August 2021

Victoria needs a vision and plan for a future that does not include a role for natural gas and is consistent with physical, economic, and environmental reality.

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Response to the Interim report issued by Infrastructure Victoria, “Towards 2050: Gas infrastructure in a zero emissions economy”.

There are no restrictions on publication of this submission or requirements for anonymity. The submission contains no personal information of third-party individuals.

1 Summary

Over the last 50 years, natural gas has made a valuable contribution to Victoria's domestic energy and chemical industries. In common with other governments in Australia, Victoria is now committed to an objective of net-zero emissions. The extraction and combustion of natural gas, at least without widespread, cost-effective, and comprehensive CCS or the use of offsets, is inconsistent with this objective[1] .

The Government's initiative to consider the future of gas in the transition to net zero is the right strategic decision. Equally appropriate is its referral to Infrastructure Victoria (IV) to advise on the state's gas transmission and distribution infrastructure in a future where the state's net zero emissions targets are achieved.

A vision of a future in which the un-abated combustion of natural gas no longer occurs is needed to provide focus across government, industry, and consumers. A plan is needed that connects the state's net zero targets and the vision with the reality of today in which natural gas plays an integrated role. IV's proposed use of scenarios can assist in developing both the vision and the plan. These scenarios should be based on economics and technology consistent with plausible international and domestic climate change policies.

The role of gas in industry for process heating and feedstock can be replaced with alternatives such as electricity, hydrogen, and concentrated solar thermal energy. The costs and commercial maturity of these alternatives are mixed, and some form of direct incentive or support may be necessary in absence of an emissions reduction obligation.

Gas is likely to play a small but important role in balancing wind and solar in the National Electricity Market in coming years[2]. This role should be framed and determined through the NEM governance arrangements, wherein Victoria is a key participant.

The scenario assessment should include analysis on the long-term economic alternatives to replacing gas for household and commercial uses with electricity, hydrogen, or biogas. The argument for electrification in other states is powerful, In Victoria it seems strongest, although the analysis and the consequences of adopting any pathway are far from simple. The assessment and recommendations should be based on this analysis and lead to consideration of the consequences of following it.

IV's advice should consider the government's role in mitigating risks in a sunset industry, including managing the distributional impacts of the inevitable costs of decline.

[1] https://grattan.edu.au/wp-content/uploads/2020/11/Flame-out-Grattan-report.pdf

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

2 Background

This submission is made by Tony Wood, of the Grattan Institute. It responds to the interim report issued by Infrastructure Victoria in July 2021.This report is directly related to the government's Gas Substitution Roadmap and framed in the context of the government's targets to reduce the state's greenhouse gas emissions by 28 to 33 per cent by 2025 and 45 to 50 per cent by 2030 and its commitment to achieve net zero emissions by 2050.

Grattan Institute is an independent think-tank focused on Australian domestic public policy. It aims to improve policy outcomes by engaging with both decision-makers and the community.

This submission covers the broad objective and the listed questions of the interim report. It does not address all the key questions raised. It draws heavily on Grattan Institute's submission to the government's Consultation Note[3] and recent report, *Flame out: the future of natural gas*[4], and the details in that report are not repeated here.

[3]

[4] https://grattan.edu.au/report/flame-out-the-future-of-natural-gas/

3 Introduction

Government investment in gas infrastructure played a key role in the early development of the natural gas industry and was instrumental in supporting the early exploration and development of the first gas fields such as the Gippsland Basin. Upstream gas developments were also granted authority to jointly market their gas in recognition that the benefits of risk sharing outweighed the risk of less competition.

By the late 1990s, the market had dramatically matured, governments had privatised the government-owned pipelines and distribution networks, and the authorisations were being wound back. Investment in new infrastructure was being made by the private sector and, in contrast with electricity, gas pipelines were not subject to economic regulation.

The depletion of traditional gas fields, opening of the east coast to international markets and the priority to address climate change all point towards the prospect of a declining industry. The direction and end point are clear, but the timing and the nature of the transition across multiple gas applications are far from clear.

4 Questions arising

4.1 Scenario design and analysis

Scenarios should be plausible and reflect a range of variables or key issues. The scenarios for gas use vary depending on how the role of gas in the three high-level sectors.

- Gas for power generation is likely to be as a balance to high levels of renewable electricity to maintain system reliability. The choices are gas with CCS, gas with offsets or another zero-emission generation source. The second of these looks to be the lowest cost based on today's best information.
- Gas for high-temperature industrial heat or feedstock will need to be released by a zero-emission source such as hydrogen or concentrated solar thermal energy.
- Gas for household and small commercial applications will be replaced by electrification or renewable hydrogen. The latter looks to be very expensive even if the Commonwealth's stretch goals are achieved and accompanied by other negative issues. Biogas looks to be too expensive and insufficiently available.

The above choices should form the basis of illustrative scenarios. Blue or brown hydrogen or CCS may have short-term attractiveness but look to be unsustainable in the long term.

4.2 An optimum scenario for a net zero emissions gas sector in 2050

Ideally, an economic analysis, constrained by the environmental objective and accompanied by a robust risk assessment, should be used to determine the optimum scenario. The most likely such scenario would seem to be electrification of everything where possible, with offsets, CCS or hydrogen for niches that remain.

4.3 Policies and regulations along low-carbon pathways

The first role of governments should be to create and implement a policy framework to meet the emissions reduction target of net zero by 2050. The policy vacuum in this space at a national level is clearly a major issue and the interim targets with pledges are an inadequate substitute.

Net zero is important since it allows for offsets in areas such as a residual role for natural gas in power generation that could remain at high levels of renewables' adoption. CCS and hydrogen may compete with offsets if/when their cost escalates.

There are challenges with replacing the role of natural gas in process heating, feedstock, and power generation. The big issue is its role in household and commercial energy supply. Most small consumers would be financially better off if they were using electricity today. The sunk cost in gas networks and the impact of electrification on the electricity network need to be fully understood as do the costs associated with a transition to either electricity or hydrogen.

The alternatives identified in the interim report are electrification, hydrogen, or biogas. Keeping options open until a clearer picture emerges is an expensive choice and any decisions taken today carry future risks. The priority should be to do the analysis and determine the destination. The role of further policies and regulations should be to address remaining market failures and barriers and to address distributional issues. The last of these are likely to be significant and challenging.

The substantial issues associated with the further questions raised in the interim report depend on whether electrification or hydrogen is adopted as the chosen destination. The latter is an expensive and technically difficult project that will require substantial planning. It is like but maybe more complex than the transition from towns gas to natural gas that was implemented over 40 years ago. The former is likely to be a much more challenging transition involving a major partnership between the government and the owners of the gas transmission and distribution infrastructure networks.

The transition plan will require detailed answers to all the questions raised in the interim report. This submission does not attempt to provide the answers.

4.4 The choice for the gas distribution networks

The challenge of either of the above scenarios are such that a comprehensive economic analysis, ideally uncompromised by commercial interest, is critical. Certainty over multiple decades is not possible but keeping options open will also become untenable. The following brief comments relate to the three alternatives most proposed to replace natural gas for household and small commercial consumers.

Biogas

Biogas is both limited in supply and expensive as a replacement for natural gas in the Australian situation. It is feasible that it could have role in areas where few, if any, alternatives exist today, the most obvious being as a basis for aviation fuel.

Hydrogen

The advantage of a shift to hydrogen compared with electrification is ongoing use of the investment in the gas network.

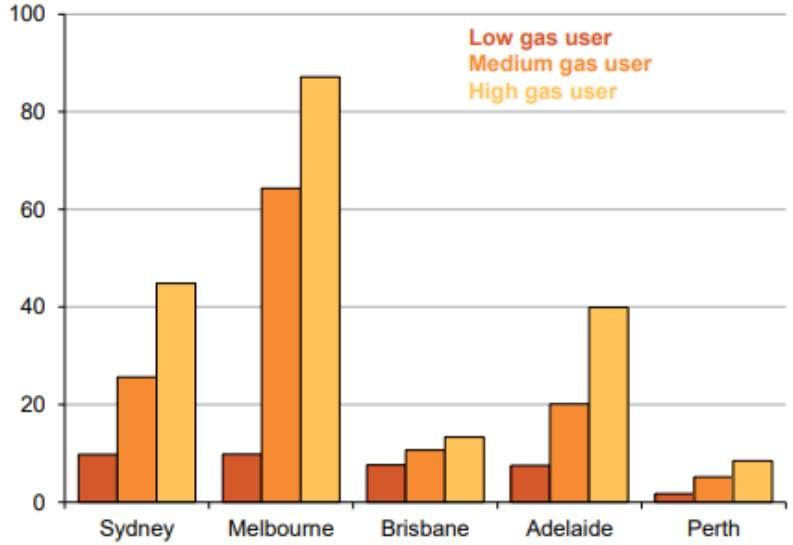
Zero-emission hydrogen, i.e., from renewable energy, is an expensive form of energy. The Commonwealth's stretch target of $2 per kilogram would represent an energy price of around $15 per gigajoule.

As Australia's heaviest household users of natural gas, Melbourne consumers have faced the highest price rises in recent years[5]. Most Melbourne households are affected, as 83% are connected to mains gas, compared with about 75 per cent in Adelaide, 50 per cent in Sydney and only 20 per cent in Brisbane. About 80 per cent of Perth households are connected, but, as with Brisbane households, consumption is low.

The following chart divides households in each city into three categories: low, medium, and high gas users, displaying the average consumption for each. A low gas user is a household in a small dwelling (one or two bedrooms) using gas for cooking and maybe hot water; a medium gas user is a household in a standard sized dwelling (three bedrooms) that has gas for cooking and hot water; and a high gas user is a household in a large dwelling (four or more bedrooms) using gas for cooking, hot water, and home heating.

Figure 9: Large households with gas heating consume much more gas than others

Yearly consumption, gigajoules



Source: ABS (2012)

Assuming wholesale gas prices today of about $8 per gigajoule, a medium gas user in Melbourne can expect a yearly bill increase of about $450 from a shift to hydrogen if they do not change their consumption. A high gas user in Melbourne can expect a hit of more than $600.

Replacing natural gas with hydrogen would be a significant undertaking, more onerous than the shift from towns gas to

[5] https://grattan.edu.au/report/gas-at-the-crossroads-australias-hard-choice/

natural gas last century. All gas burners would need to be replaced, as would parts of the distribution network made from metals incompatible with hydrogen. New infrastructure would be required for the production and delivery of hydrogen to the distribution network.

Other relevant considerations are that the hydrogen supply chain is likely to be less efficient than electrification and issues such as safety and indoor air quality, including the production of small amounts of nitrogen oxides from hydrogen combustion.

Electrification

Victoria's large household winter gas heating load means that switching small-user gas loads would have significant effects on its electricity system. This shift would move peak electricity demand from summer to winter and could increase it by as much as 40 per cent.

Accommodating this load would require significant but technically straightforward investment over the next couple of decades. The development should be accompanied by revisiting the case for more cost-reflective network pricing for electricity.[6]

Beyond an economic assessment of the full costs of the alternatives, electrification would lead to significant consequences that would require planning and communication:

- Consumers on higher incomes are already well-placed to make a financial decision on switching from gas to electricity. For others this is not so simple, and the government would need to consider some form of financial support.
- The gas distribution network is owned by the private sector, although subject to economic regulation. There is a question whether some form of financial compensation would be sought by the owners of the assets who could argue that the implicit social contract did not include such market risk.
- The transition would almost necessarily involve some form of commercial arrangement to deal with the progressive loss of volume through the gas network and the implication for cost recovery. Compromising public safety would be unacceptable.

The transition from natural gas is one of the biggest energy policy issues facing the Victorian Government and ranks with privatisation and support for renewable energy.

The imperative is for emissions reduction and that should be based on the best economic alternative. It's planning and implementation involve a range of social and distributional/equity issues, some of which have been discussed in this submission. How they are addressed will be critical to a successful transition.

[6] https://grattan.edu.au/wp-content/uploads/2014/07/813-fair-pricing-for-power.pdf