

**Submission to the Australian Energy Regulator  
re APA Access Arrangement 2023-2027**

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**Contents**

Summary .....	2
Issues under consideration by AER.....	7
Detailed submission .....	12
Capex linked to the APA proposal.....	12
APA propose significant network augmentation – and a certain return on capital .....	12
Related investment in APA pipelines that may occur over 2023-27. ....	13
Cumulative capital expenditure that is at stake .....	13
Higher tariffs and consumer segments.....	14
Huge uncertainty for pipelines .....	15
Ways to avoid new investment in gas .....	16
On the demand-side .....	16
The demand-side problem.....	16
Lack of attention to the demand side.....	18
Huge potential of Peak Demand Reduction.....	19
More reductions in residential use of gas.....	19
Industry can have certainty of gas supply.....	20
Modelling demand in new ways .....	21
On the supply side .....	21
Alternatives for augmenting supply.....	22
Surplus gas flowing out of Victoria should be reserved .....	23
Proposed pipeline investment for hydrogen readiness wasteful and emission intensive .....	23
Flaws in arguments for hydrogen blends.....	24
On system management.....	25
Addressing risks of system failure.....	25
A note on environmental and health impacts of proposed gas projects .....	26

As an environmental economist, I do unpaid and independent research on behalf of several Victorian organisations concerned about CO2e emissions and climate change. I am a long standing member of Darebin Climate Action Now, a group of residents in the municipality of Darebin (DCAN), to the north of Melbourne. DCAN was involved in Darebin becoming the first municipality in the world to declare a climate emergency.

The key documents drawn on in this submission are:

- Australian Energy Market Commission (AEMC) *Applying the energy market objectives – a guide for stakeholders*.<sup>1</sup>
- AER 2021 *Regulating Gas Pipelines under Uncertainty*. Information Paper.<sup>2</sup>
- AER 2021 *Gas Network Performance*.<sup>3</sup>
- AER 2021 'Chapter 5. Regulated gas pipelines' in *State of the Energy Market 2021*.<sup>4</sup>
- APA 2021 'A look at plans for Victorian Transmission System. APA Victorian Transmission System 2023-2027 access arrangement proposal overview. December 1, 2021'.<sup>5</sup>

Cited online references were accessed between November 2021 and February 2022

## Summary

**Meeting the national gas objectives.** We argue that the investments proposed by APA do not meet the dynamic efficiency 'test' set by the Australian Energy Market Commission (AEMC) in its 'Applying the energy market objectives – a guide for stakeholders'.<sup>6</sup>

As the AEMC states the responsibility of the AER, as required under the National Gas Law is "to promote efficient investment in, and efficient operation and use of, natural gas services for the *long term interests* of consumers of natural gas with respect to price, quality, safety, reliability and security of supply of natural gas."<sup>7</sup> We understand that these aspects of service are core criteria, and that environmental impacts are important only insofar as they impact on interests of consumers in general (small and large) *over the long-term* (i.e. the economic life of the assets. [italics added]).

The APA investments would have even less justification if changes were made to the national energy regulatory framework as suggested by AER in *Regulating Gas Pipelines under Uncertainty*. AER needs to be able to more explicitly address the interdependencies between electricity and gas (p.59), balance the interests of current consumers versus future consumers (p.26), and to fully account for decarbonisation policies or objectives. As AER states the regulatory framework was developed at a time when growth in gas use was favoured. Now "it appears difficult to reconcile the inherent tension between decarbonisation objectives and the NGO without explicit guidance in the NGL or NGR on how to address the conflict between the two." (p.58)

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<sup>1</sup> <https://www.aemc.gov.au/regulation/regulation>

<sup>2</sup> <https://www.aer.gov.au/news-release/aer-tackles-gas-pipeline-regulation-in-an-uncertain-future>

<sup>3</sup> <https://www.aer.gov.au/networks-pipelines/performance-reporting/regulating-gas-pipelines-under-uncertainty-information-paper>

<sup>4</sup> <https://www.aer.gov.au/publications/state-of-the-energy-market-reports/state-of-the-energy-market-2021>

<sup>5</sup> <https://www.aer.gov.au/networks-pipelines/determinations-access-arrangements/apa-victorian-transmission-system-access-arrangement-2023%E2%80%9327>

<sup>6</sup> <https://www.aemc.gov.au/regulation/regulation>

<sup>7</sup> AEMC 'Applying the energy market objectives'

**APA capex not warranted.** We believe APA’s proposed augmentation is not warranted. APA is proposing capital expenditure (capex) for two major projects, an investigation into pipeline suitability to carry hydrogen, and it has three Rule 80 proposals as well as considerable replacement capex in its proposals for the Victorian Transmission System.

This expenditure should not be looked at in isolation. The gas industry taken as a whole is proposing a whole range of capital expenditure in Victoria. AER should account for the synergistic effects between APA’s proposals and other expenditure on pipelines, storage and other facilities. Capital expenditure now will require more replacement capital in the future – it is a compounding effect that AER should address.

We do not believe that any of these investments are in the interests of Victorian consumers, whether in the short or long run. In our opinion, the problem of future demand exceeding supply is grossly overstated and should be addressed using the standard marginal analysis tools of economics. With attention to management of the gas supply from Bass Strait in particular, improved system management by AEMO, and action to reduce peak winter demand can ensure that all requirements for gas can be met.

**Uncertainty and fat-tailed events.** The climate impact of natural gas should be considered in this reset. The imperative to cut emissions and address climate change is driving decisions by investors and governments. The fat-tail risks of failure to do so have been identified by eminent economists, and should be considered in infrastructure planning processes.<sup>8</sup>

The role of methane in global emissions is significant. In fact, methane traps heat in the atmosphere at staggering levels compared to CO<sup>2</sup>, as shown in the following figure. Scientists are finding that when leaks are accounted for, methane emissions are much higher than generally understood.<sup>9</sup>

### Comparative effect of methane and CO2 emissions over 20 years



### Picture the effect over 2030 – 2050 of another 10 years of emissions

Source: author, based on Myhre, G. et al., 2013 as cited in Carbon Brief ‘Scientists concerned by ‘record high’ global methane emissions’ [Carbon Brief](https://www.carbonbrief.org/record-high-global-methane-emissions) 14.7.2020.

<sup>8</sup> John Quiggin 2018 ‘The importance of ‘extremely unlikely’ events: tail risk and the costs of climate change’ *Australian Journal of Agricultural and Resource Economics* 07 November 2017. <https://doi.org/10.1111/1467-8489.12238>

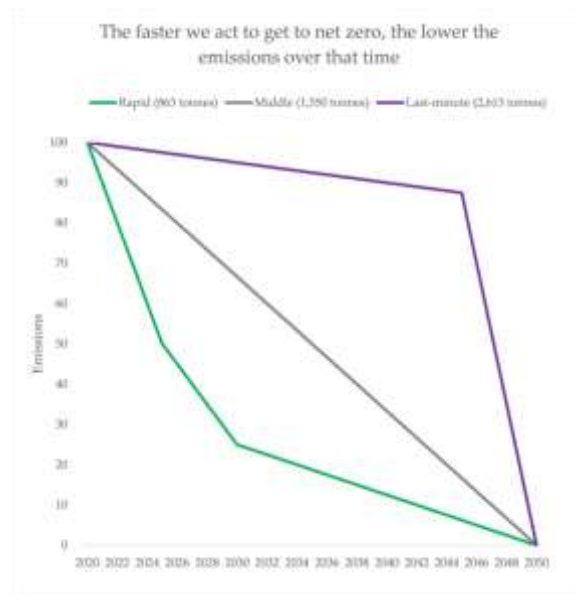
Weitzman ML. Fat-Tailed Uncertainty in the Economics of Catastrophic Climate Change. *Review of Environmental Economics and Policy*. 2011. 5(2) :275-292. <https://scholar.harvard.edu/weitzman/publications/fat-tailed-uncertainty-economics-catastrophic-climate-change-0>

<sup>9</sup> For leaks in Melbourne <https://ui.adsabs.harvard.edu/abs/2020EGUGA..2212475K/abstract>  
For Australia, <https://www.climatecollege.unimelb.edu.au/review-current-and-future-methane-emissions-australian-unconventional-oil-and-gas-production>

Emissions are cumulative. Each year of fossil fuel use contributes to growth in atmospheric pollution, and counters efforts to bring down overall emissions. This figure by Ketan Joshi starkly captures the choices that we have.

**Regulation needs to move fast too.** Regulators are catching up, as evidenced by the AER's paper *Regulating Gas Pipelines under Uncertainty*.<sup>10</sup> The evidence base on which regulators should be making decisions is growing.

Access Arrangements for gas are written so as to be consistent with National Gas Rules that give priority to efficient and safe supply of gas to consumers. There is not yet an objective specifically relating to a climate-safe environment for those consumers! As Gabrielle Kuipers writes in relation to the National Electricity Market, such rules are out of date.<sup>11</sup>



Source: Ketan Joshi

**Grounds for rejecting specific APA investments.** APA's investments are not necessary, and are even questioned by APA itself (in its proposal and in presentations) given the uncertainty surrounding energy markets and government policy. APA expresses considerable doubt about the investment climate, about future demand for gas, about competing supply projects, and whether it can be assured of a return on its capital.

We frame this argument for rejecting APA's proposals for new investment on three related grounds:

- Demand for gas
- Supply of gas
- System Management

Analysis of supply and demand issues shows that the need for the infrastructure is marginal at best.

Demand-side management was a priority for the Victorian Government after the opening up of Victoria's Bass Strait gas fields. The lack of attention since the 1980s is extraordinary in hindsight. Fortunately, this is rapidly changing.

We argue that demand reduction and proactive management of the Bass Strait supply to cover Victoria's needs during the transition to electrification are crucial to avoid large tariff increases and "locking in" the state into gas in a way that blunts efforts to rapidly reduce emissions.

Overall demand will be greatly reduced through household electrification, gas use efficiency and changed energy habits – especially if appropriate measures are supported with policy and resources. The market-based Victorian Energy Upgrades program is an important vehicle. There may also be

<sup>10</sup> <https://www.aer.gov.au/networks-pipelines/performance-reporting/regulating-gas-pipelines-under-uncertainty-information-paper>

<sup>11</sup> <https://reneweconomy.com.au/what-the-nem-could-learn-from-an-economics-professor-and-a-moon-landing/>

lessons from the soon to start NSW Peak Demand Reduction Scheme for electricity, in which the Australian Energy Market Operator (AEMO) is involved.<sup>12</sup>

With government programs targeted at reducing gas use for winter heating and hot water, demand for gas will fall much more rapidly than just with market forces. The Access Arrangements with APA and the gas distributors should be designed to be proactive in achieving this. In the short-term, system management can be tweaked to better cope with high demand for household heating on the 20-30 days a year when peak winter demand exceeds 1,000 terajoules a day. Freeing up gas that is now used by households will ensure security of supply for industry and gas-powered generation.

Asking whether demand will fall fast enough to remain below supply, based on AEMO's supply and demand forecasts, is no longer the most useful approach. The right approach is to identify through modelling the set of measures and incentives that are necessary to bring this about, and to put this set in front of governments to decide if they are prepared to implement them. Modelling is also needed to test the impact of tariff increases on different market segments, some of which have no choice about energy use, rather than dealing in averages.

**Competition facing gas.** Gas no longer has a privileged place in the energy mix given the rapid pace at which technologies for electrification and energy efficiency are becoming competitive, and the emergence of supportive policy that recognises the climate emergency. This is recognised in the Victorian Government's draft *Gas Substitution Roadmap* and the AER Information Paper *Regulating Gas Pipelines under Uncertainty*.

Costs of electrification will be low by comparison with the story portrayed by Frontier Economics in their analysis for the gas industry associations, and cited in *Gas Vision 2050*<sup>13</sup> and in their submissions to the inquiry into Victoria's 30 Year Infrastructure Strategy.<sup>14</sup> Frontier Economics do not address relative costs and benefits of their scenarios during the transition leading up to 2050, but simply compare outcomes in 2050. Alan Pears AM goes further in a direct rebuttal of their arguments:

“Many debatable assumptions are made about details of industrial heat demand, efficiencies of gas and electricity use, demand profiles and trends, and other issues. No sensitivity studies are provided, so we don't know the size of the 'error bands'”.<sup>15</sup>

**Compounding growth across all Victoria's gas infrastructure.** The more that the regulated asset base is allowed to grow – across the transmission and distribution networks - the more difficult it will be for government to deal with the eventual decommissioning of all or part of the gas networks. The more capex that is spent now, the more that will be needed in the future – just as replacement capital.

The dynamics of this cumulative growth are crystal clear from this remark by AER in its State of the Energy Market report:

“Despite reduced investment since 2014–15, the total RAB for regulated gas pipelines continues to rise, reaching \$12.1 billion in 2020 (\$1.6 billion for transmission and \$10.5 billion for distribution pipelines)” (p.23 Chapter 5).

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<sup>12</sup> <https://www.energy.nsw.gov.au/government-and-regulation/energy-security-safeguard/peak-demand-reduction-scheme>.

<sup>13</sup> <https://www.energynetworks.com.au/projects/gas-vision-2050/>

<sup>14</sup> <https://www.infrastructurevictoria.com.au/victorias-draft-30-year-infrastructure-strategy-submissions/>

<sup>15</sup> <https://reneweconomy.com.au/hydrogen-vs-electrification-why-enas-gas-vision-is-a-house-of-cards-96820/>

We thus need to see APA's proposal in the context of all current and proposed gas infrastructure in Victoria, whether or not it is regulated. Gas distribution companies will be proposing both new and replacement capital expenditure later this year. Other companies are proposing infrastructure in Victoria to drill for gas, import gas and to expand storage – outside the regulated environment.

**Conditional accelerated depreciation.** Should AER allow new investment, APA's case for accelerated depreciation should be considered only in the context of a plan to retire over time the gas pipeline network. Accelerated depreciation as now proposed by APA, and by gas distributors, will have unacceptable consequences for tariffs. In the longer-term, as wealthier customers embrace electrification, tenants and financially stressed households will carry the weight of it.

**Opportunity costs of hydrogen to households.** Investing in more gas infrastructure, and making it suitable for hydrogen, carries very large opportunity costs:

- Firstly, Victorian owner-occupiers would be better off investing in energy efficiency and electrification instead of paying higher tariffs for gas. However, consumers are not rushing to do this because they reasonably expect their existing assets to have a long life. Moreover, there are important information asymmetries and significant transaction costs involved in the change. There is a split incentive problem as landlords want appliances used for their full economic life, and do not directly face tariff increases.<sup>16</sup> Policy makers and regulators need to build models that reflect inelastic demand and design market mechanisms to deal with it.
- Secondly, the Victorian Government will face growing outlays in the future if gas investment continues to grow and the Government delays the gradual decommissioning of the gas infrastructure. Each new capital investment generates over time the need for further replacement capital. It is unrealistic that the costs of ultimate decommissioning will be totally born by the regulated gas companies (APA, Multinet, AGN and Ausnet). They have had to seek regulatory approval for each of their investments in the transmission and distribution systems, and each approval is based on an agreed rate of return on their investments. Some parts of the networks may be able to be used for other purposes, but the economics of electrification versus a hydrogen-methane blend in pipelines suggests that this will be marginal.

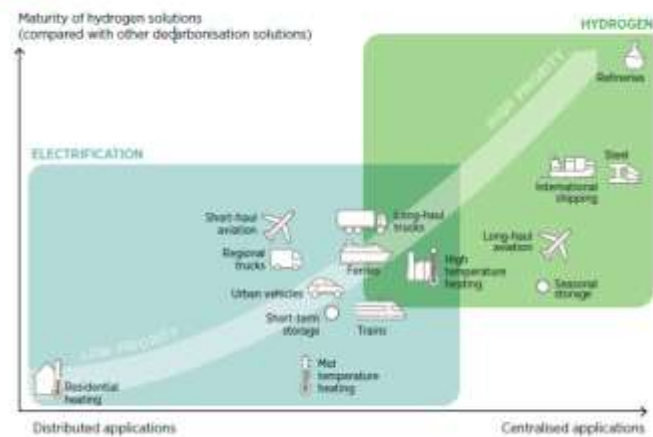
The move by APA and the gas distribution companies into blending hydrogen into the gas mix has the potential to involve very large capital costs, with little benefit, that will be borne by Victorian consumers for decades. As APA clearly states, only some of its pipe network could now carry hydrogen. But even 10% concentration of hydrogen can cause embrittlement in much of APA's steel pipeline. The bigger implication is that a 10% hydrogen blend means 90% methane for decades into the future. Moreover, a 10% blend means that hydrogen being lighter delivers only 3% of the energy in the gas blend to users. The energy density of methane is 3.2 times that of hydrogen.

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<sup>16</sup> Regulators and policy makers should draw on recent research into the decision-making of landlords, their consideration of tenant's needs and policy options for improving energy efficiency in rental properties. Michaela Lang, Ruth Lane, Kun Zhao, Rob Raven, Energy efficiency in the private rental sector in Victoria, Australia: When and why do small-scale private landlords retrofit?, *Energy Research & Social Science*, Volume 88, 2022, 102533, ISSN 2214-6296, <https://doi.org/10.1016/j.erss.2022.102533>

As this graph shows, hydrogen for domestic purposes is by far its least valuable use.<sup>17</sup>

Figure 5.3 Clean hydrogen policy priorities



## Issues under consideration by AER

**1) Is there sufficient uncertainty in future gas demand, or reasonable grounds, that give rise to a non-immaterial stranded asset risk and warrant some regulatory action?**

1. Future gas demand will certainly fall, possibly quite dramatically within a few short years as discussed in the Demand section of this submission. This is what requires regulatory action to ensure the orderly wind-down of the gas networks while protecting consumers. This is consistent with aiming for long-term dynamic efficiency in the interests of consumers of all types of energy, not just gas.
2. Managing the risk of stranded assets is a second-order question, albeit important. The most significant action to manage this risk is to avoid new investments in gas infrastructure, whether to expand the network or make it suitable for hydrogen.

**2) Which option(s) may be preferable in the specific circumstances of the regulated business to manage demand uncertainty and stranded asset risk? What are the likely immediate and long-term price impacts of the business's proposed risk-management measures and are they proportional to the identified risks?**

1. As discussed in this submission, there is no case for APA's proposed investments. Their risk management measures are essentially to use accelerated depreciation to shift the risk of investment onto consumers. As outlined in this submission, managing demand response is the preferred way to deal with demand uncertainty.

**3) Are the expected economic lives for the specific assets proposed by the regulated business supported by evidence and best available information? Is it relevant to consider the probability that the assets may be repurposed to carry other gases in the estimation of the expected economic lives for the assets?**

<sup>17</sup> Irena 2022 Geopolitics of the Energy Transformation: The Hydrogen Factor. <https://www.irena.org/publications/2022/Jan/Geopolitics-of-the-Energy-Transformation-Hydrogen>

1. APA proposes an asset life for all its assets of 30 years to coincide with net zero by 2050. Its pipelines currently have “a weighted average remaining life of approximately 34 years” (p.47), with many thus having a much longer economic life. For modelling, it used a benchmark of 55 years and 25 years. 30 years was thus a ‘compromise’.
2. A 30 year economic life involves transferring risk to consumers and away from the regulated businesses. As discussed under 5) below, we do not accept this. As discussed in this submission, there is hardly a case for such investments.
3. If the investment is to repurpose the assets for hydrogen, business should be required to use the assets for their operational life. This is consistent with the expectations of the pipeline owner and financiers for a long-lived asset, well beyond 2050. Otherwise consumers are unnecessarily front-loaded with the cost, and importantly the risk.

**4) Is the depreciation adjustment proposed by the regulated business reasonable or equitable in the current circumstances, having regard to both its interest to recover efficient costs and consumers’ interests in not having to pay more than necessary for gas network services?**

4. APA proposes accelerated depreciation on all its assets that have not yet been paid off, not just new ones. This is questionable. We are also concerned that APA is proposing mechanisms to allow ongoing adjustment of depreciation.
5. Consumers need more protection than changes to depreciation. If adjusted, a different depreciation regime should be part of a whole package that is in consumer interest. Not least, the networks should be required to be involved in, and lead, measures speed up electrification and improve efficiency of gas use.
6. Whichever form of depreciation is adopted, the AER is correct to ask for compelling evidence in support of the business proposal, as well as treating each one on a case-by-case basis.
7. The advantages of accelerated depreciation outlined by AER are appreciated. It is proposed to enable firms to recover their investment capital and make a profit. But what if the “Window of Opportunity” (WOO) for doing so is rapidly closing or has closed? A falling number of customers, reduced gas use by remaining customers, and pricing of renewables that they cannot match may well be imminent.
8. The theoretical support for accelerated depreciation was developed in an earlier time characterised by liberalising of markets and privatisation, and is not ‘fit for purpose’ if taken in isolation. It was widely held that the only thing holding industry back was regulation. If regulation was required, it should be light touch regulation and it should not hinder technological progress. This was necessary to allow firms to recover their investment capital and make a profit.<sup>18</sup>

**5) Does the current NGL revenue and pricing principle that a regulated business should have a reasonable opportunity to recover efficient costs extend to making adjustments to regulated prices to ensure the business is able to recover the sunk costs of all its investment in the current circumstances?**

1. ‘Reasonable opportunity’ should not confer an entitlement on the regulated business, especially in the current circumstances. Consumers must be protected, and business must take responsibility for its past investment decisions. Accelerated depreciation is skewed too far in favour of the regulated businesses. They have had a stable environment for many years in which to make profits. Now circumstances are rapidly changing.

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<sup>18</sup> Crew, M and Kleindorfer, P, Economic Depreciation and the Regulated Firm under Competition and Technological Change, *Journal of Regulatory Economics*, 4(1), 1992, pp. 51-61.



2. We note that fossil fuel companies around the world are scrambling to find means to protect their perceived entitlements in the face of the energy transition spurred on by climate change. Regulators need to respond strongly and firmly within a revamped regulatory framework. As Ron Ben-David argues, and as effectively indicated by this Information Paper, the system needs a root-and-branch review as it is fundamentally not meeting objectives established over 20 years ago.<sup>19</sup>
3. The preceding text has this statement: “Customers who leave the gas networks may not have contributed sufficient incremental revenue to fully pay off the capital investments incurred for their gas connection and network services.” (p.6)

Empirical evidence needs to be compiled to inform regulatory and policy responses. Does it apply for example to customers who were connected in the 1970s and 1980s? The number of customers and the extent to which their connection and services have been paid off should be quantified. Customers could be grouped according to the timing of their connection to the Victorian gas network as it has expanded.

**6) When considering the extent to which regulated prices should be adjusted to address a stranded asset risk, should there be a distinction drawn between policy changes and technological and competition changes that underpin the stranded asset risk?**

1. This distinction should not be made. How could it possibly be untangled?
2. It derives from a previous era in which government action was seen as essentially hindering the private sector. The leadership role of government, however lacking at present, is clearly crucial to addressing rising emissions, the looming climate problems and the energy transition. Concessions should not be granted to the networks just because governments are introducing policies in the public interest. Government action on climate is imperative in order to guide business and everyone else.

**7) Should there be a specific limit on the increase in regulatory depreciation across all regulated networks and across periods to provide more certainty in regulatory decisions and price paths? For instance, the limit could be defined by a reduction in standard asset lives or maximum cap on revenue impact. If yes, how should the limit be set?**

1. A limit to tariff increases on a network is necessary in the case that the network becomes underused. Energy should remain affordable. Networks may need to bear the remaining costs.

**8) Are the new capital expenditure criteria in rule 79 of the NGR still appropriate to ensure that conforming capex will best achieve the NGO if there is an expectation of material decline in the future demand for gas network services?**

1. The criteria in rule 79 may be appropriate, if implementation by AER is based on its own suggestions of adopting ‘more stringent or conservative assumptions in our expenditure assessments and demand forecasts’ and adjusting ‘the incentives currently provided’ (AER p.40).
2. In the case of APA’s proposed capex, applying these considerations would lead to rejection of APA’s capex proposals under all sub-sections of Rule 79 for reasons relating to demand, supply and system management as outlined in this submission.

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<sup>19</sup> See <https://rpianz.org/s/1811-Fairness-in-the-age-of-competition.pdf> and also a response to an AEMC draft rule determination on distributed energy [https://www.aemc.gov.au/sites/default/files/documents/monash\\_business\\_school\\_submission.pdf](https://www.aemc.gov.au/sites/default/files/documents/monash_business_school_submission.pdf)

3. AER should not treat new WORM expenditure separate from the deferred expenditure as agreed in the 2018-22 Access Arrangement.
4. The Ofgem criteria (p.49) of including costs and benefits out to 2037 and no further is prudent in light of the energy transition. However, AER should also rule out 'compensating' measures by gas companies to charge higher tariffs to existing customers
5. Regarding market expansion capex, new connections could be charged higher prices, provided that customers in new housing estates have the ability to reject a gas connection or have it disconnected without charge. This would be a second-best solution behind banning gas in new housing estates.

**9) Where there is high uncertainty in future gas demand, is it prudent and efficient for a regulated business to substitute capital expenditure with operating expenditure to avoid stranded asset risks even if it may result in higher costs in the long run? In other words, how much of a risk premium should consumers pay to avoid the risk of having to pay more than expected for gas services in the future?**

1. Treating proposed expenditure as opex rather than capex should not be allowed if the expenditure is primarily about expansion of the network. As it is for the long-term, such expenditure should not be recovered within the same access period.
2. APA should be required to treat its Brooklyn compressor expenditure as capex not opex. The proposal is directly connected to the expansionary capex proposals for the WORM and SWP.

**10) To what extent is it in the long-term interests of consumers to fund any network investments that may be predominantly for enhancing a network's capability (or potential) to carry hydrogen or other gases in meeting a net zero emission target in the future?**

1. The priority uses of hydrogen are well-recognised (see IRENA graphic), and meeting residential energy needs is at the bottom. Network investments to assist in carrying hydrogen and other gases would be ill-founded, except in very limited circumstances (e.g. specialised hydrogen pipelines for industry, or within regions where feedstock for biofuels is readily available). Long-term consumer interests, especially residential users, will be met through electrification.

**11) With respect to the regulated business's circumstances, is it still reasonable to assume that the business can manage demand risk or stimulate gas demand? Is price cap regulation still fit for purpose in the business's circumstances?**

1. Given the rapid pace of the energy transition, and the policy shifts towards reducing emissions, stimulating demand is not in the long-term interests of consumers, although it may lower short-term tariffs.
2. Regulated businesses should be required to show how they will actively seek to reduce demand for gas. APA mentions 'a market mechanism that would allow demand-side participation in the peak of winter' (First Look p.16). However, APA fails to develop this idea, and outline APA's role alongside the gas distribution companies.
3. Regulated businesses need incentives to use the best information available to model demand in the short time frame of an Access period. Giving them the right to submit a proposal for variation seems unwarranted. Uncertainty should lead to more cautious investment plans that avoid unnecessary growth in the network.
4. In planning for the long-term, it is agreed that the regulated businesses can no longer manage demand risk (by using models), but they can anticipate and plan for uncertainty (which by its nature can't be so easily modelled).
5. AER needs to develop a model, possibly a hybrid between price-cap and revenue cap, which supports reduced gas use rather than rewarding greater consumption of gas (achievable

under a revenue cap) but does not shift risk onto consumers, especially vulnerable ones (as can happen with a revenue cap).

**12) Is it consistent with the NGO to align the incentives under the form of control regulation and tariff structures with decarbonisation policies?**

1. The NGO should be changed to more directly reflect the climate crisis that we are facing. AER should be promoting this change.
2. Nevertheless, decarbonisation can still be addressed by using control regulation and tariff structures to increase dynamic efficiency over the long-term in the interests of consumers.

**13) Should the national gas regulatory framework be amended to explicitly take into account the benefits and costs of reducing carbon emissions in the provision of natural gas services? If so, how?**

The framework should:

1. encourage a fast rather than slow transition to renewable energy
2. Remove obstacles to pursuing decarbonisation should be removed, and:
  - a. Allow AER to explicitly look across both gas and electricity in identifying the short and long-term interests of consumers
  - b. Remove all incentives for growth in the network or in gas use, for example in the criteria for depreciation schedules
  - c. Remove the requirement for a standing offer to be made to new customers
3. Avoid definitions for renewable energy that in any way include fossil fuels
4. Reject terminology that allows blends with small quantities of hydrogen but mostly 'natural gas' i.e. methane to be classed as 'renewable'
5. Explicitly exclude use of fossil fuels to generate electricity or produce hydrogen
6. Address the end life of networks, providing for an orderly wind-down managing for under-utilisation for a time
7. Provide direction on withdrawing service to customers, including period of notice required and where appropriate compensation for loss of service (in the form of assistance to electrify) – noting that in the short-term switching costs for consumers are not immaterial
8. Set out principles and conditions for use of alternative forms of regulation, and less stringent use of Access Agreements to regulate the businesses. Note that this is unlikely to be appropriate until electric appliances are truly competitive in affordability, reputation and availability. The currently regulated business could be held responsible for ensuring that low income people are supported to make the transition at the time of their choosing.

## Detailed submission

### Capex linked to the APA proposal

Supporting further investment will only lead to pressures to delay from investors seeking to recoup their capital – not just financiers of APA’s proposal but also of all proposed gas infrastructure in Victoria. Instead, demand management should be deployed to address any forecast supply/demand imbalance. Instead the gas distribution and transmission network should be decommissioned in a planned and regulated way over time, while ensuring acceptable pressure levels in the pipeline network and a reliable service to consumers.

### *APA propose significant network augmentation – and a certain return on capital*

APA seeks approval for capital expenditure of \$352 million over four years to 2027 – 20% higher than was approved for the current four year period. As discussed in the next sub-section, additional related capital expenditure may occur over the 2023-27 period; this includes section 80 proposals.

APA divides its 2023-27 investment plans for the pipeline network into replacement, expansion, and hydrogen safety. It adds two other investment categories - non-network and capitalised overheads. The last is a new category.

**Table 2 Capital expenditure actual, estimated and forecast (\$millions, \$2022)**

Asset category	Unit	2018	2019	2020	2021(e)	2022(e)	2023	2024	2025	2026	2027
Replacement	\$m, \$2022	4.6	12.1	11.7	29.3	19.7	26.9	35.9	26.0	18.1	16.1
Expansion	\$m, \$2022	13.3	17.7	11.0	30.6	97.3	80.7	52.4	6.8	-	-
Other (SoCl. Hydrogen safety)	\$m, \$2022	-	-	-	-	3.7	11.4	11.6	11.5	10.7	8.0
Non-network	\$m, \$2022	7.8	15.3	10.5	5.3	3.5	3.1	3.9	2.0	1.3	3.0
Capitalised overhead	\$m, \$2022	-	-	-	-	-	8.4	7.1	3.2	2.1	1.7
<b>Total capital expenditure</b>	<b>\$m, \$2022</b>	<b>25.7</b>	<b>45.1</b>	<b>33.3</b>	<b>65.2</b>	<b>124.2</b>	<b>130.6</b>	<b>110.9</b>	<b>49.6</b>	<b>32.2</b>	<b>28.8</b>

APA outlines four new capital investment programs:

- \$184.5m for the new Western Outer Ring Main (WORM) pipeline. \$126.7 million of this was committed under the current 2018-22 Access Arrangement, but an Environmental Effects Statement has to be completed ahead of Victorian Government approval. The updated estimate adds \$24m in construction costs, \$20m in land access and approval costs, and \$7.5m in materials procurement. Although allocated in the 2018-22 Access Arrangement, only limited funds have so far been spent on the WORM because the Environment Minister required an Environmental Effects Statement.
- \$97.2m for upgrades to the South West Pipeline (SWP). “Investment in security related compression on the South West Pipeline to accommodate Lochard Energy’s expansion of Iona Storage Facility capacity to 570TJ/day (SWP570).”
- Security of Critical Infrastructure program to meet new Australian Government obligation likely to come into effect in 2022
- \$37.9m for testing feasibility of transporting hydrogen in VTS pipelines.

APA is also proposing \$122m of investment under the category of replacement. The two largest relate to management of the existing system, the third less so. Although the rules allow it, the upgrade to the Brooklyn compressor should be treated as capital expenditure, written off over a

long period rather than during this Access period, because it is primarily linked to the SWP and WORM proposals as well as the Iona upgrade.

**Table 4 Major replacement programs and projects (\$millions)**

Replacement (SIB) program	Unit	2018-2022	2023	2024	2025	2026	2027	Total
Total replacement	\$m, \$2022	77.5	26.9	35.9	26.0	18.1	16.1	122.9
<b>Key programs</b>								
BC258 Integrity management (in line inspections)	\$m, \$2022	40.4	7.0	6.5	6.9	5.2	2.1	27.6
BC259 Unpiggables	\$m, \$2022	16.9	9.7	14.1	3.0	0.0	0.0	26.8
BC204 Upgrade Brooklyn compressor	\$m, \$2022	2.8	2.5	2.5	2.5	2.8	0	10.3

### **Related investment in APA pipelines that may occur over 2023-27.**

Apart from investment committed under the Access Arrangement, there are several related investments in pipelines that may occur over 2023-27.

- Firstly, Rule 80 of the National Gas Rules provides a mechanism for AER to approve investments outside of the formal Access Arrangement. APA is anticipating that if **LNG import terminals at Geelong or Avalon** go ahead, they will require additional investment by APA. APA expects that they would need investment in augmentation of the South West Pipeline, the Brooklyn-Lara Pipeline and the Brooklyn City Gate in order for gas to reach Melbourne.<sup>20</sup> Similarly, works at the **Iona Underground Gas Storage** at Port Campbell are likely to require APA investment in additional looping of the SWP, and in the Brooklyn City Gate.
- Secondly, there are related investments outside Victoria for which Victorian gas users would ultimately pay. APA lists two possibilities.
  - “Additional expansion of the APA East Coast Grid to allow **further injections at Culcairn** would require additional upstream compression to deliver more gas to Culcairn.” p.19
  - “Further expansion of the **APA East Coast Grid** to deliver more gas to Wilton to then be shipped southbound on the Eastern Gas Pipeline would also require investment outside Victoria.” p.20

Any investments outside Victoria would be funded by shippers under bilateral contract with APA.

### **Cumulative capital expenditure that is at stake**

The consequences for consumers of approving further capital expenditure requires a stocktake of current gas infrastructure in Victoria and identification of all new investment proposals – not just for regulated assets but unregulated as well.<sup>21</sup>

- Current infrastructure includes: drilling platforms, gas processing plants, pipelines, compressor stations, storage facilities and gas-fired power stations.<sup>22</sup>

<sup>20</sup> “APA proposes to lodge an application under Rule 80 of the National Gas Rules, seeking the pre-approval of the AER to consider these projects as conforming capital expenditure if they are built.”

“The 3-part Rule 80 application is lodged with this proposal. See VTS – Application under Rule 80 of the NGR – December 2021 – Public”.

<sup>21</sup> Such a stocktake may have informed the *Gas Substitution Roadmap* and the *Gas Infrastructure 2050* report, but it is not evident in those reports. There is a long list of gas pipelines, covering both regulated and unregulated, in the 2016 Infrastructure Capability Assessment (p.15) undertaken by Deloitte for Infrastructure Victoria. <https://www.infrastructurevictoria.com.au/wp-content/uploads/2019/04/160229-Energy-Final-1.pdf>

<sup>22</sup> For an overview, see the unpublished article Gas Processing, Physical Flow and Storage at <https://crosthwaite.squarespace.com/s/Victoria-Processing-physical-flow-and-storage-of-fossil-gas.pdf>

- Proposed upgrades to existing infrastructure or new facilities similar to the above such as the APA proposals outlined above, as well as drilling and storage at Golden Beach and a gas-fired power station at Dandenong
- New types of infrastructure including: LNG import terminals, upgrades to pipelines by APA and gas distributors to make the pipelines capable of transporting hydrogen, and facilities to produce hydrogen specifically for blending with methane in the pipeline network.

Victoria could see a massive growth in capital expenditure, and then face the cumulative consequences. The capital tied up in just the regulated pipelines alone was \$12.1 billion in 2020, and growing despite a recent period of lower investment (p.23 Chapter 5 State of the Energy Market 2021).

Looking at the whole picture:

- Firstly, there is regulated expenditure by APA and the three Victorian gas companies - AGN, Ausnet and Multinet.<sup>23</sup> Each of them can propose capex under their Access Arrangement, but can also seek conditional approval for expenditure under Section 80 of the National Gas Rules (consequent on unregulated investment by other companies going ahead). APA is seeking \$352 over four years. Significant sums will be sought by gas distributors in the next period based on the past Access Period of 2018-22 when AER agreed that Ausnet and AGN could each spend \$100m or more per year. Multinet was less at about \$300m over the whole period. Much of the capex of distributors is for new connections.<sup>24</sup>
- Secondly, there is capex that does not require regulatory approval. This includes:
  - Interstate pipeline upgrades by APA that are directly related to Victorian gas.
  - LNG terminals as proposed by Viva Energy and Vopak. Each LNG import terminal costs upwards of \$250m.
  - Storage expansion as proposed by Lochard Energy at Iona
- Thirdly, making pipelines ready for hydrogen, even 10% by volume, could potentially be very costly to consumers. As indicated in a 2021 document on hydrogen integrity and safety, APA is certain that much of the transmission network is currently unsuitable for hydrogen because hydrogen can embrittle steel pipes.<sup>25</sup> APA state that factors influencing this likelihood vary from pipeline to pipeline and include “source of the steel, the manufacturing process, the construction methodology ... and operating conditions ... since entering service” (p.5). The least susceptible pipes are low grade with thick walls, but **the majority of APA’s pipelines** “are manufactured with thinner wall, higher stress, and higher-grade pipeline materials” (p.7). APA has identified the costs of surveying its pipelines for suitability and necessary upgrades, but “No remedial works to make pipelines ready for hydrogen operation is included in the estimate (p.16).”

### **Higher tariffs and consumer segments**

The cumulative investments proposed by all segments of the gas industry, will amount to a significant impost on consumers.

<sup>23</sup> See Appendix with extracts from their Access Arrangements

<sup>24</sup> See the recently released AER report on *Gas Network Performance*. <https://www.aer.gov.au/networks-pipelines/performance-reporting/gas-network-performance-report-2021>

<sup>25</sup> APA VTS - Access Arrangement 2023-27 - Business Case 200 - Hydrogen Safety and Integrity - December 2021 (PDF 721.91 KB)  
<https://www.aer.gov.au/networks-pipelines/determinations-access-arrangements/apa-victorian-transmission-system-access-arrangement-2023%E2%80%9327/proposal>

The low interest environment means that APA is 'safe' in proposing relatively low tariff increases for this next Access period. Its financing costs will be relatively low. However, the cost of gas to consumers is bound to rise in the next few years. APA's tariffs and those of gas distribution companies are just one part of the story. Many other elements in the cost of gas to consumers will come into play. Not least, gas consumers will also be paying for the cost of capital invested in new or enhanced gas infrastructure that is unregulated, whether it is an import terminal or storage facility. Over time, all sectors of the gas industry will face higher financing costs. Decisions by AER now will have a major influence on future costs.

In considering these cumulative impacts, it is also important to consider the effect of tariff increases on different market segments. Modelling by AER and APA is based on the average residential or commercial customer. But some residential gas users use far more gas than others. We cannot assume that residential gas users have such a choice – in particular they have little control if they are tenants or low income owner-occupiers. Most people in poverty live in owner-occupied homes (51.4%).<sup>26</sup> Australia-wide, "over 1.0 million low-income households were in financial housing stress in 2017–18."<sup>27</sup>

### **Huge uncertainty for pipelines**

Pushing ahead with new investments in gas infrastructure is fraught. AER is clear on the uncertainty around the future of gas as expressed in *Regulating Pipelines under Uncertainty*. APA also outlines the level of uncertainty around its investments, and is seeking to transfer the risk to consumers.

Quoting APA at length shows the degree of uncertainty:

"The demand and supply forecasts underpinning this access arrangement is the most uncertain aspects of the proposal package. The decision to invest in security of supply expansion of the SWP hinges on them." (p.17)<sup>28</sup>

"Consumer advocates raised concerns about the prospect of investing expansion of the SWP under such uncertain conditions. The concern was raised whether the proposal to invest in SWP was using long-lived assets to solve a short-term problem and whether it would be needed in five years? There was concern that future customers would be left to pay for an asset that may not be required in the longer term and may end up being stranded." (p.30)

"In this case, the Victoria Government's Net Zero 2050 initiatives have challenged the regulatory compact's expectations around the ability of investors to recover their prudently invested capital. In the case of the SWP expansion, this is manifested in two ways:

1. It is not clear that there will be an ongoing role for the SWP expansion in the context of the Net Zero 2050 horizon, and
2. With mooted demand reductions, the SWP expansion investment may become exposed to the capital redundancy provisions of Rule 85 of the National Gas Rules." (p.32)

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<sup>26</sup> The relationship between poverty, ownership status and location in Victoria has been explored in depth in recent years. Robert Tanton, Dominic Peel and Yogi Vidyattama *Every Suburb Every town Poverty in Victoria. A NATSEM/COSS report*" November 2018. <https://vcoss.org.au/wp-content/uploads/2018/11/Every-suburb-Every-town-Poverty-in-Victoria-VCOSS.pdf>

<sup>27</sup> Australian Institute of Health and Welfare - website 'Housing Affordability'  
<https://www.aihw.gov.au/reports/australias-welfare/housing-affordability>

<sup>28</sup> "The combined effect is an assumption that demand is forecast to fall over the forecast period, from 206 PJ/year in 2023 to 198 PJ/year in 2027." (p.18). Further discussion about APA VTS's demand and supply forecasts can be found in the document VTS – RIN B11 Load and demand – Dec 2021 – Public.

“Without adjustment to the regulatory framework to counterbalance the changes in risk introduced by the Net Zero 2050 initiatives, it will be very difficult for the necessary public infrastructure projects to attract private capital.” (p.32)

## Ways to avoid new investment in gas

Networks should not build new assets at risk of becoming stranded. This delays emission reduction and could lead to high costs for gas users.

There are pathways to avoid the new investment proposed by APA, if we consider all options covering:

- Demand-side
- Supply-side, and
- System management

Even if AER or APA do not consider such a wide-ranging focus to be within their role, as currently defined by National Gas Law, the unusual situation of proposing new assets that at risk of stranding should trigger a consideration of all alternative solutions for demand, supply and system management.<sup>29</sup>

## On the demand-side

Given the uncertainties facing the network, as highlighted by APA – it is especially important, from a consumer perspective, that networks demonstrate that all opportunities for demand management have been properly evaluated. We are presenting here a range of demand side opportunities that we wish to see evaluated by APA and regulatory authorities.

### *The demand-side problem*

Switching over from gas to electricity as an energy source will benefit households, consumers and small business. Research by RENEW and other organisations shows that their overall energy bills will be lower and capital costs recouped in most cases. These savings have been highlighted by ACIL Allen for the DELWP Roadmap team in stakeholder forums on 9 and 13 February 2022 (see slide below).

Modelling of reductions that could be targeted over 10 years has also been done by Northmore Gordon (2019) for Environment Victoria.<sup>30</sup> Awareness of these benefits is growing, for example the Facebook group [My Efficient Electric Home](#) has rapidly grown to nearly 50,000 members.

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<sup>29</sup> This approach is summarised in a presentation to DELWP in December 2021. Available at <https://crosthwaite.squarespace.com/gas-and-climate>

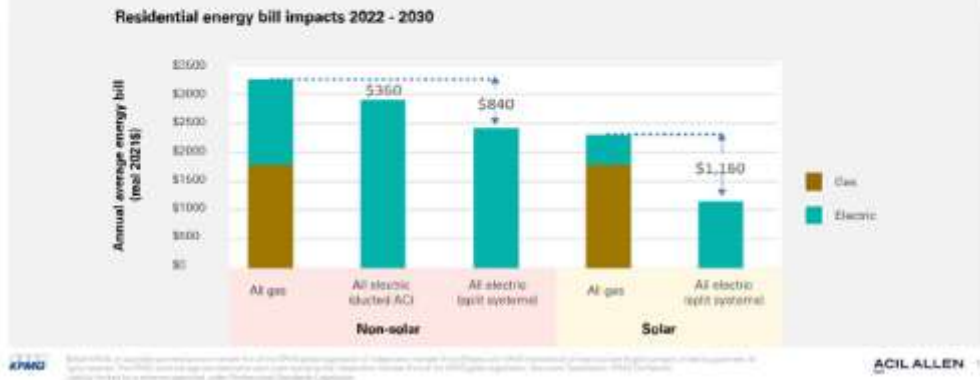
<sup>30</sup> <http://environmentvictoria.org.au/wp-content/uploads/2020/06/Vic-Gas-Market-Demand-Side-Study-Final-Report-1.pdf>



## Scenario analysis of transition pathways - interim findings

In Central scenario, electrification saves households money on their energy bills (2022-2030)

- Using ducted reverse cycle air conditioning, an all-electric home (without solar panels) could save **\$360 per year**
- Using more efficient split system air conditioners, an all-electric home (without solar panels) could save **\$840 per year**
- Biggest savings achieved by using both solar & efficient split system air conditioners, that could save **\$1,180 per year** (compared to an all-gas home with solar)



In Victoria, the problem is one of gas demand at the margins. These ‘extremes’ are an obvious target for energy authorities to drive demand for gas below available supply.

- Three times more gas is used in winter as in summer. The primary driver of this higher winter use is ducted heating in residential buildings. Systems are generally old, leaky and inefficient. They are providing some heat in old leaky houses, with much of the energy dissipated. Gas companies know who the big residential users are.
- Over recent years, gas use has exceeded 1,000 terajoules per day on only 20-30 days a year.
- Connections of new suburbs on the urban fringe are responsible growth in gas use in Victoria and for a high proportion of the capital expenditure of the three gas distribution companies.<sup>31</sup>

With action in these areas, security of gas supply to industry and gas-powered generation is much more assured.

Leaving aside electrification, there is huge potential for reduction in demand for gas through changes in both **energy efficiency** and **energy habits** (some of which can be triggered with behind-the-meter monitoring).<sup>32</sup>

Targeting **efficiency measures by gas and electricity users** is very important, as outlined by Alan Pears AM (Senior Industry Fellow at RMIT) in his submissions to DELWP’s [Gas Substitution Roadmap inquiry](#) and Infrastructure Victoria’s [Gas Infrastructure 2050](#) inquiry. Insulation is just one measure

<sup>31</sup> See the recently released AER report on *Gas Network Performance* – cited above.

<sup>32</sup> Potential for achieving a lower energy use without compromising living standards is clear:

- Per capita use of energy is far higher in Australia than in most other countries. Countries like Germany, France, Denmark, Italy and Israel use far less than Australia on a per capita basis. The World Bank data (from the IEA) show per capita energy demand in Europe in 2010 at 137.3GJ (gigajoules) falling to 115.1GJ in 2030 by comparison to Oceania at 183.4 GJ in 2010 falling to 172.9 GJ in 2030. <https://documents1.worldbank.org/curated/en/603241469672143906/pdf/778890GTF0full0report.pdf>
- In Australia, while use has been falling from its peak around the year 2000, it has been 200Gj annually in recent years compared to an average 136GJ per year in the five years to 1965-66 (calculated from Australian Energy Statistics 2020 Table B). [https://www.energy.gov.au/sites/default/files/Australian%20Energy%20Statistics%202020%20Energy%20Update%20Report\\_0.pdf](https://www.energy.gov.au/sites/default/files/Australian%20Energy%20Statistics%202020%20Energy%20Update%20Report_0.pdf)

available to improve the thermal capacity of building fabric. He also highlights the importance of **monitoring and smart technology** in improving efficiency.

Decarbonisation will increase demand for electricity but costs will not be excessive. The increase will not be as great as suggested by industry modelling. Alan Pears AM offers a critique<sup>33</sup> of the analysis by Frontier Economics for the gas industry associations, and cited in *Gas Vision 2050*<sup>34</sup> and in their submissions to the inquiry into Victoria's 30 Year Infrastructure Strategy.<sup>35</sup>

Weaknesses in the industry analyses include:

- assuming no changes in efficiency of transmission of electricity noting that 15% of electricity is consumed in its own production (at coal power stations) and in transmission. Power stations will be closing, and efficiencies in transmission are feasible (see Alan Pears submission to Infrastructure Victoria inquiry)
- overlooking potential for behind the meter demand management and assuming no significant reduction in energy use, whereas increased energy efficiency and changed habits of consumers can make a major difference. As Alan Pears notes in his Roadmap submission "Timely feedback to operators of appliances, equipment and buildings will support identification of faulty and poorly maintained equipment – a much bigger issue than most realise, and is poorly documented." He goes on "Lack of meaningful, timely feedback on energy use for consumers is a critical problem across all sectors, especially for gas. In order to provide 'efficiency' indicators, data from multiple data streams is needed, along with data analytics."
- inadequately capturing the efficiency advantages of using heat pump technology that delivers four units of energy for each unit of electricity and shifting away from use of electric heaters running off the mains (resistive heating). As discussed in later sections, the NSW Government and AEMO are collaborating on a major project to target electricity use in peak times.

### *Lack of attention to the demand side*

In Victoria, exploring demand-side possibilities for gas is only now re-emerging after a nearly three decade hiatus. Earlier the Gas & Fuel Corporation had a strong focus on demand management until at least the late 1980s, but this was lost during its privatisation (Alan Pears pers. comm.).

The foreword from the Premier Rupert Hamer to the 1977 Green Paper on Energy indicates support from the Government.

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<sup>33</sup> <https://reneweconomy.com.au/hydrogen-vs-electrification-why-enas-gas-vision-is-a-house-of-cards-96820/>

<sup>34</sup> <https://www.energynetworks.com.au/projects/gas-vision-2050/>

<sup>35</sup> <https://www.infrastructurevictoria.com.au/victorias-draft-30-year-infrastructure-strategy-submissions/>

Above all, we must learn, and learn fast, to conserve our energy supplies. For this prodigal generation, the era of cheap energy is over. It has bred habits of waste and misuse of energy which will be difficult to change. It has accustomed us to high living standards which will be difficult to sustain in the future. More important, it has exposed us to the risk of the kind of sudden energy shortages, plant shutdowns and disruption of community life seen on a wide scale in the United States this winter.

Conservation of resources, intensified research, high capital commitment, all these must be found in the energy policy of the future. This Green Paper sets out the basic facts on which that new policy can now be erected.



R.J. Hamer  
PREMIER OF VICTORIA

### ***Huge potential of Peak Demand Reduction***

As outlined above, it is winter gas use in households that drives the sizing of much of the gas infrastructure. Peak demand reduction has huge potential, and should be modelled seriously. The reduction is unlikely to be achieved through market forces alone. A point reinforced by NSW government initiatives on electricity, including a Peak Demand Reduction Scheme involving AEMO and due to come into effect in 2022-23<sup>36</sup>, and by the importance that the Victorian government places on its Victorian Energy Upgrades initiative.

Focusing on households, big reductions in demand could be achieved in two ways:

- Firstly, by targeted the small proportion of residential users who use significantly more gas than others, especially in winter. Alan Pears says 5% of users accounted for 15% of residential gas use in one survey (see his [submission](#) to the Gas Infrastructure 2050 inquiry. We can reasonably ask how much gas is used by 20% of households? The gas distribution companies have this information.
- Secondly, by targeting days of peak demand. Using AEMO data, we have identified days where winter gas use exceeds 1000 TJ per day. Looking back over recent years, there are only 20-30 days a year.<sup>37</sup> Such days can put stress on the supply system, particularly when there are consecutive days of over 1,000TJ per day.

### ***More reductions in residential use of gas***

Hot water heating is the largest residential use of gas after space heating. In Victoria it accounts for about 30% of residential gas use. Modelling possible reductions in gas use specifically for this purpose is important. Policy initiatives to shift households to using heat pumps to generate hot water are increasingly likely, and a national framework has been developed.<sup>38</sup> Heat pumps for this purpose are growing in use, but the rate could be much faster as most households, caught out by breakdowns, don't plan for replacement. An estimated 55-65% of purchases of new systems, which ever technology, are done on an emergency basis, and only 10-15% are considered purchases by

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<sup>36</sup> <https://www.energy.nsw.gov.au/government-and-regulation/energy-security-safeguard/peak-demand-reduction-scheme>.

<sup>37</sup> Our spreadsheets are available to AER on request.

<sup>38</sup> <https://www.energyrating.gov.au/document/policy-framework-hot-water-systems-australia-new-zealand> and <https://www.energyrating.gov.au/document/consultation-hot-water-systems-discussion-paper>

home owners.<sup>39</sup> Builders tend to install the cheapest system available.<sup>40</sup> Hot water services have an average life of 10-12 years, creating an opportunity to influence the replacement choice. By 2035, nearly every hot water service (HWS) in Australia will be replaced. In 2014, ABS found an estimated 3,388,300 HWS in Australia running on mains gas, and another 387,900 running on LPG/bottled gas.<sup>41</sup>

Other residential uses of gas may also offer potential for some savings in gas use. However, they are less consequential, involve lifestyle choices and are not as critical for modelling demand reductions as space heating and hot water. These include heating outdoor swimming pools.<sup>42</sup> There are also portable devices - gas barbeques and 'pavement heaters' for outdoor living areas.<sup>43</sup>

Cooking with gas indoors uses a relatively small proportion of the gas consumed by households. Electrification of cooking will advance as consumers become accepting of 'rapid response' induction stovetops and there is a greater range available in showrooms.

### **Industry can have certainty of gas supply**

Industry that is currently reliant on gas as a fuel or as a feedstock needs a steady supply throughout the year. However, demand for gas by industry is expected to fall over time, and there are pressures and opportunities that are likely to increase the pace of change.

The technical feasibility of electrifying most industrial processes has been demonstrated.<sup>44</sup> Efficiency of gas use is also a focus of government programs, guides prepared with industry bodies<sup>45</sup> and grant programs targeted to particular sectors.<sup>46</sup>

The pace of change will increase as governments become more proactive in response to industry concerns about gas prices and their own emission targets. The Victorian Energy Upgrades program is

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<sup>39</sup> [https://www.eeca.govt.nz/assets/EECA-Resources/Product-regulations/star-projects/E3-hot-water-systems-roadmap\\_11\\_18.pdf](https://www.eeca.govt.nz/assets/EECA-Resources/Product-regulations/star-projects/E3-hot-water-systems-roadmap_11_18.pdf)

<sup>40</sup> [https://www.eeca.govt.nz/assets/EECA-Resources/Product-regulations/star-projects/E3-hot-water-systems-roadmap\\_11\\_18.pdf](https://www.eeca.govt.nz/assets/EECA-Resources/Product-regulations/star-projects/E3-hot-water-systems-roadmap_11_18.pdf)

<sup>41</sup> ABS (2014) found that 75% of Melbourne households relied on gas for hot water, as did over 60% of households in Adelaide and Perth and 46% in the ACT, falling to 35% in Sydney and 13% in Brisbane. In regional Victoria, 45% were estimated to use mains gas, and 7% used LPG/bottled gas.

<sup>42</sup> On swimming pools, an unknown proportion of Victoria's pools are heated by gas. [Roy Morgan Research](#) found 9% of households in Melbourne and regional Victoria had a pool in 2018. Earlier in 1997, [ABS](#) found 139,000 (7.9%) households had a pool. [A 2017-18 report](#) states that there were then over 550 public pools in the state. The Pooled Energy Demonstration Project states that Australia has 1.4 million swimming pools <https://arena.gov.au/projects/pooled-energy-demonstration-project/>.

<sup>43</sup> Roy Morgan Research found that over 60% of Australian households have an outdoor barbeque, 347,000 had bought one in 2015 while another 249,000 planned a purchase in the following year. Most have been wood or gas-fired, though electric ones are now on the market. Roy Morgan Research (2016) *Is Australia the barbecue hotspot of the world?* Available at: <http://www.roymorgan.com/findings/6752-is-australia-barbecue-hotspot-of-the-world-201604072313> (Accessed: 6 November 2021).

<sup>44</sup> Beyond Zero Emissions 2018 [https://bze.org.au/research\\_release/electrifying-industry/](https://bze.org.au/research_release/electrifying-industry/) Strategy.Policy.Research 2019 [https://www.vic.gov.au/sites/default/files/2020-02/Appendix\\_6\\_Electrification\\_Industrial.pdf](https://www.vic.gov.au/sites/default/files/2020-02/Appendix_6_Electrification_Industrial.pdf)

<sup>45</sup> <https://www.energy.gov.au/business/industry-sector-guides/manufacturing/general-manufacturing#toc-anchor-business-energy-advice-program>

<sup>46</sup> <https://www.minister.industry.gov.au/ministers/wilson/media-releases/grants-help-food-and-beverage-manufacturers-cut-energy-costs>

expanding to allow for an increasing range of gas efficiency and electrification projects.<sup>47</sup> The NSW Government has a Net Zero Industry and Innovation program for which \$750m is allocated. “From late 2021, we will begin working with some of the largest manufacturing facilities in NSW to scope transformative industrial projects to fast-track their emissions reductions.”<sup>48</sup>

Finally, companies that are using gas are making decisions to close factories or cut back production. This may escalate as gas prices remain very high relative to five years ago. In Victoria, Qenos is closing half the units that make ethylene and polyethylene at Altona, but is keeping its NSW facility open.<sup>49</sup> Qenos does not believe that prices will lower if the Australian Government relies on voluntary mechanisms like the Heads of Agreement with LNG exporters and the Voluntary Code of Conduct for gas producers, which comes into effect on 1 June 2022.<sup>50</sup>

### Modelling demand in new ways

Noting that AEMO is incorporating the NSW program into its scenario modelling for electricity, national energy authorities could be modelling reduction of peak demand for gas. This is a critical task for three reasons:

- Firstly, residential gas use is ‘optional’ in the sense that there are clear alternatives to heating old leaky houses with old, leaky and inefficient ducted heating. There are fewer immediate alternatives for industry that relies on a steady flow of gas throughout the year.
- Secondly, modelling reductions in peak residential use is also important so policy makers and AEMO managers can be clearer about availability of gas for Gas-Powered Generation – if it is needed into the future to complement other sources as coal-fired power winds down.
- Finally, more detailed modelling specifically on peak demand reduction is also critical to decisions on new supply options and augmentation of infrastructure.

### On the supply side

With the significant and rapid reductions in demand that are possible and feasible, the pressures on the supply system are greatly reduced.

The so-called supply problem is largely a creation of how the gas markets work. There is no actual physical shortfall in gas supply. Bass Strait has 2,488 PJ proven reserves (2P) that is profitable to extract, and 3,149 PJ beyond that which is technically available (best estimate of contingent resources (2C)).<sup>51</sup>

Nevertheless, the depletion of some important gas fields in Bass Strait means that capacity to supply gas at peak times is reducing over time. This is all the more reason to:

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<sup>47</sup> <https://www.esc.vic.gov.au/victorian-energy-upgrades-program/about-victorian-energy-upgrades-program/overview-veu-activities>

<sup>48</sup> <https://www.energysaver.nsw.gov.au/reducing-emissions-nsw/net-zero-industry-and-innovation>

<sup>49</sup> <https://www.afr.com/companies/energy/refinery-shutdown-triggers-loss-of-150-chemical-jobs-20210519-p57t82>. Earlier in 2020, Qenos was seeking 42 petajoules of natural gas “at a sustainable price” over five years for its plants at Altona and in NSW. <https://www.manmonthly.com.au/news/crucial-gas-supply-ensures-qenos-continues-operations/>

<sup>50</sup>

[http://www.qenos.com/internet/home.nsf/0/96A3AC6B0CC4ACE6CA258665001C3353/\\$file/Qenos%20Media%20Statement HoA 22%20Jan%202021.pdf](http://www.qenos.com/internet/home.nsf/0/96A3AC6B0CC4ACE6CA258665001C3353/$file/Qenos%20Media%20Statement%20HoA%2022%20Jan%202021.pdf)

<sup>51</sup> <https://www.ga.gov.au/digital-publication/aecr2021/gas#australias-identified-gas-resources-section>

- Act to reduce peak demand for winter residential heating to below 1,000 terajoules every day of the year, as discussed in the section on Demand.
- Retain all possible gas in Victoria as a reserve, and exploit the remaining gas effectively
- Improve system management, as discussed below.

We propose that AER and other regulators should investigate the full range of supply options that could help to address the short and long-term energy requirements of customers, even if outside the current mandate for the regulatory framework.

### *Alternatives for augmenting supply*

There is great scope to manage the gas remaining in the Gippsland Basin for Victoria's needs. In the 2021 GS00, gas shortfalls in Victoria are not forecast until winter 2026 (assuming the proposed Port Kembla LNG import terminal is operating). If gas was reserved over the next few years it would create a buffer in the years approaching 2030.

The WORM pipeline and SWP expansion may be redundant if there is certainty of supply from the east of the state.

The most commonly considered likelihood is gas from the proposed LNG import terminal at Port Kembla, via reverse flows along the Eastern Gas Pipeline (EGP). The project has not reached FID (financial investment decision). AEMO are modelling for a FID, but APA is not prepared to do so.

Other real possibilities, for continued supply of Bass Strait gas to Victoria, include:

- Available 2P reserves and 2C resources (outlined above) are more fully utilised than currently anticipated
- Sydney is supplied with gas flowing via the APA East Coast Grid which APA suggests would free up Bass Strait gas for use in Victoria (APA 2021 A look at plans p.19)
- Sydney, regional NSW and Tasmania need less gas (from the EGP and the Tasmanian Gas Pipeline (TGP). These flows will reduce over time as industrial processes are electrified and, as is likely, more companies cease production due to high gas prices. As discussed above, the NSW Government is soon to initiate big plans for industrial electrification by 2030.<sup>52</sup>

The Victorian Government could likewise act to reserve the Bass Strait gas (and possibly Otways Basin gas) that will be saved through energy efficiency and gas reduction programmes here in Victoria through to 2030. And finally the Victorian government could make it a condition of Approval, that any new Victorian gas developments be granted on condition that a percentage of the new development be reserved for future Victoria industry use and winter peaks during transition.

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<sup>52</sup> This is the aim of the Net Zero Industry and Innovation Program.

- "The biggest opportunity for decarbonisation in NSW industry sits with a relatively small number of existing high emitting industries."
- "To help these industries shift to net zero and deliver significant emissions reduction by 2030, \$380 million has been allocated to support major plant and equipment upgrades."
- "From late 2021, we will begin working with some of the largest manufacturing facilities in NSW to scope transformative industrial projects to fast-track their emissions reductions."

<https://www.energysaver.nsw.gov.au/reducing-emissions-nsw/net-zero-industry-and-innovation>

### Surplus gas flowing out of Victoria should be reserved

Without voiding contracts to supply domestic users in other states, much of the Bass Strait gas that now flows to the north could be reserved. This is Victorian produced gas that is supplementing gas supply on the east coast, and helping enable the massive LNG exports from Queensland. The gas flows northwards have increased since the east coast gas market was connected internationally via these LNG exports.

At the same time that the ACCC inquiries into the east coast gas market were launched, exports from Victoria were increasing. Deloitte stated in a 2015 report to Infrastructure Victoria that:

“The capacity of the Longford pipeline is currently underutilised due to increasing amounts of gas from the Longford Gas Plant being sent to NSW via the Eastern Gas Pipeline (EGP). The EGP was expanded during 2015 through the construction of two new compressor stations, reducing the amount of Longford gas that is expected to flow into Victoria.”<sup>53</sup>

The ACCC currently has concerns about the pressures that LNG exporters are placing on the availability of gas. In its 12<sup>th</sup> Inquiry Report issued this year, the ACCC states:

“While LNG producers expect to have 122 PJ of uncontracted gas they could supply into the market for 2022, they are expecting to withdraw 27 PJ more from the east coast gas market than they expect to supply into it. They are also intending to supply around half the amount of gas they supplied into the domestic market each year in 2017 and 2018.” (p.15).

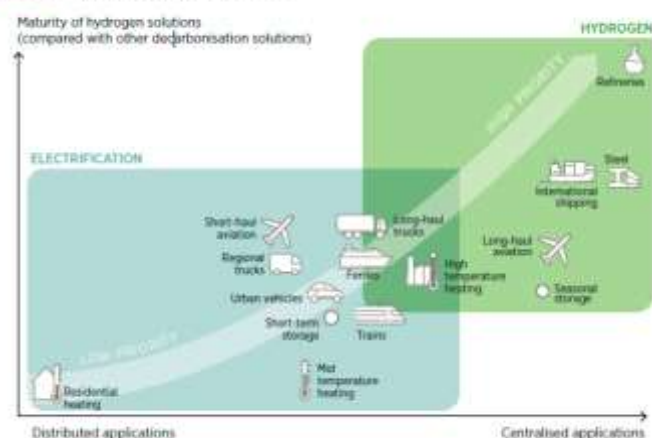
The ACCC also repeated concerns expressed in the 11<sup>th</sup> Report that LNG exporters were exporting this gas without first offering it on the domestic market as agreed in January 2021 in a Heads of Agreement with the Australian Government (p.15).<sup>54</sup>

Western Australia created a gas reserve to support its local industry. Victoria could learn from this and do the same while taking account of weaknesses, identified by economists, in the Western Australian scheme.<sup>55</sup>

### Proposed pipeline investment for hydrogen readiness wasteful and emission intensive

Hydrogen will do little to increase supply of gas for at least a decade. It certainly cannot help with any short-term mismatch between supply and demand. As discussed above, only small parts of the pipeline network are now suitable. There are likely to be huge costs in making these pipelines hydrogen-ready. The pipeline network cannot carry more than 10% by volume and 3% by energy intensity of the mix. Emissions from methane will still accumulate.

Figure 5.3 Clean hydrogen policy priorities



<sup>53</sup> <https://www.infrastructurevictoria.com.au/wp-content/uploads/2019/04/160229-Energy-Final-1.pdf>

<sup>54</sup> <https://www.accc.gov.au/publications/serial-publications/gas-inquiry-2017-2025/gas-inquiry-january-2022-interim-report>

<sup>55</sup> Quentin Grafton, R., Shi, X. and Cronshaw, I. (2018) “Making cents” of the eastern Australian gas market’, *Economic Papers: A journal of applied economics and policy*, 37(1), pp. 42–54.

Keeping the gas network open so that hydrogen can be added would be a gross waste of resources. A Victorian hydrogen economy is more likely to be based on onsite production and a dedicated small number of pipelines. See the graph above from IRENA for where investment should and should not have priority.<sup>56</sup>

Emissions from hydrogen production also must be taken into account. Large-scale production of hydrogen using renewable energy is not yet viable, although possible on a small-scale. Use of fossil fuels to produce hydrogen is problematic.

New research shows that hydrogen produced with fossil fuels and using carbon capture and storage to capture emissions will potentially have a higher greenhouse effect than burning natural gas. The researchers accounted for lifecycle emissions of both carbon dioxide and unburned fugitive methane.<sup>57</sup>

There is an additional problem with using the existing gas network as part of the transition to green hydrogen, as pointed out by Alan Pears. The emissions intensity of gas depends on its source – this will almost certainly increase when using gas from imports and from new local fields. Note that BHP and Esso recently invested billions into a plant to ‘clean up’ the remaining gas from the Longford fields.

Biogas can play a role, but limited, because of limited production potential. Its role should be explored in particular regional locations.

### **Flaws in arguments for hydrogen blends**

There are **flaws** in arguments of Frontier Economics, and used in *Gas Vision 2050*, and other documents of the gas industry to promote hydrogen blends in the pipelines. This research has been cited in industry submissions to the inquiry into Victoria’s 30 year Infrastructure Strategy and to other inquiries. The research is used to claim that hydrogen into our pipelines is a clear winner, based on great infrastructure savings and huge electrification costs of alternative solutions. I have reviewed the objectives, method, evidence, findings and recommendations in that research. Flaws include:

- Lack of sensitivity testing of results to changes in assumptions
- Inadequately dealing with uncertainty; this is particularly important given that uncertainty about the future is basic to AEMOs rationale for scenario testing. AEMOs scenarios are to 2040, whereas Frontier Economics extrapolates AEMO results beyond this to 2050. Frontier scenarios are snapshot out to 2050 based on estimating annual costs in that year; scenarios are compared for ‘net cost’ (pp.47-50).
- Key factors are omitted or downplayed in this research and in a recent summary of points by Dennis Van Puyvelde head of gas at ENA, who was lead for developing Gas Vision 2050.<sup>58</sup> Important rebuttals have been made by Alan Pears<sup>59</sup> and Ketan Joshi<sup>60</sup>.

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<sup>56</sup> Source: Irena 2022 Geopolitics of the Energy Transformation: The Hydrogen Factor.

<https://www.irena.org/publications/2022/Jan/Geopolitics-of-the-Energy-Transformation-Hydrogen>

<sup>57</sup> <https://onlinelibrary.wiley.com/doi/10.1002/ese3.956>

<sup>58</sup> <https://www.energynetworks.com.au/news/energy-insider/2021-energy-insider/playing-with-gas-victoria-should-substitute-with-its-star-performer/>

<sup>59</sup> <https://reneweconomy.com.au/hydrogen-vs-electrification-why-enas-gas-vision-is-a-house-of-cards-96820/>

<sup>60</sup> <https://medium.com/lobbywatch/the-gas-war-part-2-the-australian-gas-industry-and-their-anti-electrification-campaign-5b8702d8d6a1>



## On system management

There are clear improvements that AEMO can make in managing the gas system – the Declared Wholesale Gas Market.

First of all, there is inadequate effort and resources devoted to demand-side measures relating to gas. Problems with the NEM have led to a focus on demand for electricity, but this has not yet translated to gas

AEMO could be doing more to ensure that all available gas is ready to be used for days of peak demand in winter. This includes a willingness to over-ride private interests in the public good.

Appropriate measures include:

- Ensuring that Dandenong LNG storage (capacity 680 TJ) is rapidly filled and refilled as a priority during winter, and so can supply 20-25% of Victoria's needs (237 TJ per day) in peak demand periods
- Ensuring that filling Iona storage (capacity 23.5 PJ) before and during winter has priority over market considerations. It can supply 35-40% of Victoria's peak winter day needs via the South West Pipeline (capacity 426 TJ per day)
- Ensuring all available pipeline capacity is ready to be pressurised with gas (linepack) on days of peak demand in winter – not just within the VTS but also the Eastern Gas Pipeline and Tasmanian Gas Pipeline (120 TJ or more has been offered by TGP owners)
- Ensuring the Victorian Northern Interconnect (VNI) is fully utilised to transport gas to both refill Iona and supply peak day needs (capacity 226 TJ per day)
- Ensuring that Victorian peak day winter needs take priority when Bass Strait gas is processed at Longford and then piped to Melbourne, NSW or Tasmania (Longford to Melbourne pipeline capacity is 1030 TJ per day)

Reversing decisions that were made by regulators over a decade ago, in very different circumstances, may be required. In 2010, the AEMC agreed to a rule change proposed by AEMO that ended a requirement for the Dandenong LNG storage to hold one quarter of its capacity as a buffer available to AEMO.<sup>61</sup> Here is the rationale as set out in 2010:

“This Rule change request was submitted by AEMO on 10 June 2010. In the Rule change request AEMO sought, in light of its claim of a decreased reliance on LNG for system security, to partially liberalise the operation of the Dandenong LNG storage facility. The 12 000 tonnes Dandenong LNG storage facility provides LNG storage services to participants in the Victorian Declared Wholesale Gas Market (DWGM) and to others. In addition, the Rule Change Request essentially removed AEMO's right to 3000 tonnes of storage capacity in the Dandenong LNG storage facility for an LNG reserve.”

### *Addressing risks of system failure*

Finally, the risk of gold plating the supply system should be addressed, without doing a full social cost analysis, as suggested below.

The gas system fails many times each year, but usually these failures affect only a few users for a short time – they are summarised in AER 2021 Gas Industry Performance. This is parallel to localised

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<sup>61</sup> <https://www.aemc.gov.au/rule-changes/dandenong-liquefied-natural-gas-storage-facility>

electricity blackouts. On the other hand, in 1988, Victoria faced severe gas shortages in 1988 when an explosion occurred at Esso's Longford gas plant killing two workers and injuring eight others.

AER's research using contingent valuation and choice modelling to estimate the social cost of short-term electricity system failures is recognised. AER had also planned to use modelling for Widespread and Long Duration Outages (WALDO) (but rejected after feedback from stakeholders).<sup>62</sup>

An alternative to the WALDO modelling could be to examine the range of possible outcomes by extent of possible gas system failure and by cost of preventing each type of failure. Even without capturing the value that customers place on avoiding outages, such modelling would be very useful in decision-making by regulators and policy makers.

## **A note on environmental and health impacts of proposed gas projects**

The imperative to address climate change has been addressed above.

Evidence is mounting about the health effects of 'natural gas' in the home and in pathways from production to the home.<sup>63</sup> The location of the proposed LNG terminal in Corio, with many houses within 500 metres poses the risk of a catastrophic fat-tail event. The economic cost of these effects should be taken into account.

The social licence for new gas projects is being increasingly questioned. The Victorian Government rejected AGL's proposal for a LNG import terminal at Crib Point on environmental grounds. Viva Energy's proposed terminal within the city of Geelong is also subject to an Environmental Effects Statement and growing community scrutiny.

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<sup>62</sup> AER 2020 Widespread and Long Duration Outages - Values of Customer Reliability - Final Conclusions at <https://www.aer.gov.au/networks-pipelines/guidelines-schemes-models-reviews/values-of-customer-reliability>

<sup>63</sup> See for example <https://www.climatecouncil.org.au/wp-content/uploads/2021/05/Kicking-the-Gas-Habit-How-Gas-is-Harming-our-Health.pdf>