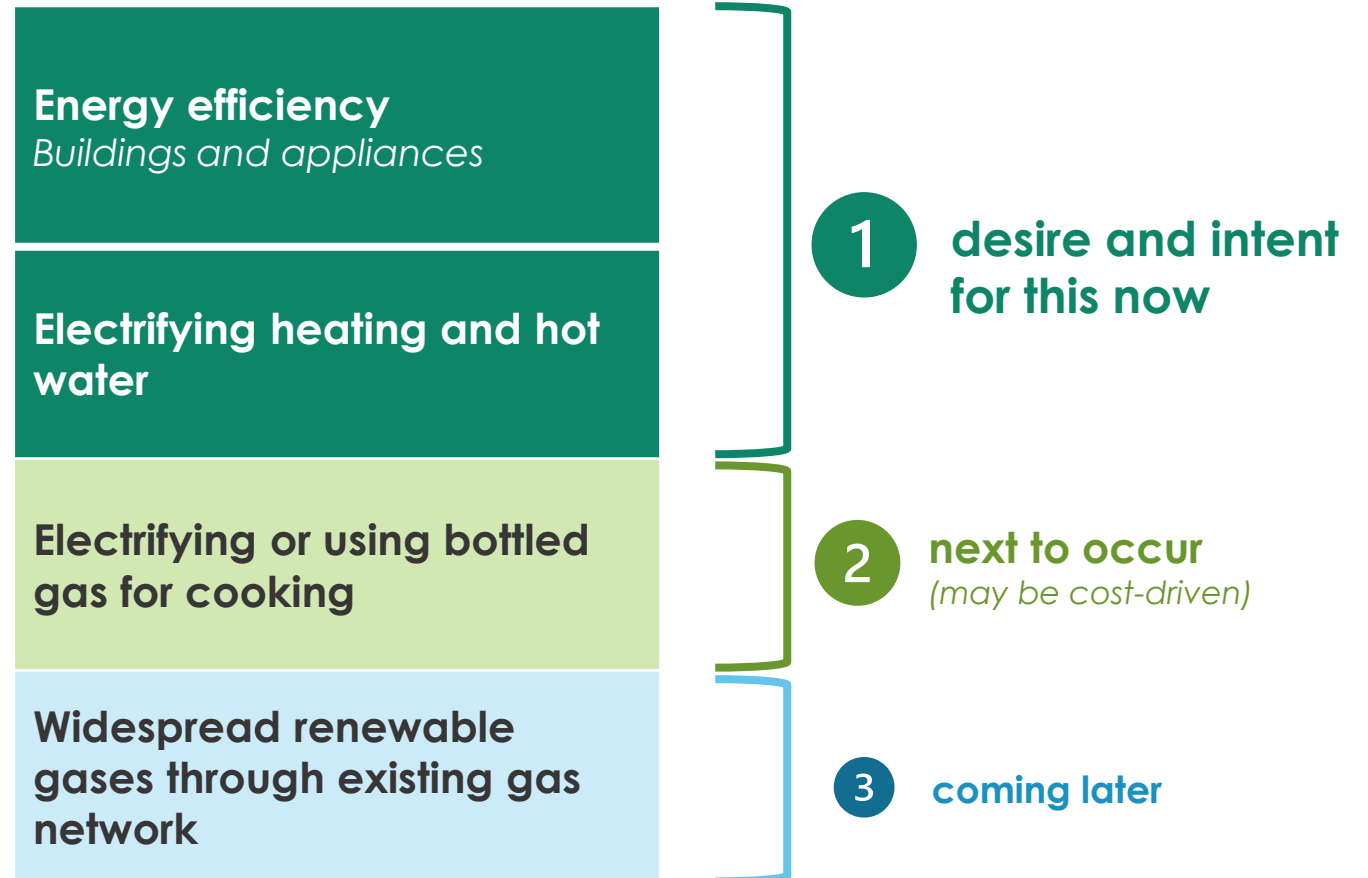
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Interpreting the Roadmap's direction

Likely to be achieved through a combination of initiatives, but Roadmap initiatives favour **electrification** of the gas load, leaving the door open for hydrogen in the future.

Government wants urgent emissions reductions, and is responding by encouraging electrification of gas load.

For the gas load, steps now = electrification.



02

What we're hearing
about how the industry
is responding to these
changes

What we're hearing from home builders

Home Builders responsible for compliance with standards and have significant influence on appliance selection

- Very high awareness of new whole-of-home energy budget / 7-star requirements
- Preparing compliant standard plans for their products but want time to transition. For many volume builders, major changes to plans are required
- Significant work undertaken on all-electric options across sector
- Volume sector is highly motivated by minimising build cost (less concerned about running costs)
- *Key decision maker on appliance selection*



National Construction Code (NCC) 2022, Vic. Plumbing Regulations, Vic. Gas Substitution Roadmap

Leon Bogers, Executive Technical Manager, Rinnai Australia Pty Ltd

on behalf of Gas Appliance Manufacturers Association of Australia (GAMAA), August 2022

NCC 2022

Approach:

- Considers building elements, orientation, site conditions and climate zone (as it always has)
- **New for 2022 are 'societal cost of energy' for heating, cooling and hot water appliances and an 'energy budget'**
- Societal cost of energy = cost of energy + cost of carbon
- For a given dwelling (type, size) in a given climate zone:
 - **(Appliance Energy – Solar PV) ≤ Budgeted Energy** - can use Solar PV to 'offset' appliance energy use. Can choose any combination of appliances.
 - Between now and 2050 the stated goal (Fed. Dept. of Climate Change, Energy, the Environment and Water) is to move to zero budgeted energy for buildings.
 - This would mean by 2050 **Appliance Energy ≤ Solar PV**.

NCC 2022, continued...

- Gas appliances always need considerably more solar PV than electric appliances (cover this later)
- In GAMAA's view, NCC 2022 overstates the energy performance of heat pump appliances
- NCC 2022 Consultation Regulatory Impact Statement (CRIS) from Sept. 2021 states benefit to cost ratio < 0.35 (significant net cost to society). But looks like NCC 2022 will proceed regardless.
- NCC amendment cycle is 3 years, that is, 2022, 2025, 2028 etc.
- Likely commencement date Oct 2022 + (12 to 18 months transition)

Victorian Plumbing Regulations

- GAMAA understanding is that Victoria will adopt the NCC 2022 in full (without variations).
- This means the current requirements for solar gas hot water in (most) homes connected to natural gas will be removed and any type of hot water system can be installed, provided the home falls within 'energy budget' requirements.
- For 'all electric' homes this encourages a shift to heat pump water heaters.

Practical impacts of NCC 2022 + changes to Vic Plumbing Regs on appliances



Australian
Building
Codes Board

Whole-of-home
Efficiency Factors
ABCB Standard

Public Comment Draft

Part 2 Whole-of-Home Efficiency Factors

Climate Zone 6, Melbourne Metro, Victoria

Main type of heater	Main type of cooler	Electric storage (standard)	Electric storage (off peak)	Heat pump (standard)	Heat pump (off-peak)	Solar electric (standard)	Gas storage	Gas instantaneous	Solar gas
Gas – ducted ≥ 6 Stars	Evaporative	3.918	3.544	2.144	2.054	2.470	2.966	2.662	1.713
Heat pump - Ducted < 2.25 Stars (< 3)	Evaporative	3.680	3.214	1.932	1.797	2.237	2.648	2.363	1.478

Some observations:

- Example highlights Energy Efficiency Factors (EFF) always higher for house with most efficient gas heater compared to house with least efficient heat pump heater.
- For water heating, inclusion of 'solar gas hot water' always has lowest EFF followed by heat pump.
- In most cases, solar PV will be required, even in an all-electric house. This is deliberate.

So how does this affect installed cost of appliances?

An example:

Assumed location: Metro Melbourne, Victoria, NCC Climate Zone 6									
New single storey modern family home, 4 bedroom, 206 m2 (mid size)					New Unit/Townhouse, 2 bedroom				
Fuels	Appliances: (heating, cooling, hot water)	Solar PV		Installed cost Appliances + Solar PV	Appliances (heating, cooling, hot water)	Solar PV		Installed cost Appliances + Solar PV	
Electric + Gas	Gas cooktop Gas ducted heater Evaporative cooler <u>Gas</u> hot water	Is Solar PV required to stay within Energy Budget?	Yes	\$ 19,868	Gas cooktop Gas Space heater Split System heat pump cooling <u>Gas</u> hot water	Is Solar PV required to stay within Energy Budget?	Yes	\$ 11,736	
		Min. required capacity (kW)	1.99			Min. required capacity (kW)	1.27		
		Installed Capacity (kW)	3.85			Installed Capacity (kW)	1.5		
Electric + Gas	Gas cooktop Gas ducted heater Evaporative cooler <u>Solar Gas</u> hot water	Is Solar PV required to stay within Energy Budget?	Yes	\$ 21,834	Gas cooktop Gas Space heater Split System heat pump cooling <u>Solar Gas</u> hot water	Is Solar PV required to stay within Energy Budget?	Yes	\$ 14,293	
		Min. required capacity (kW)	0.16			Min. required capacity (kW)	0.30		
		Installed Capacity (kW)	1.5			Installed Capacity (kW)	1.5		
Electric Only	Induction cooktop Ducted heat pump heat/cool Heat Pump hot water (AU made)	Is Solar PV required to stay within Energy Budget?	Yes	\$ 29,640	Induction cooktop Split System heat pump heat/cool Heat Pump hot water (AU made)	Is Solar PV required to stay within Energy Budget?	Yes	\$ 11,350	
		Min. required capacity (kW)	0.83			Min. required capacity (kW)	0.26		
		Installed Capacity (kW)	1.5			Installed Capacity (kW)	1.5		

Observations

- All options require solar PV
- Appliance costs for all-electric family home considerably more than Electric + Gas home
- Appliance costs for all-electric Unit/Townhouse approx. the same as Electric + Gas home (Gas hot water)

What we're hearing from home buyers

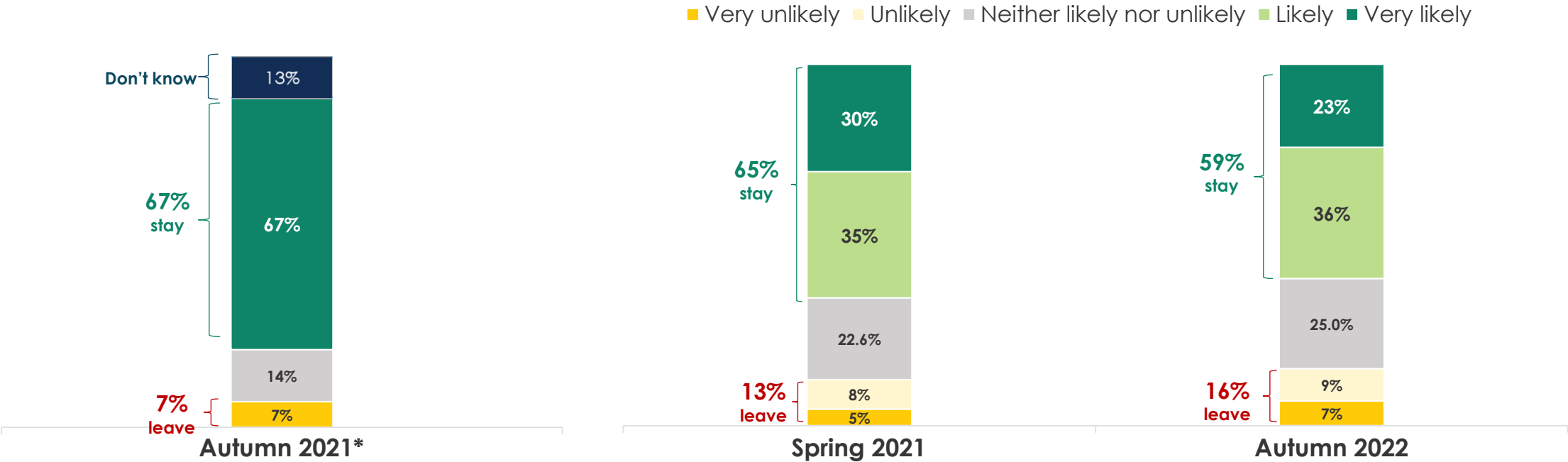
Ultimate decision-makers on appliance selection (though often led by builders)

- First home buyer decisions typically driven by installation cost and builder recommendations. Running costs are secondary.
- Environmental outcomes are becoming more important.
- High uptake of rooftop solar PV + low feed-in tariffs = incentive to use more electricity in-house
- Increasing concern about cost of energy (gas and electricity)
- Increasingly can't picture themselves using gas long-term (but ~30% of minds may be changed if renewable gas were available)
- ... but many customers still love gas, especially for cooking.



Our research with owners of existing homes/business premises

Q. In 10 years, how likely are you to be using the gas connection at your house/business?



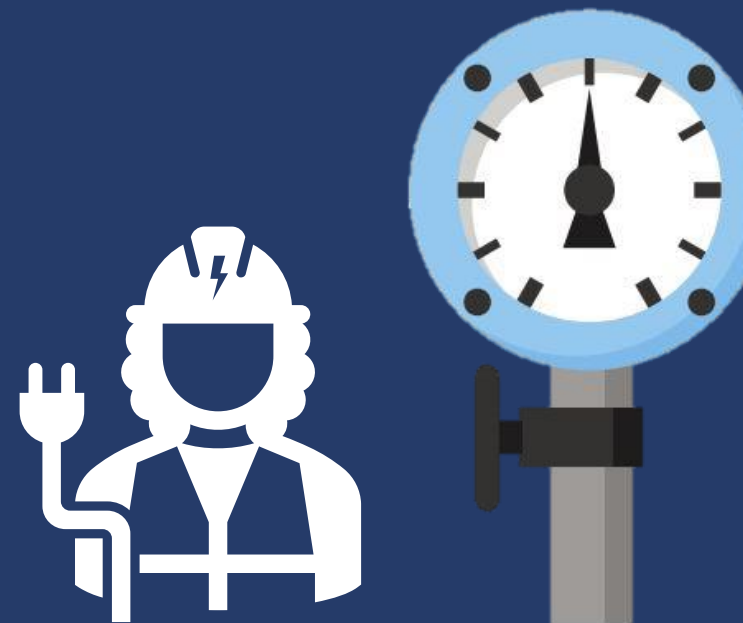
* NB A different version of this question was asked in Autumn 2021 but comparable data is shown

n = various (195 to 366)

What energy networks are thinking about

We invest in gas & electricity infrastructure at developers' request and providers of ongoing network services

- Pay up-front, costs recovered over long time period through combination of:
 - up-front developer contributions
 - fixed customer charges
 - consumption-based customer charges
- Thinking a lot about where we put our infrastructure – want it to be well-utilised
- Regulatory requirements = limited flexibility, need to plan and forecast in advance
- Install gas at developers' requests – can't refuse connections

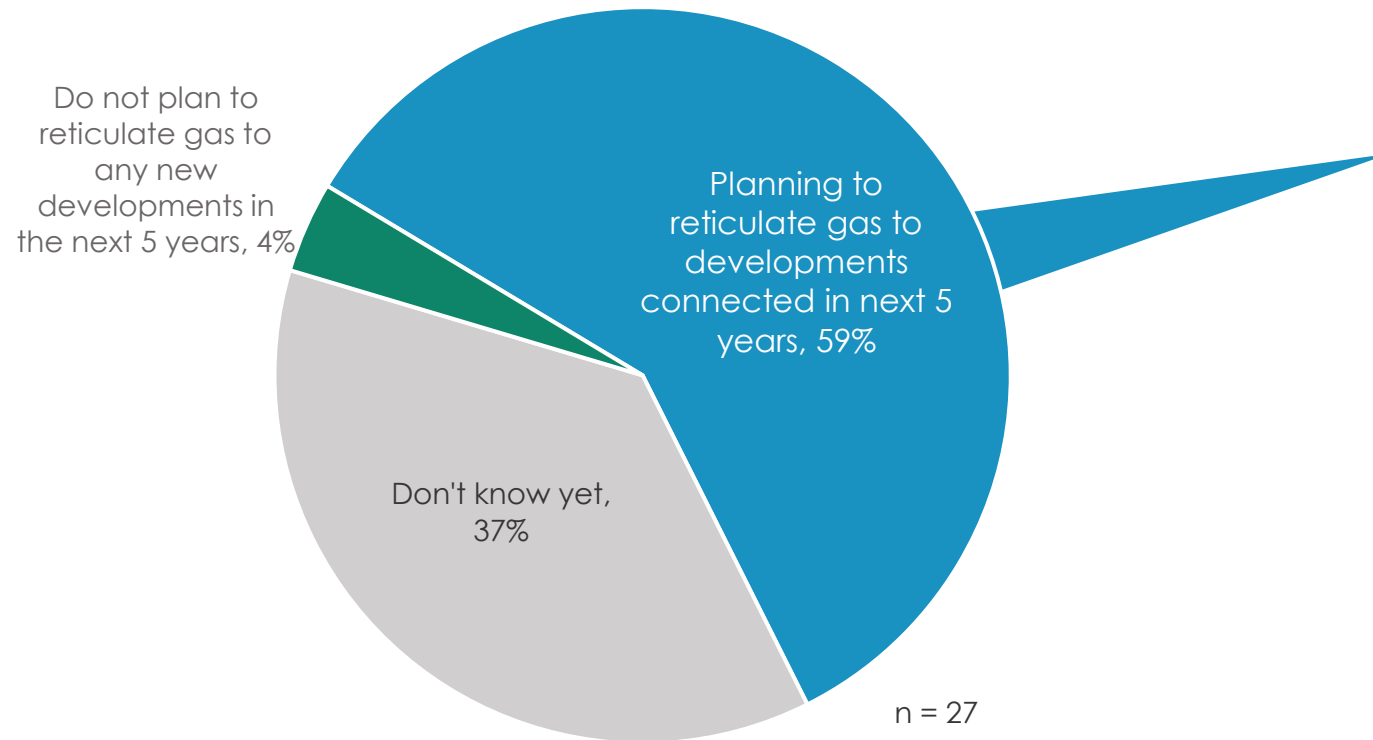


What we're hearing from the development industry

Decision-makers on whether to install reticulated gas infrastructure

AusNet

For development fronts underway or with permits, most still planning to reticulate gas. While some others plan to continue connecting gas until told otherwise by government or home-buyers, there is significant uncertainty among more than 1/3 as to whether they will reticulate gas or not.



Of the 59% who do plan to reticulate:

- 31% plan to reticulate to all
- 50% to most, and
- 19% to half or less.

... for the reasons being:

- We believe home buyers want gas (81%)
- It is cheap or free to do so (25%)
- It "future-proofs" the development (25%)
- We can't see a reason not to (13%)
- We believe home builders want gas (6%)
- It is easier than going all-electric (6%)

For new developments, many are thinking about going all-electric and some are committing to do this.

Development industry cont.

We're hearing your decision on whether to reticulate gas is most impacted by the following:

- up-front costs to install gas
- ease of getting permits / finance for developments (ESD standards)
- home buyers' preferences
- state/local government policies on connections
- home builders' product offerings
- capacity of the electricity network to accept all-electric lots.

AusNet

"Gas has always been an easy utility as costs have been minimal. Increasing costs to developers will have the immediate effect of having people look closely at all-electric alternatives. Additional costs being placed by AusNet are making a decision to stop gas altogether a likelihood."

"Developers want reticulated gas to their estates until govt states otherwise."

"It's an existing permit requirement on all our current projects. Until such time as those permits expire we have to honour them. For new development fronts that don't yet have permits, we will push for not installing gas."

"It is cost effective and the direction from our clients (Developers) is that developments should include gas in the short term."

"Most developers are now considering going gas free. On larger estates where gas is already being reticulated, it is likely that gas will continue to be reticulated (at least until that development is completed). Currently many customers still want gas connected, but this may change in the future."

Development Industry cont.

AusNet

Concerns about:

- **energy reliability / lack of redundancy** from reducing use of natural gas in the energy mix broadly, and at the household level
- the **electricity network's readiness** for all-electric estates, and whether networks can accommodate this extra load (esp. at peak demand)
- the **cost of developing all-electric estates** (vs dual fuel estates)
- the **feasibility of renewable gases** and the practicalities of putting hydrogen into gas networks
- international **gas prices and supplies** and the long-term outlook for these.
- **asset stranding risk**, putting in infrastructure that's not needed.

more on
these
shortly

"Much of our funding is linked to ESD matters and natural gas is not considered a suitable source of energy."

"Cost of gas has to be greatly reduced in order for it to be a viable option."

"It's important to get an understanding of the energy mix that's available so that this can be factored into feasibility costings, space allocation etc when looking at new developments."

"I see a risk with only having one source of energy supply to a home. Is there some way of bringing forward renewable gas?"

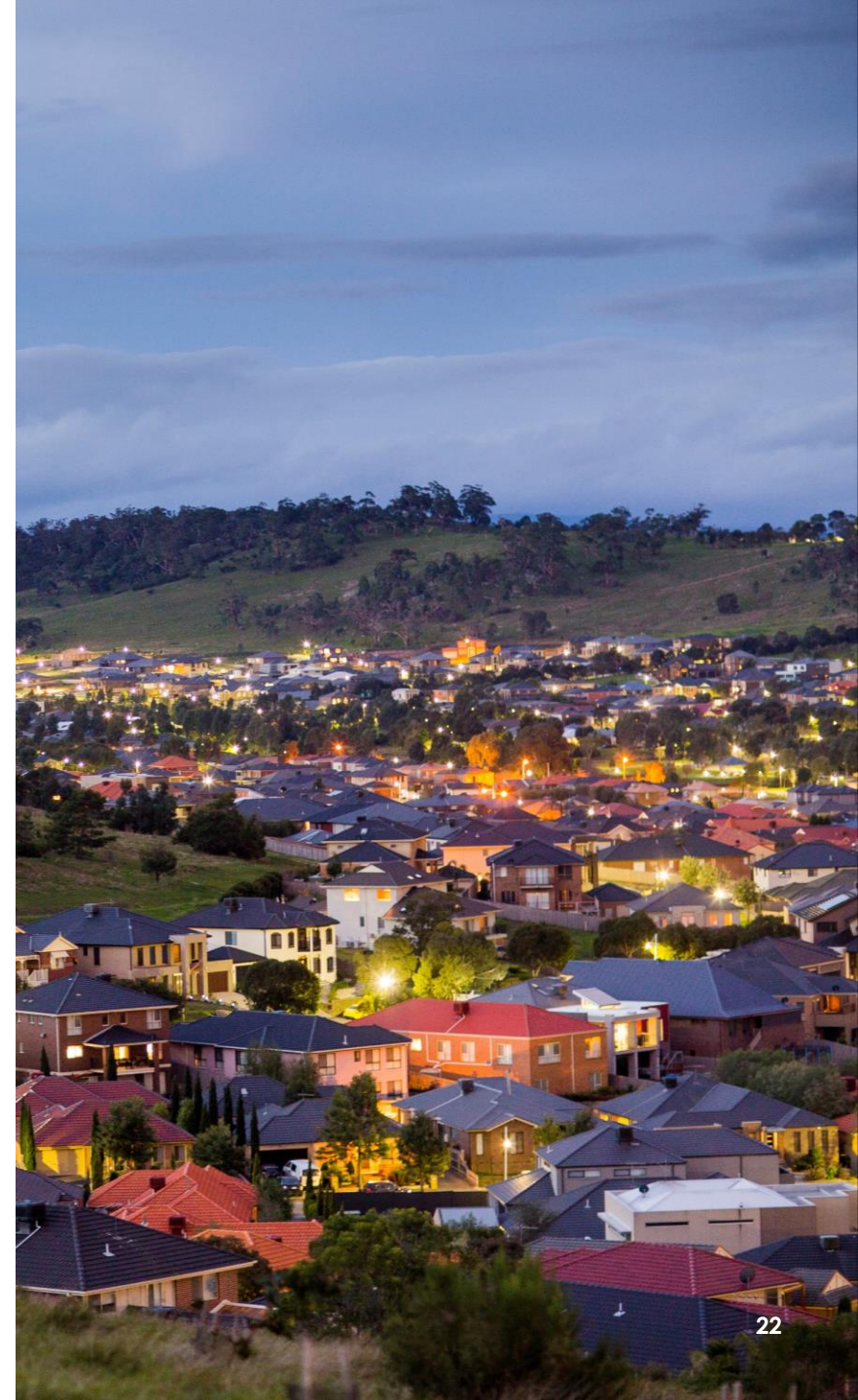
"Realistically is the existing gas infrastructure capable of distributing 'renewable gases' or is significant expenditure required for both existing & new gas networks to enable this transition?"



Discussion

Do you think the summary we've presented on the general sentiment in the industry is accurate?

Are you hearing any other themes we've missed?



03

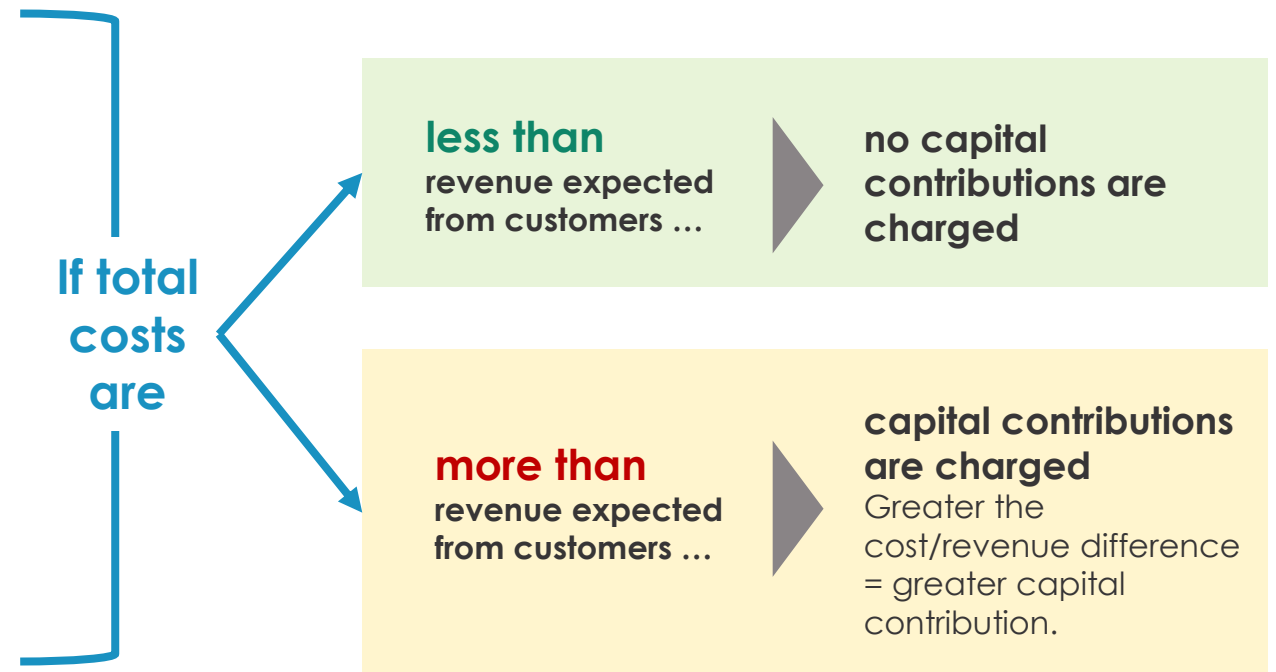
Answering some FAQs (from our survey)

How are developers' capital contributions calculated? Why are they so high for some developments?

To calculate capital contributions, we estimate the following costs:

- Capital cost of the new infrastructure (up-front and ongoing)
- Operating costs for the new infrastructure and customers (ongoing)
- Take-up rate of gas / electricity within the development
- Average energy usage per customer

The capital contributions model is updated periodically based on these forecasts



For gas, 92% of developments on AusNet's network are charged **no capital contribution under current take-up rates & usage per customer.**

Can the electricity network handle gas load being moved over?

AusNet

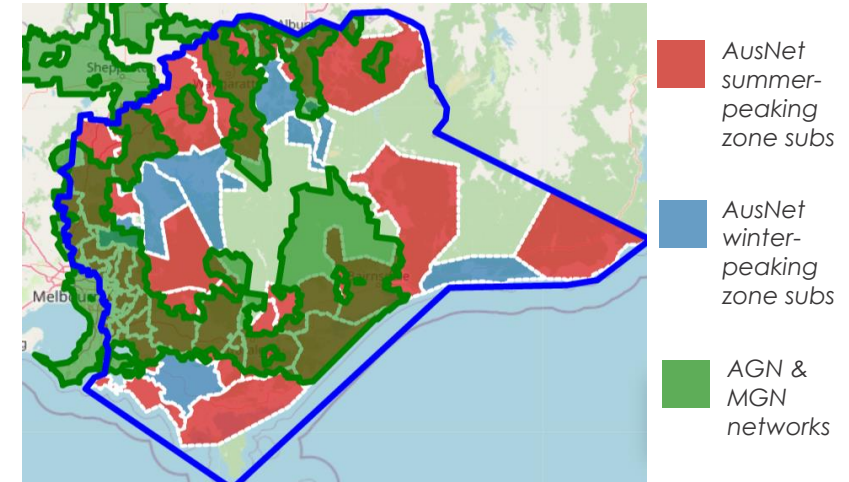
Speaking for our electricity distribution network (1 of 5) ...

Electricity networks can handle a gradual transition to electrification relatively easily.

The pace of electrification modelled in the Vic Gov Gas Substitution Roadmap (50% of households electrified by 2030) would be challenging for electricity networks to deliver.

Est. impact on our electricity network at macro level:

- each extra fully-electric customer adds +2.3kW to peak load
- extra \$244m required for electricity network by 2030



\$34m

2 new terminal station transformers
(for AusNet distribution network only)

\$36m

Augmentation of 3 sub-transmission lines

\$40m

Augmentation for up to 8 zone subs (new transformers)

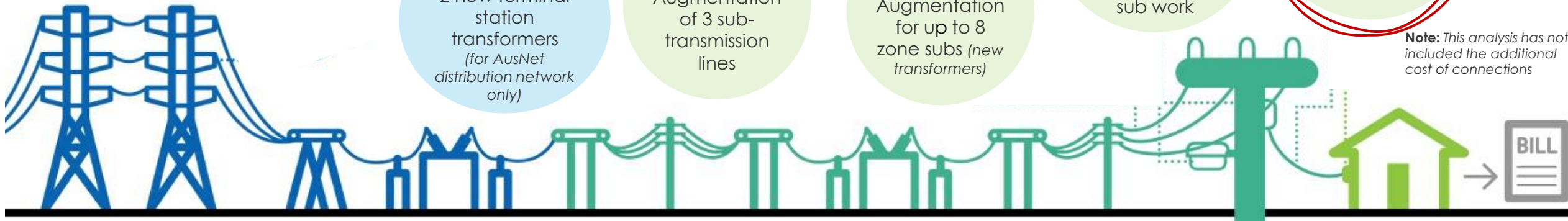
\$42m

21 existing HV feeders overloaded, may need zone sub work

\$92m

LV augmentation, ~450 distribution subs

Note: This analysis has not included the additional cost of connections



Developing an all-electric vs dual fuel estate – what is different for developers?

At the development level ...

... removing gas just means more electricity infrastructure needs to be installed.

Energy requirements depend on a range of factors, but particularly peak loads. In some circumstances batteries etc might be used to help manage peaks (some developers starting to look at these types of solutions).

EXAMPLE

A dual fuel estate might have 4 kVA per lot + gas

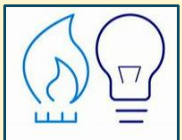


Making the same estate fully-electric might mean 8 kVA per lot
(currently up to 10kVA in some all-electric areas)



Approx. double the:

- transformer capacity
- land
- cost



Q: Will AusNet subsidise switching from dual-fuel to all-electric estates?

A: No, we are not currently looking at subsidising this.

Q: Will AusNet provide/subsidise batteries at developments to address peak loads?

A: Batteries may be considered as a means to helping us address network constraints.

04

Renewable Gases and what networks are doing to prepare for them

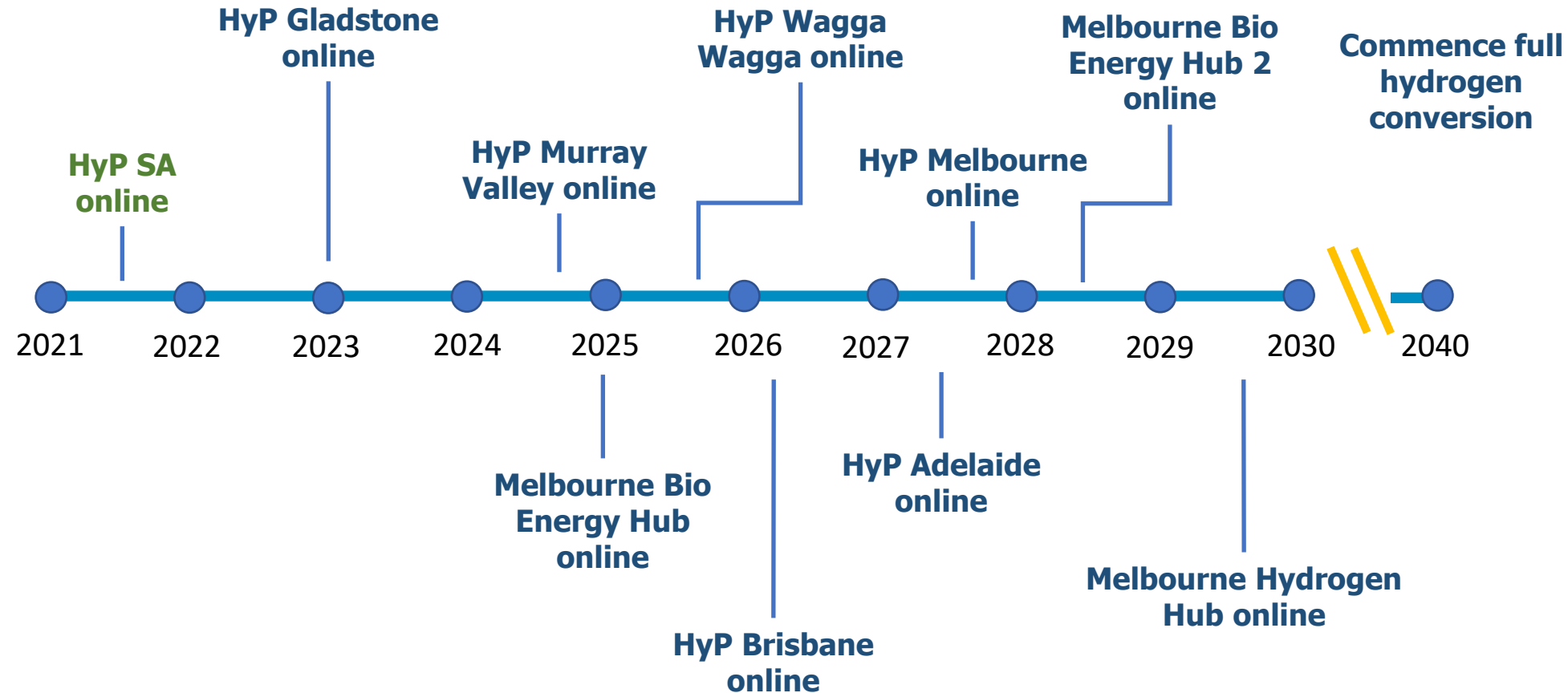
Decarbonising gas networks

AusNet Greenfield Developer Forum
22nd August, 2022



AGIG's Low Carbon Vision | 100% by 2040

Transitioning distribution networks to 100% renewable gas by 2040



10% [20%]
whole system
blending by 2030

100% by 2040,
2050 at the latest

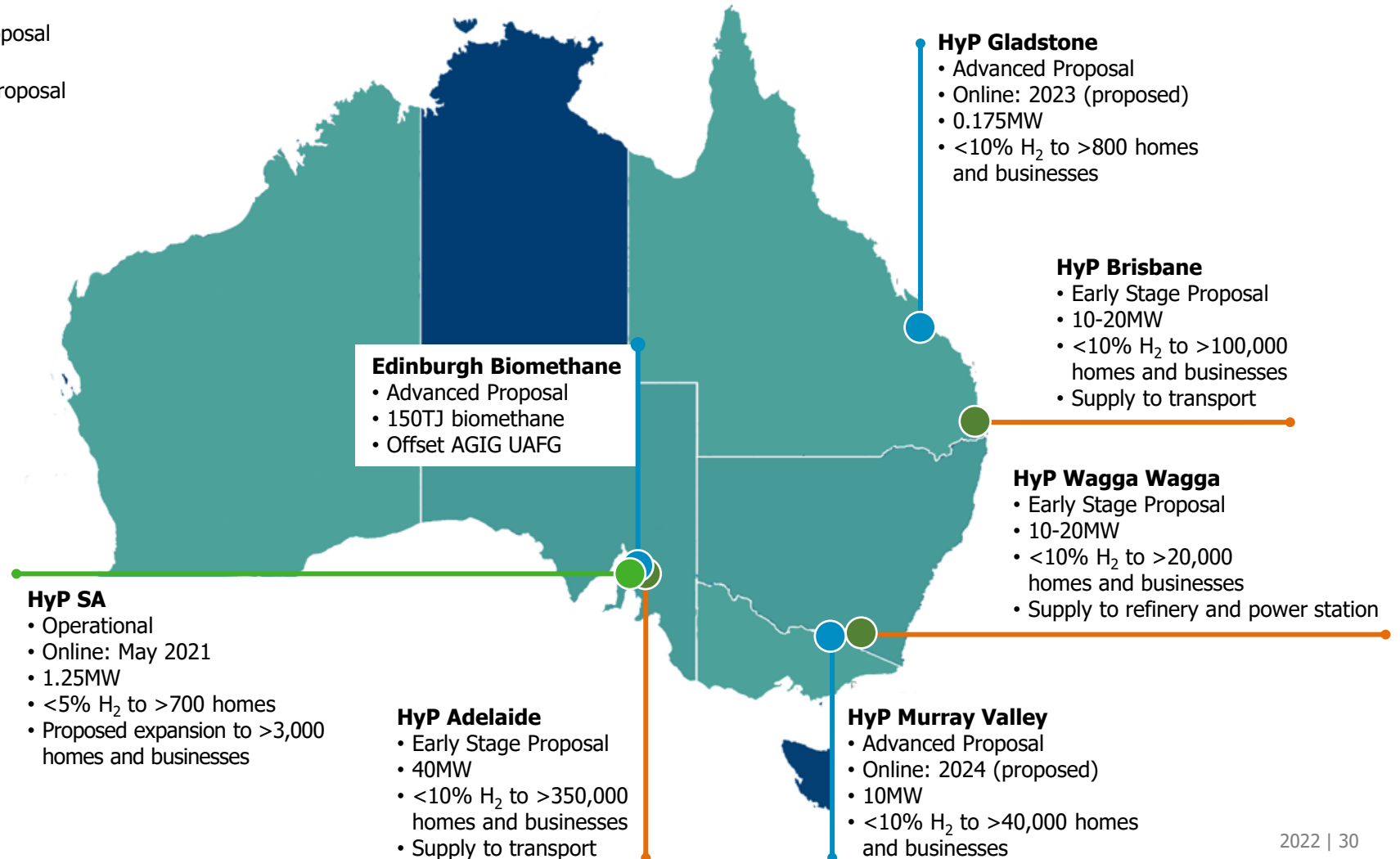
Projects | Delivering our Vision

- Operational
- Advanced Proposal
- Early Stage Proposal

One project online
(1.25MW), with
expansion plans

Two at advanced
development

Multiple others at
earlier stage
development

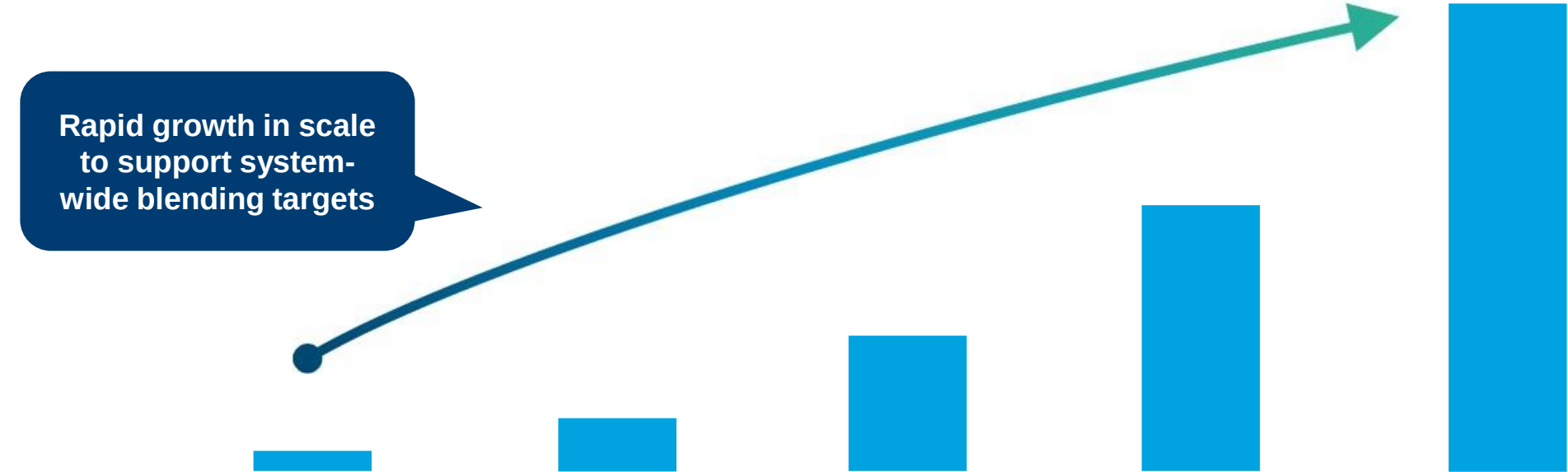


Projects | A Staged Approach Builds on Previous Projects

Rapid growth in scale to support system-wide blending targets

The domestic sector is key to building expertise and scale

Gas networks are hydrogen-ready and customers want green gas



Customers	100s	1,000s	10,000s	100,000s	1,000,000s
Projects	HyP SA HyP Gladstone	HyP SA extension	HyP Murray Valley HyP Wagga Wagga	Brisbane Adelaide	Melbourne
Year	2022/2023	2022	2023/2024	2024/2025	~2030
\$/kg	\$30-50	\$10-20	\$6 » \$5	\$5 » \$4	\$4 » \$2
Size	<1MW	1MW	10MW	50-100MW	~500MW
Policy Support	State Government Grants	AER Renewable Gas	ARENA DELWP	ARENA State Government Policy	State Government Policy

Hydrogen Park South Australia | AGIG has Delivered

**An Australian
first project –
now operational**

**More than 700
homes receiving
5% renewable
hydrogen
blended gas**

**Expanding
blending to 4,000
homes**



Enabled by a \$4.9m grant from the SA Government Renewable Technology Fund

HyP Murray Valley | Scaling up

**A world-first
blending project
in terms of
outreach and
design**

**Up to 10%
hydrogen
blending for
40,000
customers**

engie

**Australian Gas
Infrastructure Group**



**Australia's Largest
Electrolyser**
10MW facility

**Australia's Largest
Blending Project**
<10% to 40,000+
connections

**Leveraging Synergies
Improving Commerciality**
Colocation with waste
water

**Creating a Hydrogen
Hub**
Strategically positioned,
near transport, industry

**Delivered by Experienced
Parties**
AGIG and ENGIE have
proven experience

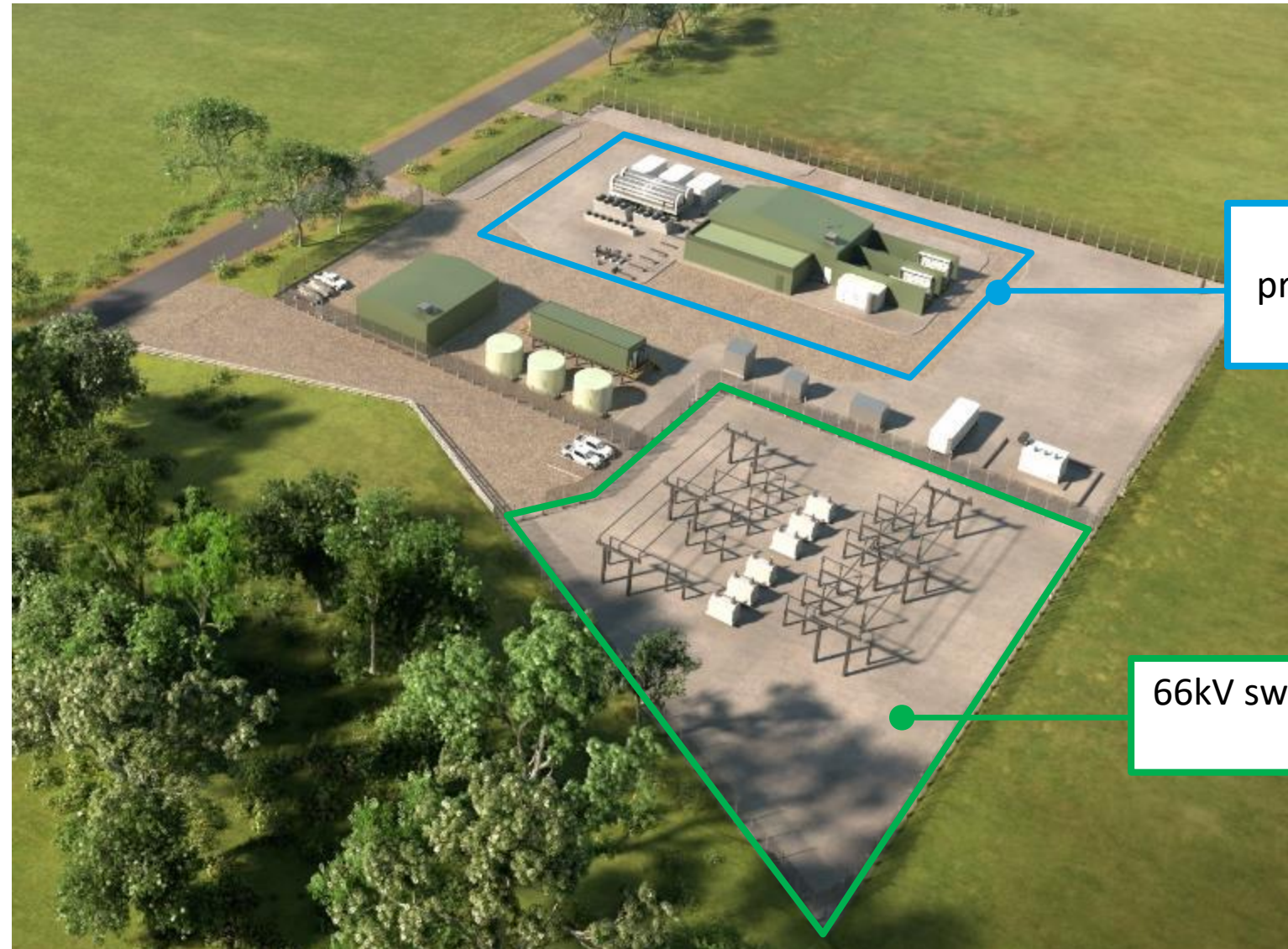
**Stakeholder
Support**
A highly engaged and
supportive community

HyP Murray Valley | Project overview

**A world-first
blending project
in terms of
outreach and
design**

ENGIE

**Australian Gas
Infrastructure Group**



Hydrogen
production and
storage

66kV switchyard

HyP Murray Valley | Project Site



**A world-first
blending project
in terms of
outreach and
design**

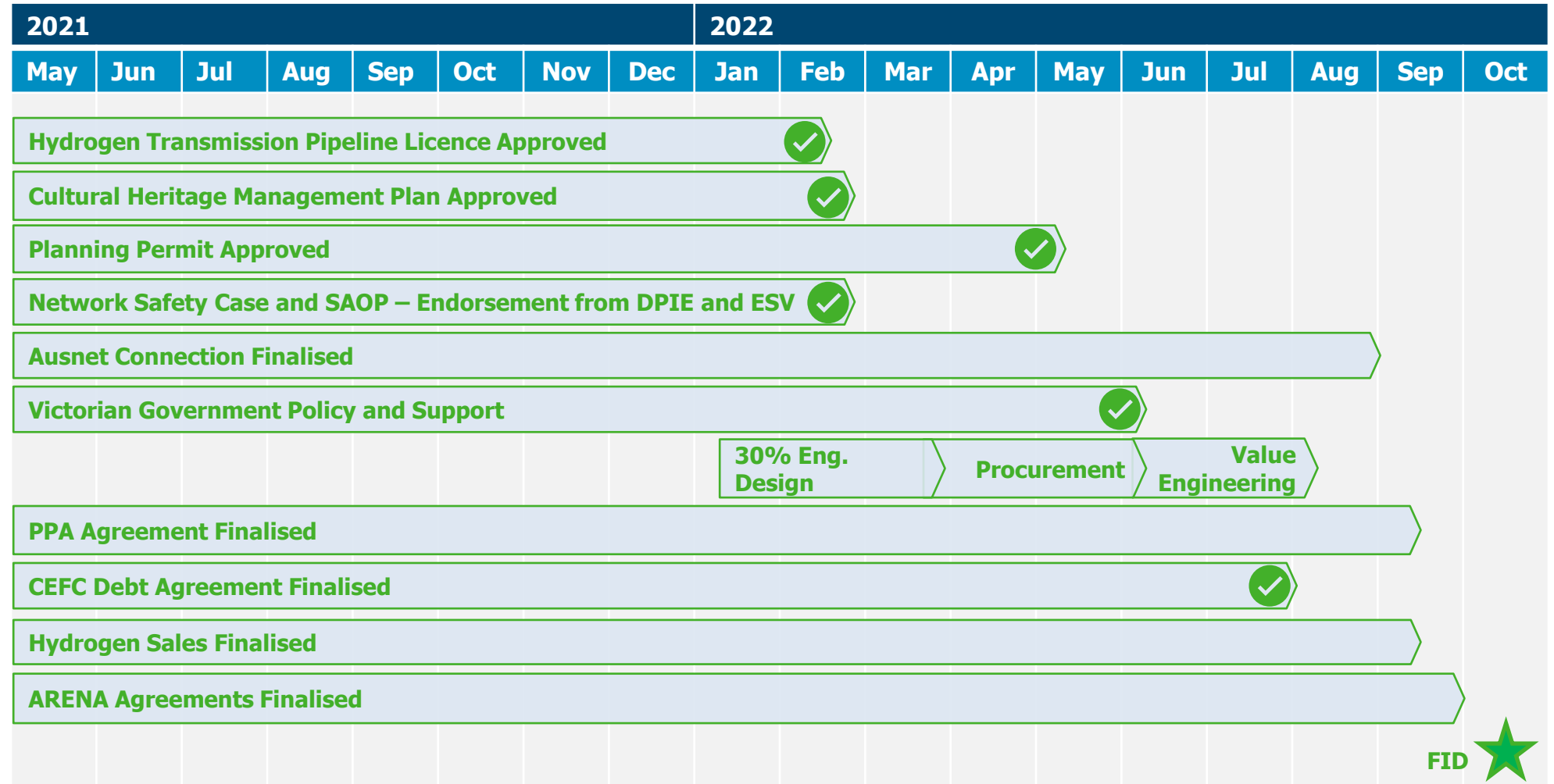
ENGIE

**Australian Gas
Infrastructure Group**

Hydrogen Park Murray Valley | On Track for FID in October 2022

FID October 2022

Commercial
Operation Date
2024



HyP Murray Valley | Stakeholder and Community Engagement

Community and stakeholder engagement is a key focus for the project team

- Project was launched to the broader community in November 2021 (letterbox drop to all 40,000 customers)
- Type A Appliances are compatible with 10% hydrogen blends with no modifications
- We have engaged extensively with key stakeholders
 - Technical regulators (ESV, DPIE)
 - Council
 - Government (local, state and federal)
 - Cross Border Commissioners
 - Landowners
 - Community groups (Rotary, Probus etc)
 - Vic Roads
 - North East Water
 - AusNet
 - Type B appliance owners
 - Business Groups: Albury Business Connect, Business Wodonga
 - Focus Groups with the community in October 2021

**We are proud to
play our role in
the community
including
through
sponsoring
Business
Wodonga,
Albury Business
Connect and
Albury Wodonga
Food Share**



HyP Murray Valley | Additional Markets

Green Gas Retail

Creating a 'green gas' retail product, enabling companies to meet their own decarbonisation targets

Forklifts

A mature technology, we have developed a deployable model

Public Refuelling

The facility is located along the existing Melbourne-Sydney road and rail transport corridor

Industrial Supply

Some industry requires pure hydrogen which can be delivered via tube trailers

Buses and Waste Collection

Back-to-base refuelling, we have had discussions with key players

Rail

Albury-Wodonga is located alongside existing rail corridors and the proposed inland rail project

Capacity to leverage Victoria's cheapest renewable hydrogen to establish additional markets and create a regional hub



**Shortlisted
under the NSW
Hydrogen Hub
Initiative**

**Commercial
Operations 2025**

Hydrogen Park Wagga Wagga | Under development

Shortlisted by the NSW Government

- Located in Bomen, within Wagga Wagga Special Activation Precinct
- 10 MW electrolyser, expandable to 20 MW
- Up to 10% blending into the Wagga Wagga network
- 23,500 gas customers
- Supply to industry, power generation and mobility

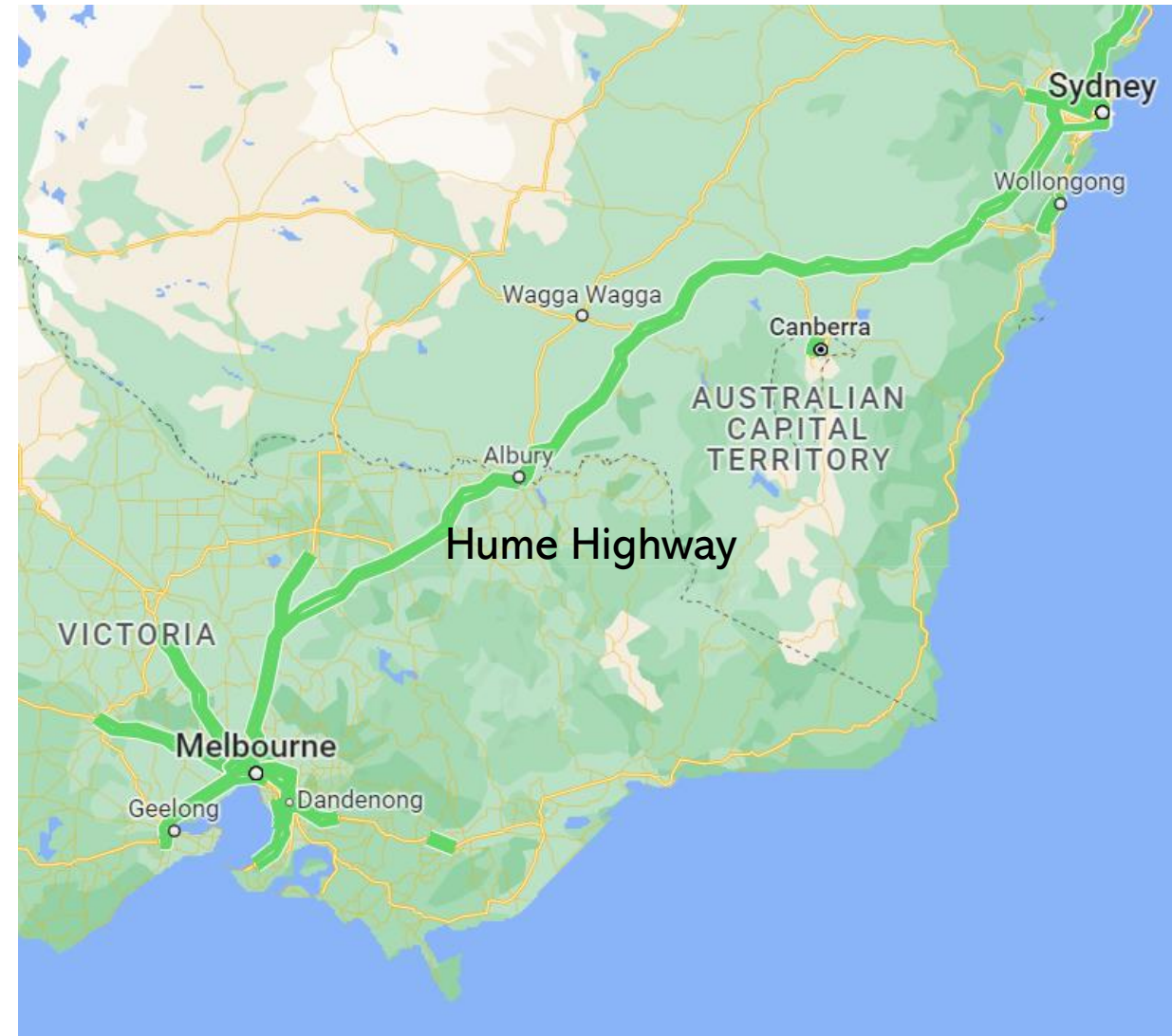


**Leveraging
hydrogen
blending
facilities to
support mobility
market**

Hume Hydrogen Highway | Wodonga and Wagga as anchor supply

Supporting hydrogen mobility at scale

- Large scale production at Wodonga and Wagga Wagga
- Ideally located along the Hume Highway
- Can provide reliability of supply and redundancy to support refuelling network



**Will deliver
decarbonisation
and scale
deployment of
electrolysis**

**Up to 600 MW
for 10%
blending and
>1,200 MW for
20% blending**

Summary | Unlocking the Domestic Hydrogen Opportunity

Gas blending provide a large market for renewable hydrogen

- 10% blending will support >600 MW of electrolysis by 2030
- Build scale and capability

Leverage to supply hydrogen mobility

- Production location are suitable to support hydrogen mobility at scale and provide reliability

Efficient path to decarbonise gas networks

- Using existing infrastructure to decarbonise
- Support industry and mobility

Thank you

Any questions?



05

Close

Would you like to get involved?



If you would like to:

join the Developer Consultative Committee

- Forum to raise and discuss opportunities for improving the greenfield connection process
- Meets quarterly

suggest opportunities for improving the greenfield connections process

or

suggest topics for a “deep dive” industry briefing

... please reach out to Lucy Holder at engagement@ausnetservices.com.au

For developers
on our **electricity**
network

AusNet

AusNet Services

Level 31

2 Southbank Boulevard

Southbank VIC 3006

T +613 9695 6000

F +613 9695 6666

Locked Bag 14051 Melbourne City Mail Centre Melbourne VIC 8001

www.AusNetservices.com.au

Follow us on



@AusNetServices



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Thank You

