



No shortage of solutions to gas supply gap

Policies to reduce demand could eliminate the risk
of peak outages in southern states

Joshua Runciman – Lead Analyst, Australian Gas



Contents

Key Findings.....	3
Executive Summary.....	4
The economic case for reducing gas demand.....	6
Conclusion	13
Appendix 1: Technical methodology.....	14
Appendix 2: Sensitivity analysis.....	18
About IEEFA.....	19
About the Author	19

Figures and Tables

Figure 1: Victorian peak day gas demand reduction delivered by modelled interventions	5
Figure 2: Gas demand reductions achieved in Victoria’s residential buildings and industry.....	7
Figure 3: Victorian Declared Transmission System daily demand profile, 2023 (TJ).....	8
Figure 4: Forecast peak day supply and Victorian DTS adequacy, 2024-28 (TJ/day).....	9
Table 1: Winter peak gas demand reduction in Victoria (August)	11
Table 2: List of interventions modelled	14
Table 3: IEEFA demand reductions estimates – sensitivity analysis.....	18

Key Findings

AEMO forecasts that Victoria's gas demand may outstrip supply on peak days due to peak demand not decreasing as quickly as peak gas supply.

Cost-effective and targeted interventions to lower gas demand could materially lower peak day gas demand and eliminate the risk of peak day excess demand events in Victoria.

This would lower household energy bills and help avoid the need for additional gas supply or infrastructure, which is likely to increase household energy bills.

Ending the sale of gas appliances, particularly gas space heaters, delivers the largest reductions in gas demand given Victoria's high gas demand for winter heating.



Executive Summary

The east coast of Australia faces the prospect of excess gas demand in coming years due to declining gas production, with the imminent possibility of short-lived periods of excess demand in Victoria on peak demand days. However, IEEFA's analysis shows that cost-effective and targeted interventions to lower gas demand could fully eradicate anticipated peak day excess demand in 2027 and 2028, provided action is taken soon enough.

The Australian Energy Market Operator (AEMO), in its 2024 Gas Statement of Opportunities, forecasts that southern east coast states are likely to face excess gas demand on annually from 2028, on a seasonal basis from 2026, and on a peak day basis from 2025 under extreme demand conditions.¹ In Victoria, which has the highest gas demand on the east coast (excluding demand for LNG exports), AEMO forecasts peak day excess demand up to 65 terajoules (TJ) in a 1-in-20-year scenario in 2027, and up to 94TJ/day and 185TJ/day under 1-in-2 and 1-in-20-year scenarios respectively in 2028.²



The interventions would lower peak day demand enough to eradicate anticipated peak day excess demand under AEMO's 1-in-2 and 1-in-20-year scenarios

IEEFA's analysis shows that cost-effective, targeted gas demand reduction interventions would lower peak day demand enough to eradicate anticipated peak day excess demand under AEMO's 1-in-2 and 1-in-20-year scenarios. Most of this decrease would come from reduced demand for residential heating. Some of the gas demand reduction interventions will lead to additional electricity demand. However, we calculated that even if all the additional electricity was generated by gas-powered plants, the interventions would still be enough to eradicate the excess gas demand in the 1-in-2-year scenario. In the 1-in-20-year scenario, at least 75% of additional electricity demand would need to be generated from other sources, such as batteries and electricity imports from Tasmania.

These interventions would also lower household energy bills. For example, if gas appliances were replaced by efficient electric appliances at the end of their life, the average Victorian home could save \$1,200 a year on its energy bills. Further, we estimate that each year of delay to ending the sales of new gas appliances costs Victorians a collective \$876 million in locked-in lifetime costs. Implementing both energy efficiency and electrification interventions in parallel will deliver additional financial benefits, such as ensuring that new equipment is not oversized or unnecessary.

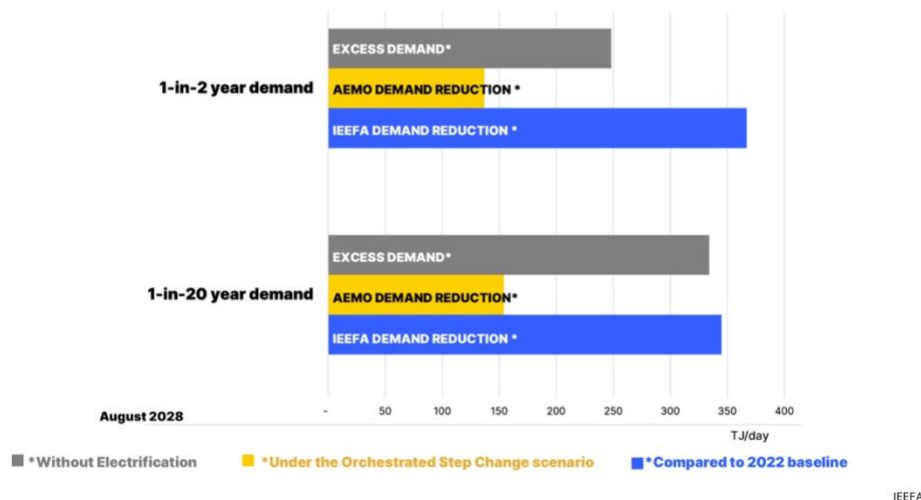
These measures can also reduce gas users' exposure to volatile gas prices, which are likely to worsen in a tight gas market. The tightening outlook in recent years has already driven gas prices well above historical levels, with some users reporting that unsustainable prices and could force them to close. For example unanticipated coal generation outages in 2022 caused a spike in gas demand, which

¹ Australian Energy Market Operator (AEMO). [2024 Gas Statement of Opportunities](#). March 2024. Pages 61, 67. Note: 1-in-2 represents a peak winter demand day experienced once every two years; 1-in-20 is once in 20 years.

² AEMO. [2024 Victorian Gas Planning Report](#). March 2024. Page 54.

resulted in prices spiking in AEMO’s gas spot markets. This led to AEMO implementing a \$40 per gigajoule (GJ) cap in the Victorian market. Excess demand in Victoria on peak demand days would similarly cause gas prices in the spot markets to soar with potentially serious impacts on industrial users, small businesses and electricity generators (as well as the gas retailers supplying them).

Ending gas appliance sales would reduce new infrastructure requirements, cut household bills



Source: IEEFA

Improving gas efficiency and increasing the use of highly efficient electric appliances would have the double benefit of reducing market tightness and increasing the predictability of energy bills. Indeed, it would increase the share of costs associated with capital investments compared with variable energy costs, which would smooth out energy costs throughout the year. For example, we calculated that a household’s winter energy costs would be only 90% higher in winter compared with summer by using heat-pump based appliances compared with 167% higher for gas-based equipment.

There needs to be a greater focus on the demand side of the demand and supply equation, particularly for those gas users who can most easily switch away from gas and will have the largest benefits. The Australian Competition and Consumer Commission (ACCC), which to date has largely focused on supply-side measures, acknowledged in late 2023 the need for further measures to reduce gas demand on the east coast.³ In IEEFA’s view, the need for demand reduction will only increase as the supply outlook worsens – urgent action is needed now to lower gas demand.

This analysis, while indicative, presents a compelling case for further investigation, and IEEFA encourages the Australian and Victorian governments to further consider these interventions. The alternative would be costly supply-side solutions that lock in higher energy bills for households during a cost-of-living crisis and potentially further expose gas users to volatile international gas prices.

³ AEMO. [2024 Victorian Gas Planning Report](#). March 2024. Page 41.

The economic case for reducing gas demand

Costly supply infrastructure an investment that may never pay off

Australia's southern states face the prospects of excess demand creating gas "shortfalls" from 2025 due to gas demand not declining as quickly as gas production on the east coast. Victoria is particularly exposed given its high gas usage, for both residential and industrial purposes, with the prospects of peak day excess demand in coming years on peak demand days.

However, energy agencies have focused on supply-side solutions in recent years, with the ACCC and AEMO calling for new gas supply in the south and the new Australian Government mandatory Code of Conduct designed to deliver additional supply commitments. There have also been several LNG import terminals proposed across the southern states, but to date none have begun operating.

A recent IEEFA report,⁴ found that cost-effective interventions could reduce gas demand enough to fully eradicate the looming gap between gas demand and supply in the southern states while lowering household energy bills.

This report builds on IEEFA's previous analysis to assess the impact of these interventions on peak day demand in Victoria in the winter months (specifically August).

This analysis illustrates the significant impact that targeted interventions could have on peak day demand (as well as average daily demand), which should be further investigated as an option for addressing periods of excess demand on peak demand days.

Australia has profitable opportunities to reduce gas demand

The amount of energy used by Australian households for cooking, hot water heating and space conditioning (i.e. space heating) could be significantly lower if gas appliances were replaced with more efficient electrical appliances. The reductions could be even larger if energy efficiency upgrades, such as installing insulation, were implemented at the same time.⁵

Australia's housing stock has very poor thermal efficiency, decreasing the energy efficiency of Australian housing. While new homes are subject to minimum efficiency requirements, many existing homes have energy efficiency ratings well below those of new homes.⁶ In practice, this means that these homes require greater energy consumptions than new, more efficient homes. For example, "... an existing home in Victoria will require about five times as much energy to heat and cool it as a home built in 2024."⁷

⁴ IEEFA. [Reducing demand – A better way to bridge the gas supply gap](#). 16 November 2023.

⁵ Ibid. Page 9.

⁶ SV. [Energy Efficiency Upgrade Potential of Existing Victorian Houses](#). September 2016. Page 6.

⁷ IEEFA. [Reducing demand – A better way to bridge the gas supply gap](#). 16 November 2023. Page 9.

Disparity in the thermal efficiency of existing housing stock also means some existing homes require much more energy – Victorian data shows that some households use up to three times more gas than the state average, leading to significantly higher energy bills for these households.^{8,9}

Similarly, the reliance on gas appliances in some Australian states, most notably Victoria, means many households are using less efficient appliances. For example, a gas space heater requires more than four times the energy input as a heat pump electric heater for the same effective temperature.

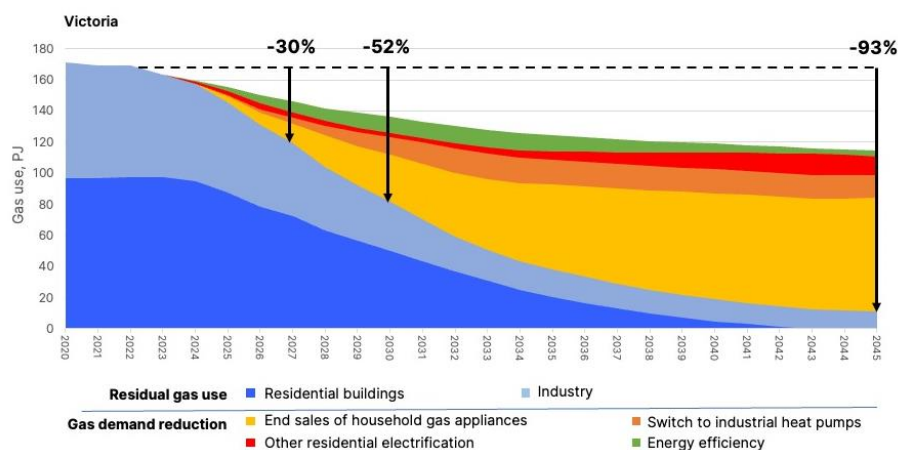
The industrial sector also presents opportunities to lower energy consumption through improved energy efficiency and greater adoption, where feasible, of more efficient heat pumps rather than gas boilers.¹⁰

IEEFA's modelling, while indicative, demonstrates that targeted interventions can materially decrease gas demand in the southern states, with even larger reductions in Victoria, reflecting its higher gas consumption (Figure 1).

These interventions would also be sufficient to delay the looming supply gap in the southern states (based on annual demand and supply forecasts under AEMO's Orchestrated Step Change scenario) and would eliminate it completely under the Green Energy Exports scenario.¹¹

The alternative to demand-side measures is to develop new sources of gas supply or new infrastructure to allow gas to be transported to the southern states. However, as previously noted by IEEFA, "All of these options require very large upfront capital investments for long-lived assets, which will need to be recovered, plus a profit margin, through energy bills."¹²

Figure 1: Gas demand reductions achieved in Victoria's residential buildings and industry



Source: IEEFA

⁸ This assumes that the state household average equates to the average for two- and three-person households.

⁹ Frontier Economics. [Residential energy consumption benchmarks](#). 9 December 2020. Page 108.

¹⁰ Ibid. Page 10.

¹¹ IEEFA. [Reducing demand – A better way to bridge the gas supply gap](#). 16 November 2023. Page 20.

¹² Ibid. Page 23.

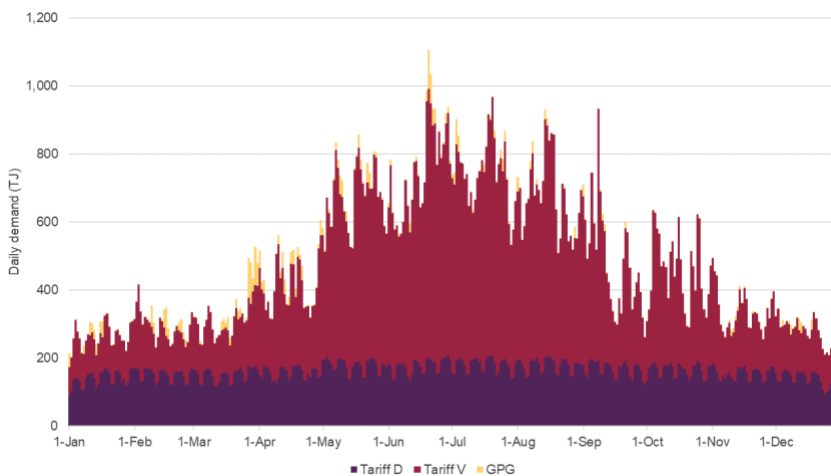
AEMO peak demand day estimates

Victoria has the highest domestic gas demand on Australia’s east coast (excluding demand for LNG exports in Queensland), consisting of residential, commercial, industrial and electricity generation demand. Victorian gas demand follows a seasonal trend, with demand significantly higher in the winter months due to Victoria’s high usage of residential gas space heating and water heating (Figure 3). This reflects Victoria’s legacy gas production from the Gippsland Basin, which has been producing relatively cheap and plentiful gas for decades.

However, the Gippsland Basin is a mature gas field in decline, with its production forecast to fall in coming years.¹³ This projected decline has not been offset by additional production elsewhere in the southern states, meaning that the supply outlook for those states is worsening. The ACCC forecast in late 2023 that the southern states would have to rely on additional gas being transported south from Queensland in 2024 (and beyond) to meet projected demand.¹⁴

David Berman, Commercial Director of ExxonMobil Australia (operator of the Gippsland Basin Joint Venture), told the 2023 Australian Domestic Gas Outlook conference that the basin supplied more than 70% of south-eastern Australia’s gas demand in 2022, and historically has increased production in winter to meet the seasonal peak. However, he also noted that the basin “will no longer have the capacity to step in as it has in the past to provide whole of market solutions when planned or unplanned maintenance events occur, or when additional gas is required to support the electricity market”.¹⁵

Figure 2: Victorian Declared Transmission System daily demand profile, 2023 (TJ)



Source: AEMO

¹³ AEMO. [Victorian Gas Planning Report](#), March 2023. Page 7.

¹⁴ Australian Competition and Consumer Commission (ACCC). [Gas Inquiry 2017-30 December 2023 Interim Report](#). December 2023. Page 24.

¹⁵ Berman, D. [The evolving role of Gippsland gas in Australia’s east coast gas market](#). March 2023.

The tightening supply outlook in the southern states, and the changing role of the Gippsland Basin, means there is a greater risk of unmet gas demand in Victoria on peak demand days in winter (as noted by AEMO in the 2024 Victorian Gas Planning Report).¹⁶ While AEMO anticipates that peak day supply will be sufficient to meet 1-in-2 and 1-in-20 year peak day demands from 2024-26, this will only be the case if assumed electrification rates are realised. However, peak day supply adequacy will tighten in coming years, and Victoria could still face system demand higher than supply on peak demand days from next year “in the event of high coincident system and GPG [gas for power generation] demand across the southern states”.¹⁷

AEMO forecasts that by 2027, system demand will exceed supply on a 1-in-20 year peak demand day (Figure 4).¹⁸ By 2028, demand is likely to outstrip diminishing supply under both 1-in-2 and 1-in-20 year demand scenarios.¹⁹

AEMO’s forecast demand in Victoria accounts for government policies to reduce demand, namely the ban on gas connections for developments requiring planning approval and the inclusion of induction cooktops in the Victorian Energy Upgrade scheme.²⁰ As noted by AEMO: “Recent policy changes contribute to the pace of electrification, reducing gas consumption ...”²¹ However, AEMO also notes: “While these policy initiatives are forecast to reduce gas consumption for both residential and small commercial customers initially, continuing the forecast reduction will require additional strong policy incentives and significant industry investment to realise the level of electrification assumed under the Step Change scenario.”²²

¹⁶ AEMO. [Victorian Gas Planning Report](#). March 2024. Page 5.

¹⁷ Ibid.

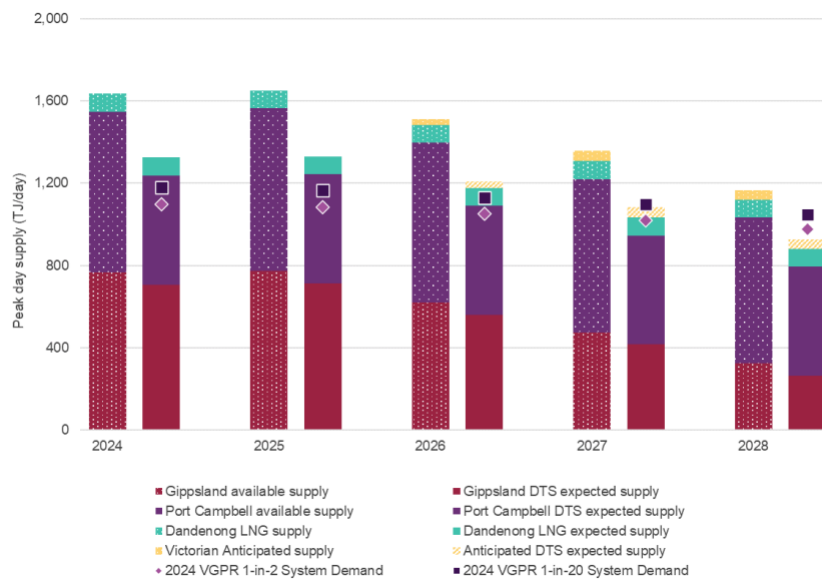
¹⁸ Ibid. Pages 10-11.

¹⁹ Ibid. Page 10.

²⁰ AEMO. [Victorian Gas Planning Report](#). March 2024. Pages 5-6.

²¹ AEMO. [2024 Gas Statement of Opportunities](#). March 2024. Page 7.

²² Ibid. Page 34.

Figure 3: Forecast peak day supply and Victorian DTS adequacy, 2024-28 (TJ/day)

Source: AEMO

AEMO also assumes additional electrification, noting: “The 2024 VGPR Update demand forecasts include an assumption that there is an increasing amount of electrification of mostly residential and small commercial customer gas demand during the outlook period.”²³ If this electrification is delayed, however, system demand could exceed supply by a much larger margin – up to 334TJ/day in 2028 under a 1-in-20 year demand scenario.²⁴

Measures to eliminate the risk of peak day excess gas demand

IEEFA’s previous analysis found that cost-effective interventions could lower residential and industrial gas demand in the southern states by up to 22% and 42% by 2027 and 2030 respectively (relative to 2022 levels).

This report builds on that analysis to assess the impact of these interventions ([Appendix 1, Table 2](#)) on winter peak day gas demand in Victoria.

This analysis, while indicative, shows that targeted interventions could lower peak day demand enough to eliminate peak day excess demand events anticipated by AEMO in 2027 and 2028 (Table 1). These events are forecast to occur even with additional electrification of existing gas demand. However, eliminating the risk of excess demand events will likely require that additional electricity demand arising from increased electrification is primarily met by non-gas electricity generation (i.e. renewable energy).

²³ Ibid. Page 11.

²⁴ Ibid. Page 53.

Table 1: Winter peak gas demand reduction in Victoria (August)

Year	2027	2028
1-in-2 year peak demand scenario		
Excess demand with Victorian expected supply (with no electrification)		-248
AEMO peak day demand reduction in Orchestrated Step Change compared with no electrification		154
IEEFA peak day demand reduction compared to 2022 baseline (equivalent to no electrification from 2022 levels)		345
1-in-20 year peak demand scenario		
Excess demand with Victorian expected supply (with no electrification)	-173	-334
AEMO peak day demand reduction in Orchestrated Step Change compared with no electrification	109	137
IEEFA peak day demand reduction compared to 2022 baseline (equivalent to no electrification from 2022 levels)	293	367

Sources: IEEFA analysis, AEMO

As noted above, AEMO's assumed rate of electrification (under the Step Change scenario) incorporates the effect of committed government policies, but also assumes an additional level of electrification. Accordingly, there is a need for additional action to drive electrification of existing gas demand to achieve the scale of electrification modelled by AEMO.

The analysis in this report presents a set of interventions that would not only address the risk of peak day excess demand events, but would also more than achieve the level of electrification anticipated by AEMO's modelling. In other words, these interventions should be considered as possible policy options that could more than achieve the level of electrification assumed by AEMO in its Step Change scenario, which in addition to addressing the risk of peak day excess demand events will also help Victoria meet its greenhouse gas (GHG) emissions reduction targets.

The interventions would also materially lower average daily gas demand in the winter months, which would improve the broader demand-supply outlook and potentially reduce withdrawals from gas storage facilities in the winter months (thereby leaving additional gas for peak demand days or to cover unanticipated outages in the system).

Declining peak day gas demand will increase electricity demand on peak days. Our analysis suggests, however, that material declines in peak day gas demand will lead to relatively smaller increases in electricity demand (due to the inherent efficiency improvements associated with electrification of household demand). For example, the interventions are likely to reduce peak day gas demand by almost 35% under a 1-in-20-year scenario in 2028, with a corresponding increase in electricity on peak gas demand days of only about 10%. Notably, days of peak gas demand in Victoria generally do not correspond to days of peak electricity demand.

In practice, this increase in electricity demand is likely to be spread over a large part of a peak demand day, given it largely relates to electricity for space heating, and this means that electricity demand on peak winter days is likely to remain below peak summer electricity demand. For example,

AEMO forecasting data from its Electricity Statement of Opportunities estimates peak day electricity demand in winter in 2028 will be about 16% lower than that in summer. In other words, it is likely that existing infrastructure will be able to accommodate the increase in electricity demand in 2028 arising from the interventions modelled by IEEFA, leading to more efficient utilisation of electricity transmission and distribution infrastructure.

Eliminating the risk of excess demand events may require that additional electricity demand is primarily met with non-gas generation (depending on how quickly gas demand falls in Victoria, including in response to government policies). We estimate that additional electricity demand from the interventions amounts to about 13.5 GWh on a 1-in-20 demand day, which would require about 128TJ of gas if it were met solely through increased gas-powered generation. Under 1-in-2-year demand conditions, additional electricity supply would require about 119 TJ if met solely through gas generation (equivalent to about 12.5 GWh of electricity), which means that even if all the additional electricity was generated by gas-powered plants, the interventions would still be enough to eradicate the excess gas demand in the 1-in-2-year scenario.

In the 1-in-20-year scenario, the electricity would need to be generated from other sources. Batteries may help limit the reliance on gas-powered generation on extremely cold days, and proposed renewable energy projects may supply a significant portion of additional electricity demand. For example, Victorian Government data shows that almost 11 GW of renewable projects (6.3 GW of solar and wind generation and 4.6 GW of battery storage) have received planning approvals but are not yet operating.²⁵

IEEFA also recently found that Tasmania could increase its winter electricity exports to Victoria by optimising its energy assets. In particular, batteries located on the mainland could help increase the utilisation of Basslink and increase exports at times of peak demand. This could reduce the reliance on gas-fired electricity on peak gas demand days. The report estimated that Basslink could export enough electricity to meet about 7.5% of maximum daily demand in winter in Victoria (equivalent to about 11.2GWh of electricity),²⁶ which could likely meet a significant portion of additional electricity demand arising from IEEFA's modelled interventions.

The interventions modelled by IEEFA illustrate the potential for demand-side measures to eliminate the potential for peak day excess demand events, and they should be given further consideration by the Victorian government.

²⁵ Victorian Department of Transport and Planning. [Renewable Energy Projects Victoria](#). Accessed 15 April 2024.

²⁶ IEEFA. [Optimising the 'Battery of the Nation'](#). March 2024. Page 34.

Conclusion

This report identifies that targeted, cost-effective measures will eliminate the risk of peak day excess demand events anticipated by AEMO in 2027 under its 1-in-2 and 1-in-20 year peak demand day modelling.

By implementing these measures, the Australian and Victorian governments can address the looming risk of gas demand exceeding supply on peak days while contributing to Victoria meeting its GHG emissions reduction targets.

The alternative to reducing demand, in response to reducing gas supply, is developing new southern sources of gas supply or building additional infrastructure, such as pipelines or an LNG import terminal, to transport additional gas into southern regions. Each of these options requires significant investment, which is likely to increase energy bills.

Prioritising demand reduction through households switching to electrical appliances, however, will lower energy bills and could save Victorian households up to \$1,200 per year if gas appliances are replaced with electrical appliances at their end of their life. Reduced household energy demand (due to the greater efficiency of heat pump electrical appliances) can also help to reduce gas users' exposure to volatile energy prices, which in turn makes energy costs more predictable and more stable over different days and seasons. More stable energy costs will in turn help households to avoid "bill shock" (particularly pertinent during the cost of living crisis).

Gas reduction policies can also generate additional benefits, including improved health outcomes following residential electrification and energy efficiency upgrades (due to improved thermal comfort and lower rates of asthma) and create jobs.

These interventions will also help to ensure gas remains available for commercial and industrial users which are not yet able to switch away from gas, thereby helping to ensure Australia maintains gas-intensive manufacturing during the transition to low emission alternatives (such as hydrogen).

However, urgent action is needed. Without it, Victoria, along with the other southern states, is likely to face higher gas prices and energy insecurity.

IEEFA recommends that governments and energy agencies consider these opportunities in more detail, and properly assess the costs and benefits of investing to reduce gas demand as opposed to investing in increasing gas supply.

Appendix 1: Technical methodology

Interventions modelled in this report

The analysis in this report is intended to be indicative only. Table 2 presents the interventions modelled by IEEFA.

These interventions are identical to those in IEEFA's report *Reducing demand – A better way to bridge the gas supply gap*, with the exception that this report does not model the impact of stopping new gas connections given this is already policy in Victoria. A detailed list of modelling assumptions is outlined in that report.

Table 2: List of interventions modelled

Intervention	Description
Residential buildings	
End sales of new gas appliances	An end to the sale of new gas appliances is implemented from 2025. It is assumed that in the first three years some exclusions are warranted for 'hard-to-electrify' households, while appropriate solutions are developed.
Accelerated retirement to support gas phase-out	Natural retirements of gas appliances would likely leave a small trail of gas users after it has become uneconomical to run the gas networks. Most of this remaining gas use would come from gas heating, which is also the most economical to electrify. As a result, we have assumed that a managed phase-down is implemented that sees the gas networks shut down in the early 2040s.
Financially driven early retirements	Early retirement of gas appliances will be highly cost-effective for many households, for example those not using all of their solar photovoltaic (PV) electricity generation, or those with just one gas appliance left in their household. Indeed, replacing this last appliance means they could stop paying the high fixed costs associated with their gas connection. In addition, gas distribution prices will likely go up as networks usage decreases, improving the economics of electrification.
Increased use of existing air conditioners	Many households using gas for heating have reverse-cycle air conditioners, but most only use those air conditioners for cooling. They could significantly reduce their gas bill by displacing their gas heating energy use completely or partially. This would be particularly attractive when gas ducted systems are used to heat the whole house when heat is only required in living areas.
Thermal efficiency upgrades	As discussed earlier in this report, simple thermal efficiency upgrades could deliver material energy savings with relatively short paybacks, especially if applied in priority to the least efficient / highest gas-consuming houses.
Industry	
Energy efficiency interventions in light manufacturing	High levels of energy efficiency savings are usually available in light manufacturing businesses, which haven't had the capabilities or bandwidth to explore those opportunities in the past. Improving metering and data analysis to identify erroneous settings, recovering waste heat, and address leakages and losses can often deliver high savings at low cost with very short paybacks.
Heat pumps	A high proportion of gas use could be switched to heat pumps in light manufacturing businesses such as food and beverage manufacturers, which represent a material share of Victoria's industrial gas use in particular. Heat pumps are also likely to be available for select applications in heavier industry in the short-to-medium term.
Ongoing best practice energy efficiency	Energy efficiency is not a one-time improvement opportunity. New technologies and solutions are developed that deliver continuous improvement. Recent examples include improvements in controls, energy monitoring and automation. Rethinking the way in which we deliver energy services can lead to step changes in energy use as per the compressed air example mentioned in the report.

(light grey = electrification, dark grey = energy efficiency)

Source: IEEFA. *Reducing demand – A better way to bridge the gas supply gap*. 16 November 2023. Page 16.

Industry baseline gas use

The approach taken in this report to modelling industrial baseline gas use is the same approach previously used by IEEFA, as outlined in an earlier report:

Industrial gas use was projected based on recent trends and gas production projections included in the 2023 GSOO from the AEMO:

- For all manufacturing sectors, we used the average rate of change in gas use over the past five years to project future gas use.²⁷ We have grouped under “heavy manufacturing” a range of subsectors, which are not broken down in the energy statistics due to confidentiality issues.
- For oil and gas production, we used the GSOO’s existing and committed plus anticipated gas production trajectory from southern states to project future gas use within the sector itself.²⁸
- For pulp, paper and printing, we also decreased the energy use by two-thirds in 2024 compared with 2022 to account for the closure of the paper-producing plant at Maryvale, which was the last plant of its kind operating in the southern states.²⁹ After that date, we applied the average rate of change.

Victoria

Gas use from oil and gas production will decline significantly over the next two decades, in line with the expected production reduction.

Gas use from “heavy manufacturing” is also expected to decline sharply, in line with recent trends. This category is likely dominated by a few large basic chemical plants for which gas use is kept confidential. This strong decline would therefore reflect the phasing out of gas production, which has been a key input to those plants.

As a result, light manufacturing represents a growing proportion of Victoria’s industrial gas use over time. In particular, food manufacturing becomes its largest component from the mid-2030s onward.³⁰

Modelling the impact of interventions on peak day gas demand

IEEFA’s model uses a bottom-up approach to estimate annual gas demand for households based on gas consumption for different appliances, and for industry based on gas demand for each industry and share of industry in Victoria.

Similarly, the interventions outlined in Table 2 are modelled on an annual basis (with reductions then subtracted from baseline gas consumption estimates to derive residual annual gas demand).

²⁷ Based on DCCEEW. [Australian Energy Update 2022, Table F](#). September 2022.

²⁸ AEMO. [Gas Statement of Opportunities 2023](#). April 2023. Figure 27.

²⁹ ABC. [Maryvale paper producing plant to close with loss of up to 200 jobs](#). February 2023.

³⁰ [IEEFA, Reducing demand – A better way to bridge the gas supply gap, 16 November 2023](#). Page 33.

However, estimating the impacts of these interventions on peak day supply adequacy requires translating reductions in annual gas demand to peak day demand (under the scenarios modelled by AEMO). To estimate average daily demand for each month, IEEFA followed these steps:

- AEMO forecast 2023 Tariff V demand estimates were divided into residential and commercial demand using data on volumes supplied to residential and commercial customers from the distribution networks in Victoria.³¹
- **Commercial demand** was apportioned to each month using weightings derived from AEMO's Tariff D monthly demand forecasts for 2023 (that is, we assume that commercial demand follows a similar seasonal profile to industrial demand). This assumption is likely to understate the winter load associated with commercial use (given the use of space heating in commercial premises) and potentially overestimates the impact of the interventions on peak day supply adequacy – sensitivity analysis of this assumption is presented below.
- **Residential gas cooktop demand** is assumed to be constant in all months (in practice, gas demand for cooking could be marginally higher in winter, but given the low volume of gas used for cooking, assuming constant demand has a negligible impact on the modelling results).
- **Seasonality in residential water heater gas demand** was accounted for using monthly consumption estimates for gas storage water heaters (zones 3-4) from the Nationwide House Energy Rating Scheme (NatHERS) Whole of Home National Calculations Method report.³² These estimates are used to create weightings for each month, which are then applied to estimated annual consumption for gas hot water heating.
- **Estimated annual residential heating demand** was apportioned to each month using weightings derived from AEMO's seasonal residential demand profile (Tariff V less commercial demand). To do this, we assumed zero space heating demand for January (i.e. used January as a base month), and then assumed any uplift in demand in other months (after accounting for any additional gas demand for water heating) was for space heating. This gave us an estimated monthly demand profile for space heating (using AEMO data), which we then used to generate monthly weights, which were applied to IEEFA's bottom-up annual demand estimates.
- **Industrial demand** is allocated to each month using monthly weightings derived from AEMO's Tariff D monthly demand forecast for 2023.

The above steps give us estimated average daily and monthly demand for five use types – cooking, hot water heating, residential space heating, and commercial and industrial demand.

Peak day demand estimates were allocated to each of the five use types as follows:

³¹ Australian Gas Networks, [Regulatory Information Notice \(RIN\) Response](#) (tab N1). May 2023. Ausnet. [RIN Response](#) (tab N1). November 2023. Multinet. [RIN Response](#) (tab N1). November 2023.

³² Nationwide House Energy Rating Scheme. [NatHERS Whole of Home National Calculations Method. January 2023](#). Page 59.

- Gas demand for cooking, hot water heating and commercial demand was assumed to not change on peak demand days. In reality, commercial demand is likely to increase on peak days due to greater space heating – sensitivity analysis of this assumption is presented in [Appendix 2](#).
- Industrial peak day demand is based on AEMO estimates of Tariff D peak day demand.
- Any residual gas demand on peak days is assumed to be fully attributable to residential space heating. As noted by AEMO in the 2019 Victorian Gas Planning Report, the increase in gas demand on peak demand days is largely attributable to space heating.³³
- The percentage decrease in gas demand for cooking, hot water heating, residential space heating and industrial use was derived by comparing residual demand following the interventions with a future baseline level of demand (estimated by IEEFA). By doing this, we can account for future shifts in gas consumption while still comparing the impact of the interventions relative to current system demand (which is likely to reflect system demand without any electrification).
- The percentage decreases in gas demand (from step 3) were applied to the estimated peak day demand for each use type (step 2) to derive the reduction in peak day demand from the modelled interventions.

Finally, we assess the impact on electricity demand by:

- Estimating additional energy demand from reduced gas demand (excluding reduced gas demand due to increased energy efficiency) by dividing avoided gas demand by an efficiency factor to account for increased efficiency of heat pumps. We use a factor of 4.5 for residential demand and 6 for industrial demand. This yields an estimate of additional energy demand expressed in TJ.
- We convert this to an estimate of electricity demand by multiplying the estimate from step 1 by 277.77 to derive an estimate of additional energy demand in MWh. We compare this to electricity demand in the Victorian grid on 1 August 2023 (a peak electricity demand day).
- We then estimate additional gas demand for GPG (assuming the additional electricity demand is met solely through GPG) by multiplying the estimated additional MWh by a heating rate of 9.51GJ/MWh.

³³ AEMO. [2019 Victorian Gas Planning Report](#). March 2019. Page 29.

Appendix 2: Sensitivity analysis

The analysis above assesses the impact of interventions targeted at households and industrial gas users. In undertaking this analysis, we have made assumptions about how to allocate commercial demand across different seasons, and how to allocate a share of peak day demand to commercial gas users. This section presents sensitivity analysis of these assumptions.

Commercial gas users are non-residential users of gas that have an annual demand of 10TJ or less (with industrial users having an annual demand of more than 10TJ). In reality, commercial users are likely to range from very small gas users (such as restaurants or shops), which have a usage profile similar to that of residential users, to relatively large users more akin to industrial users.

Our analysis, presented above, assumes that commercial demand follows the same seasonal profile as industrial users, and that commercial gas demand does not materially change on peak demand days (that is, peak day demand is not attributable to increasing commercial consumption). In practice, these assumptions have the effect of treating commercial gas users like large industrial gas users.

However, it is more likely that the “average” commercial gas users sits somewhere between a typical residential and industrial gas user. For this reason, we have undertaken sensitivity analysis that assumes:

- The seasonal profile of commercial gas use is the same as the seasonal profile of AEMO’s forecast Tariff V demand for 2023 (which incorporates residential and commercial demand).
- A share of the increase in gas demand on peak days is attributable to commercial users (with the share being equivalent to the share of gas delivered to commercial customers by Victorian gas distribution networks).

The results (Table 3) indicate that these assumptions have the effect of reducing the impact of the interventions on peak day demand. However, while the impact is lower, the scale of the reductions in peak day demand is still sufficient to fully offset AEMO’s anticipated peak day shortfalls in 2027 and 2028.

In reality, the impact of IEEFA’s proposed interventions are likely to sit somewhere in the middle of the results presented above, again suggesting that they would be sufficient to eliminate the risk of peak day shortfalls.

Table 3: IEEFA demand reductions estimates – sensitivity analysis

	2027	2028
IEEFA demand reductions estimates – base modelling		
IEEFA peak demand reduction – 1-in-2 demand day (August)	-	345
IEEFA peak demand reduction – 1-in-20 demand day (August)	293	367
IEEFA demand reduction estimates – sensitivity analysis		
IEEFA peak demand reduction – 1-in-2 demand day (August)		340
IEEFA peak demand reduction – 1-in-20 demand day (August)	287	361

About IEEFA

The Institute for Energy Economics and Financial Analysis (IEEFA) examines issues related to energy markets, trends and policies. The Institute's mission is to accelerate the transition to a diverse, sustainable and profitable energy economy. www.ieefa.org

About the Author

Joshua Runciman

Josh Runciman is IEEFA's Lead Analyst for Australian Gas. His work focuses on key issues in Australia's gas and LNG sector, including gas market policy. Prior to joining IEEFA, Josh was a director on the Australian Competition and Consumer Commission's Gas Inquiry 2017-2030, where he worked on a range of issues, including supply adequacy, gas commodity and pipeline pricing, LNG netback pricing and retailer behaviour. jrunciman@ieefa.org

This report is for information and educational purposes only. The Institute for Energy Economics and Financial Analysis ("IEEFA") does not provide tax, legal, investment, financial product or accounting advice. This report is not intended to provide, and should not be relied on for, tax, legal, investment, financial product or accounting advice. Nothing in this report is intended as investment or financial product advice, as an offer or solicitation of an offer to buy or sell, or as a recommendation, opinion, endorsement, or sponsorship of any financial product, class of financial products, security, company, or fund. IEEFA is not responsible for any investment or other decision made by you. You are responsible for your own investment research and investment decisions. This report is not meant as a general guide to investing, nor as a source of any specific or general recommendation or opinion in relation to any financial products. Unless attributed to others, any opinions expressed are our current opinions only. Certain information presented may have been provided by third parties. IEEFA believes that such third-party information is reliable, and has checked public records to verify it where possible, but does not guarantee its accuracy, timeliness or completeness; and it is subject to change without notice.

