

16 August 2021

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████████████████████
Infrastructure Victoria

████████████████████
www.ausnetservices.com.au

Via: www.engage.vic.gov.au

Dear ██████████

AusNet welcomes the opportunity to respond to Infrastructure Victoria's *Towards 2050: Gas infrastructure in a zero emissions economy – interim report* (the Interim Report).

AusNet is the owner and operator of one of Victoria's three gas distribution networks. Our network, covering Melbourne's western suburbs as well as cities and towns across western Victoria, provides gas to 760,000 households and businesses, transporting an annual average of 67 PJ of gas over the period 2016-2020. AusNet also owns Victoria's electricity transmission network and one of Victoria's five electricity distribution networks.

The future of gas as Victoria decarbonises its economy is a major issue for our customers and for AusNet's business. The best pathway to decarbonise gas is currently unclear, and government has a key role to play. AusNet agrees that a diversified approach to gas sector decarbonisation is needed and that an approach which emphasises least regrets actions should be the objective for government policy. We believe in the near term this equates to retaining customer choice, while accelerating actions to establish the feasibility of the different pathways, and to support their efficient achievement.

In the attached submission, we focus on:

- The importance of gas users to the decarbonisation of gas in Victoria and outlining the work AusNet is undertaking to engage our customers to inform our own planning for the future;
- The interactions between the gas and electricity systems that need to be more carefully explored, highlighting particularly the risks of shifting load too rapidly from the gas to the Victorian electricity system, drawing on our experience with both electricity and gas networks;
- The need for ongoing investment in gas networks, even under scenarios of falling network utilisation and opportunities to provide additional flexibility in regulatory frameworks to manage stranded asset risks in the face of uncertainty over the best pathway to decarbonisation;
- Hydrogen development, including the compatibility of existing gas distribution network infrastructure, and other actions AusNet is supporting to reduce emissions associated with our gas network and prepare for decarbonisation; and
- AusNet's view of the role for the Victorian Gas Substitution Roadmap, and specific aspects of the gas transition and policy framework that should be considered by Infrastructure Victoria before finalising its' advice to government.

In completing the remainder of Infrastructure Victoria's gas work program, there is a need for greater customer and industry consultation in order to ensure the final advice is fit for purpose and meets the specific needs of Victoria's energy landscape.

If you have any queries regarding this submission, you can contact me at [REDACTED]. We are happy to answer questions or provide further information in relation our submission.

Sincerely,

[REDACTED]

[REDACTED]

[REDACTED]

AusNet Services

Response to Infrastructure Victoria's *Towards 2050: Gas infrastructure in a zero emissions economy – interim report*

Gas users must play an important role in determining the future of gas in Victoria

As highlighted in the Interim Report, gas is a popular source of energy in Victoria, and it is used widely in households and businesses. Gas customers' (households and businesses) preferences and behaviour are going to be key to the decarbonisation of gas.

AusNet welcomes Infrastructure Victoria's intention to conduct consumer research in the next round of technical work and would encourage that this research incorporates research on consumer preferences which should be central to determining preferred policies.

This section outlines the work AusNet is undertaking to engage customers on the future of gas to inform our own planning for the future, and the preliminary insights from our research.

AusNet's customer engagement approach

AusNet, in collaboration with Australian Gas Infrastructure Group (AGIG), is conducting a major stakeholder engagement program to inform our plans for the next Access Arrangement period (1 July 2023-30 June 2028) and beyond. The future of gas is a major focus.

The program, being conducted across 2021 and 2022 and co-designed with customers, incorporates a wide range of engagement activities designed to reach an inclusive set of Victorian gas users and stakeholders. A 'Future of Gas' Expert Panel has been formed to develop a set of future energy scenarios (2030-2050) that will be used together with customer choice modelling to determine no-regrets actions for inclusion in our proposals.

Other engagement activities include customer workshops, a major gas user forum, a stakeholder roundtable, retailer reference group, property industry workshops and one-on-one stakeholder meetings.

Further information on this engagement program is available [online](#).

In addition to the Gas Access Arrangement Review (GAAR) engagement program described above, AusNet conducts a range of other research to understand our customers' needs, wants and preferences to enable us to meet their expectations and improve their experiences. These research programs include:

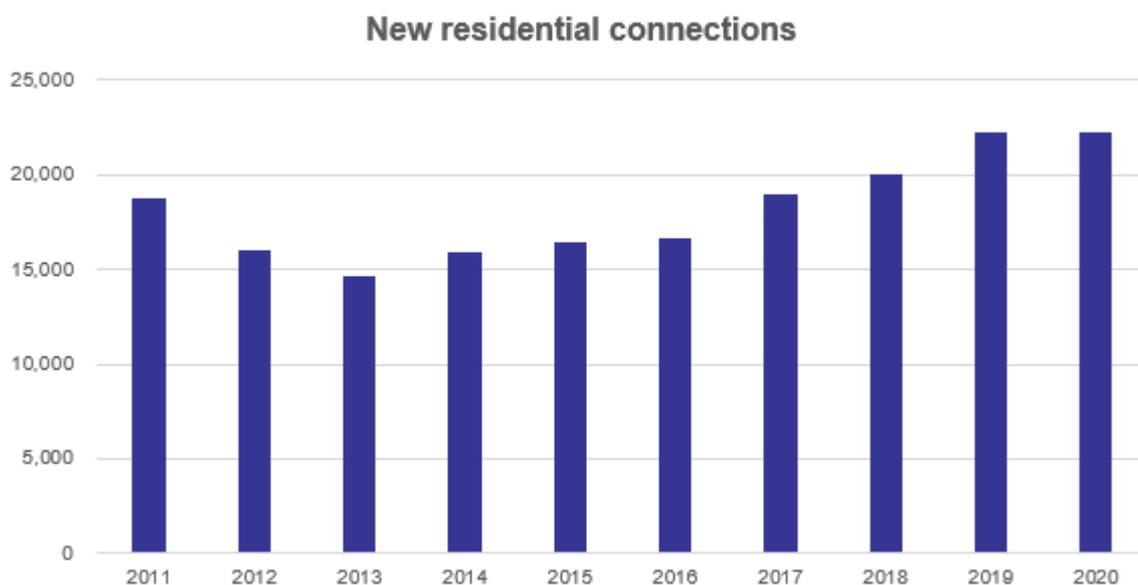
- Customer Satisfaction (C-SAT) – A monthly survey measuring customer satisfaction with key interactions (e.g. a planned or unplanned outage, a new connection or complaint). This survey captures a selection of residential electricity and gas customers that have had a recent interaction with us.
- Energy Sentiments – A twice-yearly survey (commenced in 2021) testing customer sentiment toward AusNet and industry trends, purchasing and behavioural intentions, and customers' experience with various aspects of their electricity or gas supply. This is a survey of 2,000 residential and business customers on our electricity and gas networks per annum.
- Ad-hoc Research – We undertake ad-hoc research projects for one-off topics or for "deep dives" into specific topics. These research activities include AusNet research projects and industry research projects that AusNet participates in.

Customer insights

As it stands today, gas is a popular fuel both in terms of customer attitudes and actual connections activity. This means that changes to gas supply under the various decarbonisation pathways will impact homes and businesses, including the cost of energy, the ability to continue using existing appliances and machinery, and future choices.

Network data - Gas use on AusNet’s network

Residential gas connections are at record levels on AusNet’s network.



Source: Published Regulatory Information Notices, years reflect calendar years

And, while new gas customers use significantly less gas than customers who connected ten or more years ago, a daily consumption record was set for gas consumption through the network on 4 August 2020. This record represented a 5.4% increase on the previous daily consumption record (recorded in 2019), and total system demand increased by 5.8% compared to previous years. While it is likely these unprecedented increases were due to the impact of COVID-19 stay-at-home measures, ongoing changes to work practices that involve increased working from home are contributing to continued increases to winter energy demand in homes.

Research – customer attitudes

AusNet’s 2021 research to date reveals that customers view gas favourably. Cost and affordability is a top factor, and customers generally see gas as good value. They enjoy using gas appliances, particularly for heating and cooking. Customers are also aware of wider developments (such as reduced local supply, and net-zero emissions targets) which is creating uncertainty over what this will mean for their future gas use.

Further details from the research program are provided below. We have heard from customers at GAAR Workshops [GW] and through AusNet’s Energy Sentiments Survey [SS]. A distinction worth noting is that customer research reveals people’s perceptions (i.e. what they *think* is true), which may or may not be the same as fact (i.e. what is *actually* true). Either way, perceptions are important to understanding what customers value and what is likely driving their behaviour.

What are AusNet's customers saying about gas in 2021?

Attitudes toward gas:

- [SS] Natural gas is one of the most liked fuel types (along with rooftop solar, solar farms and wind farms). 61% of gas customers like gas either 'a lot' (32%) or 'a little bit' (29%), with only 6% saying they dislike gas.
- [SS] The most disliked fuels are coal-fired power stations, petrol, gas-fired power stations and big batteries. Customers were unsure how they felt about hydrogen gas.
- [GW] People love their natural gas, especially for cooking. Many find gas heating much more economical than electric heating.
- [GW] People feel they are very uneducated on gas (much less so than electricity). They do not know how to adjust gas appliances to save money and do not know how the supply chain works.
- [SS] There is a perception that gas bills have increased over the last two years, with 57% of respondents saying bills had increased 'a little bit' or 'a lot'.
- [GW] Our customers are relatively unconcerned about their gas bills, definitely less so than their electricity bills.

Future gas usage intentions:

- [SS] Three quarters of homeowners with a gas connection intend to stay connected to the gas network. The main reasons for wanting to stay connected were: liking the way their gas appliances worked; not seeing major benefits in disconnecting; seeing gas as good value for money; and, that it would be too expensive to switch to electric appliances.
- [GW] Customers participating in workshops indicated they are more seriously considering disconnection than our survey respondents. The main reasons include: concern for the environment; and, gas connections being uneconomical if people only have one or two gas appliances (particularly if they do not have gas heating).
- [GW] They do expect gas costs to increase as there is a widely held perception that gas supplies are running out, due to Australia's gas reserves being shipped offshore and/or

government restrictions on gas projects impacting Australian supplies.

- [GW] A considerable number of customers reported, unprompted, feeling like state and local governments are pressuring homes and businesses to move away from gas. Customers gave specific examples illustrating this sentiment. Note that these actions are perceived by customers to be occurring (but may or may not be what is happening in practice). Examples cited include:
 - local governments dissuading or prohibiting new properties from connecting to the gas network.
 - mandating gas appliance checks in rental properties (to provide a financial disincentive for landlords to retain a gas connection in rental properties).
 - publicly supporting the electricity industry and talking extensively about the role of electricity and electric appliances in the future, but being silent on or speaking negatively about gas.
 - producing campaigns around efficient electricity usage and new electricity technologies but not doing the same for gas. Education campaigns for gas are limited to safety.
 - governments subsidising or investing in electricity technologies such as solar, batteries and large-scale infrastructure but not doing the same for gas. Customers questioned why renewable gas projects and appliances are not being similarly supported by state and local governments.
- [GW & SS] There are many customers who have, or feel like they have, very limited options for the role gas will play in their household or business in the future due to:
 - the costs involved in switching appliances or installing distributed energy resources such as solar and batteries, and/or
 - renting their home or business premises. Typically, renters do not have a say on what appliances are

installed at the property and how they are maintained.

Hydrogen blending:

- [SS] There is a considerable amount of uncertainty or ambivalence among customers faced with the prospect of hydrogen blending. Almost two in three customers say they “Don’t know” how they would feel about it or they would feel “Neither comfortable nor uncomfortable”.
- [GW] Workshop participants back up this finding. There is very low awareness of (but keen interest in) renewable gases. Customers have been questioning whether renewable gases are economical (compared to renewable electricity sources) and how fast these might be deployed.

Priorities for gas infrastructure:

- [SS] According to customers’ ranking of priorities, ‘lowering costs’ should be AusNet’s top focus. AusNet ‘having a positive impact on the environment’, and ‘preparing the network for a low carbon future’ are also seen as high or medium priorities by a large number of customers, ranking fourth and fifth.
- [GW] Workshop participants have put decarbonisation and affordability as their highest priorities. They are also very interested in safety and education. There is general support for renewable gas and customers have indicated that they would be willing to pay more for a renewable gas product. Customers are very satisfied with current reliability.

Interconnection between gas and electricity systems require careful consideration and planning

The pathways for decarbonising gas and electricity are connected due to the creation of additional electricity demand from gas decarbonisation (for clean hydrogen production and from electrification of gas loads) and because the electricity sector transition to renewables, at least in the near term, is dependent on gas for peaking generation.

The Interim Report does not adequately consider the interconnected challenges of gas and electricity decarbonisation in Victoria. This is largely due to simplifying assumptions made in the scenario analysis that do not reflect important elements of the Victorian energy landscape.

As an owner of both gas and electricity networks in Victoria, AusNet is alert to the challenges of the electricity transition, and of the ways in which these challenges could be stressed further by decarbonisation pathways that rapidly drive load from gas to electricity systems.

It is critical that the pathway for Victorian decarbonisation maintains energy security of both the electricity and gas systems, and considers the best outcome for overall costs to customers for both systems.

Electricity system is undergoing its own transition

Victoria's electricity sector has historically been highly emissions intensive. Today, while the transition to renewable electricity has commenced, and the pathway to decarbonise is relatively clear, grid-supplied electricity remains more emissions intensive than gas.

Decarbonisation of Victoria's electricity system involves its own multi-faceted infrastructure challenge:

- Building new generation to replace emissions-intensive electricity sources (especially large brown-coal power stations);
- Building the transmission network to connect this new generation to customers and increase interconnection with other States;
- Meeting growth in electricity demand that is expected to occur from electrification of other sectors, such as the shift to electric vehicles; and
- Meeting technological challenges of changes in generation mix (e.g. ensuring technical attributes of electricity supply such as system strength; and, integration of huge volumes of distributed generation).

For each of these elements the difficulty and cost will increase as the timeframe for delivery is compressed, but there are also some key thresholds due to existing capacity constraints and the lumpy nature of large infrastructure projects (e.g. the retirement of large power stations; the commissioning of new transmission developments and interconnectors).

The retirement or decommissioning of existing generation assets is not considered in Infrastructure Victoria's scenario analysis, which means that the total capacity of renewable electricity required is understated. Coal power station closures are planned and are necessary to meeting Victoria's interim emission reduction targets.

Electricity system capacity to handle load switching from gas

Approximately 69% of Victoria's domestic energy consumption is from natural gas. The current electricity system could not meet that load today, particularly during winter months when the significant gas peak load is more than two times the electricity peak load. Enormous levels of

investment would be needed if full electrification were to occur and may not be practically achievable to meet winter peaks. Even incremental electrification is expected to have a material impact on the electricity system.

Understanding the shape of load being transferred to the electricity system will be important to determining the capacity to meet that load with existing electricity infrastructure or the timeframe required to deliver upgrades in capacity across generation, transmission and distribution. Some observations on what we know about household gas demand:

- We do not have the same level of data on how gas is used that we have for electricity, as we do not have smart meters that can provide interval data about the time of day that individual customer gas usage occurs. However, space heating, water heating and cooking as the major residential uses for gas, and our overall network data shows the usage profile peaks at 8am and then again between 6pm and 9pm.
- Expect heavily winter-focused load – space heating is associated with a large and steady load through colder months.
 - Electricity consumption is also seasonal. Households consume more electricity in winter even though peak demand (ie. simultaneous use of energy) occurs on a small number of extremely hot summer days. In contrast, winter electricity use associated with heating is relatively steady across the winter.
 - The difference between winter-peaking and summer-peaking demand is important to consider in relation to the consequences if there are capacity constraints in the electricity system. Any difficulty in meeting winter peak demand (e.g. due to distribution capacity, transmission capacity, or a shortfall in generation) would endure over an extended period, as there would be many more events of peak, or near-peak demand once the system is winter peaking.
 - Assets that can meet peak loads for a small number of peak events, would be stressed by repeated daily winter peaks. As utilisation of the distribution network increases, risks of loadshedding due to unplanned outages could increase to a point that drives additional investment to remain within reliability risk tolerances.
- Gas load is relatively inflexible – Loads from heating and cooking are not very flexible in terms of timing, with most customers heating and cooking behaviour determined by their lifestyle including daily commitments such as work, education and caring. Customers expect to be able to use energy when they need it.

The concept of capacity needs to be considered from multiple angles of the electricity supply chain.

Electricity generation

- Capacity –
 - The initial phase of the electricity transition has been occurring in a period of low growth in total electricity demand as energy efficiency has been largely balanced with population growth. However, electrification (e.g. electric vehicles) is expected to drive growth in demand for electricity which will increase the capacity of new generation that needs to be built.
 - Electricity supply (from generation or storage) also needs to be available at the times when customers want to use it, both in terms of season and time of day. Solar, especially distributed solar PV is playing a big role in electricity transformation but may not be available (without the addition of batteries or other storage) at the times when most gas is being used (i.e. winter mornings and evenings).

- Emissions intensity – natural gas remains lower emission than grid supplied electricity, so if electrification occurs in the near term, the new load should be met by new renewable generation.
- Use of gas for peaking - Rapid electrification or growth in electricity demand, would likely increase demand for gas-fired power generation, leading to mixed overall impact on gas usage.

Electricity transmission

- Capacity – Transmission capacity issues are similar to the issues for generation, but specific planning needs to occur to account for the long lead times involved in adding transmission capacity, and for critical milestones such as closure of existing coal generation and timing of new interconnector capacity becoming available.

Electricity distribution

- Electricity distribution networks have been built around planning assumptions regarding the peak amount of demand that is assumed to occur from a group of households and businesses, accounting for typical variations in customer needs and behaviour. Electrification of some gas load, in addition to new loads from other sectors such as transport would test the validity of these assumptions.
- If required, augmentation of existing areas of distribution network to meet increased household demand would be very costly, especially in areas with underground electricity supply.

In addition to recognising that the cost of full electrification is likely to be very high, the pace of change will be a key factor in whether the electricity system is ready to handle any additional load switching from gas. The electricity system risks associated with going too fast, together with the lower emissions intensity of gas relative to current electricity supply, suggest the near-term focus should be on accelerating actions to establish the feasibility of the different pathways, and planning to support their efficient achievement while retaining customer choice.

Further expansion of gas infrastructure and stranded asset risks

The Interim Report includes a number of statements regarding the risk of stranded assets in the gas sector, particularly in relation to future expansion of gas networks.

From an infrastructure perspective, the greater concern is expanding a gas network to new developments which may become stranded before the end of its useful life of several decades unless they can be built or retrofitted to accommodate low carbon gases. New connections to existing gas infrastructure present less risk. However, both embed gas use and emissions if there is no conversion plan. (p.39)

And,

All future infrastructure and network investment decisions should be tested for compatibility with pathways to net zero. (p.44)

As noted above, AusNet does not believe the analysis supports a halt on distribution network expansion at this point in time. Indeed, continued customer connections can lower prices for all customers as the recovery of existing investment is shared across a greater number of customers. However, there is likely a need to consider whether the current connection charging regime is appropriate given the uncertainty over the future of gas.

There are several factors which continue to drive the need for gas distribution network investment. While customers continue to access gas via these networks, much of this investment is unavoidable (such as safety related maintenance). Other expenditure drivers that are related to regulatory obligations and frameworks, may benefit from additional flexibility to respond to uncertainty around the gas decarbonisation pathway.

For instance, the Victorian Gas Distribution Code requires gas distributors to provide connection offers to customers who are located within 1km of the existing gas network, and sets out requirements for setting connection charges, including fixed assumptions (e.g. assumed period of connection) used to calculate connection charges. The requirement to provide connection offers is not problematic, however greater flexibility in the underlying assumptions in setting connection charges may be warranted in light of any technology, policy or behavioural changes that occur in coming years.

Similarly, for regulated gas networks, the depreciation profile of assets is a key tool for managing the stranded asset risk of these assets. The useful life and depreciation profile, which must be approved by the Australian Energy Regulator (AER), determine the period over which the cost of investment is recovered and could potentially be shaped to match projected changes in network utilisation over time. The AER will shortly consult on appropriate regulatory responses to changes in policy around the future of gas.

Hydrogen development and other actions AusNet is supporting to reduce emissions associated with our gas network

Hydrogen readiness

AusNet is working together with industry to identify opportunities to reduce emissions from gas.

AusNet is a founding member of the Australian Hydrogen Centre (AHC), an ARENA-backed initiative between energy businesses and the Victorian and South Australian governments, exploring the feasibility of hydrogen and hydrogen blending in gas distribution networks.

The AHC work program consists of studies looking at the feasibility of:

- blending 10% renewable hydrogen in a regional gas distribution network;
- blending 10% renewable hydrogen across Victorian and South Australian distribution networks; and,
- the transition to 100% hydrogen across the Victorian and South Australian distribution networks.

The work includes a comprehensive assessment of various relevant topics such as the challenges for building clean hydrogen production facilities, injecting and distributing hydrogen through the gas distribution system, current regulatory framework and potential changes that may be required, consumer appliance considerations, and economic assessment.

The feasibility study is also exploring options for developing avenues for off takers (e.g. automobile or industrial users) in order to achieve economies of scale and consequent efficiencies.

Through the AHC, AusNet is undertaking a detailed feasibility study into blending of 10% clean hydrogen into the gas distribution system, to partially decarbonise gas networks.

The compatibility of existing gas distribution network infrastructure with hydrogen delivery is not well dealt with in the Interim Report and supporting Scenarios report from Doris Engineering.

Energy Networks Australia (of which AusNet is a member) commissioned GPA Engineering to perform a technical review of the Interim Report¹. GPA highlight that the Interim Report rarely distinguishes between the different categories of gas infrastructure, leading to sweeping conclusions being made about the further usability of Victoria’s gas infrastructure, and that this is particularly the case for the hydrogen-compatibility of distribution infrastructure.

The Interim Report asserts that there is limited capability to use existing gas networks for hydrogen due to the potential for hydrogen embrittlement. However, due to lower operating pressures and the predominance of plastic pipes in the distribution network, this is not expected to be the case. Existing pipe materials are expected to be compatible, and compatibility of other asset categories is still subject to research.

Infrastructure Victoria have flagged the inclusion of an Asset Life Review as an element of the next round of technical work “to understand the condition and capacity of Victoria’s existing gas infrastructure and assess potential pathways to upgrade and/or decommission”. This analysis must consider the different infrastructure categories across the supply chain, and consult with owners of Victorian gas infrastructure to understand local asset characteristics.

Future Fuels Research

AusNet is also an active member of the Future Fuels Cooperative Research Centre (FFCRC), an industry focused Research, Development and Demonstration (RD&D) partnership enabling the decarbonisation of Australia’s energy networks. AusNet staff are involved in all three research programs of the FFCRC and act as steering committee members and industry advisors on a number of projects.

Fugitive emissions

Replacement of low-pressure mains has a dual benefit of readying the network for hydrogen and reducing fugitive emissions. AusNet has been replacing old low and medium pressure pipes for an extended period, and will complete the low pressure replacement program by 2028 pending funding approval in the upcoming Access Arrangement.

The benchmark for Unaccounted for Gas (UAFG) is set by the Essential Services Commission (ESC) for the five-year regulatory period, 2018–2022. AusNet has consistently outperformed the benchmark set by the ESC for UAFG on its Declared Transmission System network that makes up 97% of the overall AusNet network.

What is needed from Victoria’s Gas Substitution Roadmap?

As noted in the Interim Report, Infrastructure Victoria’s final advice on gas infrastructure is intended to inform the Victorian Government’s Gas Substitution Roadmap.

Importance and role of Victoria’s Gas Substitution Roadmap

AusNet welcomes the Victorian Government’s work to develop a Gas Substitution Roadmap for Victoria.

¹ The GPA Engineering report is provided as an attachment to Energy Networks Australia’s submission.

There is uncertainty regarding the long-term decarbonisation pathway for gas. This uncertainty relates to both technology outcomes (what will be the lowest cost, or more preferred technology mix) and policy interventions (will government promote a given pathway through its policy actions? Will policies preclude certain pathways? – e.g. ACT ban on gas connections).

From a gas network perspective, the different pathways (electrification and renewable hydrogen) involve significant change and have different investment requirements.

Network investment is subject to economic regulation by the Australian Energy Regulator, with plans reviewed and prices set on a five-yearly basis. As noted earlier, gas distribution networks are currently engaging with our stakeholders to inform the development of our proposals for the 1 July 2023-30 June 2028, including identifying prudent, least-regrets actions we should be taking now to keep options open for customers in the face of uncertainty. AusNet is intending to publish a Draft Proposal for consultation in January 2022, and the final proposal is due to the AER on 1 July 2022. Policy directions set out in the Roadmap have the potential to significantly affect key gas developments in the 2023 to 2028 period.

From a customer perspective, there are also significant changes (such as changes in appliances and behaviours) likely to be involved in gas decarbonisation. The need for action from such a widespread population is another reason that government policy has an important role.

From an investor perspective, following considerable action to embed Environment, Social and Governance (ESG) principles in portfolio management, many are demanding actions from gas network owners and operators to actively support a long-term decarbonisation pathway for gas, but are also seeking some form of certainty, both from a political and regulatory lens, to commit to the sector.

Finally, the scale of gas consumption in Victoria means that a successful decarbonisation plan will require careful planning. For instance:

- Understanding the achievable timescale for gas users to switch appliances (e.g. to hydrogen compatible or electricity) and the policy levers that are needed.
- Infrastructure planning for hydrogen (e.g. readiness of distribution, transmission, metering) and the incremental steps that are required.
- Electricity system readiness and capability to meet new load requirements, linked to the forecast timeframe of load switching (this may require significant lead times to construct new transmission and generation or to upgrade local distribution network).

Policy directions

AusNet agrees with the sentiment expressed in the Interim Report that the best pathway to net-zero emissions is likely to occur through a combination of technologies and actions.

We support a least-regrets approach. AusNet believes that in the near-term this involves retaining optionality and choice for gas customers.

It is possible for the Roadmap to provide policy direction, without closing off pathways.

Specific policy observations:

- Many Victorians derive significant value from the gas that they use. To the degree that the alternatives are not perfect substitutes for natural gas, such as differences between cooking methods with gas and electricity, it is important that Victorian gas policy recognises the loss of value that customers experience if they no longer have the option to choose gas appliances. This is in addition to consideration of the explicit customer costs such as from changes in fuel cost, and the cost of new appliances.

- There are significant risks and costs if there is a fast transition to electrification of gas loads. For this reason, policy measures to encourage electrification need to be tested for their impact on electricity demand and the capability and capacity of the electricity system at all levels (electricity distribution, transmission, and generation) to meet those needs. It may be necessary to moderate electrification to ensure that the electricity network can cope with new demand.
- The uncertainty regarding what will be the dominant pathway to decarbonisation may suppress investment and planning needed for each pathway to succeed. Government should consider how it can either directly fund or de-risk such investment.
- Recognition is needed of the technical requirements for maintaining a safe gas network, and how this will impact the planning requirements for gas substitution. The safety and maintenance requirements of a network with substantially lower utilisation are the same as for current levels of utilisation. This has affordability and equity implications for customers who remain on the network because the relatively fixed networks costs need to be recovered from a smaller number of customers (or from a smaller volume of delivered gas). Under pathways with lower gas network utilisation, depreciation schedules (i.e. how rapidly the costs of existing network investment are recovered through annual gas network charges) have a role to play in managing affordability.