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RESEARCH REPORT

# Gas sector emissions and Victoria's new 2035 climate targets

Gas burned in homes and small businesses could be responsible for one-third of Victorian emissions by 2035



## SUMMARY

In the lead-up to the 2022 state election, the Andrews government announced a new target to cut emissions by 75% to 80% by 2035. This research report reveals that closing coal power stations will not be enough to achieve this target. A substantial 'emissions gap' will need to be met by other sectors, including by reducing gas use.

However, some gas industry forecasts assume very high levels of gas consumption until 2040, which poses a major problem for future emissions. If the most bullish of these forecasts come to pass, gas burned in Victorian homes and small businesses would be responsible for up to 37% of Victorian emissions by 2035 – more than triple the current share.

**Urgent government action is needed to address this looming problem, including strengthening the policies and incentives for electrification in Victoria's Gas Substitution Roadmap.**

Key findings include:

- The Andrews government's announcement to close all remaining coal power stations and reach 95% renewable energy by 2035 will not be enough to meet the new climate targets. While decarbonising the electricity grid is a huge achievement, it would still leave an annual 'emissions gap' of between 18 and 24 million tonnes (Mt) of pollution (CO<sub>2</sub>-e) in 2035. Other sectors would need to cut emissions to fill this gap, and a rapid

transition from gas to efficient electric appliances in Victorian buildings should be a priority action for government to achieve this.

- If Victorian gas consumption remains at current high levels, following the demand forecasts of LNG import terminal proposals, then gas burned in Victorian homes and small businesses could be responsible for between 29% and 37% of Victorian emissions by 2035. This would be triple the current share of about 10% in 2020.
- If Victorian gas consumption drops only slightly, following the AEMO demand forecast preferred by gas distributors ('Progressive Change'), then gas burned in Victorian homes and small businesses could be responsible for between 22% and 28% of Victorian emissions by 2035. This would be still at least double the current share.
- If Victorian gas consumption follows a transition more closely aligned with climate goals, AEMO's 'Step Change' scenario, then gas burned in Victorian homes and small businesses could be responsible for between 13% and 17% of Victoria's emissions by 2035 – significantly lower than the other pathways.
- With the electricity grid rapidly becoming cleaner, efficient electric appliances such as reverse cycle air conditioners are already better for the climate than gas heaters, and this trend will continue as more renewable energy displaces coal power.
- The climate impact of gas may be underestimated. Emissions from methane – the main component of gas – are a growing

concern for the international community and new satellite data indicates that leakage rates may be much higher than previously assumed. In this context, continued expansion of the gas sector is irresponsible and may pose an increased risk to climate targets.

- A range of new policy measures and consumer incentives are required to reduce emissions from the gas sector more quickly. These include updating Victoria's Gas Substitution Roadmap with more urgent timeframes and ambitious targets, launching a large-scale public education campaign exposing the climate and health dangers of gas, establishing a program that helps households with the upfront costs of switching from gas to electric appliances, rejecting new gas supply proposals and setting a date to prevent new gas connections.

**The appendix of this report also analyses total gas sector emissions under Victoria's new 2035 climate targets, based on Viva Energy's LNG import terminal proposal. It finds:**

- Viva Energy's proposal is banking on gas consumption being so high in Victoria that the gas sector would be responsible for nearly half (45%) of Victoria's emissions in 2035.
- The volume of gas Viva plans to import (160 petajoules) would by itself be responsible for one-third (37%) of Victoria's emissions in 2035.

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## GLOSSARY OF TERMS

**Australian Energy Market Operator (AEMO):** is the entity responsible for operating electricity markets and power systems and to ensure energy security.

**CO2-e:** Carbon dioxide equivalent is a unit used to compare the global warming potential of different greenhouse gases.

**Environment Effects Statement (EES) Process:** Victoria's highest environmental impact assessment process, which supports decisionmakers to assess projects which may have large environmental effects.

**Fugitive emissions:** Leaks and other irregular releases of gas through appliances, storage tanks, pipelines, wells, or other pieces of infrastructure. Fugitive emissions of greenhouse gases contribute to climate change (see methane) below.

**Gigajoule (GJ):** A large unit of energy but smaller than a PJ, equivalent to a billion ( $10^9$ ) joules. The average Victorian homes consumes around 54 GJ of gas per year.

**Global Warming Potential (GWP):** A measurement unit of how much a greenhouse gas contributes to trapping heat in the atmosphere.

**Intergovernmental Panel on Climate Change (IPCC):** An intergovernmental body of the United Nations with an objective to support knowledge about climate change caused by human activities.

**Megatonne (Mt):** Metric unit equivalent to a million tonnes.

**Methane:** A colourless, flammable gas with the chemical formula  $\text{CH}_4$ . It is the main component of 'natural gas' and has a global warming potential 80 times greater than carbon dioxide over a 20-year period.

**Petajoules (PJ):** A large unit of energy, equivalent to a quadrillion ( $10^{15}$ ) joules.

**Tariff D:** The tariff group applied to users with a yearly demand higher than 10 TJ per year or 10 GJ per hour. Tariff D is composed of industrial and large commercial users.

**Tariff V:** The tariff group applied to users with a yearly demand below 10 TJ per year or 10 GJ per hour. Tariff V is composed of residential and small and medium commercial users.

**Terajoules:** A large unit of energy but smaller than a PJ, equivalent to  $10^{12}$  joules.

## OVERVIEW OF GAS USE IN VICTORIA

Victoria uses significantly more gas than any other state, accounting for 37% of domestic gas consumption in the east coast gas market. By far the largest volume of this gas – more than 120 petajoules – is used in residential and commercial buildings.<sup>1</sup>

Over 2 million Victorian homes are connected to gas, also more than in any other state or territory. Infrastructure Victoria found that space heating accounts for almost two-thirds (60%) of Victoria's household gas use, while water heating accounts for around one-third (36%). Cooking makes up just 4% of total household use.<sup>2</sup>

As a result of this reliance on gas for heating, Victorian gas consumption is highly seasonal. The average demand on a cold winter day is about three times that on a summer day.<sup>3</sup>

In total, the gas sector is responsible for about 17% of Victoria's net emissions.<sup>4</sup> This figure includes burning gas directly and leakage (fugitive emissions) from the production and transport of gas.

This report will focus on the emissions from gas burned in residential and commercial buildings (not industry), which accounts for almost two-thirds of Victorian gas consumption, and was responsible for about 10.5% of emissions in Victoria in 2020.<sup>5</sup> An estimate of total gas consumption compared to 2035 emissions targets is included in the appendix.

### Historical government support for gas expansion

The Victorian Government has a long association with supporting the gas extraction and distribution industry. A government-owned entity, the Gas and Fuel Corporation of Victoria, was established in the early 1950s to supply households with gas made from brown coal.<sup>6</sup> With the discovery of gas in Bass Strait in 1965, household appliances were converted to run on this different type of gas, and the government corporation continued to have a stake in supplying gas until privatisation in the 1990s.

More recently, government programs have sought to expand gas connections. Between 2011-2017, the Victorian Government spent about \$100 million on the Energy for the Regions program. This program expanded the gas distribution network into rural

Victoria, but at a massive cost to taxpayers – in Warburton, for example, the subsidy was \$7.88 million for up to 500 new gas connections, equating to \$15,760 per connection.<sup>7</sup> With hindsight, these households would have been better served by being supported to shift to all-electric appliances and rooftop solar.

There are no current public subsidies to expand the gas network. However, despite the increasing cost of gas, the Victorian Government has used taxpayer money until very recently to support the gas industry. For example, between 2017 and 2020 the Victorian Government ran the \$42.5 million Victorian Gas Program to search for new onshore gas fields.<sup>8</sup>

In 2017 the Victorian Government permanently banned fracking and coal seam gas extraction. However, the temporary moratorium preventing exploration and development of onshore conventional gas was removed in 2020,<sup>9</sup> allowing for the gas industry to begin drilling again from July 2021.<sup>10</sup>

## Recent government support for a transition away from gas

The Andrews Government has demonstrated leadership in the transition from polluting fuels to clean renewable energy. Victoria's renewable energy generation reached 34% of Victoria's electricity generation in the 2021-22 financial year – almost double the figure five years previous.<sup>11</sup>

While much focus has been on the electricity sector, recent policies have also begun to tackle Victoria's high household gas consumption. In the context of government support for the gas industry over many decades mentioned above, this represents a major shift in policy direction.

The Victorian state budget for 2020-21 included a commitment of \$335 million over four years to replace 250,000 inefficient residential heaters, many of them gas, with efficient electric reverse-cycle air conditioners (also known as heat pumps).<sup>12</sup> This Home Heating and Cooling Upgrade Program was aimed at low-income and vulnerable Victorians, and provided base rebates of \$1000. It was scrapped in December 2022 and is no longer accepting applications.<sup>13</sup>

In July 2022, the Victorian Government released its Gas Substitution Roadmap.<sup>14</sup> The Minister's Foreword highlighted the benefits of household electrification and the following key changes:

- Expanding the Victorian Energy Upgrades (VEU) scheme, with new incentives for switching to efficient electric appliances
- Phasing out VEU incentives for fossil gas residential appliances by the end of 2023
- Changes to the Victoria Planning Provisions in 2022 to remove the requirement for new housing developments to be connected to gas
- Retiring Victoria's 6 Star National Construction Code variation (which did not include heat pumps as an allowed form of solar hot water heating for domestic hot water) to allow for more efficient hot water systems as part of new construction and major renovations
- Move to a 7 Star Standard for new home construction, this standard takes account of home energy appliances and not just the thermal shell of the building, driving greater energy efficiency from the point of design

While the Roadmap provides a systematic analysis of the challenge, it lacks clear targets and timelines, and has not been accompanied by the scale of investment needed to transition more than 2 million homes off gas to meet Victoria's new emissions targets. An update on the Roadmap is expected in 2023.

## THE CLIMATE IMPACT OF GAS

### Victoria is vulnerable to climate change

According to the Intergovernmental Panel on Climate Change's (IPCC) *Regional Factsheet for Australasia*, Australia is already experiencing increased heat extremes, sea level rise resulting in the retreat of shorelines, and decreased snowfall. Projected climate impacts for southern and eastern Australia include an increase in drought and lower rainfall.<sup>15</sup> The Victorian Government estimates that, under a high emissions scenario, by 2050 Victoria may experience an average annual temperature increase of up to 2.4 degrees, longer fire seasons with double the number of high fire danger days, sea level rise and a decline in winter rainfall.<sup>16</sup> An acknowledgement of this reality has been included in the preamble of the *Climate Change Act (2017)*: "Victoria is particularly vulnerable to the adverse effects of climate change. Natural disasters are increasing in frequency and severity as a result of the changing climate."<sup>17</sup>

### Gas no longer a 'cleaner' energy source

For many years, gas was promoted as a 'cleaner' source of energy than burning coal to generate electricity. This claim was based on the fact that gas produces significantly less carbon dioxide than coal during combustion for the power produced.<sup>18</sup> Victorian brown coal is even more polluting than the black coal used in NSW and Queensland, and so the gas industry was able to argue that gas heaters had a lower impact on the climate than old-style electric resistance heaters used in Victorian homes.

However, the rapid transition in Australia's energy system coupled with technological breakthroughs has changed the facts underpinning this argument. Already 34% of Victoria's electricity is generated by renewable energy, and the government is aiming for 95% renewable energy by 2035.<sup>19</sup> The electricity grid is becoming less polluting every day, while gas

heating is relatively unchanged. At the same time, new forms of electric heating – such as reverse cycle air conditioners, or 'heat pumps' – are far more efficient than old-style electric resistance heaters. A reverse cycle air conditioner can be 600% efficient, meaning it can take one unit of electrical energy and turn it into 6 times as much heating or cooling energy.<sup>20</sup> The result is that heating homes and hot water with these super-efficient electric appliances can reduce emissions compared to using gas, even in Victoria.

A recent report from Renew compared the annual carbon emissions from gas and electric heating in Melbourne (Figure 1 below). While gas heating created less emissions than a reverse cycle air conditioner in 2014, this was no longer the case in 2022. The projected figures for 2030 – based on AEMO's 'Step Change' scenario of 83% renewables – make it clear that efficient reverse cycle air conditioners will produce less emissions than gas heaters from now into the future.<sup>21</sup>

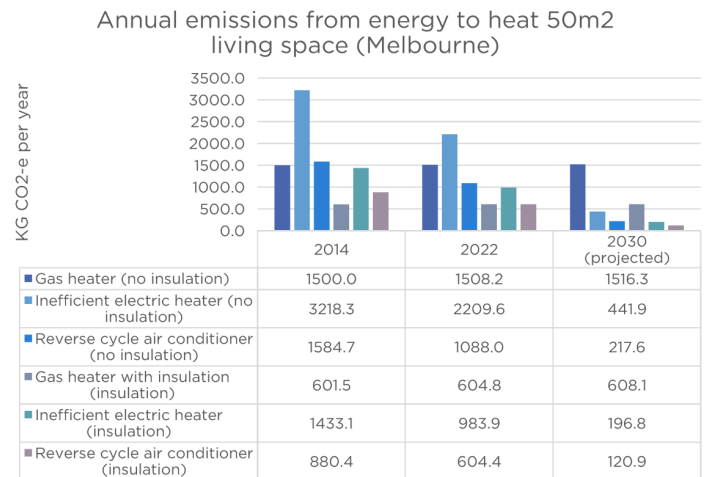


Figure 1: Carbon emissions from gas vs electric heating in Melbourne

Another concern has been that mass switching of household gas to electric appliances would increase demand for generation from Victoria's brown coal power stations. However, modelling conducted to inform Victoria's Gas Substitution Roadmap found that "the mix of generation that supplies additional demand still produces less emissions than the gas

use it displaces" (Figure 2 below). This was the case even in a scenario with no additional renewable energy policy. The Roadmap explains that most of the additional electricity would be required in winter, when Victorian electricity demand is lower, and only a small proportion would need to be provided by brown coal.<sup>22</sup>

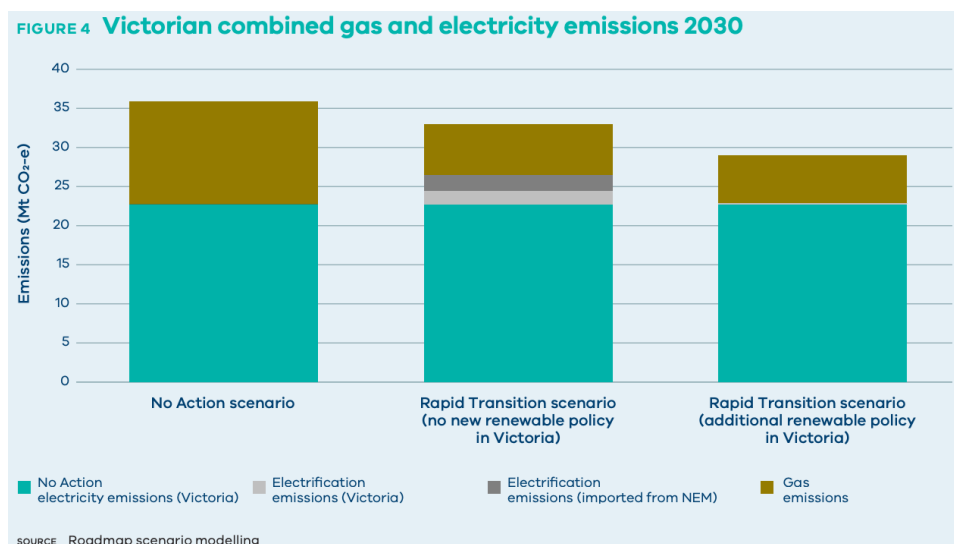


Figure 2: A rapid transition off gas in Victoria results in lower emissions overall.

Source: Victoria's Gas Substitution Roadmap

### Growing concern around methane emissions

There's another reason gas can no longer be considered a cleaner energy source: methane emissions from leakage. Industry comparisons arguing that gas is cleaner than coal focus on the carbon dioxide released during combustion. But natural gas is mostly methane, which is a much more potent greenhouse gas than carbon dioxide. Recent research has shown methane's global warming potential (GWP) to be about 75 times greater than carbon dioxide, much higher than commonly assumed, when reckoned against a time scale consistent with averting the most severe and costly climate change.<sup>23</sup>

Instead of ceasing, or even slowing, methane emissions have rapidly accelerated. While atmospheric levels of carbon dioxide are now roughly 50% higher than they were in pre-industrial eras,<sup>24</sup> methane is 150% higher, triple the increase.<sup>25</sup> More importantly, nearly all methane emissions have occurred only since 1980 compared to about half of all carbon dioxide emissions.<sup>26</sup>

Not only are methane emissions increasing, they are increasing at a much faster rate than carbon dioxide. New remote sensing satellite instruments have enabled research that strongly suggests current official emissions estimates are much lower than true estimates.<sup>27</sup> Those instruments provide more accurate measurement than previous methods<sup>28</sup> and have found that many methane sources have been significantly under reported, especially fugitive emissions from gas exploration and infrastructure.<sup>29</sup> The heightened data accuracy also has illuminated how fast that rate of increase may be. Consequently, our understanding of methane's relative contribution to climate change has been revised up.

The international community has now recognised this growing methane problem. The IPCC's Sixth Assessment Report concluded that reducing methane emissions is a standout option for achieving near-term climate targets. To date, 111 countries have signed a Global Methane Pledge to reduce methane emissions by 30% by 2030.<sup>30</sup>



## GAS INDUSTRY DEMAND FORECASTS

Gas consumption forecasts are a critical part of any project rationale for new gas supply projects in Victoria. In preparing an Environment Effects Statement (EES), for example, proponents of two proposed LNG terminals were required to address 'projected demand and supply' in the context of the state's energy needs and climate policy.<sup>31</sup>

Historically the gas industry has produced bullish forecasts, erring on the side of high gas consumption that justifies new supply projects. Both AGL's Crib Point and Viva Energy's Geelong gas import terminal proposals, for example, forecast that gas demand in Victoria will remain at the current high levels until 2040 (Figures 3 and 4 below).

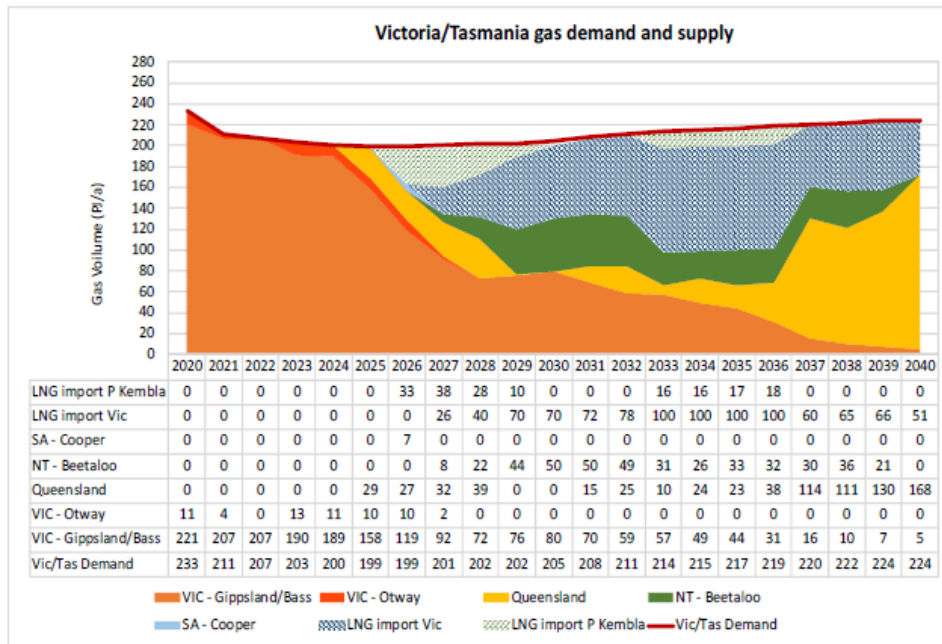


Figure 3: Victoria/Tasmania gas demand and supply 2020-2040

Source: Energy Quest (2021) Energy Demand and Market statement, part of Viva Energy's LNG import terminal EES.<sup>32</sup>

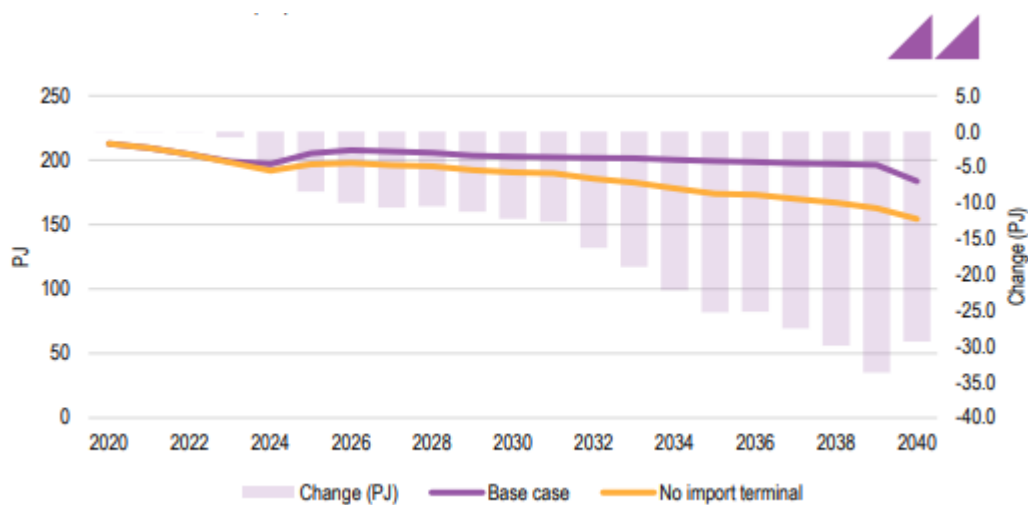


Figure 4: Projected impact on Victorian gas consumption without Crib Point LNG import terminal (PJ)

Source: Acil Allen Consulting (2020). Crib Point EES process.<sup>33</sup>



In 2022 the Australian Energy Market Operator (AEMO) introduced different scenarios or demand trajectories when forecasting the adequacy of gas supply (Figure 5 below). This was the first time that AEMO showed the trajectory of gas demand was highly dependent on policy decisions rather than just left to market forces.<sup>34</sup>

Furthermore, AEMO acknowledged that Step Change, a scenario consistent with global action to

limit temperature rises to less than 2 degrees and involving a rapid electrification of gas consumption, is the most likely pathway for Australia’s energy sector according to AEMO’s stakeholders (See Figure 6 below).<sup>35</sup> However, it’s important to note that the Step Change scenario is not a foregone conclusion and requires substantial policy to be realised.

AEMO scenario	GenCost scenario	Explanation
Slow Change	Current Policies	Consistent with current commitments to the Paris Agreement, leading to the lowest global emissions reduction ambition and a 2.6 degree warming future.
Progressive Change	Current Policies*	
Step Change	GenCost Global NZE post 2050	Consistent with global action to limit temperature rises to less than 2 degrees, and with industrialised countries targeting net zero emissions by 2050.
Hydrogen Export	GenCost Global NZE by 2050**	The most ambitious global emissions reduction scenario, consistent with limiting temperature rises to less than 1.5 degrees, as well as a strong focus on electrification and hydrogen-based developments.

Figure 5: Mapping AEMO scenario themes.

Source: AEMO (2022)<sup>36</sup>

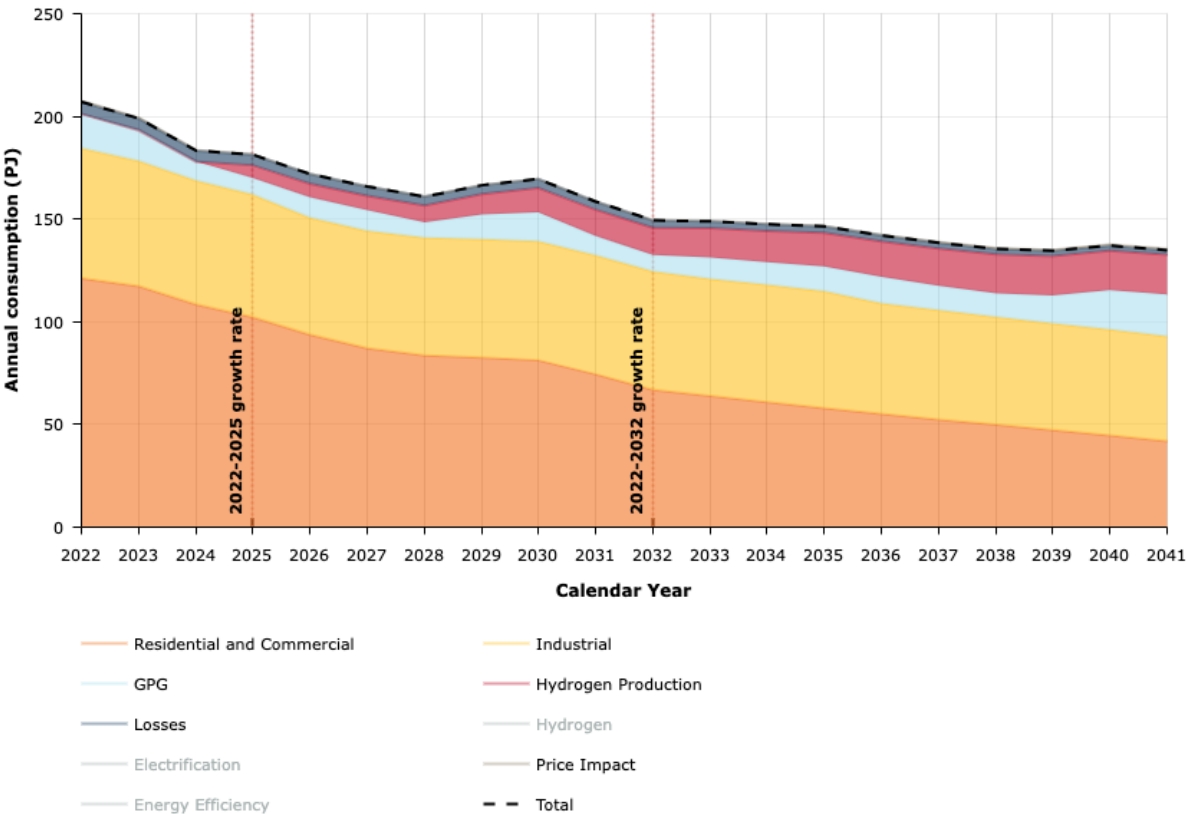


Figure 6: Victoria’s total annual gas consumption timeseries (2022-2040), Step Change scenario.

Source: AEMO (2023)<sup>37</sup>

In July 2022 the Victorian Government released its Gas Substitution Roadmap, which included an objective of reducing the greenhouse emissions of the gas sector. The Roadmap highlights electrifying certain gas uses, especially residential gas consumption, as an emissions reduction opportunity.

Gas distribution companies have taken note and acknowledged the changing policy landscape in the 2023-2028 access arrangement process (i.e. the process where the future tariffs and revenue of distribution companies are set by the Australian Energy Regulator). Despite this acknowledgement, they have also shown scepticism of the Victorian Government's ability to steer gas demand close to AEMO's Step Change scenario or the Gas Substitution Roadmap trajectories.

In effect, Victoria's gas distribution companies<sup>38</sup> are expecting Tariff V (residential and small commercial) gas demand to slowly decrease over the next 5 years rather than follow a rapid decarbonisation pace (see Figure 7 below).

These gas distribution company projections are most closely aligned with AEMO's Progressive Change scenario (Figure 8) which does not show any substantial reduction in residential gas demand until at least 2032 (and even forecasts total gas consumption to increase under this scenario in the same time period). If proven correct, these forecasts imply yet another decade of lost climate action in the gas sector.

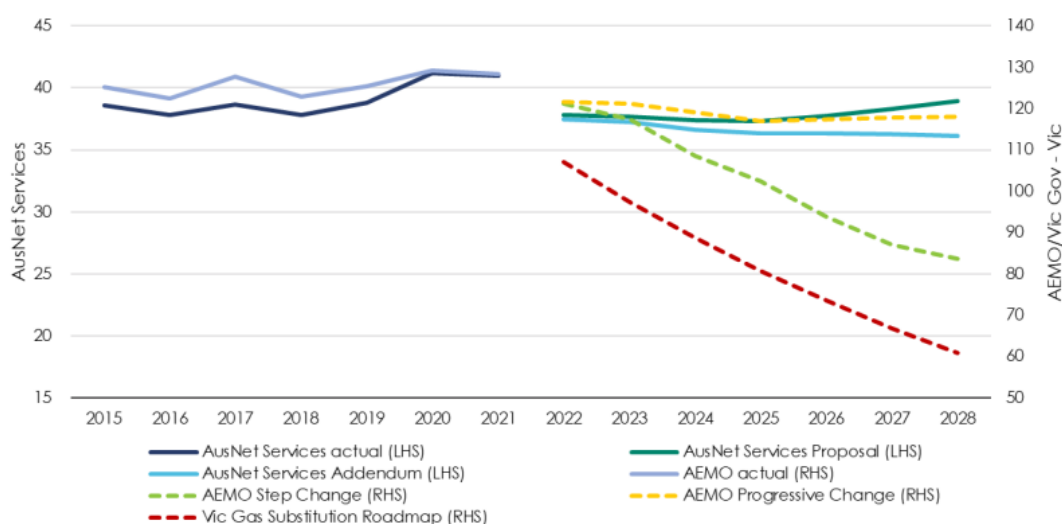


Figure 7: Forecast Tariff V gas consumption (PJ)

Source: Ausnet Services Gas access arrangement review 2024-2028, addendum (2022).<sup>39</sup>

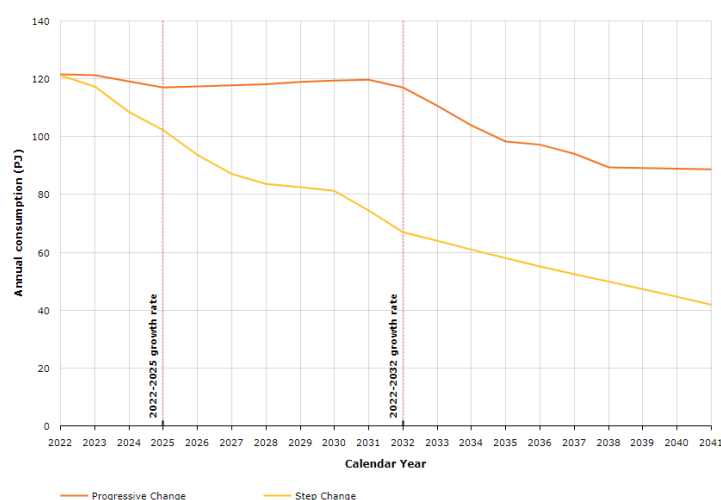


Figure 8: Victoria's annual gas consumption timeseries (2022-2040), Step Change scenario vs Progressive Change scenario for Tariff V residential and commercial users. Source: AEMO (2023)<sup>40</sup>

## VICTORIA'S NEW 2035 EMISSIONS REDUCTION TARGETS

In October last year, the Victorian Government announced commitments that would put Victoria at the forefront of global climate action, including:

- A new emissions reduction target for 2035 of 75-80%.
- Completely ending coal-burning power generation by 2035.
- Increasing the Renewable Energy Target from 50% to 65% by 2030, and 95% by 2035.<sup>41</sup>
- Bringing forward the deadline for net zero from 2050 to 2045.

These are impressive commitments that involve transforming Victoria's energy system in fewer than 15 years. While the announcements focus on transitioning the electricity sector to renewable energy, this will not be enough to achieve even the lower end of the 2035 emissions reduction target. The good news is that a decarbonised electricity

sector unlocks opportunities for further emission reductions through the electrification of sectors such as transport and residential and commercial gas consumption. The gas sector, in particular, will require a coordinated approach. Delaying action could extend the use of a polluting fuel and jeopardise Victoria's new objective to reach net zero emissions by 2045.

### The electricity sector will do the heavy lifting

For a long time, Victoria has had the dirtiest electricity in Australia due to its heavy reliance on subcritical brown coal power stations. Despite the closure of Hazelwood in 2017 and renewable generation hitting record levels, Victoria still has the most emissions-intensive electricity system in the country, releasing more pollution for each unit of power produced than any other state or territory (Figure 9).

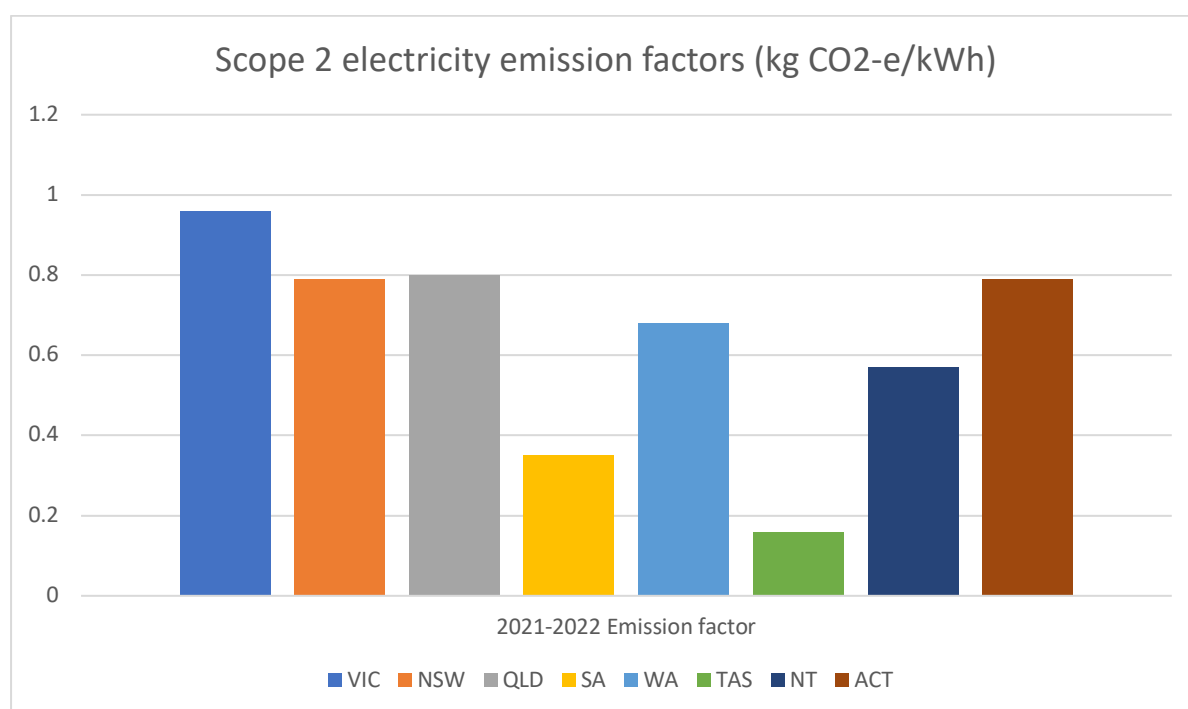


Figure 9: Scope 2 electricity emission factors (Kg CO2-e/kWh).

Source: Clean Energy Regulator 2023<sup>42</sup>

Nevertheless, this is expected to rapidly change over the next 12 years as total emissions from the electricity sector plummets due to the government's commitment to reach 95% renewable generation by 2035.

In 2022 the then Victorian Department of Environment, Land, Water and Planning (DELWP) (now the Department of Energy, Environment and Climate Action or DEECA) commissioned modelling to understand the implications of these new Victorian renewable targets. It found emissions from the electricity sector will drop from 41.7 million tonnes of carbon dioxide equivalent pollution (Mt CO<sub>2</sub>-e) in 2020 to just 5.9 Mt CO<sub>2</sub>-e by 2035.<sup>43</sup> To put the magnitude of this change in context, in 2020 the electricity sector was responsible for about 50% of Victoria's emissions, while the projected emissions of 5.9 Mt CO<sub>2</sub>-e by 2035 would represent just 12.4% of Victoria's total emissions for that year.

### Nevertheless, significant action is needed in other sectors to meet an emissions gap

This reduction alone, even in the absence of further progress in other sectors, would bring Victorian emissions down to around 47.5 Mt CO<sub>2</sub>-e by 2035, representing a 60% emission reduction from 2005 emissions levels. While the decarbonisation of Victoria's grid would be a huge achievement, this would not be enough to reach even the lower 75% emission reduction target, which would require emissions to drop to 29.65 Mt CO<sub>2</sub>-e in 2035. For the upper 80% emissions target, emissions would be required to drop to 23.72 Mt CO<sub>2</sub>-e (See Figure 10). Both scenarios would leave substantial 'emissions gaps': further reductions that need to be achieved through sectors other than electricity (Table 1 underneath).

### Reducing electricity sector emissions is not enough to meet new Victorian 2035 climate targets

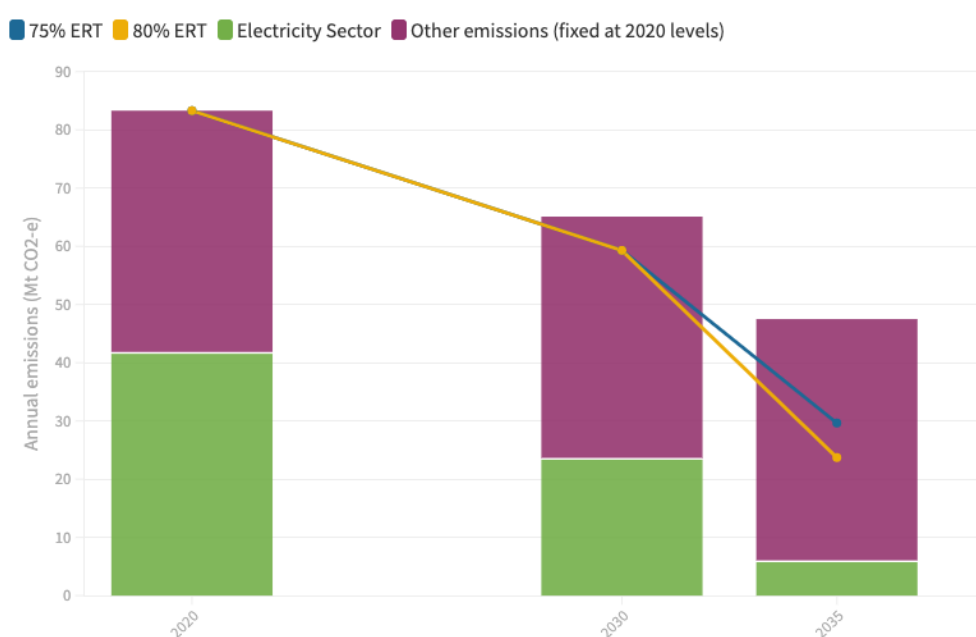


Figure 10 above: Expected reductions in the electricity sector compared with 2035 climate target scenarios.

Table 1 below: Remaining emissions gap after electricity sector reductions.

Scenario	Emissions gap (Mt CO <sub>2</sub> -e)
75% emissions reduction target	17.85 Mt CO <sub>2</sub> -e
80% emissions reduction target	23.78 Mt CO <sub>2</sub> -e

### **A decarbonised electric grid opens opportunities for other sectors**

While the rapid decarbonisation of the electricity sector will not be enough to reach the 75-80% emission reduction targets by 2035, it will create tremendous opportunities in other sectors. As the grid becomes cleaner, the benefits of electrification also increase. This includes fuel switching for gas users and adoption of electric vehicles in the transport sector.

In fact, the Gas Substitution Roadmap<sup>44</sup> and a report from Infrastructure Victoria<sup>45</sup> identified electrification, particularly residential and commercial electrification, as a key action to reduce emissions from the gas sector. The Gas Substitution Roadmap announced plans to eliminate outdated regulations that mandate gas connections and to retire incentives for the adoption of gas appliances, but fell short from establishing the kind of policies and incentives needed to drive enough households to replace their gas appliances with efficient electric appliances.

## COMPARING GAS INDUSTRY FORECASTS WITH EMISSIONS TARGETS

We have assessed the emissions from the gas sector in 2035 under Victoria's new emissions targets using three scenarios: current demand (no change), slow transition (Progressive Change) and faster transition (Step Change).

### Current demand (no change)

In 2020 residential and commercial (Tariff V) users were responsible for around 8.7 Mt CO<sub>2</sub>-e or 10.5% of Victoria's total emissions.<sup>46</sup> If Victoria were to achieve the upper target of 80% emissions reductions by 2035 (reducing total annual emissions

to 23.72 Mt CO<sub>2</sub>-e) in the absence of declines in residential and commercial gas demand from 2020 levels, then emissions from residential and commercial gas would be responsible for about 37% of Victoria's emissions. For the lower target of 75% emissions reductions by 2035 (i.e. reducing total annual emissions to 29.65 Mt CO<sub>2</sub>-e), residential and commercial gas would be responsible for 29% of emissions. See Figure 11 below.

## Share of emissions from gas burned in Victorian homes and small businesses

If current demand continues (2020 levels)

■ Emissions from residential and commercial gas ■ Other emissions

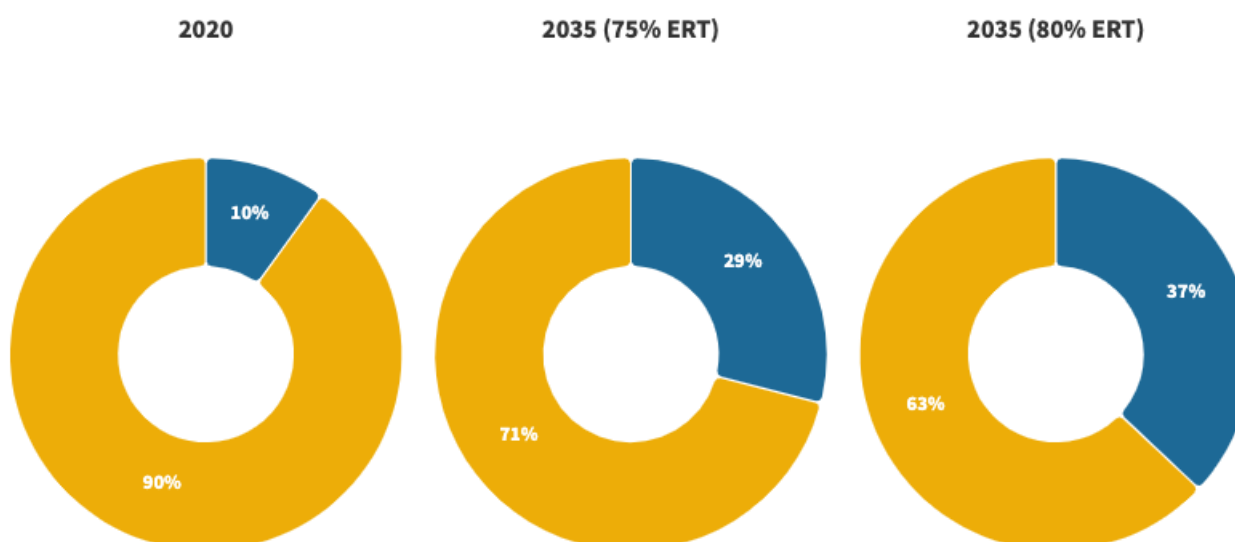


Figure 11.

Sources: [Victorian Greenhouse Gas Emissions Report 2020](#), [AEMO \(2023\)](#) Consumption from 2020 (latest emissions data) projected into the future unchanged. Assumes Victorian emissions reduction target of 75% and 80% by 2035.

### Slow transition (Progressive Change)

If instead of remaining flat, Victoria's Tariff V demand followed AEMO's Progressive Change trajectory as forecast by gas distributors, demand would decrease by 23.9% between 2020 and 2035, and Tariff V would be responsible for 22% to 28% of Victoria's emissions. See Figure 12 below.

This would still be a disproportionate percentage of Victoria's total greenhouse gas emissions – twice the current share for residential and commercial gas. It would also put pressure on other sectors that do not have easy pathways to reduce emissions. Most of the work to transition off gas would be left to the last decade prior to the objective of reaching net zero emissions by 2045.

## Share of emissions from gas burned in Victorian homes and small businesses

Under AEMO's Progressive Change scenario

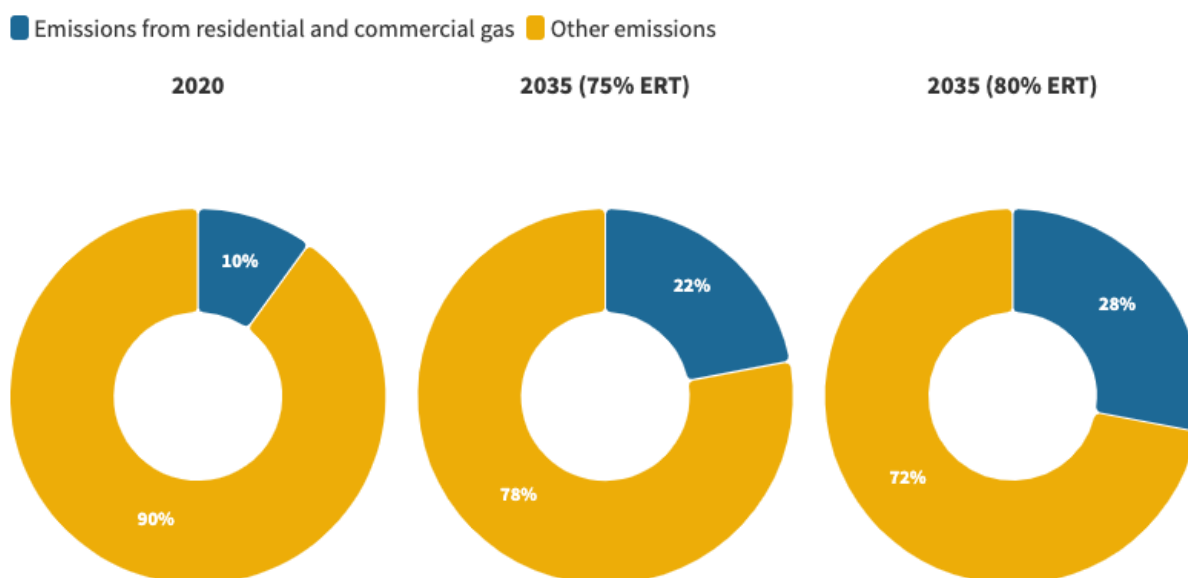


Figure 12.

Sources: [Victorian Greenhouse Gas Emissions Report 2020](#), [AEMO \(2023\)](#). Consumption from 2020 (latest emissions data) projected into the future under AEMO's Progressive Change scenario. Assumes Victorian emissions reduction target of 75% and 80% by 2035.



### Faster transition (Step Change)

On the other hand, if Tariff V gas demand were to follow AEMO's Step Change trajectory the situation would be quite different. Residential and commercial demand would reduce by 55% compared to 2020 levels, being responsible for 13% to 17% of Victoria's emissions. See Figure 13 below.

This is a more modest pathway of electrification than some other scenarios such as those modelled for the Gas Substitution Roadmap. Further, modelling commissioned by DELWP for a 95% Victorian Renewable Energy Target by 2035 assumed gas consumption would follow the Step Change trajectory and planned for generation and storage capacity accordingly.<sup>47</sup>

## Share of emissions from gas burned in Victorian homes and small businesses

Under AEMO's Step Change scenario

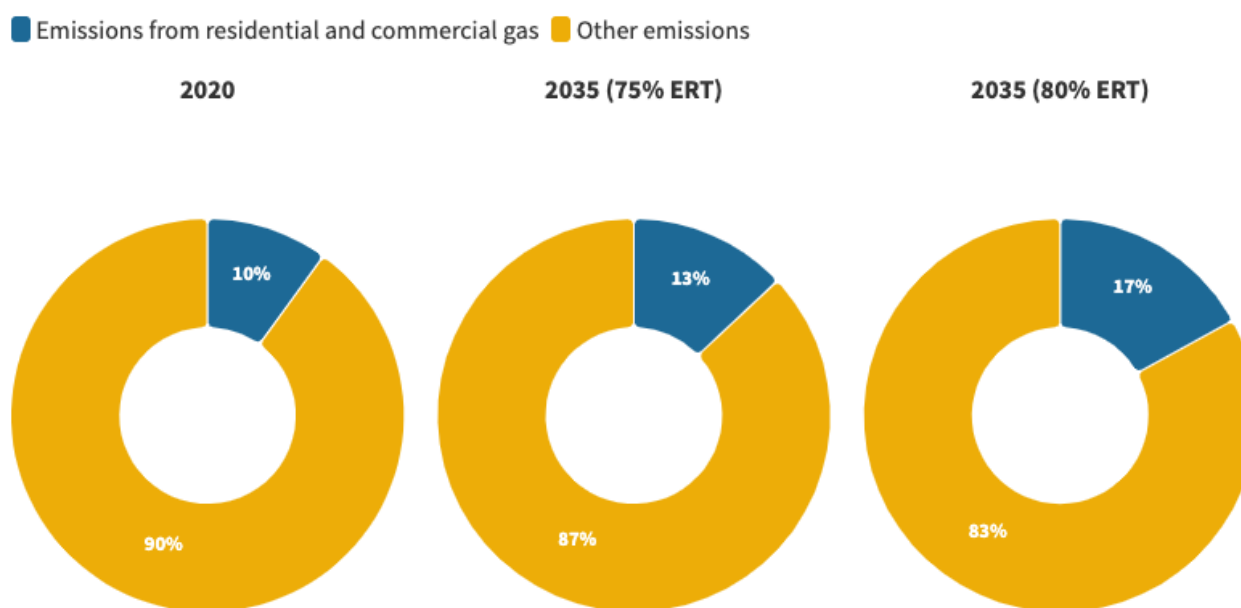


Figure 13.

Sources: [Victorian Greenhouse Gas Emissions Report 2020](#), [AEMO \(2023\)](#). Consumption from 2020 (latest emissions data) projected into the future under AEMO's Step Change scenario. Assumes Victorian emissions reduction target of 75% and 80% by 2035.

### Urgent action is needed or a heavy burden will be placed on hard-to-abate sectors

The electrification of residential and commercial gas consumption has been laid out as a priority area to decarbonise within the gas sector. The technology to make this switch is mature and widely available, can reduce household energy bills, and will start delivering emissions reductions even with the current penetration of renewable energy in the electricity grid.

In fact, according to a report commissioned by Infrastructure Victoria, there is enormous potential to reduce gas consumption in Victoria over the next two decades. Residential and small commercial users, for example, could decrease their consumption by 86.9% by 2040 (Figure 14 below). The top-ranked options were switching heaters and

hot water systems to efficient electric heat pumps, followed by draught sealing.

On the other hand, industrial and large commercial users face higher technological and economic constraints. Financially viable energy efficiency opportunities would decrease industrial demand by just 33.5% by 2040. Nevertheless, with millions of gas appliances to be switched, home electrification is a massive undertaking, and rapid and decisive action is needed in the next few years to harness the potential emissions reductions.

Missing this opportunity would put a disproportionate burden on other hard-to-abate sectors. i.e. industries or sectors that have high greenhouse gas emissions which are difficult to reduce such as agriculture, heavy industry and maritime and air transportation.

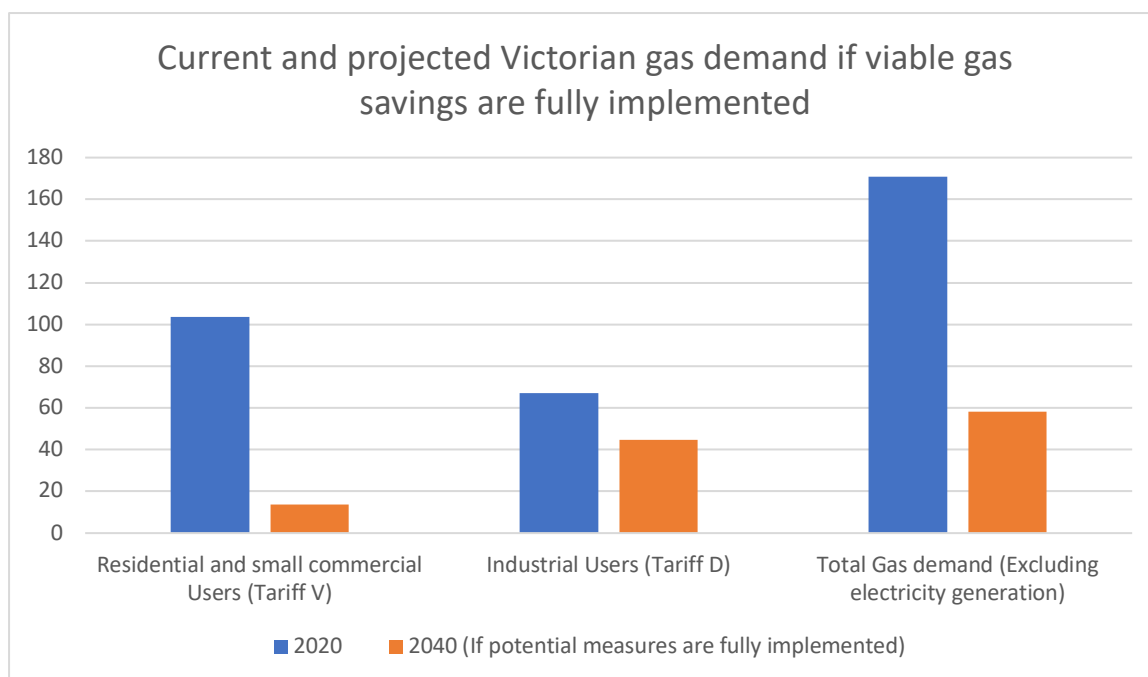


Figure 14: Current and projected Victorian gas demand if potential gas savings are realised.

Source: Northmore Gordon & Energeia (2021)<sup>48</sup>

## CONCLUSION & RECOMMENDATIONS

Victoria has an ambitious climate action agenda and a track record of overachieving its emissions reduction targets.<sup>49</sup> To date, the electricity sector has contributed the most to reducing emissions by shifting generation from coal-fired power stations to renewable energy.<sup>50</sup> Victoria's new 2035 climate targets pose a more comprehensive challenge. Closing coal power stations and reaching 95% renewable energy by 2035 will still leave a substantial emissions gap for other sectors to fill.

This report has focused on the implications for the gas sector, particularly gas burned in residential and commercial buildings, because Victoria has the highest household gas use of any state and technology to switch to electric appliances is mature and readily available. The key finding that gas burned in homes and small businesses could account for one-third of emissions in 2035 should be a warning to the government about the costs of delay, particular after the flagship Home Heating and Cooling Upgrades, which offered rebates for more efficient home heating, was discontinued in December 2022.

Environment Victoria makes the following recommendations to fast-track efforts to reduce emissions from gas:

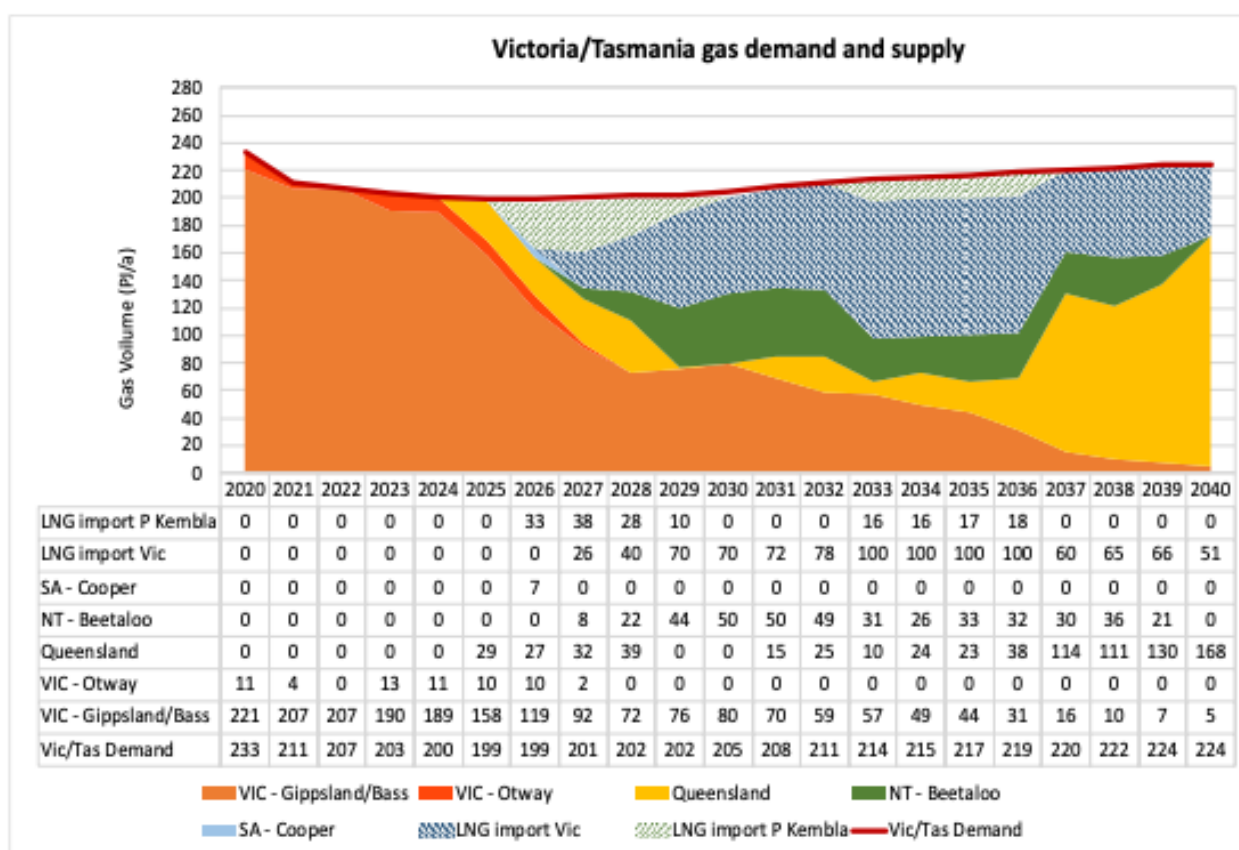
- In 2023, update Victoria's Gas Substitution Roadmap to include timelines and targets to support households and small businesses to get off gas at a rate that, at a minimum, aligns with meeting Victoria's 2035 climate targets. The emissions reduction target for gas should be higher than for other sectors, acknowledging that residential and commercial gas use represents an easier emissions reduction pathway.
- Target the gas sector at the same time as electricity to drive down emissions, as there is mature and affordable technology available to replace gas. This will give more time to work out how to cut emissions in other sectors which have less mature pathways to decarbonisation.
- Launch a large-scale community education campaign on the substantial and increasing costs of gas, including its contribution to climate change and the role of methane in global warming.
- Establish a program that helps households with the upfront costs of switching from gas to electric appliances so that they can realise the annual bill savings of cheaper, cleaner energy sources.
- Commission a comprehensive review of fugitive emissions to more accurately assess methane leaks, as well as set a separate methane emissions target.
- Assess all new gas supply projects against the new 2035 climate targets. This assessment should compare the demand forecasts underpinning these proposals with the total allowable emissions in 2035 to decide whether they are compatible with Victoria's long-term climate objectives.
- Prevent households and commercial users from connecting to the gas network by 2028 at the latest, and consider restrictions on the sale of highly inefficient gas heating and hot water systems that increase household emissions and energy bills.

## APPENDIX: TOTAL VICTORIAN GAS EMISSIONS AND VIVA IMPORT TERMINAL PROPOSAL

This report focuses on gas burned in homes and small businesses (Tariff V) because this sub-sector represents the bulk of gas demand and offers the most immediate opportunities to reduce emissions. However, for comparison's sake, it's worth considering the emissions share of the entire Victorian gas sector, not just residential and commercial buildings. We have done these calculations in the context of Viva Energy's proposal to import 160 PJ of gas per year into Victoria.

The demand forecast underpinning Viva Energy's LNG proposal is below (Figure 15). It shows Viva Energy is assuming gas demand in Victoria and Tasmania to remain at current levels out until 2040.

The chart shows a forecast of 217 PJ of gas consumed in Victoria and Tasmania in 2035. The AEMO scenario that conforms most closely with this projection of steady gas demand is Progressive Change. In that scenario, Tasmanian gas demand in 2035 would be 9 PJ, leaving a total of 208 PJ consumed in Victoria. (The Progressive Change scenario also estimates 208 PJ of gas consumed in Victoria in 2035.)



Source: EnergyQuest analysis, ECGO 2021

Figure 15: Viva Energy gas terminal proposal demand assumptions

Source: Viva Energy Gas Terminal EES, Attachment I: Energy Demand and Market Statement<sup>51</sup>

208 PJ of gas, converted into emissions using Australia's National Greenhouse Gas Account factors, is 10.7 Mt CO<sub>2</sub>-e.<sup>52</sup> This figure does not include fugitive emissions or emissions from transportation or production, and is therefore a conservative underestimate.

We can then compare that with the allowable emissions in 2035 under a 75% or 80% emissions target. The result is below (Figure 16).

## Share of emissions from total gas burned in Victoria If consumption follows Viva LNG import terminal proposal

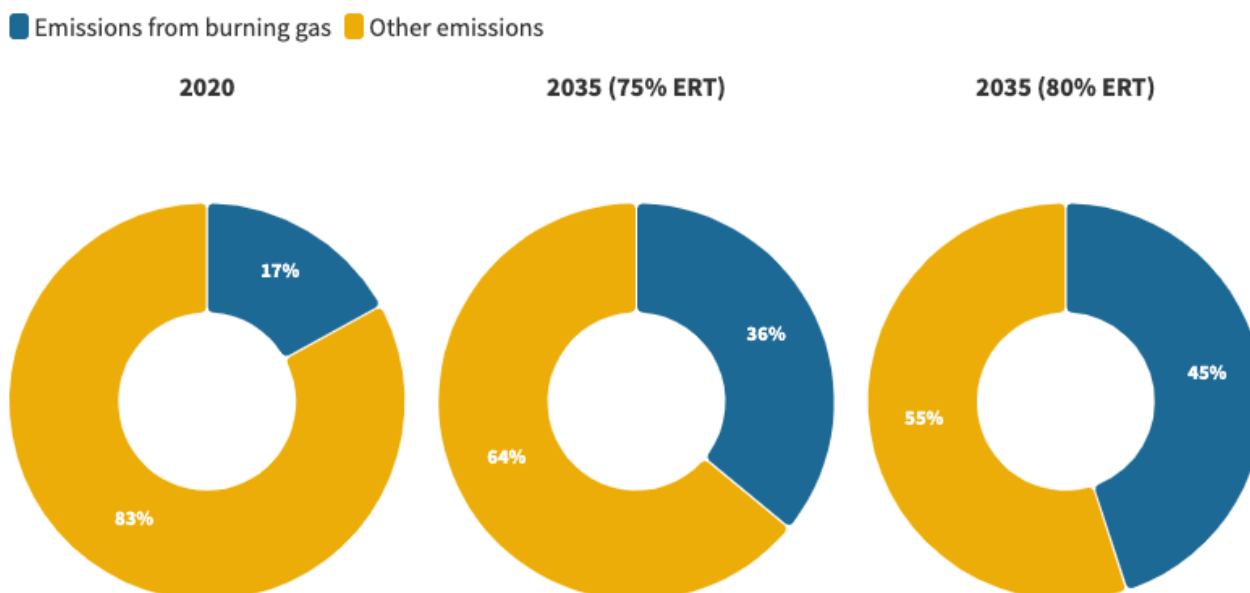


Figure 16. Sources: Victorian Greenhouse Gas Emissions Report 2020, Viva Energy LNG import terminal EES, AEMO gas consumption forecasting. Based on 208 PJ gas consumed in Vic in 2035 (AEMO Progressive Change scenario).

**This chart shows Viva Energy is banking on gas consumption being so high in Victoria that it would be responsible for 45% of total emissions in 2035.** This is based on a scenario of Victoria reducing emissions by 80% by 2035. If Victoria instead achieves the lower range of the target, reducing emissions by 75% by 2035, then the gas sector would be responsible for 36% of emissions in that year.

Viva Energy might argue that the company cannot be responsible for all gas consumption in Victoria. However, the maximum amount of gas the company plans to import – 160 PJ per year – would constitute more than three-quarters of the total 208 PJ gas demand in the forecast.

In addition, calculating the emissions from the gas sector as a whole is a useful exercise because it shows the impact if the underlying assumption of Viva Energy's business case – that Victorian gas demand will remain stubbornly high for decades – comes to pass.

Another way to assess Viva Energy's proposal against Victoria's 2035 climate targets is to calculate the emissions only from the gas imported. This is still a large amount at 160 PJ per year. For this calculation we can use Viva Energy's own figures from Technical Report C on greenhouse gas emissions,<sup>53</sup> which states: "It is estimated that emissions associated with the end use of natural gas equivalent to the project's maximum annual supply are 8,884,800 t CO<sub>2</sub>-e."

Using the same method as above, we can compare the allowable emissions in 2035 under a 75% or 80% emissions target (Figure 17 below).

### Share of emissions from Viva gas imports in 2035

Based on importing 160 PJ gas per year under new Vic climate targets

■ Emissions from imported gas ■ Other emissions

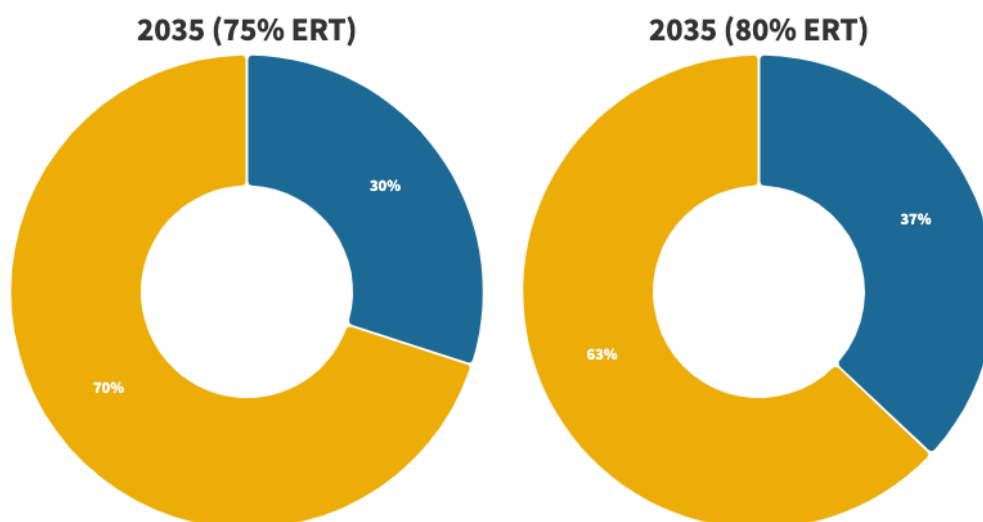


Figure 17. Source: Viva Energy Gas Terminal EES.<sup>54</sup> Does not include fugitive emissions from production or transportation.

As this chart shows, the volume of gas Viva Energy plans to import could be responsible for 37% of Victoria's emissions in 2035. This is based on a scenario of Victoria reducing emissions by 80% by 2035. If Victoria instead achieves the lower range of the target, reducing emissions by 75% by 2035, then Viva Energy's gas imports would be responsible for 30% of emissions in that year.

Viva Energy argues that it is not responsible for the emissions from burning the gas it imports because it does "not have any ability to influence the end-use consumption of the gas". While we understand the technical basis for this argument – that downstream emissions are 'Scope 3' and not included in the project's operational boundary – we believe that the Victorian government should assess the total emissions associated with a project of this scale before making a decision. This is especially the case when the associated emissions are large enough to affect Victoria's chances of meeting its climate targets.

The Victorian Government has released a Gas Substitution Roadmap, which demonstrates a clear intention to shift homes and businesses from gas to cleaner sources of energy. Modelling underpinning the Roadmap assumes gas demand would decline by 50% by 2030, representing a proportional share of Victoria's interim emissions reduction target for that year. The gas demand assumptions underpinning Viva Energy's proposal are wildly out of step with that trajectory, and the sheer amount of gas that would be imported poses a risk to Victoria's climate targets.

Environment Victoria has grave concerns about the government approving a new gas supply project that is at odds with the stated intention to reduce Victoria's gas consumption. Doing so sends the wrong message to the gas sector and undermines the Andrews Government's strong climate action agenda. It also means Viva Energy will have a vested interest in slowing the transition off gas, in order to keep its terminal operating longer to recoup investment costs. This would be a worrying development for Victoria's chances of achieving the more ambitious end of the state's new 2035 climate targets.

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