



16 August 2021

## **Submission: Towards 2050: Gas infrastructure in a zero emissions economy interim report consultation**

The Australian Pipelines and Gas Association (APGA) represents the owners, operators, designers, constructors and service providers of Australia's pipeline infrastructure, with a focus on high-pressure gas transmission. APGA's members build, own and operate the gas transmission infrastructure connecting the disparate gas supply basins and demand centres of Australia, offering a wide range of services to gas producers, retailers and users.

APGA welcomes the opportunity to contribute to the Towards 2050: Gas infrastructure in a zero emissions economy interim report (the **Interim Report**) consultation (the **Consultation**).

APGA supports the goals set out in the Paris Climate Agreement, alongside stable energy policy driving towards a technology-neutral, decarbonised future, in which the gas industry can plan a key role. APGA's vision is founded on the position detailed in the Gas Vision 2050 series of reports and is being progressed through the leading-edge research and development undertaken by the Future Fuels CRC. Our vision is a strong and vibrant gas infrastructure industry supplying renewable gases to the residents and businesses of Victoria.

APGA contends that renewable gases such as hydrogen and biogas playing a critical role in decarbonising energy in homes, buildings, industry, transport and electricity generation in the future energy mix. APGA has sought to support this future as the largest industry contributor to the \$30M, 80+ research project strong Future Fuels CRC, as well as the facilitation of industry-based research and analysis of the decarbonisation of gas demand.

APGA is not alone in this view. In its May 2021 report, *Net Zero by 2050 A Roadmap for the Global Energy Sector*, the International Energy Agency (IEA) forecasts that renewable gases will account for 13 per cent of global energy demand in 2050. APGA notes that the IEA also forecasts natural gas will provide 6.5 per cent of global energy demand in 2050. This is an expanded collective contribution for gaseous energy above the 14 per cent of global energy demand that natural gas provides today<sup>1</sup>.

The IEA forecasts the role of renewable gas will need to be even greater in a net zero 2050 if widescale deployment of carbon capture and storage technology is not achieved.

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<sup>1</sup> These figures do not include the contribution of gas power generation to electricity supply in 2050

APGA notes that AEMO's *2021 Inputs, Assumptions and Scenarios Report* puts forward that net-zero emissions will be achieved earliest, and with the greatest economic growth, in its Hydrogen Superpower scenario. This is a further excellent indication of the potential of renewable gas.

APGA is concerned that Infrastructure Victoria has incorrectly interpreted information about renewable gases and has incorrectly interpreted the conclusions of the associated technical report. In our view, information interpretation risk should be mitigated through greater engagement with the gas industry. APGA and its members are very happy to share information and continue the discussion with Infrastructure Victoria.

APGA questions the Doris Engineering report Scenario Weighting which ranks environmental and technical impacts of gas decarbonisation above safety, economic and social impacts. Rather than considering these seemingly random factors, APGA recommends the application of the energy trilemma factors of energy affordability, energy reliability and energy security which are notably considered to have equal weighting by the CSIRO<sup>2</sup>.

APGA recommends that Infrastructure Victoria analyse the Hybrid Scenario raised by its expert consultant, as well as the scenarios which the Victorian Government Department of Environment, Land, Water and Planning (**DELWP**) identify within the Victorian Gas Substitution Roadmap (VGSR). APGA proposes that recommendations which seek to enable all decarbonisation technologies will enable the best possible outcomes for the State of Victoria

APGA refers Infrastructure Victoria to its submission to the Victoria Gas Substitution Roadmap lodged on 6 August 2021 which explores the possibility of gas demand decarbonisation through six potential decarbonisation pathways in more detail (Attached)<sup>3</sup>.

To discuss any of the above feedback further, please contact APGA's National Policy Manager, Jordan McCollum, on [REDACTED]

Yours Sincerely,



JORDAN MCCOLLUM  
National Policy Manager

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<sup>2</sup> The energy trilemma – what matters the most to consumers?, CSIRO 2019  
<https://www.csiro.au/-/media/EF/Files/Energise-insights/Insight-40-Energy-Trilemma.pdf>

<sup>3</sup> Submission to the Victorian Gas Substitution Roadmap Consultation Paper, Australian Pipeline and Gas Association 2021  
[https://www.apga.org.au/sites/default/files/uploaded-content/field\\_f\\_content\\_file/210806\\_apga\\_submission\\_to\\_the\\_victorian\\_gas\\_substitution\\_roadmap\\_consultation\\_paper.pdf](https://www.apga.org.au/sites/default/files/uploaded-content/field_f_content_file/210806_apga_submission_to_the_victorian_gas_substitution_roadmap_consultation_paper.pdf)

## Expansion on APGA statements about purpose, key concerns, and a path forward

### Purpose

Getting gas decarbonisation right is important. The Interim Report notes that *the changes required to Victoria's energy sector, including gas, will have significant implications for consumers*. DELWP goes one step further in its VGSR Consultation Paper:

*“To maintain a strong and prosperous economy and protect the interests of Victorian consumers, we must maintain energy affordability, security, reliability and safety while progressively decarbonising our gas sector”<sup>4</sup>*

To this point, APGA identifies in its submission to the VGSR Consultation Paper:

*“The best possible outcome for Victorian households and businesses is the lowest cost most reliable energy system that delivers net zero emissions by 2050*

*“The technical and societal changes required for Victoria's equitable transition to a net-zero emissions future will be extensive and challenging. The potential impacts on people and their livelihoods means the energy transition must be about more than just a battle between different energy providers. The energy trilemma in part holds the key to achieving this end.”<sup>4</sup>*

This is why getting gas decarbonisation right is so important – energy decarbonisation is not simple and will impact the citizens and businesses of Victoria. Valuing this best possible outcome for Victorian households and businesses, APGA notes the level of rigor with which DELWP has approached the VGSR and commends the department on its approach to date.

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<sup>4</sup> Help Build Victoria's Gas Substitution Roadmap Consultation Paper, Victorian Government Department of Environment, Land, Water and Planning 2021  
[https://s3.ap-southeast-2.amazonaws.com/hdp.au.prod.app.vic-engage.files/1716/2544/4975/Victorias\\_Gas\\_Substitution\\_Roadmap\\_Consultation\\_Paper.pdf](https://s3.ap-southeast-2.amazonaws.com/hdp.au.prod.app.vic-engage.files/1716/2544/4975/Victorias_Gas_Substitution_Roadmap_Consultation_Paper.pdf)

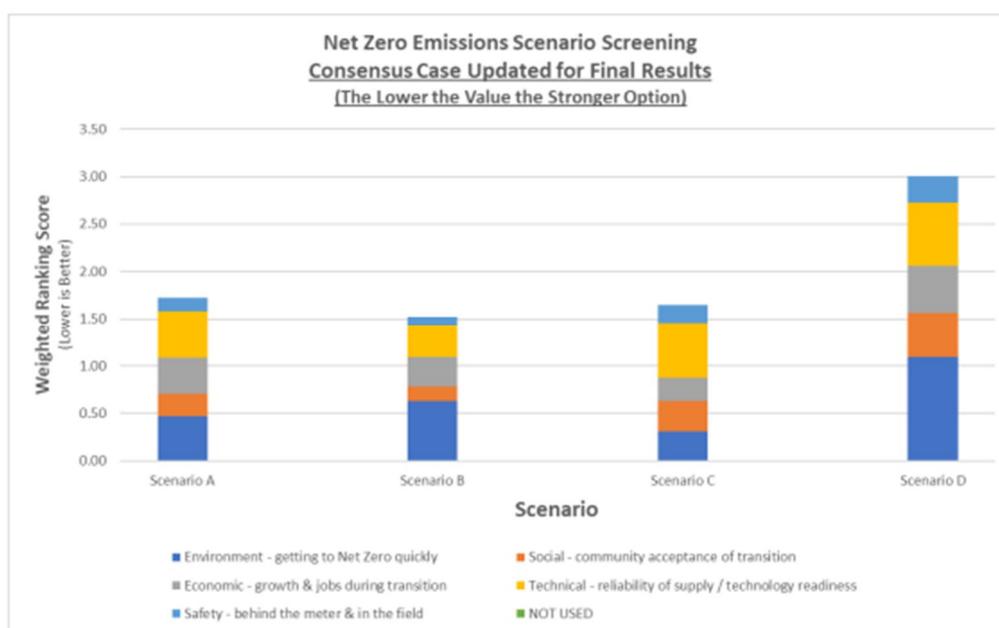
## Key Concerns

APGA has identified key concerns in both the Interim Report and the supporting Net Zero Emission Scenario Analysis Study Report (the **Doris Report**)<sup>5</sup>.

Scenario C (green and blue Hydrogen with offsets / electrification / no natural gas (in 2050) / no CCS) from the Doris Report results in:

- The shortest time to net zero emissions
- The lowest cost of achieving net zero
- The opportunity to develop a hydrogen export industry by 2050
- The lowest absolute carbon emissions
- The second highest potential jobs creation
- The most efficient infrastructure spending through<sup>6,7</sup>
  - The second highest amount of hydrogen infrastructure upgrades<sup>6,7</sup>
  - The second lowest amount of electrical infrastructure upgrades<sup>6,7</sup>

Despite this, it is not identified as the strongest option in the Doris Report Net Zero Emissions Scenario Screening. This raises concerns with APGA. How does the scenario with the above attributes not result in the strongest final ranking among all scenarios?



**Figure 1: Net Zero Emissions Scenario Screening Outcome**<sup>5</sup>

<sup>5</sup> Net Zero Emission Scenario Analysis Study Report, Doris Engineering 2021

<https://www.infrastructurevictoria.com.au/wp-content/uploads/2021/07/DORIS-Gas-Infrastructure-Advice-Scenario-Analysis-I-Study-Report.pdf>

<sup>6</sup> APGA note in relation to the final two points that new hydrogen infrastructure and existing gas infrastructure repurposed for hydrogen use are anticipated to be substantially lower cost than new electricity infrastructure<sup>7</sup>. APGA also notes that existing gas infrastructure which Infrastructure Victoria proposes will be “demolished” has significant potential to be repurposed<sup>7</sup>.

<sup>7</sup> Analysing future demand, supply and transport of hydrogen, European Hydrogen Backbone 2021 [https://gasforclimate2050.eu/?smd\\_process\\_download=1&download\\_id=718](https://gasforclimate2050.eu/?smd_process_download=1&download_id=718)

APGA notes mention of a “hybrid scenario” identified by Doris Engineering. Doris notes in their report that this hybrid scenario *may deliver improvements over the base scenarios*, but that *analysis of the “hybrid scenario” was beyond the scope of the study*.

This reinforces APGA’s perspective that recommendations contained in the Interim Report are based on an incomplete set of scenarios.

### Scenario Ranking

One of the two factors combined to deliver the Net Zero Emissions Scenario Screening outcome was the Scenario Ranking. In review of the Scenario Ranking in the Doris Report, two sources of concern are identified. Firstly, through examination of both the Ranking Logic Statements in Table 104 and the Scenario Risks and Opportunities in Appendix 2, it becomes clear that most information referenced is related to the electricity industry. APGA considers the Scenario Ranking is poorly informed and will explore that in detail in this submission.

A second source of concern are instances in which important differences between remaining scenarios are obscured by the magnitude of individual scenario factors. An example of this is seen in the CAPEX ranking, for which the unrealistic CAPEX requirements of Scenario D drown out the CAPEX differences across all other scenarios. This is of key importance as APGA anticipates the CAPEX requirements of electrification heavy scenarios to be significantly higher than that of renewable gas uptake. This is evidenced extensively through APGA’s submission to the VGSR<sup>3</sup>.

### Scenario Weighting

One of the two factors combined to deliver the Net Zero Emissions Scenario Screening outcome was the Scenario Weighting. Within the Doris Engineering report *Table 17: Consensus Weightings used for Screening Parameters*, environmental and technical impacts of gas decarbonisation are weighted above safety, economic and social impacts.

*Table 17: Consensus Weightings used for Screening Parameters*

	Consensus Weightings
Environment - getting to Net Zero quickly	100
Social - community acceptance of transition	50
Economic - growth & jobs during transition	60
Technical - reliability of supply / technology readiness	80
Safety - behind the meter & in the field	30
NOT USED	0

**Figure 2: Consensus Weightings used for Scenario Screening**<sup>5</sup>

Rather than considering these randomly chosen factors, APGA recommends the application of the energy trilemma factors of energy affordability, energy reliability and energy security which are notably considered to have equal weighting<sup>2</sup>.

APGA is unsure of the basis of the Scenario Weighting. The only source referenced as a basis for weighing social, economic and safety impacts as less important than environmental and technical impacts were the Minutes of a meeting which are not publicly available.

The idea that the safety of the energy industry is the least important parameter bears no relation to the reality of the extensive safety regulations and requirements present across all aspects of the energy industry. Similarly, the past decade of focus on energy affordability, and the resultant social impacts on Australia's least fortunate, leave APGA questioning their relatively low ranking<sup>8</sup>.

### **Case study – United Kingdom: Future Homes Standard to improve residential energy efficiency**

The case study on Page 19 of the Interim Report states that:

*“No new homes will be able to connect to the gas network from 2025. Gas boilers and other fossil fuel heating systems are banned. Instead, homes will be equipped with energy efficient insulation and heated by low carbon heating such as air source heat pumps.”*

Based on the reference provided, this is not the case. Neither the Infrastructure Victoria reference nor any information which APGA was able to find supports the above statement.

There is notable reference to a transition to low-carbon heat, low-carbon sources and low-carbon fuel choices within the resource referenced by the Interim Report. The resource referenced by the Interim Report instead identifies that:

*“Of the technologies suggested as playing a role in the Future Homes Standard, the greatest support was shown for; solar panels; green gas such as hydrogen and biomethane; and mechanical ventilation with heat recovery.”*<sup>9</sup>

This case study is presented alongside Infrastructure Victoria comparisons of gas use in Victorian to the international jurisdictions of the United Kingdom and Netherlands. By doing so, the Interim Report implies that internationally relevant jurisdictions which are advanced in gas use decarbonisation are not considering renewable gases as potential decarbonisation pathways. This is not supported by the referenced material for this case study.

APGA is concerned that this unsubstantiated claim influences the narrative that 80 per cent to 100 per cent of existing gas infrastructure needs to be demolished in the Interim Report and associated technical reports.

APGA proposes that Infrastructure Victoria's interpretation of this information does not reflect international momentum towards renewable gases, and proposes that it consider the following as indicative of the broad body of evidence displaying thriving renewable gas industry development internationally:

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<sup>8</sup> Energy Website, St Vincent de Paul Society 2021

[https://www.vinnies.org.au/page/Our\\_Impact/Incomes\\_Support\\_Cost\\_of\\_Living/Energy/](https://www.vinnies.org.au/page/Our_Impact/Incomes_Support_Cost_of_Living/Energy/)

<sup>9</sup> The Future Homes Standard: 2019 Consultation, Ministry of Housing, Communities & Local Government, HM Government United Kingdom 2021

[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/956094/Government\\_response\\_to\\_Future\\_Homes\\_Standard\\_consultation.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/956094/Government_response_to_Future_Homes_Standard_consultation.pdf)

- The European Hydrogen Backbone  
Collaboration between the majority of European countries and gas infrastructure providers to develop a hydrogen transmission backbone to enable European gas use decarbonisation<sup>10</sup>.
- The United Kingdom Hydrogen Strategy  
The UK Government is in the process of developing its own hydrogen strategy, identifying in a government white paper that it is already pioneering hydrogen heating trials<sup>11,12</sup>.
- The Netherlands Natural Gas Pipeline to Hydrogen Conversion  
Netherlands gas infrastructure company Gasunie has brought into operation a repurposed gas transport pipeline which has been modified for hydrogen transport. This is one of a number of international projects proving that existing gas pipelines can be commercial repurposed for hydrogen service<sup>13</sup>. This was achieved in 2018.

APGA expects that the recognition of renewable gases being developed internationally for the purposes of gas use decarbonisation may alter Infrastructure Victoria's perspective on the potential for a renewable gas industry in Victoria.

### Electrification of gas demand results in 40 per cent increase in electricity demand

Infrastructure Victoria references the Grattan Institute's report *Flame out: The future of natural gas* when identifying that *Peak electricity demand ... could increase by an estimated 40 per cent compared with current summer peak demand* through the electrification of gas demand<sup>14</sup>.

**APGA notes that the 40 per cent figure proposed by The Grattan Institute relates to the electrification of gas demand for small, distribution-connected customers only<sup>14</sup>.**

With peak gas demand being 262 per cent of electricity peak demand, APGA expects the impact of gas demand electrification to be significantly higher, as is explored further in its submission to the VGSR consultation paper<sup>3</sup>.

APGA also cannot identify within the Doris Report scenarios any consideration for electricity distribution infrastructure upgrades required to deliver significantly greater electricity capacity to Victorian households and businesses, as opposed to upgrades to electricity transmission infrastructure which are included.

<sup>10</sup> European Hydrogen Backbone, Gas for Climate  
<https://gasforclimate2050.eu/ehb/>

<sup>11</sup> UK Hydrogen Economy, House of Commons Library 2020  
<https://researchbriefings.files.parliament.uk/documents/CDP-2020-0172/CDP-2020-0172.pdf>

<sup>12</sup> Powering our Net Zero Future, HM Government United Kingdom 2020  
[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/945899/201216\\_BEIS\\_EWP\\_Command\\_Paper\\_Accessible.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/945899/201216_BEIS_EWP_Command_Paper_Accessible.pdf)

<sup>13</sup> Gasunie hydrogen pipeline from Dow to Yara brought into operation, Gasunie 2018  
<https://www.gasunie.nl/en/news/gasunie-hydrogen-pipeline-from-dow-to-yara-brought-into-operation>

<sup>14</sup> Flame out: The future of natural gas, The Grattan Institute 2020  
<https://grattan.edu.au/wp-content/uploads/2020/11/Flame-out-Grattan-report.pdf>

## Rapid transition of energy infrastructure

APGA notes a number of instances where the Interim Report and associated technical reports propose energy infrastructure transition which do not align with reasonable transition expectations. Examples of these include:

- Scenarios A through C anticipate that between 6,200 and 7,100 kilometres of power lines will be able to be installed before 2030 (P55 of Doris Report);
- Scenarios B through D anticipate that 20 per cent to 90 per cent of gas distribution networks will be decommissioned by 2030 (P55 of Doris Report), most of which targets rural gas customers between Walla Walla, Wallan and Horsham; and
- Scenario B anticipates wind farm deployment covering approximately 6 per cent of Victoria's total land mass (P154 of Doris Report).

Historical electricity infrastructure deployment capability does not support the ability to deliver 6,200 to 7,100 kilometres of new electricity infrastructure across the coming decade. The expectation of 20 per cent to 90 per cent decommissioning of existing gas distribution infrastructure misses the ability to repurpose gas distribution infrastructure, as well as a percentage reduction in demand not directly correlating to a percentage reduction in need for infrastructure.

Targeting rural gas customers to lose their gas supply before city customers through early gas network decommissioning appears to miss the difference between city and rural energy challenges. With security of electricity supply known to be a greater issue in the regions, this proposition is in opposition to supporting rural Victorians through the energy transition. Similarly, it is challenging to perceive Victorian citizens accepting 6 per cent of Victorian landmass being covered by windfarms, especially rural Victorians.

Scenario parameters such as these undermine the validity of the scenarios considered by the Interim Report. This underlines the risk in basing decisions upon the scenarios analysed through this process.

## Technology Readiness and Risk

The Interim Report states that *the future of low or net zero emissions gases ... remains uncertain*, and *Victoria could support further research and development in these technologies*. This statement is indicative of a number of interpretations of technical maturity information for renewable gas technologies which are not aligned with the most up to date understandings about renewable gases. This interpretation persists despite the Doris Report identifying a list of key renewable gas technologies as technology readiness level 9 (**TRL9**) technologies – the definition of technologically maturity<sup>15</sup>.

The CSIRO Hydrogen RD&D Priorities publication identifies key foundational Hydrogen technologies which are at TRL9 alongside next generation technologies requiring research and development to achieve TRL9 in coming years<sup>15</sup>. The CSIRO paper identifies TRL9 hydrogen technologies including Alkaline and PEM electrolyzers, a plethora of fossil fuel conversion processes, biogas reforming, biomass gasification, as well as hydrogen

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<sup>15</sup> Hydrogen Research, Development and Demonstration Priorities and opportunities for Australia, CSIRO 2019  
<https://www.csiro.au/~media/Showcases/Hydrogen/HydrogenRDDFullReportWEB191129.pdf>

pipelines, compression, pressure vessels, cryogenic tanks, fuel cells and hydrogen internal combustion engines.

The Interim Report states that *There is currently no biomethane production plant operating in Australia*. However, this statement does not recognise the vast, commercially mature and actively growing international biomethane industry. Europe boasted 729 biomethane plants in 2020 spanning 18 countries, with 51 per cent of these facilities having been commissioned within two years of 2020<sup>16</sup>. The Australian gas industry is actively supporting biomethane development today, with Jemena having executed agreements to develop Australia's first of many potential biomethane facilities and the Future Fuels CRC conducting research on the few aspects of biomethane integration which are unique to the Australian context<sup>17</sup>.

This interpretation of renewable gas technologies is reflected in the scenario ranking logic statements, informed by the risk and opportunity matrix, within the Doris Report. Of the technical risks and opportunities considered when assessing gas use decarbonisation in Victoria, only 8 of the 22 parameters were about the renewable gas industry, with 14 of the 22 parameters relating to renewable electricity. This lack of renewable gas technology consideration skews the Interim Reports conclusions in favour of electrification.

Addressing this interpretation of the potential of renewable gas technologies becomes important considering the history of renewable energy technologies to date. Looking at the development timeline of renewable gases alongside that of renewable electricity, it appears that renewable gas technologies are at a similar level of maturity as solar PV in the mid 1990s, but growing at a faster pace<sup>18,19</sup>.

If the Victorian and Australian governments had interpreted renewable electricity potential on the same basis as the Interim Report interprets renewable gas potential, Australia may not have the renewable electricity industry it has today.

### **Propensity for rounding up**

The Interim Report and its underlying reports round up a number of important figures with relation to gaseous energy. Indicative of this are statements about gaseous energy emissions as a percentage of total Victorian emissions. This statistic is stated as 20 per cent in the webinar and 17 per cent in the Interim Report, both of which are misaligned with

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<sup>16</sup> The 'European Biomethane Map 2020' shows a 51% increase of biomethane plants in Europe in two years, European Biogas Association 2021

<https://www.europeanbiogas.eu/the-european-biomethane-map-2020-shows-a-51-increase-of-biomethane-plants-in-europe-in-two-years/>

<sup>17</sup> Malabar Biomethane Project, Jemena 2021

<https://jemena.com.au/about/innovation/malabar-biomethane-project>

<sup>18</sup> The History of Solar, US Department of Energy circa 2003

[https://www1.eere.energy.gov/solar/pdfs/solar\\_timeline.pdf](https://www1.eere.energy.gov/solar/pdfs/solar_timeline.pdf)

<sup>19</sup> Capacity of electrolyzers for hydrogen production by commissioning year and intended use of hydrogen, 2010-2020, International Energy Agency 2020

<https://www.iea.org/data-and-statistics/charts/capacity-of-electrolysers-for-hydrogen-production-by-commissioning-year-and-intended-use-of-hydrogen-2010-2020>

readily available DELWP data which states 15.8 per cent of Victorian emissions come from gaseous energy<sup>20,21</sup>.

The Interim Report also identifies natural gas combustion emissions intensity as 0.055 Mt CO<sub>2</sub>e/PJ, while the Australian Government identifies 0.05153 Mt per CO<sub>2</sub>e/PJ<sup>22</sup>. This could be the source of the Interim Report's difference in gaseous energy emissions, with the ratio of these two instances of rounding up being similar.

Throughout the Interim Report and its supporting technical reports, biogas and green hydrogen are identified as being low carbon pathways, rather than carbon neutral or zero carbon pathways. On a scope 1 basis, biogas and green hydrogen are carbon neutral, just as solar PV and wind generation are carbon neutral on a scope 1 basis. On a scope 1 and 2 basis, solar PV and wind generation, green hydrogen production and some biogas production are all marginally carbon intensive, while some biogas production is carbon negative.

APGA proposes that Infrastructure Victoria consistently refer to energy technologies as either low or zero carbon on the basis of either scope 1 or scope 1 and 2 emissions, rather than considering scope 1 for renewable electricity and scope 1 and 2 for renewable gas. If Infrastructure Victoria challenge the international consensus on scope 1 or scope 2 emissions of renewable gas technologies, this departure from global norms needs to be justified rather than stated as fact.

These are three examples of where the Interim Report and its technical reports fail to ensure the accuracy of their fundamental factual basis. More engagement with the incumbent gas industry could help ensure that the correct interpretation of the facts is used within the Final Report.

Noting the purpose of this exercise, APGA encourages Infrastructure Victoria to engage more with the gas industry to ensure the final report delivers the best possible gas decarbonisation outcome for the State of Victoria by being based on the best available factual information.

## Path Forward

In its role as independent advisor to the Victorian Government, Infrastructure Victoria has a responsibility to guide the Victorian Government towards the best-case gas decarbonisation outcome for Victorian households and businesses. APGA notes:

*“The best possible outcome for Victorian households and businesses is the lowest cost most reliable energy system that delivers net zero emissions by 2050”*

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<sup>20</sup> Towards 2050: Gas infrastructure in a net zero emissions economy – Interim report, Infrastructure Victoria 2021

<https://www.youtube.com/watch?v=Vo1kPdDE0GA>

<sup>21</sup> Go for Net Zero, The Grattan Institute 2021

<https://grattan.edu.au/wp-content/uploads/2021/04/Go-for-net-zero-Grattan-Report.pdf>

<sup>22</sup> National Greenhouse and Energy Reporting (Measurement) Determination 2008, Australian Government 2008

<https://www.legislation.gov.au/Details/F2020C00600>

In light of this responsibility and the concerns raised by APGA within this submission, it is hoped that Infrastructure Victoria will reconsider its interpretation of foundation information, level of industry engagement, inclusion of additional scenarios, and the appropriateness of metric weightings used in the course of identifying the best possible gas decarbonisation outcome for the State of Victoria.

Within the Interim Report, Infrastructure Victoria identifies its aim of *keeping Victoria's options open rather than locking in a single approach which may not turn out to be the best course of action*. APGA hopes that Infrastructure Victoria achieves this aim by not proposing any of the scenarios assessed to date be locked in as the path forward for Victoria.

## **Towards 2050: Gas infrastructure in a zero emissions economy interim report Question Response**

Infrastructure Victoria has sought information from stakeholders on the following questions.

### **Do you have any further information, evidence or concerns that you wish to raise in relation to the scenario design and analysis?**

APGA's primary concern is that the information, evidence and methods used to develop the Interim Report are not consistent with delivering the best possible gas decarbonisation outcome for Victorian households and businesses.

Infrastructure Victoria is invited to consider the information and evidence contained within the APGA submission to the VGSR consultation paper<sup>3</sup>. APGA also recommends that Infrastructure Victoria considers the methods used by DELWP through its VGSR development process<sup>4</sup>.

### **Do you have any further information or evidence that can help identify an optimum scenario for a net zero emissions gas sector in 2050?**

Infrastructure Victoria is invited to consider the information and evidence contained within the APGA submission to the VGSR consultation paper<sup>3</sup>.

### **What policies and/or regulations, if any, are needed to support the development of low carbon pathways such as biogas, green hydrogen, and carbon capture and storage?**

As a minimum APGA proposes policies and/or regulations which take a technology neutral approach to emissions reduction. This means to ensure policies and/or regulations, established both in the past and in the future, do not discriminate against emission reduction opportunities on the basis of the form of the emission reduction technology. All emissions reduction should be considered on the basis of emissions reduction efficacy, rather than preference for how emissions reduction occurs.

If the State of Victoria wishes to enhance the uptake of renewable gases rather than simply enabling access to Victorian households and businesses, the State could look to its track record of delivering support for the uptake of renewable electricity and replicate some of these initiatives in support of renewable gases.

### **What is your view on the best ways to maintain the reliability and affordability of Victoria's gas supply if natural gas use declines?**

APGA proposes the best way to maintain the reliability and affordability of Victoria's gas supply if natural gas use declines is to transition from natural gas to renewable gases. By both repurposing existing gas infrastructure, and/or developing new gas infrastructure at lower cost than new electricity infrastructure, the replacement of natural gas use with renewable gas use is the lower cost option, especially in comparison with electrification.

Much of this is demonstrated through the side by side comparison of Victoria's existing electricity and gas infrastructure included within APGA's submission to the VGSR consultation paper.

Table 1 and Table 2 demonstrate that Victoria’s gas supply chain:

- Supplies 56 per cent more energy than electricity infrastructure in Victoria
- While absorbing peak demand around 2.6 times larger than the Victorian NEM
- Through an asset base one third of the value of electricity infrastructure
- Which costs Victorian households and businesses 75 per cent less than electricity infrastructure
- Contributing 65 per cent less emissions than the Victorian electricity sector.

**Table 1: Scale and Context of Victorian Gas Decarbonisation Opportunity<sup>23,24,25,26,27</sup>**

Victorian Energy System	Percent of Total Victorian Energy Use	Percent of Total Victorian Emissions	Emissions Intensity (tCO2e/MWh)	Average Energy Price Wholesale (W) and Retail (R)
Electricity	17%	45.5% <sup>2018</sup>	0.98	W: \$57/MWh or \$16/GJ R: 27c/kWh or 7.6c/MJ
Gas	27%	15.8%	0.186	W: \$21/MWh or \$6/GJ R: 9.2c/kWh or 2.6c/MJ

As also explored in APGA’s submission to the VGSR consultation paper, replacement of natural gas use with renewable gas use will ensure not only the continued reliability of gas supply but will ensure continued reliability and affordability of the larger Victorian energy system. Two systems, each delivering a major portion of total energy, offers increased reliability and security over a single system supplying all energy. If one system fails, the other will continue to deliver energy. Sector coupling opportunities such as gas power generation and electrolysis can even lead to internetwork support in managing minimum and maximum demand.

Importantly, we do not yet know which renewable gases will be most viable for each different customer and region. What we do know is that wherever a renewable gas option is available, it will be a superior decarbonisation option for existing gas customers, and possibly even for new gas customers depending on their energy use requirements. APGA sees this as a reason to enable all renewable gas options, providing more possible pathways to achieving least cost most reliable gas use decarbonisation, rather than less.

<sup>23</sup> Australian Energy Update 2020, Australian Government Department of Industry, Science, Energy and Resources 2020

<https://www.energy.gov.au/publications/australian-energy-update-2020>

<sup>24</sup> National Greenhouse Accounts Factors, Australian Government Department of Industry, Science, Energy and Resources 2020

<https://www.industry.gov.au/sites/default/files/2020-10/national-greenhouse-accounts-factors-2020.pdf>

<sup>25</sup> National Greenhouse and Energy Reporting (Measurement) Determination 2008, Australian Government 2008

<https://www.legislation.gov.au/Details/F2020C00600>

<sup>26</sup> Australian Energy Market Operator Website 2021

<https://aemo.com.au>

<sup>27</sup> State of the energy market 2021 – Retail Energy Markets, Australian Energy Regulator 2021

<https://www.aer.gov.au/system/files/State%20of%20the%20energy%20market%202021%20-%20Chapter%206%20-%20Retail%20energy%20markets.pdf>

**Table 2: Costs and deliveries of Victoria’s energy infrastructure (2019)** <sup>28,29,30,31,32,33,34</sup>

Transmission and Distribution Infrastructure	Regulated Asset Base (\$m)	Actual Annual Revenues (\$m)	Actual Energy Delivered (GWh)	Max Demand Capacity (MW)
Electricity	17,329	2,825	41,480	8,684
Gas	5,631	774	64,722	23,250

## What else can you tell us about the implications of decarbonisation pathways for the electricity generation, transmission and distribution networks?

APGA commentary on the implications of decarbonisation pathways for electricity generation, transmission and distribution networks is relative to two book-end pathways – decarbonisation via electrification, and decarbonisation via renewable gases.

Through decarbonisation of gas demand via the uptake of renewable gases, the implications for electricity generation, transmission and distribution networks are much simpler. Early hydrogen and biomethane production is expected to produce directly into gas distribution networks. This is due to the smaller volumes of hydrogen in early phases of uplift (up to 10 per cent by volume), and the larger volumes of centralised feedstock available close to larger populations. This will lead to some additional demand on the Victorian NEM in early stages of uplift, while being less than the electrification of similar volumes.

The majority of renewable gas production is expected to occur in the regions of Victoria, supporting growth in high value rural jobs. This expectation is based on feedstock location

<sup>28</sup> Electricity DNSP - Operational performance data - 2006-2019, The Australian Energy Regulator 2020

<https://www.aer.gov.au/system/files/Electricity%20DNSP%20-%20Operational%20performance%20data%20-%202006-2019.xlsm>

<sup>29</sup> Victorian Gas Planning Report Update, AEMO 2020

[https://aemo.com.au/-/media/files/gas/national\\_planning\\_and\\_forecasting/vgpr/2020/2020-vgpr-update.pdf?la=en](https://aemo.com.au/-/media/files/gas/national_planning_and_forecasting/vgpr/2020/2020-vgpr-update.pdf?la=en)

<sup>30</sup> AER Annual Reporting – APA GasNet Australia (Operations) Pty Ltd, Australian Energy Regulator 2021

<https://www.aer.gov.au/system/files/VTS%20%28APA%20GasNet%29%202020%20-%20Annual%20-%20RIN%20Response%20-%20Consolidated%20-%2030%20April%202021%20-%20PUBLIC%20%2312%2C211%2C975.xlsx>

<sup>31</sup> APA Victorian Transmission System pipeline information - RIN responses, Australian Energy Regulator 2021

<https://www.aer.gov.au/networks-pipelines/performance-reporting/apa-victorian-transmission-system-pipeline-information-rin-responses>

<sup>32</sup> Multinet Gas pipeline information - RIN responses, Australian Energy Regulator 2021

<https://www.aer.gov.au/networks-pipelines/performance-reporting/multinet-gas-pipeline-information-rin-responses>

<sup>33</sup> AusNet Services Gas pipeline information - RIN responses, Australian Energy Regulator 2021

<https://www.aer.gov.au/networks-pipelines/performance-reporting/ausnet-services-gas-pipeline-information-rin-responses>

<sup>34</sup> Australian Gas Networks (Victoria/Albury) Gas pipeline information - RIN responses, Australian Energy Regulator 2021

<https://www.aer.gov.au/networks-pipelines/performance-reporting/australian-gas-networks-victoria-albury-gas-pipeline-information-rin-responses>

for biomethane and an expectation of utility scale hydrogen production at the renewable electricity generation source for hydrogen. This latter expectation is based on the significantly lower cost of behind-the-meter, utility-scale renewable electricity generation and energy transport by pipeline in comparison to Victorian NEM electricity and energy transport by powerline<sup>7</sup>.

By locating electrolysers at the source of renewable generation, green hydrogen can be produced using the lowest-cost renewable electricity available and take advantage of the lowest cost energy transport pathways available. As such, less electricity transmission, distribution and storage infrastructure would need to be constructed, leading to lower costs.

This approach also includes the implication of greater electricity system reliability. Through system coupling technologies such as electrolysers, fuel cells, and gas power generation, the availability of a gaseous energy pathway increases energy reliability overall. This view is supported by The Grattan Institute who recommend targeting a net zero NEM, not a zero emission or 100% renewable NEM, as well as supporting a 90% renewable net zero NEM through 10% gas power generation decarbonised through offsets<sup>21</sup>.

Through decarbonisation of gas demand via electrification has much greater implications for the generation, transmission, distribution and storage of electricity. Peak gaseous energy demand currently sits at around 2.6 times greater than the Victorian NEM, occurs at the same time of day as peak electricity demand, which itself has very little difference in magnitude between summer and winter peaks<sup>3</sup>.

While some electric appliances have greater energy efficiency than electric appliances, not all electric appliances do, not all gas uses are technically viable to electrify, and many electric appliances such as Heat Pumps have dynamic efficiency which can be at its worst during peak demand<sup>3</sup>.

The implication of electrification for electricity generation, transmission, distribution and storage is a need for rapid multiplication of infrastructure based upon significant uncertainty. This uncertainty can come from multiple sources, including overly simplified assessments of infrastructure uplift as discussed in *Electrification of gas demand results in 40 per cent increase in* electricity demand above, and calculations based on static energy efficiency assumptions for appliance with dynamic energy efficiency.

APGA expect that the real number required for electricity generation, transmission, distribution and storage uplift to support electrification of gaseous energy demand will lay somewhere between 40% and 260%, but do not believe there is sufficient evidence to accurately determine where between these two extremes the true required uplift will land.

Such uncertainty, coupled with the absence of a secondary energy pathway to support electricity through sector coupling, is expected to compromise the reliability of the electricity supply chain. This implies more frequent supply interruptions if this pathway is forced upon Victorians, potentially leading to overbuilding as a reaction to public dissatisfaction.

All of the above implies that more electricity transmission, distribution and storage infrastructure would need to be constructed, and Victorian citizens will have to pay more to the higher cost, higher profit infrastructure organisations which own and operate these assets.

## **How can the use of Victoria's existing gas infrastructure be optimised during the transition to net zero emissions, over the short (10 years), medium (20 years) and long-term (30+ years)? How can the Victorian Government assist in this?**

APGA refers Infrastructure Victoria to the answer to Question 4 and recommends the application of the answer to Question 3.

## **What principles should apply or what measures will be needed to manage the impacts of gas decarbonisation on households and businesses?**

APGA refers Infrastructure Victoria to the answers to Question 3 and Question 4.

## **What policies, programs and/or regulations should the Victorian Government consider or expand to encourage households, commercial buildings and small businesses to reduce their gas use?**

APGA support all improvements in energy efficiency and recommend the Victorian Government consider policies, programs and/or regulations which facilitate the uptake of high efficiency gas appliances. With minimum gas appliance efficiencies being 70% - 75% today, in comparison to gas appliance efficiency being able to exceed 90%, such programs could reduce individual household or business gas use by 15% - 20%. Such policies, programs and/or regulations already exist for electric appliances today.

APGA is concerned however that Infrastructure Victoria is conflating the idea of gas use reduction to emissions reduction. If the gas being used is a renewable gas, then the gas use is carbon neutral. Further, Future Fuels CRC research shows that the replacement of gas appliances with electricity appliances before 2035 is expected to result in an increase in emissions, not a decrease<sup>35</sup>.

This is alarming considering that the policies, programs and/or regulations that exist for electric appliances often incentivise the replacement of gas appliances with electric appliances, actively increasing Victorian emissions intensity. Ensuring that the policies, programs and/or regulations that the Victorian Government consider or expand to encourage households, commercial buildings and small businesses to reduce their gas use are in fact achieving the end of reducing their emissions rather than transitioning customers towards higher cost, higher emission electricity.

With the goal of emissions reduction in mind, rather than gas reduction, APGA propose the Victorian Government consider policies, programs and/or regulations which first enable, then incentivise the uptake of renewable gases by gas customers.

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<sup>35</sup> Integrated Electricity and Gas System Studies: Electrification of Heating, Future Fuels CRC 2020 <https://www.futurefuelscrc.com/project/regional-case-studies-on-gas-and-electricity-system-integration-rp1-1-02/>

**What policies, regulations or other support, if any, do you think are needed to support industrial users to switch from natural gas to lower emissions energy sources or chemical feedstocks?**

APGA recommend the Victorian Government consider policies, regulations or other support that enables access to and uptake of the least cost decarbonisation option for the user in question. APGA recommends against policies, regulations or other support that constrains industrial users to higher cost lower emissions energy sources or chemical feedstocks such as electrification where lower cost solutions are able to achieve the desired emission reduction outcome.