

Victoria's Gas Substitution Roadmap

Submission to the Roadmap Consultation Paper

Introduction

Thank you for the opportunity to contribute to the submission process in which the Victorian community has been invited to respond to the consultation paper, "Help Us Build Victoria's Gas Substitution Roadmap". As a concerned citizen who has lived in Melbourne for my whole life and raised my family here, I am very keen to see the Victorian government continue its transition away from fossil fuels as soon as it practically can. In the current global situation, this transition is crucial for the state.

Background

Scientists are telling humanity and particularly our leaders, clearly and with increasing urgency, that it is necessary to drive down emissions as rapidly as possible. Climate damage is here and the need to act is becoming more urgent by the year. Even though there has been a lot of development with renewable energy in order to try and drive down emissions, political leaders have not responded with policies that respond adequately to the gravity of the situation. In spite of what is being achieved by governments and industry worldwide, emissions globally have been rising, with a slight dip during the pandemic, and they are on track to surge in 2022 to the highest point than they have ever been and then again in 2023. (IEA July 2021 report, Sustainable Recovery Tracker, [Sustainable Recovery Tracker – Analysis - IEA](#)). The director of the IEA says, "Not only is clean energy investment still far from what's needed to put the world on a path to reaching net-zero emissions by mid-century, it's not even enough to prevent global emissions from surging to a new record."

There is the need, therefore, for Australia to implement ambitious climate action at the national level, which alarmingly has not been at all forthcoming to date. In the face of this inaction and unwillingness, state and local jurisdictions need to do what they can to bring about transformational change to their economies to slash emissions and pressure the federal government for more convincing action. As the IEA recommends, there must be no new spending on fossil fuel projects if the world is to have any chance of staying as close as possible to 1.5 deg C of global warming <https://www.iea.org/reports/net-zero-by-2050>

I understand that natural gas has played an important role in Victoria to date. It has been highly efficient, and our state has a complex and extensive gas distribution infrastructure. My position on gas use from now and into the future, however, is that it should be phased out as soon as practically possible. This includes no expenditure on further exploration of gas fields nor new gas projects and infrastructure, for example the current proposal to develop infrastructure for a western outer ring gas main pipeline in Melbourne should not go ahead. The focus should be on continuing to develop alternative sources of renewable energy like wind, solar and biogas with a corresponding focus on increasing investment and expenditure. I feel that every effort should be made to develop hydrogen for industrial use and develop appropriate infrastructure.

Policies across every government department need to be focussed on reducing/slashing emissions and achieving emissions reduction targets. However, I would urge that policy is not constrained by the targets themselves. If policies appear to be effective in achieving targets, then efforts should continue to be made to reduce emissions ahead of schedule, and the response should be to announce higher targets.

I have read the consultation paper, *Towards 2050: Gas Infrastructure in a Zero Emissions Economy*, and note the four scenarios suggested:

- Scenario A: full electrification, no natural gas (by 2050), no CCS
- Scenario B: partial electrification, limited natural gas use (in 2050), limited CCS
- Scenario C: green and blue hydrogen with carbon offsets, electrification, no natural gas (by 2050), no CCS
- Scenario D: large-scale brown hydrogen, large-scale CCS, no natural gas (by 2050)

I feel that it is risky to include in an emissions reduction scenario technology that has not been proven to date, as is the case with CCS. It seems to me that there is a lot of potential with green hydrogen as an alternative feedstock to industry, especially in high heat processes, so I would support a scenario with facets of A and C.

Furthermore, if Victoria acts decisively, there could be export potential for hydrogen to countries that are moving away from fossil fuels and are looking to include hydrogen in their energy mix. Victoria will be investing in a renewable hydrogen industry via the Renewable Hydrogen Industry Development Plan, which sets out how Victoria will develop a renewable hydrogen sector.

Response to the Consultation Paper, *Help Us Build Victoria's Gas Substitution Roadmap*

There are a range of emerging key pathways to addressing the carbon impact of gas in Victoria.

Pathway: Improving Energy Efficiency

What are the key benefits, risks, and potential impacts on various end-users, on energy affordability, safety, security, reliability and equity?

Benefits: Improving energy efficiency in heating, hot water and cooking appliances in the home and also appliances in use in industry is a pathway that is “no regrets”. It is an essential pathway to reducing gas emissions and can be implemented without expense to gas production and distribution infrastructure. This pathway should be used in combination with other pathways to implement strong action to decarbonise from gas.

Heating constitutes a large portion of gas use in Victoria, more so than in other states. Overall heating efficiency can be achieved by good insulation in homes and buildings, sealing drafts and gaps and using construction materials that are the most energy efficient and environmentally conscious. The most energy efficient designs should be used along with optimal siting of windows. I am in favour of smaller houses, so that there is not so much space to heat and medium density living to maximise the benefits of infrastructure.

Energy efficiency upgrades to existing buildings incur an upfront expense but result in lower emissions from more economical energy use in heating and other appliances.

There are equity issues, with the disadvantaged lacking resources needed to upgrade to energy efficient measures in homes, both with regard to appliances and infrastructure of the home.

Energy affordability: This gets a good tick – energy efficiency means lower bills!

What are the scale of opportunities and potential to accelerate uptake?

Continuing public education campaigns on the cost effectiveness and imperative to bring down emissions are essential. Government rebates on appliances as per the Victorian Energy Upgrades scheme assist with uptake.

Public education campaigns to observe energy efficient practices as a way of life and public awareness of climate change linked to production of emissions through fossil fuel energy use and the necessity to bring down emissions as rapidly as possible, should be ongoing with campaigns being conducted in all media and in schools and workplaces.

The Victorian government can liaise with Councils to conduct energy efficiency campaigns, as local government has interface with the community. Local publications, information meetings and opportunities like stalls at markets can be used to disseminate public awareness.

What are the key technical, regulatory and economic barriers?

It is important that all legislation and regulatory frameworks across government departments are aligned with Victoria's net zero emission targets.

Economic barriers to improving energy efficiency would be that there costs to consumers of replacing appliances with energy efficient ones.

What are the roles to be played by government, industry and how will consumers preferences be accounted for in the transition?

Consumer preferences can be shaped by the provision of accurate reliable information from government sources, tradespeople, retailers, information about appliances. Information from government can be contained in Council and government publications and websites, and on the websites of energy retailers and providers. There can be widespread advertising from government and industry about the benefits to convert to energy efficient appliances both in cost and for the environment.

Industry needs to be well informed of government regulatory frameworks and to be given adequate lead times to accommodate change and for planning

What are the likely timings of technical maturity and economic viability?

This pathway has been in operation for quite some time. The energy star rating system for appliance efficiency started in Victoria in 1986 and has been refined and added to since then. It is well known, with most people keen to purchase appliances with as high a rating as possible.

There are other energy efficiency measures in homebuilding as well as appliances. Under the new 7 Star Homes program, builders can collaborate with Sustainability Victoria to build up-to four new homes, with a rebate available per home built. However, this scheme does not yet appear to be widespread

<https://www.sustainability.vic.gov.au/news/news-articles/supporting-the-shift-to-7-star-homes>

Another program, still in pilot stage, from Sustainability Victoria, is the Zero Net Carbon Home, which provides expertise on the design of energy sustainable homes
<https://www.sustainability.vic.gov.au/zeronetcarbonhomes>

I look forward to other, affordable measures being developed and adopted by an energy conscious community.

What are the best ways to maintain social acceptability and consumer confidence?

- public awareness campaigns of the need for selecting energy efficient appliances and good publicity to available schemes and rebates
- Assistance given to community to assist with managing costs and efficiency

- information provided by institutions, associations, groups and practitioners that the community trusts
- consistent messaging from all levels of government about the need to be energy efficient

What are the inter-dependencies and trade-offs with other pathways (are pathways complementary or alternatives)?

Clear interdependency with the electricity pathway.

What are the key uncertainties and potential for unintended consequences?

Messaging from gas companies that gas is cleaner or greener than coal, or other alternatives, would be inaccurate and confusing

Tradespeople not being accurately trained in installation of new appliances, giving incorrect advice to consumers, or preferring to install a similar appliance when an older model fails

Conflicting messaging from different levels of government and policies changing with different governments leads to confusion

New government schemes being poorly managed, publicised or rolled out, practitioners not being adequately trained, problems with supply and demand, misinformation

Pathway: Electrification, substituting gas with electric appliances/equipment

What are the key benefits, risks, and potential impacts on various end-users, on energy affordability, safety, security, reliability and equity?

Benefits: If ALL electricity is sourced from renewable means, this will mean a reduction in emissions, and gas will be a fossil fuel of the past. People will directly experience a reduction in energy bills, as gas is now expensive and rising in cost.

Risks: There is a concern that the fossil fuel sector and vested interests will seek to misinform and confuse the public. There are also risks of misinformation about appliances as replacement of gas to electric becomes widespread. Gas companies might be the source of misinformation and misleading and confusing advertising, as they seek to prop up the sector. There are also risks that tradespeople will not be adequately trained to install new appliances like heat pumps, and may misinform people. There is the risk that an appliance is replaced “like for like” (people wanting something with which they are familiar, and also tradespeople may have a preference to simply replace the appliance for an upgraded model because it is easier) and thus an opportunity is missed to convert the appliance to electric.

Impacts: People will need to learn about new appliances and change their preferences and usage patterns. People are used to the “efficiency” and “high performance” of gas appliances. People will need to seek out information from a variety of sources. There will be impacts on upfront costs and there will be equity issues, which will need to be addressed by levels of government.

Safety: Studies have been recently reported that there are health benefits to electric appliances. The studies show that use of gas appliances have adverse effects with increased asthma and also increased levels in the home environment of carbon monoxide.

Energy affordability: This gets a good tick after the investment of replacing gas appliances.

What are the scale of opportunities and potential to accelerate uptake?

The scale of opportunities and potential to accelerate uptake would be optimal if government and industry backed education and publicity campaigns are well managed, well promoted and consistent with messaging. Well managed government programs and incentives (e.g. Victorian Energy Upgrades and other schemes) will accelerate uptake.

What are the key technical, regulatory and economic barriers?

Upfront cost of changing to electric appliances and their installation would be a barrier.

Regulators must resolve how and on what schedule to retire or decommission gas infrastructure, and who would pay for it.

What are the roles to be played by government, industry and how will consumers preferences be accounted for in the transition?

Residential and commercial consumers will need to be educated on the need to change to electric appliances and the reasons will need to be clear and unambiguous. Messaging will need to include the urgency to stop gas combustion in the interests of cutting emissions and the public given plenty of lead time. The public will need to be told when gas infrastructure is planned to be decommissioned. Messaging on the urgency to act on climate and incentives and schemes for changing from gas to electric appliances will drive the transition.

Government will need to provide assistance with training for trades in installation of electric appliances and equipment and to local manufacturers to transition from production of gas to electric appliances

What are the likely timings of technical maturity and economic viability?

The government would have regular consultations with stakeholders and monitor the effectiveness of publicity and education campaigns. Timings would also be informed by targets, but not limited by them. The government would always be looking to be ahead of schedule and to adjust campaigns and roll outs.

What are the best ways to maintain social acceptability and consumer confidence?

Methods to maintain social acceptability and consumer confidence would include keeping the issues (need to decarbonise/cut emissions, transition from gas combustion) in the public arena and giving publicity to the successful transition stories. This is done best if messaging is consistent and comes from different sources (community groups, etc). Education campaigns with customers giving their experiences, and continue with training, demonstrations, information on mass and social media and the urgent message to transition away from gas.

What are the inter-dependencies and trade-offs with other pathways (are pathways complementary or alternatives)?

There is an inter-dependency with the energy efficient pathway

What are the key uncertainties and potential for unintended consequences?

Key uncertainties include any campaigns with messages that conflict with the need to transition away from gas. People will change behaviour if messaging is consistent, comes from different sources that they trust, and is regular. There may be unintended consequences for the program, if for example, the government starts to publicise transitioning away from gas, but then decides to start new gas projects or create more expensive infrastructure. A case in point is a possible project involving a western outer ring main gas pipeline. Why would this infrastructure be put in when we need to transition away from using gas?

Pathway: **Substituting natural gas with hydrogen**

What are the key benefits, risks, and potential impacts on various end-users, on energy affordability, safety, security, reliability and equity?

I feel that the role of hydrogen should be for industrial, not residential, use. We need to transition away from fossil fuels as rapidly as possible, and a better route would be to completely decommission gas connections to residences by 2035. Households would be totally electrified. Otherwise, the temptation might be to use blends of gas and hydrogen in pipelines, which would keep gas longer in residential use. The replacement of gas appliances could be delayed under this scenario.

As a result of the Victorian Hydrogen Investment program and submission process, to which I contributed in February in 2020, the Victorian Government has produced a Victorian Renewable Hydrogen Industry Development Plan

https://www.energy.vic.gov.au/_data/assets/pdf_file/0021/513345/Victorian-Renewable-Hydrogen-Industry-Development-Plan.pdf .

Benefits: The benefit of developing hydrogen is encapsulated: “The overarching vision of the National Hydrogen Strategy is to have a clean, innovative, safe and competitive industry that benefits all Australians, and where Australia is a major global player in hydrogen by 2030.” Victoria is a key player in the National Hydrogen Strategy.

*I was very happy to read in the plan: **The Victorian Government is committed to maximising our opportunities from being adaptive and resilient to climate change and transitioning to a net zero emissions economy. We are uniquely placed to use our extensive natural resources, skills and capabilities to reduce emissions and create economic advantages for the state. Renewable hydrogen is a rapidly advancing technology with huge potential for market demand, both in Victoria and as an export nationally and internationally. This opportunity is particularly valuable as economies around the world recover and reposition in the wake of COVID-19.***

As countries see the urgency to transition to alternative energy sources and invest in development of hydrogen, the price of production is dropping to viable levels. The cost of renewable energy to produce hydrogen is very favourable now, and the cost of technology in the electrolysis process appears to not be presenting the barriers that it seemed to recently. There were no references to cost barriers in the Hydrogen Industry Development Plan. This will make green hydrogen a low-cost energy option in the long term to replace gas.

Risks: There is a risk that although hydrogen from renewable energy is the only type of hydrogen production within the scope of the plan, hydrogen from other sources – coal or gas could be produced. I read in the plan – *...its (hydrogen's) development has been informed by and aligns with the policies, projects and initiatives which support other forms of hydrogen production in Victoria.* I oppose the fossil fuel industry being involved in the production of hydrogen.

In a developing hydrogen sector, there are risks inherent as regulations for hydrogen production and use are developed across other, relevant sectors. A regulatory framework will need to be developed initially, but it will be added to retrospectively.

There may also be risks involved in using the gas distribution network for hydrogen, which would be tempting, given the cost of upgrade. Currently, a mix of 10 per cent hydrogen to gas is possible, but I would be in favour of upgrading distribution networks to accommodate hydrogen. The timing, costs and resources involved in developing a new transmission network may present a barrier (see below)

Potential impacts: There will need to be decisions as to which applications hydrogen is best suited for, as opposed to electrification. In areas where either hydrogen or electrification could be used, the preference could be for electrification

What are the scale of opportunities and potential to accelerate uptake?

Our natural resources in sufficient land area (low to medium population density), four deep water ports, rivers, wind and coastline and in addition our extensive R&D resources in innovation will greatly assist in scaling up development of green hydrogen. Victoria has established pilot development projects in the Renewable Energy Zones (REZ's). The REZ's distributed around the state present opportunities to produce and distribute hydrogen at scale.

As the costs of the technology involved in electrolysis fall, hydrogen will become very competitive, and this will accelerate uptake.

What are the key technical, regulatory and economic barriers?

What are the roles to be played by government, industry and how will consumers preferences be accounted for in the transition?

The "hydrogen economy" is in its early stages and a comprehensive regulatory framework will need to be drawn up across the states by State and Federal governments for the storage and usage of hydrogen. It is important to have consistency in this process with coherent policy. All jurisdictions will need to work collaboratively, and there will need to be accurate reporting (at different levels, including nationally) and transparency. For example, the states will need to assist the federal government to prepare annual state of hydrogen report.

The hydrogen industry will need regulatory frameworks for safety and certainty. I understand this is all underway through the National Federation Reform Council.

What are the likely timings of technical maturity and economic viability?

Technology for the economical production of green hydrogen is being quite rapidly developed and I would hope be feasible as soon as possible. Similarly for the feasibility of distribution in pipelines that can carry 100 per cent hydrogen without embrittlement of the pipes. Polyethylene appears to be the best material. Steel pipes may be able to be modified which would be of less cost than a rebuild of the distribution system.

I feel that it would be preferable to decommission residential gas pipes by a certain date (2035) so that appliances can be switched over to electric.

What are the best ways to maintain social acceptability and consumer confidence?

(I've taken the following from my previous submission on VIHP, with adjustments.)

Hydrogen as a technology is still relatively unknown to the general public. Community perceptions of the safety or otherwise of hydrogen need to be covered by both a public awareness and education campaign, and a strong regulatory framework to cover all aspects of safe practices for the storage and usage of hydrogen.

The public awareness and education campaign, which would be carried out over a period of time, would need to include the following areas:

- the reasons and benefits of transitioning to hydrogen;
- the pace and scale of transition to a hydrogen economy;
- concern that the states may be competing with each other at the expense of developing a co-ordinated approach;
- concern that too many water resources are being used (if there is hydrogen produced from river systems or ground water);
- concern over associated costs, risks and safety;
- questions about domestic versus foreign ownership;
- control of technologies and related infrastructure.

This public engagement and consultation campaign would need to be conducted either ahead of or alongside the implementation of the hydrogen program.

Fortunately, research conducted by University of Queensland in December 2018 and provided to the National Hydrogen Strategy suggests that acceptance of a hydrogen economy is readily achievable as perceptions of hydrogen are positive or neutral for the majority of the population.

What are the inter-dependencies and trade-offs with other pathways (are pathways complementary or alternatives)?

The hydrogen and electricity pathways are interdependent; there are some uses that hydrogen will serve best, for example, long distance transport (trains and trucks), high heat, high temperature industrial heat, fertiliser, steel etc. Some uses of hydrogen may be alternative to electricity, eg heat (with electric being preferred in most situations)

What are the key uncertainties and potential for unintended consequences?

I feel there is some overlap between the hydrogen and electrification pathways in certain applications like light transport, domestic uses and some industrial uses. With innovations in battery storage and good economies of scale for renewable electricity, it will be preferable to use electricity.

I am not sure whether the steel distribution network for gas will be suitable for hydrogen. Tests are currently underway to assess embrittlement of steel under differing proportions of hydrogen to gas. It may be possible to use the existing steel pipelines and coat the insides with polyethylene, or the distribution system might need to be replaced.

Pathway: Emerging technologies, such as carbon capture and storage, solar thermal and geothermal

What are the key benefits, risks, and potential impacts on various end-users, on energy affordability, safety, security, reliability and equity?

I do not feel that unproven CCS technology should be relied on to play an important part in the decarbonisation of the energy system. The Gorgon CCS project that is a part of Chevron's LNG plant in Western Australia has missed its targets by an enormous margin and there have been significant technical delays and cost over-runs. <https://reneweconomy.com.au/chevron-concedes-ccs-failures-at-gorgon-seeks-deal-with-wa-regulators/>. This project to date has been a failure in doing what it was intended to do.

It would be an unacceptable risk to include CCS as a reliable method to deal with emissions when it is imperative to reduce them as rapidly as possible.

What are the scale of opportunities and potential to accelerate uptake?

To date there is very little demonstrated potential to accelerate uptake of CCS

What are the key technical, regulatory and economic barriers?

I feel that we are required to decarbonise more quickly than the time and resources could be given to develop the technology for CCS.

What are the roles to be played by government, industry and how will consumers preferences be accounted for in the transition?

I think the government should abandon any plans for CCS to play a part in assisting with decarbonisation.

What are the likely timings of technical maturity and economic viability?

Technical maturity is uncertain and if reached, would be attained far too late to suit the timeframe required for net-zero emissions.

What are the best ways to maintain social acceptability and consumer confidence?

Not applicable in view of recommendation not to pursue CCS

What are the inter-dependencies and trade-offs with other pathways (are pathways complementary or alternatives)?

What are the key uncertainties and potential for unintended consequences?

Key uncertainties have been covered above – CCS technology is far too uncertain.

Mitzi Tuke



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