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Submission to Victorian Gas Substitution Roadmap Consultation paper

The Australian Energy Council (the Energy Council) welcomes the opportunity to make a submission to the Victorian Government's Gas Substitution Roadmap – Consultation Paper (Consultation Paper).

The Energy Council is the industry body representing 20 electricity and downstream natural gas businesses operating in the competitive wholesale and retail energy markets. These businesses collectively generate the majority of the electricity in Australia, sell gas and electricity to over ten million homes and businesses, and are major investors in renewable energy generation.

Introduction

The AEC is encouraged by the Victorian Government's consultative approach to exploring pathways for natural gas substitution, as part of its policy goal to reach net zero emissions. The AEC is keen to work proactively with the Department of Environment Land, Water and Planning (DELWP) to develop the optimal decarbonisation pathway.

The AEC supports net zero emissions by 2050.[1] As the peak body representing businesses that produce and retail energy, we are acutely aware of the challenges that will need to be overcome to meet this target. It will be a long and complex journey to transition away from carbon and the decisions made now will affect Victorians for decades to come.

It is critical that the assessment of potential pathways is based on rigorous analysis utilising the most robust evidence. If sub-optimal pathways are selected, consumers and industry will be burdened with inefficient investments, uncertainty and most importantly the goal of reaching net zero by 2050 will be in jeopardy.

The Consultation Report is of a relatively general nature as the modelling that DELWP has commissioned is yet to be released. The AEC has not undertaken any modelling or analysis and as such this submission presents what the AEC believes are the principles required to achieve optimal policy outcomes. We also provide our observations of what is currently available in the decarbonisation 'toolkit'. Accordingly, the AEC is looking forward to the next stages of the consultation process when DELWP's modelling assumptions, methodologies and results are released.

The AEC believes the principles for developing a gas substitution roadmap should be:

- rigorous assessments to determine the most economically viable and deliverable solutions for gas substitution before implementing any policy;
- incentives and support are provided to consumers and businesses to transition from gas;
- decisions are technology neutral;
- uncertainty is minimised; and
- policy development is transparent and consultative.

[1] Australian Energy Council, 'Australian Energy Council backs net zero emissions by 2050', 25 June 2020, https://www.energycouncil.com.au/news/australian-energy-council-backs-net-zero-emissions-by-2050/.

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The Consultation Paper sets out the three end uses of gas:

- End Use 1: Cooking, space heating and hot water (households and businesses using reticulated gas)
- End Use 2: Industrial Process Heat and Feedstock
- End Use 3: Gas-powered generation (GPG)

This submission is primarily focussed on assessing the best approach for decarbonising End Use 1. The Consultation Paper sets out six gas decarbonisation pathways:

1) Improving energy efficiency
2) Electrification
3) Substituting natural gas with hydrogen
4) Substituting natural gas with biogas
5) Emerging technologies
6) Addressing fugitive emissions

This submission addresses the first four pathways.

Improving energy efficiency

Increasing energy efficiency is a proven and generally 'no regrets' approach to reducing emissions. Cost effective energy efficiency improvements can:

- increase productivity and reduce energy waste;
- increase household disposable income and business profitability through costs savings; and
- reduce emissions.

The AEC is supportive of improving energy efficiency and notes that the Victorian 2020-21 State Budget has set aside $335 million to assist 250,000 low-income households install reverse cycle air conditioners (ACs) and $112 million to improve thermal performance and appliance efficiency in 35,000 public and community housing properties.[2]

Electrification

Unlike the other proposed gas substitution pathways, electrification utilises proven technology and existing infrastructure. The National Electricity Market (NEM) has been in operation for over two decades and has a demonstrated track record of innovation and responsiveness to changing circumstances. The generation and retail sectors are highly competitive and the natural monopoly network service providers (NSPs) are subject to rigorous economic regulation.

The costs of generating electricity, operating the system and transporting it through the grid are well established. Of all the emissions reporting sectors, electricity has demonstrated the most ability and willingness to reduce its emissions and it has decades of experience in the identification of reduction strategies and implementing emissions reductions policies.[3] Overall, emissions from the electricity sector have been decreasing since 2011 to be around 20 per cent lower in December 2020.[4] In contrast, stationary energy (excluding electricity) emissions have increased steadily over the same period.[5]

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[2] DELWP, *Gas Substitution Roadmap: Consultation Paper*, p8.
[3] Examples include: the differences between the current generation mix and that of 1997, implementation of the Renewable Energy Target; implementation and subsequent removal of the Carbon Tax; and the implementation of numerous state government emissions reductions schemes.
[4] Department of Industry, Science, Energy and Resources, *Quarterly Update of Australia's National Green House Gas Inventory: December 2020,* p 12.
[5] Ibid p14.

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For End Use 1, electrification appears to be the most tangible gas substitution pathway. Many households and businesses in Victoria already do not use gas and in other jurisdictions this is the general case. Electricity provides high quality energy for heating and cooking. It is also capable of providing space heating that is significantly more energy efficient than gas.

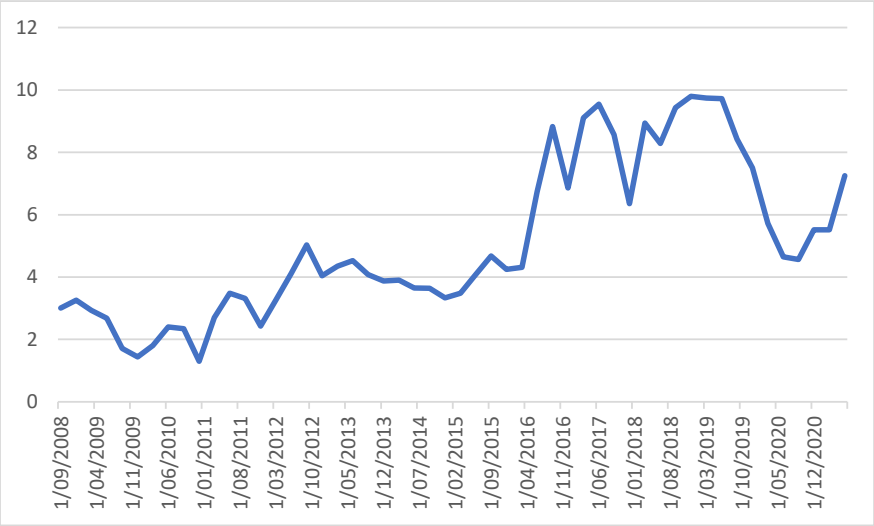
Victoria's relationship with gas

Unlike other jurisdictions, Victorian consumers have an extremely strong attachment to gas for space heating and cooking as evidenced by the 2 million connections.[6] Cold winters, plentiful gas reserves and low gas prices ensured reticulated gas was the logical choice for Victorian households and businesses. However, in recent years this landscape has changed. Reserves are depleting, prices have increased substantially and they are more volatile.

- Victorian gas production is decreasing rapidly and AEMO is forecasting the state's gas production will be unable to supply a 1 in 2 winter peak day by 2023.[7] The shortfall is expected to be replaced using NSW gas imports.

- Since the commissioning and production ramp-up of the Queensland LNG plants in 2014-2016, Victorian gas prices experienced a step change increase. Figure 1 illustrates how prices doubled from around $4/GJ to over $8/GJ in 2016. Victorian households and businesses are now exposed to global LNG price volatility.

Figure 1: Victorian Wholesale Gas Market Average Daily Weighted Prices by Quarter



Source: Australian Energy Regulator

The structural changes in Victoria's gas market have reduced the attractiveness of gas and is creating economic, as well as environmental, incentives for consumers to seek alternatives to gas.

Space heating efficiency

Space heating accounts for nearly three quarters of residential consumption and this is similar for commercial customers. A recent Northmore Gordon report demonstrates how high efficiency reverse cycle air conditioners (ACs) can deliver the same level of heat gas with a tenth of the input energy.[8] Therefore, with respect to heating, crude conversions of PJs of gas usage and PJs of electricity production to displace it are misleading

[6] DELWP, *Gas Substitution Roadmap: Consultation Paper*, p10.
[7] AEMO, *Victorian Gas Planning Report*, March 2021
[8] Northmore Gordon, *Victorian Gas Market – Demand Side Measures Review*, Report for Environment Victoria, 23 March 2020, p20.

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as electricity can create the same useable heat using much less energy (e.g. reverse cycle ACs utilise ambient heat, which is “free energy”).

Cooking with electricity

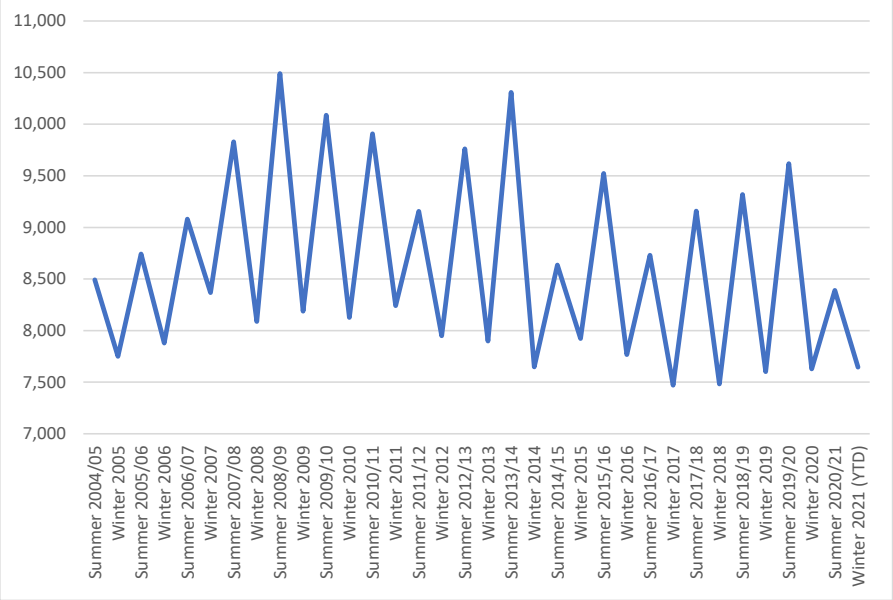
With respect to cooking, while standard electric cooking has been available for decades, Victorian consumers have traditionally preferred gas. This has begun to change in recent years with the development and uptake, of electrical induction cooking, which has been endorsed by many of the world’s top chefs including Australia’s Tetsuya and Neil Perry.

The Consultation Paper does not mention a pathway for decarbonising the Australian institution of the LPG powered BBQ.

Inverse seasonality of gas and electricity consumption

One of the key opportunities presented by the electrification pathway is the inverse seasonality of electricity and gas consumption. Electricity networks have headroom in winter as Victoria is a summer peaking market. In contrast, gas demand is winter peaking. Hence, there should be capacity in Victorian electricity networks to accommodate the additional demand from an electrification pathway to replace gas. Figure 2 illustrates summer and winter electricity peak demand for Victoria. As can be seen there is a sharp divergence between the seasons and there also appears to be a downward trend since the Global Financial Crisis (GFC) in 2008/09.

Figure 2: Victorian Summer and Winter Electricity Peak Demand (MW)



Source: Australian Energy Regulator

Figure 3 provides a more illustrative example of the winter headroom that is available in electricity networks to accommodate additional heating demand from the electrification pathway. Figure 3 charts the difference between the 2008/09 summer peak demand of 10,490MW and winter peak demands. This headroom averages 2,613MW and is never below 2,121MW.

Therefore, electricity networks should be able to accommodate the additional winter heating load associated with the electrification pathway and it appears unlikely that significant augmentation capex will be required. This increase in network utilisation would be expected to apply downward pressure on network prices as networks are largely fixed cost businesses and the electrification pathway will provide more MWh of consumption to apportion these costs.

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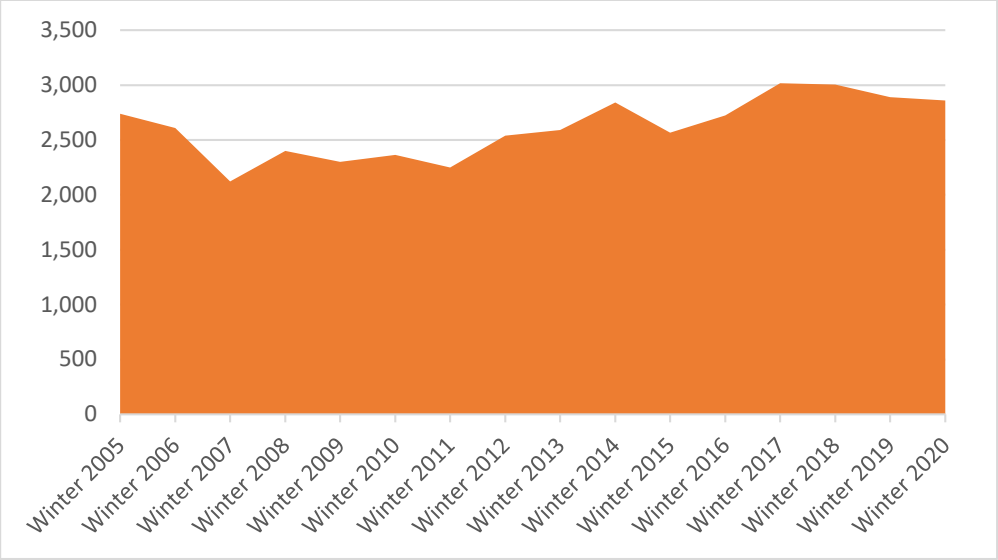
Figure 3: Winter Electricity Network Headroom (MW)



Source: Australian Energy Regulator

It is also worth noting that heating demand load is highly correlated with both Effective Degree Days (EDDs) and Heating Degree Days (HDDs) and thereby relatively predictable on a daily basis.[9]

Maintaining electricity reliability with new sources of demand

The additional demand created by implementing an electrification pathway for reticulated residential and commercial gas usage will happen incrementally over years. Demand reductions from energy efficiency improvements would be expected to partially offset this. Furthermore, reverse cycle ACs are more energy efficient than gas for space heating.

As noted above, the NEM is a sophisticated and rigorously managed system. The Australian Energy Market Operator (AEMO) invests significant resources in planning and conducts detailed analysis of multiple future electricity demand scenarios.[10] The AEC believes the electricity system will be able to accommodate this additional demand and maintain reliability.

Battery electric vehicle (BEV) uptake growth is likely to remain relatively modest and then accelerate rapidly as the economics and BEV availability tip in their favour relative to internal combustion engine vehicles (ICVs) and hybrids. Unlike gas and electricity demand, BEV charging demand is unlikely to have such pronounced seasonal characteristics and its daily demand profile will be more relevant. Therefore, it will be critical to manage this carefully within the distribution networks at a relatively low level of granularity. Innovative and carefully constructed tariffs will need to be developed to maximise the benefits of additional BEV load (e.g., higher grid utilisation and creating demand in the solar PV profile low demand periods). Failure to successfully manage BEV charging is likely to further exacerbate network load profile issues.

Significant additional electricity demand from hydrogen production (i.e. using electrolysis) appears some way off into the future. If a significant hydrogen production industry develops, the AEC believes the electricity system will be able to reliably accommodate the additional load. It is also worth noting that large hydrogen

[9] For and explanation of EDDs and HDDs, https://www.aemo.com.au/-/media/files/gas/national_planning_and_forecasting/gsoo/2018/2018-gas-statement-of-opportunities-methodology--demand-forecast.pdf?la=en&hash=368F29C2AA27C7F01FCED15D7B9C6FDF

[10] For example: AEMO, *2021 Inputs, Assumptions and Scenarios Report*, Final Report, July 2021; AEMO, *2020 Integrated System Plan,* July 2020; *AEMO, 2020 Electricity Statement of Opportunities*, August 2020 (updated in May 2021 in response to the bringing forward of Yallourn Power Station's retirement)

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production facilities may choose to self-supply with their own renewable electricity generation to avoid having to pay network charges.

Substituting natural gas with hydrogen

The AEC views hydrogen as a promising technology that has the potential to supplement existing decarbonisation efforts. The AEC supports exploring the development of a hydrogen export industry and recently submitted to the Department of Industry Science Energy and Resources Hydrogen Guarantee of Origin Scheme: Discussion Paper.

The AEC sees great potential for hydrogen to replace natural gas for End Use 2. The emissions from industrial processes requiring feedstock gas and intense heat represent some of the most challenging emissions to eliminate. Depending on the process, either electricity or hydrogen may be the most cost-effective solution to replace gas.

With respect to End Use 3, GPG is currently a critical part of Australia's generation mix. While it is significantly less emissions intensive than coal, it is still a significant source of emissions. At this stage, the AEC does not have a firm view as to what the optimal decarbonisation pathway for End Use 3 will be. Hydrogen may provide a solution to decarbonising this part of the generation sector.

In the absence of compelling evidence for the utility of substituting natural gas with hydrogen to replace End Use 1, the AEC does not consider hydrogen to be the optimal pathway.

Substituting natural gas with biogas

Across all End Uses, biogas appears to offer a partial solution to decarbonisation. As noted in AEMO's 2021 Inputs, Assumptions and Scenarios Report, it is expected to play a significant role in non-road transport decarbonisation, however its role in reticulated gas and GPG substitution is expected to be limited.[11] Nevertheless, when biogas is converted to biomethane it can be injected into existing gas networks without requiring capex to modify the networks. This provides scope to partially decarbonise reticulated gas usage in the transition process and extend the useful life of existing gas network infrastructure. However, it is a developing technology where both its price and production level capabilities are yet to be determined.

Conclusion

Achieving decarbonisation and net zero emissions by 2050 will require a suite of technologies, some of which may be transitional in nature. It is a complex problem with many moving parts and the AEC is looking forward to reviewing DELWP's modelling when it is released.

Any questions about our submission should be addressed to Peter Brook, by email to peter.brook@energycouncil.com.au by telephone on (03) 9205 3103.

Yours sincerely,

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[11] AEMO, 2021 Inputs, Assumptions and Scenarios Report, Final Report, July 2021, p40.