Australian Gas Infrastructure Group

‘Building Electrification’ Regulatory Impact Statement

AGIG Submission

Executive Summary

Australian Gas Infrastructure Group (AGIG) is the owner of the Australian Gas Networks (AGN) and Multinet gas distribution networks in Victoria. Our networks have been serving Victorians for more than 150 years and recent mains replacement activities means that our assets are of a high quality and are able to deliver energy to Victorians well into the future. AGIG employs more than 500 people across the country and approximately 1,500 contractors who serve our two Victorian gas distribution networks.

Today, our networks reliably deliver gas to around 1.4 million Victorian homes and 40,000 commercial businesses – such as coffee roasters, laundries and bakeries. We also supply more than 500 energy-intensive industrial users like food processors, breweries and manufacturers of construction products. These industries place high importance on energy reliability and affordability, which Victoria's gas networks have consistently delivered.

We are also a leading investor in renewable gases, supporting the decarbonisation of the gas networks through the introduction of renewable and low-carbon gas. We are committed to decarbonising our gas networks and are supportive of government goals to reach net zero emissions.

We believe that sensible, evidence-based, technology-neutral policies which have broad stakeholder support will underpin the success of the renewable energy transition.

In 2022 the Victorian government released its Gas Substitution Roadmap (GSR). The intent of the GSR is said to help Victoria navigate the path to net zero emissions while cutting energy bills and ensuring reliability. The 'Building Electrification' regulatory impact statement (RIS) published in December 2024 is one of the initiatives being explored under the GSR.

The consultation process on the GSR and its initiatives to date, including the RIS, has been disappointing. An inflexible pathway has been set without genuine stakeholder consultation or proper consideration of the consequences of the proposed policies and programs. Impacts to energy reliability, security, supply and network cost increases to everyday Victorians including businesses need further consideration. The evidence shows that proposals such as those set out in the RIS will not meet the overarching objectives of the GSR. Nor will they address the three specific concerns raised in the RIS itself, being energy supply, costs and emissions reductions.

AGIG does not support any of the options proposed in the RIS, all of which seek to ban gas appliances in homes, result in an unreasonable financial impact on both households and businesses during a cost-of-living crisis and fail to meet the government's objectives. The proposed regulations:

- Create more problems than they resolve with regard to Victoria's energy supply, costs and emissions;
- Will increase gas network costs for Victorian homes and businesses by between 16 and 20% per annum;
- Are an unjustifiably expensive policy option during a cost-of-living crisis – costing $22 billion more than alternative decarbonisation options; and
- Fail to properly consider a range of impacts and barriers that are so expensive and/or technically challenging to overcome that the policy will likely fail.

Furthermore, the timing of this proposed policy is very challenging given the relatively low penetration of renewable electricity in Victoria and the significant cost-of-living pressures homes and businesses are already facing.

We urge the government to use this opportunity to now adopt a genuinely consultative, industry-led, whole-of-system approach to energy policy which considers the wide range of policy levers available to reach its decarbonisation goals and the objectives of the GSR. We strongly believe this will result in better environmental and economic outcomes for Victoria. Well-credentialed experts including L.E.K. Consulting, the Boston Consulting Group and Griffith University have all arrived at the same conclusion.

Australian Gas Infrastructure Group

The proposed regulations create more problems than they resolve with regard to Victoria's energy supply, costs and emissions

A key concern noted by the government in the RIS is forecast gas shortages, and it asserts that through this policy to ban gas appliances in homes, gas will be freed up for industry who rely on it. However, analysis in the RIS shows the government's preferred option makes only 4% more gas available by 2028 when the first supply gap is forecast, and models significant shortfalls of 145 PJ in 2043 even after these regulations have been implemented[1]. Such a small change in gas supply will also do little to relieve the price pressures caused by the forecast gas[2] shortages. It is also important to note that even these minimal savings will not be realised, as independent research has found that rapid household electrification would require an increase in relatively inefficient gas-powered generation and a reliance on gas during peak times[3].

There are a range of other actions that can be taken by government to reduce or even close the supply gap in full, and which can be done without imposing significant costs and disruption directly onto Victorian homes and industry.

Over the last month, after the release of the RIS, the market has demonstrated that it is responding to the supply challenge, as it historically has done, through:

- Announcements from APA to deliver an approximate 24% increase in north-to-south gas transport capacity and new southern markets storage;
- Jemena's plan to increase its pipeline capacity to increase gas delivery to Victoria; and
- ConocoPhillips' approval to drill up to six exploratory gas wells in the Otway Basin.[4]

These commercial responses better contribute to solving the supply challenge in both the short and long term without the very significant cost, disruption and other impacts which will be borne by Victorian households and industry from the options proposed in this RIS. Efficiently bringing new natural and/or renewable gas into the market is a far better option than asking Victorians to incur the significant cost and disruption that comes with forced electrification.

There is also a potential and encouraging market response emerging in the production of renewable gases, namely biomethane and renewable hydrogen. The Victorian government has a live consultation which aims to encourage investment in renewable gases for industry, which has been met with a positive response from producers. Analysis of Victoria's biomethane potential proximal to our network footprint alone suggests that under the right policy settings, up to one-third of Victoria's current gas use could be displaced with this renewable source. This is another way that the market can respond to solve supply gaps and also serves to increase the pace at which renewable energy comes online in Victoria, while also reducing emissions.

When combined with renewable hydrogen, there is significant scope to add increasing volumes of renewable gas into the system in the same way we have renewable electricity, where Victoria has taken well over 20 years to reach an approximate 35% penetration rate. All options will need to be on the table if we are to meet the decarbonisation objectives set for the State.

Policies that send negative market signals on gas, and potentially erode the economic operation of the network infrastructure, could reasonably impact investor confidence and their willingness to invest in the supply and infrastructure needed to sustainably solve Victoria's gas supply concerns.

In relation to reducing emissions, the effectiveness of the proposed regulations is constrained by Victoria's reliance on coal[5] and the slower-than-expected pace of renewable electricity coming online. Instead of reducing emissions, the

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[1] Department of Transport and Planning & Department of Energy, Environment and Climate Action 2024, *Building Electrification: Regulatory Impact Statement, Figure 7.7, p. 74*. Available at: https://engage.vic.gov.au/building-electrification (Building Electrification RIS, December 2024)

[3] Simshauser, P. & Gilmore, J, Griffith University, *Policy Sequencing: On the Electrification of Gas Loads in Australia's National Electricity Market* (December 2024). Access here: Fuel Poverty in 2022 (Griffith University, December 2024)

[4] ABC News, '*ConocoPhillips Australia gets approval to drill gas wells in Otway Basin,*' 2 March 2025.Access here: https://www.abc.net.au/news/2025-03-02/conocophillips-approved-to-drill-for-gas-in-the-otways/104998638

[5] Department of Climate Change, Energy, the Environment and Water, *Australian Energy Statistics 2022-23. Access here:* Australian energy mix by state and territory 2022-23 | energy.gov.au

shift of gas load onto an electricity system that isn't ready to handle it, is expected to increase reliance on coal-generated electricity especially when heating demand surges in the early mornings, evenings and winter peaks.

Boston Consulting Group (BCG) also considered cost-effective decarbonisation strategies and found that grid-connected renewable electricity will have a far greater emissions-reduction impact if used to displace coal generation and liquid fuels, than by displacing gas end uses.[6]

In relation to the costs of the proposed approach, analysis conducted by strategy firm L.E.K Consulting indicates that forced electrification as proposed by the RIS will in fact increase energy bills and would cost Victorians $22 billion more over the next 20 years compared to gradual electrification.[7] It also found significant risk of system instability and only marginal emissions savings of around 2% over 20 years. These emissions savings equate to $1,222 per tonne of carbon dioxide equivalent (CO2e) saved, which is much higher than alternative abatement options. This is even before gas network cost impacts are taken into account (discussed further below). This is a very similar finding to BCG, that, given the position of the electricity market, electrification of gas used in houses and businesses is a very expensive way to decarbonise the economy.

Recent analyses done by Aurora Energy and Jacobs for Infrastructure Victoria's draft 30-year strategy also speak to the 'very likely' scenario of increased electricity demand on Victoria's grid.[8] They find that over the next decade Victoria will move from being a net exporter of electricity to a net importer as its coal-fired power plants retire, and this would lead to higher costs even if the state meets its renewable energy targets – potentially a more than doubling of wholesale electricity prices from $50/MWh to more than $110/MWh.

A whole-of-system approach to reducing costs and emissions demonstrates that forced electrification will achieve the opposite of the benefits intended. A more sensible, consumer and market-led approach will better and more quickly address supply gaps and emissions reductions objectives at a much lower cost to Victorian households and industry. This issue is discussed in further detail in Section 1.

The approach in the RIS will increase gas network costs for remaining Victorian homes and businesses by between 16 and 20% per annum

Across AGIG's two Victorian gas distribution networks, households make up 97% of current connections (around 1.4 million). The remaining 3% of connections are made up of 40,000 businesses and around 500 large industrial users. The cost of maintaining and operating the network is shared by this collective group of users, and if the vast number of users on the network are forced off, a larger share of the fixed costs of maintaining the network is borne by the remaining users.

As the proposed regulations are aimed at reducing residential gas use, network costs that have been paid by residents historically, would be shifted to commercial and industrial users. However, the resulting cost increase to commercial and industrial users is not reflected in the RIS due to an assumption that residential properties will *"only electrify appliances that are required by the regulatory change"* – in other words, all households that currently have a gas cooktop will choose to remain connected to the gas network, and only 12.6% (those with electric cooktops but other gas appliances) will disconnect from the network.

However, we expect that many households will electrify their cooktops once their other appliances have also been made electric. Looking across all of AGIG's distribution networks (more than 2 million connections across Victoria,

[6] Boston Consulting Group (BCG), *The role of gas infrastructure in Australia's energy transition* (2023) p. 13. Available at: https://www.agig.com.au/-/media/files/agig/annual-reports/BCG-Reports/20230814-ROGIET-SummarySlides.pdf (BCG Report, June 2023)
[7] L.E.K Consulting (for Energy Networks Australia), *Impacts of Forced Electrification on the Victorian Energy System, Costs and Emissions L.E.K. analytical report 2025*. Available at: https://www.energynetworks.com.au/assets/uploads/L.E.K-Consulting-Impacts-of-Forced-Electrification-on-the-Victorian-Energy-System-Costs-and-Emissions-February-2025.pdf (L.E.K Consulting Report, February 2025)
[8] Jacobs (for Infrastructure Victoria), *Victoria's energy transition risks and mitigation actions, Final REPORT August 2024*. Available at: Victoria's energy transition risks and mitigation actions and Aurora Energy Research (for Infrastructure Victoria), *Energy Transition Analysis, November 2024*. Available at: Energy transition analysis

South Australia, New South Wales and Queensland), on average only 14% of residential connections have a gas cooktop but no other gas appliances[9]. This provides a more evidence-based indication of likely disconnection rates.

To understand the impact of residential disconnections, we modelled several scenarios representative of more likely customer behaviour. Under these scenarios, homes disconnect at a faster rate than assumed in the RIS, driven by the availability of cost-effective alternatives. As these residential customers leave the network, gas network costs increase for the remaining customers, resulting in increases in the order of 16 to 20% per annum for network charges which could lead to retail gas bills doubling within a decade.

As gas network prices increases, demand will drop further, resulting in further prices increases for those customers unable to leave the network. The majority of these customers will be Victorian industrial businesses that need gas for their operations, as well as a wide range of commercial businesses that have technical or financial difficulty electrifying their equipment. In our engagement with these industries, it has become clear that many businesses are already operating on thin margins.

As a result, they will be forced to either pass on the increased costs to consumers through higher prices or make difficult decisions regarding their continued operations in Victoria. This is a significant consequence of the proposed regulations, both for the affected businesses and the broader economy. If the intention of the RIS is to support Victorian businesses, the impact of these regulations seems counterproductive. Stakeholders and industry have clearly indicated that they do not support the proposals in the RIS. It is crucial that the government fully understands and acknowledges the scale of this impact before moving forward with the RIS.

Further discussion on these points is included in Section 2.

This is an unjustifiably expensive policy option during a cost-of-living crisis

Direct cost impacts on customers who electrify

The higher network costs discussed above will start impacting customers in the near-term. When customers are then forced by policy mechanisms to switch appliances, further cost pressure will be felt in an already challenging cost environment. The true cost of switching is far higher than represented in the RIS, while the on-going cost savings from electrifying are overstated.

The assessment of the direct impacts of the RIS excludes and understates a range of costs and overstates the benefits. Net benefits are overstated by $11.5 billion, and the benefit cost ratio is less than a third of the value reported in the RIS. The result is that the RIS is a far more expensive policy pathway than indicated.

In many cases, the RIS repeats errors we pointed out in responding to the Minimum Standards for Rental Properties and Rooming Houses which have not been addressed. There are other material issues with the cost/benefit analysis relied upon in the RIS, such as incorrect assumptions about gas network augmentation costs, use of excessive carbon prices, underestimates of costs of installing hot water appliances and others. We discuss these in more detail in Section 3 with additional detail on each issue in our Technical Appendices.

Cost Impacts on the wider economy

In addition, there are wider impacts of the proposed approach which have been understated, both in terms of the price impacts for our customers discussed above and the impact on the wider Victorian economy.

For example, there are costs associated with the electricity networks that are expected to arise should this policy proceed. As noted, L.E.K. Consulting research has examined the whole-of-system impact of forced electrification and concluded it is $22 billion more expensive than consumer-led electrification.[10]

Recent applications from the four Victorian electricity network operators indicate the significant costs that will be necessary to upgrade networks to support additional demand including through increased electrification of residential

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[9] *Analysis based on an assessment of usage per residential connections. Residential connections consuming 3GJ per annum or less are assumed to have a cooktop alone.*

[10] L.E.K. Consulting Report, February 2025

gas load. This is a significant additional cost paid for by consumers through their electricity bills and should be included as part of the costs associated with the policy proposal. Instead, the RIS is inconsistent and assigns no dollar values to upgrading electricity networks, while including avoided gas network costs as a benefit in the Cost Benefit Analysis.

As explained above, as customers leave the network, those who remain face much higher costs. Because industrial and commercial customers who cannot electrify economically are spread throughout our networks, we will need to maintain the majority of our network, roughly tripling the bills of these customers. This may have a significant impact on their ongoing viability which the Victorian government needs to consider before any final policy decisions can be made.

The RIS fails to consider a range of impacts and barriers that are so expensive or technically challenging to overcome that the policy will likely fail.

Implementation of the proposed regulations presents a range of challenges due to the scale of change and the compressed timeframe to deliver it. This is further impacted by the reliance on a number of critical factors that will be difficult to control including timely delivery of renewable electricity generation and the ability of households to finance investments at the immediate moment they are required (i.e. when an appliance comes to end-of-life, which is often unplanned).

A change of this scale requires detailed analysis and plans for how around 2.2 million Victorian households[11] – or 440 households every working day between now and 2045 – might respond. This should include more realistic assessments of how Victorians will finance these changes. For example, the RIS calculates that one-in-five homes will need to upgrade to three phase power, and notes that costs can range from $2,525 to $12,250[12]. In a cost-of-living crisis, these are expenses that some households will not be able to afford in the sudden situation of an appliance expiring. The RIS makes no provision for what options are available to the 19% of homes that are expected to incur this cost and may not be able to afford it.

Much greater analysis is needed on how the policy could be effectively implemented for residential customers, the service providers they will rely upon (including electricians, plumbers and appliance manufacturers), as well as how remaining industrial customers might respond. This hasn't been explored in the RIS and must be, to avoid unintended consequences such as extended periods where homes are without hot water or heating until tradespeople can become available to complete changeouts or electrical upgrades.

This is further complicated by the evidence that there is not broad support for the policy among the community. Research completed across a range of Victorian suburbs in November 2024 demonstrated that only 13% of respondents were willing to pay the costs of replacing their gas appliances with electric equivalents, and 82% of respondents believed they should have the choice of appliances in their homes. Capacity to pay was also an issue raised in the community research which would indicate that the necessary upgrades to three phase power are likely to be a significant hurdle for many who need to pay for these. Unless an exemption is granted for these households, or another alternative option is developed, it is not clear what options are available to these Victorians other than to go without hot water or heating.

The impact assessment is not sufficiently thorough to appreciate the likely impacts to a range of different market participants and customer cohorts as well as impacts on associated businesses. This includes impacts on our regional customers, gas appliance businesses, electricity network providers and renewable gas producers. In fact, as we explain in Section 4, the proposed regulations will have the result of constraining the development of the renewable gas industry, which is contrary to the objective of the Government's Renewable Gas Directions Paper.

The policy, as set out in the RIS, lacks detailed implementation planning and, as detailed in Sections 4 and 5 of our submission, is likely to encounter technical, financial and practical implementation barriers, that render it unable to deliver the policy objectives.

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[11] Australian Energy Regulator (AER), *Gas Disconnection Quarterly Reporting*, 10 February 2025. Available at https://view.officeapps.live.com/op/view.aspx?src=https%3A%2F%2Fwww.aer.gov.au%2Fsystem%2Ffiles%2F2025-02%2FGas%2520quarterly%2520disconnection%2520reporting%2520-%252010%2520February%25202025%2520-%2520PUBLIC%252816409090.7%2529.xlsx&wdOrigin=BROWSELINK

[12] Building Electrification RIS, December 2024, footnote 294

Conclusion

The proposal in the RIS will not meet the Victorian government's objectives. If pursued, the regulations will impose significant net costs, disruption and impracticalities on Victorian households and businesses; make no material difference to gas supply or emissions; and send a further signal to business to reduce or avoid investment in Victoria. There is an opportunity to improve the analysis and find a more purposeful policy pathway that better solves the shared concerns with gas supply security, energy bill costs and reducing emissions, while continuing to encourage business and industry to invest in the state and maintaining customer choice.

We welcome the opportunity for genuine engagement on alternative whole-of-energy-system policy options that deliver on our shared objectives of providing energy reliably and affordably, while working to achieve net zero emission targets.

Contents

1. The Problem Statement

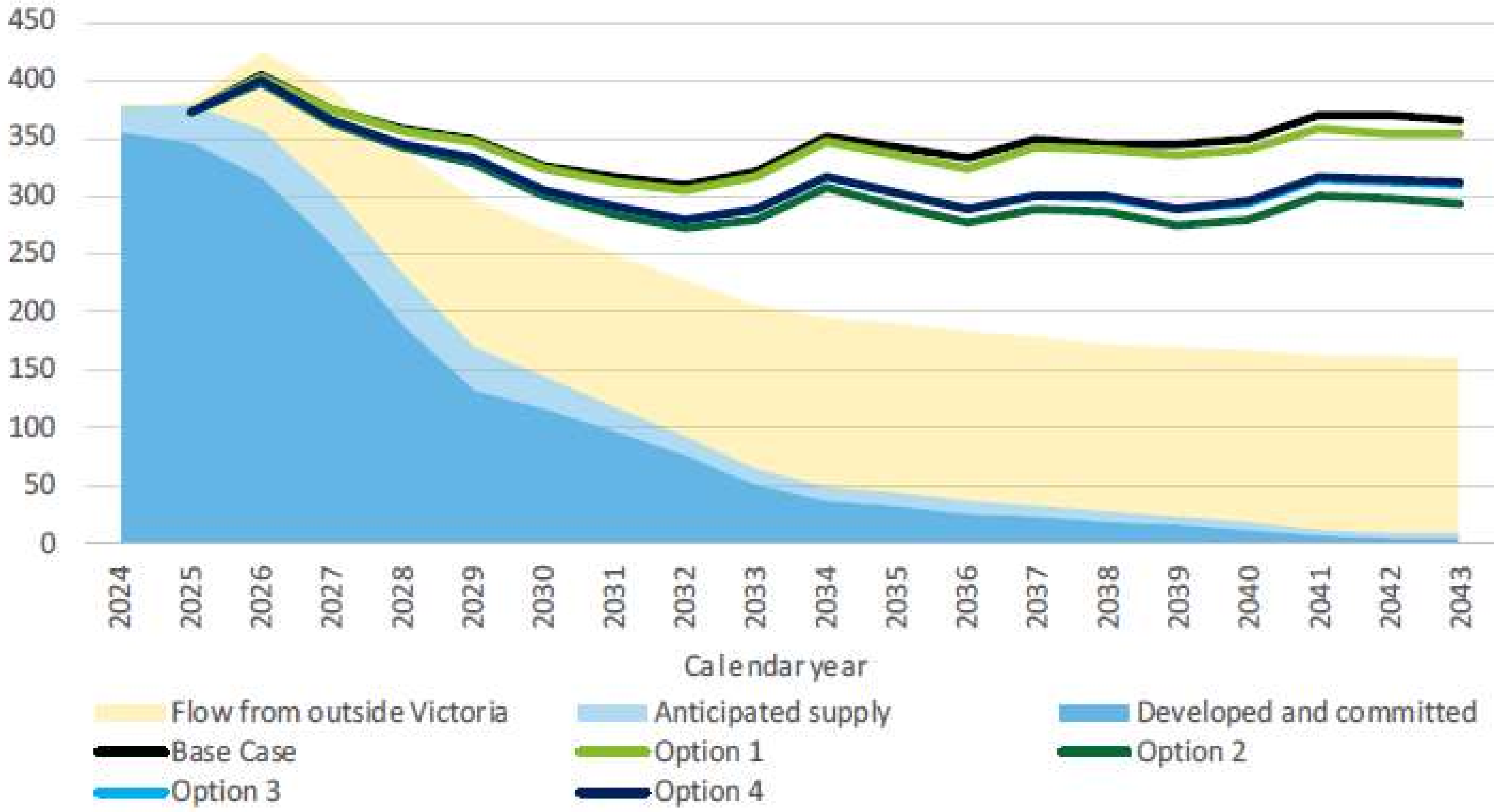
The Victorian Government's Building Electrification Regulatory Impact Statement (RIS) raises concerns about three key issues: gas supply, energy security and reliability; the cost of energy for Victorian consumers; and energy sector greenhouse gas (GHG) emissions.

In this Section we examine the limited impact the proposed regulations will have on solving these key issues, and the alternative approaches that could more effectively solve the core problems of energy supply, cost, and emissions reduction.

1.1. Gas Supply, Energy Security and Reliability

The RIS outlines its objective to save gas for industry by reallocating gas from residential customers, therefore addressing gas supply, energy security and reliability concerns. However, the modelling presented in the RIS indicates that even under the preferred scenario (Option 3), a significant gas shortfall of approximately 145 PJ per annum remains in 2043. Furthermore, under this scenario, in 2043 it projects the need for imports of 150 PJ of gas from other states, decreasing energy security for the region.

Figure 1: Supply and demand for gas in Victoria under different options



Source: Building Electrification RIS, p107 (Figure 7.7)

While accelerated electrification will result in some gas supply savings, these are minimal and come with costs, risks and other unintended consequences. Research from Griffith University is helpful to understand the inter-relationship between accelerated electrification and gas supply outcomes[13] in Victoria where electricity generation is majority supplied from brown coal[14]. This research, completed in 2024, examined the generation investment task needed to decarbonise power systems and electrify gas use at least cost. It found that accelerating electrification not only risked the unintended consequence of extending reliance on coal plants for longer, but that significant investment would need to be made in gas turbines to make enough electricity to support this new demand. This highlights that while electrification of household gas reduces annual gas demand, rising gas turbine output means there is little change in peak demand.

With specific reference to Victoria, the report finds that policies which accelerate electrification would see annual Victorian gas consumption fall from 257.0 PJ pa to 196.2PJ pa, while maximum demand rises from 1,785 TJ per day to 1,823 TJ per day[15] which means the reliance on gas remains through the electrification of homes. It urges careful planning and policy making in order to avoid this undesirable outcome.

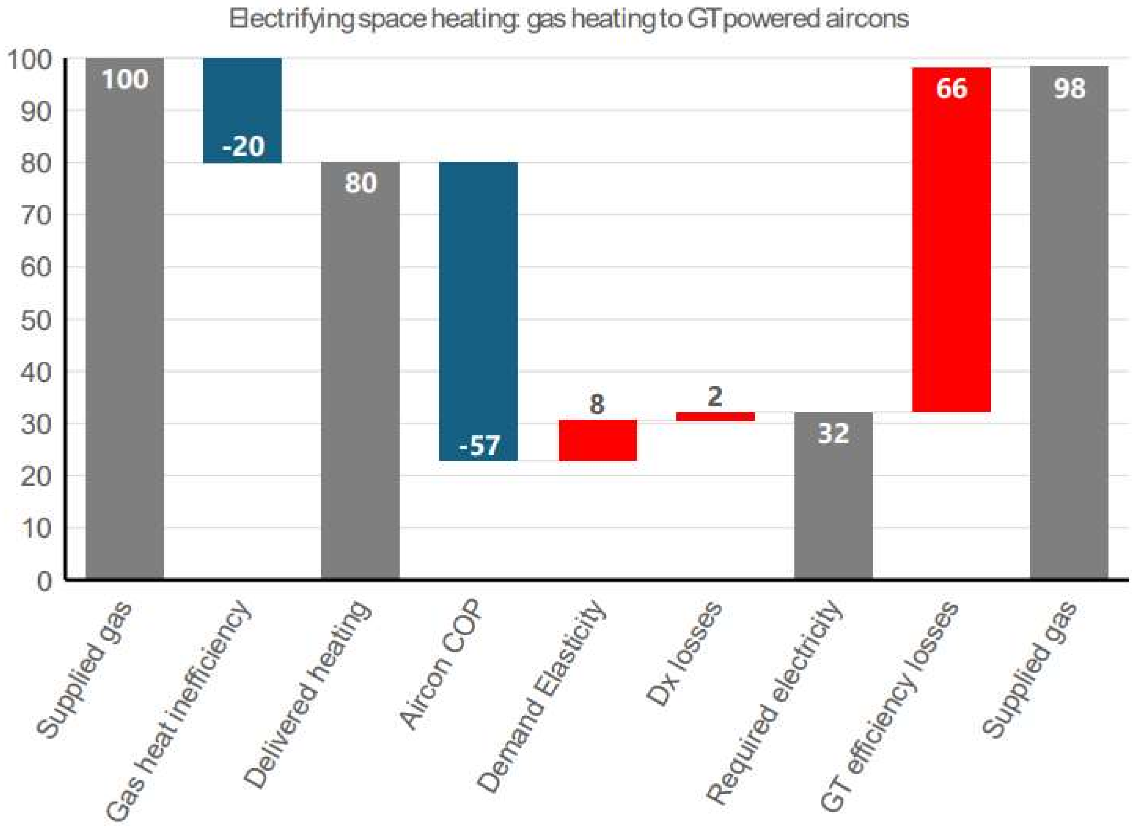


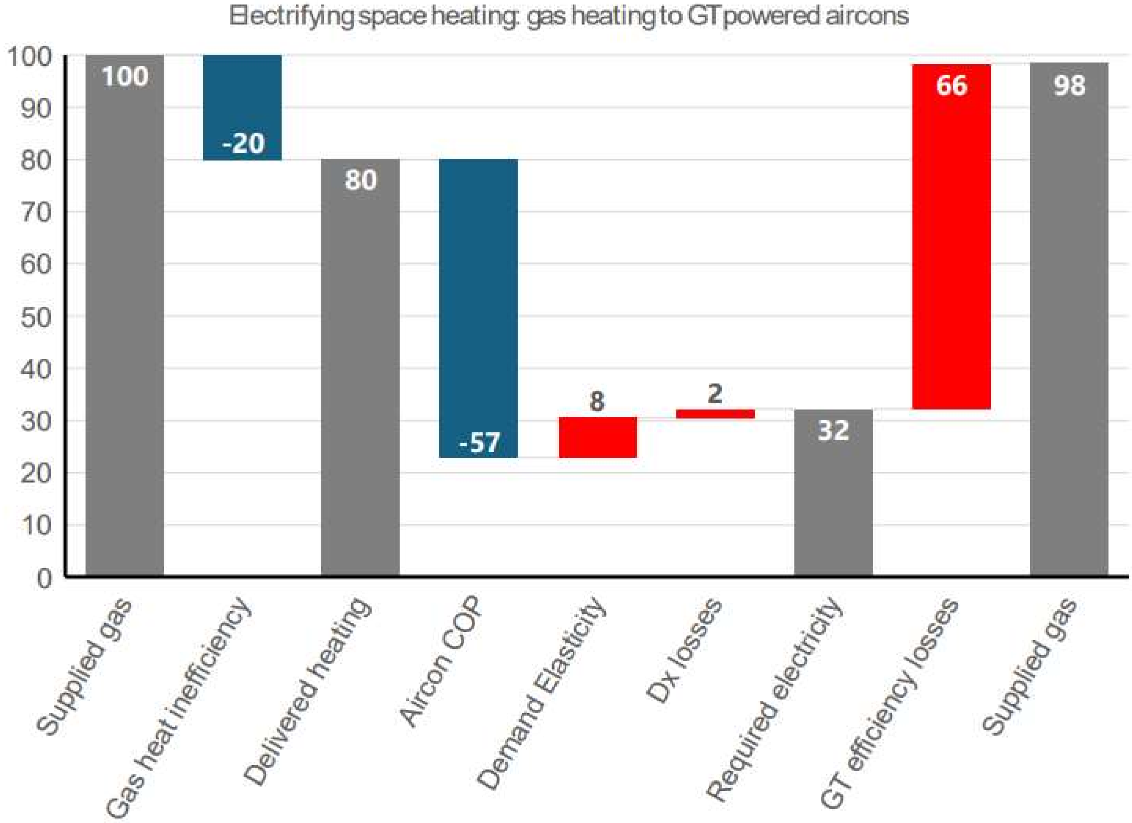
table below, extracted from the report, demonstrates the nature of the problem, where gas use is transferred from gas heating in homes to generating electricity for electric heating, resulting in a marginal decrease in the amount of gas used.

Figure 2 - Extract from Griffith University report - Household critical event winter day - gas use waterfall

[13] Griffith University, December 2024

[14] See footnote 27.

[15] Griffith University, December 2024, Footnote 3, Fig. 17.


Electrifying space heating: gas heating to GT powered aircons
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66
98
Supplied gas
Gas heat inefficiency
Delivered heating
Aircon COP
Demand Elasticity
Dx losses
Required electricity
GT efficiency losses
Supplied gas

The report uses a worked example based on 100 units of gas energy being used to supply an existing household gas heating system, and the resulting 98 units of gas needed to supply an electric heating system powered from the National Electricity Market to illustrate how gas generation is used at peak periods. Importantly, the report shows that electrification of household gas load transfers the current gas heating load in a home to an electricity system supported by gas.

An important challenge to the approach in the Building Electrification RIS is whether a gas supply shortfall is best addressed by reducing demand or by accelerating the development of natural and renewable gas supply. On this question, the Australian Energy Market Operator (AEMO) has consistently advised policy makers that increasing supply is critical to meeting demand and avoiding shortfalls. It makes this point clearly in the most recent Gas Statement of Opportunities report when it says "development of anticipated supply is crucial to ensure sufficient supply is available to support southern demand and mitigate the risk of peak day shortfalls." [16].

Geoscience Australia estimates Victoria on its own has sufficient gas resources to be produced, equivalent to 30 years of current demand, and in the absence of a forced electrification policy and the lifting of moratoriums on gas exploration, the market is already responding to solve the shortfall by increasing supply through expanded pipeline and storage capacity, and recommencing exploration activities. This is a far more effective option than expecting Victorians to incur substantial disruption and cost to electrify their homes and businesses.

Recent market announcements by APA and Jemena in February 2025 highlight new investments to respond to supply shortfalls[17]. APA's announcement to expand its north-to-south gas transport capacity and deliver new southern markets storage will directly benefit Victoria and could bring on new capacity as soon as late 2025. Jemena's plan targets up to 200 TJ/day of new gas to Victoria by the winter of 2026 with more capacity to follow, and will be achieved by upgrading an existing pipeline to operate bi-directionally. A further announcement from ConocoPhillips on achieving approval to drill up to six exploratory gas wells in the Otway Basin[18] has potential to bring fresh supplies of gas into Victoria as early as 2028[19]. These are material developments, announced after the RIS was released for consultation, that demonstrate a market response to solving the supply shortfall.

There is also capacity for renewable gases to contribute to closing the supply shortfalls.

In July 2024, we commissioned advisory firm Blunomy to undertake a study of biomethane potential adjacent our existing gas distribution networks. This study found there is approximately 63PJ of recoverable biomethane resources within 50km of our Victorian networks[20]. If this supply was enabled through supportive policy, it could address more than one-third of the expected 150 PJ shortfall noted in Figure 1 above.

The potential for biomethane to contribute to Victoria's expected gas supply shortfall is even greater if you consider:

- Resources adjacent to AusNet's networks – we understand the Victorian Government is also undertaking a comprehensive study to better understand bioenergy potential and resources across Victoria which would include AusNet's gas network in western Victoria;
- Biomethane that could be supplied to Victoria from other states through the existing pipeline network – noting Blunomy estimated there to be a further 142 PJ p.a. of recoverable biomethane resources within 50km of AGIG networks in South Australia and Queensland[21]; and

[16] Australian Energy Market Operator, *2024 Gas Statement of Opportunities*, p.10. Accessed here https://aemo.com.au/-/media/files/gas/national_planning_and_forecasting/gsoo/2024/aemo-2024-gas-statement-of-opportunities-gsoo-report.pdf?la=en
[17] APA, *APA's East Coast Gas Expansion Plan*, 24 February 2025. Access here: https://www.apa.com.au/news/asx-and-media-releases/apas-east-coast-gas-expansion-plan, Jemena, *Jemena takes crucial next step to avoid gas shortfall* , 21 February 2025. Access here: https://www.jemena.com.au/media/jemena-takes-crucial-next-step-to-avoid-gas-shortfall/
[18] ABC News, '*ConocoPhillips Australia gets approval to drill gas wells in Otway Basin,'* 2 March 2025.Access here: https://www.abc.net.au/news/2025-03-02/conocophillips-approved-to-drill-for-gas-in-the-otways/104998638
[19]Australian Financial Review, *Victorian energy: Infrastructure Victoria publishes modelling warning of energy shortages and higher prices*, March 4 2025. Access here: 'https://www.afr.com/companies/energy/victorians-warned-to-expect-energy-shortages-and-higher-prices-20250304-p5lgql
[20] Blunomy (for AGIG), *Biomethane Potential in AGIG's Network Catchment and Associated Co-benefits*, July 2024, p.16. Accessed here: https://www.agig.com.au/-/media/files/agig/Annual-Reports/240712_Biomethane-potential-and-cobenefits-Public.pdf
[21] Ibid.

- The potential to access supply in regions beyond 50km of the gas network, noting that Deloitte's estimated there to be over 370PJ of theoretical resource potential in Victoria[22]

This analysis is further supported by a recent AEMO publication acknowledging that between 170 PJ to 190 PJ per annum of biomethane could be available nationally at production costs competitive with current natural gas prices (between $10/GJ to $30/GJ, depending on feedstock)23.

There is also the potential for renewable hydrogen to contribute to gas supply. A study delivered by AGIG with support from the Victorian Government indicated that blending 10% (by volume) renewable hydrogen in Victorian gas distribution networks was technically and economically feasible and would contribute a further 3.9 PJ[24] of gas supply and we are already taking the first steps on this renewable gas journey in Wodonga with Hydrogen Park Murray Valley[25]. The Victorian Government is also investigating how to scale up renewable gas supply quickly through its Renewable Gas Directions Paper, and is in active discussions with renewable gas producers.

This potential is important and challenges the assessment in the RIS that the supply gap must be closed through aggressive, disruptive and costly demand destruction measures, such as appliance bans. We outline this in further detail in 1.5 - Insufficient Analysis of Non-Regulatory Options

and elaborate on cost considerations further in that section. A realistic assessment of how the market can respond by providing additional supply to close the gap is important to policy considerations, as it moderates the intense focus on reducing demand and opens up more sensible pathways that could better achieve the policy goals without the cost to key stakeholders such as industry and lower socio-economic households.

It is also important that policy makers consider energy supply impacts in both the near-term and longer-term contexts. While appliance bans will reduce gas demand to a minimal extent – as we explain above – extreme measures such as bans risk eroding investor confidence. These policies could discourage exploration for natural gas or investment in renewable gas, especially if demand is perceived to be artificially constrained. The ACCC's Gas Inquiry December 2024 interim report on the east coast gas markets also raises concerns about these types of policies and the impacts they have on longer-term gas sufficiency and security, noting that "one of the key challenges faced by gas investors and market participants is policy uncertainty, with the market receiving mixed signals from governments about the pace of transition and the long-term role of gas"[26].

1.2. The Cost of Energy to Victorian Consumers

The RIS states that electricity is more affordable for customers, however the analysis relied upon significantly underestimates electricity costs and overstates gas costs. When all relevant costs are accurately accounted for, including appliance upgrade and installation costs, avoided energy costs (detailed in Section 3 Cost Benefits Analysis), and corrections to energy consumption figures for both gas and electric appliances, the actual cost benefits of electrifying appliances are significantly lower than suggested.

The RIS acknowledges that nearly 20% of households will face upfront costs of $2,525 - $12,250 to upgrade switchboard and electrical supply, as the need to undertake works for network supply, and switchboard and wiring changes occurs when additional electrical load is added to a household. This is discussed in greater detail in Section 5.

For customers who continue to need gas, such as industrial or commercial customers, or residential customers who cannot afford the upfront cost of switching to electricity as the proposed regulations will require, the impact of the RIS is expected to increase network costs by between 16 and 20% per annum, as the fixed costs of operating the gas network are shared among a lower number of users. This is discussed in greater detail in Section 2, Gas Network Customer Impacts.

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[22] Deloitte, Australia's Bioenergy Roadmap, November 2021, p. 23. Accessed here: australia-bioenergy-roadmap-report.pdf

[23] AEMO, *Draft 2025 Inputs Assumptions and Scenarios Report Stage 2*, February 2025, Fig.16. Access here: https://aemo.com.au/-/media/files/major-publications/isp/2025/stage-2/draft-2025-inputs-assumptions-and-scenarios-report-stage-2.pdf?la=en

[24] p18 - 10% Hydrogen Distribution Networks: Victoria Feasibility Study. Australian Hydrogen Centre, May 2023 AHC-10-Hydrogen-Distribution-Networks-Victoria-Feasibility-Study.pdf

[25] Hydrogen Park Murray Valley | AGIG

[26] The Australian Competition and Consumer Commission (The ACCC), *Gas Inquiry 201702030. Interim update on east coast gas market, December 2024*, p. 125 Access here: https://www.accc.gov.au/system/files/accc-gas-inquiry-interim-report-december-2024.pdf

We note also that the significant investment needed by electricity distributors to meet additional demand from electrification has not been fully included in the assessment in this RIS, and is further discussed in Section 4, Impact Assessment.

Further, the existing Victorian electricity system is already strained and heavily reliant on coal power stations[27] which are expected to be retired within the timeframe of the proposed regulations occurring. Forcing accelerated electrification onto the electricity system is expected to increase wholesale costs of electricity – the research by Griffith University indicates that accelerated electrification would also be likely to result in Victoria's unit costs of electricity going from the cheapest in the National Electricity Market at $80/MWh to the most expensive at $140/MWh.[28]

Modelling by L.E.K. Consulting examines the whole-of-system impacts of the RIS on Victorian customers, including wholesale electricity prices, gas market impacts, network costs, customer costs of electrification, and subsequent impacts on emissions. It found that wholesale electricity prices would be around $5/MWh higher on average under the government's proposed regulations. It also found the proposal would add a further $22 billion in increased energy system costs from FY25 to 2045[29], including from building additional energy infrastructure and the cost associated with constrained electricity supply.

Similarly, Infrastructure Victoria's recently-released draft 30-year infrastructure strategy contains a stark assessment of the current strain on the state's electricity system and predicts this will translate to significantly increased costs to consumers – more than doubling the cost of wholesale electricity from $50/MWh to more than $110/MWh when Yallourn coal mine closes in 2028. These price increases are modeled in the absence of the proposal in this RIS, which, if implemented, would further exacerbate the price hike by shifting an even greater burden onto the electricity system.

These surging electricity costs will be passed on to Victorian households and businesses, adding to the pressures on consumers and intensifying the financial burden on businesses during a cost-of-living crisis.

1.3. Emissions Reduction

We support and are actively delivering emissions reductions in line with Victoria's *Climate Change Strategy*, which aims to achieve net zero by 2045, with interim targets of 45-50% reduction by 2030 and 75-80% by 2035[30].

Since 2005, AGIG has reduced scope 1 emissions by approximately 40%, aligning broadly with Victoria's interim 2030 target as at 2024[31]. Our *Net Zero Ambition* outlines our commitment to achieving net zero carbon emissions from our own operations by no later than 2050, while also supporting our customers to achieve net zero emissions through renewable and carbon neutral gas.

To achieve both Victoria's and AGIG's net zero ambitions, the integration of renewable and carbon-neutral gas will be essential. We are proud to lead this transition in Victoria, with Australia's equal-largest renewable hydrogen project currently under construction in Wodonga, set to join our existing operational plants in South Australia and Queensland later this year.

In the *Renewable Gas Directions Paper*, the Victorian Government states that *"directing technologies to their highest and best use"* will ensure a cost-effective transition to net zero by 2045, delivering maximum economic and environmental benefits[32]. While AGIG strongly supports the principle of 'highest and best use', our analysis indicates that the proposals in the RIS do not align with this approach.

The RIS estimates that its preferred option will reduce emissions by 3.3 million tonnes of CO_{2e} per annum (Mtpa) – just 4% of Victoria's total annual emissions of approximately 80 Mtpa[33]. This reduction comes at a high cost. The L.E.K.

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[27] 62.2% of Victoria's electricity was provided by coal in the year up to 2 March 2025. Source: OpenNEM Open Electricity: Victoria
[28] Griffith University, December 2024
[29] L.E.K Consulting Report, February 2025, p.12
[30] Victorian Government, *Victoria's Climate Change Strategy.* Available at: https://www.vic.gov.au/victorias-climate-change-strategy
[31] AGIG, *Environmental, Social and Governance Report 2024*, March 2025. Available at: Publications | AGIG
[32] Department of Energy, Environment and Climate Action (DEECA), *Victorian Industrial Renewable Gas Guarantee, Victoria's Renewable Gas Directions Paper*, December 2024, P.5 Available at: *https://engage.vic.gov.au/victorias-renewable-gas-future*
[33] Building Electrification RIS, December 2024, p.10

Consulting research referred to earlier estimates a cumulative savings of 18 Mt CO2e at a total consumer cost of $22 billion, which equates to $1,222 per tonne of CO2e saved[34].

For comparison, $1,222 per tonne is approximately 4 times the social cost of carbon in 2045 at $305 as determined by the Australian Energy Regulator, which provided a structured framework for incorporating emissions reduction benefits into energy sector decision-making and regulatory processes[35].

Further, the average price of an Australian Carbon Credit Unit (ACCU) in November 2024 was $34-$36 per tonne of CO2e abated, while the VEU certificates traded around $108 per tonne of CO2e abated in February 2025[36].

AGIG agrees with the need to lower emissions, as reflected in our Net Zero Ambition, however we do not agree that the proposed RIS delivers efficient and equitable emissions reductions.

Analysis by Boston Consulting Group (BCG), as shown in Figure 3 below, applies a 'highest and best use' approach to identifying the most impactful energy sources to displace with renewable electricity[37].

[34] L.E.K. Consulting Report, February 2025, p.6

[35] Australian Energy Regulator (AER), *Valuing emissions reduction, AER guidance and explanatory statement*, May 2024, Table 1: Interim values of emissions reduction, p. 4. Available at: https://www.aer.gov.au/system/files/2024-05/AER%20-%20Valuing%20emissions%20reduction%20-%20Final%20guidance%20and%20explanatory%20statement%20-%20May%202024.pdf

[36] Clean Energy Regulator, *Quarterly Carbon Market Report,* September Quarter 2024. Available at: *https://cer.gov.au/markets/reports-and-data/quarterly-carbon-market-reports/quarterly-carbon-market-report-september-quarter-2024/australian-carbon-credit-units-accus* and Demand Manager, Available at: https://www.demandmanager.com.au/certificate-prices/

[37] BCG Report, June 2023, p. 13

Figure 3: Extract from BCG Role of Gas Infrastructure in Australia's Energy Transition

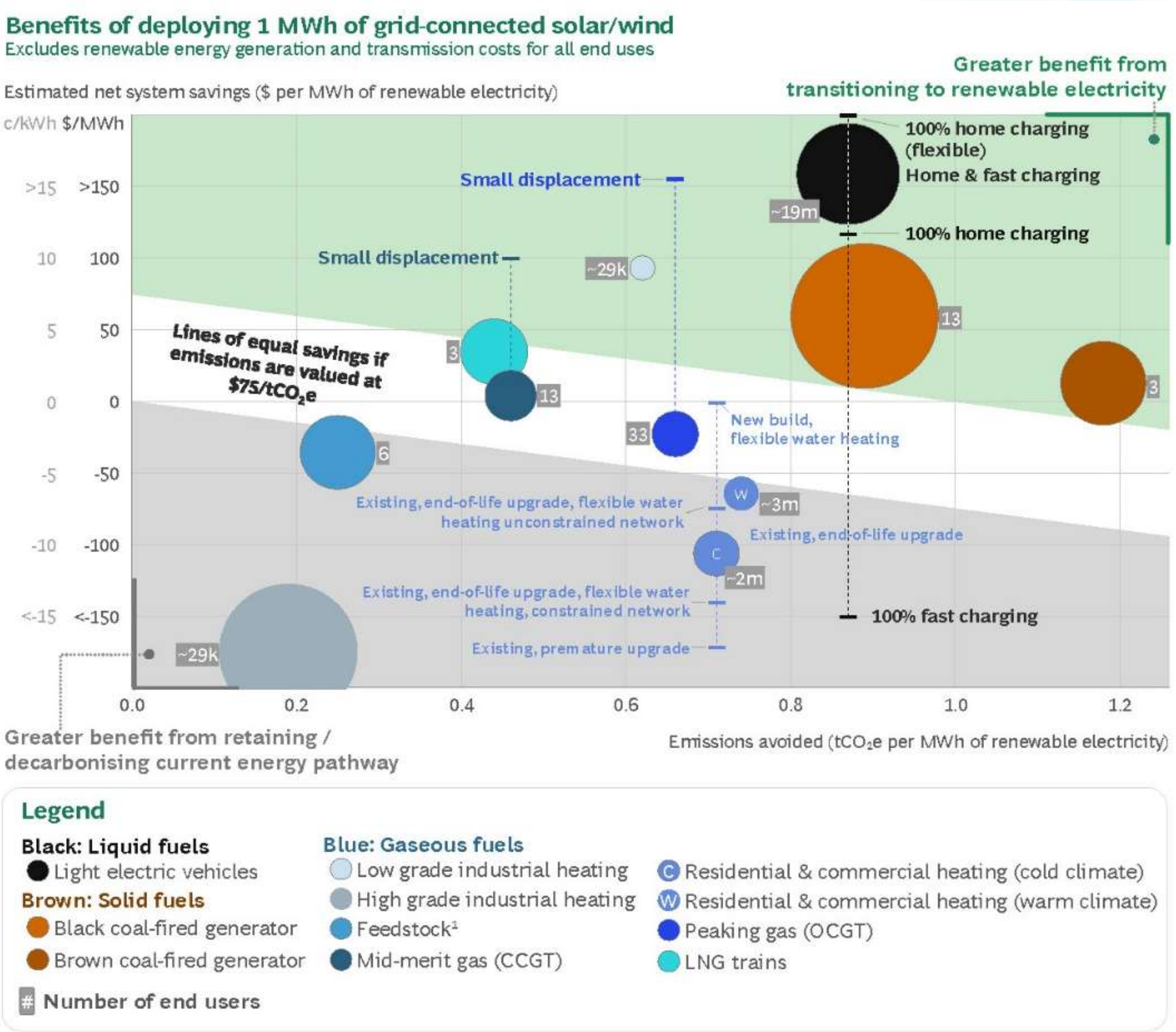

Figure 3 displays the benefits of deploying 1 MW of grid-connected renewable electricity to differing end-users, with the size of the bubble representing the total annual volume of renewable electricity required to meet its demand. The green area (i.e. towards top right) demonstrates where there is greater benefit from transitioning to renewable electricity, and the grey area (i.e. towards bottom left) demonstrates where there is greater benefit from decarbonising their current pathway through renewable gas[38].

The analysis prioritises maximising renewable electricity's impact by displacing the most carbon-intensive and least costly applications from a system perspective first:

- **Solid fuels, including coal-fired power stations,** are the highest priority for renewable electricity deployment, where each MWh of renewable electricity displacing brown coal has the greatest emissions reduction and lowest system costs of all options available.
- **Liquid fuels, such as petrol in light vehicles,** provides the next highest net emissions reduction and system cost savings when replaced with electric vehicles, though the overall benefit depends on charging time and location.

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[38] Ibid.

- **Gaseous fuels, including residential and commercial heating in cold climates,** offers a mid-merit emissions reduction but increases system costs due to complex electrification challenges, such as peak-use factors, network upgrades, and appliance costs.

BCG advises that sequencing the electricity grid's transition—*"renewify first, then electrify"*— avoids the unintended consequences of fossil-fuelled electrification and ensures that every unit of renewable energy delivers the highest possible emissions reduction represented as top-right of Figure 3. This approach enables natural gas to play a complementary role to renewable electricity by continuing to support the end uses that are lower priority because they are hard or expensive to electrify. It also allows the supply chain to scale and deliver renewable gas whilst ensuring it continues to play a critical role in peaking, high-heat industrial applications, and other hard-to-electrify uses.

In a similar notion to 'renewify before you electrify', Griffith University introduces the concept of *"speed limits"* in power system reform[39]. Speed limits can arise when renewable and firming capacity does not scale quickly enough to support both coal phase-out and increased electricity demand from network gas electrification.

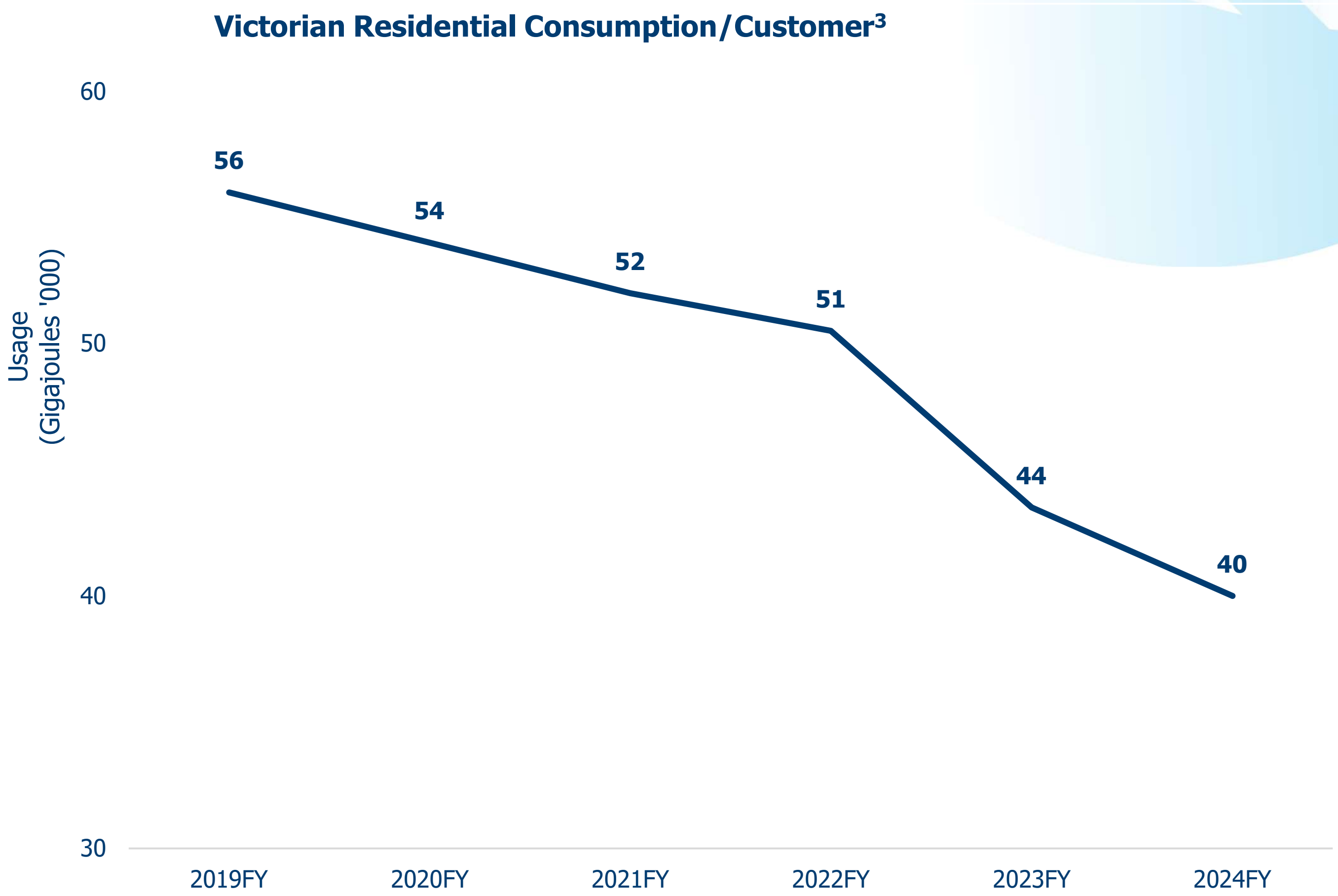
If renewable and firming project entry slows, electrification can undermine decarbonisation efforts by extending coal plant service life to maintain grid stability. This risks creating a perpetual cycle, where uncertain coal exit timelines deter renewable investment, slowing the transition further. The report suggests policymakers must address these speed limits strategically to ensure decarbonisation progresses without compromising energy reliability or affordability.

1.4. The Absence of a Market Failure – Electrification is Already Occurring

The RIS determines that electrification is not occurring fast enough and cites a number of market failures behind this. However, the data shows that for households who want to, and can technically and financially afford to do so, electrification is occurring at a sustainable rate and in the absence of a government ban on gas appliances. Residential customers have been using less gas on average each year since 2019, as shown in Figure 4.

[39] Griffith University, December 2024, p. 25.

Figure 4: AGIG Victorian Residential Consumption per Customer



It is likely that this trend will continue to accelerate. The Victorian GSR has a range of measures to reduce gas usage in homes that are still relatively new into the market and the full impact of them may not yet be evidenced in consumption data. Measures that are already in place to drive rapid electrification for homes and businesses include:

- In July 2023, gas abolishment fees were capped at $220 to lower the cost of going all-electric;
- From July 2023, all new government buildings are to be built all-electric, including new schools and hospitals;
- From January 2024, new homes requiring a planning permit were required to be all-electric;
- From May 2024, a mandatory 7-star efficiency standards for new home construction was introduced;
- From April 2024, the government prohibited Victorian gas distribution businesses from offering rebates to consumers to connect to gas or purchase and install gas appliances; and
- From 1 January 2025, customers began paying full up-front costs of a new gas connection instead of the cost being shared by all gas-users.

Furthermore, between 2023-2024, the VEU program was expanded to include induction cooktops and further incentivise space heating and cooling activities. Government databases (VEU Registry[40]) indicate that customers are responding to these incentive programs. In 2023, more than 28,000 heat pumps were purchased (up 251% from the previous year), and more than 31,500 reverse cycle air conditioners were purchased compared to 2,237 in 2022.

[40] Essential Services Commission, VEU Registry. Access here: https://www.veu-registry.vic.gov.au/Public/Public.aspx?id=Home

Given the extensive and recent nature of the government's initiatives aimed at reducing residential gas consumption, and the clear response from the market already observed to these restrictions and incentives, an assessment by the RIS that these are insufficient is premature. As Figure 4 above shows, there is a decline in gas consumption already occurring and gas appliances do not need to be banned to meet the government's stated objectives.

As we detail in the remainder of this submission, if the speed of electrification outpaces system development, as we believe it will under the proposed regulations, it risks material disruption and cost impacts to Victorian households, business and industry. Given the number of new electrification policies recently introduced – the impacts of which are not yet fully apparent - and the clear evidence that it is having a large impact on gas used in homes, the sensible approach is to continue to allow customers to choose when to electrify. Research conducted by Redbridge in November 2024 finds that Victorians feel strongly about their ability to choose the appliances that they have in their home, and have concerns about their ability to pay the costs associated with forced electrification. This points to the importance of customer choice in the energy transition and is discussed more in section 5.

Accelerated electrification also has material risks for Victoria's energy system security. Energy system risks brought about by extended coal and delayed renewables projects are starting to materialise, as we outline in section 5. Further acceleration of electrification on the grid will only strain and exacerbate existing risks to reliability, security, cost, and emissions, as projected in reports from Griffith University, L.E.K. Consulting, BCG, and Aurora Energy Research discussed above in Section 1.2.

1.5. Insufficient Analysis of Non-Regulatory Options

The RIS assesses non-regulatory options in order to address the problems and barriers considered in Sections 2 and 3. The two non-regulatory options include:

- Blending renewable gases into the reticulated gas network; and
- Encouraging voluntary electrification through:
  - information and educational campaigns;
  - mandatory disclosures; and
  - financial incentives.

Regarding renewable gases, the RIS claims there is insufficient supply at a suitable cost. This would appear to predetermine the outcome of the Victorian Government's consultation with stakeholders on a Renewable Gases Directions Paper. Under this proposal, the Victorian Government has said that it 'is committed to developing a thriving renewable gas sector' and has proposed a target guarantee as well as a range of other mechanisms to support the sector's contribution to energy security and emissions reductions. In particular, the focus is on how to do this affordably and at scale. Given the current consultation is in active discussions with producers and off-takers, it is premature for this RIS to determine there is insufficient supply at a suitable cost.

AEMO and CSIRO have provided recent updates to cost and supply projections which demonstrate a positive trajectory on renewable gas costs. As previously outlines in Section 1.1, AEMO's latest analysis supporting its Integrated System Plan estimates that between 170 PJ to 190 PJ of biomethane could be produced annually across Australia at costs competitive with current natural gas prices ($10/GJ to $30/GJ, depending on feedstock)[41].

The CSIRO's GenCost report also expects significant falls in the costs of hydrogen, expecting reductions in the levelised cost of energy (LCOE) to occur between now and 2035 from $2,840/kW to $1,206/kW[42]. Further, research undertaken by Blunomy for AGIG on biomethane potential around our networks in Victoria has the potential to produce 62 PJ per annum of biomethane, at costs competitive with current natural gas prices ($9.4 for waste water treatment plans and $10.2 for landfill).[43]

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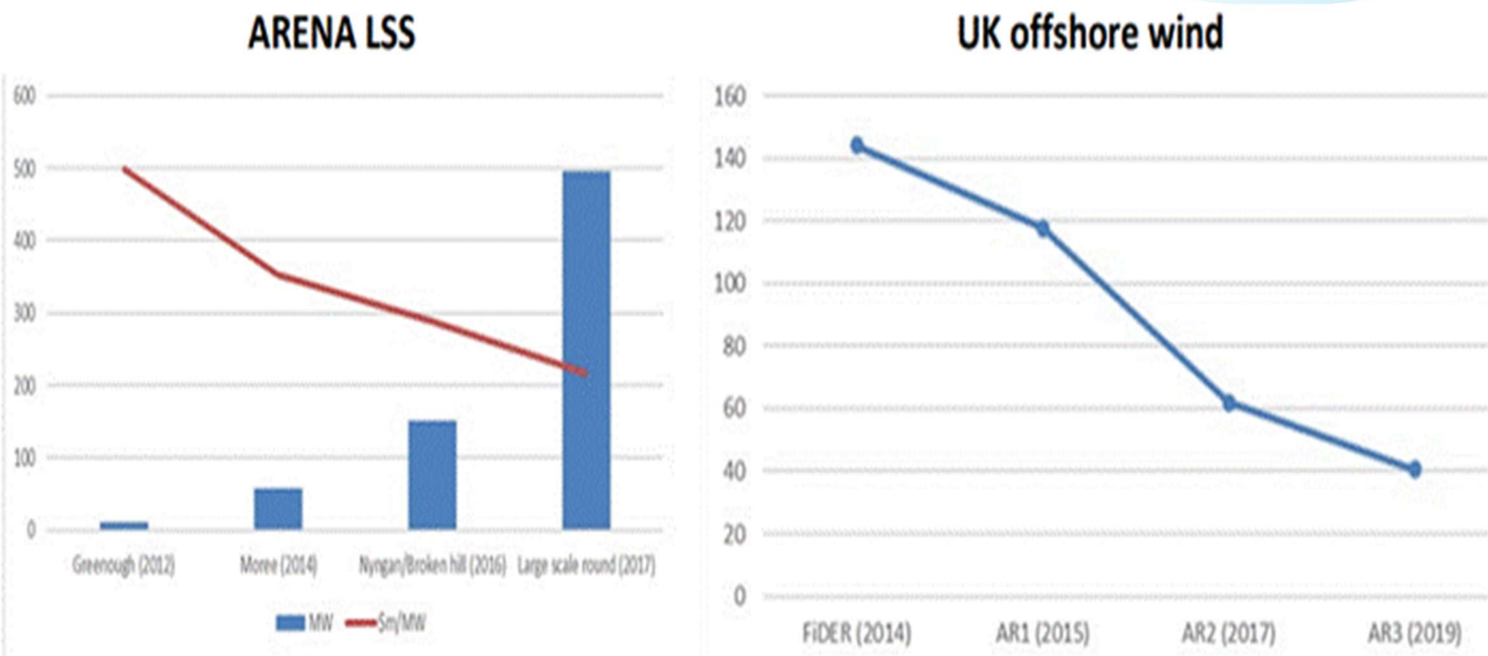
[41] Refer to footnote20.
[42] CSIRO, *GenCost 2024-25 Consultation Draft,* December 2024, Appendix table B.11 and section 5.3.16. Access here: https://www.csiro.au/en/research/technology-space/energy/GenCost
[43] Blunomy Report (for AGIG), July 2024, p.23

The RIS also overlooks the potential for the renewable gas industry to achieve materially lower costs as it matures. As demonstrated in the renewable electricity sector (examples of Australian Renewable Energy Agency (ARENA) Large Scale Solar projects and United Kingdom Offshore wind show in Figure 5), supportive policy stimulates demand and investment, which increases scale and drives down costs. We would expect to see a similar trajectory for renewable gas as a result of the policy support foreshadowed in the Renewable Gas Directions paper, which will drive investment in the sector.

Figure 5: Examples of Cost Reductions in Renewable Electricity Following Supportive Policy[44]



Blending renewable gases at scale using existing infrastructure is a platform to scale development of renewable gases. This has been done in international jurisdictions such as the United Kingdom and Denmark for biomethane. For hydrogen, work undertaken by the Australian Hydrogen Centre (AHC), jointly supported by the Victorian Government and ARENA, found that Victorian gas distribution network assets are largely compatible with transporting 100% hydrogen due to asset upgrades undertaken as part of AGIG's mains replacement program (MRP), with MGN's program expected to be completed in coming years.

Surveys of our commercial and industrial customers also indicated that for those looking to decarbonise with renewable gases, initial blending is a preferred option[45]. This is likely due to the lower costs of utilising existing infrastructure for hydrogen transport, than purpose-built hydrogen pipelines, which are around $0.42/GJ compared to $1.26/GJ for the latter[46].

AGIG's position, covered in our submissions to the Renewable Gas Consultation Paper[47] and Directions Paper[48], is that there is significant potential for renewable gases to contribute to energy supply in Victoria that can be enabled by utilising existing distribution network infrastructure. There is inadequate consideration of the options in the RIS.

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[44] Newgrange Consulting, 2021. *Renewable Hydrogen Policy Support: Analysis for Australian Gas Infrastructure Group (AGIG).* This analysis has been utilised in various policy submissions. Further details are available on request.
[45] KPMG Report (for AGIG), *Decarbonisation Pathways for Victorian Business: Experiences of Commercial and Industrial Gas Users*, July 2024.
[46] ACIL Allen, *Gas, liquid fuel, coal and renewable gas projections,* February 2025, 3.1.2. Access here: ACIL Allen fuel price report
[47] AGIG, *Submission to Victorian Government's Victorian Renewable Gas Consultation*, October 2023, Access here: https://engage.vic.gov.au/download/document/33278
[48] AGIG, *Submission to Victorian Government's Victorian Renewable Gas Consultation*, 7 February 2024, Access here: https://www.agig.com.au/-/media/files/agig/media-release/rg-directions-paper--agig-submission-070225-final.pdf

1.5.1. Voluntary Electrification

On voluntary electrification, several programs under the Victorian GSR already focus on energy efficiency and encourage electrification, such as incentives for electric appliances through the VEU scheme, the State Electricity Commission Electric Home Planner, solar for apartments, energy efficiency initiatives for social housing, and electric heat pump installation regulations[49].

Evidence suggests that voluntary electrification and energy efficiency programs can deliver significant savings in both electricity and gas consumption. For example, research on the activities of 'energy coaches' in the Netherlands indicates that their efforts alone can reduce gas usage by around 42% and halve the energy budgets of vulnerable consumers[50]. A combination of these non-regulatory options can deliver similar energy savings to electrification at a much lower cost and should be considered further. As detailed in section 1.4, there is evidence that consumer-led electrification alongside incentive program already in place, is resulting in declines in gas volume across the gas distribution networks.

Further investigation of alternative and potentially lower-cost options not considered in the RIS is warranted:

- Progressive electrification, where customers electrify appliances progressively where they choose to do so[51]; and
- Priority applications for renewable electricity are used to displace coal generation and liquid fuels used in light vehicles, and low-grade industrial heating, as detailed in BCG's analysis above[52].

On the second point, the BCG analysis also notes that the value from 1 MWh of renewable electricity being used to displace brown coal-fired power generation (between 0.8 – 1.2 tCO2e/MWh) is considerably higher than electrifying residential usage (between 0.7 tCO2e/MWh) – the latter would require in addition electricity distribution network upgrades, incremental capital cost of equipment, and consumption profile matching - all of which result in costs to consumers which are outlined in this submission.

1.5.2. Financial Incentives

In respect of financial incentives, the major argument appears to be one of cost, with the RIS suggesting that[53]:

> *Lastly, incentivising the scale of electrification required to address gas shortfalls and GHG emissions targets through financial incentives alone would impose a significant cost burden on the government. While financial incentives are useful support mechanism, particularly for low-income households, it is not a financially feasible option for the scale of change proposed. Despite increases in the uptake of existing electrification incentives, the uptake rate is not currently high enough to ensure Victoria meets its GHG emissions targets.*

This does not reflect how cost-benefit analysis is supposed to consider costs and benefits from the perspective of society as a whole. Unless the incentives required are larger than the full cost difference between a gas appliance and its electrical replacement (in which case, that would represent a value to gas which consumers have irrespective of costs, which means it should be accounted for in the cost benefit analysis), then the total cost of getting the appliance into the home is the same whether customers are required by law to install it or are provided with an incentive to get them to do it voluntarily. The only difference is who pays; whether it be the householder being required to buy an appliance at a higher cost or whether it be government providing a subsidy so the appliance is no longer more expensive to the householder. Or, to put it more correctly, the householder themselves, or the householder as purchaser of the appliance plus the householder as the taxpayer who funds the government subsidy programme through their taxes.

It cannot be an argument against a proposed approach involving subsidies that the required government subsidy is too high where the alternative is an option where the householder is asked to spend the money instead. It does not matter

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[49] Victorian Government, *Gas Substitution Roadmap Update 2024,* pp.8-9. Access here: gas-substitution-roadmap-update-2024.pdf
[50] Llewellyn, J et al 2025, Scientific Reports, *"Assessing the impact of energy coaching with smart technology interventions to alleviate energy poverty",* 13 January 2025. Access here: https://www.nature.com/articles/s41598-024-80773-9
[51] Ibid – see footnote
[52] BCG Report, June 2023, p. 13
[53] Building Electrification RIS, December 2024, p.152

who pays, so long as, in both instances, society as a whole is paying for the set of appliances. Whilst there may be evidence that uptake of certificates is lower in areas where there are more rental properties and lower levels of economic resources, this does not mean (as the BHL study cited by DEECA shows) that the only solution is a ban on appliances, but rather that more targeted use of support is required.

Additionally, the RIS notes that[54]:

> *Even if a financial incentive scheme covers the full cost of installation, building owners also have the logistical and administrative burden of organising the upgrades and may lose rental revenue if the property is uninhabitable while the upgrades are undertaken, and will likely be expected to maintain or replace installed appliances in the future, at their own cost. This would likely further decrease building owner's propensity to upgrade their properties in response to financial incentives*

The RIS assumes one hour of time at $36 per hour for the administrative burden of swapping an appliance and did the same for the Rental Standards RIS.[55] Whilst we consider that estimate to be too low, if the RIS believes it to be accurate, then it cannot simultaneously believe that it is burden preventing appliance switching.

1.6. Conclusion

When assessed against their ability to solve the problem statement in the RIS, the proposed regulations fall far short of their goal. The regulations would do little to solve the immediate challenges of making more gas available for industry, while simultaneously impacting investor confidence in gas exploration and investment, entrenching longer-term supply issues for Victorian businesses. The policy of accelerated electrification also fails to make much – if any – impact to emissions or energy bill reduction, as a premature transfer of the gas load to Victoria's coal-reliant electricity grid results in higher emissions-intensity energy use and increased costs flowing from additional energy infrastructure spend.

Moreover, it is not clear that the policy is needed. Gas volume per connection has been declining across Victoria's gas distribution networks since 2019 and a range of recently implemented government policies designed to reduce gas demand and incentivise electrification are yet to take full effect. As demonstrated by reputable academics and energy experts, accelerating these policies to a pace that exceeds the build out of renewable electricity – as would be the case with the preferred option in the RIS – would have the opposite effect of what the policy intends to achieve and would further entrench a reliance on coal, redirect gas savings into gas-generated electricity and increase the overall cost of the energy transition through requiring additional infrastructure spend to manage peak demand.

A range of more constructive alternatives exist that reduce demand and energy costs more quickly, and better solve the gas supply problem in both the short and long-term. We would strongly encourage the government to explore these options in lieu of imposing appliance bans with higher costs and disruptions for Victorians.

[54] Building Electrification RIS, December 2024, p.152

[55] Building Electrification RIS, December 2024, p.71

2. Gas Network Customer Impacts

In this section we expand on our concern that the options outlined in the RIS will have significant and far-reaching impacts on the gas distribution network and the customers who rely on it. The analysis in the RIS has significantly underestimated price impacts and customer consequences, specifically that customer bills could nearly double over 10 years and triple over 15 years. The long-term impact on Victoria's industrial sector, and hence Victoria's economy could be substantial and has not been taken into account. These risks must be carefully considered before any regulatory changes are implemented.

2.1. The Reliability and Investment into the Gas Network Infrastructure in Victoria

Our infrastructure is largely underground which makes it resilient to severe weather events and offers high levels of reliability. Industry measures of reliability support these claims, with very low unplanned system interruptions. When outages do occur, they tend to be localised and affect fewer customers involved than when outages occur in the electricity networks.

To maintain the high level of reliability, safety and performance, we invest in our assets including through our mains replacement program. This replaces older mains pipes with polyethylene pipes which provide improved reliability and support the delivery of renewable gases. The 2023-28 program of mains replacement represents an investment of $30 million[56] for our AGN network (now fully complete) and $408 million[57] for our MGN network. The program has also been supported by the Victorian Government through Energy Safe Victoria to ensure we meet the safety standards at which we deliver gas to our customers. While this was a safety driven program with its aim to reduce leaks, it also had added benefit of improving reliability as well as making the network ready for renewable gases.

The value and potential of Victoria's gas distribution networks seem to be overlooked in the RIS. These networks are valuable assets that can meet the energy demands of Victorians without the significant costs required to shift the load to electricity networks. Given the ongoing challenges and delays in decarbonizing electricity networks, all options need to be considered to meet decarbonization targets.

2.2. The Economics of Infrastructure and Impact of Customer Numbers

Gas networks, like other essential infrastructure such as electricity, rail, and water, operate on a declining cost model. Once the fixed costs of building the network are covered, adding new customers is relatively inexpensive, meaning costs are spread across more users, keeping prices lower for all.

This approach to pricing and development has allowed the network to grow in line with customer needs – reaching across the state and allowing industry to locate where it suits to run their business, for example choosing to co-locate with other businesses, supply chains and component suppliers or manufacturers, service providers (e.g. services for workers, restaurants and cafes located in industry), roads and transport infrastructure, and workforce (particularly in regional areas).

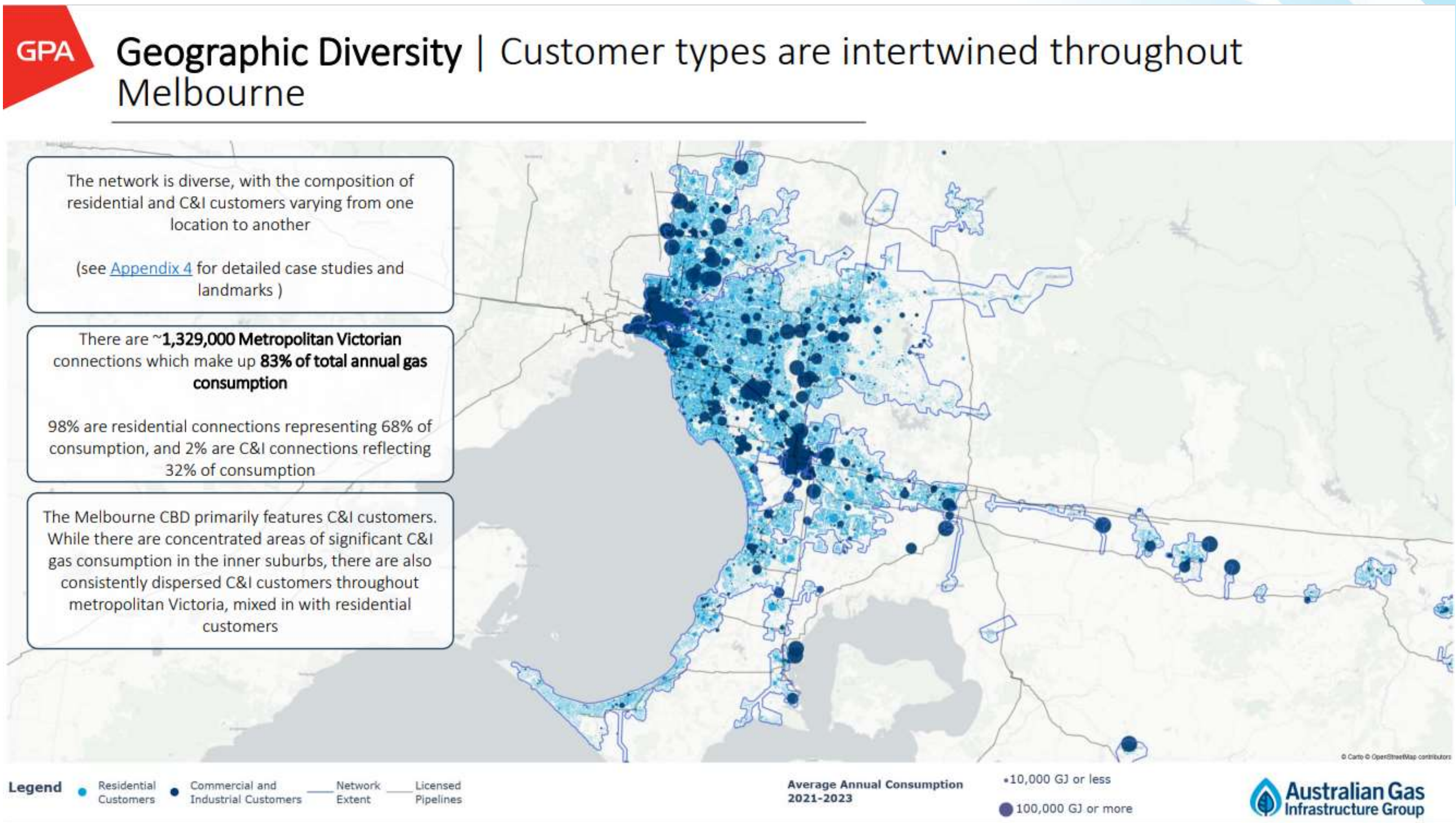
As a result, residential, commercial and industrial users are spread across AGIG's 20,000km of Victorian gas distribution networks. This is shown in Figure 6, which highlights how more than 500 industrial customers (dark blue dots) are spread across the state.

This is important because falling average costs work both ways. If customers start to leave, costs per customer starts to rise. A key issue, then is how many customers leave, over what timeframe, and what the long-term consequences of this will be.

We consider that the RIS has materially underestimated the rate at which customers will leave the network, and subsequently the impact on customers in the short and long-term.

[56] Australian Energy Regulator (AER), *Final Decision, Attachment 5 – Capital Expenditure, Australian Gas Networks (Victoria & Albury) Gas distribution access arrangement 1 July 2023 to 30 June 2028*, p 6, table 5.1. Access here: https://www.aer.gov.au/system/files/AER%20-%20AGN%202023-28%20-%20Final%20decision%20-%20Attachment%205%20Capital%20expenditure%20-%20June%202023.pdf

Figure 6 Geographic Diversity of Customers in AGIG Networks[58]



2.3. Expected Gas Network Disconnection Rates will be Higher

A key assumption made in the RIS is that only 12.6% of customers completely disconnect from the network, derived from an assumption of the proportion of existing customers who have gas space and water heating but an electric cooktop[59]. This is specifically detailed in the RIS document which states:[60]

> *As noted in Section 5, this approach assumes properties only electrify appliances that are required by the regulatory change, such that voluntary uptake is the same as under the Base Case. There may be an increase in properties that, having been required to electrify two appliances, also choose at that point to electrify all remaining appliances and then disconnect from the gas network. Increased voluntary electrification and disconnection from the gas network under sub-options would increase the impact of network supply charges for remaining gas customers*.

The 12.6% disconnection rate, assumes that customers will keep gas appliances, unless regulations require them to do otherwise. No reason is given in the RIS as to why customers would behave in this way. We do not believe this assumption is reasonable because the likelihood of customers retaining their gas connection for cooking alone, is impacted by their preferences (gas versus electric), their personal circumstances and the relative costs of alternate fuel sources (network gas versus LPG and electric).

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[58] GPA Engineering, *AGIG Victorian Distribution Network Overview – Summary Report,* 2025. Access here: https://www.gpaeng.com.au/wp-content/uploads/2025/02/240899-INT-003-r1-AGIG-Victorian-Distribution-Network-Overview.pdf – see p11.
[59] Building Electrification RIS, December 2024, p.64
[60] Building Electrification RIS, December 2024, footnote 331

When we analyse current customer behaviours across our networks (more than 2 million connections across Victoria, South Australia, New South Wales and Queensland), on average only 14% of residential connections have a gas cooktop but no other gas appliances[61]. This provides a more evidence-based indication of likely disconnection rates.

Additionally, under all options in the RIS, bottled or reticulated LPG usage is permitted[62]. For those customers who prefer to cook with gas, the cost differential between LPG and gas delivered by the network is an important driver. At present, for the average cooktop load of circa 7 MJ per day, an LPG bottle costs $296 per annum, and the gas network cost is $361.

With the assumption of only 12.6% of customers disconnecting from the gas network, which is considerably lower than what the evidence suggests, the RIS models bills rising approximately 40% by 2040 and then levelling off (RIS Figure 7.8). If the assumption of only 12.6% of customers leaving the network is incorrect – which is likely given the cost differential outlined above and as supported by actual customer behaviour – then gas network price consequences are much greater.

We see short-to-medium term impacts arising over the period of roughly 15 years as existing customers swap their gas hot water and space heating appliances for electricity and then decide whether to remain on the network for just their cooking load, and then a longer-term impact for commercial and industrial customers who need gas into the future. We discuss both of these impacts below.

2.3.1. Short-to-Medium Term Consequences

The short-to-medium term is the period during which residential customers are swapping their existing gas space and water heating appliances, and then making a decision about whether to keep their gas network connection just for the cooktop load. As noted above, this would be more costly than switching to LPG (or an induction cooktop) for these customers.

To understand this, we modelled 2 disconnection scenarios:

- Scenario A – where 86% of residential customers disconnect from the network, leaving 14% connected for the purpose of operating their gas cooktop only (14% is the proportion of customers across our Australian networks who currently have a gas cooktop and no other gas appliances).
- Scenario B – where residential customers electrify all appliances as they reach end-of-life and disconnect from the network. In this scenario, after 14 years, all residential customers leave the network, with 14 years chosen as the lifespan of the last gas appliance installed in 2025.

We consider the second case to be the more realistic potential outcome, as it maps to the differences in costs. In this scenario the decrease in gas demand leads to an increase in price – consistent with the economics of infrastructure – which then results in a further drop in demand, commonly referred to as a *death spiral.*

Under both scenarios, the cost of disconnecting from the gas network is socialised with the remaining gas network users. We also assume that there is a change to our depreciation schedule so that all of our current asset base is recovered by the end of the transition period. If the RIS is implemented, we will most likely be making an application to re-open our existing access arrangement to give effect to those changes, given the importance of every year for the recovery of our investments which have been supported by various government departments up until 2025.

The result would be that industrial and commercial customers over the longer-term pay only their ongoing operating and maintenance costs rather than any legacy costs associated with the residential network[63]. Finally, commercial and industrial customers are assumed to remain connected to the network, with no growth and disconnecting at historic rates.

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[61] *Analysis based on an assessment of usage per residential connections. Residential connections consuming 3GJ per annum or less are assumed to have a cooktop alone.*
[62] Building Electrification RIS, December 2024, p.13
[63] Any change in depreciation would require approval by the AER. Assuming all of our existing assets are depreciated rather than all except the specific assets required for industrial users is a simplifying assumption which raises prices now more than would otherwise be the case, and lowers them more than would otherwise be the case over the longer term (we can only recover our assets once, so the total cost to customers is the same, but it is just shared differently).

The resulting average impact on network charges is between 16 and 20% per annum for the next 14 years (see Table 1) significantly more than the increases suggested in the RIS[64].

Table 1 Per annum network charge changes resulting from the RIS

Scenario	Average Annual Increase Across AGN and Multinet
Scenario A: 14% residential customers left after 14 years	16%
Scenario B: 0% residential customers left after 14 years	20%

With annual network price rises of 16 to 20%, it takes only 5 years (not 15 as suggested in the RIS) for retail bills to rise by 40%, ten years for them to double and 12 to 13 years for them to triple. If bills double, LPG is on par with the price of network delivered gas for an average Victorian household of 2 to 3 people using gas for water, space heating and cooking and, if they triple, LPG is cheaper for even very high users of domestic gas[65].

The higher gas network bills are, the less likely it is that cooktop only customers will remain (as the RIS assumes) and the more likely it is that all residential customers will leave the network.

The expected changes to network costs for Scenario A – 0% residential customers left on the network, and a 20% p.a. increase, are illustrated below in Table 2.

Table 2 Indicative p.a. network bill increases for network customer - Scenario A

Customer Type	Average network bill now (2025) – p.a.	Expected network bill p.a. – 2030 *(248% ↑)*	Expected network bill p.a. – 2035 *(619% ↑)*	Expected network bill p.a. – 2039 *(1284% ↑)*
Residential	$393	$977	$2,431	$5,041
Commercial – Tariff V	$1,481	$3,684	$9,167	$19,009
Industrial – Tariff D	$13,513	$33,625	$83,671	$173,500

Expected changes to network costs for an average customer based on Scenario B (14% residential customers left on the network), and a 16% p.a. increase (as outlined above in Table 1) are illustrated in Table 3.

[64] Building Electrification RIS, December 2024, Fig 7.8, p 110
[65] How network charges translate into bills for customers depends upon assumptions about gas wholesale costs and retail charges. According to the AER *State of the Market Report* 2024, p 246) the wholesale gas price comprises 40% of a residential retail bill, network charges making up 40% and retail margins comprising 20%. If wholesale gas prices and the dollar value of retail margins stay constant and the network charges increase by 20% per annum, network charges will be some 60% of the overall retail after 5 years and roughly 80% in 10 years. Beyond this point growth in network charges starts to rise exponentially as customer numbers get small.

Table 3 Indicative p.a. network bill increases for average customer - Scenario B

Customer Type	Average network bill now (2025) – p.a.	Expected network bill p.a. – 2030 (210% ↑)	Expected network bill p.a. – 2035 (441% ↑)	Expected network bill p.a. – 2039 (799% ↑)
Residential	$393	$825	$1,732	$3,136
Commercial – Tariff V	$1,481	$3,110	$6,531	$11,826
Industrial – Tariff D	$13,513	$28,383	$59,613	$107,938

This brings us to the potential long-term consequences.

2.3.2. Long-term Consequences

If residential customers leave over the short-to-medium term as outlined above, after approximately 14 years (based upon the RIS' assumption on appliance life), the only remaining customers will be industrial and commercial customers for whom electrification is either technically unfeasible or is cost-prohibitive.

As shown in Figure 6, these customers are geographically dispersed, requiring a significant portion of our existing network to be maintained to ensure reliable gas supply. From a gas network cost perspective, the lowest cost pathway for these customers would be where our current asset base is recovered from residential customers over the transition period – as modelled in the preceding section. This would allow industrial and commercial customers to pay only for ongoing operating and maintenance costs once residential customers leave the network.

In this scenario, operating and maintenance costs also change:

- Customer related categories such as maintenance of customer meter sets, meter reads, and customer service activities would reduce at the same rate as customer numbers reduce. This represents around 50% of operational expenses.
- Gas mains related work such as pipe maintenance, leak survey and leak repairs declined in-line with the length of mains left for AGN Victoria, however increases over time for MGN as our current investment in mains replacement ceases, and leaks on the older cast iron mains increase, along with associated repair costs.

Categories of work such as pressure reduction station maintenance and transmission pipeline maintenance see no change over time as these activities are still required to service industrial customers.

These costs are divided by current demand from industrial customers to make a comparison with current prices – consistent with the economics of infrastructure. Under this 'best case' scenario, gas network charges essentially triple.[66]

We make no comment on how many of our industrial customers would be able to absorb a tripling in their network charges; however we strongly recommend that consultation on this matter is undertaken with industrial customers. We also make no comment about how much it might cost our industrial customers to relocate which may enable the length of mains required to be reduced, nor how long this would take. Again, this is information that should be established before any changes are made that could force industry to relocate.

Our analysis outlines how the proposed RIS is likely to have near and long-term impacts on gas network charges which will have a significant impact on customer bills. This will particularly impact industry – the very customers for whom the RIS is proposed to benefit in terms of gas supply. The impact on the cost structure of Victorian industry which

[66] It is also assumed that customers could choose when to leave the network rather than be told when their section was being decommissioned. This impacts how long the gas mains are required as they can only be removed when the last customer has left the network; and that existing high level of public safety are maintained.

should be considered very carefully before it is imposed is not something which can be monitored ex-poste as, to the extent that residential customers do leave, each one leaving will negatively affect future prices faced by industry in a manner which is not reversible. Already, the gas connection ban will have a progressive impact, driving higher network charges for industrial customers

2.4. Related Customer Impacts

In the discussions above, we assume that existing commercial customers remain on the network as most are exempt from the requirement to replace appliances at end of life.

The RIS acknowledges that there is a lack of public information on commercial customers. Section 5.2.2 of the RIS calls for additional information to inform the commercial analysis it undertakes and notes that much of the input data in the analysis needs further work. We support this and consider that the RIS should not progress without this understanding.

The net benefits and Benefit Cost Ratios for the commercial sector[67] are very small (we estimate them at approximately $50 million), and it seems unlikely, once further information emerges, that extending the appliance ban to new commercial businesses would be in the public interest. For example, we note that the RIS analysis[68] is somewhat arbitrary and effectively assumes, in the absence of publicly available data, that smaller businesses use residential gas appliances primarily for space and hot water heating, and that half of businesses are small businesses.

As part of GPA Engineering's assessment of our Victorian networks mentioned above, we asked GPA to understand how commercial customers use gas. In summary, commercial business gas use is complex and varied, with commercial customers using gas differently and at different volumes across our network[69]. This is illustrated in the

[67] Building Electrification RIS, December 2024, p 123, Fig 8.1
[68] Building Electrification RIS, December 2024, p 71
[69] GPA Engineering Report, 2025, Appendix 3 p29.

It is also important to note that commercial and industrial customers overlap – for example, the cement, concrete, lime and plaster manufacturing sector is made up of both commercial (Tariff "V" volume) and industrial (Tariff "D" demand) customers, and the volume of gas consumed may reflect the scale of the business or manufacturing process, rather than the use of high heat applications.

In July 2024, AGIG commissioned KPMG to gain a deeper understanding of our commercial and industrial customers' decarbonisation plans. We heard from almost 100 Victorian businesses to understand their current uses of gas, replacement plans for assets, views on alternative energy sources, including key drivers and barriers to decarbonisation, and their attitudes towards renewable gases. Our key findings highlight the diversity of these commercial businesses, and by extension, the varied impacts the RIS will have across the sector. Key insights from the study include:

- Financial barriers dominate decision-making with "long time to recover capital" - ranked as the top barrier to decarbonisation, followed by high upfront costs.
- Many businesses face near-term asset replacement decisions, with nearly half of the 50 commercial businesses we heard from having asset replacement milestones by 2030, primarily for water heating or space heating.
- When planning future asset replacements or upgrades through to 2040, pathways to decarbonisation are mixed, with 42% of businesses indicating a preference for natural gas or biomethane, while 38% were considering switching to an electric alternative. Only 20% are looking to fully electrify their gas assets in the next 15 years, with cost, performance and reliability cited as the main decision factors.

These findings reinforce that commercial and industrial businesses have unique operational needs, meaning the impacts of the RIS will not be uniform. Many businesses still see a role for gas – whether natural or renewable – in their long-term energy strategies. As outlined earlier, network cost increases from the RIS will add further financial pressure on these businesses, and access to renewable gases may also be constrained by economic barriers (as discussed above in Section 1.5 Insufficient Analysis of Non-Regulatory Options

In addition to our submission, AGIG strongly encourages the views of industry to be considered in finalising this process.

Finally, there is the issue of the relative costs of gas and electric commercial kitchens; under Option 3 (the preferred option) existing commercial premises can use gas, but new ones cannot. To the extent that this has cost implications, it has potential competition implications. This is discussed in greater detail in Section 4 Impact Assessment.

2.5. Conclusion

The RIS underestimates the likely rate of residential customers who will leave the network, resulting in significant cost impacts to existing users left on the network. Indicative annual network cost increases range between 16 and 20% per annum, with the potential for longer term cost impacts on the industrial sector.

3. Cost Benefits Analysis

This Section summarises our response to the Cost Benefit Analysis in the RIS. We note that several of the issues identified here were also raised in our submission to the Victorian Government's Minimum Standards for Rental Properties and Rooming Houses Regulatory Impact Statement[70]. We note these concerns have not been considered in the current RIS and do not appear to have informed the analysis undertaken. We therefore raise these points again for consideration in this consultation process. Further detail on our analysis is provided in the Technical Addendum.

3.1. Concerns with the Cost Benefit Analysis

3.1.1. Misunderstanding of the Residential Baseline Study Document

A misunderstanding of the Residential Baseline Study document in respect of space heating, and an over-estimate of the amount of water used by an average Victorian household causes a significant over-estimate of energy savings. When corrected, the true energy savings are only 70% of the energy savings stated in the RIS. When applied to the Net Present Value (NPV) dollar terms in the RIS' preferred option ($3.435 billion), this results in an overstatement of $1.171 billion.

The Residential Baseline Study uses homes with very different characteristics, different usages of energy and different jurisdictions etc. When the data is used in the RIS analysis, the result is not a like-for-like comparison of the impact of swapping from gas to electric appliances in a given house, with the same characteristics. Instead, the analysis has measured the cost savings which would arise from moving from a house with gas appliances to a house with electric appliances but with completely different characteristics. The consequence of this is that the modelling is inconsistent in respect of the amount of energy output from a gas appliance compared to an electric appliance. This causes a significant over-estimate of energy savings, which leads to a significant over-estimate of running cost savings noted above.

3.1.2. Gas Network Augmentation

The network augmentation costs assume a level of new home uptake of gas appliances in the absence of the appliance ban which would not occur if customers consider solely the cost of appliances.

Under the assumptions of the RIS, the cost of a new gas appliance, once the requirement to pay for a connection is factored in, is higher than the cost of an equivalent new electric appliance. The RIS implicitly assumes that appliance choice is based solely on cost. We do not agree with that assumption, but note that if it were correct, no new customers would choose gas appliances, regardless of the proposal in the RIS.

This means that most of the purported benefit shown in the analysis disappears as existing customers impose no gas network augmentation costs. The underlying problem is that the data on gas appliance uptake comes from 2021, before policy changes such as the ban on gas rebates, the removal of gas appliances from the Victorian Energy Upgrades program, and the introduction of upfront connection costs, and it is therefore not an accurate proxy for how new customers would behave. Data on current market conditions and customer behaviour should be collected before the analysis can be properly undertaken.

3.1.3. Other Material Issues

There are a number of other material issues with the Cost Benefit Analysis which are addressed in more detail in the Technical Addendum and summarised below:

- A similar issue to the logic discussed in section 3.1.1 above affects cooling appliance capital benefits, which would not accrue to new customers for the same reason. Additionally, the RIS appears to have over-estimated

[70] AGIG Submission, *Minimum Standards for Rental Properties and Rooming Houses Regulatory Impact Statement*. Access here: https://www.agig.com.au/-/media/files/agig/media-release/rental-ris/240715_rental-appliance-ban-ris-response_final_agig.pdf

the benefits to existing customers because of an erroneous assumption about when cooling appliances are replaced.

- The RIS has used values for carbon prices which are in excess of the values agreed to by the Ministerial Energy Council. This has the effect of significantly overstating carbon cost savings. This is an issue we, and others, had previously raised in the context of the Minimum Standards for Rental Properties and Rooming Houses RIS.
- The RIS significantly understates the “administrative” costs incurred by customers who must switch to an entirely new appliance with which they are unfamiliar. We have sought the views of the Master Plumbers Association who deal with appliance installation to understand the different process flows which go with installing a replacement gas and a new electric appliance to give a better estimate of administrative costs.
- The RIS analysis ignores practical matters like the fact that electric hot water appliances require a plinth for mounting, which raises their costs. This is an issue we raised in the Minimum Standards for Rental Properties and Rooming Houses RIS. Despite being a simple omission, it adds up to a significant new cost when multiplied by the amount of properties which would be installing these new appliances under the government’s preferred option.
- The use of retail energy prices is incorrect, and the RIS should have used the socially avoided costs of energy instead. A more robust methodology would estimate the avoided underlying economic costs of energy supply (wholesale costs). This has the effect of reducing net benefits by about $1.4 billion for the preferred option.

We note that our ability to provide an assessment of the Cost Benefit Analysis is constrained by the lack of transparency of the modelling, which has not been made publicly available. This means that stakeholders cannot trace through the impact of errors to understand exactly how they might impact the final conclusions reached on the purported costs and benefits. Final policy decisions should not be made until stakeholders have had a chance to do this to ensure the firmest foundation upon which to base policy. Not doing so is unacceptable for a proposed policy of this significance.

3.2. Table Summary of Cost Benefit Analysis Issues

We have summarised our best estimate of the overall impacts of correcting the errors in the Cost Benefit Analysis in Table 4 below, noting the limitations set out above.

Table 4: Recasting of Costs and Benefits - 10-year benefit stream case ($million)

	DEECA RIS result	AGIG corrections	Final result
Appliance upgrade and installation costs	$4,766	$0	$4,766*
Building upgrade costs	$1,051	$0	$1,051*
Administrative cost	$53	$953	$1,006
Cost to government	$11	$0	$11
Plinths and outdoor space	$0	$839	$839
Outdoor space restrictions	$0	$6,515	$6,515
Network reliability	$0	$170	$170
Total costs	***$5,882***		***$14,358***
Avoided energy cost	$4,226	$1,171	$3,055
Avoided GHG emission costs	$3,282	$560	$2,722
Avoided air pollution costs	$49	$0	$49
Avoided capital cost of cooling appliances	$2,664	$705	$1,959
Avoided gas network costs	$678	$582	$96
Total benefits	***$10,900***		***$7,881***
NPV	*$5,01874*		*-$6,477*
BCR	***1.8526***		***0.55***

** We have not addressed appliance costs and installation issues as this is not our core expertise, but do note some potential issues. For example it appears the government has used the cost of a condensing instantaneous gas hot water system and the efficiency of a standard gas hot water system which is inconsistent and would contribute to a much higher cost estimate for gas. We would urge the government to consult more with stakeholders who have expertise on appliance upgrade and installation costs, such as GAMAA.*

3.3. Conclusion

Due to several omitted costs and an over-estimate of benefits, the net benefits of the preferred option in the RIS have been substantially over-estimated by roughly $11.5 billion. This assessment has been undertaken on the information available and is likely to be conservative given the modelling has not been provided, and that issues with items such as appliance costs have not been included. These matters should be addressed and taken into account before any final policy decisions can be made.

4. Impact Assessment

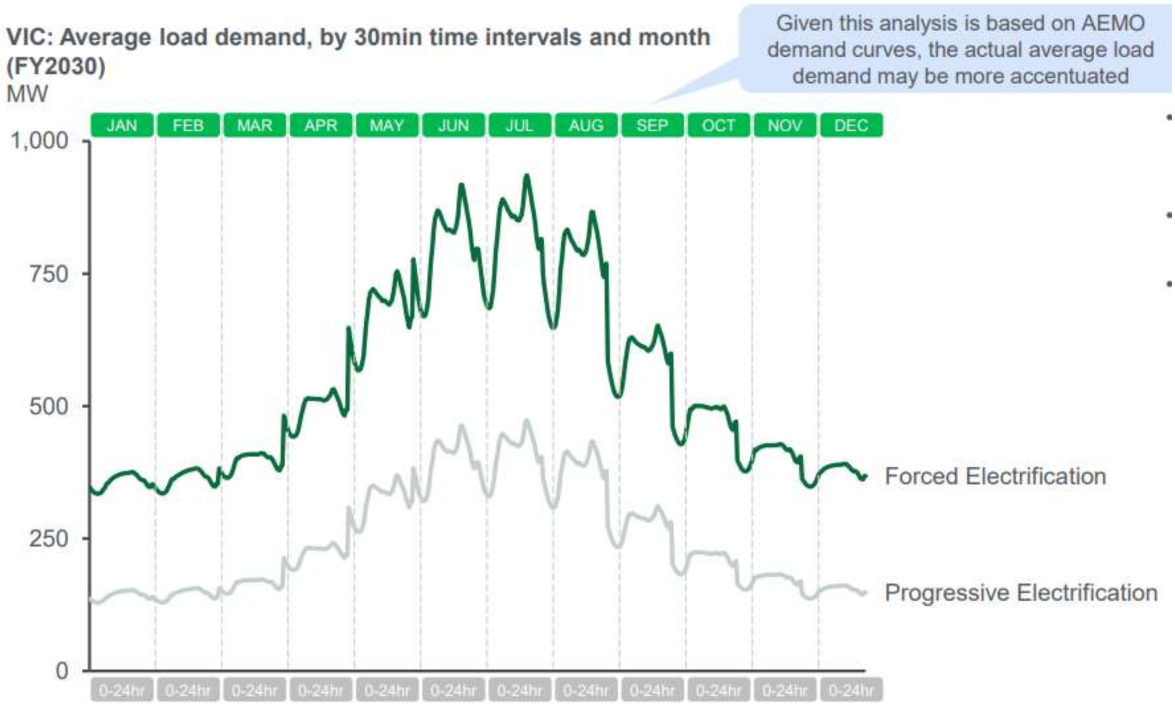
This Section summarises our analysis of the impact assessment in the RIS, and considers a number of wider economic impacts which have not been properly analysed or considered. More information from affected industries is required to enable a full analysis of the impacts of the proposal and we urge the government to seek this information as part of the RIS consultation process.

The proposal in the RIS, if implemented, will have very significant consequences for households, small businesses and industry, many of which would be irreversible. Dealing with potential issues as they arise as part of the implementation and monitoring plan as proposed in the RIS will be completely insufficient.

Further discussion is included in Section 8 of the Technical Addendum and summarised below:

- The analysis of electricity network impacts delivers counterintuitive results. The base case causes peak demand to increase by over 40%[71]. However none of the options, which add roughly two thirds of the residential housing stock and all commercial demand to the base case, make any difference at all to peak demand. We also note that electricity networks point to substantially more electricity network investment than the RIS, with AusNet Services expecting 18% growth over 2026-31 in winter peak demand in its recent 2026-31 regulatory proposal without the RIS[72]. Analysis by L.E.K. Consulting also indicate that the RIS (the "Forced Electrification" scenario) results in a significant increase in the winter peak on the electricity grid, as shown in Figure 7[73]. In addition to these costs, the savings in gas network augmentation costs have been included in the Cost Benefit Analysis, but the increases in electricity distribution investment costs have not. The Cost Benefit Analysis should cover the net costs of investment in gas and electricity networks rather than excluding additional electricity network investment all together.

Figure 7 - Extract from LEK. Consulting report - Victorian average load demand as a result of the RIS



[71] Building Electrification RIS, December 2024, Figure 7.3
[72] AusNet, *Electricity Distribution Price Review 2026-2031 Engagement*. Access here: [Electricity Distribution Price Review 2026-2031 Engagement | Community Hub]
[73] L.E.K. Consulting Report, February 2025, p. 32, footnote 29

- Gas appliance manufacturer impacts are also not considered. The proposal in the RIS is likely to have very significant effects on gas appliance manufacturers and the availability of appliances. This will have a significant impact on residential and commercial customers who have exemptions from gas appliance bans, and for the Victorians who choose to retain a gas cooktop under the government's preferred option.
- The renewable gas industry assessment concludes that the industry is too costly to be viable and that the Victorian government will help develop it to support hard to electrify industries.[74] We welcome the development of policies encouraging investment in renewable gases in Victoria through the Renewable Gas Directions Paper, which is supportive of low-cost renewable gas for industry. The best and most commonly used policy option to assist a developing industry is to increase scale and thereby reduce costs. The proposal in the RIS will have the opposite effect by deliberately removing potential sources of demand. Banning gas appliances and reducing customer numbers will significantly increase transportation costs, making renewable gases less viable. The result will be limited scope to reach scale in production. This will likely adversely affect the 'hard to abate' sector. Additionally, the potential for renewable gas to lower emissions at a relatively low cost of carbon has been overlooked.
- The competition assessment in the RIS analysis is incorrectly focused. The RIS suggests that, because there are towns with no reticulated gas supply where business operates effectively, competition is not affected. However, there is no consideration of the competition impact where existing businesses can use gas (as per Option 3) and new businesses cannot. The proposal in the RIS will lead to cost differentials between businesses and competition will be significantly affected. Industry submissions and / or further consultation should be used as a starting point to understand how cost differences might arise where some businesses can use gas but others cannot. Detailed analysis of the competition impacts of these cost differences needs to be undertaken. In our view this analysis needs to occur before the Minister can issue a competition policy certificate.

4.1. Conclusion

The assessment of wider impacts of the proposal in the RIS is very brief and lacks depth. There are a number of potentially serious impacts across the whole of the Victorian economy which have not been considered at all. Many of these impacts are likely to be structural if the proposal in the RIS is implemented and difficult to reverse. Significantly more assessment of impacts is needed, both in respect of distribution networks and customers (see Section 2) as well as wider impacts.

[74] Building Electrification RIS, December 2024, p.150

5. Implementation Issues

Notwithstanding the issues of increased network costs, reduced competitiveness and other concerns that we have covered in our submission, the implementation of the proposed regulations will have significant – and in some cases, unprecedented – challenges, the scale of which does not appear to be appreciated in the proposal.

If the practical implementation of this policy is not fully considered and adequately planned, it could lead to consequences ranging from prolonged disruptions to essential services in homes to potential human harm if the discontinuation of gas services is not effectively managed during the policy's rollout.

In this Section we raise a range of issues that we have identified that would reasonably create concerns or impose a barrier to implementing a ban on gas appliances in the way that the RIS is proposing.

5.1. Electricity System Readiness

The modelled benefits of the proposed policy to electrify buildings are highly dependent on the successful delivery of Victoria's broader electricity transition. This is despite significant concerns regarding Victoria's energy system's ability to replace its existing reliance on aging coal plants, coupled with delays in bringing renewable electrcity online quickly enough to replace the retiring coal-fired power sources. Currently, Victoria's primary energy supply is comprised of[75]:

- Coal – 33.4% of supply, primarily for electricity;
- Oil – 39.1% of supply, primarily for transport;
- Natural gas – 18.1% of supply, used for electricity (~2.6% of end use), mining (~1.3%), commercial and industrial users (~5.9%), and homes (~8.2%)[76]; and
- Renewable energy – 9.4% of supply, primarily for electricity.

Replacing coal with renewable electricity while also ensuring sufficient additional renewable supply to electrify cars and building loads represents a fundamental shift in Victoria's energy system—transitioning approximately 90% of its existing energy sources to new supply, storage, infrastructure, and usage patterns.

These policies are also highly interdependent—if coal is not phased out as planned, or equally exits without sufficient replacements, emissions outcomes, system reliability, and costs will be adversely impacted.

In recent years, the energy transition has experienced headwinds in developing new supply driven by a range of considerations such as international competition for capital investment, market uncertainty including price shocks and political intervention, approval challenges, higher financing costs, and supply chain shocks caused by COVID-19 and international conflicts[77].

Several critical challenges in Victoria's energy transition that are not considered in the RIS include:

- Renewable supply challenges: Victoria requires 25 GW of new renewable electricity by 2035, equating to around 2.27 GW per annum[78]. However, deployment has lagged with only 0.288 GW commissioned and 0.290 GW financially committed in 2024[79]. Delays in offshore wind (4 GW planned by 2035) – including delays on the release of the next stage of Victoria's offshore wind strategy – are particularly concerning as the state is relying on this fuel source to replace a large amount of the energy currently generated through coal. Other material developments include a ~98% reduction in solar feed-in tariffs from 1 July 2025 (6.3 GW in rooftop solar

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[75] Department of Climate Change, Energy, the Environment and Water, *Australian Energy Update 2024*, Figure 13: Australian energy mix, by state and territory, 2022–23. Access here:https://www.energy.gov.au/publications/australian-energy-update-2024

[76] Primary end-use calculations are based on 18.1%, multiplied by sub-sector Victorian estimates from BCG Report, June 2023, p.6

[77] Oxford Economics Australia (2025). *2025 IASR Planning and Installation Cost Escalation Factors*, p. 3. Available at: https://aemo.com.au/-/media/files/major-publications/isp/2025/stage-2/2025-iasr-planning-and-installation-cost-escalation-factors.pdf?la=en

[78] DEECA (2024). *Cheaper, Cleaner, Renewable: Our Plan for Victoria's Electricity Future*, p. 17. Access here: https://www.energy.vic.gov.au/__data/assets/pdf_file/0014/715010/our-plan-for-victorias-electricity-future.pdf. Calculated based on 11 years of deployment between 2024 and 2035, with 25 GW / 11 years = 2.77 GW per annum.

[79] Calculated using data from the Clean Energy Council's (CEC) Q1, Q2, Q3 and Q4 2024, which provide insights into renewable energy projects and investment trends. All reports are available at: Clean Energy Council (2024). Reports & Publications. Available at: https://cleanenergycouncil.org.au/clean-energy-council-reports (Accessed: 5 March 2025).

planned by 2035), which add further risk[80]. At end-2024, Victoria has 3.27 GW of renewable generation either financially committed or under construction— just 13% of the capacity required to meet its 2035 targets[81].

- Transmission constraints: Victoria's electricity grid, originally built for Latrobe Valley coal generation, requires $12.7 billion in transmission upgrades to connect new renewable projects[82]. Delays caused by community opposition, planning constraints, and supply chain have delayed these upgrades, prompting government intervention to review transmission guidelines[83].
- Coal extensions: Phasing out Victoria's existing 4.8 GW of coal-fired power stations to achieve 95% renewable electricity by 2035 requires ~11 GW of wind or ~13 GW of large-scale solar[84]. Actual requirements would vary based on factors such as geographic location, grid infrastructure, and storage capabilities. Noting challenges to supply and transmission outlined above, concerns over price volatility and grid reliability have fuelled speculation about confidential agreements to extend the operation of coal-fired power plants, including Yallourn (scheduled to close 2028) and Loy Yang A (scheduled to close 2035)[85].

The RIS acknowledges in its executive summary that Victorian gas networks delivered nearly double the energy of electricity networks, with 104 PJ by gas compared to 54 PJ of electricity. It also assumes the additional electricity required is projected to be largely supplied by increased generation from variable renewable electricity supported by energy storage and GPG. However, it does not provide any consideration for the amount of new generation required or specify where it will come from.

Even with a generous assumption of 4x appliance efficiency, the electricity supply required to replace 104 PJ of gas energy is approximately ~24 GW of wind or ~29 GW of solar, effectively doubling Victoria's target of 25 GW by 2025[86]. This is further exacerbated by the electrification of transport including Victoria's goals of fully decarbonising road transport by 2045.

The reports from Griffith University and L.E.K. Consulting, which we have referenced throughout this submission, make conclusions that aggressive electrification will exacerbate the challenges listed here, and have significant impacts for whole-of-system energy stability and costs. Modelling released in recent days for Infrastructure Victoria's draft 30-year strategy (completed by Jacobs) adds further support to the findings of Griffith University and L.E.K. Consulting.

The Jacobs report models eight 'energy risk events' for the state which include the known challenges of transmission and renewable electricity project delays. It finds that in Victoria all eight risks events are 'likely' and that if they materialise, there will be 'severe' effects on affordability, reliability and emissions.

For these reasons, a proposal that intends to shift further strain onto this electricity system would seem at a very high risk of failure - whether that is because of sufficient electricity reserves or because it significantly increased prices as a result of the supply-demand imbalance. This deserves careful and clear-eyed attention by policymakers and is disappointingly overlooked or oversimplified in the RIS.

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[80] Essential Services Commission (2024). *Minimum feed-in tariff review 2025–26: Draft decision*, p. 7. Available at: https://www.esc.vic.gov.au/electricity-and-gas/prices-tariffs-and-benchmarks/minimum-feed-tariff/minimum-feed-tariff-review-2025-26

[81] CEC (2024). *Quarterly Investment Report: Large-scale Renewable Generation and Storage, Q4 2024*, p. 5. Available at: https://cleanenergycouncil.org.au/getmedia/baf51990-48e7-4d0c-b88d-8920eb78d55f/cec-quarterly-report_q4-2024.pdf

[82] Ibid., p.25.

[83] DEECA (2024). *2024 Victorian Transmission Plan Guidelines*, p. 12. Available at: https://www.energy.vic.gov.au/__data/assets/pdf_file/0035/719378/2024-victorian-transmission-plan-guidelines.pdf

[84] Calculated on the basis Victorian coal has a 70% capacity factor (Australia Institute, 2021), compared with an average capacity factor of 30% for wind (Cornwall Insights, 2023) and 25% for solar pv (Solar PV Magazine, 2025). The Australia Institute (2020). National Energy Emissions Audit Report. Available at: https://australiainstitute.org.au/wp-content/uploads/2020/12/NEEA-July-2020-WEB.pdf. Cornwall Insight (2023). An investigation into REZ capacity factors during Victoria's dark doldrums. Available at: https://www.cornwall-insight.com/our-thinking/chart-of-the-week/aus-an-investigation-into-rez-capacity-factors-during-victorias-dark-doldrums/. PV Magazine (2025). Large-scale solar delivers generation high in Australia. Available at: https://www.pv-magazine.com/2025/01/29/large-scale-solar-delivers-generation-high-in-australia/

[85] Durkin, P. (2024, October 21). *AGL, EnergyAustralia coal power deals with Victoria kept secret*. Australian Financial Review. Retrieved from https://www.afr.com/companies/energy/agl-energyaustralia-coal-power-deals-with-victoria-kept-secret-20241018-p5kji8

[86] Calculated on the basis 104 PJ of gas is equivalent to 28.89 GW of continuous electricity, divided by 4x to account for assumed efficiency of an electric appliances. The required renewable capacity assumes a 30% capacity factor for wind (Cornwall Insights, 2023) and 25% capacity factor for solar pv (Solar PV Magazine, 2025).

Figure 8 - Extract from Jacobs' Victoria's energy transition risks and mitigation actions - Table 3-7[87]

Victoria's energy transition risks and mitigation actions

Table 3-7. Estimated increase in emissions as a result of identified risk occurring. Colours denote significance of emissions to achieving 2030 and 2035 emissions reduction targets

Risk ID	Risk Event	Risk Rating	2030 Mt CO2e pa	2035 Mt CO2e pa
VH1	Thermal power plants are run longer than expected (as per ISP)	Very High	3-20	3-20
VH2	Offshore wind targets not met	Very High	0	3-20
VH3	More frequent extreme climate weather events increase frequency and unpredictability of peak demand events	Very High	0.25-1	0.25-1
VH4	Peak and annual gas supply shortfalls	Very High	3-20	3-20
VH5	Existing gas customers don't electrify to the anticipated level per the ISP	Very High	0.2-1	0.4-2
VH6	Lack of renewable gas developments	Very High	0.1	0.5
VH7	Consumers uptake of battery electric vehicles (BEV) and plug in hybrid electric vehicles (PHEV) not high enough to achieve emissions objectives	Very High	0.1-0.2	0.4-1.2
VH8	Major transmission project delays (Marinus Link, VNI West, V1-V8 REZs, Western VIC, Eastern VIC)	Very High	3-20	3-20
H1	Inadequate management of additional loads and flows on distribution networks	High	0.2-1	0.4-2
H2	Curtailment of VRE resources due to low minimum demand levels	High	0.25-1	0.25-1
H3	Households do not improve energy efficiency of their homes to reduce their electricity load	High	0.25-1	0.25-1
H4	Lack of customer take up of embedded and aggregated storage	High	0.25-1	0.25-1
H5	Increase in coal fired power outages	High	0.25-1	0.25-1
H6	Extension of fire season reduces generation and transmission reliability, extreme weather impacts transmission reliability	High	0.25-1	0.25-1
H7	Inadequate long duration storage in time for coal exit	High	0.25-1	0.25-1
H8	Spiralling gas network costs for remaining gas consumers.	High	N/A	N/A
H9	EV charging profile is peakier than anticipated in the ISP	High	0.25-1	0.25-1
H10	Development and funding risk for onshore VRE and clean dispatchable resources	High	3-20	3-20

Major impacts are driven by the degree of electrification achieved in Victoria, or the amount of emissions from direct combustion of gas that are displaced as a result of electrification. This has a bearing on the risk that existing gas customers don't electrify to the anticipated level in the ISP. In **Table 3-7**, the ranges are driven by an assumption that electrification is 10%- 50% below the levels assumed in the ISP. Some of the obstacles to electrification illustrated by Grattan in their report on Getting Off Gas, imply that a risk range this wide may be appropriate given the obstacles experienced by more than 50% of Victorian consumers in

The table above, extracted from Jacobs' report for Infrastructure Victoria, illustrates the likelihood of key energy risk events materialising and the estimated increases in emissions if these scenarios do eventuate.

5.2. Workforce Availability

One of the practical challenges of implementing widespread electrification, as proposed in the RIS, relates to workforce availability[88]. A simple workforce estimation illustrates the workforce challenge:

- Victoria has approximately 2.2 million residential gas connections.

[87] Table 3-7 in Jacobs' report for Infrastructure Victoria, August 2024: Victoria's energy transition risks and mitigation actions
[88] Building Electrification RIS, December 2024, p. 62

- This equates to around 440 home conversions every single working day (excluding weekends and public holidays) between now and 2045.

This labour requirement must be met in the context of an existing skills shortage, where electricians required to deliver renewable electricity generation, transmission infrastructure deployment, and electric vehicle charging are already facing intensified demand resulting in wage inflation and high labour costs, and even project delays[89].

While the RIS acknowledges an estimate by Jobs and Skills Australia (JSA) that an additional 32,000 electricians are likely to be needed across Australia by 2030, it does not acknowledge how the proposed policy worsens the gap between the skilled workforce supply and demand, nor does it provide any solutions to address the shortfall. This barrier to implementation is made even more pronounced by the proposal to introduce the preferred option in January 2026, which would provide no practical opportunity for this skills gap to be addressed.

The RIS also does not *"address potential shortages or gaps within individual occupations"* as part of its modelling[90]. Instead, it applies a broad 25% sensitivity on 'purchase and installation costs', which is taken to include a broad range of activities including: the capital costs of purchasing a new appliance; labour costs associated with installation; administrative costs for homeowners and businesses, and government costs relating to enforcement and monitoring.

Without conducting a detailed sensitivity on each of these components, the 25% applied by the Cost Benefit Analysis appears speculative and arbitrarily chosen. These gaps include the following, listed in Table 5 below.

Table 5 Implementation constraints listed in the Cost Benefit Analysis

Implementation Constraint[91]	Impact
Current shortage of electricians	Workforce is already constrained, yet the Cost Benefit Analysis does not quantify the impact of this shortage on project timelines and costs.
Increase in demand for electricians resulting from policy	Electrification will intensify workforce shortages, further stretching labour supply.
Delays to implementation	Labour shortages extend project timelines, delaying benefits and reducing the NPV of the policy.
Labour market friction for switching between plumbers and electricians	Retraining and upskilling workers from adjacent trades is not seamless and adds time and costs.
Cost associated with supply-side policies of training electricians	The NPV analysis excludes the financial burden of training and attracting new electricians, underestimating the true transition cost.
Current dropout rates of electricians in training	With 41% of electrical apprentices not completing their training, workforce expansion is severely constrained[92].

Without addressing these workforce and cost constraints, the RIS underestimates the practical challenges of implementation and fails to quantify the impact on consumers. As a result, the conclusions on economic benefits lack robustness and risk significantly underestimating the financial and logistical barriers to rollout.

[89] Australian Energy Council, *Australia's workforce shortage: A potential obstacle on the road to net zero,* 25 July 2024. Access here: *https://www.energycouncil.com.au/analysis/australia-s-workforce-shortage-a-potential-obstacle-on-the-road-to-net-zero/*
[90] Building Electrification RIS, December 2024, p. 114
[91] Implementation constraints have not been individually quantified in the RIS and hence captured accurately in the CBA. It is proposed that the 25% purchase and installation cost sensitivity is an insufficient proxy for these costs and does not accurately capture other negative impacts faced by the customer.
[92] Powering Skills Organisation Ltd, *Workforce Plan 2024: Challenges and Opportunities within Australia's Energy Sector,* July 2024, p.35. Access here: https://poweringskills.com.au/wp-content/uploads/2024/08/Workforce_Plan_Report_2024_Final_15July2024.pdf.

5.3. Exemption Challenges

Victorians need certainty in the proposed policy. While exemptions for uneconomic, unfair, and impractical cases make sense, inconsistencies and ambiguities undermine confidence and create confusion – resulting in broad impacts on Victorian energy consumers and the implementation of the proposed regulations. Clear and more robust exemption criteria are required to ensure Victorians do not face unfair, unpredictable and hidden financial burdens.

We have identified issues with the exemptions proposed in the RIS and have grouped them under the categories below in Table *6*.

Table 6: Exemptions in the currently proposed regulations - grouped by category

Exemption Category	Proposed Exemption	Analysis	Recommendation
Use Case	Existing residential and commercial cooking	Inconsistent application No rationale for why gas cooktops are treated differently from other gas appliances (hot water, heating).	Clarify why cooking appliances qualify for exemptions while others do not; how "commercial kitchens" will be exempted in practice.
Building Type	Regulated properties (heritage homes).	Lacks Clear Definition Some heritage properties may technically allow electrification, but at prohibitive costs. The exemption criteria do not specify which properties qualify.	Clarify whether all heritage homes are exempt or only those with explicit regulatory restrictions.
	Shared gas services	Buildings with shared gas services are exempt.	No comment
Not Financially Viable	Supply connection upgrades	Lacks Clear Definition, Inconsistent Application Insufficient cost estimates and no defined financial threshold for network augmentation. Ignores switchboard and wiring costs triggered as a result of the proposed policy, underestimating the financial burden on homeowners.	Cost estimates should be updated based on current economic conditions, including inflation and supply chain disruptions. The exemption should cover all associated upgrade costs (network, switchboard, and wiring) and home reinstatement costs to provide a complete and accurate assessment of financial impact. Clear thresholds should be set for exemption eligibility.
Not Technically Achievable	Space constraints	Lacks Clear Definition, Inconsistent application Proposes exemptions due to spatial limitations while others with comparable challenges do not.	Exemptions should be extended to cover: • Structural and amenity constraints; • Technology availability; • Technology performance; and • Technology reliability.

A summary of each category and proposed recommendations are provided in the following sections, with further detail provided in the Section 9.

5.3.1. Use Case – Existing Residential Cooktops and Commercial Kitchens

The RIS proposes that residential gas cooktops and commercial kitchens are exempt from the proposed electrification regulations, allowing like-for-like replacements. It does not state why this exemption applies, which may include costs, consumer preference, emissions impact, broader industry effects, or other impacts.

The selective exemption for gas cooking (both residential and commercial) raises several key questions regarding implementation:

- How would the definition of a *"commercial kitchen"* be applied in practice? For example, would a bakery or coffee roaster qualify?
- On the issue of homeowner equity, why should new homes be required to install electric cooking while existing can choose the best option that suits their needs?
- On the issue of business equity:
  - Why should new businesses be required to install an electric commercial kitchen, while existing competitors can choose the option that suits their small businesses needs?
  - On what basis does the hospitality sector (i.e. commercial kitchens) appear to benefit from an exemption whereas other businesses types do not?

Clarity should be provided on these issues, and further consultation undertaken on the cost benefits associated before proceeding any further with the RIS.

5.3.2. Building Type

The RIS acknowledges that existing regulations prevent modifications to some buildings, for example heritage buildings, but does not provide a clear framework for how this exemption is applied. Buildings may have partial restrictions, meaning electrical upgrades could be technically allowable but cost prohibitive. Without further clarification, it is uncertain which properties truly qualify.

By way of highlighting the example provided in the RIS (noting other examples exist under the proposed exemption) there exist approximately 103,000 connections to heritage homes within AGIG's Victorian network alone, making up nearly 10%[93] of residential gas usage in the network.

5.3.3. Not Financially Viable

Currently, the proposed threshold only includes electrical network supply upgrade costs only and does not consider material costs a building owner may incur as a direct result of the policy. This includes the switchboard and supply upgrade costs, and switchboard and wiring upgrades. The upgrade costs and expected instances in the RIS appear to be materially understated. Switchboard and supply upgrade costs of up to $12,250 per household appear to be estimated based on the lower end of the range from existing data, with expected instances extrapolated from a limited dataset. Switchboard and wiring upgrades are excluded from the RIS due to uncertainties about the extent of this occurring. Further detail is provided in the technical addendum to the submission.

Further, and as noted earlier in this submission, we note that real-life trials are underway which show the cost of electrification is variable and can be much higher, such as with AusNet's trial in Morwell. With this context, it will be important for the government to:

- Reassess the network upgrade rate estimate and cost assumptions for supply connection upgrades, incorporating more representative data that accounts for regional properties, older housing stock, and economic changes, and conduct a sensitivity analysis to assess the impact of different upgrade rate scenarios and 2025 market conditions on costs.
- Recognise that homes requiring a network supply upgrade will often also require additional switchboard and wiring activities as a direct result of the proposed policy, rather than dismissing the cost as unrelated.
- Include the estimated cost ranges for switchboard and wiring activities based on available market data as part of the Cost Benefit Analysis. This could also consider the benefits of addressing unsafe wiring in Victorian buildings.

[93] GPA Engineering Report, 2025

- Define a clear exemption threshold that accounts for total upgrade costs, rather than assessing network costs in isolation, to ensure homeowners are not unfairly burdened by hidden costs.

Discussion on other costs, including potential increases to energy costs, is undertaken in greater detail in Section 1.

5.3.4. Not Technically Achievable

The RIS acknowledges that some buildings may face challenges in retrofitting electrical infrastructure due to space limitations, which could be grounds for an exemption[94].

While the RIS acknowledges space constraints render installing an electrical alternative technically unachievable makes sense, it does not acknowledge a range of equally impactful circumstances where an electric alternative is not achievable that should also be considered grounds for exemption. These include:

- **Structural and Amenity Constraints**: Buildings must have the structural capacity to support additional electrification infrastructure. If modifications require reinforcing walls, altering facades, or adding ventilation, an exemption should apply. Similarly, installations that obstruct pathways, restrict movement, or generate disruptive noise and airflow should qualify.
- **Technology Availability**: Just because an electric alternative exists does not make it readily available. If homes and businesses face extended delays in securing or installing an electric alternative, particularly when a like-for-like gas replacement is immediately available, an exemption should apply.
- **Technology Performance**: Many gas users depend on the high pace at which gas achieves high temperatures and subsequently cools down. Gas also plays a critical role in meeting customer expectations and cultural requirements. Where electrification reduces efficiency or conflicts with these needs, an exemption should apply.
- **Technology Reliability**: Compared with the existing use of gas, electrification increases vulnerability to power outages, peak demand constraints, and higher maintenance costs. Where these risks compromise business continuity or critical services, an exemption should apply.

The case studies below demonstrate real-life examples of where structural and amenity constraints occur and could present a barrier to implementing this policy; as well as an example of technological and financial barriers to electrifying a commercial business. Further case studies are provided in Section 9.

[94] Building Electrification RIS, December 2024, p. 74

Case Study: Class 1 Building Amenity

While spatially possible, installing a heat pump to replace an existing gas water heater in the same position of a side access pathway of a Class 1 house may significantly reduce amenity. Factors include:

- Physical Obstruction to Movement: A heat pump in a side pathway may restrict access to the backyard for emergency egress, garbage bins, and equipment including prams and wheelchairs.
- Noise and Airflow Disturbances: Unlike gas hot water systems, heat pumps generate operational noise and require continuous airflow, impacting nearby living areas and outdoor spaces.
- Structural and Installation Constraints: Retrofitting may require additional plumbing, electrical modifications, or drainage relocation, increasing costs and disrupting existing structures.
- Equity and Practicality Considerations: Narrow lot and townhouse residents face fewer installation options, creating an unfair compliance burden compared to properties with more space.

In this example, relocating the system elsewhere may be undesirable, higher cost, or impractical, and an exemption should apply.

Case Study: Laundry Service Technology Availability

In discussions with the Laundry Association Australia, we understand the industry is heavily reliant on gas to heat water, dry towels and generally provide hygienic cleaning services to customers. Laundry service faces significant delays and costs in securing an electric hot water and linen pressing system, while a like-for-like gas replacement is available immediately.

There also is also uncertainty in the industry around performance of electric alternatives in relation to reliability and heat output, and concerns about slower drying times and reduced service efficiency.

Our discussions with this industry have raised concerns about forced electrification resulting in ongoing delays, risks of financial losses, contract cancellations, and reputational harm, if businesses cannot meet the fast turnaround times required by hotels, motels, and restaurants.

A broader exemption framework that accounts for these constraints will ensure electrification remains practical and does not impose unreasonable burdens on users. Further detail is provided in Section 9.

5.4. Unintended Consequences

The proposed policy underestimates the disruption of switching from gas to electric appliances.

In a parallel submission to this RIS, the Master Plumbers Association have provided detailed analysis that changing from gas to electric hot water and heating takes more time, costs more, and leaves households without essential services for longer than modelled in the RIS. Gas-to-electric transitions can take 5-9 days compared to 1-3 days for like-for-like gas hot water service replacements[95].

The RIS also assumes high-efficiency electric appliances will deliver cost savings. However, households may buy cheaper, less energy-efficient models. If cheaper, less energy-efficient appliances are widely adopted under the scheme, projected emissions savings modelled in the RIS would be impacted[96].

The RIS does not clearly outline the efficiency benchmarks necessary for consumers to achieve the projected bill savings. RIS modelling appears to rely on a Coefficient of Performance (COP) of approximately 5 times for electric heating based on Table 2.1 of the RIS. However, analysis of the VEU program shows that only 5% of available electric models meet this efficiency threshold, while the majority perform 17%–50% below this level. This suggests that 95% of appliances currently on the market will fail to deliver the economic and emissions benefits modelled in the RIS. In addition, it is expected that the appliance costs for high COP appliances will be more, which may increase the uptake of lower COP appliances which are likely to result in 40-50% impact on proposed benefits[97].

The policy also fails to account for LPG uptake, which we consider is highly likely, and discussed in greater detail in Section 2. Victoria has the highest LPG use in Australia, with 356,600 households relying on it for indoor use including cooking, hot water, and heating[98]. The Esperance Energy Transition Project[99] in Western Australia saw 58.5% of commercial users adopted LPG and 34% of residential users adopted either partial or 100% LPG appliance changeovers, in the absence of being able to access natural gas via networks[100].

Noting the carbon emissions of LPG, material adoption of LPG could have a mitigating impact on the forecast carbon reduction associated with widespread electrification. LPG is also more expensive and less reliable than reticulated gas, given its added supply chain complexity. Households switching from gas to LPG could see their energy bills increase by up to 140%[101]. The government has not addressed the risk of LPG uptake undermining the policy's financial and environmental goals.

5.5. Lack of Community Support for the Policy Change

For any policy to be successful, it must have a foundation of strong community support. Engaging with and gaining the support of the community ensures that the policy reflects the values, needs, and priorities of the people it aims to serve, and also enhances the policy's long-term sustainability.

A policy that lacks community backing is often met with resistance, making its implementation challenging – including risks of delays and program cost increases – and generally limiting its effectiveness. In the case of banning gas appliances, there is clear and recent evidence that overwhelmingly Victorians do not support the key features of the proposal that is being put in the RIS.

In November 2024, social and communications research firm, Redbridge, conducted a survey of over 1000 Victorians across a range of metro, outer and regional suburbs to test community awareness and support for the government's GSR. The research overwhelmingly indicates that Victorians do not support the key components of the policy outlined in the RIS. This includes that:

- More than **90%** of respondents agreed that Victorian households should not carry the financial burden of the transition to renewable energy;

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95 Refer Chapter 7.1.2 for further analysis.

96 Refer Chapter 9.7 for further analysis.

97 Ibid.

98 Gas Energy Australia (GEA), *Australian LPG Industry: Our Value*, GEA, 2017. Access here: https://www.gasenergyaus.au/get/1869/gea-australian-lpg-industry-our-value.pdf

99 Horizon Power, *Esperance Energy Transition Report*, November 2023. Access here: https://www.horizonpower.com.au/globalassets/media/documents/news--announcements-assets/esperance-energy-transition-report.pdf?v=4ad4ef.

100 Refer Chapter 9.8 for further analysis

101 Estimates based on commercial LPG offerings provided by Origin Energy for delivery to the Melbourne CBD, accessed on 14 February 2025. Source: Origin Energy LPG Offers.

- Only **13%** are willing to pay the costs of replacing their gas appliances with electric equivalents and potentially new connections;
- **27%** said they cannot afford to spend anything on energy efficiency improvements, and **15%** said they can afford less than $1,000;
- **82%** of respondents believe they should have the choice of appliances in their homes; and
- Almost half of respondents **- 48% -** said a ban on gas appliances would make them less likely to vote for the government responsible for the policy.

Of particular concern should be the 40% of respondents who said they could afford to spend nothing or less than $1,000 on energy efficiency improvements. If this number reflects the broader population of 2.2 million homes impacted by this policy, it indicates a significant number of people who could struggle to afford the upfront costs of this policy, which the RIS acknowledges can be upwards of $10,000. Given that the RIS offers no option for Victorians who cannot afford the upfront and often immediate costs required under this proposal, this appears to be a significant oversight by the government. It reflects a lack of sensitivity during an ongoing cost-of-living crisis.

Even for those who can afford the necessary work, this research suggests that many simply oppose the change. It's foreseeable that opposition to the policy could generate behavioural and market responses that would slow or disrupt policy implementation including illegal workarounds and pressure on policymakers to significantly increase the number and range of exemptions.

5.6. Scheme Administration

The RIS places the burden of administering exemptions on individual plumbers, requiring them to determine whether a property qualifies for an exemption and document their justification[102].

The proposed amendments to the *Plumbing Regulations 2018* introduce several operational challenges for plumbers, particularly in assessing exemptions for network gas appliance installations and replacements. This creates risks of regulatory loopholes, inconsistent application of exemptions, and increased administrative burdens.

Additionally, building owners may exploit the lack of standardisation by searching for plumbers willing to grant exemptions, leading to further divergence in enforcement.

Without strong oversight and structured recourse mechanisms, industry stability may be impacted. Further, the additional administrative burdens placed on plumbers, may be passed onto the customer through increased costs. This is due to the greater time required per job for plumbers to review exemptions and the upskilling needed to administer them. Additionally, the requirement to replace existing gas appliances with electric alternatives may drive some plumbing work underground, as consumers seek ways to maintain their existing systems outside of regulated channels.

We have engaged with the Master Plumbers Association, the peak body for the plumbing industry in Victoria, who have provided a parallel submission to this RIS to ensure that the perspectives of industry professionals are accurately represented. Their insights have informed our position, reinforcing concerns about the roles of installing and certifying plumbers, the impact of consumer decision-making, and the potential for unregulated plumbing work.

5.6.1. Inconsistencies and Interpretation Variability

Under the proposed framework, plumbers are responsible for determining whether an exemption applies without a formal application or approval process.

The criteria for exemptions, such as "insufficient space" or "regulatory constraints" (e.g., Heritage Act 2017), are subjective and open to interpretation.

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102 Refer Chapter 9.10 for further analysis.

The extent of such overlays varies significantly between properties and is currently assessed by local councils with assistance from Heritage Victoria. Expecting plumbers to make these determinations introduces a serious flaw in the process, as they may lack the necessary expertise and could be placed in a legally ambiguous position.

Further, it is important to note that in practice the installing plumber may not necessarily be the certifying plumber, who is responsible for supervising and taking legal responsibility for the work.

This distinction is not considered by the RIS, and could result in additional costs, as the certifying plumber may need to attend the site separately to verify compliance.

Without a centralised verification mechanism, different plumbers may apply exemptions differently, leading to a lack of regulatory consistency.

5.6.2. Plumbers as Policy Officers

The proposal whereby "*A plumber will determine if the circumstance meets the exemption as described in the proposed regulations or not"*[1] presents several key risks and challenges. Plumbers are not trained policy administrators, meaning their interpretations of exemption criteria may vary, leading to inconsistencies in how exemptions are granted. The absence of a more rigid exemption framework, exemptions will be granted through subjective and discretionary judgement, resulting in inconsistent policy application.

Further the policy places plumbers in a position whereby they would be reviewing each other's work leading to potential conflicts of interest. Relationships or clients with a preference to maintain their gas connection might influence exemption decisions, that are now the responsibility of the plumber.

5.6.3. Risk of 'Plumber Shopping' and/or Unlicensed Work

Building owners, as consumers, ultimately drive the decision on which plumber to engage for an installation. Without clear standardisation, some may actively seek plumbers willing to grant exemptions under broad or vague justifications, creating an uneven playing field. Plumbers applying stricter interpretations of exemptions may lose business to those who are more lenient, fostering inconsistency in application.

This consumer-driven dynamic could also have unintended consequences by creating a market for unregulated 'off-the-books' plumbing work. While non-registered work may be illegal, it is the Master Plumbers view that there is a low likelihood of enforcement, particularly where consumers are able to purchase gas appliances and equipment independently.

The Master Plumbers Association has provided evidence that such behaviour is occurring in the market, including instances in the Australian Capital Territory, where some consumers have connected LPG bottles to existing gas meter points to continue using gas, highlighting the potential for non-compliant work in response to restrictive regulations.

5.6.4. Limited Avenues for Recourse

There is no formal appeal process if a plumber's exemption decision is later challenged by regulators or industry authorities. The Victorian Building Authority (VBA) is expected to oversee compliance, but the regulatory impact on individual plumbers is unclear. Plumbers who apply exemptions incorrectly could face penalties or liabilities, increasing legal risk.

5.6.5. Increased Compliance and Training Costs

Under the proposal, plumbers must document and justify each exemption in compliance certificates, adding administrative overheads. Significant training will be required for plumbers to accurately assess exemption criteria, increasing industry costs.

Beyond the administrative burdens outlined in the RIS, the Master Plumbers Association hold significant industry-wide concerns regarding the impact of these regulations on workforce training and compliance. These include:

- A significant reduction in gas fitting work, affecting the employment of approximately 20,000 registered gasfitters in Victoria.

- Implications for plumbing apprenticeships. With gas fitting demand expected to decline in Victoria, employers may see the required 150 hours of gas training in the Certificate III in Plumbing as unnecessary. This could impact apprenticeship opportunities and the future pipeline of skilled workers.

5.7. Conclusion

It is clear that there are a range of issues that will quickly become barriers to the successful implementation of the proposed regulations. Given the proposed policy has not been implemented anywhere else in Australia, and is proposed to apply to a significant amount of homes (nearly 80% of Victorian homes) and commercial businesses, it will be especially important that policy makers address the range of issues that are raised here as potential barriers to implementation.

Technical Addendum

Technical Addendum

6. The Problem Statement and Market Failures

The RIS concludes that electrification is not occurring quickly enough and suggests that a series of market failures are responsible for this. There is little evidence presented in the RIS to suggest that these market failures exist or are significant enough to require the imposition of a policy as restrictive as an appliance ban. We explore the market failure evidence cited by the RIS, in particular the evidence associated with:

- Bounded rationality;
- Externalities;
- Split incentives; and
- Information asymmetries.

6.1. Bounded Rationality

A market failure referenced in the RIS is "bounded rationality"; where essentially consumers are not able to process the full range of information associated with new products and so fall back on simple heuristics to make decisions. It is true that biases can drive decisions, and that consumers can act in a way that is not in keeping even with their stated best interests. The issue is whether that bias is strong enough that an extreme solution like banning a product is appropriate.

Here, the evidence is lacking. For example:

- The paper by Andor et al 2017[103] does say that consumers focus on purchase prices rather than running cost information, and examines the salience of several different bounded rationality biases, but it concludes (see p2 of the paper) that energy labels do guide consumers to more efficient choices where there is a trade-off between purchase price and running costs rather than pointing to an appliance ban. [104]
- The paper by Blasch and Damina 2018[105] states that people *with* a status quo bias (the presence or otherwise and its effects being what the paper sets out to estimate empirically) tend to replace like with like, which is different from saying that people exhibit status quo bias generally (which is what the RIS implies). In fact the portion of the sample with status quo bias is less than half across different measures[106]. In addition, the paper refers to electric appliances only and the authors do not recommend appliance bans as a solution.
- The paper by JWS 2021[107] does make the point about like for like replacement, but also that almost two-thirds of respondents were likely to install a reverse cycle air-conditioner as the main form of heating[108] and summarises a number of messages which work to make arguments in favour of air-conditioners favourable. It does not suggest that blanket appliance bans are either necessary or desirable, nor is there a focus on behavioural biases.
- The paper by the Brotherhood of St Lawrence 2016[109] is paraphrased as the RIS suggests that households "typically" choose a like for like replacement even when it is not optimal, but the focus of the paper is not on

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[103] Building Electrification RIS, December 2024, p. 50, footnote 183
[104] Andor et al (2017), *Consumer inattention, heuristic thinking, and the role of energy labels*. Access here: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2795579
[105] Building Electrification RIS, p 50, footnote 184 and 189
[106] Blascj, J and Daminato, C (2018), Behavioural anomalies and energy-related individual choices: The role of status-quo bias. The Energy Journal, p 14, Vol. 41, No. 6. Access here: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3272245
[107] Building Electrification RIS, p 50, footnote 187
[108] JWS Research (2021), Household energy preferences: Research Report, p 52. Access here: file:///C:/Users/mvilkhu/Downloads/Household-Energy-Preferences-Consumer-Survey-(JWS)%20(1).pdf
[109] Building Electrification RIS, p 50, footnote 188

behavioural biases, but rather financial barriers for new appliances (which included, in this study, gas and electric). The paper summarises a number of papers which look at ways of overcoming financial, informational and trust barriers, but in its executive summary[110] states that "Low income home owners will upgrade to a more efficient hot water system when they are provided an incentive or subsidy, a low interest loan to cover the out of pocket expenses and information on upgrade options". This suggests that well-considered programmes such as the HEEUP programme the report summarises may be better than blanket bans, which the paper does not support.

In addition to the above, the RIS misses a key point; the fact that people don't behave in ways that a model suggests is "optimal" does not mean that the people are in some way "bounded"; often it means that the model is bounded.

In particular, modellers face similar problems of a wide range of complex products and options to include in their models, such as, for example, the fact that no two houses are really alike in their energy choices. Modellers often utilise simplifying assumptions (like assuming that people will not switch cooktops without government intervention, or that there will be 100% compliance with this policy, for example) which can lead to models becoming "bounded" in their ability to explain how customers are making their choices. There is little real evidence that behavioural biases are preventing customers from making choices that really are in their best interests (as distinct from simply not replicating a model outcome), we believe that it is more likely that the model used in the RIS is "bounded" than are Victorian consumers.

6.2. Externalities

It is true that, where the consumption of a product causes harms that are not priced in a market, externalities are created and, through not being priced by the market, the amount of consumption is excessive compared to the social optimum[111]. It is also true that burning gas creates carbon dioxide, which is not priced. However, that fact that an externality might exist is insufficient to take policy action. The RIS suggests that[112]:

> *As a result, consumers may not fully recognise the environmental and public health impacts of their energy choices, creating a disincentive to transition to cleaner, electrified alternatives. Furthermore, the positive externalities from electrification such as reduced GHG emissions are often not considered by residential properties or building owners as these may not immediately translate into financial returns. This leads to under-investment in electrification measures.*

It is unclear how the RIS arrives at the conclusion that emissions are not considered by building owners who won't pay for the positive externalities.

As evidence to the contrary, Domain publishes a regular review of the "green home premium", which suggests that consumers in general are willing to pay a premium for more sustainable homes. This is not exactly the same as pricing the particular emissions caused by gas appliances and avoided by an electric home, but it is evidence of the fact that the sustainability of housing, of which electric appliances may form a part, is well and truly priced by home buyers.

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110 Department of Industry, Innovation and Science and Brotherhood of St. Laurence (2016), Home Energy Efficiency Upgrade Program Final Report, p xxii, available at https://library.bsl.org.au/bsljspui/bitstream/1/10184/1/Sullivan_Home_Energy_Efficiency_Upgrade_Program_final_report_2016.pdf

111 Monash University (2023), *Switching on: Benefits of household electrification in Australia*. Access here: https://www.monash.edu/__data/assets/pdf_file/0005/3433550/Switching-On_Benefits-of-household-electrification-in-Australia_report.pdf, this reference cited at footnote 192 on p50 does not address externalities as it only assess it in relation to electrification.

112 Building Electrification RIS, December 2024, pp. 50-51

Figure 9: Green premia in Australian cities.

	Houses		Units	
Year	% price difference	$ price difference	% price difference	$ price difference
2024	14.5%	$112,000	11.7%	$70,000
2023	15.8%	$110,000	13.8%	$75,000
2022	17.9%	$129,300	11.4%	$65,000
2021	14.1%	$90,000	13.6%	$75,000
2020	12.6%	$75,000	14.8%	$80,000
2019	17.0%	$92,375	17.5%	$85,000

Source: Domain, 2024, Sustainability in Property 2024: Demand, supply and affordability of green homes, p9, available here

Specifically in the context of Melbourne, Domain note:[113]

> *Melbourne has the largest price premium of all the capital cities (28.8% for an EE house and 22% for an EE unit), dwarfing Sydney (23.1% for an EE house and 11.7% for an EE unit) (table 2). Given the typically higher prices in both cities, it is not surprising that they also yield the greatest green-home premium. This is likely symptomatic of the higher income levels in both cities and the willingness of buyers to spend significantly more for the same sustainability features. Melbourne also has a considerably more affordable housing market than Sydney which might mean home owners are able to stretch further to achieve a higher level of sustainability*.

This does not suggest strong evidence that Australian home buyers, and those in Melbourne in particular, ignore the sustainability of homes. To the extent that such buyers view electrifying appliances as part of a suite of sustainability options (as the RIS clearly does; environmental benefits are a key part of the Cost Benefit Analysis), it is difficult to conclude they do not value it.

Further to this point, if the externality is not priced, there is no evidence quoted in the paper that suggests that a ban is the most cost-effective option. A price, or a tax would be the more usual method of dealing with externalities, rather than banning the product. The reason for this is that the product producing the externality usually also produces some economic value; people never buy a good just because they can cause externalities with it. The same is true of gas. A ban takes away the economic benefit the customer is getting from gas along with the externality, which is a uniquely heavy-handed approach to managing an issue.

6.3. Split Incentives

The split incentives discussion is applied solely to rental accommodation. It is an issue we addressed in our submission to the Minimum Standards for Rental Properties and Rooming Houses RIS[114] where we showed that the split incentives theory was one possible theory to imagine, with the other one being Coase's theory about social cost,[115] and suggested that evidence was needed to reconcile which theory was more likely as an explanation of the market. We showed that there was evidence of their being more air-conditioners in rental properties than in private homes, only slightly more, but if the theory of split incentives was apt, then one would have expected far fewer air-conditioners in rental homes which are potentially subject to the issue than in owner occupied homes which are not. This evidence has not been considered in the Building Electrification RIS.

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[113] Domain 2024, ibid, p10.

[114] AGIG's Submission to the Minimum Standards for Rental Properties and Rooming Houses RIS. Access here https://www.agig.com.au/-/media/files/agig/media-release/rental-ris/240715_rental-appliance-ban-ris-response_final_agig.pdf

[115] Coase, RH, 1960, "*The Problem of Social Cost*", Journal of Law and Economics, 3, 1-44. Access here https://home.cerge-ei.cz/ortmann/UpcesCourse/Coase%20-%20The%20problem%20of%20Social%20Cost.pdf.

6.4. Information Asymmetry

Information Asymmetry is where buyers of houses know less about the energy efficiency of the house and its appliances and hence might not value the energy efficiency as much as they should. The RIS has provided no evidence that information asymmetries are pervasive in Victoria[116], but the evidence from Domain cited above makes it clear that a large part of the sustainability premium buyers have in homes stems from the energy efficiency features of the home, which suggests that information asymmetries might not be all that pervasive. Even if information asymmetries did exist, two issues remain.

Firstly, where there is an informational asymmetry, some form of certification should be provided, as in the case of commercial building and suggested by the RIS[117]. The RIS makes the point that certification only currently exists for commercial buildings over a certain size in Victoria, but residential schemes operate in the ACT[118]. It is not clear as to why Victoria cannot adopt the NatHERS (Nationwide House Energy Rating Scheme) framework[119]. More importantly, it is unclear how removing a product from the product mix a customer can choose their energy so that only appliances that government has "pre-approved" is really solving the information asymmetry, unless the government believes that taking information out of the market is as valid an approach to managing this issue as putting more information in it.

Second to this, it is not the case that information asymmetries in respect to energy efficiency are related solely to the presence or absence of gas appliances. The efficiency of the building is arguably much more important than the type of appliance in it as an inefficiently insulated building will waste energy regardless of whether that energy comes from gas or electricity. Moreover, electric appliances themselves are different in terms of the energy efficiency, and simply banning gas appliances does nothing at all to address this issue. It is in fact difficult to see how banning a particular type of appliance will address information asymmetries, and indeed the RIS makes no attempt to argue that it does.

The final market failure relates to a lack of accessible information. It is not clear if this is precisely what the RIS means, but it appears to us that one reason the government would like to ban gas appliances is that telling people from diverse cultural and linguistic backgrounds about appliances and their differences is challenging. We would respectfully suggest that a little more effort in reaching out to and communicating with culturally and linguistic diverse people (and other groups mentioned, like the elderly) might be a less costly policy option than banning all gas appliances.

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[116] The relevant paragraph cites two papers, one from ACIL Allen (available here) who say many of the same things as the RIS says (see p12), but provide no empirical evidence of this issue in practice, and one from Gerarden et al (2015, available here) who in fact say (p8):
Despite widespread acceptance of the theoretical argument for adverse selection due to information asymmetries, there is little empirical evidence of this phenomenon in the context of energy efficiency, particularly in the period since energy-efficiency product testing and labeling became the norm for many energy-using appliances. Empirical research on the effects of asymmetric information is more prevalent in contexts unrelated to energy efficiency. These studies provide only limited guidance for two reasons. First, their results are mixed and second, the characteristics of these markets are different from those of energy-efficiency market.This does not appear to be the strong evidentiary support one would expect for a market failure.

[117] Building Electrification RIS, December 2024, p. 51

[118] ACT Government, Energy efficiency - Environment, Planning and Sustainable Development Directorate - Planning

[119] Nationwide House Energy Rating Scheme, *Existing homes consultation launches,* July 2024. Access here: https://www.nathers.gov.au/blog/existing-homes-consultation-launches

7. Cost Benefits Analysis

In this Section, we provide the background detail to our response to the various aspects of the Cost Benefits Analysis in the RIS summarised in Section 3 of our submission. We focus on errors which have a consequence of more than $100 million,

A key issue in examining the costs and benefits relied upon in the RIS is a lack of information provided. The information provided is insufficient to enable stakeholders to consider and respond adequately. This makes it difficult to establish exactly how a given cost or benefit has been constructed, and the consequences for the overall Benefit Cost Ratio. It is essential that this is rectified before any final decision on the proposed approach is made.

We summarise the overall impacts of correcting the errors in Table 7. below, noting the limitations above. We note that considering these issues would change the balance of costs and benefits still further, and likely reduce the Benefit Cost Ratio.

Table 7: Recasting of Costs and Benefits - 10 year benefit stream case ($million)

	DEECA RIS result	AGIG corrections	Final result
Appliance upgrade and installation costs	$4,766	$0	$4,766*
Building upgrade costs	$1,051	$0	$1,051
Administrative cost	$53	$953	$1,006
Cost to government	$11	$0	$11
Plinths and outdoor space	$0	$839	$839
Outdoor space restrictions	$0	$6,515	$6,515
Network reliability	$0	$170	$170
Total costs	***$5,882***		***$14,358***
Avoided energy cost	$4,226	$1,171	$3,055
Avoided GHG emission costs	$3,282	$560	$2,722
Avoided air pollution costs	$49	$0	$49
Avoided capital cost of cooling appliances	$2,664	$705	$1,959
Avoided gas network costs	$678	$582	$96
Total benefits	***$10,900***		***$7,881***
NPV	*$5,01874*		*-$6,477*
BCR	***1.8526***		***0.55***

** We have not addressed appliance costs and installation issues as this is not our core expertise, but do note some potential issues. For example it appears the government has used the cost of a condensing instantaneous gas hot water system and the efficiency of a standard gas hot water system which is inconsistent and would contribute to a much higher cost estimate for gas, We would urge the government to consult more with stakeholders who have expertise on appliance upgrade and installation costs, such as GAMAA.*

7.1. Issues in Respect of the Cost Benefit Analysis

In this Section, we provide detail on the issues with various costs and benefits.

7.1.1. Plinths and Space Constraints

In our submission to the Minimum Standards for Rental Properties and Rooming Houses RIS, we noted that every heat-pump hot water system requires a plinth for mounting that a gas system, particularly a wall-mounted instantaneous gas system does not need. Each of these plinths costs roughly $450. This feedback has not been considered in this Cost Benefit Analysis for this RIS, despite it being a necessary part of any installation.

We also noted that air-conditioners (roughly 1.3 square metres) and heat pump hot water system (0.8 square metres) take up more outdoor space compared their gas equivalents, and this then becomes space that cannot be used for other purposes. This may be small for an individual house, but it still represents an opportunity cost, which a Cost Benefit Analysis needs to consider; particularly since the number of houses impacted is very large.

The issue is not merely theoretical; many properties on smaller blocks will find it most convenient to locate air-conditioners and hot water systems down the narrow alleyway between houses, particularly if this is where bathrooms are located and thus piping costs can be minimised. However, where this blocks passage between the front and rear yards, this can be an inconvenience for householders. This RIS may create a very practical disamenity for such houses which can only be proxied by assuming that all parts of a block of land have equal value to a customer. Certainly, we do not think it is appropriate to assume that any part of a block of land has zero value to an owner, which is what ignoring this issue implicitly assumes.

Given that the average value of real estate in Victoria is roughly $3,000 per square metre,[120] the opportunity cost of not having this space available for other purposes can add up very quickly when several thousand properties are forced to give up space every year due to government regulations.

We have used the same values for these two additional costs as we used in our response to the Minimum Standards for Rental Properties and Rooming Houses RIS, and applied them to the new number of affected properties in this RIS. For the plinths, the 10-year NPV is $839 million and for the opportunity cost of the space, it is $6.5 billion.

7.1.2. Administration Costs

The RIS assumes that a new homeowner will require no extra time to choose all electric appliances compared to a base case where they have choice, and that an existing homeowner will require just one hour of administrative time to choose the relevant electric replacement appliance when their existing gas appliance breaks down.[121]

We agree with the conclusions in respect of new homes; the amount of time spent choosing a new appliance for a new home, to match the characteristics of that home is probably not going to depend very much on how that new appliance is fueled.

However with regard to existing homes, a homeowner whose gas appliance breaks down cannot simply replace it with a newer version of the same appliance with which they are already familiar but must instead learn about a new appliance with very different characteristics. For example:

- An instantaneous gas hot water system, or a gas-boosted solar hot water system provides continuous hot water of essentially unlimited volumes, whilst a heat pump has a tank, and when that tank runs out, the water is cold. This requires consumers to consider, perhaps for the first time, how much hot water they might need at any given point in time when they are used to the supply being essentially infinite.

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[120] We calculated this value in our submission for the Minimum Standards for Rental Properties and Rooming Houses RIS and have not subsequently updated it. However, it is not likely to have changed substantially over the intervening 6 months.

[121] Building Electrification Scheme, December 2024, p. 71

- A gas space heater provides radiative warmth, whereas an air-conditioner heats up all of the air that passes through it, returning that heat (roughly) evenly through the whole room. Moreover, an air-conditioner works best when a house is well-insulated, which either may not be the case or may be something a homeowner is uncertain about.

To understand this issue better, we have consulted with the Master Plumbers Association to understand the process flow from an appliance breaking to the installation of a new appliance. This includes the time to do the research, arrange several quotes, have tradespeople attend site and schedule equipment and works and the time for customers to navigate the rebate schemes available. As it stands, the RIS allows only one-hour, for the research only. It also accounts for the possibility that customers do not necessarily plan an appliance replacement but most often do so when an appliance unexpectedly breaks down.

We track both the amount of time the customer spends performing tasks associated with getting their new appliance and the time they spend waiting. The latter time can be substantial, particularly when an appliance changeover is unplanned, because plumbers and electricians are not commonly available instantly to assist with the next step in the process chain once a customer has decided about a particular step. The results of this analysis are shown in the following table.

Table 8: The process for getting a new gas or electric appliance

	Customer Time	Customer Interactions	Days without Hot Water/Heating
Hot water appliance changeover			
Gas for electric	20-25 hours	6-8 interactions	5-9 days
Gas for gas	8 hours	3 interactions	1-3 days
Difference:	+12-17 hours	3-5 interactions	4-8 days
Space heating appliance changeover			
Gas for electric	29-40 hours	7-10 interactions	19-42 days
Gas for gas	15-19 hours	5 interactions	8-20 days
Difference:	+14-25 hours	+2-5 interactions	+11-34 days

If we value customer time spent actually doing something at $36 per hour as per the RIS (see Table C1) and take the lower bound of the differences in customer time provided by the Master Plumbers Association, then the net present value of the increase in customer time from going electric is $1,006 million, compared to $53 million in the RIS. To be conservative, we only include this value in Table 7.

If we value time spent waiting at $6.33 per hour, which is the value of guaranteed service level payments for electrical outages determined by the Essential Service Commission in Victoria for the time spent without a gas space heating or hot water appliance, this would represent an additional $2.3 billion in costs[122]. In so doing, we are implicitly assuming that being without a gas appliance is like being without electricity. This may be conservative as we suspect that having no space heating for a month in winter would be difficult for most people, and some would at least buy a small bar heater in the interim, incurring additional running costs to keep warm.

7.1.3. Differences in Network Reliability

In our submission to the Minimum Standards for Rental Properties and Rooming Houses RIS, we noted that forcing customers to use electric appliances exposed them to the lower reliability of the electricity networks compared to the gas networks, and meant that customers would have no access to warmth, hot water or cooking in the event of a blackout. The RIS notes that gas appliances also require electricity and are not immune to power outages[123].

Gas cooktops do not require electricity to operate, and all options ban gas cooktops in new houses, with Options 2 and 4 banning them in existing homes as well. Therefore, network outage costs should have been considered in this context.

In the RIS it is stated that gas appliances also require electricity to operate and so electricity network costs should be zero. However, for gas space and water heaters, electricity is required to start them, but not all of them require electricity to keep operating. Gas space heaters in particular are often operated for long periods of time and, so long as they are switched on when the power outage occurs, remain operational and can continue to be used for heating.

Finally, no gas appliance intrinsically requires electricity from the electricity network to operate; the starter mechanism could be battery powered or have a pilot light for emergencies (as some do)[124]. Removing all new appliances removes any incentive to add such products to the marketplace. By contrast, an electric appliance needs a continuous supply of electricity.

We have recalculated the cost based on the values we used in our response to the Minimum Standards for Rental Properties and Rooming Houses RIS, using the numbers of houses from this RIS and the result, over ten years, is $170 million in costs on an NPV basis.

7.1.4. Energy Use by Gas and Electric Appliances

In our response to the Minimum Standards for Rental Properties and Rooming Houses RIS we noted several issues in respect to assumptions about energy use. The same mistakes appear to have been made in this RIS, although there is slightly more information about energy use in this RIS, allowing a clearer understanding of the errors made in the RIS analysis. The error stems from the use of the Residential Baseline Study (RBS) in this and previous RIS documents, as well as elsewhere in the Gas Substitution Roadmap.

The RBS has several different household types; households with gas appliances, households with electric appliances and various different combinations of each. The key point is that these are *different houses*; a house with an electric space heater is not identical in every way to a house with a gas space heater save for the different appliance but is rather different in many ways which result in different energy use. This is not a function of energy inputs, and a heat pump using less energy to produce a given energy output in the house than a similar gas appliance, but rather represents different characteristics in the subset of houses in the RBS which have, say an instantaneous gas hot water

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122 See We use the payment of $380 for 60 hours of outages per annum as this gives the lowest number. See Essential Services Commission, *Guaranteed Service Level payments for energy outages*. Access here: https://www.esc.vic.gov.au/electricity-and-gas/information-for-electricity-and-gas-consumers/guaranteed-service-level-payments-energy-outages.

123 Building Electrification RIS, December 2024, p. 127

124 For a home with solar cells and or a battery, these have easily sufficient power to start a gas appliance, but nowhere near enough to keep a heat pump or an air-conditioner running for long, in most cases.

system compared to the subset which have a heat pump hot water system which cause them to need a different amount of hot water.

There are many ways in which differences like this can arise. Houses with electric space heating appliances are likely to be newer, or at least better insulated, and thus require less heating regardless of source. Houses with a heat pump hot water system, because it has limited hot water, might have shorter showers than houses with instantaneous gas.

The practical upshot is that the RIS has measured the wrong thing; rather than measuring the energy saving that a given Class 1 (or Class 2) household might experience if they switched their gas appliances to electric and still used the same amount of energy in their house (that is, the energy coming out of the appliances for us in the house is the same), it measures the change in energy usage a household would experience if they moved from the average Class 1 (or Class 2) house with gas appliances to the average Class 1 (or Class 2) house with electric appliances, which is a combination of different energy outputs and different energy inputs. These differences can be substantial:

- The average Class 1 house in the RBS (which the RIS takes directly) with gas space heating uses this for 526 hours per annum whilst the average Class 1 house with electric space heating uses that for only 226 hours per annum. These are clearly very different houses and not the same house with different space heating appliances.
- In respect of hot water use, the RIS has used several sources, rather than just the RBS, but the basic issue remains; in the RIS a house with an instantaneous gas hot water system uses 150 litres of water per day whilst one with a heat pump hot water system uses 70 litres per day. Again, these are clearly not the same house with different appliances, but must be different houses taking, for example showers of different lengths.

The error made in the analysis is not clearly spelled out in the RIS itself but must be established by looking at information made available in the RIS and looking at the source documents for the RBS. To assist us with this, we employed expert assistance from energyFit, who have been involved with the RBS for many years and are experts in home energy use.

Space Heating

To understand the issue of space heating, it is important to understand the data the model is based on, the approach to building the model and the intent of the model. Energy Consult, the developer of the RBS took an engineering algorithm approach rather than a thermal simulation approach as noted in the RBS[125]. This approach was taken because it provides a good estimation of national or statewide energy use for a given heating or cooling technology. It can be used to compare the energy use of different forms of heating, such as comparing ducted gas and ducted RCAC, however extreme care must be taken to normalise the factors used in the engineering algorithm so that it is a like for like comparison.

The table below shows the main factors that are used in the engineering algorithm for Energy Consult's RBS model, which forms the basis for the heater model used in the RIS.

[125] Energy Rating, 2021 Residential Baseline Study for Australia and New Zealand for 2000 to 2040, RBS Technical Appendix. Access here: https://www.energyrating.gov.au/sites/default/files/2024-06/RBS%20Technical%20Appendix.pdf

Table 9: Factors in the algorithm used to determine energy use in the RBS

Unit Type	Heating Size (kW) 2025	Cooling Size (kW) 2025	Hours Heating all years	Hours cooling all years	Unit Energy Consumption (heating, kWh for elec, MJ for gas) 2025	Unit Energy Consumption (cooling, kWh) 2025	Fan electricity for gas (kWh) 2025	Heating efficiency 2025	Cooling Efficiency 2025
Ducted Gas	26	-	526	-	65,552	-	198	0.76	-
Ducted RCAC	8.7	7.8	226	361	521	745	-	3.78	3.76
Room Gas	8	-	549	-	19,158	-	14	0.78	-
Split system AC	3.9	3.3	170	271	155	196	-	4.26	4.5
Evaporative Cooling	-	-	-	365	-	-	-	-	-

These factors were developed to accurately predict the statewide energy use for the appliance types across Victoria and did so successfully in the RBS. However, it is important to note that not all appliance types have historically been installed in similar properties and used in the same way and therefore cannot be compared directly. For example, the 2012 ABS HEC survey which is the bases for heater and AC use, results in ducted gas heaters being ran for 526 hours in the model and ducted RCAC for only 226 hours a year. This is not because ducted gas heaters need to be run for more hours, it is because new homes disproportionally have RCAC units and newer homes need less heating.

Additionally, in 2012 there were many homes with ducted RCAC that had been installed for cooling and the house still had an existing heater that was used in winter, such as a wood or gas heater. Similarly, the homes that installed RCAC needed a smaller unit compared to gas heaters. Therefore, if you compare the energy use per unit without accounting for these factors, it will not be representative of a home electrifying heating.

Knowing how the RBS model was built and knowing the energy use figures reported in Tables C.8 and C.9, allows energyFit to back engineer how the RBS was applied for the RIS and pinpoint the errors made.

For the RIS, the heater capacity was normalised at 12.5473 kW heating capacity for both ducted gas and ducted RCAC. This is shown when we take the energy use from the RBS for ducted gas which is 65,552 MJ and divide it by the RBS capacity of 26 kW and multiply by the new – average capacity of 12.5473 kW. This results in a gas use for ducted gas heaters of 31,103 MJ which is exactly the gas use in the RIS for ducted gas heating. Note that this approach maintains the 526 hours of heating per year.

The RBS heater model correctly also normalised the heating capacity of ducted RCAC, raising it from 8.7 kW to 12.5473 kW. However, the RIS keeps the heating hours of only 226 hours per year for ducted RCAC. The RIS also assumes a weighted average COP of 4.1 for ducted RCAC, EER of 4.09 and standby energy of 151.5 kWh per annum.

When the normalised capacity, weighted efficiencies and hours of use are used to calculate the energy use for ducted RCAC we get 1,836 kWh (12.5473/4.1x226 + 11.2493/4.09x361 + 151.5) which is the figure provided in the RIS.

That is, using the base data for the algorithm in the RBS, and the run hours of 526 for gas appliances and 226 hours for electric appliances allows energyFit to replicate the energy use values for the various space heating appliances in the RIS (only two are shown here for brevity), which shows that the RIS is implicitly assuming different running hours, and thus heating outputs; they are measuring the energy outputs of different houses.

There is also an additional error in respect of space heating. The COP and EER have been modelled to increase every year by 0.5% to 2050. The real-world data ends at 2014 and then the assumption that COP and EER will continue to improve at 0.5% per annum continues for 36 years. Additionally, the standby power decreases by 1% every year in the model. Now, this projection is too long and more recent real-world data should be built into the model, given 11 years have passed since any real data was included in the model. Projections aside, there is an error in how the efficiencies were applied for the RIS.

The RIS has assumed not only that *new* air conditioners will become more efficient, but that *installed* air conditioners will also change their efficiencies to match the efficiency of the new air conditioners being installed in that year. For clarity, an example follows.

In 2025 the average COP for a ducted RCAC is 3.78. When this unit is installed, the COP doesn't change, the unit is installed and will have that COP for 12 years of operation. However, when checking the RIS results, energyFit found the best fit (in fact an exact match) to the results in the RIS was found when they made a deliberate mistake of assuming that installed air-conditioners had the same improvement in efficiency as new air-conditioners year on year. This suggests that the RIS model has incorrectly assumed that a unit installed in 2025 increases its efficiency by 0.5% every year, even though it was already manufactured and installed. So, the installed unit increases its efficiency in 2026 to 3.8, then in 2027 3.82, etc. even though it is already installed. Correcting for these mistakes would result in the energy use for ducted RCAC increasing from 1,836 to 2,848, a 55% increase in energy use.

Our consultant, energyFit has calculated that, on the basis of 526 run hours for both the gas and the electric space heating appliance, rather than 526 for gas and 226 for electric and the costs of energy provided in the RIS, the net result would be a 33% drop in the energy saving compared to the energy savings shown in the RIS. If we assumed that both gas and electric appliances ran for 226 hours, the savings would drop by 73%. We use the former assumption, because the starting point is a house using gas.

Before moving to water heating, we make two additional points.

Firstly, the RIS does not discuss the option of requiring or incentivising high efficiency gas space heaters to reduce gas use. Electrification benefits are reduced by 80% compared to high efficiency gas heaters if 226 hours are assumed.

Secondly, the RIS does not model the cost effectiveness of running a split system AC and a ducted gas heater together, even though this is the most common heating arrangement for Victorian households. Many Victorian homes have a split system air conditioner installed in the living rooms for cooling and ducted gas heating installed throughout. energyFit advise that running one then the other and sometimes both in combination for heating is an extremely cost-effective mode of heating which the RIS does not address, even though it is the arrangement that the majority of Victorian residents have decided to install. The full electrification of these homes might have a saving of only around $50 a year when using the 226 hours a year. The RIS does not model, this most common type of appliance arrangement because the RBS model does not have that functionality. The Victorian Government should update the energy models to be able to simulate the most common type of heating and cooling systems correctly.

Hot Water

Hot water values are more difficult to extrapolate as they do not come directly from the RBS and the model used is not available for stakeholders to see. Here the issue is not an inconsistency in water use between appliance types, but rather an inconsistency in water use between the RIS and the average water use in a Victorian household.

In the RIS, backing out water use from the energy use assumption, suggests 155 litres per day.[126] This would be equivalent to a household of 3.5 people respectively taking 8 minutes showers per day each. The average Victorian household is 2.5 people (see ABS Census) using 110 litres per day (see NatHERS). If this standard number was used, the energy savings would be reduced by 26%, keeping all other RIS assumption the same.

The effect of this reduction is most pronounced when converting gas instantaneous water heaters to heat pumps. Given instantaneous gas water heaters don't have a storage tank, there are no constant heat losses. Essentially, heat pumps have a fixed energy cost which cannot be removed, because they need to keep a tank of water hot. Assuming 712 kWh per year tank losses, 3.1 COP and 27 cents per kWh, heat pumps have a $62 per year fixed cost. As the water use reduces this fixed cost becomes more pronounced.

Noting that 2.5 people per home is an average, which includes homes that have 2 people and homes that have 3 people. A 2 person household that wash clothes on cold will use 65L per day[127]. At 65L per day, gas instantaneous water heaters will cost $177 per year to supply hot water. Heat pumps will cost $171 per year, $62 for tanks losses and $109 for heating water used by the home. A 2 person household that washes clothes in cold water (hence using roughly 65 litres of hot water a day), only saves $6 per year moving from gas instantaneous to a heat pump.

Less common but very impactful for the individual households is a switch from gas instantaneous to instantaneous electric. 17% of class 2 homes are assumed to switch from gas to electric instantaneous water heaters, for this individual households their water heating bills will increase from $299 in gas to $613 in electricity. This is a $314 increase in bills, assuming 110L per day.

Determining the Impacts of Lower Energy Use

To determine the total size of the over-estimate of the benefits of energy savings, we need to be able to isolate hot water and space heating use alone. We can do this for existing homes by looking at the difference between Option 1 and Option 3, which is $3.435 million in savings. We cannot do it for new residential homes, because there is no combination of options which allows us to isolate out the hot water and space heating component for new homes. The best we can do is subtract the existing residential hot water and space heating benefit in the RIS ($3.435 billion) from Option 4, which has new and all existing residential appliances becoming electric, which gives us benefit from all new homes being electric and existing home cooking being electric. This is only $112 million ($3.547 billion minus $3.435 billion).

We apply the reductions in energy savings calculated above separately for the space heating and hot water an individual representative house in MJ terms once the energy output of that house is kept constant (as above) across all of the various appliances (so we use the proportions of appliances in Class 1 and Class 2 homes in Table C3 from the RIS and the appliance swap assumptions as houses electrify in Table C4 in the RIS), and then we add them up to give the true energy saving in MJ for that representative house. We compare that to the energy saving (in MJ) constructed in the same way following the RIS (that is, using different energy outputs before and after electrification). We find that the true energy saving is 70% of the RIS energy saving. We then apply this percentage to the stated energy saving in NPV dollar terms in the RIS ($3.435 billion) which gives $2.376 billion, or an overstatement of $1.059 billion.

Noting the discussion in Section 7.1.5 below in respect of gas network augmentation (and the same discussion for cooling appliance capital savings), we then add the $112 million calculated above for new home electrification because no new home would connect to gas based on the cost of gas vs electricity in the RIS once connection costs (which must now be paid by new homes) is included. This gives $1.171 billion, the overstatement shown in Table 7.

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[126] This assumes a coefficient of performance of 3.1. The RIS do not state what co-efficient of performance they assume, if it is higher than this, then the amount of water being heated given the energy use shown in the RIS would increase.

[127] Based on the average L/min for showers and taps in WELS, 8 min shower time pp, 5 min tap use per house and the average hot water use for clothes washers from GEMS. For a 2.5 person household this calculation results in 109.65 L per home per day, matching NatHERS Whole of Home.

We note that this is likely a slight overstatement, as we are including cooking as well, but cooking energy savings are likely to be minimal (see box below). Note that we make no change to the savings from commercial electrification of hot water and space heating, even though the same arguments we have used above about energy outputs likely apply there as well. This is particularly the case because the RIS proxies small commercial property energy use by using residential values[128].

Assessment of cooking appliances

Since Option 3 does not include cooking appliances in existing homes, and since the NPV of the benefits for all new homes is small when it comes to energy savings, we have not focused on assessing cooking appliance savings. However, energyFit makes an important point about cooking appliances which, whilst it may not make much of a difference in dollar terms, does point to some concerns in respect of the robustness of the underlying model.

The RIS has used the NatHERS Whole of Home System to compare gas and electric cooking, however the cooking component of the NatHERS Whole of Home System has not been tested and is not currently included in the National Construction Code (see here). It appears as though the NatHERS cooking calculation method has been based on a single case study which was undertaken in the USA on American made products and only included one gas cooktop.

According to Oxford Economics, Australia receives all of its cooktops from brands made in Australia, Europe, Turkey and China where these products are made to the European energy efficiency standards which have been in place for ovens and cooktops, including gas cooktops since 2015. In a recent article the Commonwealth Government confirmed that they will be releasing options to put in place Minimum Energy Performance Standards (MEPS) for cooktops under the E3 program which Victoria is a participant.

E3 have been consulting with suppliers and manufacturers in Australia on adopting the minimum efficiency levels currently in place in Europe. It is essential to note that the NatHERS Whole of Home cooking load factors for gas cooktops are based on a gas cooktop that would not be allowed to be sold in Australia under the proposed minimum energy performance standards and is not reflective of the current supply of products in Australia. The RIS should be updated to reflect the actual energy use of gas and induction cooktops when tested in accordance with IEC 60350 – 2 and EN 30 – 2- 1 which are the test methods used to regulate the energy efficiency of cooktops in Europe and is what E3 has proposed to adopt in Australia when consulting with suppliers and manufacturers on Minimum Energy Performance Standards. It is energyFit's understanding that if Victoria tested actual cooktops available in Australia in accordance with the international test methods that are being proposed by the E3 Program, there would not be any energy cost saving from electrifying cooking.

7.1.5. Avoided Gas Network Augmentation Costs

The RIS posits two gas network costs which will be saved under the RIS:

- A saving in opex of $66 per residential customer and $157 per commercial customer that disconnects from the network.
- A saving of $2,078 in "network augmentation", which is outlined in the RIS to mean the average cost of a new connection rather than, say, increased mains expenditure to deliver more capacity for a new subdivision.[129]

There are four issues with these figures. Firstly, although the RIS counts what it proposes is a gas network saving from new connections not happening, it does not include (see Section 8.2 below) the added cost for electricity networks as a result of more electricity demand, despite this being classed as an expense of up to 15% of distribution network investment in the RIS. It is highly likely that much of the purported gas network cost saving (to the extent that it exists at all, see below) is in fact simply a transfer to electricity network costs, and the Cost Benefit Analysis should consider the net of gas network savings and electricity network cost increases.

[128] Building Electrification RIS, December 2024, p. 78

[129] Building Electrification RIS, December 2024, p.78 states that this is an average across residential and commercial customers, but Table C23 also has a charge of $19,052 as the connection cost for new commercial businesses. It is not clear where this latter figure is used.

The second problem is that we cannot see how either of these figures have been derived. In Table C.2 of the RIS, the operating expenditure (opex) saving is described as having come from some work by St Vincent de Paul on bills and then the proportion of opex related to customer service in the regulatory Post-Tax Revenue Model, and then on p.78 of the RIS reference is made to our Access Arrangement decisions and avoided opex attributed to serving customer numbers. The $2,078 is referenced as having come only from the Essential Services Commission (ESC), although on p. 78 of the RIS, a more specific reference to an ESC Gas Distribution Code is made.

In respect to opex, there is no division into classes in the PTRM (it is just a single line item). In our proposals for our Access Arrangements, part of the trend component (roughly 50%) is given to growth in customer numbers prior to an adjustment being made for productivity gains.[130] The figure of $66 is roughly half the opex per customer, so we assume that is what the RIS analysis has done.

In respect of the Code review, the document cited in the RIS contains no information on the cost of each new connection. Submissions by ourselves and AusNet to the Code review did make reference to changes in demand and capital expenditure caused by the Gas Substitution Roadmap (which was released very shortly after we submitted our proposals to the AER for our current AA review, resulting in us needing to resubmit), but did not contain the number used by the government. Using those changes in forecasts, we obtain a number not far from the one the RIS uses, and we suspect the differences may arise to the use of customer weighting across the three Victorian networks.

As the analysis is not transparent, we are unable to deduce if the values are accurate or not. However, the issue is not so much the quantum of the difference between the figures the RIS has used and the "correct" figure but rather that, even using publicly available information, the RIS does not step through how the relevant costs were estimated in a way that stakeholders can follow.

Thirdly, although we agree with ACIL Allen in their expert report for the ENA that the government should not use retail prices to capture energy savings, if it is using retail costs, it misses a key point in respect of network economics as discussed in Section 2. That is, if a new customer costs less to connect and serve than the average for existing customers, then that average declines. Since prices are based on average costs under regulation, this results in lower prices for all. Once lower cost customers can no longer join the network, the benefit they bring to the bills of existing customers disappears.

This is particularly pertinent in the case of Victoria where changes to the Gas Distribution Code of Practice now require us to charge the full up-front cost of any new connection to the customer connecting to the network.[131] This means that, the marginal cost of this new customer to the network is zero, and thus the tariff benefit to existing customers is maximised.

The final point in respect of this is perhaps the most important; we do not really understand why, given the nature of the counter-factual, the gas augmentation cost is anything much more than zero, particularly for the preferred option, and particularly for residential customers, who make up the vast majority of our customers and revenues.

For existing residential customers, there are no network augmentation cost savings, as they already have a connection. There may be some opex savings, but these are minimal. In Option 3, 12.6% of customers (in total) are assumed to leave the network as these are the existing customers who have gas space and water heating but an electric cooktop [132]. This is roughly 265,000 customers altogether, or roughly 19,000 per annum over 14 years based on customer numbers in the RIS. With a $66 per customer saving, this results in an NPV of $10 million over 10 years.

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[130] See, for example, Table 8.10, of AGN Final Plan. Access here

[131] Essential Services Commission, *Gas Distribution Code of Practice*, October 2024, Access here. The connection charge we must now charge is called a "new standard connection" charge, and is in our ancillary charges reference sheet, available here.

[132] On p 64 of the Building Electrification RIS, the figure of 12.6% is mentioned and there is reference to a report from Energy Consumers Australia. That report looks at different rates of appliance ownership, but does not single out the proportion of houses with gas space and water heating and an electric cooktop (it deals with each appliance individually). In a subsequent meeting with DEECA, we were told that this is the origin of the 12.6% figure.

This suggests that the avoided gas network costs for residential customers in the RIS must be almost entirely a new customer phenomenon.

What is unclear here is why a new residential customer would choose a house with gas appliances, given the cost assumptions in the RIS, because the total cost to a new customer based on information in the RIS, and including the average network connection charge which they must pay, is higher for gas than it is for electricity. This is shown in below.

We note that, in Table C5 of the RIS, the cost of space heating appliances are higher for new homes than for existing homes. This seems illogical as a new home can be built around the requirements of an electric appliance, but an existing home needs various rectification work to fit an electric appliance in where a gas appliance formerly existed. This point was also picked up in the expert report from ACIL Allen for the ENA.

Further to this, (as ACIL Allen point out) existing homes have higher costs in the GHD commissioned by the Victorian Government in 2021, and the costs of most appliances in the Minimum Standards for Rental Properties and Rooming Houses RIS (see Table A5, and note, for example, the similarity between ducted 5 star electricity costs there and the new home cost for ducted RCAC in Table C5) which was applied to existing homes are closer to the "new home" equivalent in Table C5 than they are to the existing home equivalent. We assume that this is due to a simple typographical error, and the columns have been printed the wrong way around in Table C5. We therefore present a set of results based on "stated costs" and a set based on "assumed costs" where we use what Table C5 says are existing home costs across all appliances as our new appliance cost.

Table 10: Upfront costs for equivalent gas and electric bundles

	Gas cost	Electric cost	Gas cost	Electric cost
	Stated New Class 1		Assumed New Class 1	
Gas Ducted with instant HWS	$14,790	$16,695	$14,032	$12,779
Gas Ducted with gas storage HWS	$14,165	$16,188	$13,407	$12,272
Room Gas with instant HWS	$10,552	$8,348	$9,953	$7,027
Room gas with gas storage HWS	$9,927	$7,841	$9,328	$6,520
	Stated New Class 2		Assumed New Class 2	
Gas Ducted with instant HWS	$12,687	$11,255	$12,906	$9,539
Gas Ducted with gas storage HWS	$12,292	$10,910	$12,281	$9,194
Room Gas with instant HWS	$8,717	$6,382	$8,888	$5,900
Room gas with gas storage HWS	$8,322	$6,037	$8,263	$5,555

Apart from the two cases coloured green, in every instance, it is cheaper for a new home buyer to install the electric bundle than it is to install an equivalent gas bundle. This raises the question as to why new customers would choose the gas bundle. It may be possible for the following reasons:

- Customers are irrational and do not see or act on the cost differences. If this is the case, then many other aspects of the RIS would need to change; indeed we are not clear how a Cost Benefit Analysis which assumes agents are irrational.
- Customers value gas more than the difference in up-front costs. If this is the case, then the value of gas would need to be included elsewhere in the Cost Benefit Analysis.

Table 10 points to an underlying issue with the analysis in the RIS; Table C3, which captures the portion of new customers who choose gas is based upon data from 2021. Not only was this prior to the change to the Gas Distribution Code of Practice which requires us to charge for connection up-front, but it pre-dates the July 2024 ban on us offering incentives to connect to the gas network (see RIS p49). It is far from clear whether new customers, under these changed conditions, would choose gas in the same way they did in 2021.

The ideal solution would be for the government to wait until the change to the Gas Distribution Code of Practice and the incentive ban have had enough of an effect on the market to re-estimate Table C3 in the RIS based upon the new market conditions robustly. Until that point, we consider it appropriate to assume that customers are rational and choose options where the up-front costs are lowest[133]. This means that the best answer for the network augmentation costs for new customers is zero.

As a final point, we have not considered commercial customers in the discussion above. This is a much more complex case as there are many more archetypes. Moreover, the net benefits to commercial customers in the RIS (see RIS p123) are very small[134], and the RIS itself notes that it does not have very good data for the highly heterogeneous commercial sector (see RIS p79). We note that the only real difference between Option 1 and Option 3 is that Option 3 contains new commercial customers and Option 1 does not, and that the difference between these two in respect of avoided gas network augmentation costs is $86 million. Even though commercial customers face exactly the same issue in respect of paying for their connection cost up-front as residential customers, we do not know what this does to the relative prices of gas and electric appliances and thus, as per Table 10, whether the impact of the Gas Distribution Code of Practice would be to make the rational commercial customer, focussing on up-front cost differences (we encourage the government to do more work on understanding ongoing cost differences between gas and electric appliances in a business setting, see Section 8.1).

For this reason, given that, for Option 3 at least, the network savings are $10 million for existing customers (over 10 years), and zero for new residential customers, the maximum value for this benefit is unlikely to be more than $96 million; at least until more work can be done in the commercial sector to refine the analysis.

7.1.6. Cooling Appliance Capital Savings

The RIS posits that, due to the proposed regulations, customers with a gas space heating appliance who also has a reverse-cycle or evaporative air-conditioner to cool their home will receive a benefit because they now no longer need one; new consumers no longer need to purchase one, and existing consumers no longer need to replace the one they have already because the electric option they are required to use to replace their gas appliance can cool the home as well. We consider that the stated benefits do not exist for new customers, and that there are very likely issues with

133 We note that the RIS posits a number of "market failures" which mean, according to the RIS, that customers do not choose the lowest cost option. We have issue with the lack of empirical support for these theoretical ideas (see Chapter6, but even absent of that, when comparing up-front costs, few of the supposed externalities actually apply, even in theory).

134 The scale on Figure 8.1 makes it very difficult to work out how large the net benefits are across the different areas of commercial customers, but if a BSR of 0.98 reflects a net cost of $14 million (see RIS p123), then application of a bit of simple algebra suggests that the total net benefit across all commercial customers is about $50 million in net present value terms over a 10-year time horizon. We suspect this is well within the margin of error with which the RIS has estimated the costs and benefits for commercial customers, noting that the costs for commercial customers (see RIS p86) are around $1.4 billion for Option 3.

existing customers, which the description of the modelling approach makes this difficult to confirm, but that this value too appears to have been significantly over-estimated due to a modelling error.

In respect of new residential customers, assuming there is no innate preference for gas (which we believe there is, and that this is missing from the RIS, but which the RIS assumes there is not), the choice is between a gas plus electric cooling bundle and an electric only bundle as in the case in the preceding discussion. The relative costs of these are shown in **Error! Reference source not found.** below. Note that the approach we have followed is exactly the same as in Table 10 (including the use of "stated" and "assumed" appliance costs discussed above), except that we remove the cost of the hot water system, and we include only half of the connection cost, assuming that the other half is accounted for by gas hot water[135]. To the extent that a customer prefers a heat pump for hot water and thus is choosing to connect to gas solely for space-heating this approach understates the cost advantage of electricity in the RIS data.

Table 11: Upfront costs for gas and electric space heating and cooling bundles

	Gas cost	Electric cost	Gas cost	Electric cost
	Stated New Class 1		Assumed New Class 1	
Gas Ducted	$11,093	$12,013	$10,335	$8,097
Room gas	$6,855	$3,666	$6,256	$2,345
	Stated New Class 2		Assumed New Class 2	
Gas Ducted	$9,444	$7,040	$9,209	$5,324
Room gas	$5,474	$2,167	$5,020	$1,685

In this instance, there is only one case where gas is cheaper, and it does not seem credible that a rational consumer would choose gas if cost were the only consideration. As with the discussion in Section **Error! Reference source not found.** above, we believe the decision to base the proportions of new appliance choices on the data in Table C3 of the RIS is incorrect, because those data were collected prior to the Gas Distribution Code of Practice requirement which requires customers to pay up-front for new gas connections and the ban on us providing incentive to connect to the gas network. Again, we believe that the appropriate option would be for the government to wait until the market has had time to respond to these changed market conditions and new, robust data to emerge. However, for the purposes of this RIS, we consider it prudent to assume rational consumers of new homes will not choose a gas plus electric cooling bundle, which would mean that the cooling capital saving for these customers due to the regulations would be zero, as the regulations make no difference to what customers would do anyway.

If no new residential customers would rationally choose gas, then the only new customers who might do so are new commercial customers. There is insufficient information in the RIS to calculate this benefit, but it is possible to estimate it using some simple algebra, noting that:

- Option 1 includes new residential and new commercial.
- Option 2 includes new residential, existing residential, new commercial and existing commercial.

135 Again, if we apportioned the connection cost between space heating, hot water and cooking, making the connection cost $700 for each, this would not change the results as it would only lessen the electricity advantage by $300.

- Option 3 includes new residential, existing residential and new commercial.[136]
- Option 4 includes new residential and existing residential.

This means that the difference between Option 4 and Option 3 (2664-2139=525) gives the value of the capital cooling cost to new commercial, and the difference between this and Option 1 (830-525=305) gives the value of new residential capital cooling costs in the RIS. Since this should be zero, $305 million should be removed from the capital cooling cost savings estimates for Option 3, based on the arguments above, to reflect only the benefits to new commercial customers and existing residential customers (discussed below). We note that this is likely an under-estimate of the error as the RIS appears to have used residential properties (see RIS p78) for small commercial properties, which are roughly half of the overall commercial properties (see Table C17) but we do not have sufficient information to estimate the size of this effect.

The second issue relates to existing homes. According to the RIS, gas space heating appliances have a life of 14 years and electric space heating appliances have a lifespan of 12 years (see Table C2). This means that there is only a roughly 1% chance that a given gas heater and a given electric cooler would need to be replaced in the same year.[137] This means that it would be incorrect to assume that, for every gas space heater requiring replacement in 2030, say, there will be a corresponding cooler which requires replacement in 2030 as well. It is far more likely, given the lifespan of electric appliances that, within the group of gas appliances requiring replacement in 2030, one-twelfth will be paired with an electric cooler requiring replacement in 2030, one-twelfth with a cooler requiring replacement in 2031, one-twelfth in 2032 and so on.

This matters, because the value to a consumer of not having to replace a cooler is related to when that cooler might otherwise need to be replaced. So if the heater needs to be replaced in 2030, and the cooler, worth $500, does not need to be replaced until 2035, the avoided capital cooling cost in 2030 is not $500, but $411; the net present value of a $500 benefit, received 5 years hence, at a discount rate of 4% per annum.

To estimate the cooling capital saving properly, the following steps need to be undertaken:

- Estimate the NPV of 12 years of future cooler replacements from that year (assuming an even spread of cooler ages in the population); and then
- Discount that value back to the present value.

It is, in other words, a two-step process. The consequences of failing to do this, and assuming that the cooler needs to be replaced when the heater needs to be replaced is to over-estimate the benefit by about 28%, based on our calculations.[138]

There is insufficient detail to see exactly what approach has been taken, as the RIS makes no commentary on which year it assumes cooler replacements needs to happen relative to the heater replacement. We therefore looked at what the size of the benefit to existing customers would be if one assumed that the new cooling appliance was bought at the same time as the gas appliance being replaced and compared that with the estimate of the benefit for existing customers which we are able to extract from the RIS following the algebra we outline above.

We use the information in Table C27, assuming one in fourteen of the heaters need to be replaced each year and that the fraction of corresponding cooler replacements happening each year is the same proportion as the relevant cooler

[136] We note that Option 3 excludes cooktops from existing residential, but this makes no difference to the estimation of cooling capital cost savings.

[137] We estimate this by doing cycles of 12 years and cycles of 14 years over a 5000 year time horizon and counting the years where each cycle lines up, which is a crude approximation of the probability.

[138] For brevity, we do not explain all of these calculations. We are happy to make the workbooks in which we have done all of our work available to DEECA, or to any other interested stakeholder, and assist in understanding our approach; there is nothing confidential in our modelling.

type in Table C27.[139] We then multiply that number of cooling appliances by the value of one cooler appliance to get the annual total, and then take the NPV of ten years of these annual totals. This gives us an NPV of $1,949 million.

This is a little higher than the value of capital cooler savings we can derive for existing homes in the RIS, for Option 3 by subtracting the capital cooling cost saving benefit for Option 1 from the same benefit for Option 4 (2664-830=1834), which is the same algebra we use to impute the value of new commercial and new residential capital cooling Cost Benefits above. However, it is close enough, given the difficulties in replicating what the RIS has done to suggest that in fact it has estimated the cooling capital Cost Benefit the wrong way, by assuming that the cooler needs to be replaced in the same year as the heater.

We then recalculate the benefit the right way by assuming in each year that there is a stream of 12 future benefits (in practical terms, we take the annual benefit calculated the wrong way above and divide it by 12 to get the annual values for each of the 12 future benefits), and the annual benefit now is the NPV, at a 4% discount rate, of this 12 years stream of benefits. We then take the NPV of ten years of these benefit streams. The final answer is $1,524 million, or about 78% of the answer obtained when the calculation is done the wrong way. We apply this 78% to the $1,834 million we have imputed for the existing residential capital cooling benefit from the RIS, which gives $1,434 million, and means the RIS has overstated this benefit by $400 million.

Adding together the error of including new residential benefits when no rational customer building a new home, based on the numbers in the RIS, would choose gas plus cooling ($305 million) and the error from falsely assuming that cooling appliances need to be replaced in the same year as a heating appliance needs to be replaced ($400 million), yields a total error of $705 million.

[139] So, for example, in Table C27, there are 898,329 Class 1 homes with ducted gas, meaning that 64166 of these (ie 1/14th) will replace ducted gas each year. Of the total number of homes with ducted gas, roughly 1/3 (that is 288,486/898,329) have evaporative air conditioning.

8. Impact Assessment

In Section 2 Gas Network Customer Impacts we cover impacts of the RIS on our network and our customers. However, we believe that many of the wider impacts discussed in the RIS have not been considered adequately and require substantially more analysis before the RIS process is concluded. We point to some issues we see in this Section and encourage Government to undertake further consultation with relevant industry groups to get a much better appreciation of those impacts. We believe this should happen before any policy positions can be finalised, as some of the consequences for industry which may flow from the proposed appliance ban may be substantial, and difficult to unravel once the new regulations are in place.

In this appendix we cover:

- Competition impacts;
- Impacts on electricity networks;
- Impacts on gas producers and appliance manufacturers;
- Impacts on the renewable gas industry; and
- Wider economics impacts and the computable general equilibrium modelling undertaken.

8.1. Competition Impacts

A competition assessment is assessed by Better Regulation Victoria as part of its assessment of the adequacy of a RIS.[140] The responsible Minister must also certify that that the requirements relating to regulatory impact statements in the Subordinate Legislation Act 1994 (SLA) and the SLA Guidelines have been complied with, and that in their opinion the regulatory impact statement adequately assesses the likely impact of the proposed statutory rule[141]. This requirement is given expression through the SLA Guidelines, which requires that to meet the requirements of the Competition Principles Agreement, the responsible Minister must issue a competition policy certificate for proposed statutory rules for which a RIS has been prepared[142]. In this instance, it is not clear that the analysis in the RIS would enable the responsible Minister to meet their obligations, because it is not supported by relevant information and is misdirected in respect of the analysis of relevant competition effects.

The key issue in respect of competition effects pertains to the fact that existing businesses might have a different cost profile compared to new businesses. The RIS briefly covers the potential for this issue, noting[143]:

> *In some instances, buildings with access to reticulated gas may be perceived to be more favourable than all-electric. Namely, business owners or operators in the food and beverage industry, such as hospitality or accommodation services, may prefer to operate in existing commercial properties where kitchens are able to operate on gas, while all new commercial kitchens must be electric or use LPG. There are some risks of using portable LPG cylinders in commercial kitchens such as the risk of fire, explosion and leaks in areas with insufficient ventilation. The potential*

[140] Section 10(3) of the Subordinate Legislation Act 1994 provides that the responsible Minister must ensure that independent advice as to the adequacy of the regulatory impact statement and of the assessment included in the regulatory impact statement is obtained and considered in accordance with the guidelines.
[141] Section 10(4), SLA
[142] SLA Guidelines, paragraph 228
[143] Building Electrification RIS, December 2024, p. 132

impact of the proposed regulations on competition in the food and beverage sector will be managed through the implementation plan (for more information on implementation see Section 9).[144]

The following discussion in the RIS goes on justify the lack of competition impacts:[145]

> *There are many areas in Australia and the South Island of New Zealand that are not connected to the reticulated gas network. These include areas such as Cairns and Queenstown which are popular tourist destinations and have a number of hospitality businesses. Many small to large commercial businesses successfully operate in these regions without a connection to a reticulated gas network.*

However, this discussion misses an important point that if the proposal in the RIS is implemented, existing businesses will be able to retain gas appliances while new entrants will be unable to install gas. In the example of a hospitality business used in the RIS, the relevant comparison is not between two hospitality businesses in a town where neither have gas, but rather between two businesses right next to each other where the existing one has gas and a new entrant must use electricity. To the extent that gas and electricity have different cost consequences for business, this does not result in a level playing field and the fact that in some areas of Australia no such businesses have access to a reticulated gas network is irrelevant.

Information should be gathered on relative costs between like businesses which differ only in respect (as far as is possible) of whether they use electricity or gas. Submissions from stakeholders in industry (for example, from laundries and kitchens) should form a first step in this analysis, but more focussed fieldwork and industry analysis is required.

We are of the view this needs to happen before any decision is made to require new businesses to electrify, rather than simply being something which is monitored ex-post, to ensure than anti-competitive market structures do not become entrenched. If it is the case that coffee shops, for example, have substantially different cost structures depending upon whether they use gas or electricity, and a new coffee shop cannot establish itself because of this, in a crowded local retail market where properties are snapped up for alternate uses quickly, the incumbent may be able to sustain a position of local market power for some time, even if the regulations are subsequently relaxed.

8.2. Electricity Network Impacts

Impacts on electricity markets are discussed on pages 97 to 103 of the RIS, with the analysis culminating in Figure 7.4 and 7.5, which show electricity tariffs increasing by a maximum of about 3% for Option 3 by about 2041. It appears that the base case already increases peak electricity demand (which electricity infrastructure needs to be able to serve) by about 40% by about 2041, and none of the options in this RIS presented change this by more than 3.5% (see RIS Figure 7.3).

We accept that the base case does not include just the changes to legislation and regulations which have occurred to date, but other factors. For example, the existing change in regulations likely to have the largest impact on electrical networks would likely be the Minimum Standards for Rental Properties and Rooming Houses RIS, as just under a third of Victorians live in rental properties[146]. However, other changes, such as the rise of electric vehicles, are also likely to have a significant impact on peak electricity demand.

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[144] We note that we can see nothing in the implementation plan to deal with issues which may arise if new businesses which are all electric find it hard to compete with businesses using gas, beyond a proposal to work with DIISR and industry bodies to monitor trends in potentially affected issues (RIS p142).

[145] Building Electrification RIS, December 2024, p. 123

[146] Department of Energy, Environment and Climate Action, *Minimum energy efficiency and safety standards for rental homes – Regulatory Impact Statement*, May 2024, p.9. Access here: https://engage.vic.gov.au/new-minimum-standards-for-rental-properties-and-rooming-houses

The question is how these interact. It might be possible for electric vehicles to have such a large impact on peak demand that the power demands of residential properties can fit into the spare capacity available at non-peak times. However, peak power demand is now and remains forecast[147] to be in the evenings; if electric vehicles are making a major contribution to peak demand,[148] then, since this would be at the same time that heating cooking and hot water loads also tend to peak, electrification of homes could not soak up spare capacity created by expanding the grid to meet the needs of electric vehicles. This would suggest that rental properties comprise a reasonable portion of the base case in Figure 7.3 and, since non-rental residential properties are roughly twice as numerous as rental properties, the small increase to accommodate non-rental properties from the base case appears counter-intuitive. If electric vehicles are soaking up spare capacity by being charged late at night, say, then this would suggest that rental properties make up more of the contribution to the base case, which makes the small increase from the base case to the other options all the more perplexing.

This is unclear in the RIS[149], noting:

> *Victoria's total electricity demand is expected to consist of multiple emerging segments in the future – including electric vehicle charging, industrial electrification and hydrogen production – each of which has different timing, magnitude, seasonality and time of day assumptions. The electricity demand patterns of these emerging segments (e.g., hydrogen production), and how they interact with distributed energy resources, energy efficiency and demand side management initiatives, remains uncertain. The seasonal pattern of Victoria's peak demand could change in the coming years as these dynamics evolve. Noting that the impact of seasonal availability of solar resources on roof top solar and corresponding demand from the grid is already captured in the model under all options and Base Case. That is, in summer when there is a high chance of solar availability at peak hours, less demand would be required from the grid compared to winter which has more limited solar availability.*

It is important for the modelling underlying Figure 7.3 and its conclusion that very little additional electricity network investment will be required as residential and commercial gas loads are electrified, is published. This is a crucial aspect to the proposed RIS, and indeed the general direction of the Gas Substitution Roadmap and needs to be clarified for stakeholders.

This is especially the case because those who will actually need to do the investment to support both the RIS and the Gas Substitution Roadmap, the electricity utilities, appear to have a different view to the government.

AusNet, who provides both gas and electricity services in Victoria and therefore has a unique perspective across both markets notes that Victorian electricity networks are already the most constrained in the nation, and that all of the Electricity Distribution Price Review (see for example, AusNet) already have significant increases in network investment planned, even before the RIS and its pressures.[150] They note in particular that the cost of providing sufficient network resilience will be particularly high, to prevent power interruptions as the extra peak load comes on board, and not that the true consequences are likely to be much more substantial than the whole of system modelling that the government has done, noting that:

- Investment in brownfield areas, where powerlines may already be underground, is likely to be particularly expensive; and
- Location matters, meaning that a proper assessment can only be done once a detailed sub station-by-sub station assessment is undertaken.

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[147] AEMO, *Integrated System Plan* 2024, p. 28, Fig 8. Access here: https://aemo.com.au/-/media/files/major-publications/isp/2024/2024-integrated-system-plan-isp.pdf?la=en

[148] We acknowledge that electric vehicles are not the only contributor to peak demand, but the same logic would apply to other contributors.

[149] Building Electrification RIS, December 2024, p. 101

[150] AusNet, Electricity Distribution Price Review, 2061-31 Regulatory Proposal, 31 January 2025. Access here: AusNet EDPR 2026-31

We believe that the full impacts of the RIS may change substantially when this more detailed work is performed in consultation with the electricity networks who will be required to implement it.

The RIS also notes in respect of electricity transmission infrastructure that[151]:

> *For Option 2, the modelling suggested that existing ODP investment under AEMO's Draft 2024 ISP Step Change scenario would not be sufficient to meet peak demand, therefore some additional investment appears to be required. Option 2 and Option 4 are expected to require a moderate increase in transmission capital investment relative to the Base Case. While Option 3 also requires additional transmission investment, this is relatively lower than Option 2 and Option 4 and appears marginal when compared to the capital expenditure required by 2050. This is because Option 3 results in lower peak demand levels compared to Option 2 and 4, hence does not require the same magnitude of transmission investment to support peak loads.*

And in respect of electricity distribution infrastructure that[152]:

> *In total, across the modelled period, the additional capital investment for the distribution network relative to Base Case is projected to be high for Option 2 and Option 4, moderate for Option 3 and low for Option 1.*

No dollar values are given (for distribution or transmission), but a footnote explains that a moderate impact is between 5 and 15%. We note that the Cost Benefit Analysis includes as a benefit the capital and operating expenditure that gas networks do not need to incur when demand falls due to the RIS. It is unclear why avoided gas network costs are included as a benefit in the Cost Benefit Analysis, but increased electricity network costs are not included as a cost. We consider that the Cost Benefit Analysis should have included the net effect of whatever it finds in respect of avoided gas network costs and increased electricity costs, as this is the true cost to the community as a whole.

8.3. Gas Producer and Gas Appliance Manufacturer Impacts

In respect of natural gas producers, the RIS notes the following[153]:

> *Entry and exit for fossil gas producers largely depends upon the availability of gas which, as discussed in section 2.3.1, is already declining in Victoria, with sustained gas supply shortages projected for Victoria as soon as 2028. The proposed regulations are therefore expected to have a limited impact on competition among fossil gas producers.*

We would recommend the government seek the views of gas producers in this regard. An appropriate response from the government would be to outline how gas availability may be addressed, say by policy more designed to motivate exploration, given the need for gas as a transition fuel, as demonstrated in recent approvals for exploration licences granted off the Otway Basin[154]. Instead, the RIS appears to arrive prematurely, without undertaking the requisite analysis, at a conclusion that this particular policy makes no difference to competition on an assumption that the gas production sector is declining. We note also that the market already appears to be responding to a need for more supply with both APA and Jemena recently making ASX releases highlighting increased investment in pipeline infrastructure to ensure that Victoria does not run short of gas (see, here for APA and here for Jemena). It is crucial that the RIS does not provide negative signals to this investment.

In respect of appliance manufacturers, the basic conclusions of the RIS appears to be that they ought to switch to electric appliance manufacture or exit the market, and that their business model, like that of gas producers, has a limited lifespan given that gas itself is running out.

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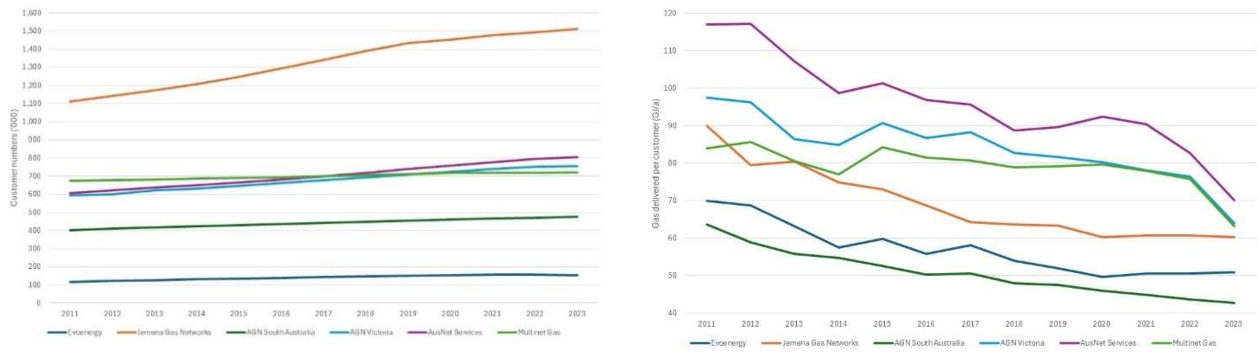
151 Building Electrification RIS, December 2024, p. 102
152 Building Electrification RIS, December 2024, p. 102
153 Building Electrification RIS, December 2024, p. 134
154 ABC News, *ConocoPhillips Australia gets approval to drill gas wells in Otway Basin.* Access here: ConocoPhillips Australia gets approval to drill gas wells in Otway Basin - ABC News

We would suggest the government consult with organisations like GAMAA, who will have more information on this point. A particular focus ought to be on differences in market supply between gas and electric appliances; we understand the share of imported electric appliances is significantly higher than is the share of imported gas appliances, which has important effects on Victoria's economy. However, the conclusion that gas appliance manufacturers face risk regardless of this RIS appears misplaced. This is clear when examining Figure 10, which takes data from the AER *Network Performance Reports*.

Figure 10: Customer numbers (LHS) and consumption per customer (RHS)



Source: AER 2024 Network Performance Reports data workbook, available here

As is clear, customer numbers are increasing, slightly, whilst use per customer (and indeed, overall use) is falling. Gas appliance manufacturers business is dependent upon demand for appliances, not demand for gas. If no gas is available, then there is nothing for appliances to use, but short of that, if users of gas are reducing how often and how much they use it, but still favour having a gas appliance, it is not clear that the appliance market is in decline absent of this RIS which, by design, forces the market to cease to exist by removing entirely the demand side of it.

8.4. Renewable Gas Industry Impacts

As a leading renewable gas investor, we provided detail in our submission to the Renewable Gases Directions Paper on the role of the network in providing physical infrastructure to deliver renewable gases, and its role in market creation. This model of using existing distribution network infrastructure to enable renewable gas development and scaling up has been replicated in several international schemes looking to scale up renewable gases – notably, in Denmark, and the United Kingdom.

The RIS covers renewable gas only tangentially, addressing it as one of the options not involving regulation which it rejects. The RIS note that:[155]

- Renewable gases are much more expensive than natural gas, with even biomethane being much more expensive than electrification. The RIS suggests that electric appliances are four times cheaper than appliances run using biomethane and ten times cheaper than appliances run using hydrogen.
- There are insufficient stocks of either hydrogen or biomethane available to fully substitute Victoria's gas load, with issues in respect of both feedstock availability and scalability.
- Given the challenges with renewable gases, diverting renewable gases to other uses may mean that there are insufficient renewable gases available for uses where electrification is infeasible.

[155] Building Electrification RIS, December 2024, p. 150

The section closes by noting that the Victorian government is working with industry to develop renewable gases for hard to abate sectors.

In respect of the third point, if policymakers want a particular product or service to fall in price so that it can be used, the usual economic response is to work to produce as much as possible of it, rather than to limit production. In this instance, the best way to ensure that there is sufficient low-cost renewable gases available for whichever sector of the economy needs them, is to support their production at scale. Limiting their use to a very small niche of the economy by deliberately preventing other sectors that could use them from doing so would instead make renewable gases uneconomical.

This lesson was well understood by policymakers in respect of other renewable power sources such as wind and solar where governments around the world (including in Victoria) provided support on both the supply (via support to manufacturers, particularly in places like China) and demand (via measures to incentivise the deployment of wind and solar, such as the Renewable Energy Target scheme) precisely in order to build scale and lower costs.

Related to this point is the issue of transport; if there is no gas network, or accessing the gas network is too expensive because of the need to share fixed costs over a small number of customers (see discussion in Section 2), then the hard to abate sectors for whom the Victorian Government is prioritising renewable gas for may find transporting it too expensive to make it viable. Some might be able to access more expensive means of transporting the gas, such as trucks, and some might be able to co-locate to use a local resource, but, without a viable network to transport the renewable gas around, its use will be limited still further.

In order to develop renewable gas for the hard to abate sectors, it is necessary to work with industry to ensure it can develop at scale. Once that happens, markets are the best way to ensure that the low-cost renewable gas goes to the sectors of the economy which value it the most. Deliberately limiting opportunities for scale by removing sources of demand and making networks much more costly for their users is the very opposite of the best way to assist this industry to succeed.

These points are made in greater detail in our submission to the Victorian Government's Renewable Gases Directions Paper[156].

Additionally, one of the problems the RIS aims to solve is a reduction in carbon. Notwithstanding, the RIS makes no assessment of the cost of reducing carbon for any of the options. L.E.K. Consulting points to a costing of the RIS and its implications for customers compared to the amount of carbon reduction it will achieve which suggests that the effective price per tonne of carbon removed is around $1,200 per tonne[157]. Not only is this far higher than the social cost of carbon used in the RIS ($167 per tonne by 2032; we note that even the MCE carbon values, which go out to 2050, have a maximum value of $420 per tonne), it is also more expensive than any other form of carbon reduction we are aware of. Even direct air capture, which we understand is the most expensive option being considered anywhere, is estimated by the IEA at being roughly half this cost,[158] meaning that Victorians would be better served by investing in direct air capture at scale than banning gas appliances in the way the RIS proposes.

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[156] AGIG Submission, Renewable Gas Directions Paper, 7 February 2024. Access here:https://www.agig.com.au/-/media/files/agig/media-release/rg-directions-paper--agig-submission-070225-final.pdf

[157] L.E.K Consulting Report, February 2025

[158] The IEA estimate, which is from 2019, is available here. The maximum of the range shown is close to USD 350 per tonne, or AUD550 at current exchange rates. We are aware of other estimates, such as this one, which suggests ranges, particularly for very long term storage, of up to USD 1000 per tonne today (see here, noting the bottom end of the range is USD700 per tonne), or AUD1500 per tonne, but even sceptics (see, for example, here) suggest this will fall through time.

8.5. Wider Economic Impacts

In addition to the cost benefit analysis, the RIS looks at the wider economic impacts via a computable general equilibrium (CGE) analysis which tracks the impacts of the RIS through the economy.[159] CGE analyses are widely used in this role and even though they do not play a role in determining whether a given regulation should go ahead within the RIS framework, they can provide useful additional information about how a given regulation might affect the economy at large. Unfortunately, in this instance, the CGE analysis is unlikely to add much that is of value for policymakers.

The CGE analysis contains issues in its assumptions about investment. The RIS requires people to spend more money (up front) on an electric appliance to perform the same job as an equivalent gas appliance would do. This should be a net drain on the investment side of the economy, equivalent to a tax. Instead, the RIS CGE analysis appears to count the additional cost of the electric appliances relative to gas appliances as additional beneficial investment in the economy and not as a diversion of household funds that would otherwise be spent on a cheaper option. This massively overstates the wider economic impacts of the policy and materially impacts the results and usefulness of the CGE analysis.

As we discuss elsewhere in our submission, there are many impacts on the economy which have not been adequately examined by the RIS, such as the competition impacts of different cost structures for commercial businesses in this section or the impact on industry of higher gas costs as favourable network economic are unwound in Section 2. To the extent that government wishes to understand wider economic impacts, it should first address all the direct impacts on industry and the commercial sector, and then trace through the wider impacts on the Victorian economy.

159 Building Electrification RIS, December 2024, pp. 111-112

9. Implementation

9.1. Switchboard and Supply Upgrade Cost

The RIS estimates that 19% of Victorian homes will incur costs between $2,525 and $12,250 to enhance the connection between the external power grid and the switchboard, with an average modelled cost of $4,700.

Given the significant financial impact and wide variation of estimates, these assumptions require further explanation than what is currently provided in the RIS.

- How is the 19% figure, as extrapolated from the Solar Victorian scheme, applied to represent all of Victoria's diverse building stock, and not those already suitable for solar (both technically and/or in terms of household vulnerability)? How many homes were included in the dataset? What was the age and distribution of homes in the sample and were older homes, regional properties, and other complex buildings adequately accounted for?
- How has the $2,525 to $12,250 cost estimate, based on 2022 desktop research, been adapted to apply to economic conditions in 2025 including cost of living pressures, labor cost increases, inflationary pressures, supply chain disruptions, and the higher electricity demand potentially impacting network upgrade costs?
- What margin of error is associated with this estimate, and what contingency plans exist if the real percentage or range of costs is significantly higher?

Overall, the policy intent to exempt buildings where the network connection is not financially viable is essential, however, the proposed exemption definition only covers network costs while excluding material switchboard costs.

Further, the proposed drafting excludes significant hidden costs, including household wiring, which are addressed in the following section.

9.2. Switchboard and Wiring Upgrades

The RIS states that switchboard and wiring upgrades could be required if existing infrastructure cannot handle new electrical loads[160].

This statement acknowledges that if a network connection upgrade is required – the quoted expected cost of which is $2,525 to $12,250 – further switchboard upgrades are also likely. These could include:

- Three-phase power installation;
- Additional wiring and power points throughout the house; and
- Circuit breaker replacements.

However, the RIS explicitly excludes these activities from exemption eligibility, stating: *"… costs associated with upgrading switchboards are considered part of the normal cost associated with the upgrade and no exemptions are available on this basis."*[161].

Further, these costs were not included in the CBA due to uncertainties about the extent of unsafe wiring in Victorian homes; whether regulations or other safety standards trigger upgrades; how often renovations would have led to replacements independently; and the omission of safety benefits like reduced fire risk and loss of life prevention[4].

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[160] Building Electrification RIS, December 2024, p. 70

[161] Building Electrification RIS, December 2024, p. 70

While these uncertainties may complicate precise cost estimation, they do not justify excluding wiring upgrades entirely from the CBA. Similar uncertainties exist for network supply upgrades, yet those costs were included. This omission distorts the financial assessment of electrification, as many households will face costs not reflected in the RIS.

Additionally, the RIS acknowledges that an electrician may discover additional wiring deficiencies when installing electric appliances[162], creating financial uncertainty. Households may begin an upgrade only to face unexpected additional costs, with no recourse.

The exclusion of household wiring upgrades an inequitable situation where network augmentation is recognised as a financial burden, but household wiring upgrades are excluded despite being equally prohibitive. Reasonable questions around this include:

- If network supply upgrades qualify for an exemption on grounds of being "*disproportionately high*", why are switchboard and wiring costs treated differently, despite both being essential to making homes compliant with electrification requirements?
- Given that many older homes and regional properties may require both types of upgrades, has the RIS adequately accounted for these real-world scenarios, particularly the likelihood that a network upgrade will often necessitate a switchboard upgrade? If these costs are interdependent but only one is considered for exemption, does this omission significantly underestimate the financial burden on homeowners?
- How will homeowners be protected from unexpected wiring costs, particularly when these costs only become apparent after installation has commenced and no exemptions apply? Does the lack of household wiring data mean that the RIS significantly underestimates the true costs of electrification?

9.3. Structural and Amenity Constraints

In addition to sufficient spatial amenity, buildings must have the structural capacity to support additional electrification infrastructure. This requires adequate structural integrity, weight-bearing capacity, ventilation, fire safety measures, and compliance with building codes.

Changes to the building envelope or structure, such as adding new roof plant space, or adapting the façade to allow improved ventilation may require additional planning permits or be subject to updated seismic or fire risk codes, at the discretion of the building surveyor and local council.

9.4. Technology Availability

Just because an electric alternative exists does not make it readily available, it must establish scaled supply and distribution. Further, the availability of skilled tradespeople to install and maintain new electric technologies can also be compromised—particularly in an already constrained market.

If users cannot access proven, timely replacements, they risk losing essential energy supply while waiting for a suitable alternative. For businesses, this disruption can be exponentially more severe, leading to significant operational and financial consequences.

A balanced exemption framework is needed to ensure users can maintain reliable energy solutions if suitable electric alternatives are delayed compared to gas options.

[162] Building Electrification RIS, December 2024, p. 81

9.5. Technology Performance

In addition to the range of users for which electrification is not possible due to the levels of heat required; many gas users depend on the high pace at which high temperatures can be achieved and subsequently cooled to operate most economically.

Electric alternatives generally take longer to heat up to operating temperatures compared with a gas-fired equivalent, for these users, operational costs could be increased through:

- Additional electricity as the equipment takes longer to heat up and cool down;
- Additional on-site staffing requirements while the equipment operates; and
- Additional exposure to 'peak' electricity tariff charges as users move to time-of-use based tariff structures (compared with gas which is a flat 24/7 charges).

Beyond operational considerations, purchasers of Victorian goods and services often expect gas for cultural, practical, and quality reasons, appreciating its superior technical performance, aesthetic appeal, and functional benefits.

These factors are particularly relevant to a wide range of businesses subject to the proposed policy, including but not limited to coffee roasters, meat processing, bakeries, laundries, breweries, mechanics, where gas plays a critical role in meeting customer expectations.

Case Study: Bakeries[163]

In 2024, a notable case emerged highlighting the challenges businesses face with electric appliances. A business owner, Mr. Boscacci, decided to replace their electric equipment with gas alternatives, describing the demand tariffs as a "*penalty*", with an estimated $2,500 of his $8,500 monthly electrical bill being attributable to their demand tariff. Mr Boscacci stated "*due to [the] cost of electricity, we're actually going to put it in a gas oven now*", being of the view "*that should save us a fair chunk of money*".

Further, bakeries must consider operational challenges electric ovens often require longer preheating times compared to gas ovens. This delay can disrupt baking schedules, potentially necessitating the employment of additional staff to manage extended operating hours and ensure timely production. Changes to attributable to distinct heat distribution and baking characteristics of electric ovens, which may require retraining staff and modifying recipes to maintain product quality.

9.6. Technology Reliability

Reliability and redundancy are crucial considerations for energy users, particularly those that require continuous operation and minimal downtime. Compared with the existing use of gas, users being made to switch to electric alternatives face increased vulnerability to grid instability, power outages, and peak demand constraints.

Electrification introduces the need for backup systems in case of power failures, typically diesel generators, adding substantial costs, ongoing maintenance requirements, and additional carbon emissions.

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163 ABC News, *Penalty demand power tariffs blamed as business rips out electric and installs gas*, 2024. Access here: https://www.abc.net.au/news/2024-05-04/business-rips-out-electric-installs-gas-blames-demand-tariffs/103792258.

Another critical factor is serviceability and maintenance. Gas appliances are mature, well-understood technologies with widely available spare parts and trained technicians. In contrast, many electric alternatives – especially newer commercial-scale models – face a steep learning curve, with limited availability of replacement components and fewer specialised technicians capable of servicing them efficiently.

These factors make redundancy planning and long-term serviceability major hurdles for businesses being made to electrify. Without addressing these challenges, businesses may experience higher maintenance costs, longer downtimes, and reduced operational efficiency, ultimately diminishing the benefits of electrification.

9.7. Underperforming Electric Appliances Compared with RIS Modelled Outcomes

The RIS introduces concepts of information asymmetry and bounded rationality, acknowledging that consumers may struggle to assess the long-term costs and benefits of electrification due to limited information, time constraints, and cognitive overload[164].

However, it does not model that not all electric appliances perform equally to apply these concepts in practice by recognising that many Victorians, particularly low-income households, will prioritise upfront affordability and opt for low-cost resistance electric appliances, which provide similar efficiency levels to gas alternatives. This risks undermining the expected gains in energy efficiency and emissions reductions.

Under the proposed policy, Victorian households replacing a gas space heater may face a choice between a lower-cost, proven and available heat pump with lower efficiency or a higher-efficiency model with greater long-term savings but a higher upfront cost and limited in-market demonstration and availability.

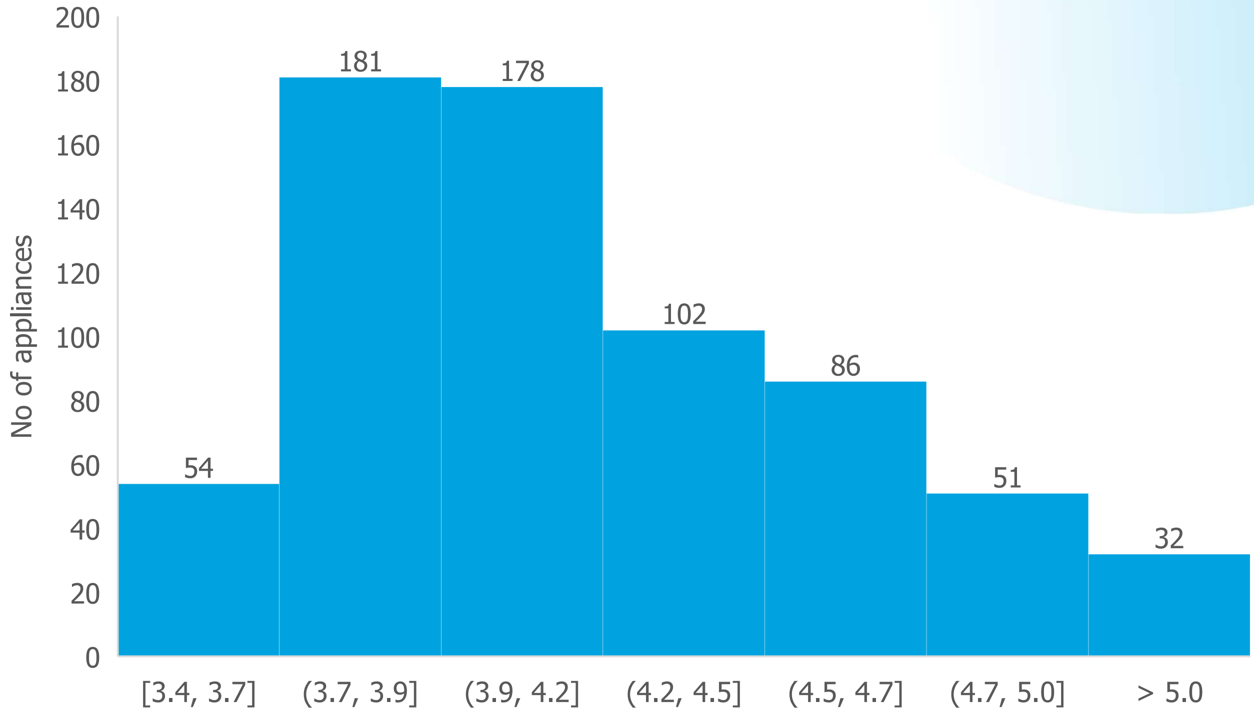
Without clear efficiency benchmarks, targeted incentives, or structured market interventions, many consumers—particularly those under financial pressure—will prioritise immediate affordability and reliability over long-term efficiency. Factors such as limited product availability, installation complexity, lack of clear guidance, and behavioural biases like loss aversion and decision fatigue further increase the likelihood of suboptimal choices.

The RIS does not clearly outline the efficiency benchmarks necessary for consumers to achieve the projected bill savings. RIS modelling appears to rely on a Coefficient of Performance (COP) of approximately 5 times for electric heating based on Table 2.1 of the RIS. However, analysis of the VEU program shows that only 5% of available electric models meet this efficiency threshold, while the majority perform 17%–50% below this level. This suggests that 95% of appliances currently on the market will fail to deliver the economic and emissions benefits modelled in the RIS. In addition, it is expected that the appliance costs for high COP appliances will be more, which may increase the uptake of lower COP appliances which are likely to result in 40-50% impact on proposed benefits.

This is further complicated by the fact that the RIS does not clearly outline the specific efficiency benchmarks that electric appliances need to meet for consumers to realise its projected savings. Without this clarity, it remains unclear to customers what efficiency levels are required for an appliance to deliver the expected bill savings, making it difficult to make informed purchasing decisions.

164 Building Electrification RIS, December 2024, pp. 50-51

Figure 11: Appliances and CoP in VEU



Further, it is noted that higher-efficiency appliances tend to be more expensive, meaning lower-income households may struggle to afford the high-COP appliances needed to realise the modelled cost savings.

To address this lack of clarity for consumers, minimum quality and efficiency standards should be introduced for Victorian households that are required to switch under the proposed regulations.

9.8. Low Quality Electric Appliances

While the RIS acknowledges *"low-quality heat pumps can be a potential risk to safety and effectiveness"* at a high level, it does not fully contemplate this risk nor suggest a mechanism for mitigating it.

Without strict quality controls, independent verification, and proper consumer guidance, less scrupulous suppliers could misrepresent resistance-based systems as advanced heat pump technology, leading to households unwittingly installing appliances that fail to provide the promised financial relief.

Case Study: 'Dodgy' solar panels and risks of poor product oversight

During Australia's solar boom, a surge of low-cost, low-quality solar panels entered the market, often misleading consumers with exaggerated performance claims and inadequate warranties.

Many of these cheaper panels and inverters did not come with robust warranties or reliable customer support. Simultaneously the rush to meet installation quotas from installers resulted in instances of improper system wiring, grounding and incorrect panel orientation.

"*There are still problems in rooftop solar, you've still got the classic problem of people who sell systems that are so cheap they can't possibly be any good," says Finn Peacock, founder of SolarQuotes, which helps consumers find a suitable installer*[165].

Gavin Dufty, executive manager of policy and research at St Vincent de Paul Society, described consumer issues with solar and battery installations as "*huge*", and called for a reworking of legacy consumer protection frameworks in light of the transition to low-carbon energy.

"*Trust is very important here; if you start to have a few poor experiences it can undermine the transition and have broader implications*."

This necessitated the Clean Energy Regulator development of consumer guidance frameworks in relation to solar panel product quality and installation[166].

9.9. Existing LPG Use

Victoria is Australia's largest user of LPG with 29% of total stationary demand[167]. Over 356,000 Victorian households currently rely on LPG for indoor cooking, heating, and hot water[168]. Victorian homes represent 79% of stationary LPG use, with business using the remaining 21%[169].

The RIS acknowledges consumers may turn to LPG as a readily available alternative to electrification. However, it does not quantify the impact of this cohort adopting LPG. The opportunity presented by the proposed policy to expand LPG supply to Victorians has been highlighted by GEA[170]:

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165 Macdonald-Smith, A. (2024). *Where have the cowboy solar panel spruikers gone? Home battery storage*. Australian Financial Review. Access here: https://www.afr.com/policy/energy-and-climate/where-have-the-cowboy-solar-panel-spruikers-gone-home-battery-storage-20241104-p5knmd.

166 Clean Energy Regulator, *Rooftop solar and solar water heater complaints information*, 2024. Access here: https://www.cleanenergyregulator.gov.au/RET/Scheme-participants-and-industry/Individuals-and-small-business/what-to-do-if-you-have-concerns-about-your-solar-installation

167 Gas Energy Australia, *Australian LPG Industry: Our Value*, 2017. Access here: https://www.gasenergyaus.au/get/1869/gea-australian-lpg-industry-our-value.pdf.

168 Gas Energy Australia, LPG: Part of Victoria's renewable cooking, 2024. Access here: https://www.gasenergyaus.au/read/2061/lpg-part-of-victorias-renewable-cooking.html.

169 Ibid

170 Gas Energy Australia, *LPG can save Victorian families & businesses from massive costs*, 2023. Access here: LPG can save Victorian families & businesses from massive costs < Media Releases < News Archive - 27 October 2023 | Gas Energy Australia - representing the downstream gas fuels industry

"Families on natural gas can also easily and cost-effectively switch to LPG rather than electricity. The transition from natural gas to LPG, typically, requires minor changes by a licensed gasfitter. If, in rare cases, natural gas equipment cannot be made LPG-compliant, new LPG appliances retail for about half the price of electrical appliances and without the need to rewire homes.

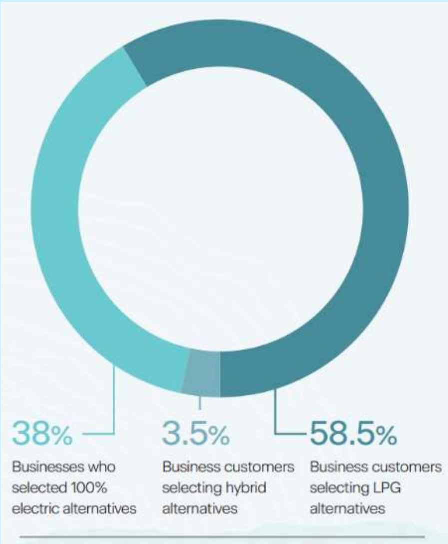
"Victorian families have told us they've been quoted not to expect change out of $50,000. In the ACT, we've been advised it runs to $55,000. One family in Canberra whose ducted gas heating system died, sought to replace it with an electric alternative. The quote was $20,000 due to a host of hidden costs. Not surprisingly, they went with a new ducted gas unit.

In its report commissioned by the ACT Government identifying suitable electrified alternatives for commercial and industrial appliances, GPA Engineering state[171]:

"Some appliance owners may face large transition costs and/or product quality concerns [with electrifying], and so may swap out their gas connections for LPG, or even consider relocate to areas where they can continue using their existing appliance (though this may be a challenge for many small businesses, who serve a specific geographic area)"

Case Study: Esperance Energy Transition Project[172]

In 2023, Horizon Power initiated the Esperance Energy Transition Project to assist approximately 400 customers in shifting from a decommissioned reticulated gas network to alternative energy sources. The project emphasised customer choice, offering subsidies to encourage the adoption of energy-efficient electric appliances. Despite these incentives, the transition decisions among business users revealed notable trends.



Conclusion

Approximately 60% of business customers opted to switch to LPG , while 34% of residential customers adopted either partial or 100% LPG connections. This was despite there being available funding to cover 95% of electrification costs, compared to 75% of LPG costs, evidence that in many instances, businesses value the gas offering, even in instances where electrification has been artificially subsidised to a greater extent.

171 GPA Engineering, *Green gas alternatives for the ACT commercial and industrial sector*, 2024. Access here: https://www.climatechoices.act.gov.au/__data/assets/pdf_file/0006/2509242/green-gas-alternatives-for-the-act-commercial-and-industrial-sector.pdf.

172 Horizon Power,*Esperance Energy Transition Report, Horizon Power*, 2024.Access here: https://www.horizonpower.com.au/globalassets/media/documents/news--announcements-assets/esperance-energy-transition-report.pdf?v=4ad4ef

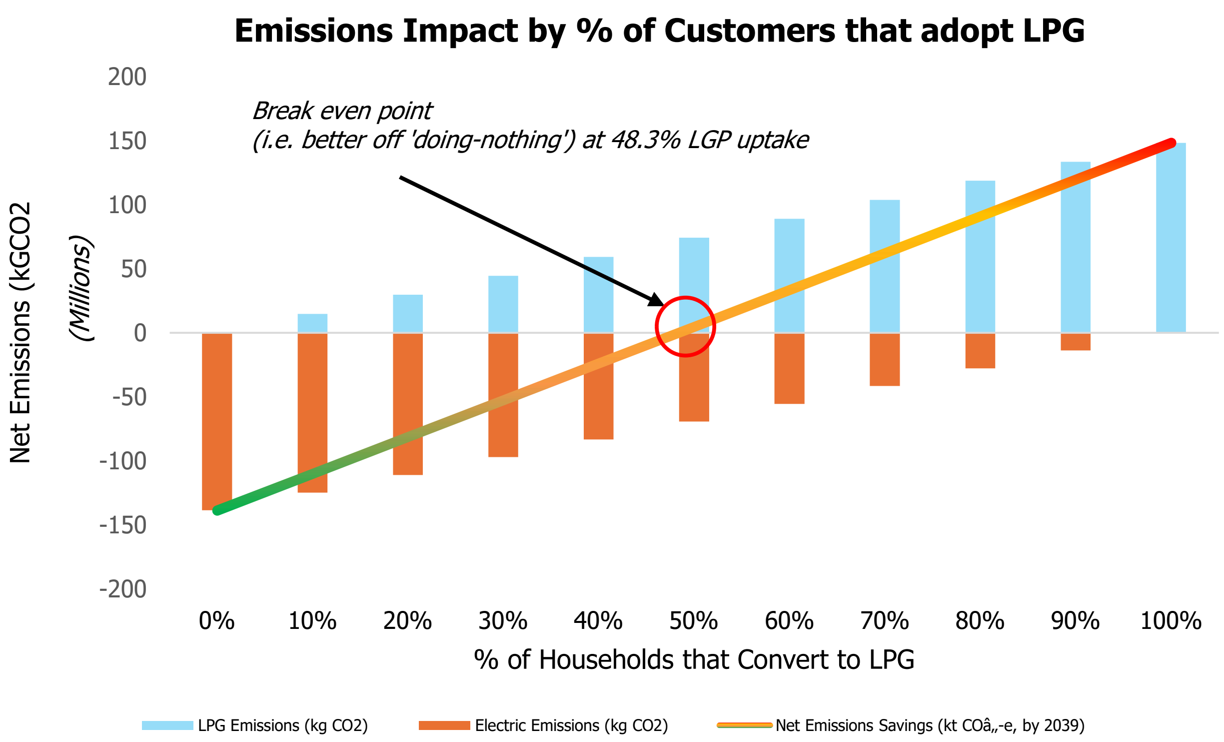
9.9.1. Emissions Impact of LPG

Produced with a combination of refined natural gas (~60%) and crude oil (~40%)[173], LPG emits approximately 17% more carbon than natural gas delivered via existing gas networks[174], compared with the assumed 16% saving in carbon emissions per all-electric household compared with natural gas set out in the RIS[175].

This means each household switching to LPG offsets more the emissions reductions modelled in the RIS from one electrified household. Applying the analysis referred to in the RIS in household terms, if electrifying a household saves 500kg CO_2-e annually (a 16% reduction), it follows that switching to LPG increases emissions by 535 g CO_2-e per household annually (a 17% increase)[176].

The chart below highlights the relationship of LPG emissions, offsetting households electrifying on a per household conversion basis.

Figure 12: Net Emissions Impact by Proportion of Customers that Electrify vs adopt LPG



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[173] Elgas, *LPG origin: How it is made, produced & manufactured*, 2023. Access here:https://www.elgas.com.au/elgas-knowledge-hub/residential-lpg/lpg-origin-how-made-produced-manufactured/.

[174] LPG (60.2kg CO_2 per GJ) is 17.12% more carbon-intensive than natural gas supplied via networks (51.4 kg CO_2 per GJ), according to DCCEEW (2024). Australian National Greenhouse Accounts Factors. Available at: https://www.dcceew.gov.au/sites/default/files/documents/national-greenhouse-account-factors-2024.pdf

[175]Building Electrification RIS, December 2024, p. 44.

[176] Calculated on the basis the RIS states electrifying a household reduces emissions by 16%, equating to 500 kg CO_2-e annually, and LPG is 17.12% more carbon-intensive than natural gas. The emissions increase from switching to LPG is therefore calculated as: (17.12/16) × 500 =535 (17.12/16)×500=535 kg CO_2-e per household per year.

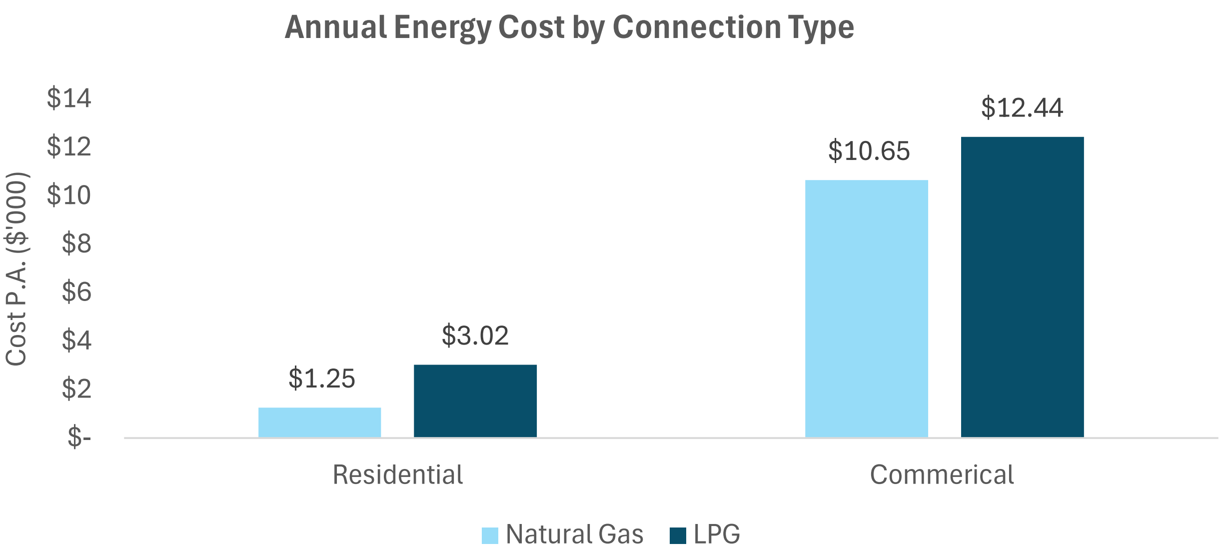
This analysis excludes the additional upstream emissions associated with LPG compared with natural gas supplied via networks, including additional processing, storage, and transport (trucking, bottling). For simplicity, it also excludes carbon reduction pathways for both LPG and gas networks.

9.9.2. Cost and Equity Impact LPG

The RIS acknowledges that upfront capital costs are a key barrier to electrification, particularly for low-income households, retirees, and regional communities[177]. It also identifies appliance costs and electrical infrastructure upgrades as the main cost drivers for electrifying commercial buildings[178].

This suggests that if forced to move away from reticulated gas systems, households may adopt LPG systems as seen in the Esperance Energy Transition Project. However, as noted in the VGSR update, LPG has a higher cost per energy unit than reticulated gas, meaning households that switch will face higher ongoing bills compared to staying on the gas network[179]. Figure 5 highlights this cost disparity.

Figure 13: Annual Energy Cost by Connection Type[180]



9.10. Issues with Administering Exemptions

The RIS places the burden of administering exemptions on individual plumbers, requiring them to determine whether a property qualifies for an exemption and document their justification.

The proposed amendments to the *Plumbing Regulations 2018* introduce several operational challenges for plumbers, particularly in assessing exemptions for network gas appliance installations and replacements.

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[177] Building Electrification RIS, December 2024, p. 125.
[178] Ibid, p. 128.
[179] DEECA, *Victoria's Gas Substitution Roadmap Update*, 2024. p. 46.Access here: https://www.energy.vic.gov.au/renewable-energy/victorias-gas-substitution-roadmap/gas-substitution-roadmap-update-2024.pdf
[180] According to the RIS, the average retail cost of natural gas is $30/GJ. In comparison, LPG costs $72/GJ for a standard 45kg household bottle and $35/GJ for a tanker fill option, which is more typical for commercial LPG applications. For existing Victorian homes that use 42 GJ of gas per year on average, switching to bottled LPG increases the fuel component of their bill by 140%. Similarly, for commercial applications using 355 GJ per year on average, the cost increase is 16.7% when switching to tanker-delivered LPG.

This creates risks of regulatory loopholes, inconsistent application of exemptions, and increased administrative burdens. Additionally, building owners may exploit the lack of standardisation by searching for plumbers willing to grant exemptions, leading to further divergence in enforcement.

Without strong oversight and structured recourse mechanisms, these factors could ultimately increase costs and reduce industry stability.

9.10.1. Inconsistencies and Interpretation Variability

Under the proposed framework, plumbers are responsible for determining whether an exemption applies without a formal application or approval process. The criteria for exemptions, such as "insufficient space" or "regulatory constraints" (e.g., Heritage Act 2017), are subjective and open to interpretation. Without a centralised verification mechanism, different plumbers may apply exemptions differently, leading to a lack of regulatory consistency.

Case Study: Trade Disputes Over Energy Transition Policies in New York and Maryland[181]

The trades sector is facing mounting pressure as new government regulations in New York and Maryland impose complex energy compliance requirements, forcing plumbers, electricians, and HVAC specialists to shoulder additional administrative burdens, rethink their service offerings, and grapple with job security concerns. Many in the industry argue that policymakers are implementing sweeping changes without consulting those responsible for making them work in practice.

In both states, tradespeople are pushing back against rules that complicate their work, increase liability risks, and undermine their traditional expertise. The lack of clear transition support and training pathways has only intensified tensions, with unions and industry groups warning of economic fallout for small contractors, independent tradespeople, and legacy businesses.

New York: Plumbers and Builders Challenge Government Overreach

New York's decision to restrict the installation of gas appliances in new buildings has sparked an industry-wide backlash, with trade unions and builders arguing that the state is making them responsible for enforcing policies that threaten their core work.

Plumbers, in particular, are concerned about the future of their trade, given that a large portion of their work involves gas line installation, servicing, and repairs. Richard Brooks, Business Manager of Plumbers Local Union No. 200, voiced his frustration:

"New York's gas ban will unnecessarily hurt New York workers by removing our members' jobs at a time when we are already leading the nation in the expansion of alternative energy for New York residents." (New York State Senate, 2023)[182].

Beyond concerns about job losses, builders and contractors have warned that the policy is creating uncertainty about what projects they can take on. Without a structured plan for retraining or a clear phase-out strategy, many feel they are being left to navigate a shifting regulatory landscape on their own.

For smaller businesses, the stakes are even higher. Independent contractors who built their careers around gas fitting and servicing now face the possibility of losing a decades-old skill set that has sustained their livelihoods.

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[182] New York State Senate, *Senator Mattera rallies coalition to support lawsuit against New York's gas ban*, 2023. Access here:https://www.nysenate.gov/newsroom/press-releases/2023/mario-r-mattera/senator-mattera-rallies-coalition-support-lawsuit

Maryland: HVAC and Electrical Contractors Protest Unworkable Compliance Standards

Maryland's Building Energy Performance Standards (BEPS)[183] have triggered widespread resistance from HVAC specialists and electrical contractors, who say the regulations impose unrealistic timelines and financial burdens on the industry.

Many tradespeople argue that the workforce is simply not ready to meet the ambitious efficiency and emissions standards that the government is mandating. HVAC specialist Mark Reynolds expressed deep concerns about the labor shortage and lack of preparation:

"We don't have enough trained workers to handle the upgrades at the scale they're asking for—it's setting up businesses for failure." (Whiteford Law, 2024).

Unlike large firms with dedicated legal and compliance teams, independent electricians and HVAC contractors are struggling to keep up with shifting expectations. Many are concerned that failure to meet compliance deadlines will result in heavy penalties, further increasing financial pressures on an already stretched industry.

Faced with billions in projected compliance costs, contractors and builders joined Washington Gas in a lawsuit against the state in January 2025, seeking to delay or amend the rules (Gordon Feinblatt LLC, 2024)[184]. Industry groups argue that tradespeople have been given an impossible task, with little consideration for the practical challenges of meeting aggressive efficiency targets.

183 Maryland Department of the Environment, *Building Energy Performance Standards (BEPS)* 2024. Access here: https://mde.maryland.gov/programs/air/ClimateChange/Pages/BEPS.aspx

184 Gordon Feinblatt LLC (2024) *Maryland BEPS: New rules for energy performance in buildings*, 2024. Access here: https://www.gfrlaw.com/what-we-do/insights/building-energy-performance-standards-published