Climate Tasmania response to the Tasmanian Future Gas Strategy Discussion Paper

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Climate Tasmania is a group of concerned professionals who have a diverse range of expertise, spanning scientific, legal, economic, health, energy, social and policy aspects of climate change. Our aim is "To provide timely, independent and authoritative advice to Tasmanian business, government and community leaders on climate change and appropriate policy responses."

Details of the members of the Climate Tasmania board and expert advisers are available at www.climatetasmania.org/members/

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Glossary

Term	Definition	Notes
biogas	Gas produced from biological sources such as waste from agricultural, municipal, and forestry sources, including sewage, garden and food organics, sawdust, straw	Consists mainly of methane
biomethane	Biogas that has been cleaned up to meet the pipeline gas quality standard	Common in parts of Europe, not in Tasmania
GWP	global warming potential	See appendix
LNG	Liquified Natural Gas	See ReCFIT 2021a p.7
LPG	Liquified Petroleum Gas	Consists mainly of propane and butane
Natural gas	Gas derived from fossil fuel reserves	Consists mainly of methane
renewable methane	Methane synthesised from renewable hydrogen plus carbon.	See ReCFIT 2021a p.18

Recommendations

Summary

Climate Tasmania welcome the proposal for a Future Gas Strategy. While we are supportive of the Government's announced intention to develop sectoral based Emissions Reduction and Resilience Plans, it is also essential to look at specific fuel-based strategies for the phasing out of fossil fuels. The circumstances for the phasing out of fossil fuels are different for each fuel (liquid petroleum products, coal, LPG and natural gas).

In line with the state government's net zero emissions commitment, the Future Gas Strategy should send an unambiguous message that the state government's intention is that the use of fossil natural gas should be phased out.

> ***R.1 the Future Gas Strategy should send an unambiguous message that the state government's intention is that the use of fossil natural gas should be phased out.***

Wherever practical and economic, gas use should be replaced with electrification. Where there is no practical alternative to the use of gas as a fuel, the intention should be that this need is met by whatever is the most effective combination of biogas, hydrogen, renewable methane and biomass.

Arguably, the statement of future direction is more important than the details of programs to achieve this objective. Without a clear policy direction industry and consumers are likely to continue investing in gas infrastructure resulting in increased costs and the risk of stranded assets (Climate Tas 2021a).

Issues

The role of methane as a greenhouse gas

Methane, the primary constituent of natural gas, is a potent greenhouse gas. Depending on the timescale of the calculation it is between 28 and 87 times as potent as carbon dioxide in producing global warming (see Appendix 1 for details).

Because of its high warming potential, and the fact that reductions in methane concentration can have a more immediate impact than reductions in CO_2 emissions, reductions in methane release are a high priority in meeting the internationally agreed goal to keep global heating below 1.5 °C above pre-industrial levels.

> ***R.2 The Tasmanian Government should commit to the objectives of the Global Methane Pledge.***

> ***R.3 The Tasmanian Government should adopt the GWP_{20} value for methane for all its State level greenhouse gas reporting and policy considerations.***

Methane is released from wastes, natural sources and agricultural activities as well as leakage from the transport and use of natural gas. Table 1 below contains the methane emissions data for 2019 reported by the Australian Government's Australian Greenhouse Emissions Information System (AGEIS) database. Climate Tasmania has made recommendations on mechanisms for regulating the release of methane in our submission to the government in response to the release of draft amendments to the Climate Change Act (Climate Tasmania 2021b).

Table 1. Tasmania's methane emissions as reported in AGEIS for the 2019 inventory year.

Sector	Methane emissions for period	% of total methane
Energy	167.2 Gg	6%
Industrial processes	0.4 Gg	0%
Agriculture	1,907 Gg	67%
Land use, land use change, & forestry	402.3 Gg	14%
Waste	381.3 Gg	13%

The challenge of gas policy in Tasmania

The discussion paper (ReCFIT 2021a) and the associated background research (OGW 2021) accurately outline the dilemmas facing gas policy in Tasmania. In summary:

- Natural gas is a fossil fuel and the Tasmanian Government has committed to net zero greenhouse gas emissions by 2030.
- In the past the cost of transporting gas to Tasmania was partially underwritten by contracts that Hydro Tasmania signed to transport gas to the Tamar Valley Power Station (TVPS). But the TVPS is now barely used. It will become even less financially viable and less relevant to our energy security in future.
- The infrastructure is heavily underused resulting in excessive costs for consumers. Only a small proportion of Tasmanian households are connected to the gas network.
- The national energy market operator is forecasting a supply/demand imbalance on peak demand days in southern states from 2024 and a large imbalance in overall gas supply/demand from late 2020s onwards (OGW p.5&6).
- Despite 20 years of uninterrupted operation, the single undersea gas pipeline that connects Victoria to northern Tasmania is actually a bigger single point of failure than the Basslink cable that failed with such dramatic impact in December 2015.

An additional challenge not mentioned in the discussion paper is that natural gas (being mainly methane) is a far more potent greenhouse gas than carbon dioxide. As explained below, reducing methane release and leakage is the most urgent and most practical way of reducing the greenhouse effect.

In response to these challenges, the most obvious possible policy responses are:

- Increase the use of natural gas so that the industry is more financially viable.
- Do little or nothing and allow market forces to result in a continuing decline in the use of gas.
- Actively manage a process of replacing natural gas with electrification wherever possible and explore alternatives for those uses which are harder to substitute.

The first two options are dismissed in the Oakley Greenwood report (p.15) for reasons with which we are largely in agreement.

Most of this submission is therefore concerned with the practical challenges of a managed reduction of the use of natural gas, finding ways of addressing the transitional issues, and dealing with hard to substitute uses.

Benefits of electrification

Electricity can provide gas consumers with cheaper heating, hot water and cooking in most residential situations and many small commercial and industrial uses.

The Oakley Greenwood modelling shows that, once capital costs of transition are covered, electrification provides savings over continuing use of natural gas, and is far cheaper than alternative substitutions such as hydrogen, biomethane and renewable methane (OGW p.25).

The benefits of electrification are significantly understated by OGW because "We have based our assessment of the relative costs of different energy sources purely on the relative energy contents of the different options (i e we have not had any regard to the efficiency of performance e g air conditioning COPs)" (OGW p.17). The coefficient of performance (COP) of heat pumps for space and water heating are in the range of 3 to 5 so this will make the savings for customers in converting from gas to electricity very much greater.

Added benefits and advantages of electrification are:

- the technologies are well proven and are capable of being implemented by the existing workforce, compared with the need to develop new technologies in hydrogen or renewable methane
- costs are well known
- more of the money stays in Tasmania
- supply is more local and secure
- inductive electric cooking improves indoor air quality compared with the use of natural gas and LPG.

> ***R.4 A pilot program should be initiated as soon as possible to subsidise electrification for the replacement of gas infrastructure in residential and small commercial and industrial uses.***

A pilot program will:

- test the level of subsidy at which a significant number of users are prepared to switch from gas to electricity
- identify any workforce, safety and other issues that need to be addressed before a large-scale roll-out of subsidised conversions.

An initial pilot program should be open only to natural gas users but a full-scale program should also be open to LPG users.

Phasing out LPG

We were surprised to discover the dominant role of LPG over natural gas in residential use.

> *There is comparatively high residential use of LPG in Tasmania with nine times as much LPG being consumed by households than natural gas. (ReCFIT 2021a, p.9)*

As a fossil fuel, LPG needs to be phased out of use, however this is not as high a priority because:

- Propane and butane are not greenhouse gases
- Costs are unlikely to be strongly increased by reduced overall Tasmanian demand.

> ***R.5 Subsidies should be available to residential users of LPG to invest in electric alternatives.***

Potential problems in phasing out natural gas

While most users will ultimately be better off financially if the use of natural gas is phased out, a major change such as this will inevitably have some potential losers. The major concerns are likely to be:

- The concern that without Hydro Tasmania underwriting the gas transport market, prices for other users will increase dramatically.
- Impact on the financial viability of Tasmanian Gas Pipeline (TPG), the owner of the pipeline from Victoria and TasGas, the owner of the gas distribution network.
- Impact on the financial viability of gas retailers (TasGas Retail and Aurora Energy).

At the 2021 GBE scrutiny hearings for Hydro Tasmania, the energy minister made the point that negotiation of gas transport contracts for Hydro Tasmania were separate from those for other users and that the national gas rules provided for arbitration of costs (Parliament 2021, p.42)

TPG is owned by Palisade Investment Partners, a large infrastructure investment group which owns at least 5 wind farms, including the Granville Harbour Wind Farm in Tasmania. In its 2021 Annual Report (p.103), Hydro Tasmania stated that "*On 5 September 2017 Hydro Tasmania was directed to enter a power purchase agreement with West Coast Wind to facilitate the construction of the Granville Harbour Wind Farm…. In 2020-21, this unfunded CSO direction has an implied cost to Hydro Tasmania of $2.7 million due to the prevailing market price for LGCs.*".

Oakley Greenwood note (p.7) that TGP generates significant revenue from sources other than transport of gas to Tasmania. For example gas storage may "*be expected to evolve into the major revenue generating service*". For background see (Smith 2016 p.25).

TasGas is both a gas retailer and operator of the gas distribution network. It is owned by Infrastructure Capital, another large infrastructure investment group which own a number of wind farms.

While a reduction in gas usage is likely to result in a decrease in employment in gas retailing, there would be additional jobs created in electricity retailing and in the replacement of gas infrastructure with electrical infrastructure.

Options for remaining gas use

The discussion paper identifies three possible solutions for the larger and harder to substitute gas uses: biogas, renewable methane and hydrogen. These are all less proven, more complex and more expensive than electrification. These future technologies should be actively explored, but should not be used as a rationale for delaying the practical, money saving alternatives that are available now.

We note three concerns about these possibilities:

- As discussed in Appendix 1, methane is a potent greenhouse gas irrespective of whether the source is fossil fuel or renewable. Careful attention needs to be given to reducing leakage and release of unburnt gas whatever its source.
- Renewable methane will inevitably be more expensive to produce than green hydrogen given that it involves an extra conversion process. This may be offset by the fact that renewable methane is more compatible with existing infrastructure than green hydrogen.
- There is no discussion about the possibility of using solid biomass fuels as an alternative source of heat. The best example of such fuels is wood pellets: these are made in Tasmania from wood processing wastes, mostly sawdust. Wood pellets are a premium renewable fuel that can be burned cleanly and efficiently in specialised pellet heaters, which are available from local distributors. Appendix 2 has some more detail and an important caveat about the source material used to make pellets.

R.6 Grants should be available to commercial and industrial gas users to explore the business case for renewable alternatives to fossil gas where electrification is not practical.

Decentralisation of alternatives to fossil fuel gas

It is highly likely that a decentralised gas network would be more viable and more effective than a centralised approach based on large generators of decarbonised gas for a variety of reasons. For example:

- The distribution network is more suitable for adding hydrogen than the steel transmission network (ReCFIT 2021a p.17).
- Hydrogen electrolysers can be located anywhere that water and electricity are available. Some locations (eg wastewater treatment sites) will have the added benefit that generated oxygen has a local use (OGW p.13).
- Injecting hydrogen at the distribution level means that not all users on the network have to be upgraded at the same time.
- Raw material for biogas generation are typically bulky and expensive to transport. Local biogas generation can be tailored to available feedstock and can avoid transport costs.

R.7 The Future Gas Strategy should explore the benefits of localised solutions to the generation and use of non fossil fuel gas.

Responses to discussion paper questions

Summary answers are provided below to relevant questions in the discussion paper.

Drivers influencing our gas industry

1. What factors do you think the need to be considered in developing a strategy for the future of gas in Tasmania?

- Equity considerations for residential users.
- Starting with most cost-effective substitutions first.
- Setting a direction that discourages further investment in gas infrastructure.

2. What changes are you, or members of your industry, observing related to global and domestic market settings for fossil fuels that could potentially impact on the outlook for gas in Tasmania?

- Initiatives in other states to phase out gas or prevent further development of gas infrastructure. For example in the ACT (ACT Gov), Victoria (Vic Gov) and NSW (NSW Gov 2021, p.10).

Decarbonisation pathway

10. Should Tasmania be transitioning to a decarbonised gas network?

- Yes, to extent that gas use can not be substituted by other solutions.

11. If Tasmania is to transition to a decarbonised gas network what should the transition pathway look like?

- A clear statement from the government that fossil gas use should decline and eventually be phased out completely.
- Subsidising the most cost-effective substitutions first, which are likely to involve electrification.
- Providing grants to commercial and industrial gas users to explore the business case for renewable alternatives to fossil fuel gas where electrification is not practical. This should be done as part of the development of the proposed sectoral Resilience and Decarbonisation Plans.

13. What risks do you see with decarbonising the Tasmanian gas network (technical, economic, social)?

- Equity issues if the process is not managed effectively.
- Continued methane emissions if leaks and venting are not tightly controlled.

15. What is the role for the Tasmanian Government in a decarbonisation transition for the gas sector? What should the Government's priority measures be?

- Sending a clear message that the future of the gas network is for less gas use and for full decarbonisation over time.
- Discouraging, or legislating against, further development of gas using infrastructure.
- Developing effective subsidy mechanisms to encourage electrification where this is economic and practical.
- Regulating to reduce methane emissions where possible.

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Public submissions to consultation paper available on the website.
https://engage.vic.gov.au/help-us-build-victorias-gas-substitution-roadmap

Appendix 1: Methane as a Greenhouse Gas

1. Methane's Global Warming Potential.

Methane traps heat in the earth's atmosphere more efficiently than carbon dioxide, and therefore is regarded as having a higher global warming potential (GWP). GWP is measured by comparison with carbon dioxide, which has been assigned a GWP of 1. A greenhouse gas which is twice as efficient as carbon dioxide at trapping heat has a GWP of 2.

Because methane is relatively short-lived in the atmosphere, compared with carbon dioxide, its GWP depends on the time frame over which its heat-trapping characteristics are considered. The range of GWP values assigned to methane are[1]:

For 20 years (GWP_{20}):	84 to 87
For 100 years (GWP_{100}):	28 to 36

Because – as discussed in more detail later – reducing methane emissions is a key strategy in urgent global efforts to remain below 1.5 °C warming, Climate Tasmania recommends that the Tasmanian Government uses the GWP_{20} value for methane in all its policy decision making. (In contrast, the Australian Government uses the lowest available GWP figure for methane, 28, in its greenhouse gas emissions reports.)

2. Importance of methane emissions.

The International Energy Agency's 2021 World Energy Outlook said that reducing methane emissions was a key priority if global heating is to be kept below 1.5 °C[2].

> *Methane has contributed around 30% of the global rise in temperature today and the IPCC 6th Assessment Report highlights that rapid and sustained reductions in methane emissions are key to limit near-term warming and improve air quality. The energy sector is one of the largest sources of methane emissions today: we estimate that fossil fuel operations emitted around 120 Mt of methane globally in 2020, equivalent to around 3.5 gigatonnes of carbon dioxide equivalent (Gt CO2-eq)[3].*

The IEA devotes considerable space in the 2021 edition of its World Energy Outlook to the importance of reducing methane emissions, particularly from the oil and gas industry, and has produced a series of reports on reducing methane emissions.

One of the initiatives launched at COP 26 in Glasgow was the Global Methane Pledge, an agreement by countries led by the USA and the EU that they would reduce their methane emissions by at least 30% from 2020 levels by 2030[4]. Australia refused to support the Pledge. If the Pledge is open to sub-national governments, then Climate Tasmania recommends that the Tasmanian Government sign up to the pledge in order to reinforce the climate leadership it claims.

3. Policy implications for the Tasmanian gas system.

3.1 Introduction.

Methane's Global Warming Potential is independent of the source of the methane – whether fossil methane, methane from anerobic decomposition, or methane from livestock. Thus, while the Discussion Paper's recognition of the need to phase out fossil fuels is very welcome, all leaks of methane into the atmosphere are of concern, regardless of the source of the methane. If, for example, Tasmania was able to replace all the fossil methane it currently uses with renewable

[1] IEA (2020), Methane Tracker 2020, IEA, Paris https://www.iea.org/reports/methane-tracker-2020
[2] IEA (2021), World Energy Outlook Figure 1.7. IEA, Paris.
[3] IEA (2021), World Energy Outlook page 41. IEA Paris.
[4] https://www.globalmethanepledge.org/

biomethane but made no efforts to reduce leaks or venting, then the adverse climate impacts of the leaks and venting would not change.

3.2 Relative impacts are path dependant.

While the previous sentence is correct, the situation is more nuanced than it suggests. Consider the situation in which all the biomethane which replaces fossil methane comes from sources which would otherwise have been released to atmosphere. If all the biomethane which would otherwise have been released is instead collected and transported to its end use, it is converted to carbon dioxide before entering the atmosphere – a significant relative improvement over the counterfactual situation. A 2020 paper by Dr Emily Grubert[5] explores such scenarios in detail. Dr Grubert notes, for example, that biomethane which is currently flared at source would need to be collected, transported, and used with no more leakage than associated with flaring for the change to be greenhouse neutral; if the collection and use involves additional leakage, then the change produces a worse outcome.

3.3 Not all uses of methane have the same leakage potential.

Consider two scenarios: a medium sized industrial gas user compared with a considerable number of domestic gas users whose aggregate gas demand is the same as the industrial gas user. The industrial gas user is likely to have a single gas connection to a higher pressure branch of the gas distribution network, while the domestic customers will all be connected to the lowest pressure sections of the network, and will be getting their gas via a number of branches and connections in the network "tree". Even though the pressures are lower, the sheer number of connections through the network to the domestic customers offers increased potential for leakage. There are also important differences at the usage end. Industrial gas customers tend to use gas as a high quality heat source for applications such as raising steam, firing kilns, etc. Their gas usage is likely to be continuous: once the boiler or kiln is fired up it runs until there is a significant break in production and the plant is shut down. The industrial plant may have a maintenance program for its gas fired equipment, and is very likely to have a person who keeps a good eye on gas usage and costs. The domestic gas users will almost certainly not have any maintenance arrangements for their gas appliances, which may be of varying ages, states of repair and quality. Domestic gas appliances such as water heaters and some space heaters will have thermostats and will cycle on and off under the control of the thermostat. Every time the appliance fires up, some of the gas is unburnt as the flame is established, and over multiple equipment items and multiple starts per day these individually small leakages can be significant[6].

[5] Emily Grubert 2020 *Environ. Res. Lett.* **15** 084041

[6] This issue was discussed by Emily Grubert in a podcast: https://xenetwork.org/ets/episodes/episode-140-methane-leakage/ released on 3 February 2021

3.4 Policy implications.

Climate Tasmania submits that the policy implications of the preceding discussions are:

1. Methane venting and leakage needs to be addressed, whatever the source of the methane. Accordingly, we recommend that the Tasmanian EPA be provided with the staff, measuring equipment and legislative power to strictly control all methane emissions from stationary sources in Tasmania.
2. Minimising methane leakage needs to be a policy priority. Tasmania's ambition to be a climate leader will not be realised if it ignores the opportunity that methane provides to reduce warming.
3. The use of methane in domestic settings should be phased out. The discussion in section 3.3 above highlights how much easier it will be to control methane leakage in the industrial setting than in the equivalent number of domestic settings. Because of this, even if biomethane is to be adopted widely in Tasmania, it should not be considered for the domestic network, where Climate Tasmania's recommended approach is to shut down the domestic use of gas and to shrink the gas network to a smaller number of larger users. The availability of alternative to the use of natural gas is discussed elsewhere in this submission; alternatives exist for all domestic uses of gas that provide equivalent energy services at lower cost.
4. Phasing out LPG is important, but of lower priority. Propane and butane are not greenhouse gases. While their use needs to be phased out, phasing out methane is a higher priority.
5. Residual users of methane can possibly be accommodated, but probably not cheaply. Once all the current users of methane that can be converted to electricity or to some other carbon-free fuel have done so, the remaining methane users should ideally all use biomethane from sources that currently are released to atmosphere – for example, from open anerobic digestion pits, ponds and lagoons. This would turn methane into a distributed energy resource, with the gas network operating in a many to several configuration. Leak detection and control would be a priority for this slimmed down and restructured network. If practicable, this solution is preferred to using green hydrogen for these residual fuel users because the biomethane path resolves some current anerobic methane emissions.

Appendix 2: Alternatives to Natural Gas and LPG

1. Low temperature heat (less than approx. 75 °C).

Electrically driven heat pumps are likely to dominate this segment. Currently, capital costs are likely to be higher than for gas, but operating costs are likely to be significantly lower, particularly with continuing improvements in the coefficient of performance. The upper temperature boundary of this technology is likely to also increase as devices are continuously improved, and purchase costs of standard sized units are also likely to decrease over time because of learning curve effects.

Apart from cost and temperature limitations, the heat source used will impose limits in some circumstances. As capacities increase, air sourced heat pumps need to move more and more air to provide the heat to be pumped. Eventually this will be a limiting factor, as in some sites, space and noise issues will make installations that need to move large amounts of air problematic. Water reservoirs and ground water provide much greater amounts of heat per volume, but being uncommon sources at present, are likely to increase capital costs, particularly for early adopters.

In the longer term, significant opportunities are likely when co-location of industries allows the waste heat from one operation to be the source heat for another.

2. Hot water between 75 and 100 °C.

This segment may eventually be served by heat pumps, but such equipment does not seem to be currently available. In the interim, wood pellets offer a good alternative. Pellet water heaters are available in Tasmania: companies in Hobart, Launceston and Eden (NSW) represent manufacturers of equipment at a range of price points and capacities. While Tasmania has several wood pellet manufacturers, and is currently oversupplied with pellets, none of the pellet manufacturers offer truck delivery of bulk pellets, a delivery mode needed for the larger water heaters.

The current manufacturers of wood pellets in Tasmania use waste from wood processing – such as saw dust - to make the pellets. Climate Tasmania is aware that using wood for fuel can be controversial. The Government could improve the acceptance of wood pellets as a renewable fuel by introducing a source certification system which guarantees that wood pellets are made only from waste and that not one additional tree was cut down to make the pellets.

Climate Tasmania expects bulk delivered wood pellets, when available, to have lower fuel costs than gas and LPG.

3. Steam.

Climate Tasmania has been told that while pellet boilers producing steam are available in Europe, Australian boiler registration requirements impose additional type testing costs on boilers which are already fully approved in Europe. This adds to the cost of selling the equipment and has made it uncompetitive.

Pellet boilers for raising steam appear to commonly fill the smaller capacity market – installations up to several hundred kW. In this size range the equipment is relatively simple, because the fuel is very standardised and predictable. In the larger sizes, the economics appear to favour more expensive and complex equipment designed to cleanly burn more variable fuel such as agricultural wastes.