ADDENDUM

The impact of the Victorian Gas Substitution Roadmap on forecasts of gas usage and connections in the AusNet distribution area

Prepared for
AusNet

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THE CENTRE FOR INTERNATIONAL ECONOMICS
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CANBERRA

Centre for International Economics
Ground Floor, 11 Lancaster Place
Canberra Airport ACT 2609

Telephone +61 2 6245 7800
Facsimile +61 2 6245 7888
Email cie@TheCIE.com.au
Website www.TheCIE.com.au

SYDNEY

Centre for International Economics
Level 7, 8 Spring Street
Sydney NSW 2000

Telephone +61 2 9250 0800
Email ciesyd@TheCIE.com.au
Website www.TheCIE.com.au

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Summary

The CIE has been commissioned by AusNet Services to analyse the impacts of the Victorian Gas Substitution Roadmap on the GAAR 2023-28 forecasts

The key changes expressed in the Roadmap include:

- phasing out Victorian Energy Upgrades (VEU) scheme incentives for gas residential appliances by the end of 2023 and developing new incentives through the VEU program to help replace gas water heating and space heating with efficient, low-emissions electric equipment
- changes to the Victoria Planning Provisions in 2022 to remove the requirement for new housing developments to be connected to gas allowing developers and homeowners to choose all-electric homes
- retiring Victoria's 6 Star National Construction Code variation to better allow for more efficient electric hot water systems as part of new construction and major renovations
- moving to a 7 Star Standard for new home construction and taking into account the energy use of fixed home appliances (such as heating and cooling; hot water and lighting) instead of just the thermal shell of the building, driving greater energy efficiency from the point of design.

Some of these policy changes are reasonably clear and for others the intent is clear, however there is not sufficient detail for quantitative analysis. Where there is detail available for quantitative analysis, we estimate that r the Roadmap will have the following impacts:

- usage per new house will reduce by 3.5 per cent,
- usage per new apartment will reduce by 27 per cent, and
- usage per existing customer will reduce by 0.13 per cent year-on-year.

These estimated impacts yield projections of gas usage that are far higher than the usage scenario presented in the Roadmap and the AEMO Step Change or Progressive Change scenarios in the Gas Statement of Opportunities (GSOO). Hence, in addition to the to scenario reflecting the potential specific impacts able to be analysed from the GSR (labelled the bottom-up scenario), we model five scenarios for residential connections using assumptions developed with AusNet:

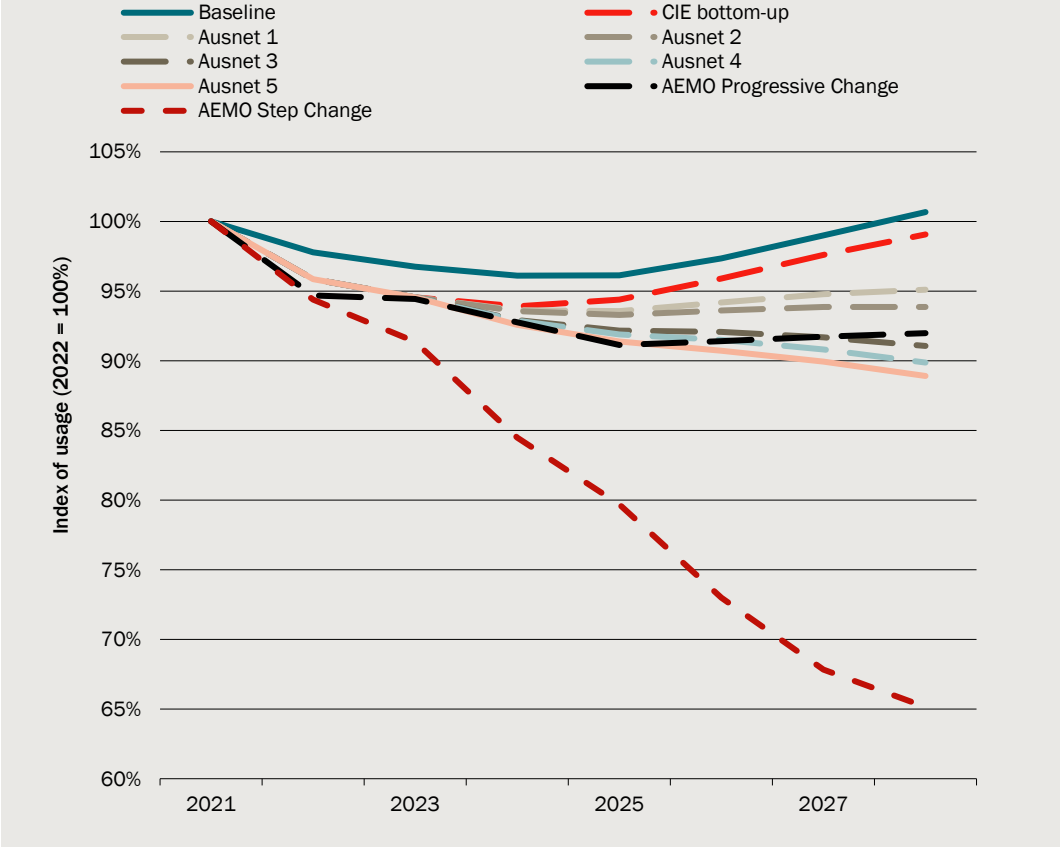
- Ausnet 1 has a 75 per cent lower marginal penetration rates (i.e. the number of net new customers per new dwelling) by 2027, with a linear glide path to this reduction starting in 2024. Further, it includes a reduction in usage of new houses and apartments of 40 per cent, which is based on new connections not using gas for hot water as a result of the GSR impacts.

- Ausnet 2 is the same as Ausnet 1, but with a lower marginal penetration rate (further reduced by 50 per cent) and a year-on-year reduction in usage per existing customer consistent with the CIE bottoms-up scenario.
- Ausnet 3 and 4 are the same as Ausnet 1 and 2, respectively, but with the addition of disconnections due to customers substituting to electric appliances. It is assumed that 0.75% of residential customers (as a share of customers in 2022) disconnect in 2024, 2025 and 2026, which rises to 1% of customers in 2027 and 2028.
- Ausnet 5 assumes that disconnections occur as per Ausnet 3 and 4, without any of the other impacts assumed in other scenarios. That is, the marginal penetration rate and usage per existing and new customer remain the same as under the baseline, except with updated price forecasts.

The CIE bottom-up and Ausnet scenarios also differ from the baseline in that they apply the price forecasts from the GSOO 2022 Progressive Change scenario. Each of these changes under the scenarios are modelled to start in 2024.

The differences between scenarios in terms of residential usage are shown in chart 4.3. Usage is indexed to 100 per cent at 2021 to facilitate comparison with the GSOO Progressive Change and Step Change scenarios for residential and commercial usage. The Ausnet 3 scenario has the closest trajectory to the GSOO Progressive Change scenario, falling to around 8 per cent below the 2021 level for usage, while the AEMO Step Change scenario shows a far greater decline in usage (66 per cent by 2028) than any scenario modelled.

1 Residential usage index by scenario plus GSOO 2022 scenarios



Note: The GSOO 2022 forecast includes energy efficiency and fuel switching adjustments. The baseline, CIE bottom-up and Ausnet scenarios all include energy efficiency and fuel switching adjustments consistent with the adjustments made in the original Ausnet forecasts. This chart compares residential and commercial usage forecasts from AEMO to residential usage only for the other scenarios.

Data source: GSOO 2022, CIE.

1 The Victorian Gas Substitution Roadmap

Energy affordability and reliability are priorities for the Victorian Government. The Victorian Gas Substitution Roadmap considers that using less natural gas, through energy efficiency and electrification, can lower Victorian consumers' energy bills by reducing their exposure to high gas prices.

Gas used to be the cheapest source of fuel for heating across Victoria but given international events and uncertainty surrounding gas supply and prices globally, gas prices have been steadily rising.

The Victorian Gas Substitution Roadmap is intended to reduce the cost of living of Victorian residents by moving away from gas to more affordable and efficient energy use for households and businesses.

Victoria has also decided to halve emissions by 2030 in order to transition to a net zero emissions economy by 2050. Achieving Victoria's interim emissions reduction targets will require cutting emissions across the entire economy, including the gas sector which contributes about 17 per cent of Victoria's net emissions.[1]

Victorians have the highest use of gas for heating, cooking and hot water in Australia.

The intended outcomes of changes flagged in the Gas Substitution Roadmap are a reduction in gas use and gas customer numbers bounded by the extent to which the reforms affect gas to electric switching behaviour, solar PV adoption, and developer choice to connect new dwellings to gas.

Energy efficiency and electrification is expected to free up gas for industrial use away from commercial and household use.

Proposed changes in the Victorian Gas Substitution Roadmap

The key changes expressed in the Roadmap include:

- phasing out Victorian Energy Upgrades (VEU) scheme incentives for gas residential appliances by the end of 2023 and developing new incentives through the VEU program to help replace gas water heating and space heating with efficient, low-emissions electric equipment
- changes to the Victoria Planning Provisions in 2022 to remove the requirement for new housing developments to be connected to gas allowing developers and homeowners to choose all-electric homes

1 Victoria Department of Environment, Land, Water and Planning 2022. Gas Substitution Roadmap.

- retiring Victoria's 6 Star National Construction Code variation to better allow for more efficient electric hot water systems as part of new construction and major renovations
- moving to a 7 Star Standard for new home construction and taking into account the energy use of fixed home appliances (such as heating and cooling; hot water and lighting) instead of just the thermal shell of the building, driving greater energy efficiency from the point of design.

These incentives and policy reforms build on existing programs such as[2]:

- The 10-year $1.3 billion Solar Homes Program, which is providing 778 500 rebates to support Victorian households to install solar PV panels, solar hot water and electric heat pumps, or battery systems at home
- The Solar for Business Program, which is supporting 15 000 Victorian businesses to install solar PV systems at their work premises
- The Big Housing Build program, with thousands of new energy efficient public housing units being built and upgrades of 35 000 social housing units underway, with all-electric specification wherever possible

Some aspects of the Roadmap are relatively clear in terms of the policies being implemented. Other aspects are really a policy intent, but without specific details.

2 Victoria Department of Environment, Land, Water and Planning 2022. Gas Substitution Roadmap.

2 Estimating impacts from the Roadmap

How will the changes in the Roadmap impact demand?

In table 1 we identify which part of gas forecasts would be impacted by relevant changes from the Roadmap. The largest impacts are expected on new customer connections and usage.

1 Changes in Victorian roadmap

Policy change	Residential or non-residential	Existing/new customers	Impacts take-up rates?	Impacts gas use per customer?
Expanded Victorian Energy Upgrades program ▪ Remove incentives for gas appliances ▪ Increase incentives for electric appliances	Both	Existing	Indirectly	✓
Amendments to the Victoria Planning Provisions to remove requirement for new housing developments to be connected to gas	Residential	New	✓	×
Home energy efficiency to 7 star and covering appliances	Residential	New	Indirectly	✓
Removal of Victorian variation to the NCC, which requires the inclusion of either a rainwater tank plumbed to all sanitary flushing systems or a solar hot water system for new Class 1 dwellings. (A large share of houses have adopted solar boosted by gas.)	Residential (Class 1 only)	New	Indirectly	✓

Source: The CIE, based on Victorian Gas Substitution Roadmap.

The sections below outline the expected magnitude of impact, where these can currently be anticipated.

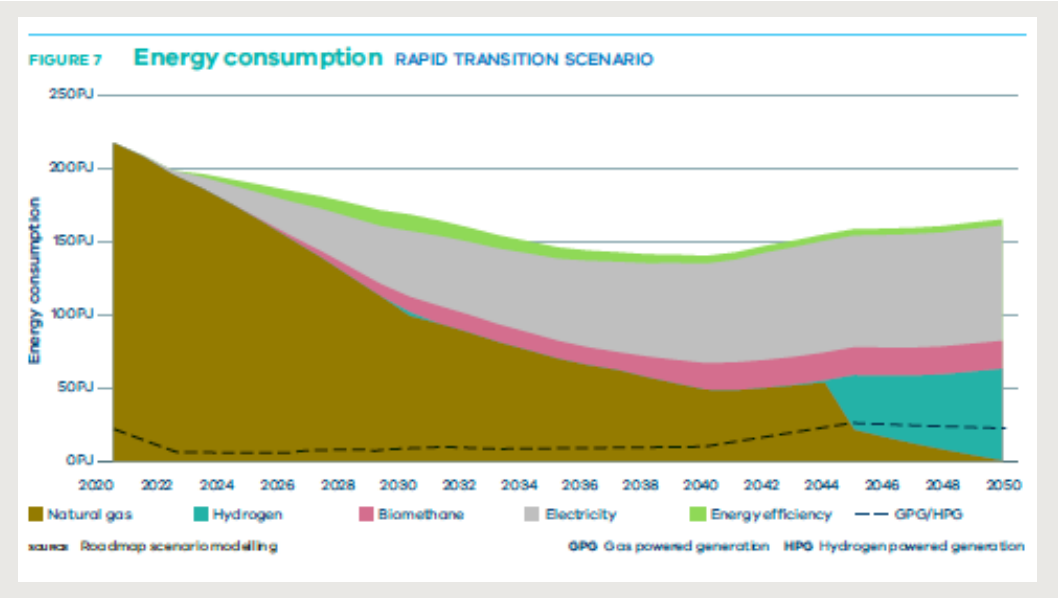
Top-down projections of the impact of the Roadmap

The Roadmap presents scenarios of overall projections of Victorian gas usage. AEMO also has projections for a number of similar scenarios. Top down projections anticipate very large reductions in gas usage under most scenarios.

- The scenarios presented in the Roadmap anticipate reductions of ~8 per cent per year in gas usage. This reflects declining demand for energy as well as a switch to electricity and increased energy efficiency. Chart 2.1 shows the estimates for the 'Rapid Transition' Scenario. The Roadmap also shows an 'Electrified Future' scenario and a 'Zero carbon fuels' scenario, which show similar reductions in gas consumption to 2030.

- AEMO has also developed a number of gas consumption scenarios for Victoria as part of the Gas Statement of Opportunities 2022.[3] These range from fairly stable consumption (the Progressive Change Scenario) to large reductions in gas consumption for other scenarios (chart 2.2). AEMO notes that the 'Step Change' scenario is considered the most likely by stakeholders.[4]

2.1 Overall gas consumption trends anticipated in the Roadmap

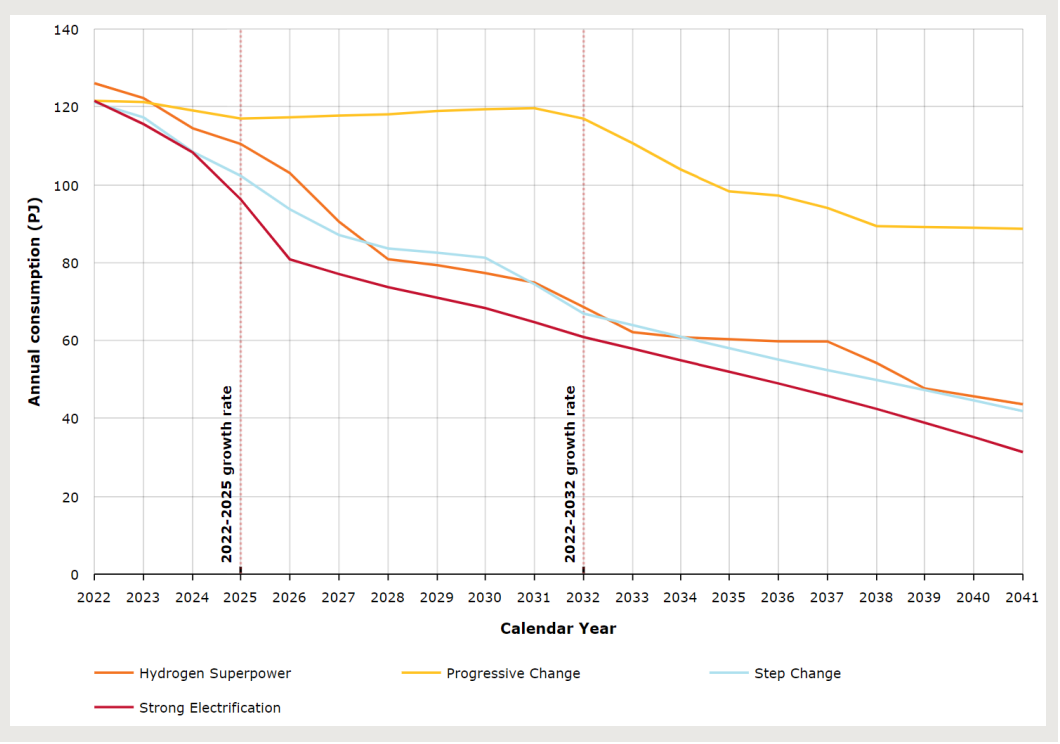


Data source: Victorian Gas Substitution Roadmap, https://www.energy.vic.gov.au/__data/assets/pdf_file/0037/579907/Victorias-Gas-Substitution-Roadmap.pdf, Figure 7.

3 AEMO 2022, Gas Statement of Opportunities, https://aemo.com.au/en/energy-systems/gas/gas-forecasting-and-planning/gas-statement-of-opportunities-gsoo.

4 AEMO, 2022, Gas Statement of Opportunities, p.5.

2.2 AEMO gas consumption scenarios



Data source: AEMO 2022, Gas Statement of Opportunities, https://aemo.com.au/en/energy-systems/gas/gas-forecasting-and-planning/gas-statement-of-opportunities-gsoo.

The overall scenario modelling from AEMO and the Roadmap shows that there is now significant risk that gas projections will be materially lower than previously expected. However, the specific policies that will drive these large reductions are not yet obvious.

Seven star homes and whole of home energy budget

The Victorian Government is proposing stronger efficiency standards for new homes as outlined in changes to the 2022 National Construction Code (NCC), including a move to 7 stars and new requirements for fixed appliances such as heating and cooling, hot water systems and lighting, to come into effect, retiring the existing 6 Star standard.

Under NCC 2022, new homeowners and developers will be able to choose a mix of fixed appliances that suit them (including heating, cooling and hot water) provided they meet the new whole of home energy budget. The whole of home energy budget provides for installation of on-site energy generation and storage such as adoption of solar PV and will be supported by new tools through the Nationwide House Energy Rating Scheme (NatHERS).[5]

As part of the NCC 2022 development process, the ABCB engaged ACIL Allen to develop a Consultation Regulation Impact Statement (RIS) assessing the costs and benefits of proposed increases in energy efficiency requirements in the NCC 2022 for new

5 Victoria Department of Environment, Land, Water and Planning 2022. Gas Substitution Roadmap.

residential buildings. We have used the change in gas usage estimates calculated using the policy options modelled in the Consultation RIS. There are two options modelled under the RIS apart from the Business-as-usual case. The options include[6]:

- Option B sets a maximum annual energy use budget for the elements of a building regulated by the National Construction Code (NCC) (space conditioning, water heating systems, lighting and pool and spa pumps). The budget allocation is based on a 'benchmark home' built with the following characteristics:
  - building shell performance level: equivalent to a 7 Star Nationwide House Energy Rating Scheme (NatHERS) rated dwelling
  - heating equipment: equivalent to a 4.5 star rated (Greenhouse and Energy Minimum Standards (GEMS) 2012) heat pump heater (Annualised Energy Efficiency Ratio, AEER = 4.5)
  - cooling equipment: equivalent to a 4.5 star rated (GEMS 2012) heat pump cooler (Annualised Coefficient of Performance, ACOP = 4.5)
  - water heater: instantaneous gas
  - 4 Watts per square metre of lighting
- Option A is based on 70 per cent of the Option B benchmark and the same energy use budget as Option B. Therefore, under option A, compliant buildings must achieve savings equivalent to savings equivalent of 30 per cent of the societal cost of applying the equipment and building fabric performance level of the benchmark building specified in Option B).

Under both options, a societal cost of operating this benchmark building is calculated and a new building is deemed to be compliant if it has the same cost as the benchmark building. If a piece of equipment (e.g. water heating) is installed that performs worse than the benchmark, this will have to be offset either through installing other equipment that performs sufficiently better than the benchmark (e.g. cooling) or through the installation of on-site renewables (solar PV).

Option B is considered the low-cost implementation option compared to Option A (high cost). We assume that Victoria is seeking to implement Option B.

Estimated impacts from the Consultation RIS

Table 2.3 shows the estimated changes in gas consumption calculated in the Consultation RIS for Class 1 and Class 2 dwellings under Option B. Results are shown for Victoria — the teal rows are the climate zones relevant for AusNet's distribution area. We also show NSW as a comparator, as it is evident that there are large differences in assumed appliance switching across states.

The consultation RIS expects fairly small gas impacts for Class 1 dwellings (detached houses). This is because it is expected that these dwellings would largely meet

6 ACIL Allen 2021, Consultation Regulation Impact Statement for a proposal to increase residential building energy efficiency requirements, https://consultation.abcb.gov.au/engagement/consultation-ris-proposed-ncc-2022-residential/.

requirements by installing solar PV. For Class 2 dwellings (apartments), larger reductions in gas use are expected, because these dwellings have less scope for solar PV.

2.3 Estimated changes in energy consumption for Class 1 and Class 2 dwellings across different jurisdictions and climate zones modelled under Option B

Jurisdiction	NCC climate	Class 1 dwellings: Change in annual gas consumption (MJ)	Class 2 dwellings: Change in annual gas consumption (MJ)
		MJ/dwelling/year	MJ/dwelling/year
NSW	2	-3 541	-7 418
NSW	4	-5 701	-7 694
NSW	5	-5 883	-7 570
NSW	6	-6 914	-8 319
NSW	7	-6 481	-8 623
NSW	8	-9 375	NA
VIC	4	-1 993	NA
VIC	6	-2 357	-9 676
VIC	7	-2 412	-10 274
VIC	8	-3 108	NA

Source: ACIL Allen 2021, Consultation Regulation Impact Statement for a proposal to increase residential building energy efficiency requirements, https://consultation.abcb.gov.au/engagement/consultation-ris-proposed-ncc-2022-residential/.

The percentage reduction expected is calculated based on AusNet annual usage per dwelling , the marginal penetration rate and AusNet usage per connected dwelling, as shown in table 2.4. This is based on most new developments being in climate zone 6. Gas use is reduced by 27 per cent for apartments (Class 2 dwellings). For houses (Class 1 dwellings), gas use is reduced by 3.5 per cent under Option B.

2.4 Percentage impact of revised building energy efficiency standards

	Marginal Penetration rate	Average Gas Usage per connected dwelling	Per cent change in gas use
		In MJ per annum	Per cent
Houses (Class 1)	0.79509	53 092	-3.5
Flats/Apartments (Class 2)	0.80759	28 622	-27.3

Source: CIE

The expected pathways for compliance with the new standards may include either improving the performance of the building and its equipment (all appliance pathway) or adding solar PV or a combination of both these approaches. The equipment performance can be improved either by:

- using more efficient gas appliances
- switching from gas to electric

Given the lack of data about the split in solar PV penetration by building class, the analysis assumes that the current and future penetration of solar PV in Class 2 dwellings (flats/apartments) is effectively zero. This is also due to the difficulty of implementing

solar PV in Class 2 dwellings. Therefore, compliance in Class 2 dwellings is expected to be achieved using an all-appliance pathway.

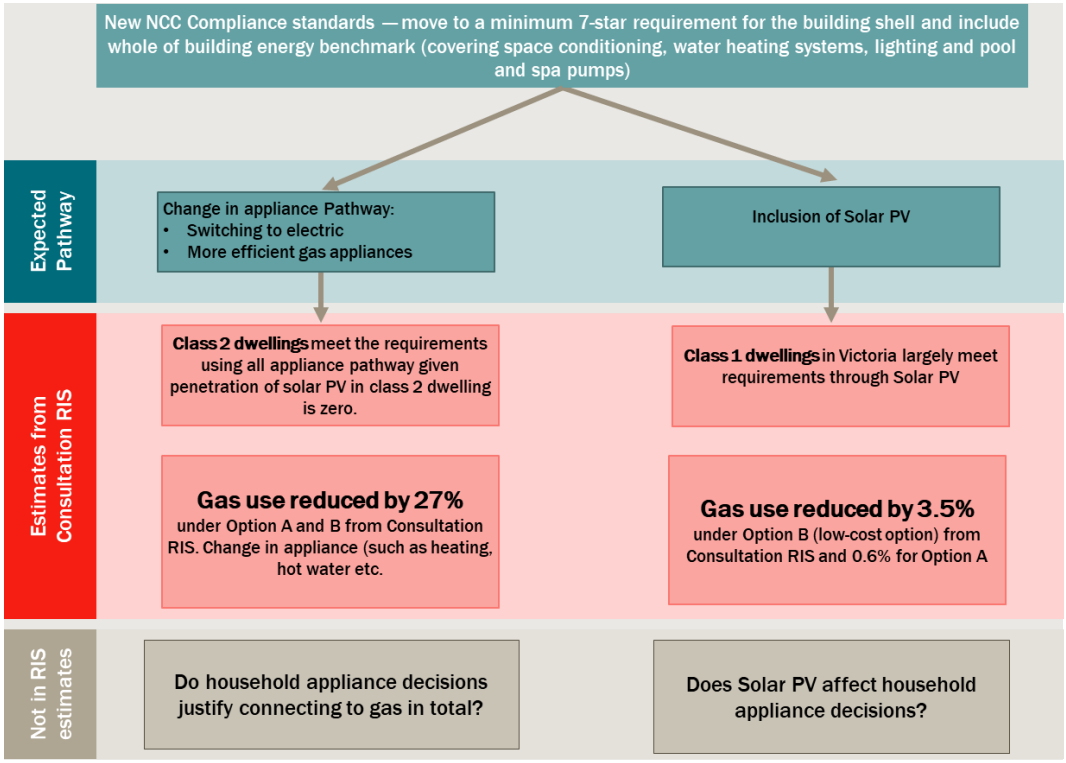
On the other hand, Class 1 dwellings (i.e. houses) in Victoria are largely expected to meet requirements through solar PV as the fall in gas usage is minimal. That is, households are largely meeting new building standards through simply adding solar PV and continuing to use gas as they currently do.

The Consultation RIS does not consider flow-on impacts of changes to appliances or solar PV. In particular, whether:

- a detached house connected to solar PV is less likely to use gas for all or some appliances, or
- an apartment that moves some appliances to gas would make a decision to move others or go all electric.

A summary of what is and is not in the RIS is shown in chart 2.5.

2.5 Summary of impacts of energy efficiency standards covered by the RIS



Data source: The CIE.

Flow-on impacts of revised energy efficiency standards

The work undertaken for the Consultation Regulation Impact Statement has not investigated flow-on impacts, such as developers no longer reticulating gas and customers shifting off gas because they have fewer appliances on gas or have solar electricity. From a gas demand perspective, these flow-on impacts could be very significant. For example:

- The Roadmap notes that an existing detached dual-fuel home with rooftop solar photovoltaic (PV) that moves from using gas for heating, hot water and cooking to using efficient electric appliances could reduce its average energy bill by around $1,250 per year. For a household without solar, going all-electric could save around $1,020. This indicates that the incentives for households to use gas are changed when they have access to solar.
- EvoEnergy surveys of customers found that there were considerable interactions in appliance decisions[7]:
  - two thirds of respondents would choose to change their hot water system if they switched their heating to electric and about half would change their cooking
  - 60 per cent of respondents indicated they were extremely likely or very likely to switch their heating to electric if they installed a solar system. 57 per cent were extremely likely or very likely to switch their hot water to electric if they installed a solar system
- AusNet consultation with developers and building industry associations has indicated that some developers would no longer reticulate gas under the revised home energy efficiency standards.

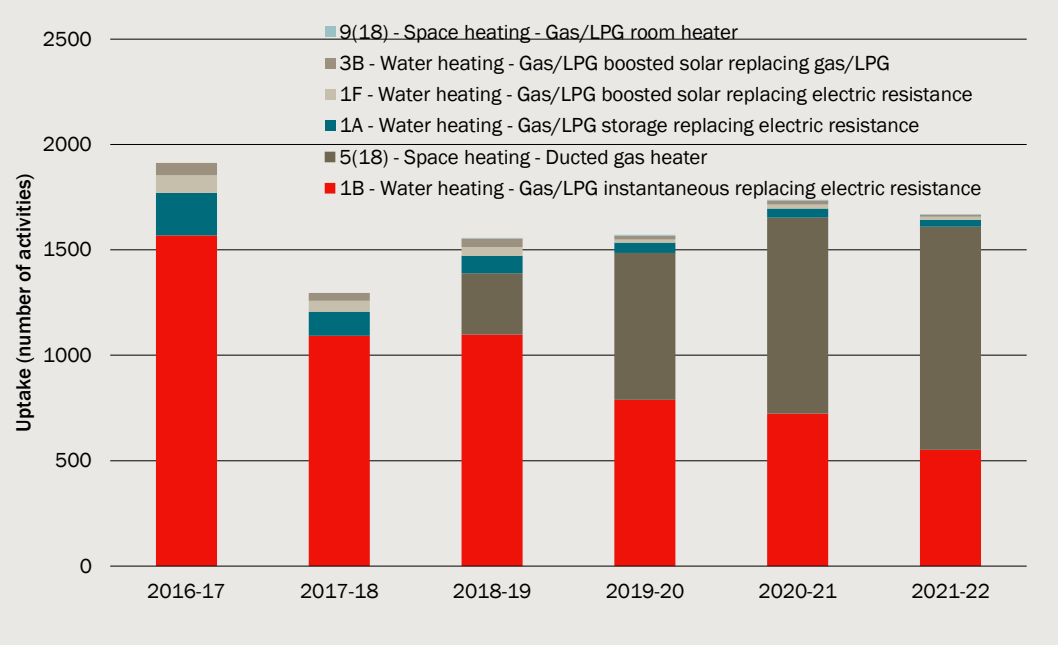
These findings suggest that changes to one appliance and to having solar PV will lead to flow-on impacts to other choices related to use of gas. We have not found robust evidence about how large these flow-on impacts could be at this stage. We have therefore used a scenario approach and compared this with top-down modelling of expected gas consumption trends.

Expanded Victorian Energy Upgrades program

The Victorian Energy Upgrades (VEU) program currently has a range of incentives that encourage the use of efficient gas appliances, including switching from electric appliances to gas. Take up of these is quite low at around 1500 activities per year across Victoria (chart 2.6). The most used incentives relate to the replacing electric resistance water heating with instantaneous gas water heating of at least 5 stars and installing 5 star ducted gas heating, which could mean switching from electric or other gas.

7 Sagacity Research 2021, *Demand for natural gas: understanding future uncertainty,* prepared for EvoEnergy, pp. 36, 39., available at: https://www.aer.gov.au/system/files/Evoenergy%20-%20Sagacity%20Research%20-%20Attachment%208.3%20-%20Demand%20for%20natural%20gas%20report%20-%20January%202021_0.pdf

2.6 Uptake of gas related activities under the VEU



Data source: VEU Registry, https://www.veu-registry.vic.gov.au/Public/Public.aspx?id=Home.

We have assumed that these incentives will be removed. To consider the change in gas consumption as a result of this, we have:

- used the data on the number of activities and applied this to estimates of the gas use per appliance to give gas consumption incentivised by the VEU
- assumed that none of these changes would occur in the absence of the VEU, and
- divided the impact by Victorian residential gas consumption to give a percentage impact per year.

Based on this, we find that removing the gas incentives would lead to, at most, a 0.03 per cent reduction in gas use per year. That is, a trivial impact.

The Roadmap also indicates that it will introduce additional incentives to encourage people to switch from gas to electricity. The nature of these will be worked out over the next year. These could be much more significant, but are highly uncertain.

To gain an idea of the possible magnitude, we have estimated the change in gas usage if the electricity to gas incentives created the same number of Victorian Energy Efficiency Incentives (VEECs) as are currently being created under the gas incentives. In 2021-22, the gas incentives created 36 000 VEECs, each equivalent to one tonne of GHG emissions. Each GJ of gas use creates 51.53 kgs of GHG emissions.[8] It therefore takes a reduction in gas use of 700 000 GJ to achieve a reduction in GHG emissions of 36 000 tonnes.

However, the replacement appliances will also have associated GHG emissions. If we assume that an appliance change would be eligible for the VEU if it achieved a reduction

8 Table 2, https://www.industry.gov.au/sites/default/files/2020-10/national-greenhouse-accounts-factors-2020.pdf.

in GHG emissions of 50 per cent, then the total reduction in gas use required is 1.4 million GJ, or 1.4 PJ. This is spread over the life of the appliances, which is typically assumed as 12 years in the VEU. Hence there is a reduction of 116 000 GJ per year, equivalent to 0.10 per cent of Victorian residential gas demand. This would occur each year.

The possible impacts above are speculative, as there is currently no information on the specific changes that could be part of the VEU, as this will be worked out over the next year.

Amendments to the Victoria Planning Provisions to remove requirement for new housing developments to be connected to gas

The Victorian Planning provisions currently:

- give gas distribution businesses a formal approval power for new residential subdivisions, which effectively removes the choice for a subdivision to not reticulate gas
- apartment buildings also have requirements to be connected to gas.

These provisions are currently being revised to make reticulation of gas optional.

The effect of these changes will interact with other changes, such as seven star and whole of building energy efficiency requirements. It would be expected to reduce the growth in gas connections, as some developments will not have reticulated gas.

Removal of variation to the NCC

Victoria has a variation to the National Construction Code that prescribes that a new Class 1 building (a detached house) must either:

- install a rainwater tank that is plumbed into all toilets or install a solar water heater
- where the solar water heat option is chosen and reticulated gas is available, the water heater should be gas boosted.

As part of moving to whole of home energy efficiency requirements, this variation would be removed.

Estimates of the share of water heaters by type for Class 1 buildings are shown in table 2.7. Victoria has an estimated 49 per cent of Class 1 buildings with solar gas. This is much higher than other states and the removal of the variation is expected to reduce this in favour of other water heater options.

Other states have a wide variation in which water heaters obtain the highest shares. Partly this reflects whether reticulated gas is available. However, even where it is available there is substantial variation.

If the removal of the variation leads Class 1 houses to switch to instantaneous gas instead of solar gas, such as used in NSW, then this change could increase gas consumption. A

gas boosted solar hot water heater uses about one quarter of the gas of an instantaneous system.[9] However, if this change leads people to switch to heat pump, such as mainly used in SA, Tasmania and the ACT, then this would reduce gas consumption.

2.7 Estimates of water heaters for new Class 1 buildings

State	Electric continuous	Electric controlled	Heat pump	Solar electric	Gas storage	Gas instant	Solar gas
	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent
NSW	1	1	9	9	2	76	3
VIC	2	9	6	15	4	14	49
QLD	14	54	8	22	0	2	0
SA	1	9	49	10	2	22	7
WA	7	1	18	34	5	17	18
TAS	25	25	36	2	2	8	1
NT	8	1	2	87	0	1	1
ACT	8	12	49	2	4	15	9

Source: Table 73, Energy Efficiency Strategies 2021,NCC 2022 Update: Whole of home component, prepared for Australian Building Codes Board, https://consultation.abcb.gov.au/engagement/consultation-ris-proposed-ncc-2022-residential/supporting_documents/NCC%202022%20Update%20%20Whole%20of%20House%20Component%20Energy%20Efficient%20Strategies.pdf.

Given that this variation is only one aspect of the larger set of changes for new class 1 dwellings, we consider overall scenarios for new dwelling use of gas.

Comparison of top down and bottom up estimates of impacts

The specific bottom-up estimates of impacts of the Roadmap are small, at less than 1 per cent reduction from CIE's previous forecasts per year. This reflects that much of the actual policy change is not yet obvious and that indirect impacts on gas take up are not well understood.

In contrast, modelling scenarios for gas consumption used by the Roadmap and AEMO show very large reductions in gas consumption:

- around 8 per cent reduction per year for the Roadmap to 2030,
- 1 per cent reduction per year for AEMO's Step Change scenario to 2028, and
- 6 per cent reduction per year for AEMO's Progressive Change scenario to 2028.

These differences lead to a substantial grey zone for forecasting of gas demand.

To seek to bring these into closer alignment, a number of scenarios have been developed to understand what changes in use for different groups lead to in terms of overall consumption trends. These are compared to what can be specifically modelled and the overall consumption scenarios of AEMO. The five scenarios modelled are:

9 Sustainability Victoria website, https://www.sustainability.vic.gov.au/energy-efficiency-and-reducing-emissions/save-energy-in-the-home/water-heating/calculate-water-heating-running-costs.

- Scenario 1: By the end of the next regulatory period (2028), only 50 per cent of new estates connect to gas and of these, only 50 per cent of the customers within those estates get a service connection. For those that do connect, they use 40 per cent less gas because they don't connect hot water. These changes occur starting in 2025.
- Scenario 2: By the end of the next regulatory period (2028), only 25 per cent of new estates connect to gas and of these, only 25 per cent of the customers within those estates get a service connection. For those that do connect, they use 40 per cent less gas because they don't connect hot water. These changes occur starting in 2025.
- Scenario 3: Scenario 1, but also with a 0.75 per cent attrition rate for the existing customer base.
- Scenario 4: Scenario 2, but also with a 0.75 per cent attrition rate for the existing customer base.
- Scenario 5: No new connections by 2028 and a 1 per cent attrition rate for the existing customer base.

3 Other changes included in revised modelling

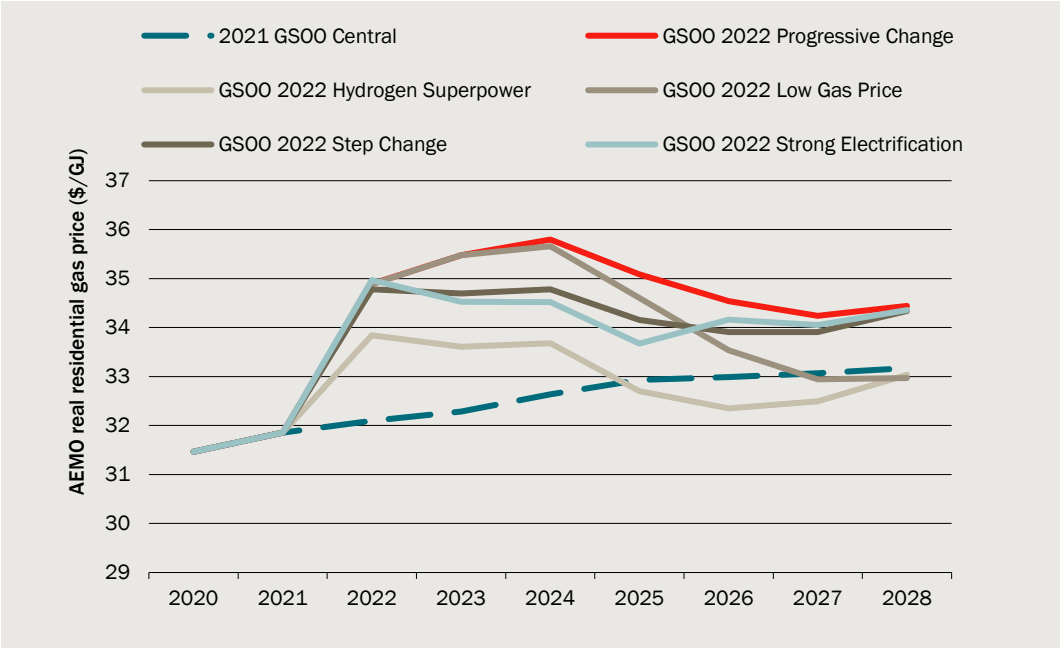
Revised price projections for gas

The Gas Statement of Opportunities (GSOO) 2022 was published by AEMO in March 2022,[10] and it provides updated forecasts of retail gas prices under a range of scenarios (chart 3.1). Relative to the gas price forecasts in the 2021 GSOO, prices are projected to be higher over the near-term, before falling to a level around $1/GJ higher than the previous forecasts. The GSOO 2022 forecasts start at 2022, and so we have used the GSOO 2021 central case forecast for 2021 as the starting point.

The Progressive Change scenario has the higher forecast of prices, being $1/GJ higher than the Step Change scenario in 2024, although the forecasts converge by 2028.

The impact of higher gas prices will be to decrease usage relative to our previous forecasts.

3.1 Retail gas price forecasts from the 2021 and 2022 GSOO



Data source: AEMO GSOO 2022 and GSOO 2021, CIE.

Recent wholesale gas prices are substantially higher than those included in the AEMO GSOO 2022 projections, which provides a further downside risk to gas demand.

10 AEMO, 2022, *Gas Statement of Opportunities*, March 2022, available at: https://aemo.com.au/-/media/files/gas/national_planning_and_forecasting/gsoo/2022/2022-gas-statement-of-opportunities.pdf?la=en

4 Revised forecasts

Table 4.1 presents the specifications of the baseline (our existing forecasts) and six alternative scenarios reflecting the potential impact of the GSR. Each of these scenarios differs from the baseline in that they apply the price forecasts from the GSOO 2022 Progressive Change scenario.

The CIE bottom-up scenario reflects the outcome of the analysis in the previous chapters, which suggests that:

- usage per new house will reduce by 3.5 per cent,
- usage per new apartment will reduce by 27 per cent, and
- usage per existing customer will reduce by 0.13 per cent Year-on-Year.

Each of these changes is modelled to start in 2024.

Further, we model five scenarios for residential connections using assumptions supplied by AusNet:

- Ausnet 1 has a 75 per cent lower marginal penetration rates (i.e. the number of net new customers per new dwelling) by 2027, with a linear glide path to this reduction starting in 2024. Further, it includes a reduction in usage of new houses and apartments of 40 per cent, which is based on new connections not using gas for hot water as a result of the GSR impacts.
- Ausnet 2 is the same as Ausnet 1, but with a lower marginal penetration rate (further reduced by 50 per cent) and a year-on-year reduction in usage per existing customer consistent with the CIE bottoms-up scenario.
- Ausnet 3 and 4 are the same as Ausnet 1 and 2, respectively, but with the addition of disconnections due to customers substituting to electric appliances. It is assumed that 0.75% of residential customers (as a share of customers in 2022) disconnect in 2024, 2025 and 2026, which rises to 1% of customers in 2027 and 2028.
- Ausnet 5 assumes that disconnections occur as per Ausnet 3 and 4, without any of the other impacts assumed in other scenarios. That is, the marginal penetration rate and usage per existing and new customer remain the same as under the baseline, except with updated price forecasts.

Commercial connections and their usage are not varied under these scenarios.

Table 4.2 shows a range of measures of forecast usage and customer numbers under each scenario. We also generate forecasts for the 2023 stub period and financial years starting with 2023/24 using the same approach as in our original forecasts.

4.1 Settings for alternative scenarios for gas usage and customer numbers

2022 scenarios	Gas price scenario	Ratio of Marginal Penetration Rate to current	Disconnections (2024, 2025 and 2026)	Disconnections (2027 and 2028)	Reduction in usage per new house	Reduction in usage per new flat	Reduction in usage per existing customer (YOY)
Baseline	2021 GSOO Central	N/A	N/A	N/A	N/A	N/A	N/A
CIE bottom-up	GSOO 2022 Progressive Change	100.0%	0%	0%	3.5%	27%	0.13%
Ausnet 1	GSOO 2022 Progressive Change	25.0%	0%	0%	40%	40%	0.00%
Ausnet 2	GSOO 2022 Progressive Change	12.5%	0%	0%	40%	40%	0.13%
Ausnet 3	GSOO 2022 Progressive Change	25.0%	0.75%	1.00%	40%	40%	0.00%
Ausnet 4	GSOO 2022 Progressive Change	12.5%	0.75%	1.00%	40%	40%	0.13%
Ausnet 5	GSOO 2022 Progressive Change	0.0%	1.00%	1.00%	0%	0%	0.00%

Source: Assumptions for CIE bottom-up as per previous chapters of this briefing, assumptions for Ausnet 1-5 supplied by Ausnet, CIE.

4.2 Measures of forecast usage and customer numbers under each scenario

Scenario	Measure	2020	2021	2022	2023	2024	2025	2026	2027	2028
Baseline	Residential usage per customer	49.571	43.891	42.022	40.674	39.526	38.666	38.290	38.163	38.041
	Residential customer numbers	721 303	738 801	754 582	771 241	788 418	806 166	824 401	841 070	858 193
	Residential usage (GJ)	35 755 747	32 426 485	31 708 822	31 369 209	31 162 858	31 171 431	31 566 586	32 098 136	32 646 777

Scenario	Measure	2020	2021	2022	2023	2024	2025	2026	2027	2028
	Tariff V usage (GJ)	41 188 931	38 041 243	37 813 741	37 676 171	37 369 065	37 318 311	37 730 634	38 310 002	38 909 234
	Tariff V customer numbers	737 876	755 428	771 257	787 968	805 198	823 001	841 293	858 014	875 190
	Cumulative additional residential disconnections			0	0	0	0	0	0	0
CIE bottoms-up	Residential usage per customer	49.571	44.406	41.676	40.215	39.076	38.413	38.168	38.073	37.872
	Residential customer numbers	721 303	738 801	754 582	771 241	788 418	806 166	824 401	841 070	858 193
	Residential usage (GJ)	35 755 747	32 807 224	31 447 676	31 015 667	30 808 331	30 967 509	31 465 541	32 022 451	32 501 364
	Tariff V usage (GJ)	41 188 931	38 431 517	37 496 932	37 260 101	36 954 478	37 076 375	37 605 464	38 218 211	38 745 651
	Tariff V customer numbers	737 876	755 428	771 257	787 968	805 198	823 001	841 293	858 014	875 190
	Cumulative additional residential disconnections			0	0	0	0	0	0	0
Ausnet 1	Residential usage per customer	49.571	44.406	41.676	40.215	39.093	38.518	38.378	38.399	38.309
	Residential customer numbers	721 303	738 801	754 582	771 241	785 735	797 004	805 186	809 710	814 476
	Residential usage (GJ)	35 755 747	32 807 224	31 447 676	31 015 667	30 716 740	30 699 117	30 901 638	31 092 098	31 201 680
	Tariff V usage (GJ)	41 188 931	38 431 517	37 496 932	37 260 101	36 862 886	36 807 982	37 041 561	37 287 858	37 445 967
	Tariff V customer numbers	737 876	755 428	771 257	787 968	802 516	813 839	822 078	826 654	831 472
	Cumulative additional residential disconnections			0	0	0	0	0	0	0
Ausnet 2	Residential usage per customer	49.571	44.406	41.676	40.215	39.096	38.478	38.298	38.281	38.152
	Residential customer numbers	721 303	738 801	754 582	771 241	785 198	795 374	801 886	804 381	807 083
	Residential usage (GJ)	35 755 747	32 807 224	31 447 676	31 015 667	30 698 416	30 604 382	30 710 639	30 792 139	30 792 225
	Tariff V usage (GJ)	41 188 931	38 431 517	37 496 932	37 260 101	36 844 563	36 713 247	36 850 561	36 987 899	37 036 512
	Tariff V customer numbers	737 876	755 428	771 257	787 968	801 979	812 210	818 778	821 325	824 080
	Cumulative additional residential disconnections			0	0	0	0	0	0	0
Ausnet 3	Residential usage per customer	49.571	44.406	41.676	40.215	39.069	38.463	38.286	38.259	38.115
	Residential customer numbers	721 303	738 801	754 582	771 241	780 325	786 184	788 957	786 268	783 820

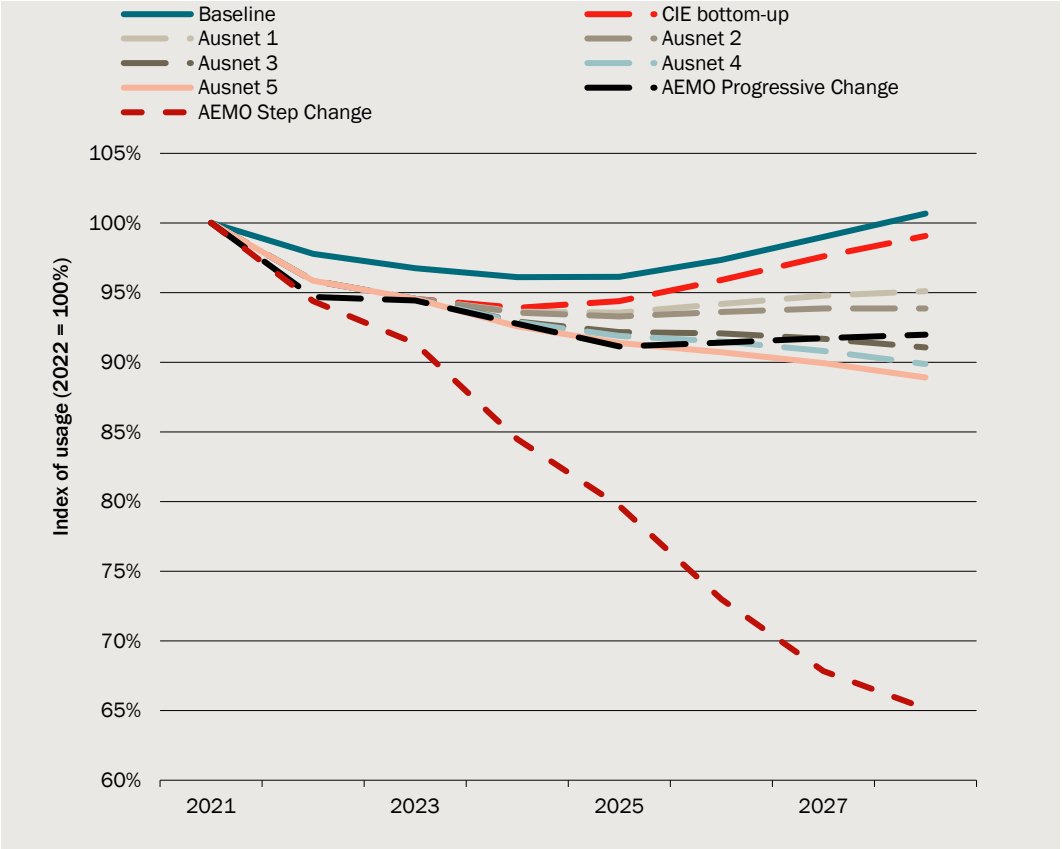
Scenario	Measure	2020	2021	2022	2023	2024	2025	2026	2027	2028
	Residential usage (GJ)	35 755 747	32 807 224	31 447 676	31 015 667	30 486 364	30 238 630	30 206 351	30 081 605	29 875 609
	Tariff V usage (GJ)	41 188 931	38 431 517	37 496 932	37 260 101	36 632 511	36 347 496	36 346 274	36 277 365	36 119 896
	Tariff V customer numbers	737 876	755 428	771 257	787 968	797 106	803 020	805 849	803 212	800 817
	Cumulative additional residential disconnections			0	0	- 5 410	- 10 820	- 16 229	- 23 442	- 30 655
Ausnet 4	Residential usage per customer	49.571	44.406	41.676	40.215	39.072	38.423	38.210	38.148	37.973
	Residential customer numbers	721 303	738 801	754 582	771 241	779 789	784 555	785 656	780 939	776 428
	Residential usage (GJ)	35 755 747	32 807 224	31 447 676	31 015 667	30 468 178	30 145 317	30 019 649	29 791 394	29 483 555
	Tariff V usage (GJ)	41 188 931	38 431 517	37 496 932	37 260 101	36 614 325	36 254 182	36 159 572	35 987 155	35 727 842
	Tariff V customer numbers	737 876	755 428	771 257	787 968	796 569	801 390	802 548	797 883	793 424
	Cumulative additional residential disconnections			0	0	- 5 410	- 10 820	- 16 229	- 23 442	- 30 655
Ausnet 5	Residential usage per customer	49.571	44.406	41.676	40.215	39.068	38.466	38.303	38.307	38.199
	Residential customer numbers	721 303	738 801	754 582	771 241	777 449	779 319	776 946	770 200	763 625
	Residential usage (GJ)	35 755 747	32 807 224	31 447 676	31 015 667	30 373 292	29 977 536	29 759 358	29 503 967	29 169 449
	Tariff V usage (GJ)	41 188 931	38 431 517	37 496 932	37 260 101	36 519 439	36 086 401	35 899 280	35 699 727	35 413 736
	Tariff V customer numbers	737 876	755 428	771 257	787 968	794 229	796 155	793 838	787 144	780 622
	Cumulative additional residential disconnections			0	0	- 7 213	- 14 426	- 21 639	- 28 852	- 36 065

Source: CIE.

The differences between scenarios in terms of residential usage are shown in chart 4.3. Usage is indexed to 100 per cent at 2021 to facilitate comparison with the GSOO Progressive Change and Step Change scenarios for residential and commercial usage. Note that this compares residential and commercial usage forecasts from AEMO to residential usage only for the other scenarios.

The Ausnet 3 scenario has the closest trajectory to the GSOO Progressive Change scenario, falling to around 8 per cent below the 2021 level for usage. The AEMO Step Change scenario shows a far greater decline in usage to 66 per cent of the 2021 level by 2028.

4.3 Residential usage index by scenario plus GSOO 2022 scenarios



Note: The GSOO 2022 forecast includes energy efficiency and fuel switching adjustments. The baseline, CIE bottom-up and Ausnet scenarios all include energy efficiency and fuel switching adjustments consistent with the adjustments made in the original Ausnet forecasts.

Data source: GSOO 2022, CIE.

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