Felicity Sands
Manager, Gas Reform
Department of Environment, Land, Water and Planning
Email: gas.roadmap@delwp.vic.gov.au

30 July 2021

Re: Energy Efficiency Council Submission to the Victorian Gas Substitution Roadmap Consultation Paper

Dear Felicity

Thank you for the opportunity to comment on the Victorian Gas Substitution Roadmap Consultation Paper.

The Energy Efficiency Council (EEC) is the peak body for energy efficiency, load shaping and energy flexibility. Our members include service providers, manufacturers, governments, research institutions, not-for-profits and independent experts. The EEC applauds the Victorian Government for leading the national debate on the future of natural gas.

Victoria's *Climate Change Act 2017* sets a target for the state to emit net zero greenhouse gas emissions by 2050. To achieve this target, all small-scale end uses of natural gas must eventually be substituted with electricity or a zero emissions fuel like hydrogen or biogas. While some zero-emission substitutes for natural gas are not yet mature, currently available and affordable technologies like energy efficiency, gas efficiency and electrification can rapidly reduce emissions from gas by over 60 per cent.

Over the period 2021 to 2030, the Victorian Government can and must use a combination of mature technologies to reduce emissions from natural gas as rapidly and affordably as possible in a way that sets Victoria up for a net zero economy. Emissions reductions of The EEC recommends four key strategies:

1. **Fund a major strategy to upgrade the fabric of homes and commercial buildings**

   This no-regrets measure would deliver significant improvements in health, wellbeing and energy affordability while reducing greenhouse gas emissions from space heaters by up to 70 per cent, regardless of any future changes in heating technology.

2. **Replace low-efficiency gas space heaters and water heaters**

   Low-efficiency gas systems should be replaced with either electric heat pumps or high-efficiency gas systems. Electrification needs to be accompanied by energy efficiency upgrades (e.g. building upgrades and low-flow shower roses) and load-shaping programs to minimize the costs and maximise the benefits to the network.

3. **Require large energy user to have Energy Management Systems (EnMS)**

   Energy users need good EnMS to cost-effectively reduce their carbon intensity on an ongoing basis. Mandating EnMS should be accompanied by grants targeting the replacement of gas-using systems (e.g. with heat-pump pre-heating or biogas), especially projects that demonstrate or commercialise zero-emission technologies.

4. **Support development & commercialization of zero-emission fuels & technologies**

   Victoria should support the development of zero-emission substitutes for natural gas use. This includes support for research and development of hydrogen and electrification of high-temperature heating, but also generating local demand for hydrogen and other zero-emission technologies to foster market transformation.

These recommendations are set out in more detail in the attached submission.

The EEC looks forward to continuing to work with the Department of Environment, Land, Water and Planning on the *Victorian Gas Substitution Roadmap.* If you have any questions on the points raised on this submission, please contact me on 0414 065 556 or rob.murray-leach@eec.org.au.

Yours sincerely,

Rob Murray-Leach
Head of Policy
Energy Efficiency Council

energy efficiency
COUNCIL

Submission to the Victorian Gas Substitution Roadmap Consultation Paper

30 July 2021

Table of Contents

1. The abatement task

Developing a Victorian strategy to reduce emissions from natural gas requires consideration of two timeframes – the next decade; and the target date of net zero greenhouse emissions by 2050

2021 to 2030

It is absolutely critical that Victoria does not wait for all necessary zero-emission technologies to be available before it starts to reduce its greenhouse gas emissions. Victoria's impact on the climate is based on its cumulative emissions over the next 30 years, not its emissions in any one year.

Therefore, Victoria should use a combination of strategies that reduce emissions from natural gas as rapidly as possible while improving energy affordability and reliability and setting Victoria up for a net zero economy. At a broad level, this strategy must include:

- Deploying mature and near-mature technologies. This includes actions that substantially reduce, but don't entirely eliminate emissions from natural gas, including energy efficiency and lower-emission fuels (e.g. blended hydrogen and gas); and
- Research and commercialization of zero emission technologies and fuels.

By 2050 at the latest

Victoria's *Climate Change Act 2017* sets a target for the state to emit net zero greenhouse gas emissions by 2050. By this time, most homes and businesses must entirely eliminate their use of natural gas. Appliances and equipment that currently use natural gas must either be electrified or switched to use 100 per cent renewable gas, such as biomethane or hydrogen. However, even in a world where fuels are fully decarbonized, energy efficiency will still have a critical role in delivering improved health, energy affordability and energy security.

2. Abatement options

2.1 Abatement opportunities vary between key sectors

The opportunities for reducing emissions from natural gas in the period 2021-2030 vary significantly between various parts of the economy:

- **Residential and commercial buildings**
  Gas use can be dramatically decarbonised through the following mature technologies: building energy efficiency; water efficiency; installing more efficient gas appliances; and electrification of hot water and space heating.

- **Industrial and agricultural**
  The existence of mature decarbonization technologies varies substantially between sub-sectors. Electrification and use of biogas is possible at some sites, but there are many sites where energy efficiency will be the main opportunity for abatement.

2.2 Mature technologies can reduce natural gas emissions by over 60 per cent

A number of technologies are already fully mature and can deliver well over 60 per cent of the abatement needed to fully decarbonize Victoria's natural gas emissions. These technologies include space heating and hot water technologies in buildings, and efficiency and fuel-switching options in industry.

Figure 1: Natural gas uses in Victoria *(source – consultation paper)*

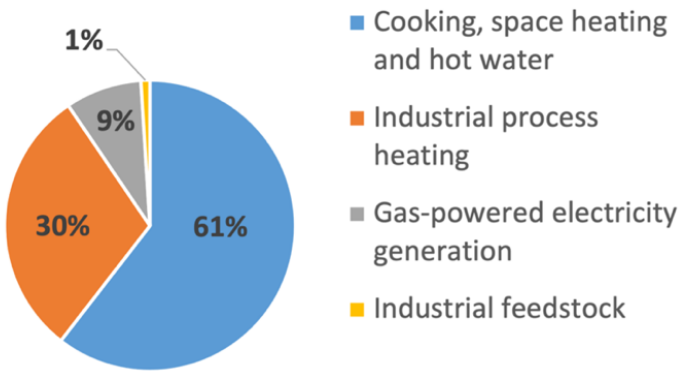
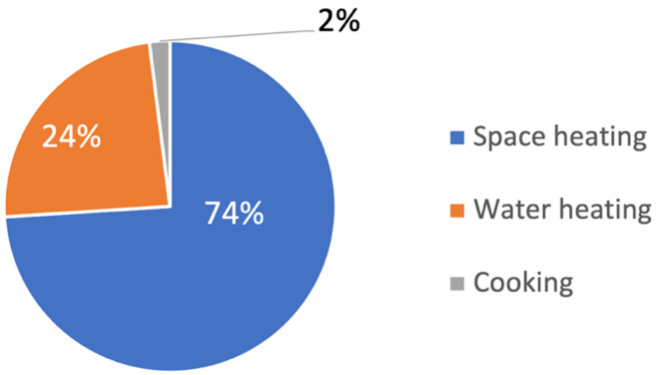


Figure 2. Residential gas uses in Victoria *(source – consultation paper)*



Building energy efficiency

Improved energy efficiency of residential and commercial building fabric (insulation, air tightness etc.) is technologically mature although there is scope for research, development and commercialization to lower costs and deliver further gains. The average home in Melbourne has NatHERS rating of 1.8 stars – retrofitting homes to an average of 6 stars would reduce heating energy use by 70 per cent, regardless of the fuel used for heating.

Retrofitting existing homes also delivers major improvements in health, wellbeing and energy affordability. For example, upgrading existing homes to at least 5.4 NatHERS has been modelled to reduce deaths in heatwaves by 90 per cent.[1]

High efficiency gas water heaters and space heaters in buildings

The energy efficiency of gas appliances varies, with models rated from 1 star to 6 stars. Replacing a 1 star gas appliance with a 6 star model could reduce emissions from that appliance by around 30 per cent. To operate in a net zero emissions world, gas appliances may need to be upgraded to operate using zero emission fuels.

Electric water heaters and space heaters

Existing gas appliances can also be replaced with electric appliances, such as solar and heat pump water heaters, heat pumps for hydronic heating and reverse cycle air conditioners. Induction cooking is also available but, as indicated in Figure 2, this is a much lower priority for emissions reductions than water heating and space heating. The cost-effectiveness of electrification varies, but assessments by Renew suggest that it's already economic to make new homes all-electric, and often economic to replace gas appliances with electric appliances at their end-of-life.[2]

Electrification is associated with an increased demand for electricity, which can necessitate augmentation of the grid and additional storage if it is not managed properly. However, properly integrated additions of loads to the grid, combined with energy efficiency, can actually help manage the variable output of wind and solar PV – for example, electric water heaters can run in the middle of the day and use output from solar PV. Therefore, the EEC strongly recommends that any electrification strategy should be accompanied by:

- Energy efficiency of buildings (e.g. air tightness and insulation);
- Requirements that electric appliances should be high efficiency and potentially accompanied by other forms of efficiency (e.g. low-flow shower heads); and
- Encouraging the installation of electric appliances that support load shaping and, where possible, smart load control and demand response.

The positive news is that electrification naturally synergises with energy efficiency:

- Many forms of electrification deliver automatic improvements in appliance energy efficiency – for example, many heat pumps have a coefficient of performance (CoP) over 3, which means each unit of electricity creates 3 or more units of heating; and
- The replacement of unflued gas heaters with either flued gas heaters or electric space heating allows buildings to be made much more air-tight. Making a building more air-tight both reduces heating demand and dramatically improve the economics of electrification, by reducing the number / size of space heaters needed.

[1] Alam, M., Rajeev, P., Sanjayan, J., Zou, P. and Wilson, J. 2018 'Mitigation of heat stress risks through building energy efficiency upgrade: a case stufy of Melbourne, Australia.' *Australian Journal of Civil Engineering,* 16:1, 64-78

[2] Renew 2018 *Household fuel choice in the National Electricity Market,* Renew, Melbourne.

As buildings become more airtight, attention needs to be paid to proper ventilation strategies to deliver maximum health benefits.

Industrial efficiency and electrification

The opportunities for gas savings on industrial sites varies significantly between sub-sectors. These opportunities include:

- Improved efficiency is possible on virtually all sites, with especially large savings available on sites that have not previously undertaken thorough assessments of their energy saving opportunities and implemented these opportunities;
- Some sites can entirely eliminate gas use by adopting heat-pump water heaters for lower-temperature hot water; and
- Some sites that need higher-temperature hot water can use heat-pumps to pre-heat water to a moderate temperature, and use gas-fired systems to take the water to the temperature that is required. While this will not fully decarbonise the natural gas use, it can significantly reduce gas emissions.

Industrial use of biofuels

Governments could support sites to take up biomass, biogas or biomethane as a substitute for natural gas where it is economic. However, biofuels are generally only economic where this a cheap and locally accessible source of feedstock, such as biomass at timber mills and biogas at piggeries and waste-water treatment sites. Limitations in the scale and cost of biofuel production mean that while it is valuable to adopt at some site we do not anticipate that this will deliver major reductions in state emissions in the period 2021 to 2030.

Addition of zero emission fuels to the gas network

A proportion of zero emission fuels (e.g. hydrogen) can be added to the gas network to reduce the emissions intensity of all sites attached to the gas network that use natural gas. Depending on the scale of zero emission fuel available to be added to the network, this could deliver a significant reduction in greenhouse gas emissions.

2.3 Emerging technologies will be critical for industrial emissions

Some industrial processes, potentially accounting for around 25 per cent of Victoria's gas use, cannot be decarbonized using currently economic technologies. The development of low-cost zero emission fuels (especially hydrogen) and electrification of key processes will be critical to decarbonize these processes. There is research underway on industrial decarbonization technologies in several countries.

While there is a remote possibility that carbon capture and storage (CCS) may become viable for some large gas-using sites (e.g. generators and cement factories), it is exceptionally unlikely that CCS will ever be economic for smaller appliances, such as residential water heaters. Therefore, CCS will simply not deliver substantial abatement of natural gas emissions in Victoria.

Accordingly, the EEC recommends that the Victorian Government collaborate internationally and with Australian companies and research institutions on research and development of emerging gas decarbonization technologies, particularly hydrogen and industrial electrification. In addition to supporting the development of new technologies (push), it is critical that the government support the uptake of these technologies (pull). Support for the adoption of new technologies could include a range of options, such as:

- Grants for industrial sites that adopt and demonstrate technologies that are novel in their sector; and
- A target for the gas network to contain a minimum proportion of gas from renewable sources (e.g. hydrogen and biomethane).

3. Recommendations

Over the period 2021 to 2030, the Victorian Government can and must use a combination of mature technologies to reduce emissions from natural gas as rapidly and affordably as possible in a way that sets Victoria up for a net zero economy. The EEC recommends four key strategies:

1. Fund a major strategy to upgrade the fabric of homes and commercial buildings

This no-regrets measure would deliver significant improvements in health, wellbeing and energy affordability while reducing greenhouse gas emissions from space heaters by up to 70 per cent, regardless of any future changes in heating technology. This strategy will include new buildings, but focus on existing buildings, and should include the following:

- Invest in a major project to identify the skills and industry development necessary to retrofit existing homes, similar to the Industry-led Insulation Roadmap;
- Rapidly introduce mandatory disclosure of the thermal comfort and energy efficiency of homes at the point of sale (ratings required in advertising);
- Strengthen minimum standards for the thermal comfort and health of homes;
- Retrofit government buildings and other commercial buildings; and
- Raise energy efficiency standards in the National Construction Code and substantially improve enforcement. This could potentially include moving towards testing the performance of new buildings, including blower-door testing.

2. Replace low-efficiency gas space heaters and water heaters

Low-efficiency gas systems should be replaced with either electric heat pumps or high-efficiency gas systems. Electrification should be accompanied by energy efficiency upgrades (e.g. building upgrades and low-flow shower roses) and load-shaping programs to minimize its costs and maximise its benefits to the network. The EEC congratulates the Victorian Government on its program to support vulnerable households to install high efficiency heaters, and suggest that this is complemented by policies such as:

- Supporting the installation of low-flow shower roses when new water heaters are installed; and
- Working with South Australia, NSW, other key governments and industry to determine the best way to encourage major appliances (such as water heaters, air conditioners and pool pumps) to be sold with functionality enabling them to be part of the monitoring and control of distributed energy resources.

3. Require large energy user to have Energy Management Systems (EnMS)

Energy users need good EnMS to cost-effectively reduce their carbon intensity on an ongoing basis. Mandating EnMS should be accompanied by grants targeting the replacement of gas-using systems (e.g. with heat-pump pre-heating or biogas), especially projects that demonstrate or commercialise zero-emission technologies.

4. Develop and commercialise zero-emission fuels and technologies

The Victorian government should support RD&D into hydrogen and electrification of high-temperature heating. In some sectors there are currently no viable zero-emission substitutes for natural gas use – collaborating in global research and creating local demand for hydrogen and zero-emission technologies will be critical to their development and deployment.