Factsheet

Energy Networks Australia

The role of Australia's gas distribution networks 2024

Gas distribution networks provide gas to industrial, commercial and residential customers across Australia.

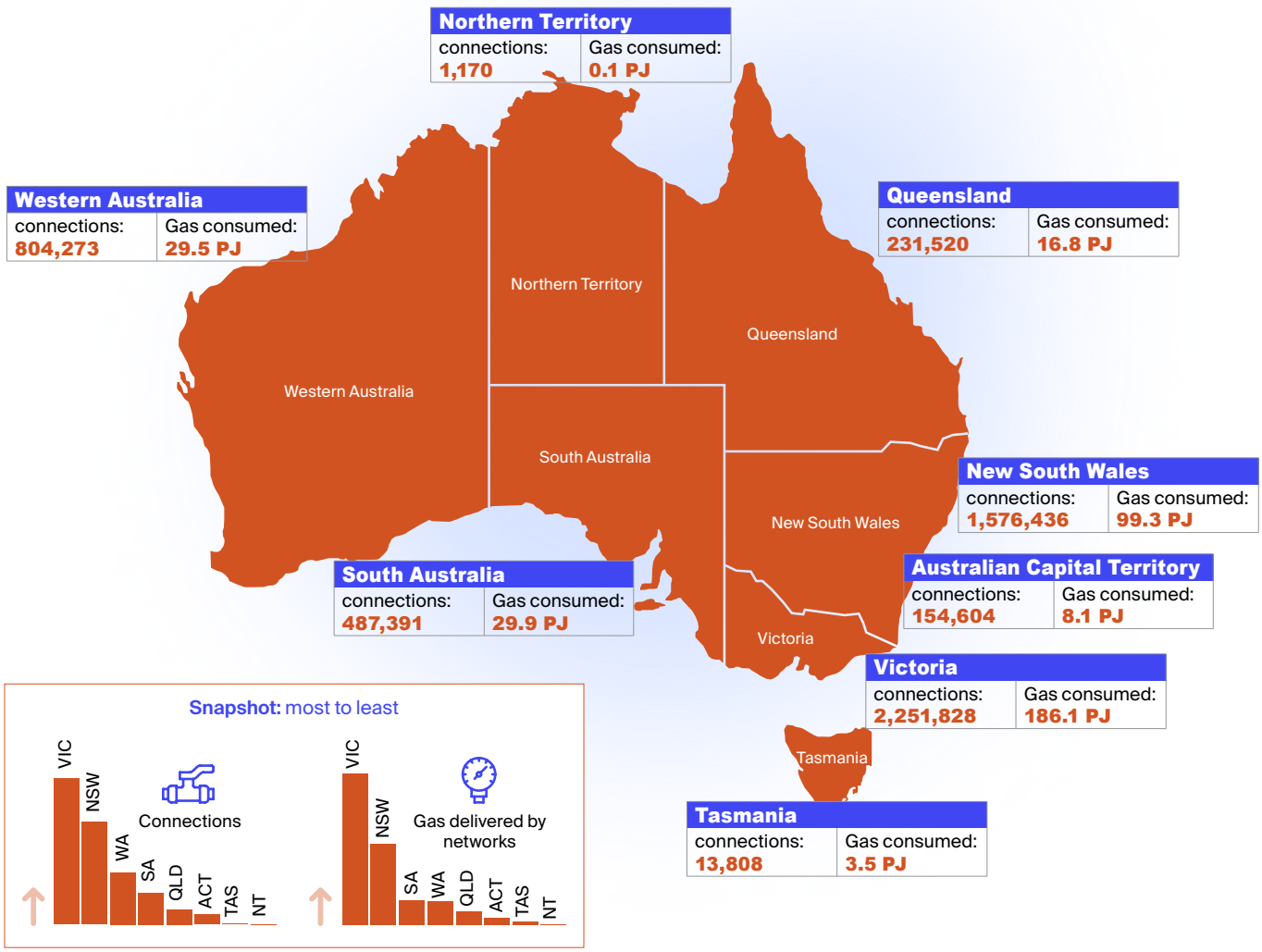
The role of Australia's gas distribution networks

Delivering energy across Australia

Australia's gas distribution networks deliver gas to homes, businesses and industry in every state and territory in Australia. At the end of June 2023, there were over **5.5 million** connections consisting of **5.4 million** residential connections and **140,000** commercial and industrial connections. In total, customers on Australia's gas distribution networks consumed **374 PJ** per year.

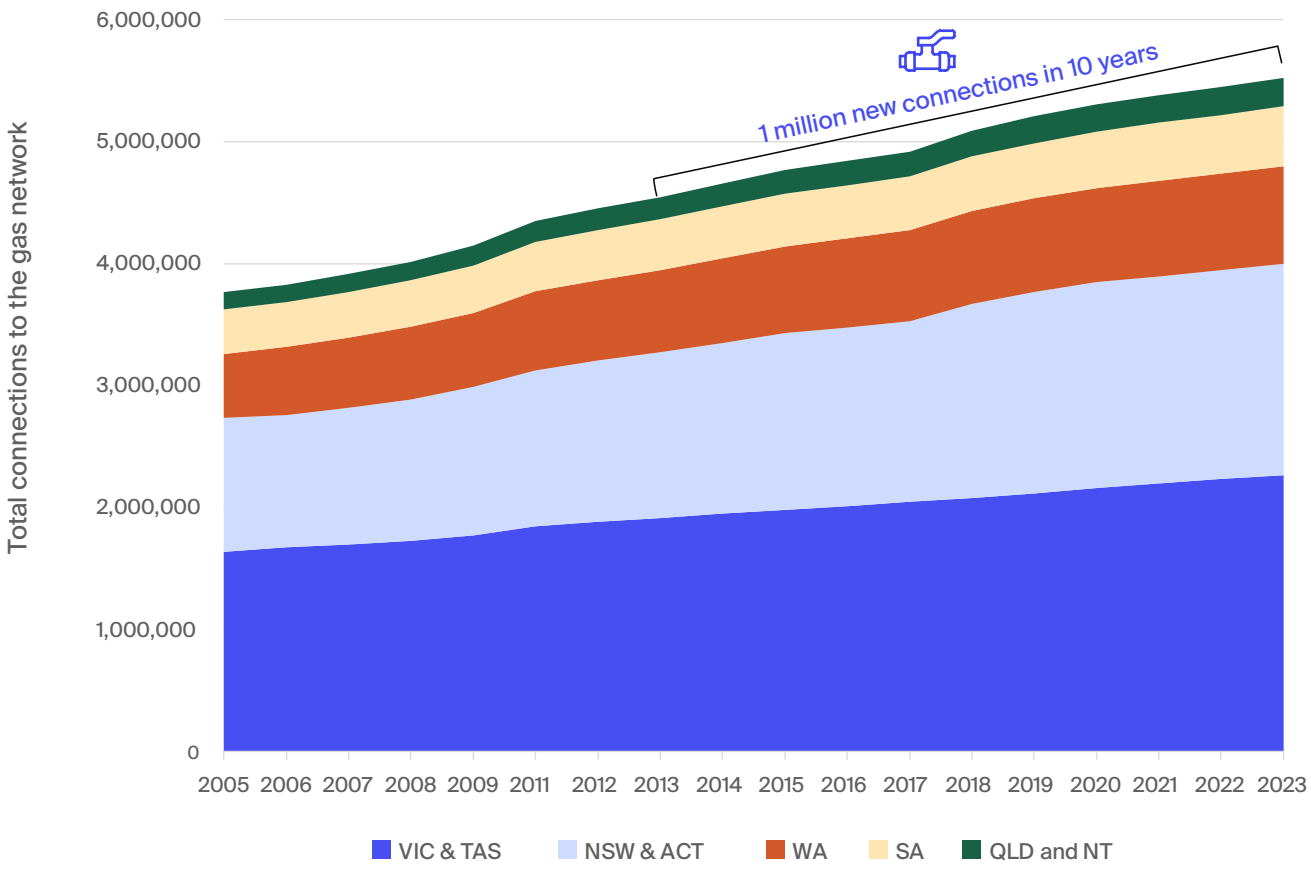
Australia produces around **6,000 PJ** of gas per year of which **4,900** is used for export (including LNG compression). Hence, Australia's gas pipelines deliver around **1,100 PJ** of gas for domestic use, of which **374 PJ** is delivered to distribution networks, and the remaining **726 PJ** direct to mining, large scale industry or for power generation. The distribution network creates opportunities to provide gas to a wide range of customers.

Figure 1: Overview of gas delivered by Australia's gas distribution networks (June 2023)



Gas network connections continue to grow in all regions in Australia, with the exception of the ACT. Over the last decade, **973,086** new connections were made, which continues the trend from 2005 of around **100,000** new connections per year.

Figure 2: Connections to the gas network continue growing



Gas distribution networks complement high pressure gas pipelines that also directly deliver gas to large-scale industrial users and gas-fired power stations.

Gas in Australian homes

Within the home, gas is mostly used in cooking, to provide hot water and space heating. The ACT and Victoria have the highest proportion of homes connected to the gas network, with 79.4 and 77.2% respectively. These households also consume much more gas than the national average – driven by gas being used to heat homes during winter.

While there are a range of options to heat homes, including electric heat pumps, LPG and wood heating, gas continues to be a preferred choice for many customers. Residential gas consumption in Queensland and Western Australia is much lower as gas is rarely used for space heating and more often used for hot water and cooking.

Table 1: Natural gas in Australian homes (data as end June 2023)

Region	Residential Connections	Per cent homes with gas	Average consumption (GJ pa)
ACT	151,585	79.4%	31.7
NSW	1,539,429	45.6%	20.0
NT	1,063	1.2%	10.8
QLD	219,324	10.1%	9.5
SA	475,469	58.8%	16.3
TAS	12,758	4.9%	28.4
VIC	2,192,224	77.2%	46.6
WA	789,192	69.3%	13.5
Australia	**5,381,044**	**49.5%**	**29.5**

Gas supporting Australian businesses and industry

Gas supplied by networks support many Australian businesses and industry. Networks provide 200 PJ of gas to these businesses and industry and high pressure gas pipelines provide over 700 PJ of gas to very large industrial sites, mine sites and power generators.

Small businesses and commercial buildings, such as apartments or hospitals, use gas to provide hot water, space heating and cooking services. Many commercial kitchens use gas to prepare the food. Industrial customers use gas mainly for heating, for example in food processing or paper manufacturing. Industrial ammonia and fertiliser producers use gas both to provide energy to their process and the gas molecules are also an essential component of the reaction taking place, and these are normally supplied via pipelines.

Table 2: Examples of gas used by businesses and industry

Businesses	Small industrials	Large industrials
Hotels	Food processing	Cement manufacturing
Shopping Centres	Asphalt production	Metal manufacturing
Hospitals	Glass manufacturing	Power generation

At a national level, gas networks deliver around 45 per cent of its gas to homes and the other 55 per cent to businesses and industry. This proportion differs by state reflecting how gas is used within the home and the industrial activity of that state. While 90 per cent of the gas in Tasmania is used by industry, this is off a small total volume and represents 3.1 PJ of gas. Victorian gas networks on the other hand deliver 42 per cent of their gas to Victorian businesses and this represents a total of 74 PJ.

Table 3: Commercial and industrial gas use by state (data as end June 2023)

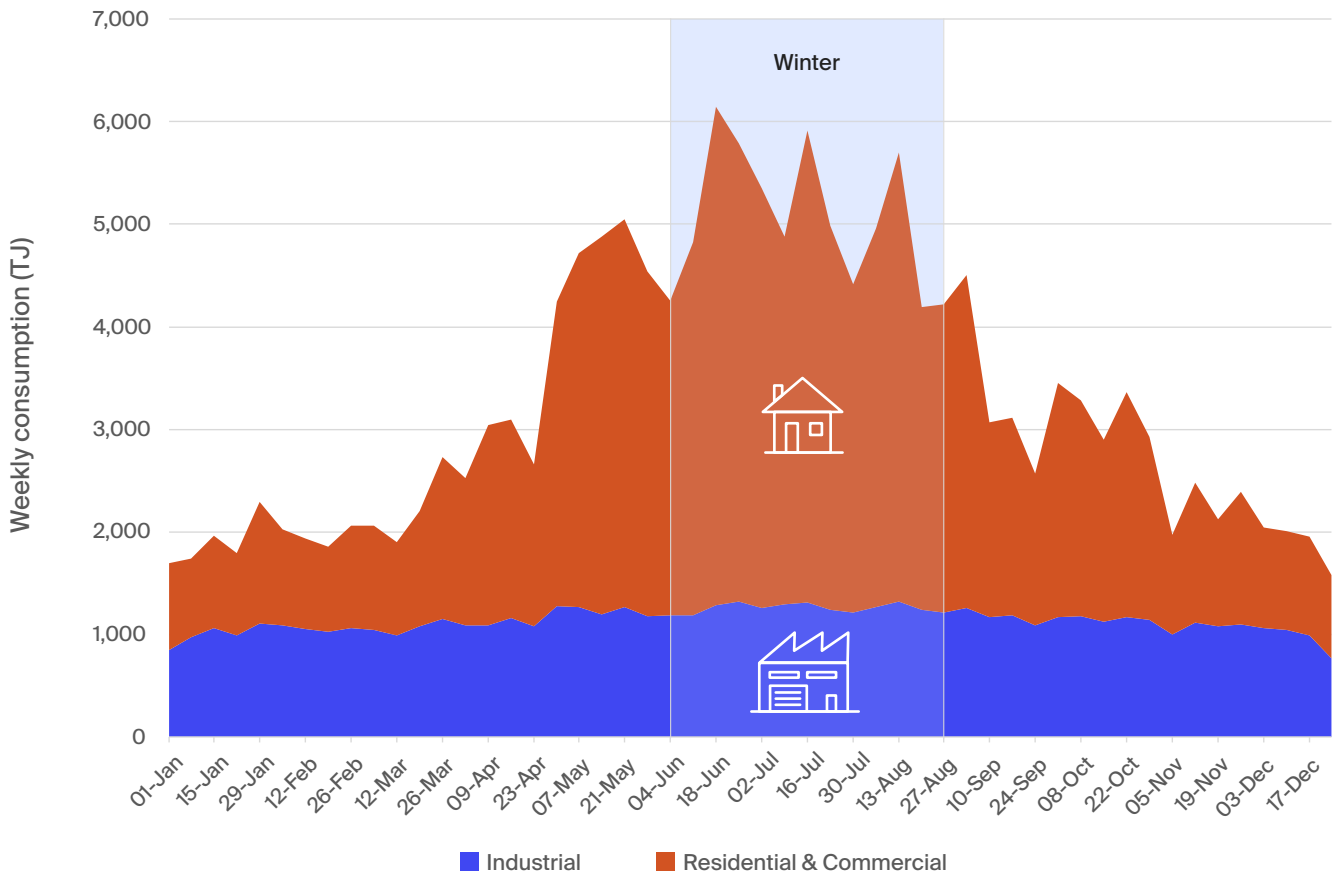
State/ Territory	Residential consumption (PJ)	Business and small industrial consumption (PJ)	Large industrial consumption (PJ)
ACT	4.8	1.8	1.3
NSW	30.8	13.9	52.1
NT	NT only consumes 0.1 PJ via the gas networks		
QLD	2.1	4.7	9.5
SA	7.7	3.5	18.7
TAS	0.4	0.4	2.8
VIC	102.1	20.6	53.3
WA	10.6	3.6	14.2
Australia	**158.5**	**48.6**	**151.7**

Gas networks built to provide peak demand

Gas demand for industry is generally uniform throughout the year but residential gas demand shows both daily and seasonal peaks that align with periods of heating. Gas distribution networks have been built to be able to meet these seasonal and daily demand cycles.

Figure 3: Weekly gas consumption in Victoria across the year

✦ ***Source:*** *AEMO, ENA analysis*



In Victoria, over the course of the year, gas consumption for the residential sector is nearly double that for the industrial sector.

- During summer, the demand in both sectors is roughly the same.
- During winter, the residential sector requires three times as much gas as the industrial sector.
- On a seasonal basis, the average demand for the residential sector is four times higher in winter than summer.
- On a daily basis, the maximum demand during winter is nine times higher than the lowest demand during summer.

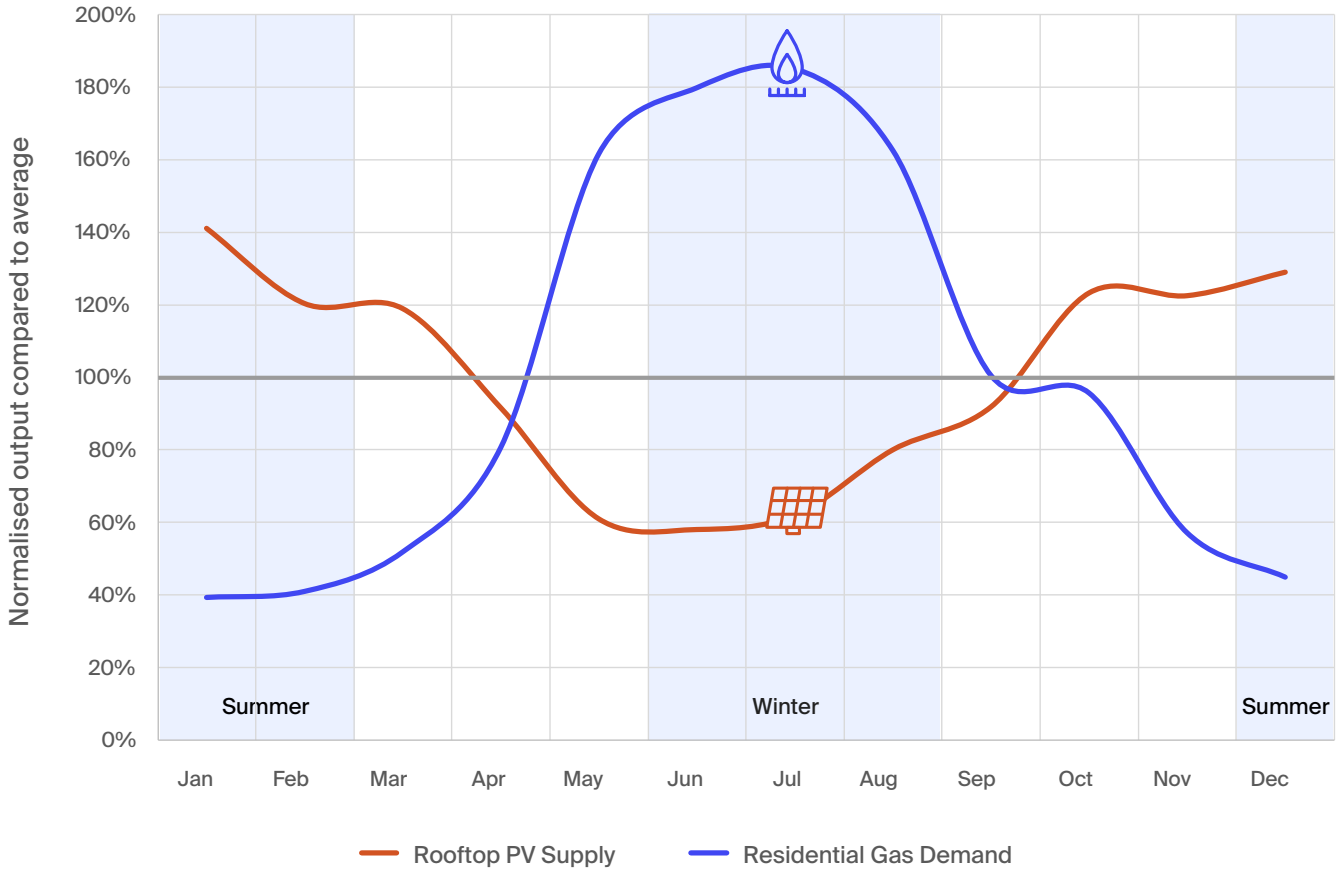
The whole gas infrastructure supply chain allows these demands to be met. The seasonal peak from residential consumption of gas is less prominent in other regions.

Complementary to rooftop PV

The energy delivered by gas networks is complementary to that provided by rooftop PV. Rooftop PV works best during daylight hours, especially in summer when the solar intensity is higher. This makes rooftop PV match well with air conditioning in summer to cool homes during the day and the early evening.

However, demand for gas is highest during the colder winter periods with shorter days when rooftop PV produces the least amount of energy. Indeed, most heating in homes occurs in the early morning or afternoon when the output from rooftop PV in winter is negligible. Figure 4 illustrates how rooftop PV and residential gas demand are complementary energy sources for southern Australian homes.

Figure 4: Gas demand is highest when rooftop PV supply is lowest.



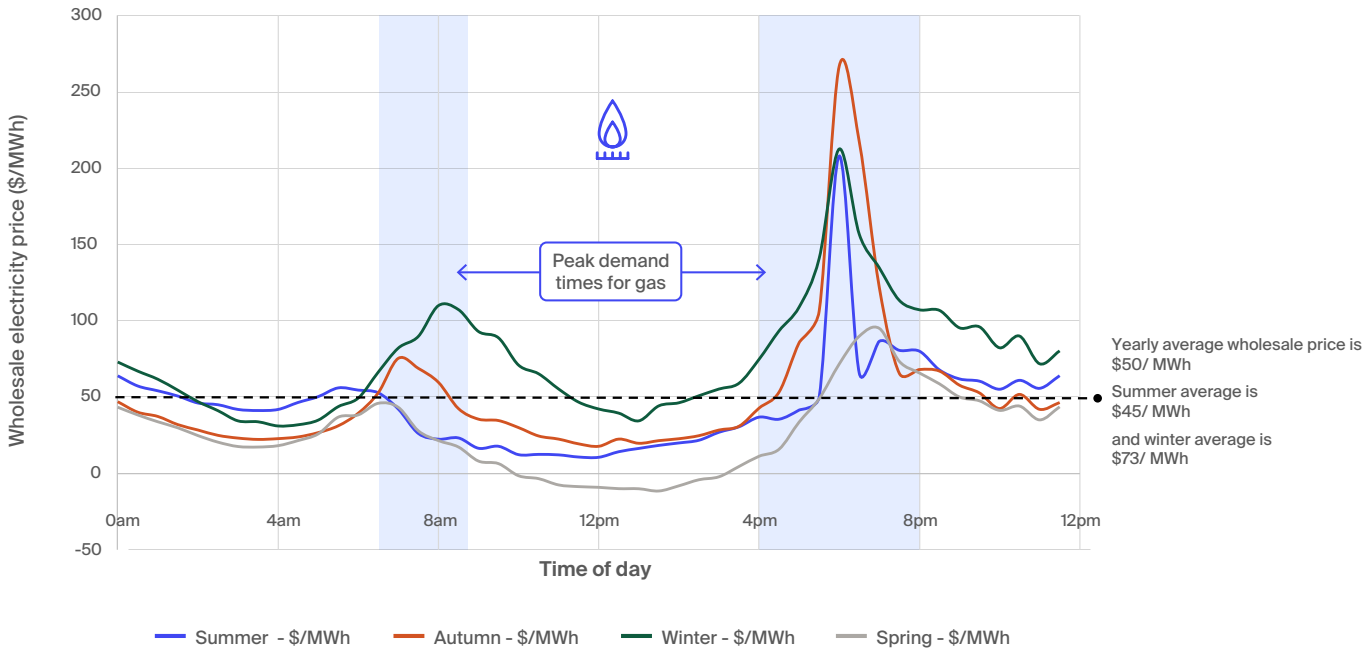
Avoids higher electricity demand during peak periods

Demand for gas in homes occurs at the same times as when electricity demand is high and renewable generation is low. At those times, gas-powered generators are often the marginal generators that are called upon to maintain electricity supply. This results in higher wholesale electricity prices compared to during those times of the day with high amounts of solar PV generation.

Using gas directly, instead of electricity to heat the home during those times of the day, reduces the pressure on the electricity system, and ultimately will avoid increases in retail tariffs by avoiding higher electricity demand during the peak periods. This is especially the case in the colder seasons where the wholesale price at those peak times is higher than during summer and shoulder seasons.

Figure 5: Daily demand for gas in Victoria coincides with peak electricity wholesale prices

✦ ***Source:*** *NemReview, 2022, ENA Analysis*



Networks readiness to provide renewable gas

Achieving Australia's emission targets requires the use of gas to be decarbonised through the use of renewable gas opportunities. Gas networks are already providing blends of renewable gas and are ready to support decarbonisation of homes, businesses and industry.

Biomethane

Many European countries are active in biomethane production with Denmark, France, Italy and the UK leading production.

When biomethane is produced with the same specifications as natural gas, it can be interchangeably used with natural gas, either as a blend or as 100 per cent biomethane.

This means that gas networks and existing industrial, commercial or residential appliances can continue to be used as they are currently.

Blended hydrogen

Gas distribution networks are early adopters of hydrogen, as well as among the first to initiate renewable hydrogen production in Australia and can continue to expand Australia's hydrogen industry. There are hydrogen blending projects underway in Perth, Adelaide and Sydney with more planned in Victoria and Queensland.

Hydrogen produced from electrolysis using renewable electricity is an emission free fuel when combusted. Hydrogen can be blended with natural gas to start the journey to reduce emissions. Blends of up to 20 per cent by volume can be used with existing appliances.

A diverse range of common new and used, certified gas appliance operated safely and effectively on blends of up to 20 volume percent hydrogen with natural gas under normal gas appliance testing conditions.

✦ ***Source:*** *FFCRC*

Hydrogen

While hydrogen blends can be used in existing gas appliances, switching to 100 per cent hydrogen will require modifications or replacements of existing gas appliances.

However, Australia's gas distribution network is ready to provide renewable gas to customers in Australia. Our networks are world class as they have been replaced by new modern network materials that are capable to safely transport hydrogen to customers.

The Future Fuels CRC has investigated concerns regarding using hydrogen in Australia's gas distribution networks. The main findings are that:

- There are no significant issues in using hydrogen blends or 100 per cent hydrogen in gas distribution networks once all the upgrades to modern plastic networks are completed.
- There may be some issues with meter sets and seals and these will need to be routinely replaced as the conversion to 100 per cent hydrogen progresses.

While the future role of hydrogen remains uncertain, there are no significant barriers to limit the blending of hydrogen in gas distribution networks. The barriers to converting natural gas to 100 per cent renewable hydrogen have been partly addressed and will continue to be addressed with ongoing research and demonstration. There are no technical showstoppers that cannot be overcome.

References

AEMO (2024): Victorian Gas Planning Report 2024 update

DCCEEW (2023): Australian Energy Update 2023

ENA (2023): Gas Vision 2050: Renewable Gas Innovation, Delivering Renewable Gas to Customers

ENA (2023): Natural Gas Distribution Benchmarking Report 2022-23

Future Fuels CRC (2023): Two page summary: RP1.4-05 – Performance of Type A appliances with blends of hydrogen and natural gas

Future Fuels CRC (2023): RP3.1-05 - Compatibility of plastic piping with future fuels

NemReview (2022)

Energy Networks Australia

For more information
energynetworks.com.au/the-role-of-gas

www.energynetworks.com.au