



AUSTRALIAN PARENTS FOR CLIMATE ACTION

Australian Parents for Climate Action Submission re the Victorian Gas Substitution Roadmap Consultation Paper 30 July 2021

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Australian Parents for Climate Action represents over 15,000 parents, grandparents and carers from across Australia. We are Australia's leading organisation for parents advocating for a safe climate. Our supporters are from across the political spectrum, across Australian electorates (including those affected by this project), and from different socio-economic positions. We seek non-partisan responses to climate change and its impacts.

We are focused on pushing Australian governments and businesses to take urgent action to cut Australia's carbon emissions to net zero as quickly as possible. We encourage Australia to take a leadership role on the world stage, leading by example and calling for other nations to take the necessary action to protect our children's futures.

For more information, visit www.ap4ca.org

This submission was prepared by Sydney based volunteer David McEwen, an independent climate risk consultant. It has been approved by Nic Seton, Chief Executive Officer of Australian Parents for Climate Action. Additional input was provided by members including Anna Harvey.

Submission

Australian Parents for Climate Action, representing our 15,000 supporters including around 4,000 in Victoria, **strongly oppose** any expansion of fossil methane gas extraction or uses.

While we welcome the release of the Victorian Gas Substitution Roadmap Consultation Paper, it *lacks urgency* given the gravity of the climate crisis and the horrific impacts it will have on children in Victoria and around the globe. In particular, its targets and timelines are wholly inadequate.

As parents, we rely on governments to make rational investments and policy decisions in the best interests of current and future generations. Indeed, the Federal Court has now made it Australian law that the Minister for the Environment has a duty of care to Australian children not to exacerbate catastrophic climate change in approving certain developments under the EPBC Act (1999).¹

The equity provisions of the Paris Climate Agreement acknowledge that developed countries have a greater role to play in helping the world achieve decarbonisation objectives. But even at the upper end, Victoria's interim target of 45-50% emissions reduction (off 2005 levels) by 2030 only just meets the *global average minimum* requirement. If the world is to meet the Paris Agreement's 1.5 degree limit on global warming, Victoria will need to decarbonise far more quickly. University of Melbourne's Climate Targets Panel calculates that we will need to reduce fossil gas use, along with other emissions sources, by 74% (off the 2005 baseline) by 2030 and be completely off fossil gas and other fossil energy sources by or before 2035.²

As the Discussion Paper notes, the six decarbonisation pathways proposed need to be used in careful combination. However, in line with the overall target the Gas Substitution Roadmap must start with the premise of curtailing all fossil gas uses by 2035 at the latest, with the possible exception of industrial feedstock uses providing high societal benefit, and that cannot be substituted with emissions-free alternatives such as green hydrogen.

Indeed, the United Nations Environment Program's (UNEP) Global Methane Assessment notes that "reducing human-caused methane emissions is one of the most cost-effective strategies to rapidly reduce the rate of warming and contribute significantly to global efforts to limit temperature rise to 1.5°C."³

Based on Australian Parents for Climate Action's research and consultation with energy and climate experts, we make the following observations and recommendations:

¹ <https://www.comcourts.gov.au/file/Federal/P/VID607/2020/3898890/event/30742944/document/1800207>

² [Australia's Paris Agreement Pathways: Updating The Climate Change Authority's 2014 Emissions Reduction Targets](#)

³ [Global Methane Assessment](#)

Electrification Delivers Efficiency

The electrification pathway presents the largest opportunity for Victoria to reduce carbon emissions quickly from its gas sector. Electrification yields massive efficiency benefits for building and process heat uses. In his 2020 book *Rewiring America*, Australian-American energy expert Saul Griffith makes a compelling case that the most effective and efficient, no regrets decarbonisation pathway is to “electrify [nearly] everything ... now”⁴ in conjunction with the build-out of a fully renewable electricity grid sized for the additional loads.

According to Griffith's calculations, the US could decrease its total energy consumption by 58% if it electrifies everything that can be, due to the efficiency benefits electrification brings as shown in the figure below (extracted from *Rewiring America*):



Using any gas (methane or hydrogen) to heat air or a liquid is fundamentally inefficient compared with using a heat pump. For example, research by the Energy Efficiency Council found that “a leading edge (at present) residential heat pump can deliver heat at 600% efficiency, compared with a gas heater at 50% to 95% efficiency.”⁵ Reverse cycle & heat pump technology is effective down to ambient temperatures of negative 10°C; below this, supplemental electrical heating elements can be used.

⁴ Griffith, Saul (2020), [Rewiring America - A Field Manual for the Climate Fight](#)

⁵ [Heat Pumps](#)

Electrification is the right way to deliver efficiency. We cannot decarbonise gas by tinkering with the efficiency of gas appliances and plant. Technologies to efficiently electrify buildings (reverse cycle air conditioners, hot water heat pumps, and induction cookers) are mature and available at scale.

We acknowledge that electrification, while already cost effective for new builds and for retrofitting existing buildings where there are few gas uses⁶ requires additional effort by building owners given the need in some circumstances to run additional power circuits. **With many appliance purchases made in a panic when the old one breaks, setting clear goals and aligned incentives for electrification is critical.**

As noted in the discussion paper, electrification of buildings and process heating in industry may also increase buildings' maximum demand and change usage patterns, requiring careful coordination with electricity distributors and the grid operator (particularly in conjunction with the electrification of transport). It goes without saying that the additional electricity should be generated from renewables and emissions-free storage, and we acknowledge the challenges of matching winter heat demand with variable renewables production.

Hydrogen Enrichment's Unintended Consequences

Australian Parents for Climate Action believes hydrogen enrichment is particularly susceptible to unintended consequences and is generally **opposed** to this pathway for the following reasons:

1. *Inefficiency.* Hydrogen produced from electricity (then compressed, transported and burnt) is vastly less energy and cost efficient than electrification of gas uses. Even at the best of times, hydrogen is a relatively inefficient energy carrier given its low energy density by volume.
2. *Cost.* Hydrogen produced from electricity will always be more expensive than using renewable electricity directly.
3. *Misaligned incentives.* Our research indicates that the market signal of hydrogen enrichment - that the fossil gas network is becoming incrementally more energy efficient - will discourage electrification. It will encourage building and industrial users to continue to buy new gas appliances and plant, naively thinking they are doing the right thing by the climate, when electrification is the vastly superior choice.
4. *Pathway to Decarbonisation.* If your goal is to get to about 10% hydrogen enrichment and then stop increasing the hydrogen concentration, then in terms of decarbonisation you've achieved very little, and you've delayed electrification due to the misaligned incentives outlined in the preceding

⁶ [All-electric solar homes save thousands over gas: report](#)

point. If your goal is to eventually fully replace hydrogen in the existing fossil gas network, let's play out what happens next:

Somewhere between 10 and 30% hydrogen concentration, two things start to happen:

- i. A condition known as hydrogen embrittlement starts to attack the metal or welds in gas pipes (particularly transmission and some pipes in buildings).⁷ Unless at risk pipework is replaced (at considerable cost), this will exacerbate dangerous methane leakage, which is devastating for the climate.
- ii. Gas appliances and industrial plant need to be modified or replaced to cope with the different characteristics and combustion properties of hydrogen versus methane.⁸ They might also need to be modified or replaced again at intermediate concentrations up to 100%.

Think about it. Unless the Victorian government is prepared to ask the building owners and businesses of Victoria to more or less simultaneously upgrade or replace their gas appliances (at enormous cost), then hydrogen enrichment is essentially a dead end decarbonisation tactic. While it might provide a ready market for a nascent green hydrogen production industry, creating supply and driving costs down while valid industrial substitutions of fossil fuels for hydrogen are being established, that's about the only benefit it brings. **If it is not clear to gas users that electrification is the end game and the fossil gas network will be retired, then hydrogen enrichment starts actively working against the State's decarbonisation goals.**

For the reasons above **it is essential that Victoria incentivise rapid electrification of all building uses and industrial process heat uses.** Accordingly, **new gas connections should be prohibited** (as has been implemented in the ACT and over 50 cities in the United States⁹ amongst many other jurisdictions. Renovators should be required to electrify any appliances being added or replaced.

Though unsuitable for hydrogen enrichment, Australian Parents for Climate Action **strongly supports the use of green hydrogen** (produced by electrolysis using surplus renewable electricity). However, given hydrogen's relatively high costs, poor volume density, transmission challenges and various other technical constraints, we assert that **green hydrogen uses should be restricted to:**

1. Industrial: green steel (replacing coking coal), ammonia, chemical feedstock, etc.;
2. Industrial: high-heat applications if emerging technologies such as **solar thermal** are impractical;
3. Transport: some long haul land transport,¹⁰ shipping and some air travel (as hydrogen or ammonia);

⁷ Journal of Materials Science (2018), '[Understanding and mitigating hydrogen embrittlement of steels: a review of experimental, modelling and design progress from atomistic to continuum](#)'.

⁸ [30 percent of the UK's natural gas could be replaced by hydrogen, cutting carbon emissions](#)

⁹ [California's Cities Lead the Way to a Gas-Free Future](#)

¹⁰ We would prefer electrification of inter-city passenger and freight rail, and note with interest the opportunity of [battery swap stations for inter-city trucking](#).

4. Dispatchable electricity generation, if needed given the deployment of other storage options and improved transmission.

We **strongly oppose** the use of hydrogen produced from fossil fuels (with or without the use of carbon capture).

When considering a green hydrogen future, it is imperative that Victoria moves away from traditional conceptions of what a gas network looks like. Don't think about a centralised, monolithic green hydrogen network. Instead, imagine:

1. Green hydrogen produced in many locations, close to points of use.
2. Discontiguous, small networks.
3. Critically, think of only hundreds of nodes, rather than the current millions.

Biogas - Limited Uses Only

We encourage consideration of biogas to focus on uses for industrial feedstocks that cannot be replaced with hydrogen, might still require methane. These could use biogas captured from landfill or piggeries (for example). Aim to minimise transmission requirements by locating industry adjacent to biogas capture. Industrial users may need to add processing equipment to obtain appropriate gas purity.

Emerging Technologies

Australian Parents for Climate Action appreciates that there is a valid role for **carbon capture, use and storage** where industrial applications that deliver significant societal benefit cannot be substituted with fully decarbonised options. However, we **strongly oppose** all uses of CC(U)S that might be applied to fossil fuel extraction, processing or electricity generation. Based on the abject failure of the Chevron Gorgon CCS project¹¹ amongst others, we urge the Victorian Government to remain highly skeptical of industry claims regarding the efficacy, reliability and costs of CCS.

Fugitive Emissions

Even as fossil fuel extraction is ramped down over the coming decade(s), it is imperative that the enormous climate impact of **fugitive emissions** be mitigated.

Australian Parents for Climate Action is appalled at the chronic *under-measurement* of fugitives and the lack of rigorous independent verification of industry self-measurement by governments. New satellite and terrestrial measurement approaches are identifying substantially (orders of magnitude) higher rates of fugitive emissions than are being reported. For example, recent independent measurement of coal fields in the Bowen Basin found fugitive methane rates 47% higher than the

¹¹ [Australia's giant carbon capture project fails to meet key targets](#)

global average (for the particular activity) estimated by the International Energy Agency.¹² Analysis has found high leakage rates in cities too, both from leaking pipework, and pre-combustion emissions from gas stoves and other appliances.

A US study found that instantaneous gas water heaters emitted about 1% uncombusted methane.¹³ Given the 20-year Global Warming Potential of methane is 86, that seemingly innocuous puff of methane on startup nearly *doubles* the emissions of the appliance.

We recommend that the Victorian Government invest in contemporary methane detection technologies and establishes an independent fugitives detection and mitigation body, resourced and empowered to a) detect fugitives at all points across the fossil fuel supply chain; and b) direct and enforce fugitive reduction by the responsible parties (producers, transmission and distribution companies, and commercial users).

Social Acceptability and Consumer Confidence

As a parents-led group, we represent a major consumer segment. We want energy that is safe and affordable. Gas is neither. Our members have raised the following concerns in their decisions to reduce their use of gas at home.

- **Health and safety:** As well as its appalling climate impact, it contributes to a plethora of health issues. When burnt in our homes, it releases formaldehyde, carbon monoxide, particulate matter, and nitrous oxides. “Cooking with gas is estimated to be responsible for up to 12 percent of the childhood asthma burden in Australia” and has a comparable risk of living in a home with cigarette smoke.¹⁴ The Victorian Government should publicise these risks to consumers, and assist them to move away from gas.
- **Cost:** Fossil gas is very costly – choosing all-electric appliances and solar PV instead of gas for a new build can save \$16,000 over the first ten years.¹⁵ A connection to the methane gas network means the householder must pay at least \$200 per annum before they even switch on the stovetop. Instantaneous hot water can be delivered via an all electric appliance (though not with the same efficiency as an electric heat pump hot water system). An average split system reverse cycle air conditioner is 6.4 times more efficient than gas heaters, and they are useful year round rather than just in the cooler months.¹⁶
- **Fit-for-purpose:** Induction cooking is just as responsive as gas cooking, much cleaner,¹⁷ and produces less waste heat so the cook does not get as hot (and the air conditioning does not need

¹² [Top Australian Coal Mines Are Spewing More Methane Than Rivals](#)

¹³ [Quantifying Methane Emissions from Natural Gas Water Heaters](#)

¹⁴ [Invisible Danger: Gas, Asthma and our Children](#)

¹⁵ [All-electric solar homes save thousands over gas: report](#)

¹⁶ [Energy Efficient Buildings Plan, 2013 – a Zero Carbon Australia report](#)

¹⁷ [The Benefits of Induction Cooking](#)

to work as hard in summer).¹⁸ Many famous chefs, including Neil Perry, have switched their kitchen appliances to induction.¹⁹ There are even residential and commercial solutions for wok cooking.²⁰

Indeed, the Australian Facebook group My Efficient Electric Home (established by Victorian energy efficiency and gas specialist Tim Forcey) has become extremely popular, with over 32,000 members discussing how to design and retrofit their homes without gas.²¹

Rather than lose customers, gas networks have been pouring money into advertising fossil gas – influencers on Instagram in the US and in Australia have been paid to post about their gas appliances.²² Gas networks in California have even set up and funded fake community groups to fight back against electrification legislation.²³

To improve social respectability and consumer confidence, the Victorian Government should mount its own campaign (including use of social media influencers) to contrast the health, cost and climate impacts of fossil gas (perhaps using a slogan “not so natural gas”), with the health, efficiency and cost benefits of an electrified home.

In the commercial building sector the Green Building Council of Australia is already helping spur interest in electrification, having recently changed its Green Star tool to deny its top rating to buildings that still use gas.²⁴ Given net zero mandates by major Australian corporates, this will undoubtedly generate interest in building retrofits to remove gas plant.

Roles and Consumer Preferences

It is essential that the government is open and honest in acknowledging that fossil gas has no long term future in Victoria (or anywhere) if we are to limit warming to a level that allows the state to continue to prosper and its people to live in safety. The government can also lead by example by accelerating the electrification of its buildings and facilities.

While gas producers and distributors are and will continue to fight for their longevity, they must not distract the government from setting and delivering the 74% reduction by 2030 and net zero by 2035 that is essential for our childrens’ very survival. Legal advice should be sought to confirm whether the government has any obligation to support the gas industry. State subsidies or support for fossil fuels including gas should be wound back. Support should be provided to households and businesses seeking to electrify (or appropriate businesses seeking to switch to green hydrogen or biogas), including compensation for the distributor’s meter disconnection fee (in lieu of that fee being waived).

¹⁸ [A beginner's guide to induction cooking « Appliances Online Blog](#)

¹⁹ [No longer cooking with gas: how a shift to induction cooking could affect Victorian homes and restaurants](#)

²⁰ For example, [Domino Induction Wok Cooktop 40cm](#)

²¹ [My Efficient Electric Home Facebook Group](#)

²² [The Australian Instagram influencers being paid to promote gas](#)

²³ [How the Fossil Fuel Industry Convinced Americans to Love Gas Stoves – Mother Jones](#)

²⁴ [Green Star eliminating natural gas and electrifying buildings](#)

As noted in the preceding section, with a suitable and sustained communications campaign, particularly alerting consumers to the deleterious health impacts of gas appliances (especially stoves and un- or poorly-flued heaters, plus the cost efficiency of an all electric home, it should be possible to modify preferences away from gas.

In Summary

Australian Parents for Climate Action recommends that the Gas Substitution Roadmap clearly articulates a path to fully exiting fossil methane gas distribution in Victoria by 2035 at the latest.

Incentives and messaging must be aligned to promote rapid electrification of buildings and process heat uses in industry. Electrification will bring enormous energy efficiency benefits, along with cost savings and health benefits due to improvements in indoor and outdoor air pollution. Close coordination with the electricity grid operator and distributors will be essential.

Hydrogen enrichment is a dead end strategy with multiple negative consequences and misaligned incentives. Instead, 100% green hydrogen should be produced close to points of use, and restricted for the specific applications noted in point 4 above. Envisage a parallel infrastructure for green hydrogen as noted in point 5 above.

Biogas should only be considered for societally beneficial industrial feedstock uses that cannot be substituted with emissions-free alternatives such as green hydrogen. Industry requiring biogas should ideally be co-located with viable sources such as landfills to minimise fugitive emissions and losses.