2024

Energy Networks Australia

Renewable gas for a future made in Australia

Renewable gas can secure the future of Australian industry

Executive summary

Renewable gas can secure the future of Australian Industry

The decarbonisation of Australia's gas system is a complex challenge that enlivens furious debate. Energy Networks Australia (ENA) supports the Australian Government's Future Gas Strategy and its position that gas can, and should, support our future made in Australia.

With around **70 per cent** of Australia's gas use, occurring in manufacturing, industry and as feedstock to support the electricity grid and only **10 per cent** used in homes and small businesses, the Future Gas Strategy has rightly identified that gas will play a role in our energy transition through to 2050, and beyond. Our commitment to net zero emissions means we must focus on decarbonising and protecting our 'Australian made' future.

We want to ensure that Australian manufacturing is decarbonised at the lowest cost. But the fact is the emissions for many applications in the heavy industrial sector are too expensive to electrify, making it one of the biggest hurdles to achieving net zero. Many industries today rely on natural gas to generate onsite electricity through co-generation systems producing both electricity and heat simultaneously, improving efficiency.

Gas is widely used for heating in the production of metals, glass, ceramics and cement – these processes require high temperatures that cannot be achieved with electricity alone. Gas is also a vital raw material to produce chemicals and fertilisers.

The Australian Government's 6 committed principles are on the right path to ensure Australia is serious about the future of gas in our economy. With further development of renewable gas solutions to address this large-scale energy consumption, we can support the economic and environmental sustainability of Australian industry. However, there is more that can be done to develop and prioritise renewable gases such as biomethane and hydrogen for Australia's industrial sector to not only survive, but thrive. The 2025 Budget included additional funding to support hydrogen development but similar support is also needed for biomethane.

Critical policy adjustments such as enabling certification of both biomethane and hydrogen and including considerations for a renewable gas target (RGT) into the sectoral plans that inform Australia's Net Zero Plan will help deliver a least-cost transition. This will also drive innovation, reduce costs through economies of scale, and accelerate the development of renewable gas infrastructure and supply chains, while **securing Australian jobs**.

The 2025 Budget included additional funding to support hydrogen development but similar support is also needed for biomethane.

Our recommendations

1 Introduce a certification scheme for all renewable gases

Emission reductions from a market-based approach for renewable gas to be recognised under the National Greenhouse and Energy Reporting scheme.

2 Expand existing hydrogen support programs to include biomethane

Expand the $4 billion Hydrogen Headstart program to include biomethane to increase its scale-up and development.

3 Renewable Gas Target (RGT) for Australian industry by 2030

With gas emissions reduction strategies being considered through the six sectoral plans as part of Australia's Net Zero Plan, ENA recommends that this include policy design for an RGT by sector, so that appropriate targets can be set in place by 2030.

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Introduction

Energy Networks Australia (ENA) is the peak industry body representing Australian electricity and gas networks that serve almost every single Australian, every day.

This paper brings together recent analyses of KMPG, ACIL Allen, and BCG as well as the Australian Government's Future Gas Strategy to identify a feasible pathway to renewable gas development and use in Australia, as well as policy levers that could deliver economies of scale for renewable gas by 2045, and beyond.

Australian energy networks are key enablers to the energy transition. ENA is focused on supporting the nation's transition to a low emissions energy future with robust and practical solutions for decarbonising the Australian economy.

We are committed to:

1. Driving innovative solutions for networks to support customers through the transition.
2. Connecting renewable energy to customers in an affordable and sustainable way.
3. Exploring and defining the role of gas and renewable gas in the transition.

Australia's gas emissions

The production and use of gas comprises 18% of Australia's total emissions. This is 7% in NSW, 18% in Vic, 15% in QLD, 56% in WA and 36% in SA. The main sources of gas emissions are electricity generation, large industrial manufacturers, and gas production and processing.

As BCG noted, many industrial applications are either impossible or too expensive to abate emissions through electrification. As such, the scale-up of renewable gases must be part of our decarbonisation plan. To meet Australia's net zero commitments, we must recognise the barriers that exist in electrification. Renewable electricity alone will not decarbonise our nation's entire energy system. We must explore options such as renewable hydrogen and biomethane.

The role of gas networks through the transition

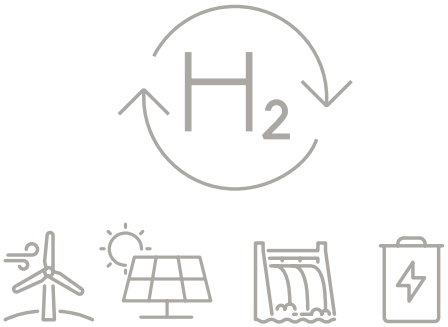
Australia's gas infrastructure network is extensive with more than 100,000 kilometers of gas lines and over 42,000 kilometers of transmission pipelines that interconnect. These pipelines are crucial for delivering natural gas to residential, commercial, and industrial customers across the country. There are over 5.5 million connections to Australian homes, businesses and industry. In addition, some large-scale industrial facilities and gas-fired power generators are directly connected to high pressure transmission pipelines.

Current infrastructure projects and trials are underway to demonstrate the role of renewable gases. Innovative pilots to deliver renewable gas to industry on existing gas pipelines, like the Hydrogen Park South Australia, the Western Sydney Green Hydrogen Hub, and the Malabar Biomethane Injection Plant, are already proving successful.

The importance of getting the right policy settings

Our analysis shows a clear long-term role for gaseous fuels for Australian industry. Renewable gas is an robust solution to reduce emissions from gas use. Developing these renewable gas supply chains requires focused investment and policy support aimed at reducing costs of the technology, gaining community support for renewable gas solutions, and building the right skills and workforce.

What is renewable gas?



Hydrogen

Green hydrogen is a low-emissions fuel produced through the process of electrolysis, where renewable electricity is used to split water into hydrogen and oxygen.

The key characteristic of green hydrogen is that the electricity used in this process comes from renewable sources, such as wind and solar.

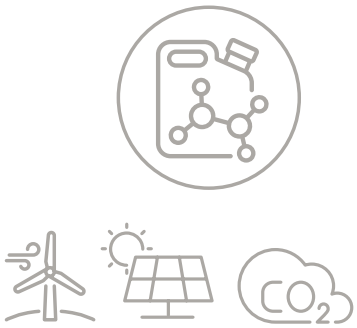
This is a useful proof of concept, and green hydrogen will benefit from early inroads made with this fuel.

Biomethane

Biomethane is a biofuel produced by breaking down organic matter in the absence of oxygen.

This can be done using materials such as agricultural waste, manure, plant material, sewage, green waste, or food waste.

Using this gas keeps gas within the biological cycle, replacing gas that adds emissions from outside the biological cycle.



Are there others?

Renewable Syngas (Synthetic Gas) is produced from renewable resources, through the gasification of biomass or organic waste.

It generally requires green hydrogen to be 100 percent carbon neutral and is therefore still cost prohibitive and a more onerous to produce.

The evolving role of gas

The outlook for the role of gas varies by sector. The Australian Energy Market Operator (AEMO) forecasts gas demand across the economy, considers government policies that can impact that demand, and outlines any supply gaps.

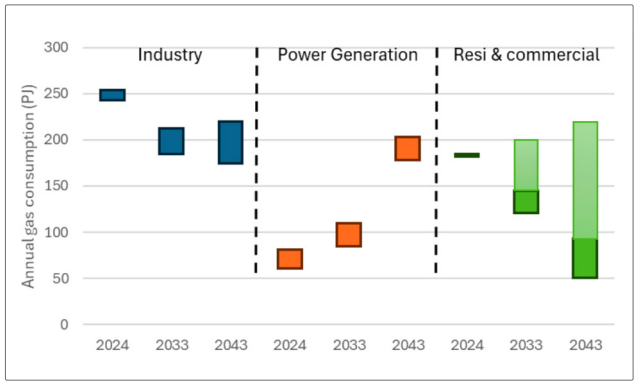
AEMO forecasts gas use across several sectors in its 2024 Gas Statement of Opportunities (GSOO). AEMO's projection is summarised in Figure 1, with the ranges for 2033 and 2043 representing the different scenarios that have been modelled.

Under AEMO's gas demand projection:

- **Industrial gas demand remains relatively unchanged**, declining from a 2024 level of 245 PJ to around 230 PJ by 2043. The principal driver of this lower demand scenario is the risk of industrial closure, rather than the potential for alternative fuel types to be used in industry.
- **Gas demand for power generation increases over time** as the role of gas in the electricity sector evolves. The optimal path for the electricity sector that is developed by AEMO shows that gas will play an increasing role to back up the grid around renewable energy.

The greatest declines in gas demand are projected to occur in the residential and commercial sector, with 140 to 200 PJ of gas demand electrified over the period to 2043. This is mostly driven by policies such as those introduced in Victoria and the ACT. There is a high degree of uncertainty in this sector so AEMO also projected gas demand in the absence of policy driven electrification, where gas demand continues to increase.

Figure 1: Projected role of gas by sector (excluding WA)



(Source: AEMO, 2024)

Noting the modelling outcomes, we are faced by three pressing challenges:

1. Ensuring the availability of gas over the short to medium term to meet demand for the fuel, consistent with the outlook in the GSOO.
2. Supporting the evolving role of gas for electricity generation highlighted by the 2024 Integrated Systems Plan (ISP)†. This will require careful attention to the appropriate market settings as well as gas network planning and investment settings to support the gas and electricity infrastructure required to deliver on this need for additional gas-fired peaking generation.
3. Supporting the development of and staged transition to the use of renewable gases such as biomethane and hydrogen, particularly for industrial processes that require very high temperatures or molecules as a feedstock (e.g. metals and fertiliser).

† AEMO (2024), Integrated System Plan for the National Electricity Market

Decarbonising the gas system

Australia is committed to net zero emissions by 2050, with a national target of 43% emission reductions (from 2005 levels) by 2030.

Meeting this target in the energy sector includes targets for 82% renewable generation in the electricity sector by 2030 and a revised Safeguard Mechanism aiming to reduce emissions from large-scale industrial facilities by 30% by 2030.

Decarbonising the gas system can occur through:

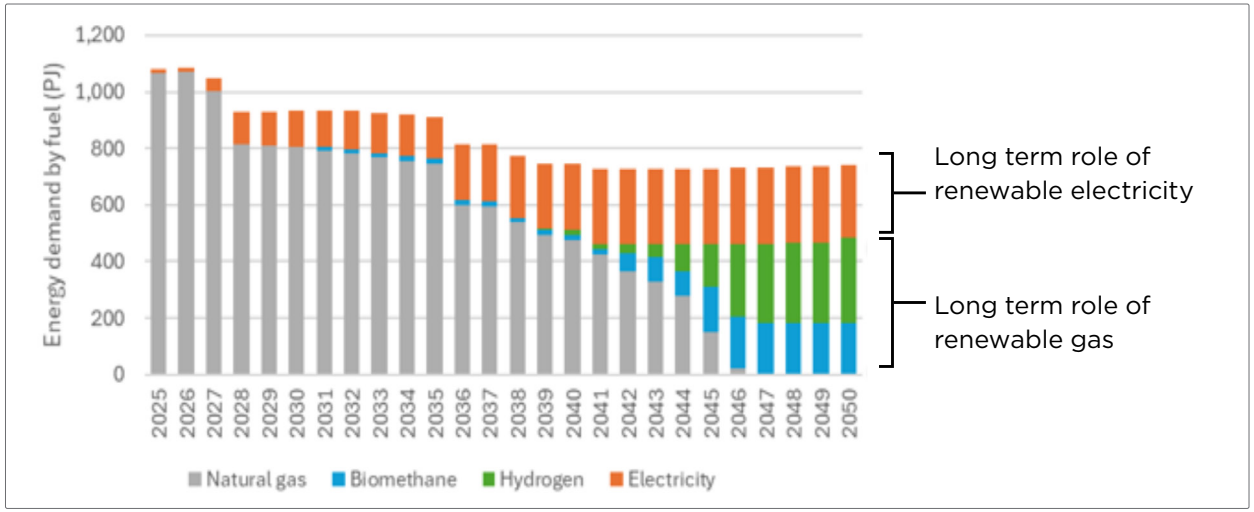
- Reducing fuel use through energy efficiency
- Replacing gas fuels with cleaner gas options, such as biomethane or hydrogen
- Replacing gaseous fuels with electricity (assuming the electricity system is decarbonised with renewables), and/or
- Paying to offset emissions by capturing carbon and storing it, or sequestering carbon elsewhere.

As the Future Gas Strategy highlights, under all credible net zero scenarios, gas is needed through to 2050 and beyond.

ACIL Allen modelled multiple pathways to net zero and the lowest cost pathway to decarbonise gas used by Australia's industrial, commercial and residential sectors. The analysis found:

- Both electrification and renewable gases have a role to play in the lowest-cost pathway to decarbonisation.
- Energy efficiency improvements from electrification reduces the total energy demand needed to deliver the same services.
- Early opportunities are centred on electrification in some industrial processes (mainly conversion of LNG trains that are undergoing capital equipment upgrades) and some commercial and residential electrification, and later (from 2040) opportunities will require renewable gases. While this signifies hard-to-electrify sectors are decarbonised at the later stage of our transition to net zero, it shows that we do not get there by 2050 without a reliable renewable gas option as part of the transition.

Figure 2: Decarbonisation pathway for Australia's gas use



(Source: ACIL Allen, 2024, Theoretical Efficient Policy Scenario)

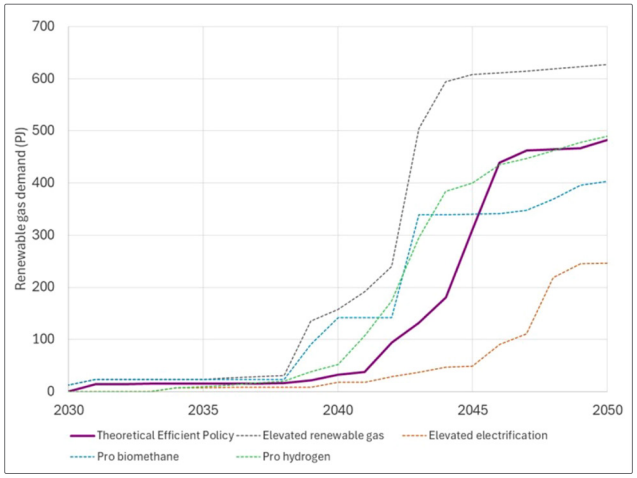
Keeping industry onshore

ACIL Allen modelling tested a range of sensitivities that stretched the costs of electrification and input fuel costs in either direction, as well as limited the availability of biomethane. The analysis showed that future demand for renewable gas is:

- most robust in the industrial sector because many industrial processes either do not have an electrification alternative, or the electrification alternative is far too expensive to justify, and
- more variable and sensitive to technology cost assumptions in the residential and commercial sectors

Note: The ACIL Allen analysis did not look at gas use for electricity generation in the National Electricity Market.

Figure 3: Modelling fuel sensitivities for renewable gas demand to 2050

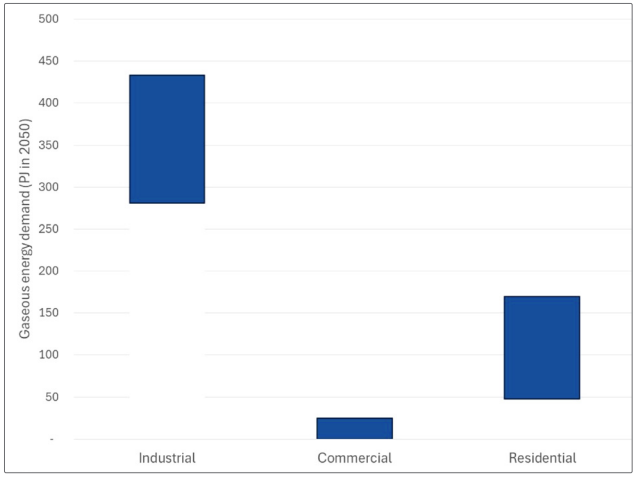


(Source: ACIL Allen, 2024)

The analysis also showed:

- the need for renewable gases to be developed for widespread adoption through the late 2030s and 2040s is clear and robust
- this future pathway will not arrive without strategic policy and government support, which is needed to facilitate and scale up renewable gas supply in time for wide adoption
- we must help drive innovation, reduce costs through economies of scale, and accelerate the development of renewable gas and supply chains to keep Australian jobs onshore, and
- existing gas infrastructure is a critical platform to enable a nascent renewable gas industry, and for the successful and reliable delivery of renewable gas at scale.

Figure 4: Projected range of gaseous fuel demand by sector in 2050



(Source: ACIL Allen, 2024, ENA analysis)

The path to renewable gas

Australia's gas distribution networks are already trialling the delivery of renewable gas and renewable gas blends to customers in various projects across Australia.

Hydrogen is being blended in networks at up to 10 per cent in natural gas, but successful tests at levels of 30 per cent have been reached internationally.

Infrastructure compatibility of hydrogen and hydrogen blends is ongoing with most networks being capable of safely and efficiently transporting hydrogen. Biomethane can be substituted into existing natural gas pipelines and networks with no appliance or network upgrades.

Australia's gas distribution networks are among the safest and most reliable of anywhere in the world and are capable of delivering renewable gas.

Biomethane can be substituted into existing natural gas pipelines and networks with no appliance or network upgrades.

The path to renewable gas

With the goal to reduce emissions at lowest cost across the Australian economy, the transition to renewable gases requires concerted policy support over time.

KMPG's findings align with those of the Future Gas Strategy, identifying that we cannot rely on past investments in gas to get through the next few decades. As a nation, we need continued investment in, and development of, a renewable gas supply.

Relying solely on a voluntary market comes with less certainty and, if unsuccessful, increases pressure on our decarbonisation efforts in the 2040s. If we consider policy changes now, we can navigate the future with greater focus, keeping downward pressure on the overall cost to transition.

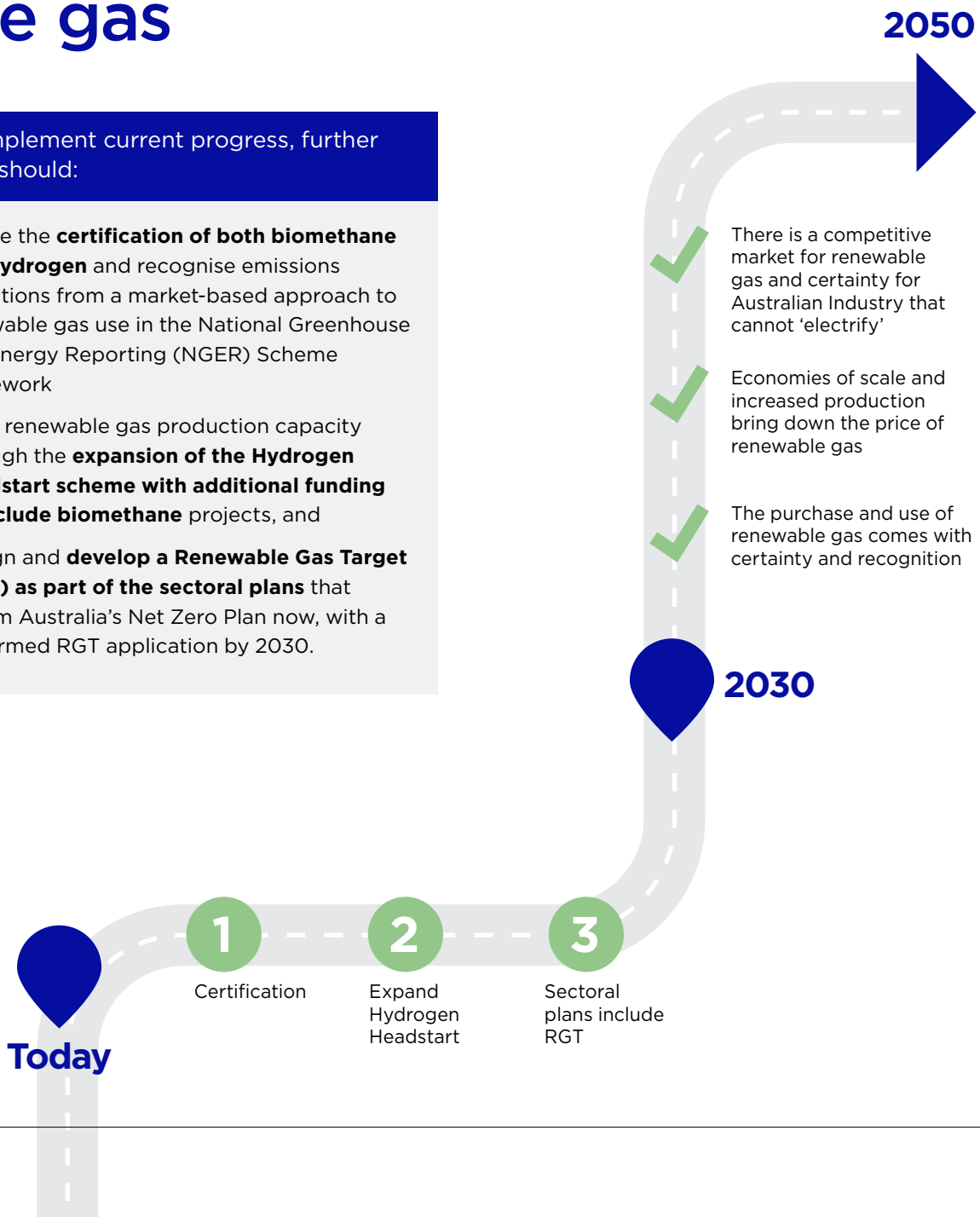
The Australian Government is investing $4 billion in the Hydrogen Headstart program. This program will provide revenue support for large-scale renewable hydrogen projects through competitive hydrogen production contracts.

This investment will accelerate development of Australia's hydrogen industry and help Australia connect to new global hydrogen supply chains.

Now is the time to ensure this investment maximises our opportunities to decarbonise the sector, by including biomethane which, if used with a Contracts for Difference (CfD) or Feed in Tariff (FiT) instrument, would incentivise renewable gas production by providing price certainty. This is a necessary step in advance of implementing a renewable gas target to drive the ongoing deployment of renewable gases at scale.

To complement current progress, further action should:

1. Enable the **certification of both biomethane and hydrogen** and recognise emissions reductions from a market-based approach to renewable gas use in the National Greenhouse and Energy Reporting (NGER) Scheme framework
2. Build renewable gas production capacity through the **expansion of the Hydrogen Headstart scheme with additional funding to include biomethane** projects, and
3. Design and **develop a Renewable Gas Target (RGT) as part of the sectoral plans** that inform Australia's Net Zero Plan now, with a confirmed RGT application by 2030.



Opportunity in biomethane

Biomethane is a renewable gas that can be brought to market at scale within the next couple of years. This will allow it to contribute to Australia's emission reduction targets.

Natural resources are used to produce biomethane. As these resources grow, they absorb carbon dioxide from the air. When the biomethane produced from those resources is burnt to provide heat, the carbon converts back to carbon dioxide and is released back into the air. Overall, the use of biomethane is carbon neutral and does not increase the overall emissions of greenhouse gases. This is recognised within Australia's carbon accounting frameworks which shows the emission factor for biomethane is essentially zero[1].

The Malabar Biomethane Injection Project – in Sydney - is the only project injecting biomethane into the gas network. There are many other biogas facilities around the country and these predominantly use the produced biogas[2] on site or for renewable electricity generation. The right mix of policies could incentivise further biogas being upgraded and blended within the gas network.

Many European countries are much more advanced in blending biomethane into their gas networks. Denmark is at the forefront, having reached 40 per cent of its domestic gas consumption from biomethane in September 2023[3]. The Danish ambition is to have 100 per cent green gas by 2030, which is driven by a declining demand for natural gas and increased production of biomethane. Danish government schemes including feed in tariffs or tax exemptions have grown the industry.

Similar schemes in Australia would be needed to build the biomethane industry. In particular, a new methodology is needed to recognise the emission reduction of a market-based approach to biomethane. This would allow industrial users to pay a premium for biomethane that is blended in the network and use the emission reductions from that biomethane to reduce the emissions from their processes. A similar process has been in place for renewable electricity as part of the Renewable Energy Target.

Australia's Bioenergy Roadmap shines a light on the biomethane opportunity. The Roadmap indicated biomethane could represent between 9 and 33 per cent of Australia's gas demand by 2050, depending on the level of targeted support.

1. The Scope 1 emission factor for CO2 for biomethane is 0.0 kg CO2-e/GJ. The Scope 1 for combined gases for biomethane is 0.13 kg CO2-e/GJ compared to the emission factor for natural gas which is 51.53 kg CO2-e/GJ.

2. Sydney Water uses some of the biogas it produces for on site power generation. The extra biogas is sent to the Jemena facility, where it is cleaned up and then injected into the local natural gas network.

3. **https://en.energinet.dk/gas/biomethane/**

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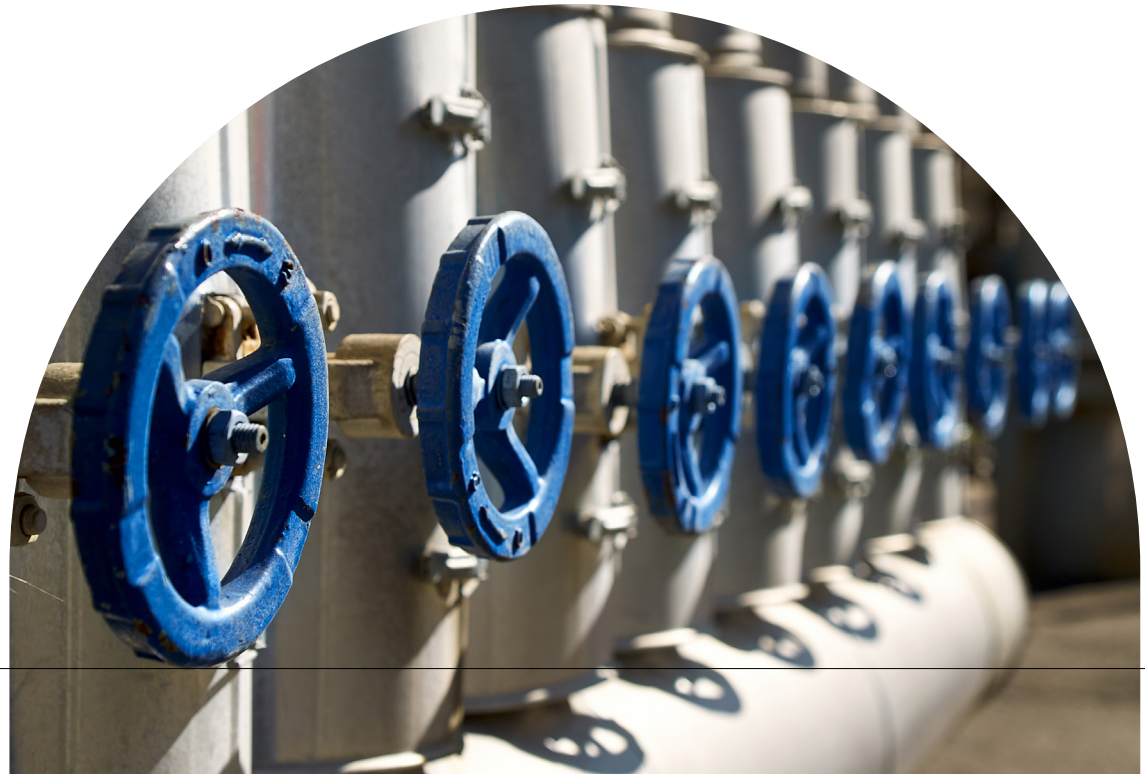


Appendices

‘The Role of Australia’s Gas Infrastructure in the energy transition’

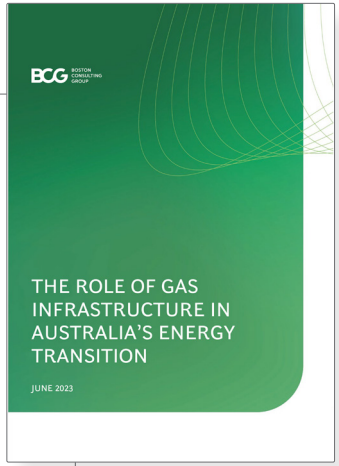
In August 2023, BCG released a report ‘The Role of Australia’s Gas Infrastructure in the energy transition’ that focused on the phases needed to support Australia’s energy transition at the least cost and in the most robust manner.

HIGHLIGHTS:

- Natural gas – and the gas infrastructure that stores and transports it – is a cornerstone of Australia’s energy system today, representing 27% of primary energy.
- During the ‘transition phase’, natural gas can support the ‘renewify first’ sequence by serving applications that are hard or expensive (peaking applications in particular) for the system to electrify.
- An integrated clean energy system, combining low-emissions gas networks and expanded electric networks, could be the least cost approach to net zero.

Exhibit 1: The role of gas and gas infrastructure in the energy transition (infographics in appendix)

	1. TODAY	2. TRANSITION	3. NET ZERO
THE ROLE OF GASEOUS FUELS	**Natural gas is a pillar of the energy system** 27% of primary domestic energy 34% of household energy 5-10% grid-connected electricity generation (NEM+SWIS)	**Natural gas has a reducing but critical role** Serves hard/expensive to electrify applications Maintains peaking applications, such as gas-powered generation (critical to an orderly electricity system transition) Provides low-carbon gas as sources start to build	**Low-carbon gas could be competitive for some existing gas customers, at anticipated prices** Essential for some hard-to-electrify industrial applications Competitive option for some households and available for potential new customers (e.g. fuel cell heavy transport)
THE ROLE OF GAS TRANSPORT INFRASTRUCTURE	**Gas infrastructure plays a critical role supplying energy to over 5m industrial, commercial, and residential customers** Transmission network supports distribution and industrial customers Distribution network supports homes, businesses and industrial customers	**Gas infrastructure continues to serve customers, while demonstrating low-carbon gases** Develops and demonstrates physical and economic feasibility of low-carbon gas (blending and 100% streams)	**Low-carbon gas networks form part of an integrated clean energy system** Transports low-carbon gas to end users domestically, and potentially for export Role likely to differ by region and network, based on a range of factors



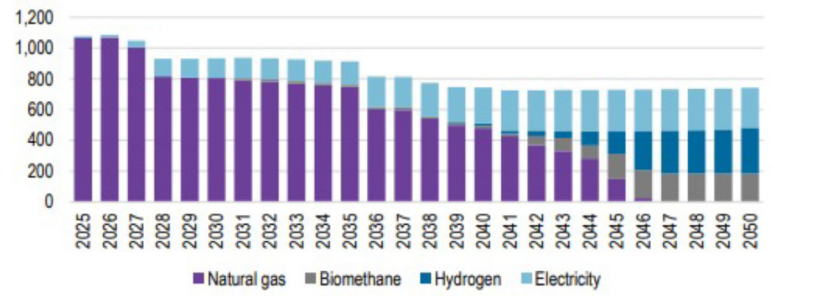
ACIL ALLEN

Delivering lower cost decarbonisation for gas customers and the Australian economy

HIGHLIGHTS:

- The most economically-efficient pathway to net zero emissions for today's gas users involves a mix of renewable gas and renewable electricity.
- Australia will need access to renewable gas as part of an efficient transition.
- A Renewable Gas Target (RGT) could secure net zero gas emissions at a lower cost than a more electrification focused approach.

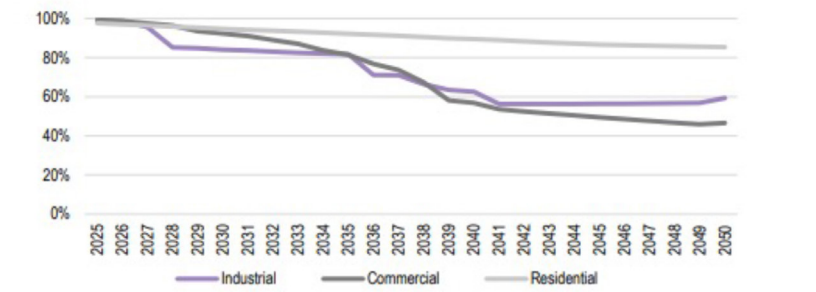
Figure ES 3 Theoretical Efficient Policy scenario fuel mix (PJ)



Source: ACIL Allen Gas Transition Model

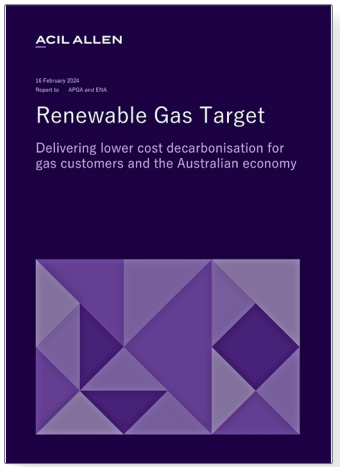
Gaseous fuels and electricity both play important roles across each of the industrial, commercial and residential sectors, with gaseous fuels playing a particularly large role in the residential sector (Figure ES 4).

Figure ES 4 Theoretical Efficient Policy scenario gaseous fuel share by end use sector



Source: ACIL Allen Gas Transition Model

The combined effect of electrification and investment into renewable gases rapidly reduces emissions from the gas sector, consistent with Australia's net zero objective (Figure ES 5).



Policy options to support Australia's decarbonisation journey

HIGHLIGHTS:

- Renewable gases such as green hydrogen and biomethane have the potential to deliver emissions reductions by displacing conventional natural gas and other fossil fuels in the energy system
- Renewable gases are likely to play a role in the build environment sector alongside energy efficiency and electrification
- A Renewable Gas Target (RGT) scheme could be highly effective instrument for stimulating deployment at scale and cost reductions . This should be supported by certification and recognition of renewable gases, as well as direct support for hydrogen and biomethane projects leading into an RGT.

Table 1: The Potential Role of Renewable Gases in Sectoral Net Zero Pathways

The Australian Government is developing six sectoral decarbonisation plans.[27] Renewable gases have a potential role to play in each, as shown further in the table below.

Major sector	Potential role for renewable gases
Electricity and energy	• Long term storage and export (green hydrogen) • Reducing the emissions intensity of gas-fired peaking plants
Industry	• High temperature heat (steel, cement, glass) • Chemical production
Resources	• Gas generation for remote mining sites • Hydrogen for heavy-duty vehicles such as mining trucks • Low-emissions ammonia and other chemicals for mining and mineral processing applications
The built environment	• Biomethane and hydrogen blending to reduce emissions from gas appliances in existing buildings • May have a more prominent role in southern locations with high heating needs and dense populations
Agriculture and land	• Low-emissions ammonia and fertiliser production • Biomethane as waste-to-energy
Transport	• Hydrogen for heavy-duty transport (trucks and maritime)

Energy Networks Australia

For more information

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