evoenergy

Appendix 2.1: The Centre for International Economics Gas demand forecast report

Access Arrangement Information

ACT and Queanbeyan-Palerang gas network 2026–31

June 2025

FINAL REPORT

Gas demand forecast

ACT and Queanbeyan 2026-2045

Prepared for
Evoenergy

19 June 2025

THE CENTRE FOR INTERNATIONAL ECONOMICS
www.TheCIE.com.au

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Background

The CIE has been commissioned by Evoenergy to develop an independent and detailed forecast of demand and customer numbers for their Australian Capital Territory (ACT) and Queanbeyan-Palerang gas distribution network over the period to 2045. The forecasts will be used in network planning and the setting of prices for Evoenergy's gas network tariffs for the access arrangement (AA) period 2026–31. The items that require forecasts are set out in table 1.

This report sets out the forecasting methodology and detailed results for forecasts prepared in the third quarter of the 2025 financial year to inform Evoenergy's access arrangement proposal.

1 Forecast items

Purpose	Item	Customer/tariff type
Tariffs	Fixed charge quantities	Volume individual (VI) Volume boundary (VB) Demand tariff
	Usage	VI, by block VB, by block Demand Throughput tariff, by individual customer
	Chargeable demand	Demand Capacity tariff, by individual customer by block
Capex	New connections	Residential (primarily NSW) Commercial (primarily NSW) Demand tariff
Opex	Total connections	All
Ancillary charges	Permanent disconnections[a] Temporary disconnections Reconnections	All

[a] A permanent disconnection involves decommissioning a Delivery Point, including removal from the customer list and the Meter Installation Registration Number (MIRN) from the market.

Source: CIE.

Key issues

We developed a significantly more sophisticated demand forecasting approach than we have used in the past to meet challenges arising from the current context. Three aspects of that context are particularly noteworthy:

- ACT Government policy
- total gas demand has started to decrease, and
- the interdependence between price and demand.

The ACT Government has committed to phasing out natural gas

The ACT Government has committed to phasing out natural gas by 2045. It has banned new gas connections and under current policy settings expects the total stock of ACT gas users to decline significantly by 2030.[1] [2] There remains uncertainty over the policy environment, with the Government stating that it "will need to explore options to accelerate the transition and move towards regulatory options to ensure emissions reduction targets are met. This could include updating the minimum standards for rental properties or prohibiting the installation of new gas appliances towards the end of this decade… The pace of the transition will be examined as the government undertakes the mid-point review of the first [Integrated Energy Plan] in 2027."[3] The ACT Greens, who were in shared government with ACT Labour during the 2020-2024 term of government, have indicated their policy is to prohibit the installation of new gas appliances from 2027.[4] The ACT Chief Minister has stated that a ban on new gas appliances would be the logical next step.[5]

The forecast in this report reflects the existing ban on new gas connections in the ACT and assumes a ban on new gas appliances commencing in 2030. The forecast rate of disconnection is based on ACT Government policy and what consumers told us they will do under various pricing scenarios in the context of rigorous quantitative surveys and interviews.

1 https://www.climatechoices.act.gov.au/__data/assets/pdf_file/0007/2052475/Gas-Transition-Utility-Impact-Statement.pdf (accessed 13/06/2025)

2 https://hdp-au-prod-app-act-yoursay-files.s3.ap-southeast-2.amazonaws.com/1316/9078/0794/Integrated_Energy_Plan_Summary_ACCESS_FA2.pdf (accessed 13/06/2025)

3 ACT Government 2024. The Integrated Energy Plan — Our pathway to electrification 2024-2030. p 27.

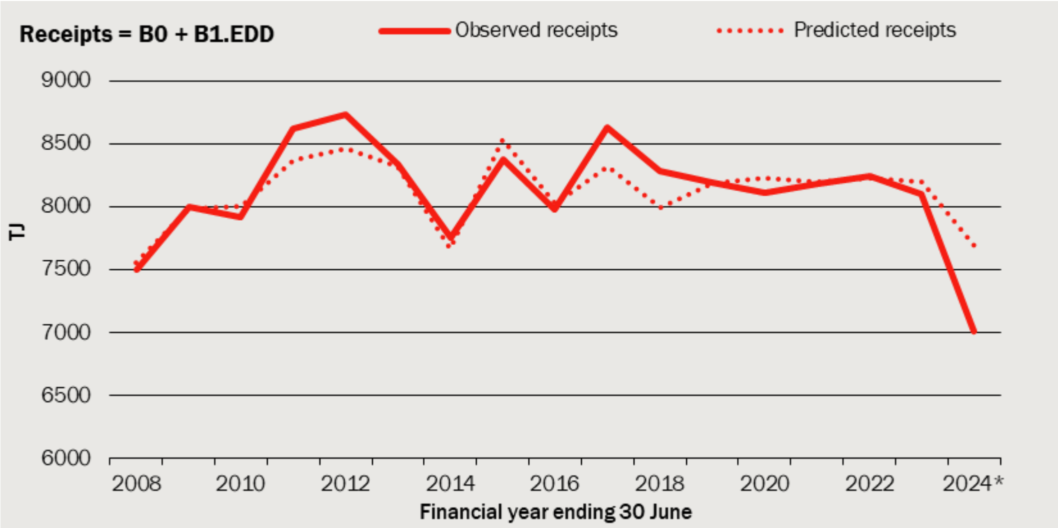
4 ACT Greens 2024. ACT Greens 2024 Policy Initiative. Real climate leadership for the ACT. (https://greens.org.au/sites/default/files/2024-08/2024%20Initiative%20-%20Real%20Climate%20Leadership.pdf, accessed 11/10/24)

5 https://www.abc.net.au/news/2024-06-19/canberrans-could-be-banned-from-buying-new-gas-appliances/103997228 (accessed 13/06/2025)

Total gas demand is now decreasing

Total demand in 2023/24 was the lowest observed for 17 years. The weather was milder than average, but this does not fully explain the drop in demand. Figure 2 shows observed demand and predicted demand based on a simple linear regression of total consumption on effective degree days (a measure of cold weather conditions). It shows that consumption was lower in 2024 than would be expected under a stable relationship between weather and demand.

2 Observed and predicted historical total consumption



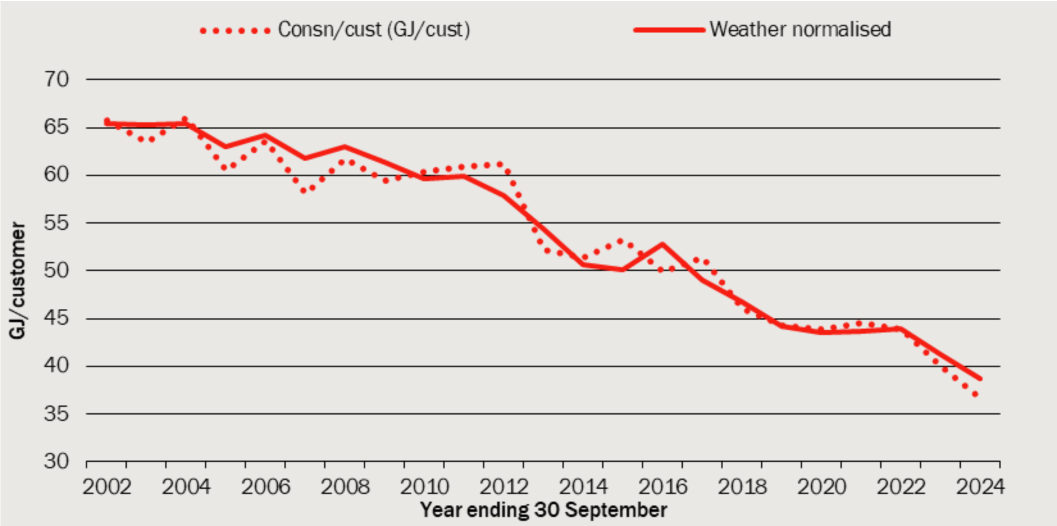
* Actuals to 18 June, estimate for last 12 days of the year.

Data source: Evoenergy total receipts, AEMO EDD, CIE analysis

Over the decade prior to 2023/24, the relatively stable level of total demand was the product of two offsetting impacts — increasing connections and decreasing consumption per connection. Recently, however, connections have stopped increasing and total demand has begun to fall with average consumption. Figure 3 shows weather-normalised average Tariff VI consumption has decreased 12 per cent over the two years to September 2024.[6] This decrease is significant, but not out of step with the long-term trend. Similar decreases have been observed in the past, but their effect on total demand was offset by increasing customer numbers.

6 September 2024 is effectively the end of the billing data set used in our forecast, since only a subset of customers have been metered in the data recorded over October 2024 - January 2025.

3 Weather normalised average consumption per VI connection



Data source: Evoenergy billing data; CIE analysis

Data from the survey of gas customers conducted by The CIE for Evoenergy in 2024 suggests that temporary reductions in usage in response to cost-of-living pressures played a relatively limited role. Only around one in eight customers indicated they had used their gas heater less than in previous years, without substituting to another type of heater.[7]

There is some uncertainty over how the interrelated trends in customer numbers and average consumption may change as the rate of disconnections increases over the course of the energy transition. Further data, including data from winter 2025, will be available for Evoenergy's revised proposal, which will provide further indications.

Rather than making assumptions about trends, we used rigorous survey research and customer interviews to model consumer behaviour and intentions in coming years (see Box 4 for key findings and The CIE's separate elasticity study report for detail).

7 CIE 2025. Price elasticity of demand for natural gas. Final report. June.

4 Key findings from The CIE elasticity study

The main factors influencing switching decisions are total cost over time, affordability of upfront costs, environmental concerns, and appliance quality.

For most households, the timing of decisions is tied to appliance failure or home renovations.

The stock of appliances in the ACT is ageing. The average age of gas appliances is roughly 10 years, with almost half of appliances expected to come up for replacement by the end of 2030/31.

When appliances fail:

- more than half of households intend to switch to electric appliances, regardless of what's happening with gas prices and Government rebates.
- for roughly one third of households, the choice between new gas and electric appliances depends on the relative costs.
- Around 1 in 10 households have a strong preference for gas due to appliance quality and will not switch even with financial incentives.

Some households are intending to switch to electric appliances within the next four years, before their gas appliances fail. Roughly 1 in 10 households are intending to do this regardless of relative costs. Environmental concerns are a stronger driver among this group. Others would consider it at higher gas prices and/or replacement rebates.

Switching is more difficult for commercial customers than for residential customers. Only around 1 in 5 commercial customers have formed an intention to disconnect from gas by 2045.

However, 4 in 10 commercial customers are intending to reduce their gas usage by a half or more by 2045.

Only around one third of commercial customers indicated the timing of their gas usage reductions/disconnections would be affected by gas price increases.

Gas demand and gas prices are interdependent

Gas network prices are likely to increase over the course of the energy transition due to declining demand in the face of largely fixed costs and potentially accelerated depreciation. In the context of significant price changes, gas demand and gas network prices ought to be forecast simultaneously, since they are interdependent. The forecast in this report is based on an iterative modelling approach that accounts for the interdependence between gas prices and demand.

Approach

The forecasting method involves:

- Separate forecasting models for Volume Tariff connections, Volume Tariff average consumption, and each Demand Tariff customer.[8]
- Each model includes two key components — a baseline model, assuming no disconnections, and a switching model, which projects appliance switching and disconnection and generates indices that are applied to the baseline forecast to calculate a total forecast (figure 5).
- The baseline forecast model involves regression analysis of customer-level billing data (from October 2000 to January 2025 for Tariff V customers and from July 2019 to June 2024 for Tariff D customers) to identify relationships between demand and weather and other drivers (figure 6).
- The baseline forecast is based on applying these relationships to a starting point based on recent observations and external forecasts of weather and prices. The time trend is excluded from baseline forecasts to ensure no double counting of impacts in the switching model.[9]
- The switching forecast captures the expected impacts of appliance replacement and the ACT Government's Integrated Energy Plan, which has signalled increasing government intervention from 2030 and the eventual decommissioning of the gas network (figure 7).[10]
- The switching forecast model uses data from quantitative surveys conducted with Evoenergy customers and designed to understand the impact of gas and electricity prices on the extent and timing of appliance switching and disconnection.
  - The residential switching model estimates the likelihood of disconnection in each year for each of 1885 customers, based on the age of their appliances, assumed appliance survival curves, and a statistical choice model estimated on the responses of the 1885 customers to discrete choice experiments relating to appliance replacement decisions, both at end of appliance life and pre-emptively, under various price scenarios.
- Aggregating the forecasts to measure total usage and chargeable demand by price block.

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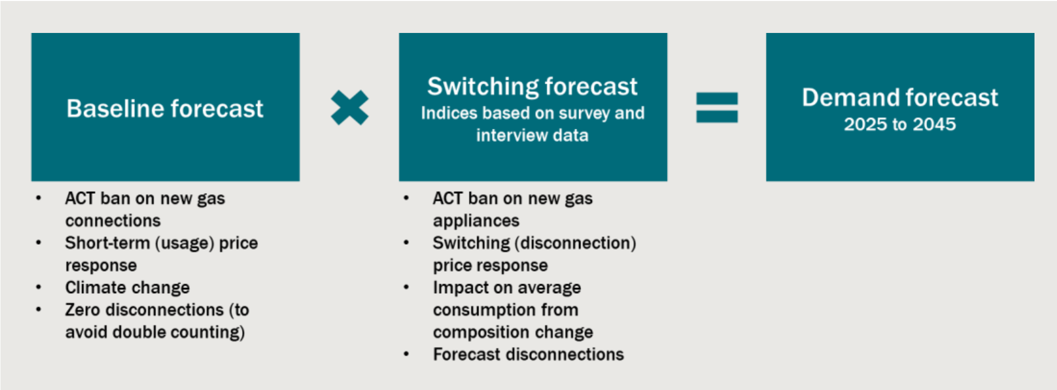
8 The Volume Tariff modelling relates to the Volume Individual tariff which comprises 99.99 per cent of all Volume Tariff customers. Forecasts for the 17 customers on the Volume Boundary tariff are assumed to follow the same pattern as Volume Individual forecasts.

9 The time trend in the baseline forecast would include several effects, some of which would be covered by the switching modelling (e.g. appliance replacement) and some which would not (e.g. building efficiency improvements). Since there was no sound evidence on which to decompose the trend into these respective effects, we make the conservative assumption to omit the trend entirely.

10 ACT Government 2024. 2024–2030 The Integrated Energy Plan — Our pathway to electrification.

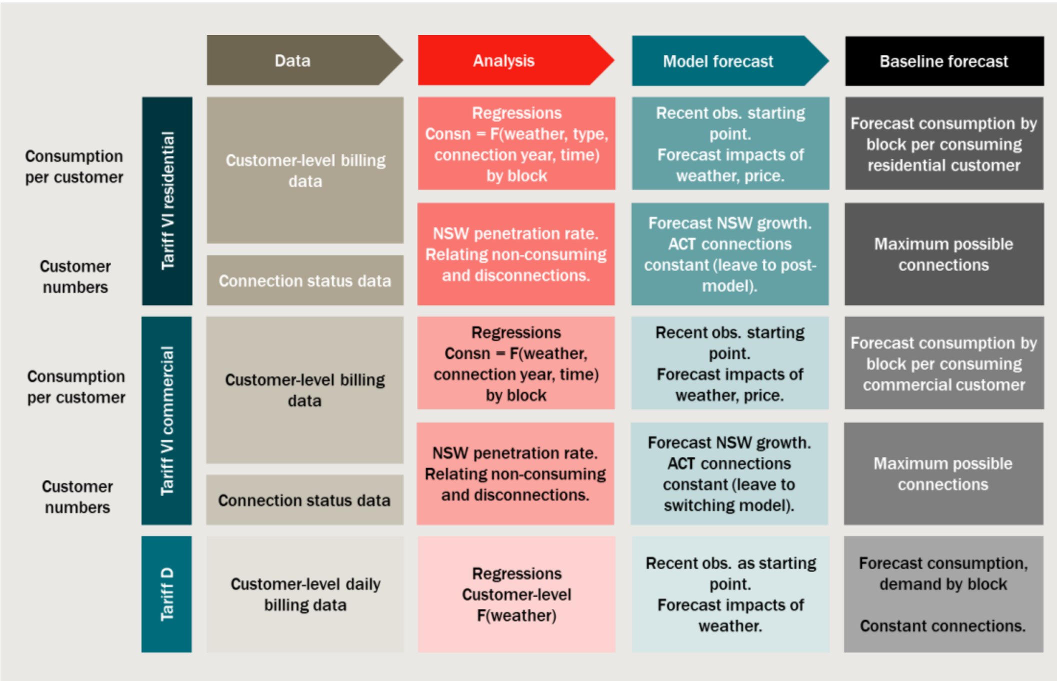
5 Summary of forecasting approach



Data source: CIE

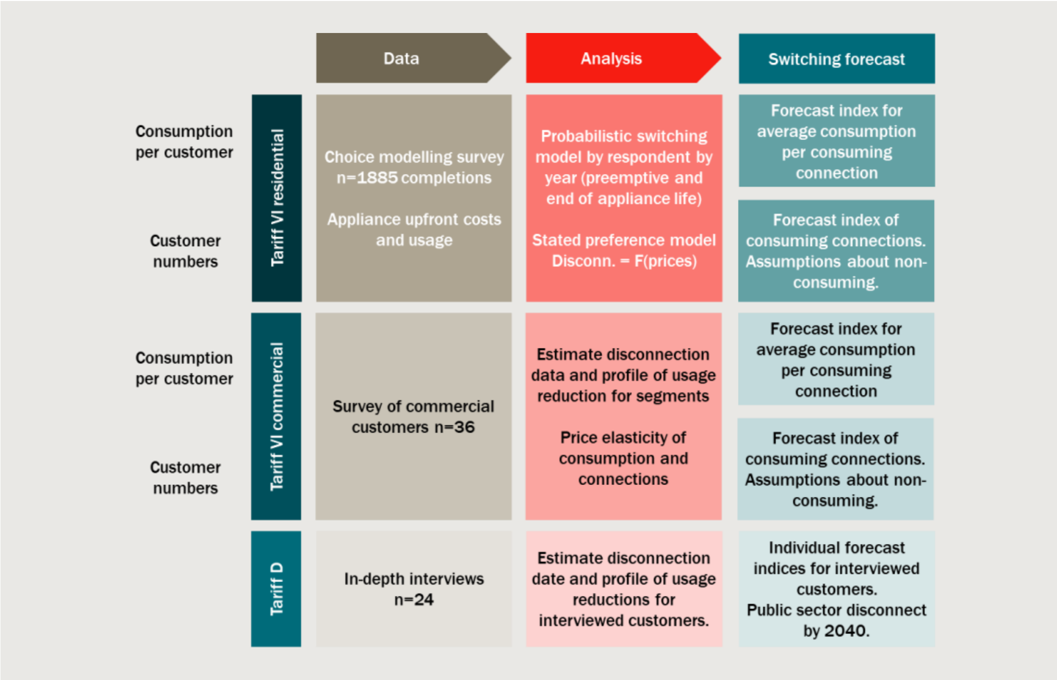
The baseline model and the switching model are not separate models or alternative forecasts, but rather two complementary parts of one comprehensive demand forecasting model. Both parts are needed because each addresses different drivers of gas demand. Conservative assumptions, such as omitting the time trend from the baseline model, have been made to avoid any double counting of effects across the two parts.

6 Approach to baseline forecast



Data source: CIE

7 Approach to switching forecast



Data source: CIE

Results

Table 8 sets out Volume Tariff forecasts for the AA period 2026–31. Now that the ACT has banned new gas connections, the rate of decline in total connections is expected to increase from around 1 per cent this year to 9 per cent per year by FY 2031, as consumers carry out planned electrification or switch to electric appliances when their existing gas appliances reach end of life. Usage per connection is forecast to increase in FY 2026, relative to the level observed under mild conditions in FY 2024 and FY 2025. It is expected to then go on increasing due to changes in the composition of the customer base, with residential customers disconnecting at a faster rate than (relatively larger) commercial customers.

This combination of results — with demand reductions occurring almost entirely due to disconnections, rather than reductions in average consumption — is driven by modelling assumptions that replacements of major appliances will translate within two years to disconnections. It is important to recognise that the number of connections and average consumption per connection are interrelated; for example, a slower staging of appliance replacement and disconnection by households would see a slower decline in connections and a steeper decline in average consumption.

Over the AA period 2026–31, the annual rate of decline in total usage is forecast to increase from 4 per cent in 2027 to 8 per cent in FY 2031.

8 Forecast Volume tariff connections and consumption

Financial year ending	Fixed charges	Growth in fixed charge quantities	Usage per connection	Growth in usage per fixed charge	Total usage	Growth in total usage
	Number	per cent	GJ/year	per cent	PJ/year	per cent
2018	144 461	3.5	46.8	-7.1	6.8	-3.9
2019	149 109	3.2	44.1	-5.8	6.6	-2.8
2020	153 070	2.7	43.2	-2.0	6.6	0.6
2021	155 865	1.8	43.1	-0.3	6.7	1.5
2022	156 320	0.3	43.1	-0.2	6.7	0.1
2023	155 134	-0.8	42.3	-1.7	6.6	-2.4
2024	153 983	-0.7	36.0	-15.0	5.5	-15.7
2025[a]	152 351	-1.1	34.7	-3.6	5.3	-4.6
2026	149 461	-1.9	36.8	6.2	5.5	4.2
2027	143 182	-4.2	36.8	-0.1	5.3	-4.3
2028	133 724	-6.6	36.9	0.3	4.9	-6.3
2029	123 557	-7.6	37.2	0.7	4.6	-7.0
2030	113 249	-8.3	37.5	0.9	4.2	-7.6
2031	103 329	-8.8	37.8	1.0	3.9	-7.9

[a] Estimate

Source: CIE

Table 9 sets out Demand tariff forecasts for the AA period 2026–31. Forecast declines in usage are more variable from year to year than those forecast for Volume customers, since they reflect disconnection of specific customers during the AA period 2026–31. Charts 10 and 11 show the long-term forecast of total consumption and connections, including both Volume and Demand Tariff customers, out to 2045.

9 Forecast Demand tariff connections and consumption

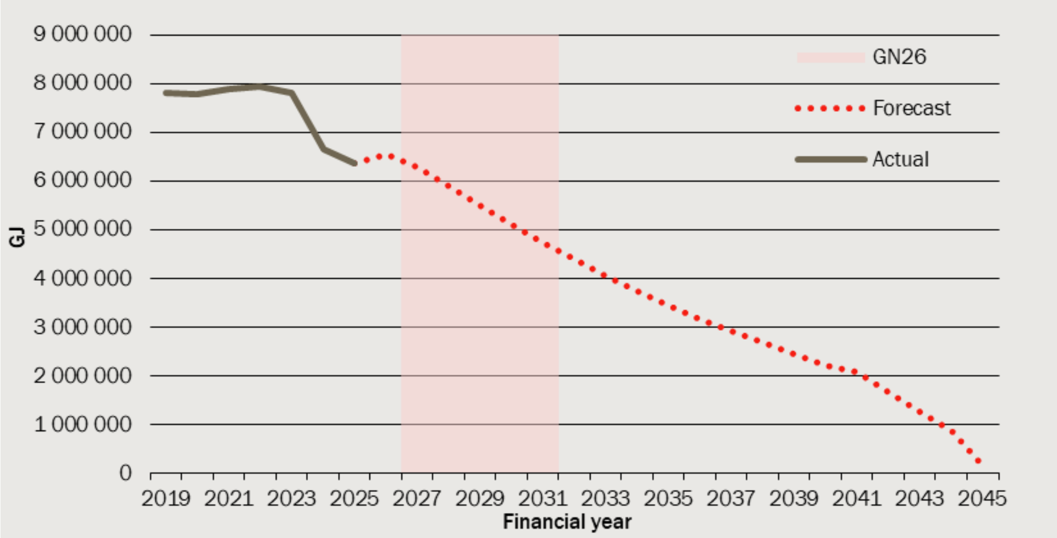
Financial year ending	Usage	Usage growth	Customers[a]
	TJ	per cent	Number
2018	1224	5.2	38
2019	1232	0.7	38
2020	1172	-4.9	38
2021	1166	-0.4	39
2022	1199	2.8	41
2023	1250	4.2	41
2024	1124	-10.1	43
2025	1092	-2.8	43
2026	1049	-4.0	43
2027	1005	-4.1	43
2028	955	-5.0	42
2029	915	-4.2	42
2030	870	-4.9	40

Financial year ending	Usage	Usage growth	Customers[a]
	TJ	per cent	Number
2031	834	-4.1	39

[a] Average over year

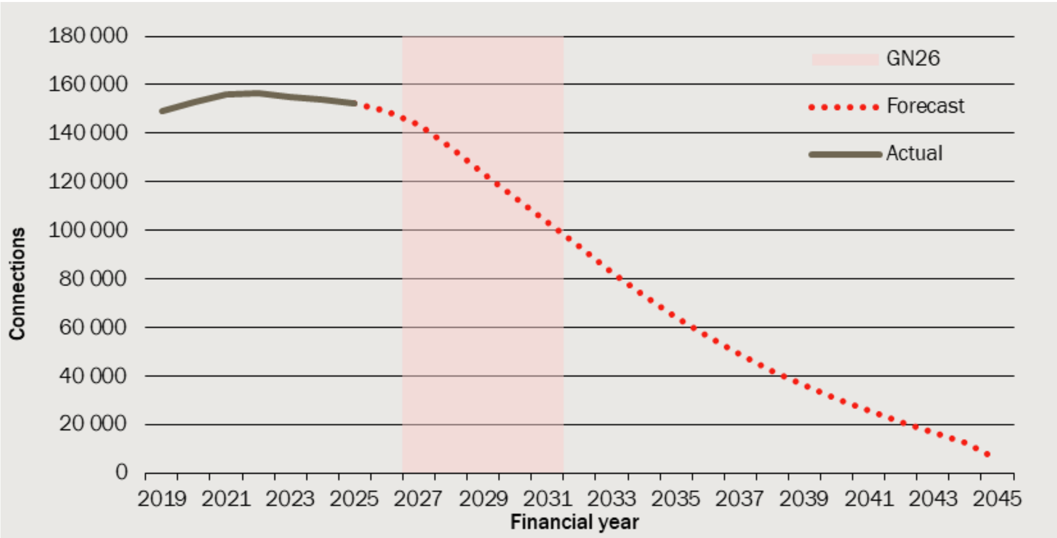
Source: CIE

10 Forecast total usage



Data source: Evoenergy historical data and CIE analysis

11 Forecast connections



Data source: Evoenergy historical data and CIE analysis

1 Introduction

Purpose of this report

Evoenergy is the natural gas distributor that owns and operates gas infrastructure in the Australian Capital Territory (ACT) and adjacent areas of New South Wales (NSW). Evoenergy's gas network includes around 5 000 km of pipeline and services approximately 160 000 connections, comprising around 150 000 residential and commercial customers and approximately 10 000 connections that have been temporarily disconnected for 12 months or longer.[11]

The Evoenergy gas distribution network is subject to economic regulation by the Australian Energy Regulator (AER) under the National Gas Law and National Gas Rules (Rules). The AER determines the level of Evoenergy's gas network tariffs in the ACT and the Queanbeyan-Palerang region. Evoenergy's prices in the current five-year regulatory period are set under the Evoenergy (ActewAGL) ACT, Queanbeyan and Palerang — Access arrangement 2021-26, which concludes on 30 June 2026.

Under the Rules, Evoenergy is required to submit to the AER by 30 June 2025, proposed revisions to the Access Arrangement that will apply to its natural gas distribution network for 2026–31.[12] A key element of Evoenergy's submission will be a forecast of demand and customer numbers which will be used to set prices for Evoenergy's gas network tariffs for the 2021–26 Access Arrangement. The forecasts need to reflect a realistic expectation of demand to ensure prices are set in a way that promotes efficient investment in, and operation of, natural gas services.

The forecasts must also satisfy the AER's requirements in relation to Access Arrangement proposals. In particular, Rule 74 requires that:

1) Information in the nature of a forecast or estimate must be supported by a statement of the basis of the forecast or estimate.
2) A forecast or estimate:
    a. must be arrived at on a reasonable basis; and
    b. must represent the best forecast or estimate in the circumstances.

Further, Rule 72 requires that information provided as part of an Access Arrangement proposal must include:

> … usage of the pipeline over the earlier [2021-26] access arrangement period showing:

11 Temporary disconnections do not pay a network tariff fixed charge. Evoenergy continues to maintain temporary disconnections and provide meter reads, leakage surveys, and emergency response services.

12 *National Gas Law*, section 132(1); Rule 52 and clauses 34 and 35(3) of Part 5 of Schedule 1 of the Rules

A. for a distribution pipeline, minimum, maximum and average demand …

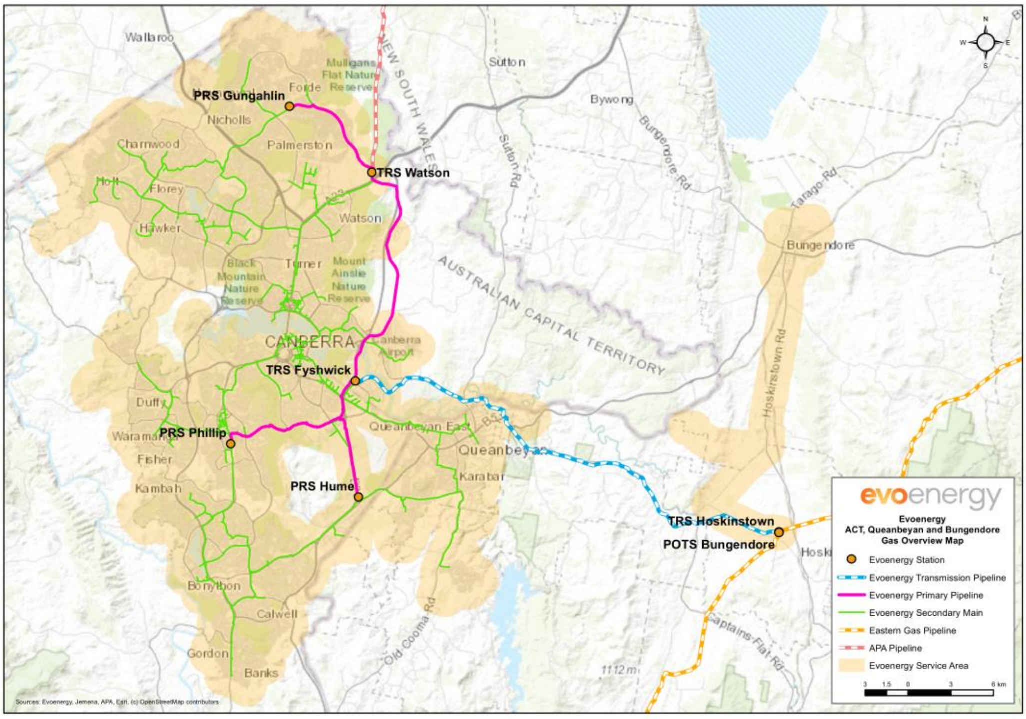
B. for a distribution pipeline, customer numbers in total and by tariff class.

The CIE has been engaged by Evoenergy to analyse historical demand and customer number data and develop robust forecasts that meet these requirements. This report represents a statement of the basis of the forecasts to comply with Rule 74(1) and also provides some of the information required by Rule 72. Further detail is available in the accompanying spreadsheet model and The CIE's separate report on its stated preference research on the long-run price elasticity of demand for Evoenergy gas network services, which was conducted in parallel with and was used as an input to the present report.

Evoenergy distribution area

Evoenergy's distribution areas are shown in chart 1.1, covering most of the ACT and nearby urban areas in NSW. Most customers are located in the ACT and Queanbeyan. Evoenergy also operates a gas distribution network in Nowra, but forecasts for that network are not developed in this report, since it is not covered by the access arrangement that applies to prices for gas distribution in the ACT and Queanbeyan-Palerang.

1.1 Evoenergy's ACT and Queanbeyan gas network



Data source: https://www.evoenergy.com.au/About-us/Gas-network/Gas-network-ACT-and-Palerang

Structure of this report

The remainder of this report is structured as follows.

- Chapter 2 presents a review of the forecasts prepared for the current access arrangement period in 2020.
- Chapter 3 presents important context and analysis of the most pertinent issues at the current time in forecasting gas demand in Evoenergy's network.
- Chapter 4 describes the CIE's approach.
- Chapters 5 – 8 present forecasts of the following components of individually metered (Tariff VI) usage:
  - Chapter 5: residential customer numbers
  - Chapter 6: residential usage per customer
  - Chapter 7: commercial customer numbers, and
  - Chapter 8: commercial usage per customer.
- Chapter 9 combines these projections of Tariff VI customer numbers and usage per customer to forecast total usage.
- Chapter 10 presents forecasts of boundary metered (Tariff VB) customer numbers and usage.
- Chapter 11 presents forecasts of Tariff D usage and customer numbers.
- Appendices provide technical information about data sources and methodologies for estimating modelling inputs.

2 Review of forecasts for the current access arrangement

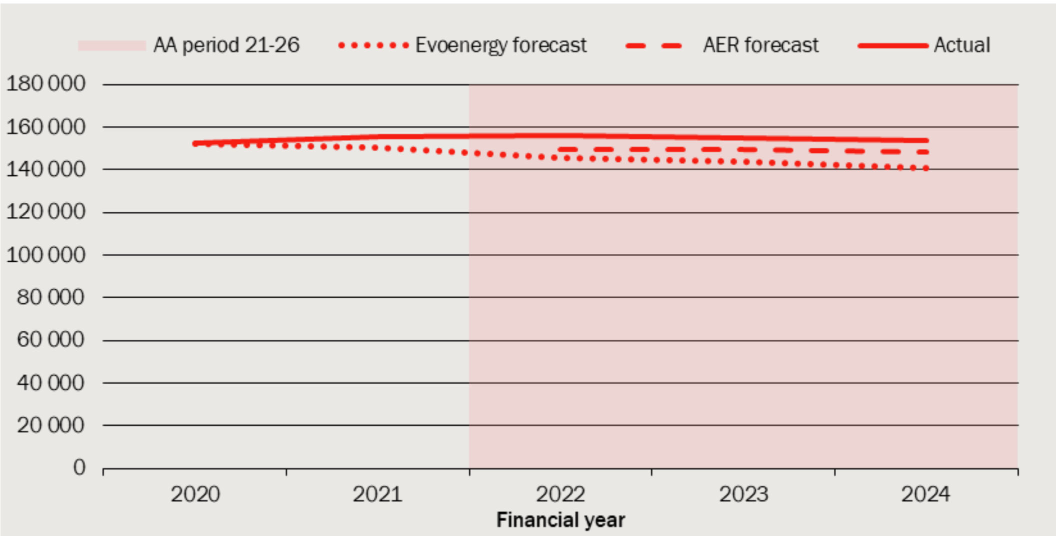
The forecasts for the current access arrangement period were prepared for Evoenergy by The CIE in 2020.[13] The AER final decision adopted different forecasts to those proposed by Evoenergy by altering the post-model adjustment applied to VI tariff customer usage. Both forecasts are compared to actuals in this chapter.

Actual and forecast demand

Connections

Connections have remained above the level observed in 2020, despite both Evoenergy and the AER forecasting declines. The reasons for this difference are discussed later in this chapter.

2.1 Forecast and actual connections



Note: VI tariff estimated fixed charges FY average.

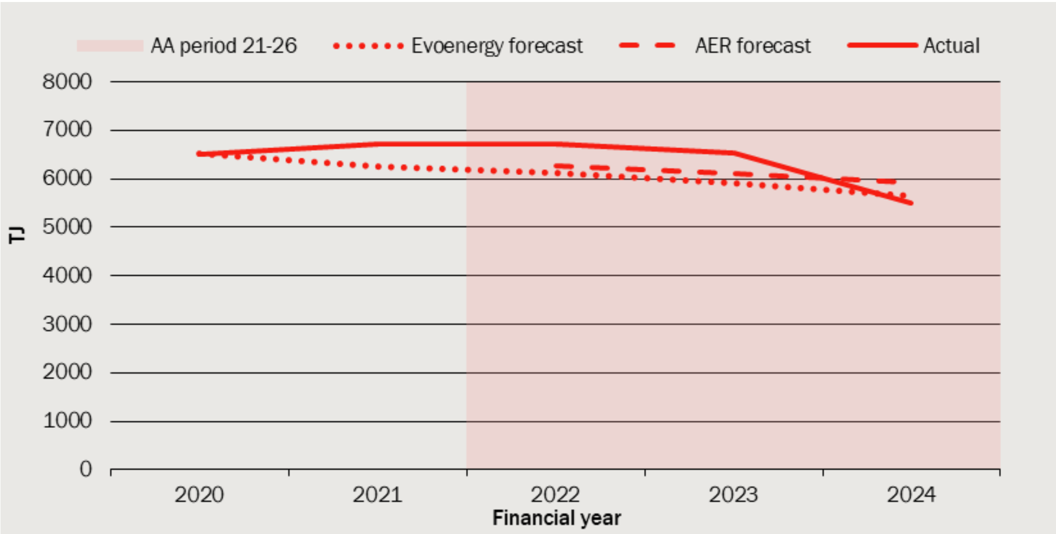
Data source: CIE

13 Evoenergy - CIE - Attachment 8.1 - Update to forecast demand report - January 2021. (https://www.aer.gov.au/system/files/Evoenergy%20-%20CIE%20-%20Attachment%208.1%20-%20Update%20to%20forecast%20demand%20report%20-%20January%202021_0.pdf, accessed 11/10/24)

Total consumption

Actual consumption by volume tariff customers has been higher than forecast up until 2023/24. In 2020, The CIE forecast declining total consumption driven by both disconnections and reductions in average consumption per connection. Actual gas usage remained relatively similar to the 6.6 TJ observed in 2019/20, before declining significantly in 2023/24 to a level slightly below the 2020 forecast.

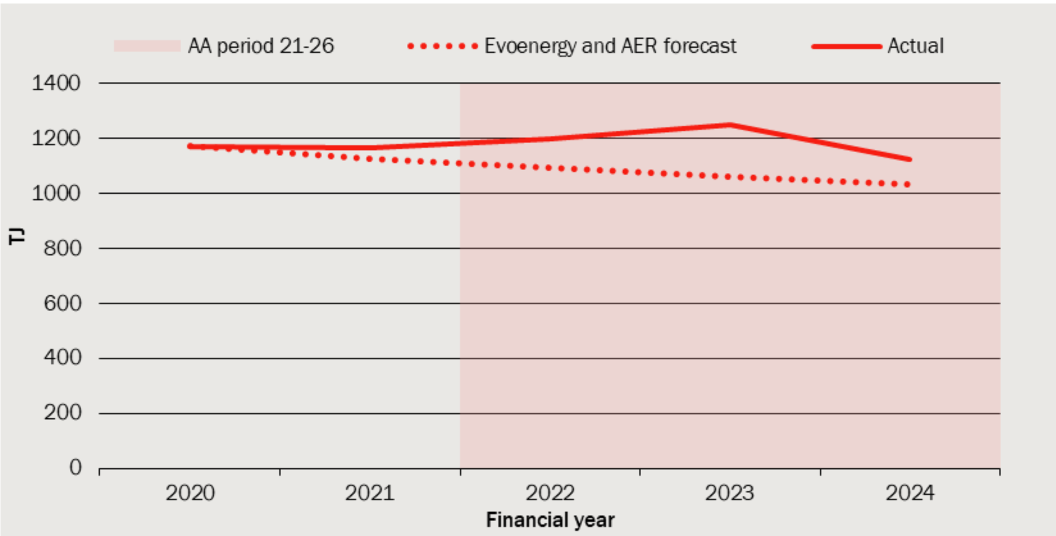
2.2 Forecast and actual volume tariff consumption



Data source: CIE, Evoenergy billing data

Actual consumption by demand tariff customers has also been higher than forecast. In 2020, declining consumption was forecast driven by public sector customers making progress towards electrification targets. No material reduction in consumption was observed until 2023/24, which was 4 per cent below consumption in 2019/20.

2.3 Forecast and actual demand tariff consumption



Data source: CIE, Evoenergy billing data

Drivers have differed from forecast

Government policy

One of the reasons actual connections and consumption have been higher than forecast in 2020 is that government policy has differed from expectations. The two main differences in government policy compared to what was assumed as part of the 2020 forecast are:

- there has been an unanticipated reduction in ACT Government rebates for appliance switching, and
- bans on new gas connections have been implemented more slowly than expected.

The rebates available for appliance switching were up to $5 000 in July 2019. The rebates available in 2024 were $2 500 for concession card holders only and $1 500 for others (however, they have since increased). The ACT Government has also restricted eligibility for its interest-free loan scheme to households with lower unimproved land values. On the other hand, the value of that incentive — that is, avoided interest payments over the course of the loan term — has increased with interest rates in recent years.

The number of rebates paid by the dominant retailer in the ACT, ActewAGL, for heater replacements has been significantly below the forecasts we developed in 2020 based on consumer intentions as stated in the survey conducted by Sagacity in 2020 (table 2.4). The AER assumed replacements much lower than those proposed by Evoenergy, but still assumed there would be an increase over time. That increase has not eventuated.

2.4 Gas-to-electricity home heating replacements

Financial year ending 30 June	2020	2021	2022	2023	2024
Actual number of ActewAGL rebates	674	785	526	566	565[a]
CIE forecast 2020		2544	2544	2544	2544
AER final decision		774	842	910	979

[a] excluding June

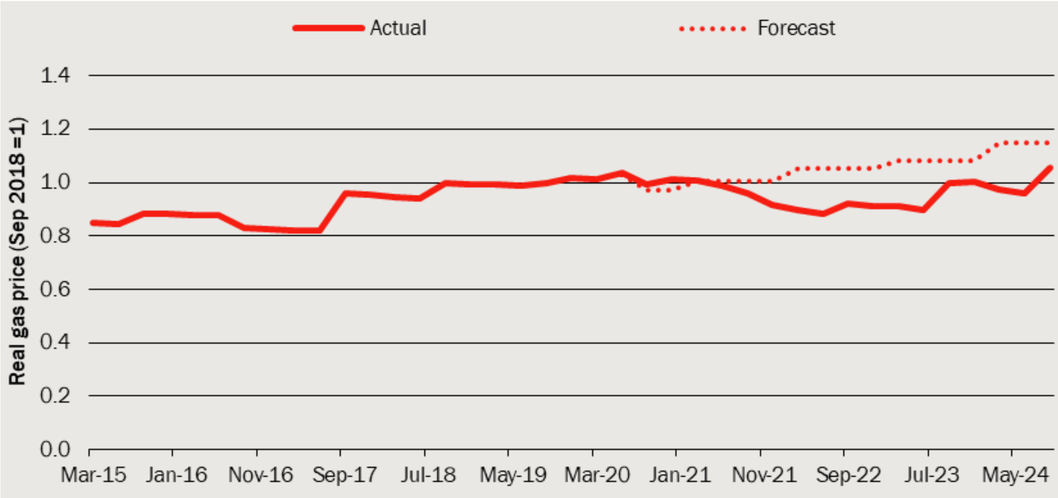
Source: ActewAGL rebate counts, CIE analysis, AER final decision 2021

In 2020, CIE forecast, based on the Parliamentary and Governing Agreement for the 10th Legislative Assembly, that there would be no ACT greenfield connections from 1 July 2021 and infill connections would also drop to zero from 1 January 2023. The implementation of these bans was slower than expected, with the complete ban not coming into force until December 2023. Some connections are still taking place, as development applications lodged before March 2024 are permitted to connect, and we understand there was increased demand for connections prior to the ban taking effect.

Gas prices

Another reason consumption has been higher than forecast in 2020 is that, since June 2021, retail gas prices have been lower than forecast (figure 2.5).

2.5 Forecast and actual gas price

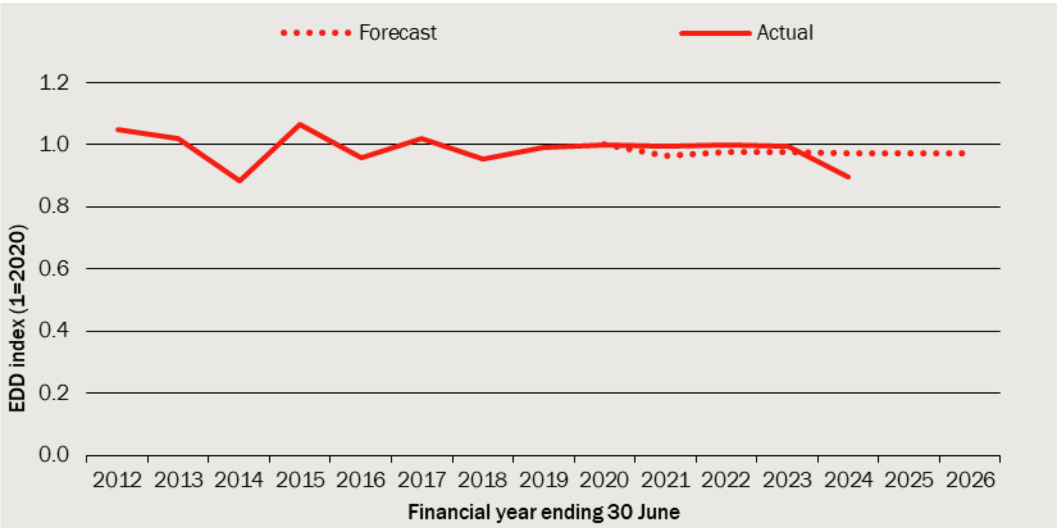


Data source: Forecast from CIE and actuals from ABS CPI Gas and other household fuels (ACT)

Weather

Yet another reason for higher-than-forecast demand is colder weather. The present project uses a measure of Effective Degree Days (EDD) for the ACT published by AEMO in its retail market procedures. Since this measure differs from the measure of EDD used in the 2020 forecast, actual and forecast *growth* in EDD relative to the 2019/20 observed EDD are compared. Actual EDD was slightly higher than, albeit within 3 per cent of, forecast EDD for the period 2020/21 to 2022/23 — that is, the years in which demand was higher-than-forecast. It was 8 per cent lower than forecast in 2023/24.

2.6 Forecast and actual effective degree days

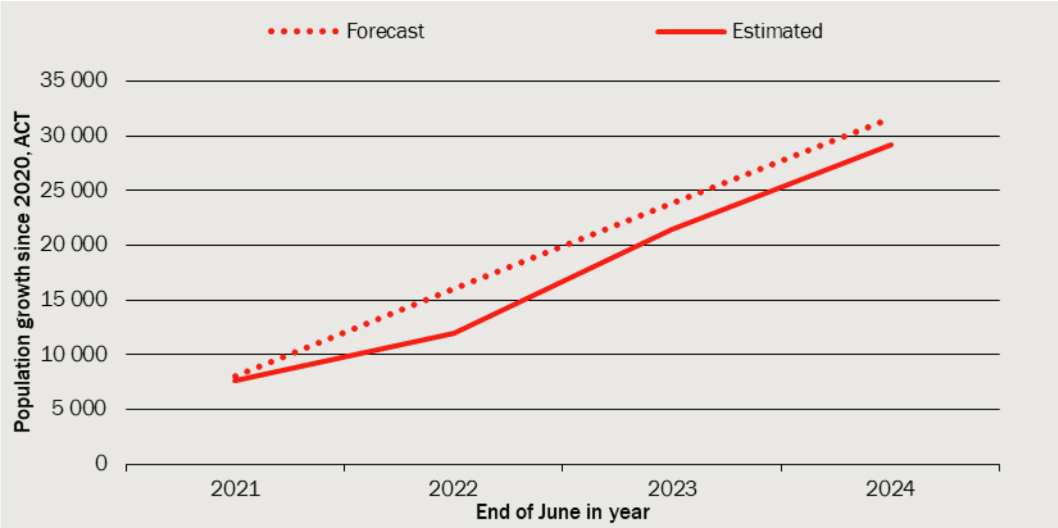


Data source: CIE and AEMO.

Population and dwelling growth

Higher-than-forecast connection numbers do not appear to be a product of higher-than-expected population growth. ABS estimated resident population growth is lower than the growth that had been forecast in 2020. However, the estimated residential population data between the 2016 and 2021 censuses dramatically underestimated the actual population growth that took place over that period, so the figures should be treated as estimates rather than actuals.

2.7 Estimated and forecast ACT population growth

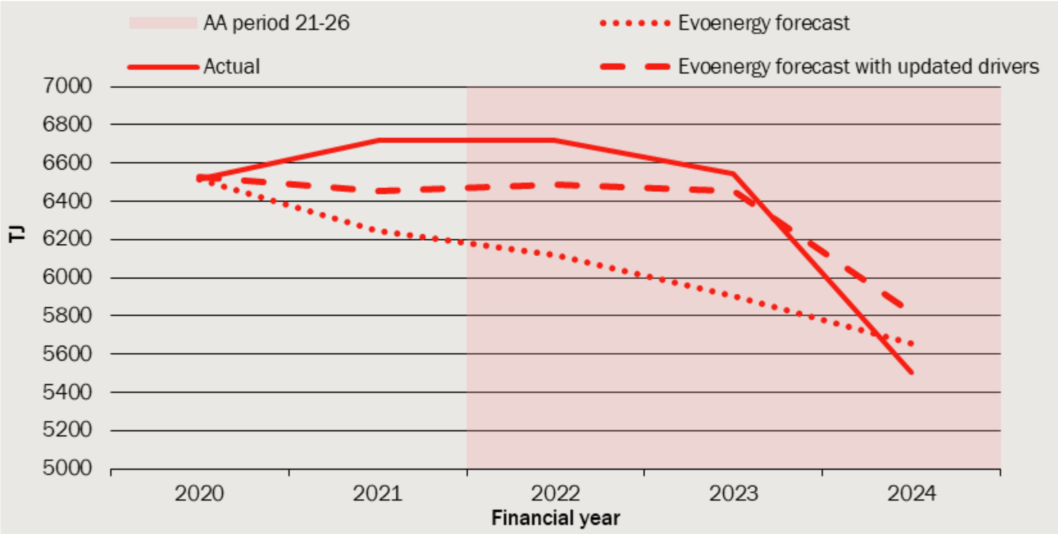


Data source: CIE, ABS Estimated Resident Population

Forecasts based on 2020 model with updated drivers

Updating the 2020 forecasting model with updated assumptions for government policy (i.e. removal of Tariff V post-model adjustments, including removal of the adjustments for appliance switching predicted using the Sagacity customer survey), gas prices, and EDD results in estimates similar to actuals. Figure 2.8 shows that most of the variance between actuals and the Evoenergy forecast can be explained by these three factors. Over the four financial years 2021 to 2024, actual consumption is only 1.1 per cent higher than the forecast with updated drivers.

2.8 Tariff VI consumption forecast from 2020 model with updated drivers



Data source: CIE analysis

Other factors

In addition to the variance in drivers discussed above, the AA period 2021–26 also saw:

- the COVID-19 pandemic and associated impacts on:
  - global supply chains, and
  - working-from-home arrangements, and
- high levels of price inflation and subsequent increases in interest rates.

It is possible these factors could have disrupted consumer plans for appliance replacement and increased residential gas usage.

Lessons for the present project

The analysis above indicates the modelling approach itself was sound. However, it is noteworthy that part of the justification for the post-model adjustments was evidence from the Sagacity customer survey. The preferences expressed in this survey are related to but not fully dependent on government policy. It appears likely that survey respondents were overly optimistic about the timing of their appliance replacements. While some of difference between intended and actual appliance replacement may be explained by the 'other factors' noted above, it is prudent for the present project to use available techniques for limiting hypothetical bias in survey research.

Another lesson for the present project is that the transition towards disconnection or zero-carbon targets by non-residential customers is unlikely to be linear, with customers generally making slower progress to date than the rate implied by a linear transition.

3 Issues in forecasting gas for the access arrangement period 2026-2031

Three noteworthy issues impacting the gas demand forecasts are:

- ACT Government policy
- total gas demand has started to decrease, and
- price elasticity of demand.

Government policy

The ACT Government has committed to phasing out natural gas by 2045. It has banned new gas connections and under current policy settings expects the total stock of ACT gas users to decline significantly by 2030.[14] [15] There remains uncertainty over the policy environment, with the Government stating that it "will need to explore options to accelerate the transition and move towards regulatory options to ensure emissions reduction targets are met. This could include updating the minimum standards for rental properties or prohibiting the installation of new gas appliances towards the end of this decade… The pace of the transition will be examined as the government undertakes the mid-point review of the first [Integrated Energy Plan] in 2027."[16] The ACT Greens, who were in shared government with ACT Labour during the 2020-2024 term of government, have indicated their policy is to prohibit the installation of new gas appliances from 2027.[17] The ACT Chief Minister has stated that a ban on new gas appliances would be the logical next step.[18]

The forecast in this report reflects the existing ban on new gas connections in the ACT and assumes a ban on new gas appliances commencing in 2030. The forecast rate of disconnection is based on ACT Government policy and what consumers told us they will

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14 https://www.climatechoices.act.gov.au/__data/assets/pdf_file/0007/2052475/Gas-Transition-Utility-Impact-Statement.pdf (accessed 13/06/2025)

15 https://hdp-au-prod-app-act-yoursay-files.s3.ap-southeast-2.amazonaws.com/1316/9078/0794/Integrated_Energy_Plan_Summary_ACCESS_FA2.pdf (accessed 13/06/2025)

16 ACT Government 2024. The Integrated Energy Plan — Our pathway to electrification 2024-2030. p 27.

17 ACT Greens 2024. ACT Greens 2024 Policy Initiative. Real climate leadership for the ACT. (https://greens.org.au/sites/default/files/2024-08/2024%20Initiative%20-%20Real%20Climate%20Leadership.pdf, accessed 11/10/24)

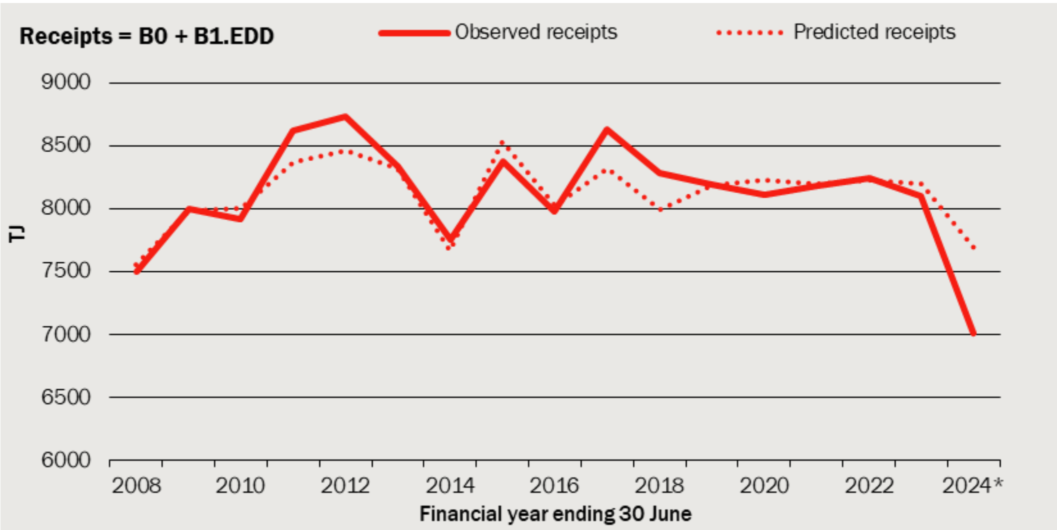
18 https://www.abc.net.au/news/2024-06-19/canberrans-could-be-banned-from-buying-new-gas-appliances/103997228 (accessed 13/06/2025)

do under various pricing scenarios in the context of rigorous quantitative surveys and interviews.

Total gas demand is now decreasing

Total demand in 2023/24 was the lowest observed for many years. The weather was milder than average, but this does not fully explain the drop in demand. Figure 3.1 shows observed demand and predicted demand based on a simple linear regression of total demand on effective degree days. It shows that consumption was lower in 2024 than would be expected under a stable relationship between weather and demand.

3.1 Observed and predicted total demand

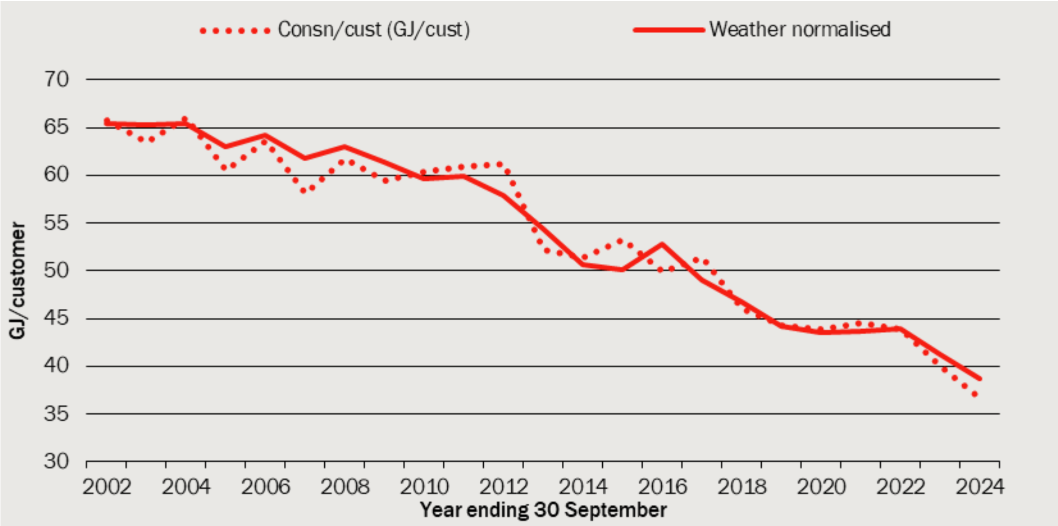


[a] Actuals to 18 June, estimate for last 12 days of the year.

Data source: Evoenergy total receipts, AEMO EDD, CIE analysis

Over the decade prior to 2023/24, the relatively stable level of total demand was the product of two offsetting impacts — increasing connections and decreasing consumption per connection. Recently, however, connections have stopped increasing and total demand has begun to fall with average consumption. Figure 3.2 shows weather-normalised average Tariff VI consumption has decreased 12 per cent over the two years to September 2024 (effectively the end of the billing data set used in our forecast, since only a subset of customers have been metered in the data recorded over October 2024 - January 2025). This decrease is significant, but not out of step with the long-term trend. Similar decreases have been observed in the past, but their effect on total demand was offset by increasing customer numbers.

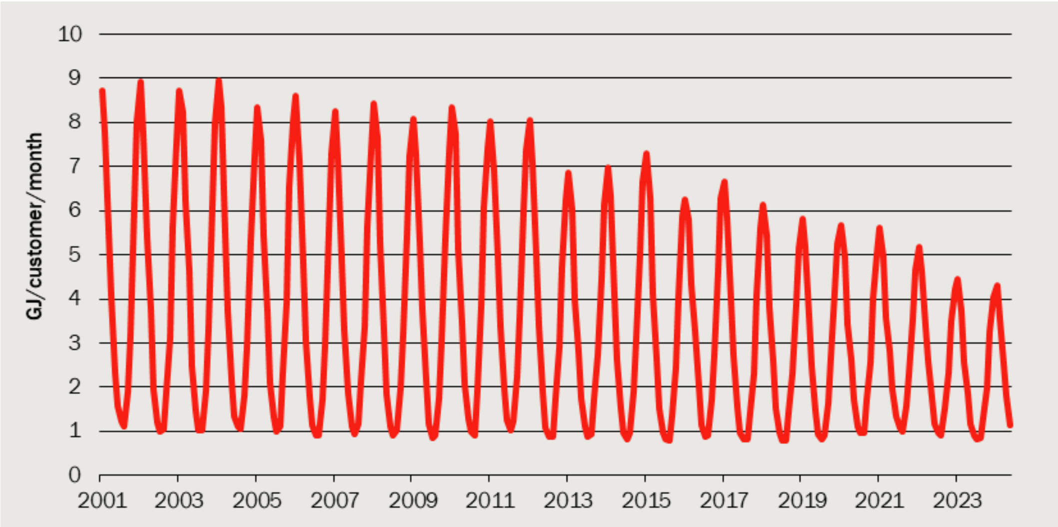
3.2 Weather normalised average consumption per VI connection



Data source: Evoenergy billing data; CIE analysis

Figure 3.3 shows that the reductions have occurred in winter, suggesting they are associated with switching from gas to electric heaters, reduced heater usage (e.g. by lowering thermostat temperatures) and improving average building energy efficiency.

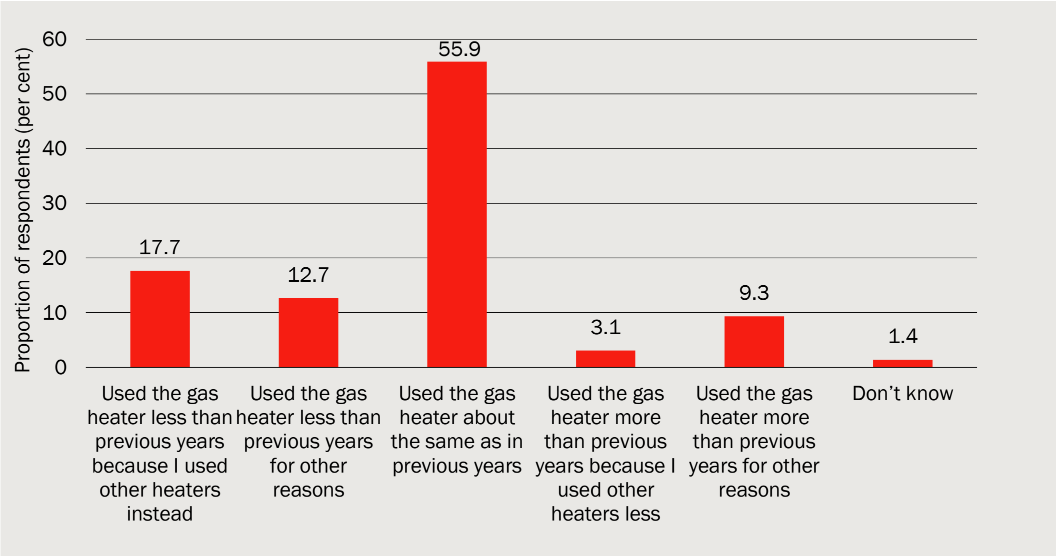
3.3 Average usage per residential customer by month



Data source: CIE analysis of Evoenergy billing data

Data from the survey of gas customers conducted by The CIE for Evoenergy in 2024 suggests that temporary reductions in usage in response to cost-of-living pressures played a relatively limited role. Only around one in eight customers indicated they had used their gas heater less than in previous years, without substituting to another type of heater (figure 3.4).

3.4 Gas heater usage in 2024 compared to previous years



Data source: CIE 2025. Price elasticity of demand for natural gas. Stated preference research. Prepared for Evoenergy. June.

There is some uncertainty over how the interrelated trends in customer numbers and average consumption may change as the rate of disconnections increases over the course of the energy transition. Further data, including data from winter 2025, will be available for Evoenergy's revised proposal, which will provide further indications.

Rather than making assumptions about trends, we used rigorous survey research and customer interviews to model consumer behaviour and intentions in coming years (see Box 3.5 for key findings and The CIE's separate elasticity study report for detail).

3.5 Key findings from The CIE elasticity study

The main factors influencing switching decisions are total cost over time, affordability of upfront costs, environmental concerns, and appliance quality.

For most households, the timing of decisions is tied to appliance failure or home renovations.

The stock of appliances in the ACT is ageing. The average age of gas appliances is roughly 10 years, with almost half of appliances expected to come up for replacement by the end of 2030/31.

When appliances fail:

- more than half of households intend to switch to electric appliances, regardless of what's happening with gas prices and Government rebates.
- for roughly one third of households, the choice between new gas and electric appliances depends on the relative costs.
- Around 1 in 10 households have a strong preference for gas due to appliance quality and will not switch even with financial incentives.

Some households are intending to switch to electric appliances within the next four years, before their gas appliances fail. Roughly 1 in 10 households are intending to do this regardless of relative costs. Environmental concerns are a stronger driver among this group. Others would consider it at higher gas prices and/or replacement rebates.

Switching is more difficult for commercial customers than for residential customers. Only around 1 in 5 commercial customers have formed an intention to disconnect from gas by 2045.

However, 4 in 10 commercial customers are intending to reduce their gas usage by a half or more by 2045.

Only around one third of commercial customers indicated the timing of their gas usage reductions/disconnections would be affected by gas price increases.

Price elasticity of demand

Gas network prices are likely to increase over the course of the energy transition due to declining demand in the face of largely fixed costs and proposed accelerated depreciation of network assets. In the context of significant price changes, gas demand and gas network prices ought to be forecast simultaneously, since they are interdependent. The forecast in this report is based on an iterative modelling approach that accounts for the interdependence between gas prices and demand.

4 The CIE's approach

Outputs required

Evoenergy requires forecasts of several items for its tariff and capex modelling (see table 4.1). Some of the items are closely related; for example, fixed charge quantities depend on the number of new connections, disconnections and reconnections.

Forecasts for Tariff VI have been prepared at the jurisdictional level (separately for the ACT and NSW), while other forecasts are prepared at the customer level.

This report presents forecasts of these items by customer and tariff type and jurisdiction where relevant.

4.1 Forecast items

Purpose	Item	Customer/tariff type
Tariffs	Fixed charge quantities	Volume individual (VI) Volume boundary (VB) Demand tariff
	Usage	VI, by block VB, by block Demand Throughput tariff, by individual customer
	Chargeable demand	Demand Capacity tariff, by individual customer by block
Capex	New connections	Residential (primarily NSW) Commercial (primarily NSW) Demand tariff
Opex	Total connections	All
Ancillary charges	Permanent disconnections[a] Temporary disconnections Reconnections	All

[a] A permanent disconnection involves decommissioning a Delivery Point, including removal from the customer list and the Meter Installation Registration Number (MIRN) from the market.

Source: CIE.

Principles of forecasting

The forecast should be the best forecast or estimate possible in the circumstances and be arrived at on a reasonable basis. Meeting the following criteria will ensure this is the case:

- Be accurate and unbiased
- Transparent and repeatable
- Incorporate key drivers
- Model validation and testing
- Accurate and consistent at all forecast levels
- Use of the most recent input information
- Assumptions are clear and based on evidence
- Top Down (Global) meets Bottom Up (Spatial) forecast
- Weather normalisation, and
- Adjusted for discrete changes from major customers.

A key part of meeting some of these criteria (such as the requirements for accurate, unbiased, transparent and repeatable forecasts) requires an understanding of where forecast errors are most likely to arise. Hendry and Clements (2001) set out a taxonomy of forecast errors typical of forecasting models. These errors are shown in table 4.2.

The most important of these is the first. In plain English (and applied to gas) this means that the past relationship between drivers of demand and demand may not be true in the future. This has clearly been the case in the ACT where government policy has intentionally changed those past relationships, so that gas demand no longer grows with population.

These errors are directly related to the forecast criteria. For example, for an unbiased forecast, over time, the addition of errors between the forecast and what actually happens will be zero. For an accurate forecast (with minimum error), the absolute difference between the forecast and what occurs will be small.

Transparent and repeatable forecasts require the forecasting procedures to be understood by the AER and others and to be updatable and replicable if required.

4.2 Forecast error taxonomy

Errors related to coefficients (deterministic terms)	Errors related to error bounds (stochastic terms)
1. Shifts in the coefficients of deterministic terms	6. Shifts in the coefficients of stochastic terms
2. Misspecification of deterministic terms	7. Misspecification of stochastic terms
3. Misestimation of the coefficients of deterministic terms	8. Mis-estimation of the coefficients of stochastic terms
4. Mismeasurement of the data	9. Changes in the variances of the errors
5. Errors cumulating over the forecast horizon	

Source: Hendry, D. and M. Clements 2001, "Economic forecasting: some lessons from recent research", Economic modelling, vol. 20(2), pages 301-329, March.

Modelling structure

Two models

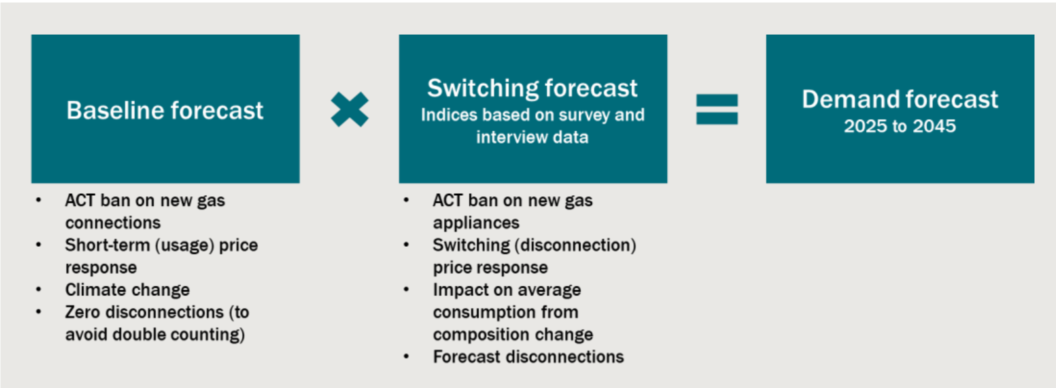
The major changes in energy policy that have occurred in the ACT during the current regulatory period mean that forecasts based only on projections of historical drivers of gas demand are unlikely to be accurate. The key question relates to the rate at which customers will transition away from gas to electricity. Government has the means to increase this rate to meet its policy objectives, including through financial incentives and a ban on installation of new gas appliances. Forecasts need to be based on predictions of consumer behaviour under assumptions about those policy settings.

To meet this challenge, our approach consists of two separate but related models:

- a baseline model, and
- a switching model.

Double counting of impacts across the two models was avoided, with the baseline model incorporating the ban on new ACT connections, the short-term usage response to price changes, and climate projections, and the switching model incorporating the long-term appliance-replacement response to price changes, a 2030 ban on new gas appliances in the ACT and forecast disconnections by various types of customer (figure 4.3).

4.3 Summary of forecasting approach



Data source: CIE

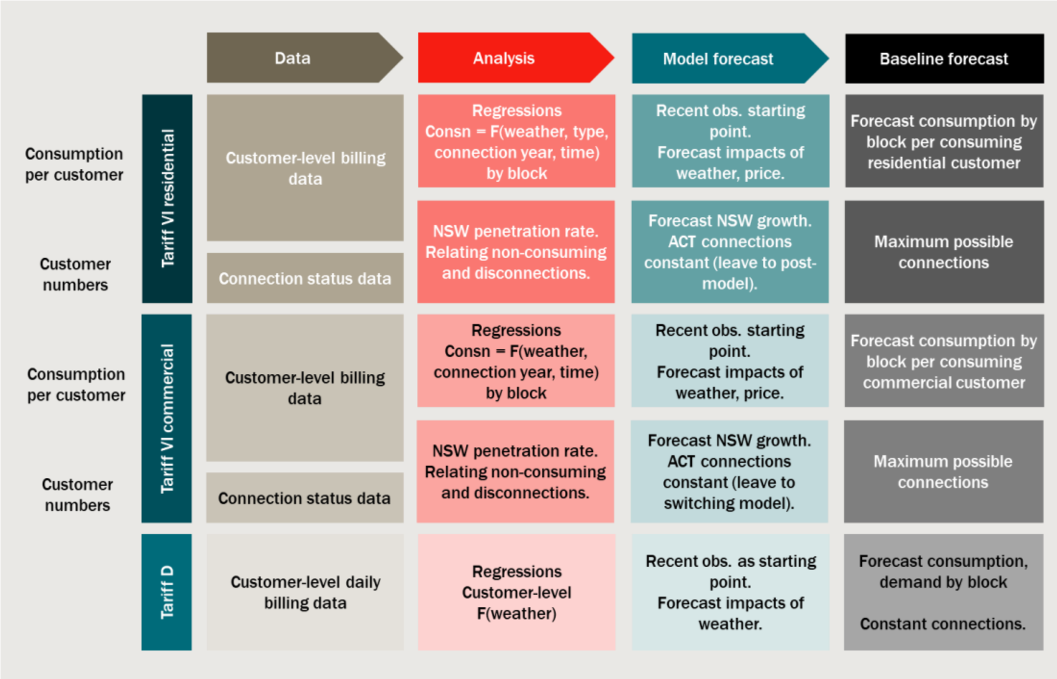
The baseline forecasting model (figure 4.4) involves:

- Separate forecasting models for Volume Tariff connections, Volume Tariff average consumption, and each Demand Tariff customer.[19]
- Regression analysis of customer-level billing data (from October 2000 to January 2025 for Tariff V customers and from July 2019 to June 2024 for Tariff D customers) to identify relationships between demand and weather and other drivers

19 The Volume Tariff modelling relates to the Volume Individual tariff which comprises 99.99 per cent of all Volume Tariff customers. Forecasts for the 17 customers on the Volume Boundary tariff are assumed to follow the same pattern as Volume Individual forecasts.

- The baseline forecast is based on applying these relationships to a starting point based on recent observations and external forecasts of weather and prices

4.4 Approach to baseline forecast



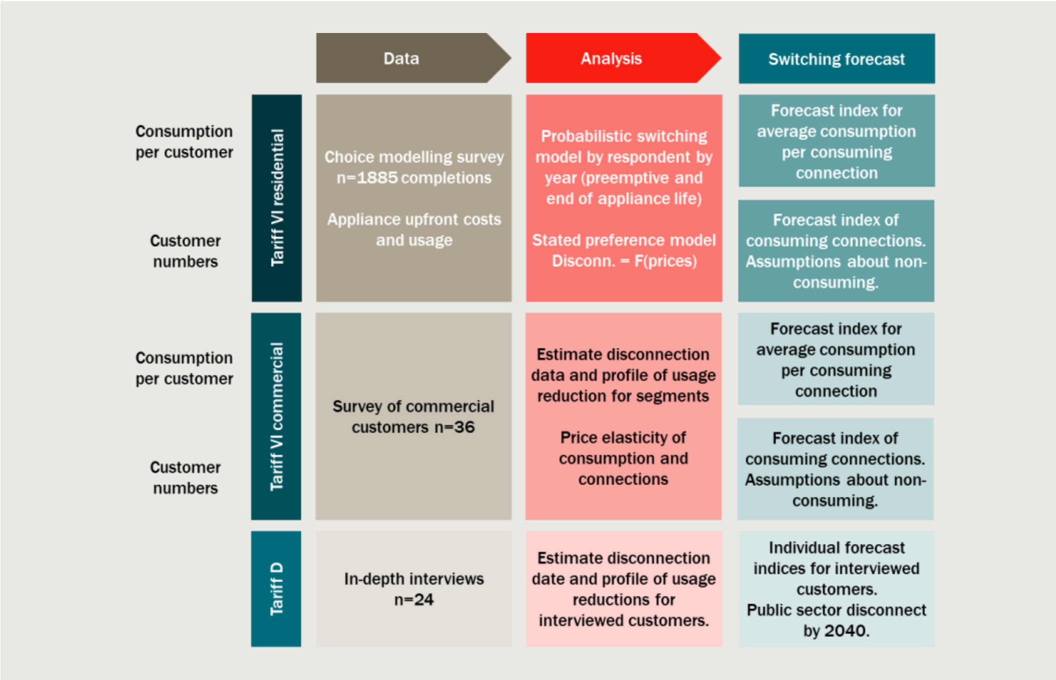
Data source: CIE

The switching model involves:

- capturing the expected impacts of appliance replacement and the ACT Government's Integrated Energy Plan, which has signalled increasing government intervention from 2030 and the eventual decommissioning of the gas network.[20]
- using data from quantitative surveys and interviews conducted with Evoenergy customers and designed to understand the impact of gas and electricity prices on the extent and timing of appliance switching and disconnection.
  - The residential switching model estimates the likelihood of disconnection in each year for each of 1885 customers, based on the age of their appliances, assumed appliance survival curves, and a statistical choice model estimated on the responses of the 1885 customers to discrete choice experiments relating to appliance replacement decisions, both at end of appliance life and pre-emptively, under various price scenarios.
  - Large-customer switching is modelled at a customer level based on interviews and a review of publicly available statements about electrification plans.

20 ACT Government 2024. 2024–2030 The Integrated Energy Plan — Our pathway to electrification.

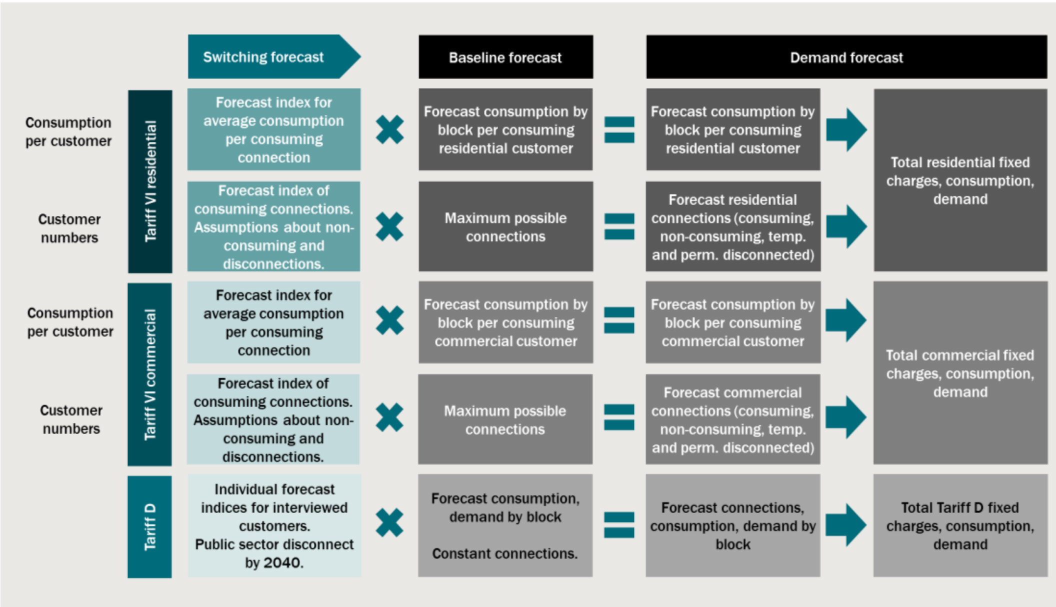
4.5 Approach to switching forecast



Data source: CIE

Finally, forecasts are aggregated across the two models and across customer types to measure total usage and chargeable demand by price block (figure 4.6).

4.6 Aggregating the forecast



Data source: CIE

The baseline model and the switching model are not separate models or alternative forecasts, but rather two complementary parts of one comprehensive demand forecasting model. Both parts are needed, because each addresses different drivers of gas demand.

Conservative assumptions, such as omitting the time trend from the baseline model, have been made to avoid any double counting of effects across the two parts (table 4.7).

4.7 Drivers of demand

Measure of demand	Baseline model drivers	Switching model drivers
Number of volume customers	▪ The level of population growth in NSW	▪ The rate at which gas appliances need replacement, which depends on the age and condition of existing appliances. ▪ Alternative energy sources (and their prices) available to customers for heating, cooking and hot water. ▪ Prices of being connected to and using gas. ▪ Government policy on the prohibition of new gas network connections in the ACT from 8 December 2023.[a] ▪ Other government policies to encourage electrification, including rebates and interest-free loans. ▪ Customer preferences relating to environmental impacts of gas and alternative fuels
The amount of gas consumed by volume customers	▪ Weather — consumption is impacted by temperature, sunshine and other aspects of weather ▪ Building design and size. Better insulated buildings will require less gas for heating. New building standards for energy efficiency have been steadily rising. We found that new customers use significantly less gas than long-standing customers. New customers are forecast for NSW only. ▪ Prices of gas and substitutes, such as electricity or bottled liquid petroleum gas, and economic conditions, such as changes in real income, both affect short-term usage (e.g. reducing heater thermostat)	▪ The number and efficiency of gas appliances — government policy is incentivising replacing gas appliances with electric alternatives ▪ Building type. Apartments and houses use different amounts of gas on average. The switching model accounts for forecast changes in the composition of the customer base over time.
Demand customers	▪ Weather	▪ The feasibility and prices of alternative energy sources. Feasibility depends heavily on the nature of gas usage. ▪ Prices of being connected to and using gas. ▪ Government policy on the prohibition of new gas network connections in the ACT from 8 December 2023.[a] ▪ Federal and ACT Government targets for zero emission buildings.

[a] ACT Government. 30 November 2023. Regulation to prevent new gas connections starts in December. Available at: https://www.cmtedd.act.gov.au/open_government/inform/act_government_media_releases/rattenbury/2023/regulation-to-prevent-new-gas-connections-starts-in-december.

Source: CIE

The baseline model

A forecasting model is a set of dependent variables representing demand (a vector of customer numbers, customer consumption, etc) and its relationship to a set of demand driver variables.

Mathematically, this can be represented as follows.

$$\widetilde{D}_t = B\tilde{X}_{t/t-1} + \tilde{\varepsilon}_t$$

Where:

$\widetilde{D}_t$ is a $N \times 1$ vector capturing N different types of demand at time t

$\tilde{X}_{t/t-1}$ is a $M \times 1$ vector of explanatory variables (such as population level, income level). It can be for variables of the current period (t) or past periods (such as t-1)

$B$is a $N \times M$ matrix of coefficients (such as the response of customer numbers to a higher population)

$\tilde{\varepsilon}_t$ is a $N \times 1$ vector of error terms in the forecasts

Forecasting requires two components.

1 Establishing values for the matrix B that are relevant for the future.
2 Projecting forward X so that projections can be made for D where necessary.

There is little added value in putting in explanatory variables (X) that are subject to as much or greater forecast difficulties as D, as these variables will also have to be projected. For example, if the forecast is based on take-up of electric appliances for cooking, but there is no available forecast of this, then nothing has been gained in the forecasting process by including this variable.

For the purposes of gas demand forecasting for the AER, the distributor has to satisfy the AER that forecasts used in setting reference tariff(s) are arrived at on a reasonable basis and represent the best forecast or estimate possible in the circumstances.[21]

In practice this means that the forecasting model should establish the parameters B in as robust a way as possible given data availability and should use independent projections of *X*. This could include population projections put forward by the ACT Government or the ABS.

Once the basic relationships are established, forecasts should consider factors that are different between the past period over which the relationships are estimated and the period over which forecasts are to be derived. For example, if there are significant industrial customers that are known to be changing their operations, or changes in technology available that makes other forms of energy more or less favourable in comparison to gas. These are generally known as post-model adjustments.

The formal statistical analysis is undertaken using panel data regression in STATA, a statistical software package. Our approach has allowed for:

21 National Gas Rules 72(1)(a)(iii)(B) and 74.

- Testing of different models (random effects and fixed effects)
- Undertaking a variable selection process from general to specific, to identify a parsimonious model of gas use.

The switching model

Residential switching model

The residential switching model is a detailed choice model conducted at the customer level for a weighted sample of 1885 Evoenergy customers who completed The CIE's discrete choice experiment survey. To keep the survey exercise manageable, electrification of appliances was treated as a single decision, even for respondents with multiple gas appliances. A separate, post-model adjustment is made for potential staging of electrification.

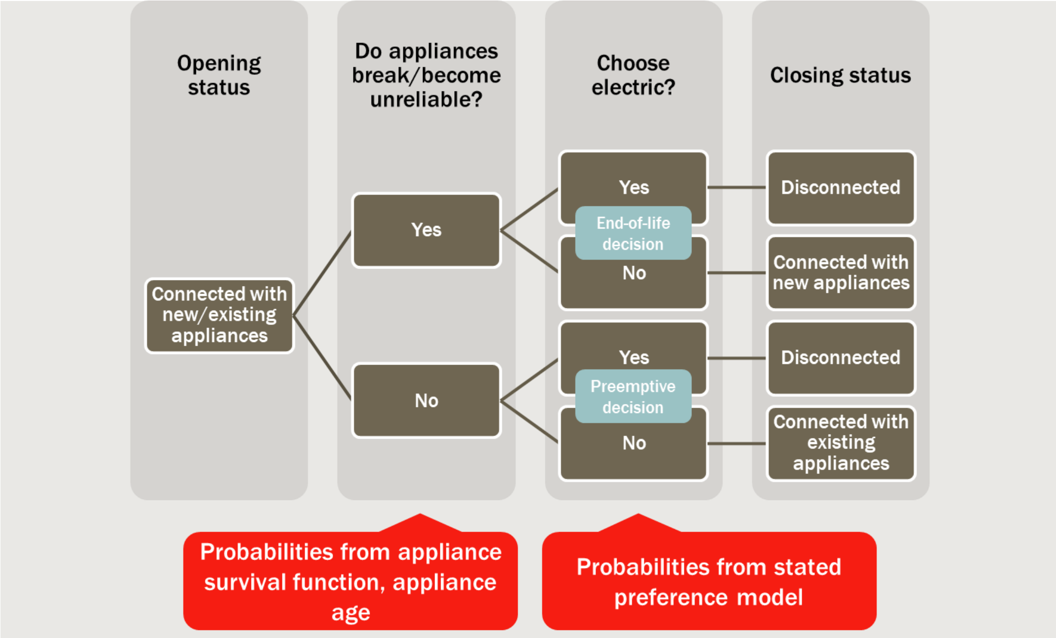
The model estimates the probability of electrification in 75 400 different choice situations defined by:

- Two decision types — pre-emptive or appliance end of life (EOL)
- 1885 customers, accounting for individual preferences, appliance types, and a range of household characteristics influencing appliance usage and replacement cost, and
- 20 years.

These modelled decisions are used to estimate the statistical expectation of the number of customers with each of three types of status each year (figure 4.8):

- Connected with existing appliances (all sampled customers have this status at the opening of year 1)
- Connected with new appliances, or
- Disconnected.

4.8 The decisions modelled for each sampled customer in each year



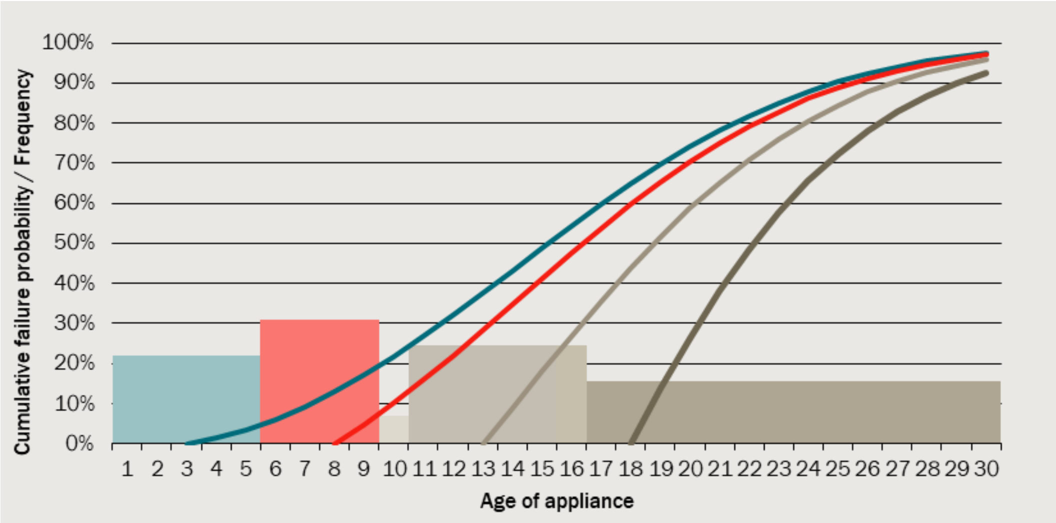
Data source: CIE

The likelihoods of changes in connection status were estimated as:

- Pr. Preemptive Existing to Disconnected$_t$ = Pr. Opening status 'Existing'$_t$ * (1 – Pr.EOL$_t$|t) * Pr.Electric$_t$
- Pr. EOL Existing to Disconnected$_t$ = Pr. Opening status 'Existing'$_t$ * Pr.EOL$_t$|t * Pr.Electric$_t$
- Pr. Preemptive New to Disconnected$_t$ = Pr. Opening status 'New'$_t$ * (1 – Pr.EOL$_t$|t) * Pr.Electric$_t$
- Pr. EOL New to Disconnected$_t$ = Pr. Opening status 'New'$_t$ * Pr.EOL$_t$|t * Pr.Electric$_t$
- Pr. EOL Existing to New$_t$ = Pr. Opening status 'Existing'$_t$ * Pr.EOL$_t$|t * (1 - Pr.Electric$_t$)

The probability that appliances reach EOL in a given year for a given respondent is a function of the age of the respondent's most costly appliance and an assumed appliance survival function based on UN e-waste statistics (a Weibull function with parameters 2.47 and 18.04, which represents an average life of 16 years). Maximum end of life is set to 2045. Figure 4.9 shows the frequency of appliances within age ranges as reported in the survey and our assumed cumulative probability of failure for each of those cohorts of appliances as they age.

4.9 Assumed appliance survival function and distribution of appliance age

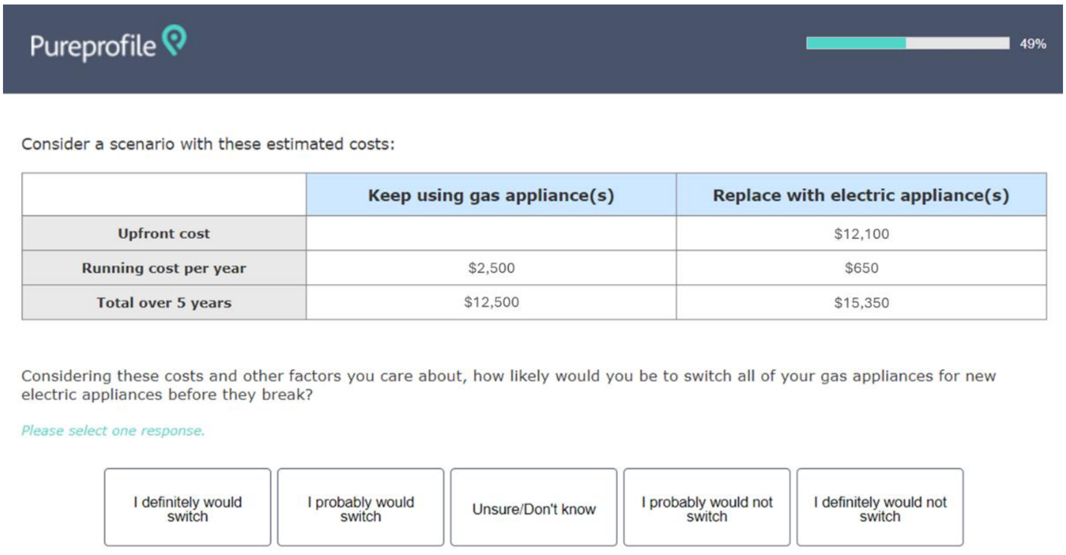


Note: Columns represent a histogram of the age of gas appliances in Evoenergy's network. The lines represent conditional cumulative failure probabilities as those appliances age from today.

Data source: CIE elasticity study survey; CIE calculations.

The probability that a given respondent chooses to electrify in a given year is predicted using a mixed multinomial logit model estimated on responses to the discrete choice experiment. The key explanatory variables in the model are the upfront cost and running cost of the gas and electric options. The running cost depends in part on gas network prices, which themselves depend on the demand forecast. This model includes an iterative process to deal with this feedback loop. Separate models were estimated for pre-emptive and appliance end-of-life decisions. Examples of survey questions generating the data for these models are illustrated in figures 4.10 and 4.11. Each respondents answered four pre-emptive appliance replacement questions and four corresponding appliance end-of-life replacement questions based on the gas appliances in their home.

4.10 Example of a pre-emptive appliance replacement choice question


Pureprofile 49%

Consider a scenario with these estimated costs:

	Keep using gas appliance(s)	Replace with electric appliance(s)
Upfront cost		$12,100
Running cost per year	$2,500	$650
Total over 5 years	$12,500	$15,350

Considering these costs and other factors you care about, how likely would you be to switch all of your gas appliances for new electric appliances before they break?

Please select one response.

I definitely would switch | I probably would switch | Unsure/Don't know | I probably would not switch | I definitely would not switch

Data source: CIE

4.11 Example of an end-of-life appliance replacement choice question

Pureprofile 53%

If your appliances break or become unreliable before you switch, would you choose to replace them with gas or electric appliances?

	Replace with gas appliance(s)	Replace with electric appliance(s)
Upfront cost	$7,100	$12,100
Running cost per year	$2,150	$650
Total over 5 years	$17,850	$15,350
Considering these costs and other factors I care about, I would choose:	○	○

Data source: CIE

When designing the survey and making modelling choices, we recognised the lesson learned from the 2020 forecast that respondents may be overly optimistic about how quickly they will electrify, as discussed in Chapter 2. The key steps we took to mitigate this risk are summarised in Box 4.13.

The mixed logit model includes both observed preference heterogeneity, through interacting respondent characteristics with other variables, and unobserved preference heterogeneity, through the estimation of random parameters. As a result, each of the 1885 customers in the sample has its own utility function. The (unweighted) average parameter values across the sample are shown in table 4.12.

4.12 Average parameter values in choice models

Parameter	Average value in pre-emptive choice model	Average value in end-of-life choice model
Fuel type (Gas=1, Electric=0)	3.40651	-4.06054
Upfront cost ($)	-0.00050	-0.00099
Running cost ($ p.a.)	-0.00171	-0.00273

Note: These parameter values represent a reduced form equation that incorporates the average impact of 27 interaction variables with respondent characteristics, which are omitted here for simplicity.

Source: CIE

The probability of respondent j choosing an option i from n=1…N is:

$$P_{ij} = exp(\beta_{ij}X_{ij})/exp\left(\sum_{n=1}^{N}\beta_{nj}X_{nj}\right)$$

where $\boldsymbol{\beta}$ and X are the coefficients and parameter levels for the fuel-type and cost variables.

For further detail of the statistical model estimated on the survey responses, see our separate report on that study.

Assumptions for upfront and running costs are provided in Appendix C.

4.13 Techniques used to mitigate hypothetical bias

The following information was provided: "The process of installing an appliance will typically include arranging a quote from one or more installers, deciding on the type of appliance, and arranging a day for a power supply upgrade, if needed, and a day for installation. If you are having a ducted system installed, tradespersons may require access to every room of the dwelling."

A 'cheap talk' script was included: "Research has shown that decisions like appliance replacement tend to take longer than people say they will in surveys. Please bear this in mind and try to be realistic about how soon you will replace appliances, taking account of all of the potential practical challenges (e.g. disruption from installation works) and your other priorities."

A five-point certainty scale was used in questions about pre-emptive (prior to end of life) appliance replacement and only a 'I definitely would switch' response is treated as a decision to electrify. Responses of 'I probably would switch' were treated as decisions to continue using existing gas appliances.

A question was included about the likely length of time it would take before pre-emptive electrification would be completed. Later in the survey a follow-up question asked whether, considering how long previous renovations and home projects have taken, whether it is likely electrification would take longer than stated in the survey. The responses of both questions were factored into the modelled timing of electrification for each respondent. A third type of delay was introduced for respondents with multiple gas appliances to take account of potential staging of electrification.

The time trend of declining average consumption was excluded from the forecast to avoid potential double counting.

The statistical expectation of the number of customers in the disconnected status category in each year was used to construct an index. Estimated gas consumption from connected customers was estimated based on each respondent's characteristics and was used to generate a similar index for average consumption per connected-and-consuming customer.

Sampling weights, generated by iterative proportional fitting, were used in the construction of the indices to account for under- and over-sampling of location (ACT vs NSW) and tenure type (owner-occupier vs landlord) to ensure more accurate generalisation to the full population.

These indices were applied to the baseline forecasts of connections (zero disconnections) and average consumption.

Commercial switching model

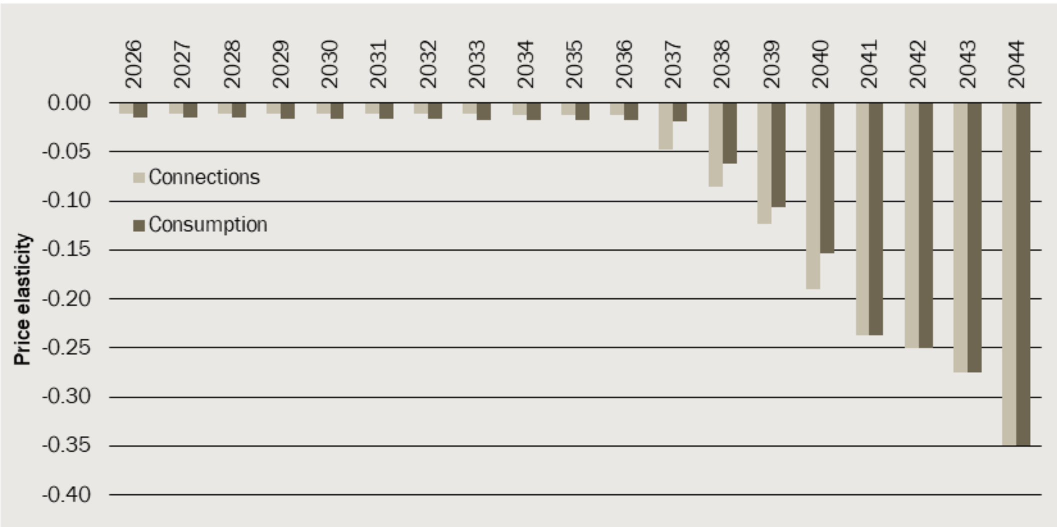
The commercial switching model was much simpler than the residential model, as it was based on a survey that was necessarily shorter and less detailed. It involved establishing a baseline forecast and a price response.

Based on the survey responses, we assumed a baseline 1.1 per cent disconnection rate per year until 2040 and a 16.7 per cent disconnection rate between 2040 and 2045. These rates assume disconnections will be uniformly distributed between now and 2045 for the 22 per cent of commercial customers who indicated they are intending to fully disconnect from gas. Disconnections for the remaining 78 per cent are distributed between 2040 and 2045.

Baseline average consumption per customer is forecast to decline by around 0.5 per cent per year based on 11 per cent of survey respondents indicating they would switch half of their gas usage to electric usage by 2045 and 7 per cent indicating they would switch three quarters of their usage.

For some customers, the timing of switching was dependent on prices. The survey question asked about the degree to which disconnection would be brought forward by a doubling in gas retail prices. The implied price elasticities of connection and consumption are shown in figure 4.14. These elasticities were used to estimate commercial customers' price response to forecast changes in gas prices.

4.14 Effective long-term price elasticity of commercial gas demand



Data source: CIE

Tariff D switching

Demand tariff (Tariff D) customers are large users of gas (>10 TJ p.a.) and include hospitals, large office complexes, hotels, universities, aquatic centres and a small number of industrial users.

Tariff D disconnection and consumption forecasts were made at a customer level. Some 24 of the 43 Tariff D customers were interviewed directly about the profile over time of any expected reductions in gas usage and any targets for disconnection. This sample included 19 of the 31 public sector Tariff D customers and 5 of the 12 private sector customers. The forecasts for these customers were based on statements made in these interviews. For other customers, we assumed:

- Public sector customers would decrease their gas usage to zero in a linear fashion between 2031 and 2041 (based on the ACT target of net zero emissions from ACT Government operations by 2040[22] and the Net Zero in Government Operations Strategy,[23] which states that "From 1 July 2026, where a contract is entered for the purchase or construction by or for the Commonwealth of office space, the office space must be all-electric where available" and "By 1 January 2040, entities should only lease or own office space that is all-electric.")
- Private sector customers would decrease their gas usage to zero in a linear fashion between 2041 and 2045.

22 https://www.climatechoices.act.gov.au/climate-change/what-the-act-government-is-doing/zero-emissions-government, accessed 22/05/2025

23 https://www.finance.gov.au/sites/default/files/2023-11/Net_Zero_Government_Operations_Strategy.pdf, accessed 22/05/2025

5 Tariff VI residential customer numbers

Tariff VI residential customers are individual households connected to the gas network. They account for over 98 per cent of connections and are a key driver in total gas usage. This chapter outlines recent trends in customers numbers, the forecasting methodology used and reports projections for residential customers.

Snapshot of residential customer numbers

Residential customer number data is taken from the billing database provided to the CIE by Evoenergy. Customers are identified by their Meter Installation Registration Number (MIRN), which is a number assigned to each gas service (by Evoenergy as the distributor). Total residential customer numbers are the number of MIRNs that correspond to households who receive an individual, separate bill in a relevant quarter.[24] We count customer numbers in the June quarter of each year.

In June 2024, Evoenergy had 150 453 residential customers. Of these, 89 per cent were located in the ACT and 11 per cent were located in NSW (essentially Queanbeyan, Jerrabomberra and Bungendore).

5.1 Residential customer numbers June 2024

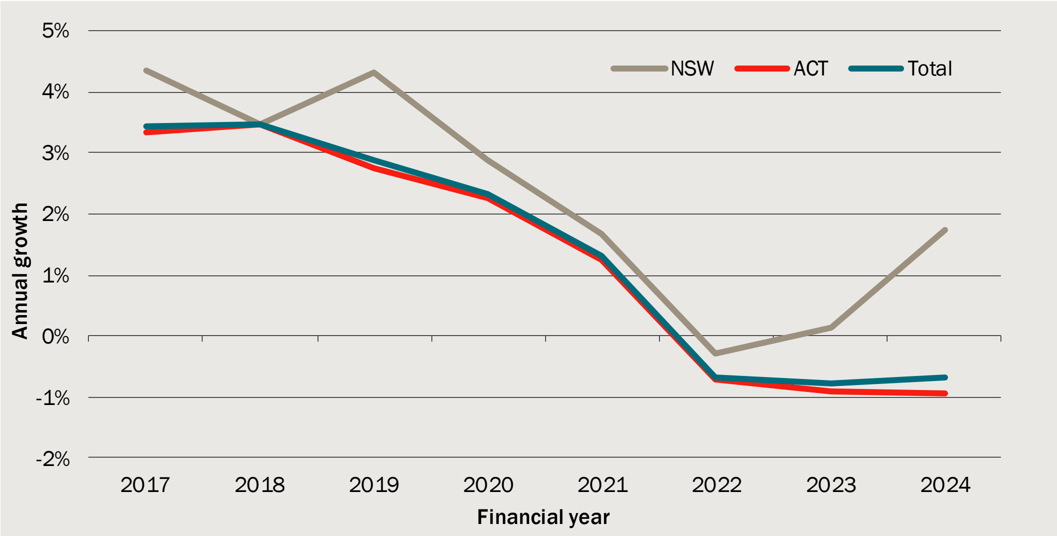
	Residential customer numbers	Share
ACT	134 638	89%
NSW	15 815	11%
Total	150 453	NA

Source: CIE analysis of billing data

In recent years the number of residential customers has begun to fall (chart 5.2). This has been driven by evolving customer energy preferences, the prohibition of new gas connections initially in some greenfield development areas in the ACT (and for all of the ACT from December 2023) as well as public statements by the ACT Government around emissions reductions and the benefits of electrification. Although there has not been similar prohibition on new connections for NSW, the pattern of growth for new customers has largely mirrored that for the ACT, although customer numbers in NSW increased in both 2023 and 2024.

24 This includes only Tariff VI customers (customers who receive a separate bill for their own household. It excludes Tariff VB customers (apartment blocks where there is one MIRN for the entire block). Within Tariff VI customers, we exclude customers who are ‘business’ (or commercial) customers – these are forecast separately in Chapters 8 and 9.

5.2 Residential customer annual growth

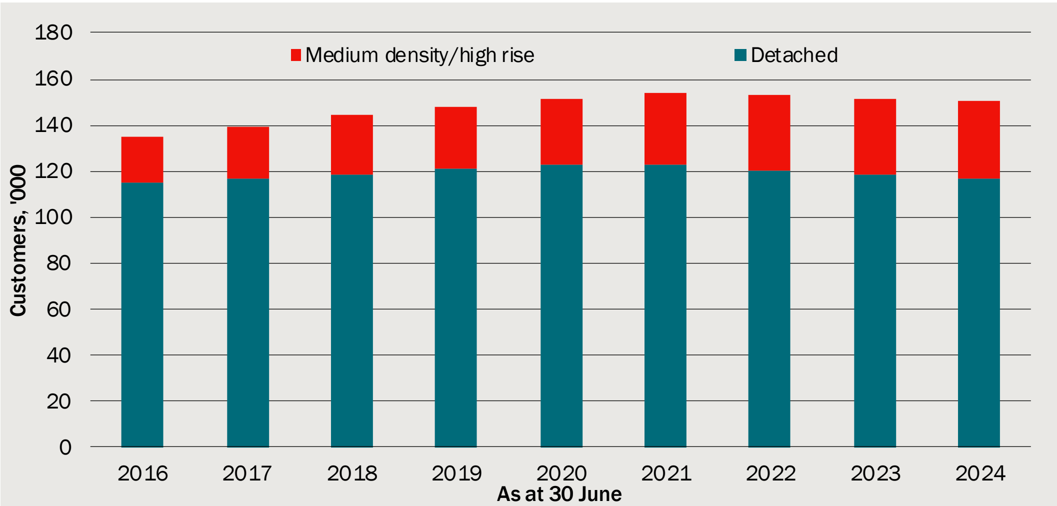


Data source: CIE analysis of billing data.

Residential customers by dwelling type

Most gas connections are for detached dwellings, which account for 78 per cent of total connections (chart 5.3).

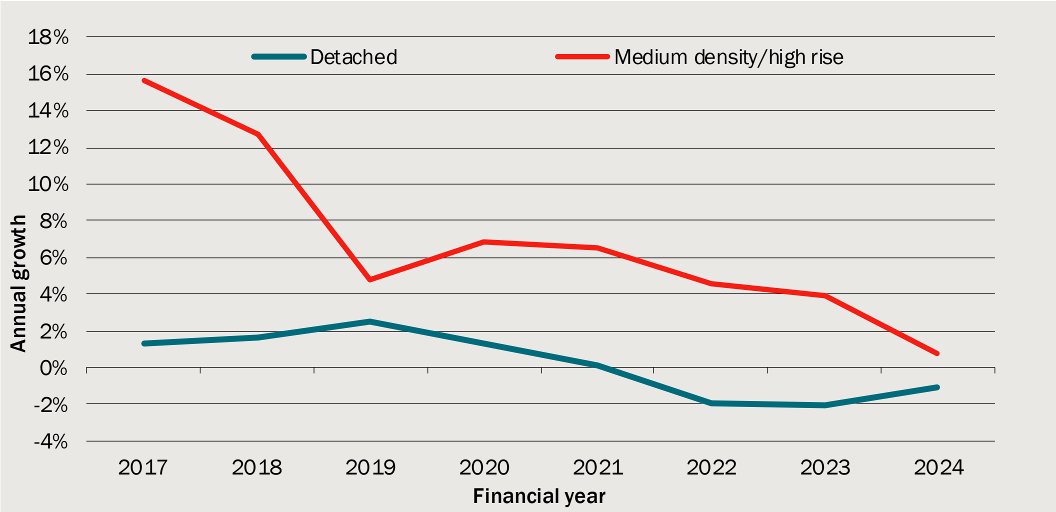
5.3 Residential customer numbers by dwelling type



Data source: CIE analysis of Evoenergy billing data.

The growth of both detached and medium density/high rise customers has slowed recently (chart 5.4). The number of detached dwelling customers began falling in 2021, while the number of medium density/high rise customers continues to grow, but at a historically low rate. Some higher-density housing approved prior to the ban on new gas connections is still being built late in 2024/25 due to relatively long planning and construction lead-times. In absolute terms, net falls in customers numbers have been led by detached dwellings in the ACT (table 5.5).

5.4 Residential customer number growth by dwelling type



Data source: CIE analysis of Evoenergy billing data

5.5 Net new customers by jurisdiction and dwelling structure

Financial year ending 30 June	ACT	ACT	NSW	NSW	Total
	Detached dwellings	Medium density & high rise	Detached dwellings	Medium density & high rise	
2017	1 859	2 641	561	115	**5 176**
2018	588	3 077	259	87	**4 011**
2019	5 131	1 627	1124	26	**7 907**
2020	1 434	1 842	247	46	**3 570**
2021	-147	1 863	230	25	**1 971**
2022	-2 390	1 400	-48	1	**-1 037**
2023	-2 454	1 221	-22	43	**-1 212**
2024	-1 555	256	272	-2	**-1 029**

Source: CIE analysis of Evoenergy billing data

Decomposition of change

The contribution of each of the flows in this relationship are shown in table 5.6. The fall in connections has predominantly been driven by increasing disconnections. Since 2020 the number of new connections has also been falling. The rate of permanent disconnections has remained relatively constant.

5.6 Decomposition of customer change

	2020	2021	2022	2023	2024
New connections	3 567	3 244	2 885	2 652	1 312
Permanent disconnections	416	377	461	448	510
Net temporary disconnections	-419	896	3 461	3 416	1 831
Net change	**3 570**	**1 971**	**-1 037**	**-1 212**	**-1 029**

Source: CIE analysis of Evoenergy billing data

Baseline modelling

Customer numbers from year to year are determined by this relationship:

$$\begin{aligned} &Customer\ number_t \\ &\qquad = Customer\ number_{t-1} + new\ connections_t \\ &\qquad - permanent\ disconnections_t - net\ temporary\ disconnections_t \end{aligned}$$

Where:

- new connections are due to either a new dwelling being connected to the gas network, or a dwelling being connected where previously there was no connection (i.e. when a new MIRN appears in the billing data)
- permanent disconnections, which relates to meter removal (i.e. when a MIRN is abolished and ceases to exist in the billing data)
- net temporary disconnections are the change in the stock of temporarily disconnected dwelling. This occurs where a customer is temporarily disconnected, and their meter is wadded. Over time connections may enter and leave this category, based on whether that customer reconnects or permanently disconnects from the gas network.
- 'Customer number' is primarily made up of connected-and-consuming customers, but also includes a small number of connected-and-non-consuming customers.

For each segment, we forecast:

- new connections (from 2025/26 only estimated for NSW customers due to prohibition of new gas connections in the ACT, box 5.7)
- permanent disconnections,
- temporary disconnections, and
- connected-and-non-consuming connections (customers connected but not consuming for greater than 12 months).

The baseline modelling is relatively simple. It holds constant the group of customers existing at the end point of the billing data set (effectively September 2024 after accounting for an incomplete billing cycle) and forecasts the number of new connections.

The switching model is used to forecast the number of customers becoming non-consuming. To disaggregate non-consuming customers, we forecast the number of permanent disconnections and connected-and-non-consuming customers, with the balance assumed to be temporary disconnections.

The key forecasting steps are outlined in the remainder of this section.

New connections in ACT

For the ACT, we forecast zero new connections from 2025/26 due to the prohibition of new gas connections (box 5.7).

Most of the tariff VI forecasting is based on billing data up to September 2024, so 2024/25 is effectively the first year of the forecast and the switching model is applied to the cohort of customers existing at the time the survey was conducted in October-November 2024. However, ancillary charge quantities data show that 365 new customers have connected in the ACT in the first 10 months of 2024/25. We have included these customers, and an estimated 73 connections for May-June 2025, in the baseline forecast. Some 299 of these customers are detached dwellings and 139 customers are medium density/high rise dwellings.

5.7 Prohibitions on new gas connections in the ACT

Since 8 December 2023, new gas connections in the ACT have not been permitted for residential, commercial and community facility land-use zones, and for residential buildings in non-residential zones. This has been phased in such that from 1 March 2024 all buildings captured by the regulation cannot have a new gas connection unless:

- a connection application was made to Evoenergy before 8 December 2023, as long as the connection is completed within 12 months of the application
- a development application is lodged or a building approval is issued by 1 March 2024 and a certificate of occupancy has not been issued
- an approval for an exemption has been issued.

Connections have continued to occur in 2024/25 but in small numbers. No new connections have been forecasts for VI customers from 2025/26.

New connections in NSW

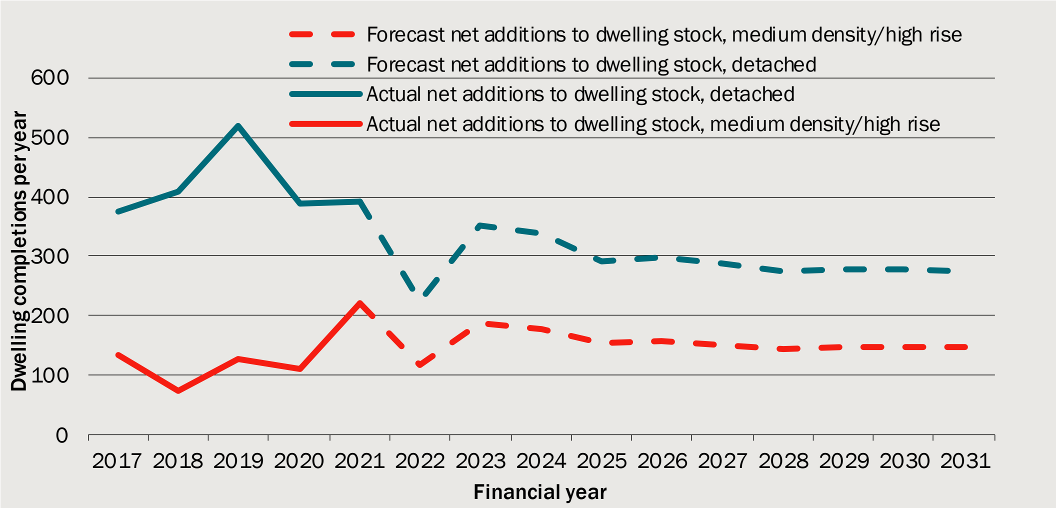
For each NSW segment, we forecast net new customers each year based on forecasts of potential customers (new dwellings) and a penetration rate.

The approach is summarised in the following equation, at time t for and dwelling type j:

$$\begin{aligned}&forecast\ new\ connections_{tj}\\&\quad = forecast\ dwelling\ type\ share_{tj}\\&\quad \times forecast\ change\ in\ dwelling\ stock_{t} \times Gas\ penetration\ rate_{tj}\end{aligned}$$

The change in the stock of dwellings is based on NSW Government implied dwelling demand projections for the SA2 areas covered by the Evoenergy network.[25] [26] These data project the number of dwellings required to house projected population. The total projection is disaggregated into detached and medium density/high rise dwellings based on the net change in dwelling stock from year to year by dwelling type for the SA2 areas covered by the Evoenergy network (chart 5.8).[27] These data are available to June 2022, with the future share of detached dwellings assumed to remain at June 2022 levels. This suggests the stock of dwellings in Evoenergy's NSW service area will increase by between 400 and 450 dwellings per year from 2025 to 2031.

5.8 Net annual change in dwelling stock



Note: Calculations based on SA2 areas which encompass the NSW Evoenergy gas network.

Data source: CIE, 2024 NSW Common Planning Assumption Projections for year ending 30 June, ABS 2022, Estimated dwelling stock.

The forecast marginal gas penetration rate is based on the observed five-year average from 2020 to 2024 ratio of new customers to dwelling completions (based on NSW Common Planning Assumptions implied dwellings) (chart 5.9). Note that in some years the gas penetration rate is greater than 100 per cent of new dwellings. This may be due to

- electricity to gas connections,
- connections associated with rebuilding a dwelling. During construction a connection may be permanently disconnected before a new connection is established. As rebuilding a house does not change the dwelling stock, this sees a new gas connection against no change in the number of dwellings.

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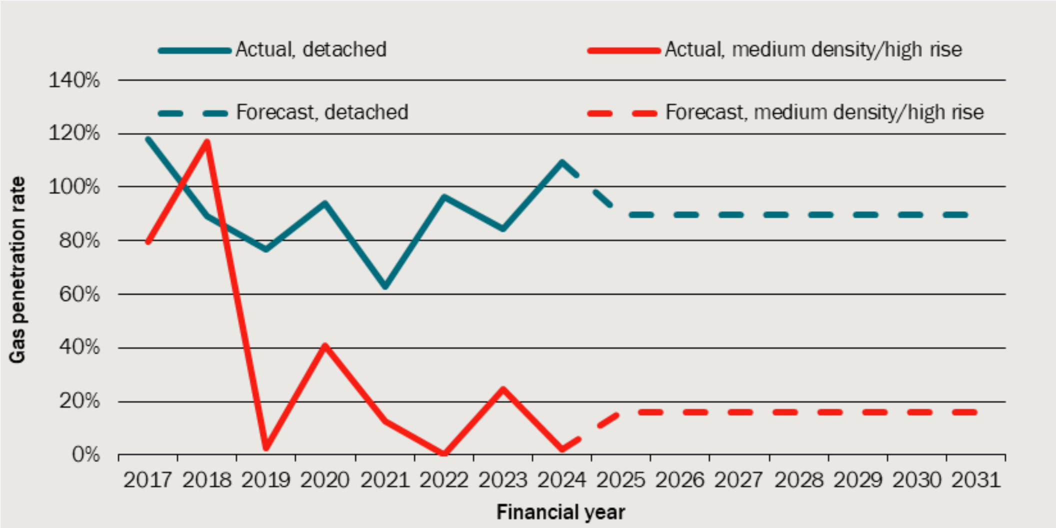
25 2024 NSW Common Planning Assumption Projections for year ending 30 June, accessed from https://www.planning.nsw.gov.au/research-and-demography/population-projections/explore-the-data, accessed on 3 February 2025.

26 The SA2 areas covered by the Evoenergy network are: Queanbeyan West – Jerrabomberra, Karabar, Queanbeyan – East, Queanbeyan, Googong and Queanbeyan Surround. Note this takes in some areas not covered by the Evoenergy gas network, which is controlled for in the gas penetration rate.

27 ABS 2022, Estimated dwelling stock.

- timing mismatches between when a dwelling completion and new gas connection are recorded.

5.9 NSW gas penetration rate

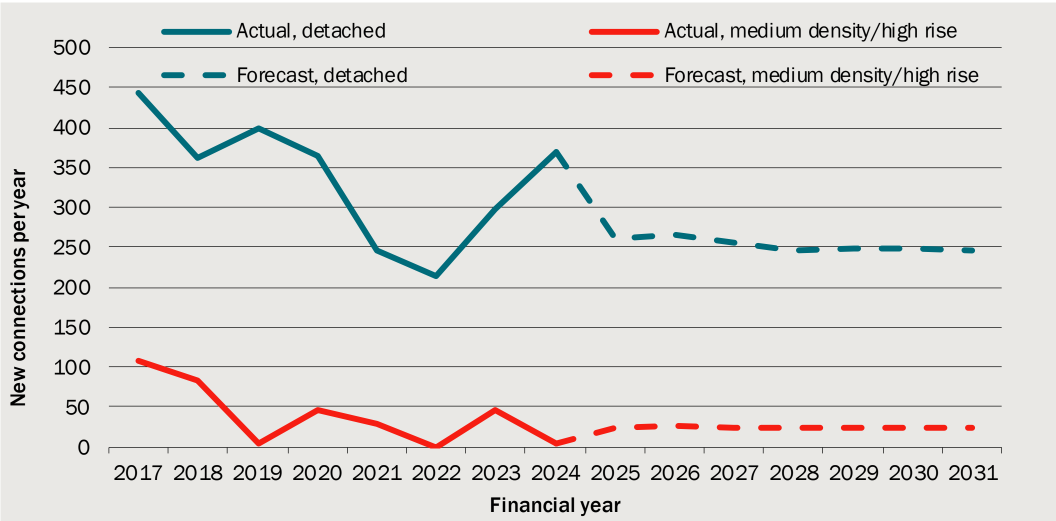


Note: Calculations based on SA2 areas which encompass the NSW Evoenergy gas network.

Data source: CIE analysis of Evoenergy billing data, 2024 NSW Common Planning Assumption Projections for year ending 30 June, ABS 2022, Estimated dwelling stock.

Combining the forecast number of net new dwellings and gas penetration rate gives an estimate of the new customer connections for Evoenergy in NSW (chart 5.10). As gas penetration rates are held constant, the new connection profile has the same shape as the new dwelling projection.

5.10 New NSW gas connections per financial year



Data source: CIE analysis of Evoenergy billing data, 2022 NSW Common Planning Assumption Projections for year ending 30 June, ABS 2022, Estimated dwelling stock.

Permanent and temporary disconnections

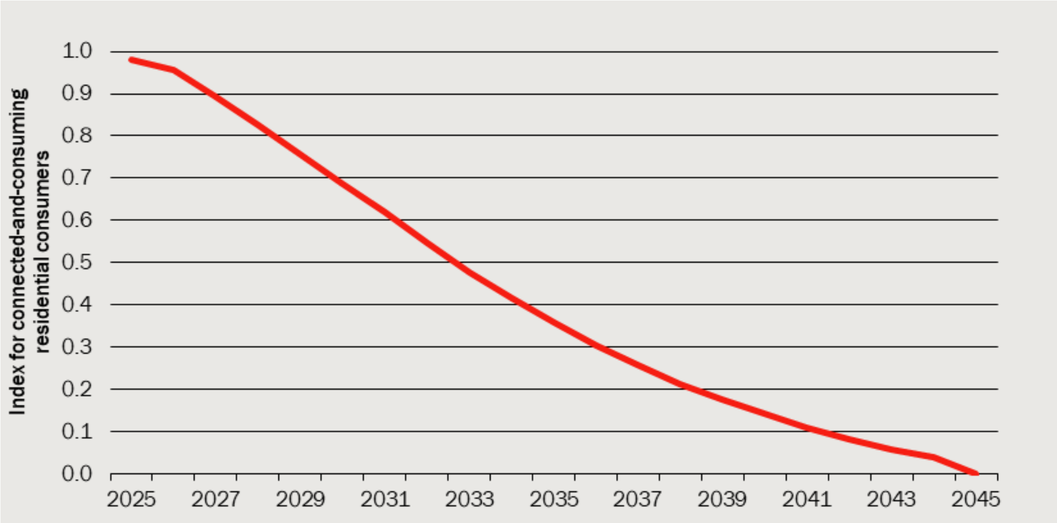
As discussed in Chapter 4, permanent and temporary disconnections are not included in the baseline modelling, but are instead captured by the switching model, which generates indices that are applied to the constant customer projection in the baseline model.

Switching model

The switching model estimates the statistical expectation for the share of current connected-and-consuming customers who will still be connected each year to 2045. The result of this modelling is illustrated in chart 5.11 and table 5.12. The model predicts 38 per cent of customers existing at the end of the 2024 financial year will have disconnected by the end of 2031. Some of the noteworthy drivers of this outcome are:

- the fact that half of gas appliances in the survey sample are more than 10 years old and the assumption of a survival curve with an average appliance life of 16 years mean that almost half of appliances are expected to reach end of life by the end of FY 2031
- the choice model estimated on survey data indicates most households will switch to electric appliances when this happens
- the choice model also indicates an additional 10 per cent of households will disconnect from gas 'pre-emptively' (before appliance failure) by 2031.

5.11 Index for forecast connected-and-consuming residential customers



Data source: CIE gas demand forecasting model

5.12 Index for forecast connected-and-consuming residential customers 2026-2031

	2026	2027	2028	2029	2030	2031
Index	0.95	0.89	0.83	0.75	0.69	0.62

Source: CIE gas demand forecasting model

Allocation of customers no longer connected and consuming

The switching model outputs customers who are no longer connected and consuming as a (residual) single category. These customers (or former customers) include:

- connected-and-non-consuming connections, which occur when customers do not consume gas over a continuous 12-month period, but remain connected to the gas network
- temporary disconnections, which occur when the meter is wadded and remains in situ and the customer is no longer billed, and
- permanent disconnections, which occur when a service is capped near the main, the meter is removed and the corresponding MIRN which is no longer billed.

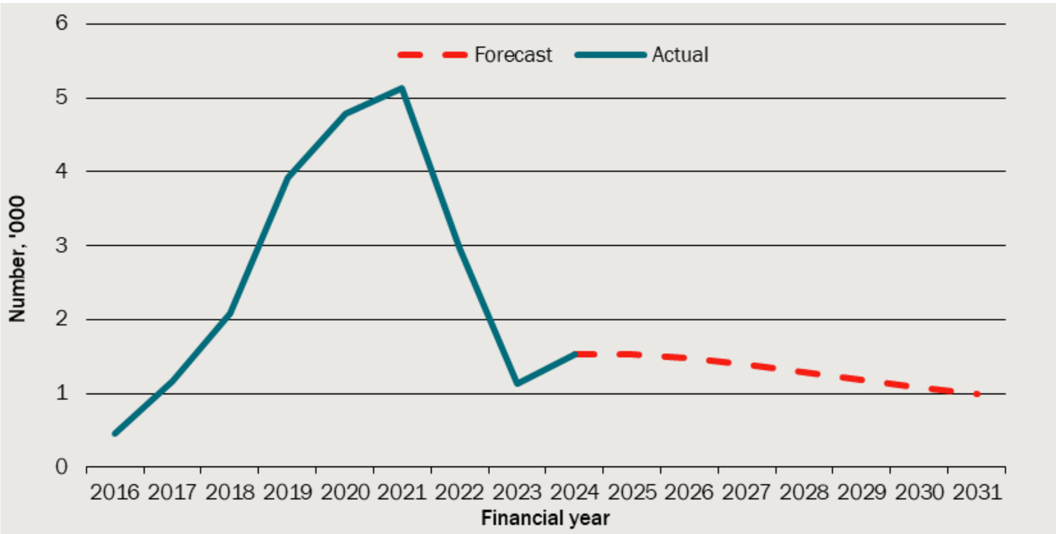
We develop forecasts for the first and third items above, based on historical data, with temporary disconnections treated as a balancing item. Temporary disconnection is the status that is least expensive for a customer/retailer to choose under current pricing arrangements. The approach for each component is discussed in turn below.

Connected-and-non-consuming connections

Connected-and-non-consuming connections are customers who remain connected to the gas network (and incur fixed charges) but have not consumed gas for a continuous period of 12 months or more.

We assume that over time the number of connected-and-non-consuming MIRNs will remain at a fixed share of connected-and-consuming connections (chart 5.13), reflecting the underlying rate of connections which become non-consuming from time to time due to customers leaving dwellings vacant.

5.13 Connected-and-non-consuming MIRNs

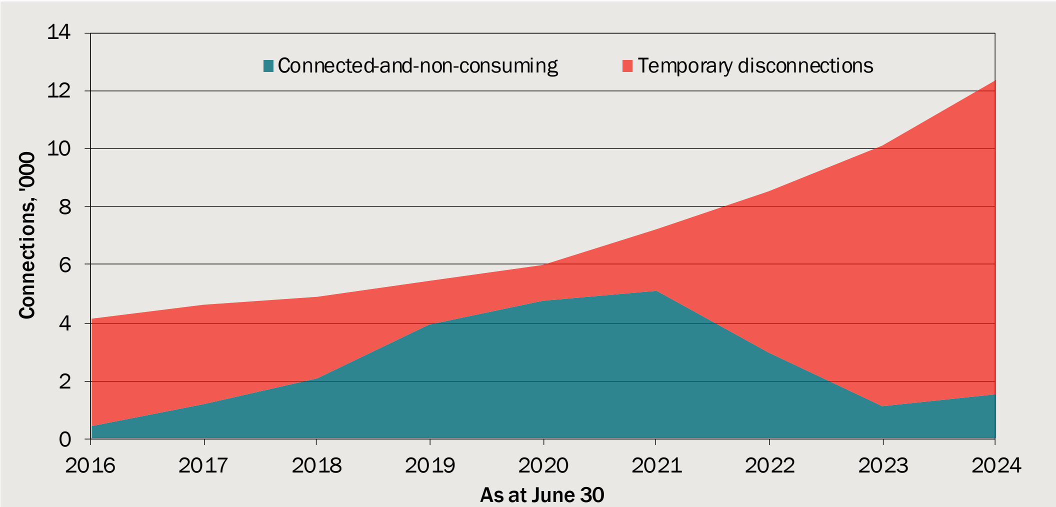


Note: Connected-and-non-consuming MIRNs are those which are non-consuming for 12 or more consecutive months.

Data source: CIE analysis of Evoenergy billing data

This approach assumes the relatively large numbers of connected-and-non-consuming MIRNs in 2019-2021 were due to a combination of increased disconnections and a pricing policy under which fixed charges were levied on temporary disconnections, providing no disincentive to retailers leaving MIRNs with no contract in the connected-and-non-consuming category. In 2019/20 there was a change in pricing, with the removal of fixed charges on temporary disconnections. This created an incentive for retailers to convert connected-and-non-consuming MIRNs to temporary disconnections. This has seen a reduction in connected-and-non-consuming connections and a steep rise in temporary disconnections (chart 5.14). There was a lag between the pricing policy change and the impact. This backlog appears to have since been cleared.

5.14 Non-consuming MIRNS (connected-and-non-consuming customers plus temporary disconnections)



Note: Connected-and-non-consuming MIRNs are those which are non-consuming for 12 or more consecutive months.

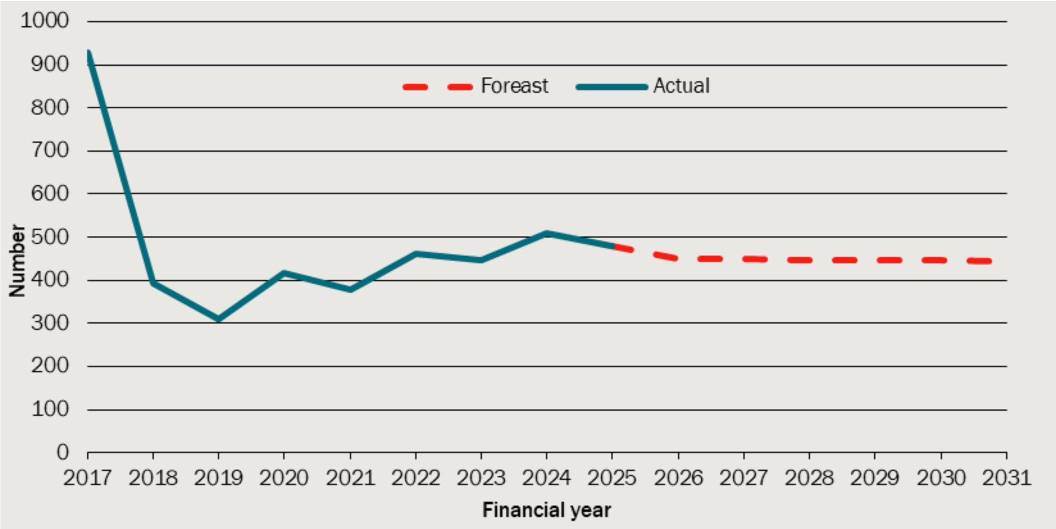
Data source: CIE analysis of Evoenergy billing data

Permanent disconnections

Permanent disconnections are when the service is capped near the main, the meter is removed, the corresponding MIRN is no longer billed and the MIRN removed from the market. These occur when a site is redeveloped (including knock-down-rebuilds) or when a customer switches to electric appliances and elects to have supply infrastructure removed. In the billing data a permanent disconnection is measured when a MIRN ceases to exist.

Since 2017, the number of new permanent disconnections has declined as demolitions conducted by the ACT Asbestos Response Taskforce under the Loose Fill Asbestos Insulation Eradication Scheme have wound up (chart 5.15). Over the past few years, the number of new permanent disconnections appears to have stabilised around 400 per year. In the absence of any changes to regulatory arrangements around disconnections, we have forecast that the rate of permanent disconnections will remain similar to recently observed levels.

5.15 Annual residential permanent disconnections



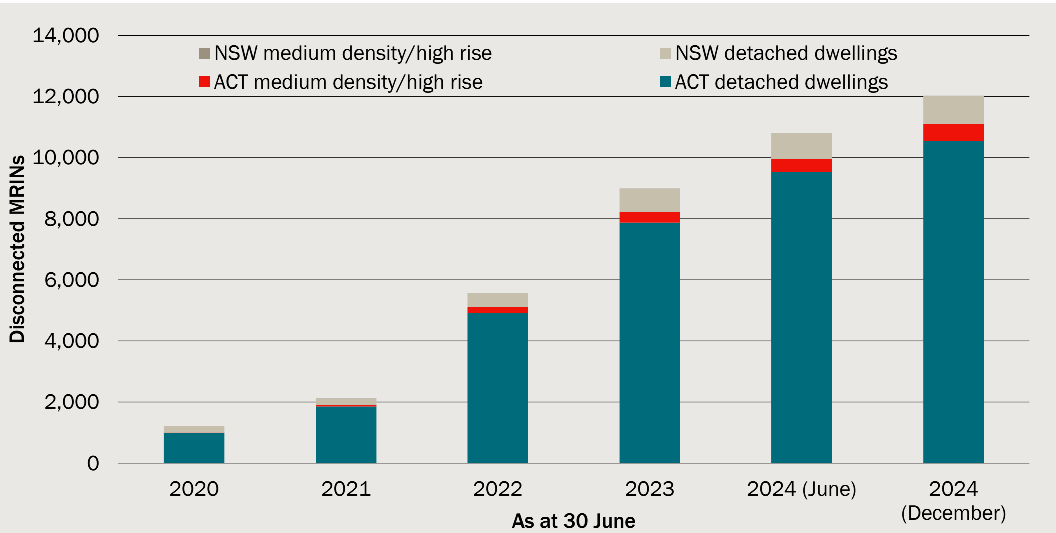
Note: FY 2025 estimated based on data to April 2025

Data source: CIE analysis of Evoenergy billing data.

Temporary disconnections

End-of-year counts of MIRNs by connection status (separate from the billing data set used for most of our analysis) show that, over the period 2019 to 2024, the number of temporarily disconnected MIRNs has grown rapidly, with most being detached dwellings in the ACT (chart 5.16).

5.16 Stock of temporary residential disconnections



Data source: CIE analysis of Evoenergy billing data

This rapid increase appears to have been driven by:

- An increase in the number of dwellings switching from gas to electricity.
- A possible change in behaviour of gas retailers to avoid paying a fixed standing charge. Since 2019/20, temporarily disconnected customers incur a fixed standing

charge, while temporary disconnections do not incur a fixed standing charge. The impact of this on temporary disconnections has lagged somewhat, but the number sharply increased since 2021, as retailers are incentivised to temporarily disconnect non-consuming customers.

- Recent gas to electricity switching appears to have primarily manifested in an increase in temporary disconnections.
  - We note that retailers put forward service requests for disconnections to Evoenergy, which may or may not reflect customer preferences (i.e., a customer may not know or be provided with the option by their retailer between a temporary and permanent disconnection when the customer requests to close their gas account).

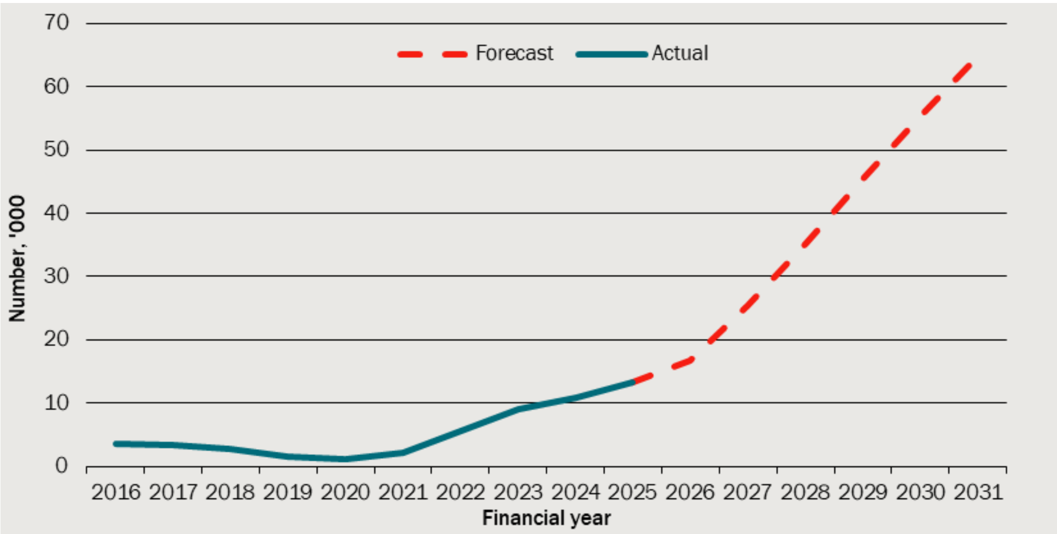
We forecast the temporary disconnections as a residual or balancing item, using the following identity:

$$\begin{aligned} &\mathit{Temporary\ disconnectons} \\ &\quad = \mathit{Total\ connections} - \mathit{connected\ and\ consuming\ connections} \\ &\quad - \mathit{cumulative\ permanent\ disconnections} \\ &\quad - \mathit{connected\ and\ nonconsuming\ connections} \end{aligned}$$

This means the forecast for temporary disconnections is jointly driven by the projected electrification and the assumptions made for connected-and-non-consuming connections and permanent disconnections.

The annual additions to long-term temporary disconnections are expected to continue to increase, in line with recent trends (chart 5.17). Most of the household electrification predicted by the switching model is assumed to result in temporary disconnections.

5.17 Annual additions to long-term temporary disconnections

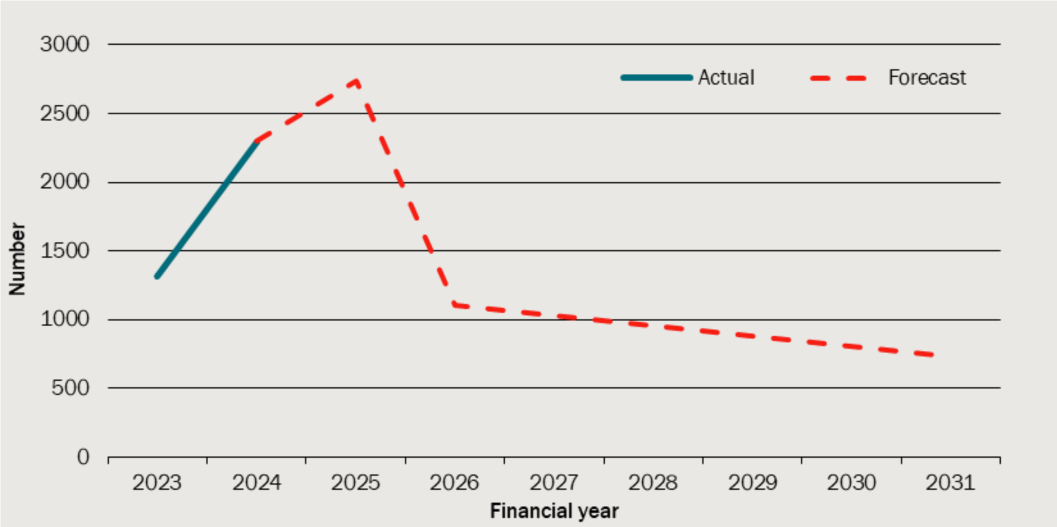


Note: FY 2025 is an estimate based on data to April 2025

Data source: CIE analysis of Evoenergy billing data

For the purpose of estimating ancillary charge quantities, we also consider additional temporary disconnections and reconnections that happen within a financial year, which are forecast to decrease from around 1100 to around 700 per year over the 2026 access arrangement period (figure 5.18). The forecast is based on the average of total reconnections over the period FY 2021 to FY 2024 as a share of total customer numbers, disaggregated into residential and commercial reconnections based on the shares observed in available detailed data between July 2022 and December 2024.

5.18 Flow of short-term residential temporary disconnections and reconnections



Note: FY 2025 is an estimate based on actual data to April.

Data source: Evoenergy reconnections data.

Tariff VI – Residential customer numbers

The forecast number of total Tariff VI customers that incur fixed charges (i.e. the sum of connected-and-consuming and connected-and-non-consuming customers) are shown in table 5.19 (measured at end of financial year). Over the AA period 2026–31, the number of customers is expected to fall due to gas-to-electricity switching. The decrease is greater in the ACT than in NSW due to the prohibition of new connections in the ACT.

5.19 Forecast total residential Tariff VI customers

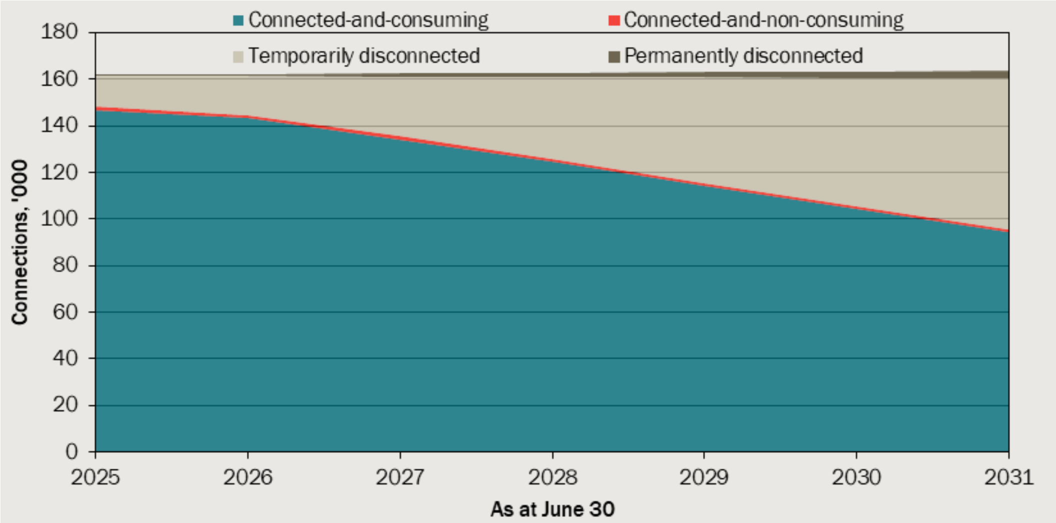
Financial year	2024	2025	2026	2027	2028	2029	2030	2031
ACT dwellings	134 638	132 284	128 986	120 695	111 599	102 047	92 696	83 844
NSW dwellings	15 815	15 957	15 668	14 980	14 185	13 342	12 522	11 757
Total	**150 453**	**148 241**	**144 654**	**135 674**	**125 784**	**115 389**	**105 218**	**95 601**
Growth	-0.7%	-1.5%	-2.4%	-6.2%	-7.3%	-8.3%	-8.8%	-9.1%

Note: End-of-financial-year count

Source: CIE

Growth in disconnections is expected to see fixed charge quantities fall (chart 5.20). The share of connected-and-non-consuming customers, which for the purpose of modelling are defined as MIRNs which are non-consuming for 12 months or more, in total, is assumed to remain constant over the forecast horizon at 1 per cent of total customers incurring fixed charges.

5.20 Residential customer forecast



Note: Permanent disconnections are the cumulative total from 2025.

Data source: CIE analysis of Evoenergy billing data

The customer numbers above are estimates as at the end of financial year. For setting tariffs, it is important to recognise that customer growth occurs throughout the year and the number of fixed charges invoiced will be a number between the opening and closing number of connected customer numbers for the financial year. Based on a neutral assumption of uniform customer growth throughout the year, the number of equivalent annual fixed charges will be equal to the average of the opening and closing numbers of connected customers (table 5.21).

5.21 Forecast equivalent annual fixed charges – Tariff VI residential

	ACT	NSW	Total
	Number	Number	Number
2023/24 (actuals)	135 288	15 680	150 968
2024/25	133 461	15 886	149 347
2025/26	130 635	15 812	146 447
2026/27	124 840	15 324	140 164
2027/28	116 147	14 583	130 729
2028/29	106 823	13 763	120 586
2029/30	97 372	12 932	110 303
2030/31	88 270	12 139	100 409

Source: CIE demand forecasting model

6 Tariff VI residential usage per customer

Customer numbers (discussed in the previous chapter) and usage per customer (discussed here) combine to generate total demand for gas by households in Evoenergy's operating area.

Snapshot of residential usage

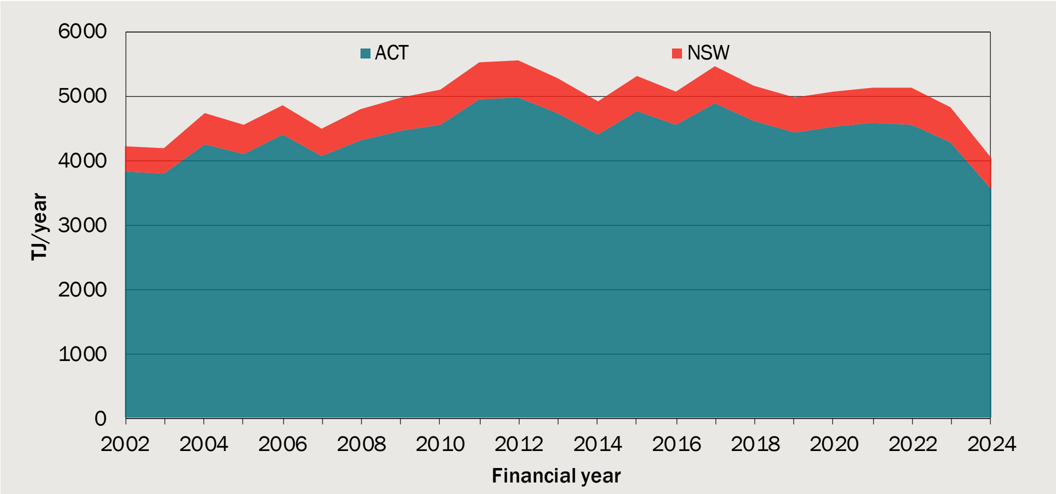
The gas usage of residential customers has changed over time. A few major trends have driven these changes:

- New residential dwellings tend to use less gas than existing dwellings of the same type.
- The share of new dwellings which are medium density or high rise is higher than the share of existing dwellings which are medium density or high rise.
- Usage per customer is declining over time, likely reflecting:
  - energy efficiency improvements in existing buildings (such as new insulation or double-glazing of windows);
  - improved efficiency of gas appliances; and
  - fuel switching induced by government policy, customer preferences, and improvements in electrical appliances that are substitutes for gas appliances.

Total residential usage

Total residential usage peaked in 2011/12 (chart 6.1). There has been very little growth in total gas usage since then, as customer growth has been offset by reduction in usage per customer. In Evoenergy's network, the share of gas usage in the ACT network has fallen gradually from 91 per cent in 2002 to 88 per cent in 2024 of total usage supplied by Evoenergy.

6.1 Total residential usage



Note: These data are not weather-normalised.

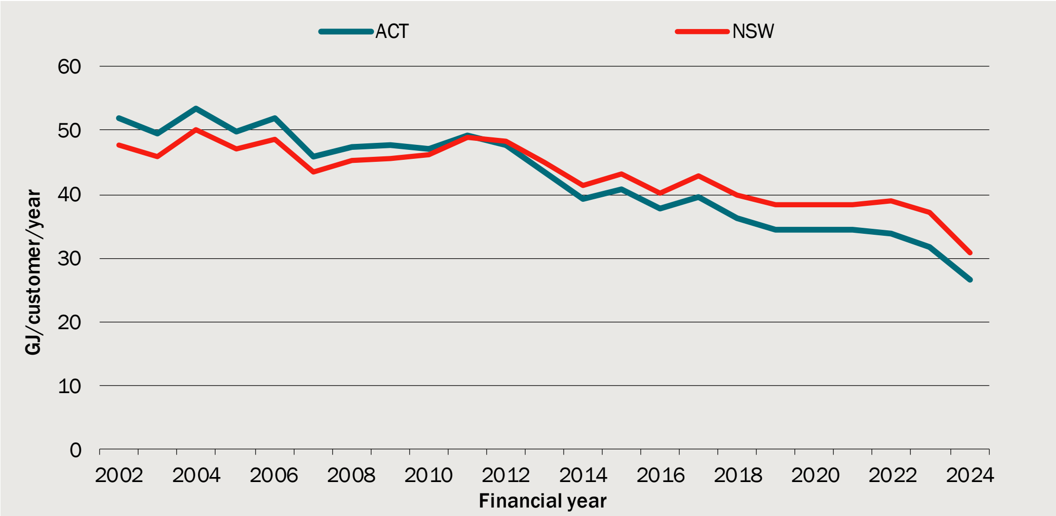
Data source: CIE analysis of Evoenergy billing data.

Usage per residential customer

Since 2002, the average usage per residential customer has fallen steadily, with a significant drop in 2024 (chart 6.2) which can be partly explained by milder weather. From 2002 to 2024 usage per residential customer has fallen by 3 and 2 per cent per year for the ACT and NSW respectively. Usage has fallen faster in the ACT due to differences in:

- the dwelling stock: the ACT has experienced a more pronounced shift to medium density and high rise dwellings which account for 24 per cent of customers at the end of 2023, compared to Evoenergy's network in NSW (11 per cent of customers at the end of 2023
- drivers for the uptake of energy efficiency, including recent government incentives for gas to electricity switching in the ACT.

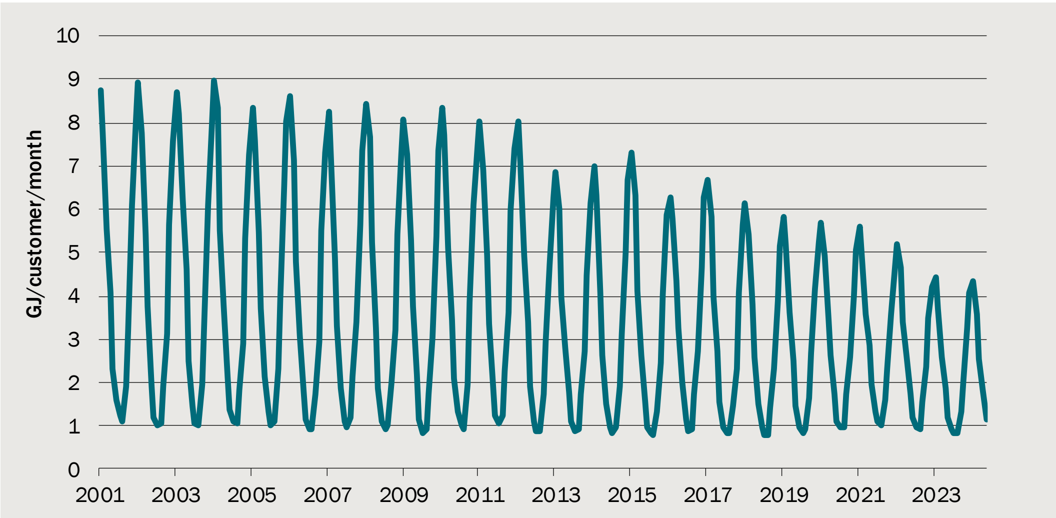
6.2 Average usage per residential customer by year



Data source: CIE analysis of Evoenergy billing data

Usage data at a monthly level[28] shows that usage in Evoenergy's network is highly seasonal and that the monthly winter peak has declined noticeably from around 9 GJ per customer per winter month at the beginning of the sample to around 4.3 GJ per customer per month in 2024 winter (chart 6.3).

6.3 Average usage per residential customer by month



Data source: CIE analysis of Evoenergy billing data

Relationship between usage and weather

The seasonality in usage suggests that weather is likely to be one of the main drivers of gas usage in Evoenergy's network. In 2008, around 52 000 ACT households were using

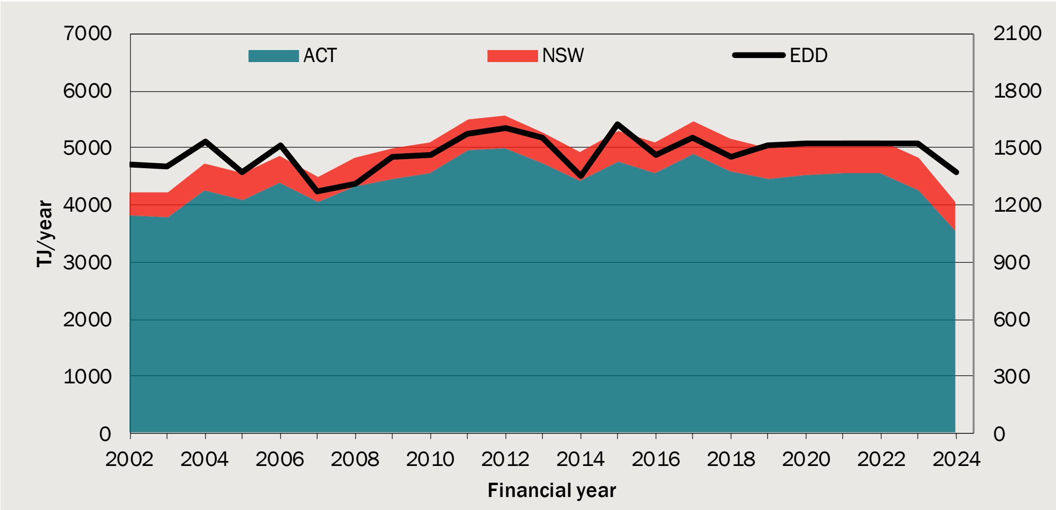
28 Residential meters are generally read quarterly, with usage allocated to months on a pro rata basis. Every month a subset of residential customers' meters are read.

ducted gas heating as their main source of space heating[29] and The CIE's survey of Evoenergy gas customers in 2024 suggests around 62 000 households on the network use ducted gas heating. Gas usage for space heating is likely to vary strongly with weather conditions.

Previous research has shown there are several aspects of the weather that affect gas usage, including temperature, wind chill, solar insolation and the time of year. AEMO combines these aspects into a summary metric called 'effective degree days' (EDD), which we use as the measure of weather in this study. For detail on the construction of EDD for Evoenergy's network area, see appendix A.

Chart 6.4 shows that there is a clear positive relationship between EDD and usage at the aggregate annual level.

6.4 Total residential usage and effective degree days

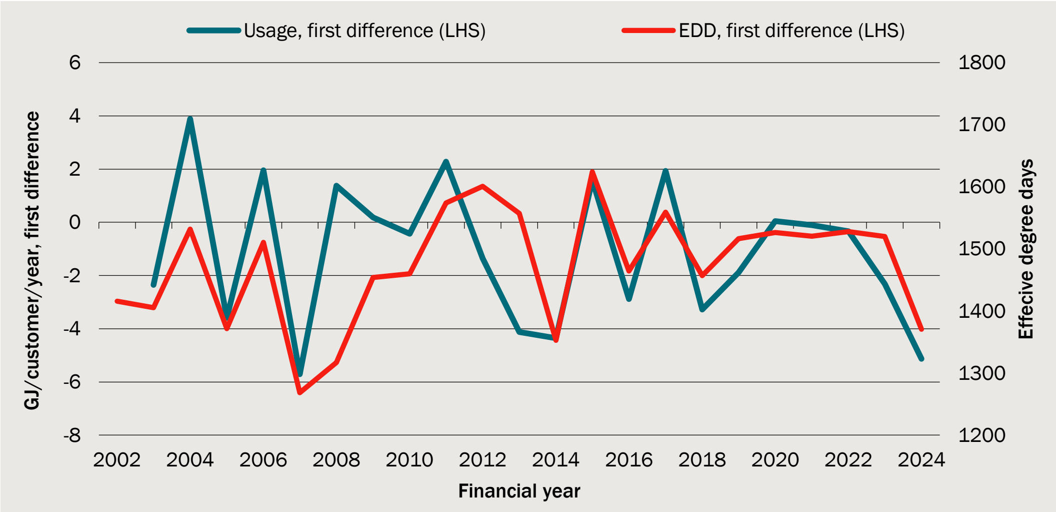


Data source: CIE analysis of Evoenergy billing data; Bureau of Meteorology, Canberra Airport station

Average usage per customer in first differences (i.e., detrended) has a strong positive correlation with EDD, with a correlation coefficient of 0.55. This implies that the gradual decrease in usage (i.e. the downward trend in consumption per customer) over the past is not related to weather (chart 6.5).

29 EnergyConsult 2011, Ducted Gas Heaters Product Profile, Prepared for the Equipment Energy Efficiency Program, E3 Report 2011/02, p. 15.

6.5 Average residential usage and effective degree days in winter



Data source: CIE analysis of Evoenergy billing data; Bureau of Meteorology, Canberra Airport station

Baseline modelling

Analysis of key areas of change one by one cannot give a good characterisation of all the changes that have occurred together. This can only be done by formal statistical analysis. In this section we conduct formal statistical analysis of historical gas use.

Note that analysis of what change has occurred is only a starting point for the purpose of forecasting. Once we have correctly characterised historical change, we then need to understand why these changes have occurred and whether they will continue over into the AA period 2026–31.

Model form

There are three sorts of models that could be estimated for residential gas consumption making use of the billing data we have across dwellings and through time. (This type of data is known as panel data.)

- A fixed effects model — this model allows each household to have a different base consumption and then uses changes in this through time to assess the impact of variables that also change through time. This method is best for identifying impacts of variables that change through time, such as the weather or prices. It cannot be used for variables that remain the same for a dwelling such as the age of the building or type of dwelling.
- A random effects model — this model uses differences across households as well as differences through time to assess the impact of particular household characteristics and variables that change through time. It allows for households to be systematically different through the error term rather than through a constant. It can be used to identify impacts of dwelling age and type for example.
- A pooled regression model — like a random effects model, this sort of model uses differences across households as well as differences through time to assess the impact

of particular household characteristics and variables that change through time. However, it does not allow for households to be systematically different. This model is not pursued further as statistical tests indicate that it is a poor fit for the data.[30]

There are additional models not explored in this analysis using autoregressive components, such as lags of usage.

In past research using Evoenergy's billing data, we initially developed the panel regression model shown in the equation below.

$$q_{it} = \beta_0 + \beta_1.hdensity_i + \tilde{\beta}_2.year\ conn_i + \beta_3.nsw_i + \mu_i + \\ \gamma_1.month_t + \gamma_2.edd_{it} + \\ \delta_1.price_{it} + \delta_2.price\ ratio_t + \varepsilon_{it}$$

The dependent variable, q_{it} is the natural log of the quantity of gas used by dwelling *i* in year *t*. We estimate our model using the log of consumption, as drivers would be expected to have similar percentage impacts on usage rather than similar GJ impacts on usage. The use of natural logs means that parameters can be interpreted as the per cent changes resulting from the change in the parameter. One feature of natural logs is that they are undefined where the quantity of gas usage is equal to zero.

The first row of explanatory variables contains the constant term and dwelling characteristics — whether the dwelling is a detached dwelling or medium density/high rise (the *hdensity* variable), *i* number of (0,1) dummy variables for the year in which the dwelling was connected (the *year conn* variables), dummy variables for whether the dwelling is in NSW, and a dwelling-specific error term (μ_i).

The second row of explanatory variables is time specific characteristics, such as *month* and effective degree days (*edd*).

The third row of explanatory variables is characteristics that vary by both time and dwelling, which includes *price*, the ratio of gas prices to electricity prices (*price ratio*) and an error term for that dwelling for that year.

If a fixed effects model is used, then the first row becomes a constant estimated for each specific dwelling. The value of this dwelling-specific constant is then estimated in a second-stage regression using the same set of dwelling characteristics variables.

If a random effects model is used then the total error for each observation is $\mu_i + \varepsilon_{it}$, which allows for a specific error for each dwelling (distributed around zero) and an error for each dwelling and in each time period (ε_{it}).

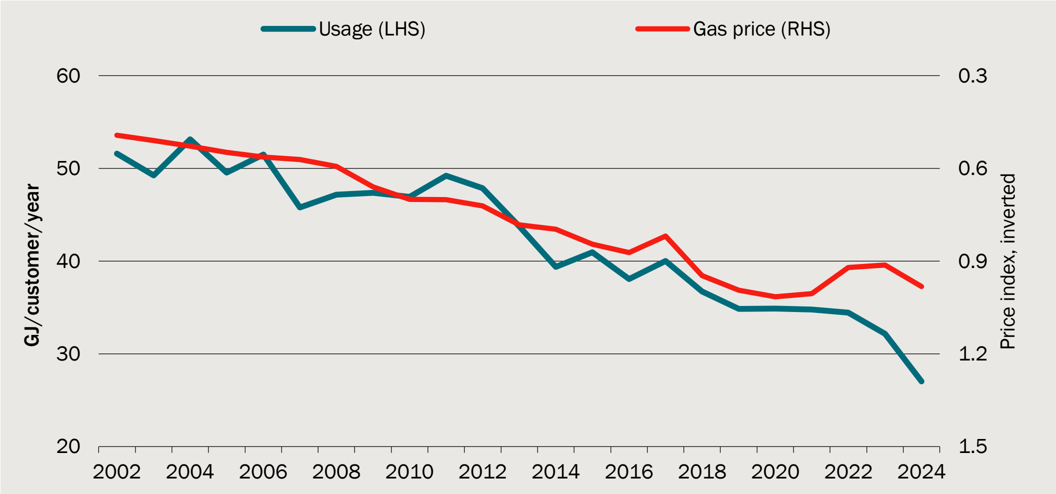
Consistent with previous modelling, the fixed effects model specification has been chosen as the base model.

Estimating the effect of gas prices on demand (the price elasticity of demand) is problematic. Gas prices have a strong negative correlation with residential usage (chart 6.6), however the energy efficiency of buildings and appliances has been improving gradually and the main substitute to gas — electricity — also saw price increases over the

30 The Breusch Pagan test indicates that a random effects regression is a better fit than a pooled ordinary least squares regression.

same period.[31] There is insufficient variation in these variables to disentangle their effects.

6.6 Average residential usage and gas price



Note: Price indices are in real terms, 1=Sept qtr 2018; chart shows average of four quarters for each financial year.
Data source: CIE analysis of Evoenergy billing data, ABS 6401.0

To prevent the model from overstating the impact of price changes by attributing all the historical decline in gas usage to rising gas prices and neglecting factors like energy efficiency improvements, we adjusted the model to include an assumed price elasticity.

$$q\_norm_{it} = \beta_0 + \beta_1 . hdensity_i + \tilde{\beta}_2 . year\ conn_i + \beta_3 . nsw_i + \mu_i + \gamma_1 . month_t + \gamma_2 . edd_{it} + \varepsilon_{it}$$

The dependent variable, *q_norm*, is the natural logarithm of gas usage normalised for the impact of prices. We used AEMO's 2024 GSOO elasticity assumption of -0.05 on heating load.[32] Specifically, we:

- specified base load as 25.3 MJ/day for residential customers, estimated using historical data for average consumption during summer;
- split usage into base and heating usage;
- adjusted heating usage, multiplying it by $1 - 0.1 \times \frac{1-p}{p}$, where p is a gas price index; and
- derived adjusted usage by adding base usage and adjusted heating usage.

This price elasticity estimate is compared to other estimates from the literature and industry reports in table 6.7.

31 Over this period, gas prices increased by around 3 per cent on average per year, compared to 5 per cent on average per year for electricity.

32 AEMO 2024. Gas Demand Forecasting Methodology Information Paper for the 2024 Gas Statement of Opportunities for eastern and south-eastern Australia, March, p. 26.

6.7 Estimates of the price elasticity of demand for gas

Study	Own-price	Cross-price
AEMO 2024, Gas Demand Forecasting Methodology Information Paper March, p. 26.	Short-term (excludes impact of fuel switching) Heating load: -0.10 (progressive change scenario) -0.05 (Step change scenario and Green energy exports scenario)	
AEMO 2019, Gas demand forecasting methodology information paper, March, p. 19.	Heating load: -0.10	
AEMO 2018, Gas demand forecasting methodology information paper, June, p. 20.	Base load existing homes: -0.066 Base load new homes: -0.162 Heating load existing homes: -0.20 Heating load new homes: -0.33	
Core Energy 2014, Gas Network Sector Study, Prepared for ENA, pp. 92-94.	Long-run residential: -0.30 Long-run non-residential: -0.35	Long-run: 0.10
AusNet Services, Appendix 4A - Centre for International Economics, 2018-22 GAAR Consumption and Customer Forecasts, 16 September 2016, p. 55-6	Short run residential: -0.053 Short run commercial -0.265	
AER 2013, Jemena, final decision, Attachment 13, pp. 12-14.		Accepted: 0.10 But noted it is at the upper end of acceptable
AER 2013, AGN Victoria and Albury, draft decision, Attachment 13, p. 12.	Long-run residential: -0.30 Long-run non-residential: -0.35	Long-run cross price: 0.10
Payne, J.E., Loomis, D. and Wilson, R., 2011. Residential natural gas demand in Illinois: evidence from the ARDL bounds testing approach. Journal of Regional Analysis & Policy, 41(2), pp.138-147.	Long-run (1.42 years) residential: -0.264 Short-run residential: -0.185	Long-run (1.42 years) residential: 0.123
Alberini, A., Gans, W. and Velez-Lopez, D., 2011. Residential consumption of gas and electricity in the US: The role of prices and income. Energy Economics, 33(5), pp.870-881.	-0.693 to -0.566	Statistically insignificant

These variables have been selected for the modelling based on the data that is available and judgements about the important drivers of gas demand. Importantly, in estimating these statistical models we determined that these variables have statistically significant relationships in predicting usage per customer.

We do not have income variables for each household or information on other household characteristics, such as household size. It would be possible to include income variables or household size variables at a postcode level, although information would primarily be from the Census and thus not of sufficient frequency to enable accurate estimation of any income effects.

Consideration has been given to the inclusion of a Gross State Product (GSP) per capita variable. However, as we found with the gas price variable, GSP is very highly correlated with the time trend. This creates a problem of multicollinearity, which will reduce the precision of forecasts when the pattern of correlation between the variables changes in the future.[33] It is preferable to use the time trend rather than GSP per capita because the coefficient of GSP per capita variable is likely to capture variation in usage per customer that is due to unobserved variables that are correlated with GSP per capita, such as energy efficiency improvements.

Model estimation

The model is estimated in STATA, which is a data analysis and statistical software package.[34] STATA uses generalised least squares regression to estimate coefficients for panel regressions under random effects and fixed effects assumptions. We allow for error terms in regressions to be clustered by customer in constructing the statistical significance of parameters.

We use dummy variables for the year of gas connection. A dummy variable takes either a value of 0 or a value of 1. For the dummy variable for year of connection for 2004, for example, all connections established in the financial year-ending 2004 (i.e. 2003/04) would have a value of 1 and all other connections would have a value of 0. We use a dummy for each year because we would not expect that the impact of year connected would be linear.

We define *month* as the number of months since October 2000. We generally do not use a dummy variable approach for months because then we would not be able to differentiate between weather effects and any time trend in consumption. The use of month as a scalar variable implies that the time trend is linear — i.e. each month on average leads to the same percentage change in consumption.

We do not know the exact price paid by each customer. Instead, we use the Canberra gas price index produced by the Australian Bureau of Statistics (ABS) as a measure of the changes in gas retail prices that customers have faced historically.[35]

Model results

Table 6.8 presents the estimated coefficients of the models estimated for each block of residential usage, where blocks are defined by the Tariff VI usage thresholds expected to be applied in the AA period 2026–31; i.e. 1.25 GJ/month at block 1, the next 13.45 GJ/month at block 2, the next 45.3 GJ/month at block 3 and any additional usage at block 4. All coefficients except the *new connections'* coefficients are directly estimated using fixed effects models for each block of usage.

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33 Belsley, D., 1984, 'Collinearity and forecasting', *Journal of Forecasting*, 3(2): 183-196.

34 See http://www.stata.com/ for more details.

35 ABS 6401.0, Table 9, series A2331916L

6.8 Coefficients from residential usage models

Explanatory variable	Block 1	Block 2	Block 3	Block 4	Total usage
Month	-0.0006	-0.0014	0.0005	-0.0014	-0.0014
EDD	0.0013	0.0052	0.0029	0.0037	0.0043
NSW	0.0390	-0.0036	0.0047	0.3228	0.0343
Medium density/high rise	-0.3335	-0.6937	1.0711	0.2393	-0.6154
New connections [a]	-0.1990	-0.4915	0.3216	0.2890	-0.2700

[a] Coefficients constructed as the average of the coefficients of the last three years' connection year dummies divided by the average of coefficients of all connection year dummies in the model.

Source: CIE.

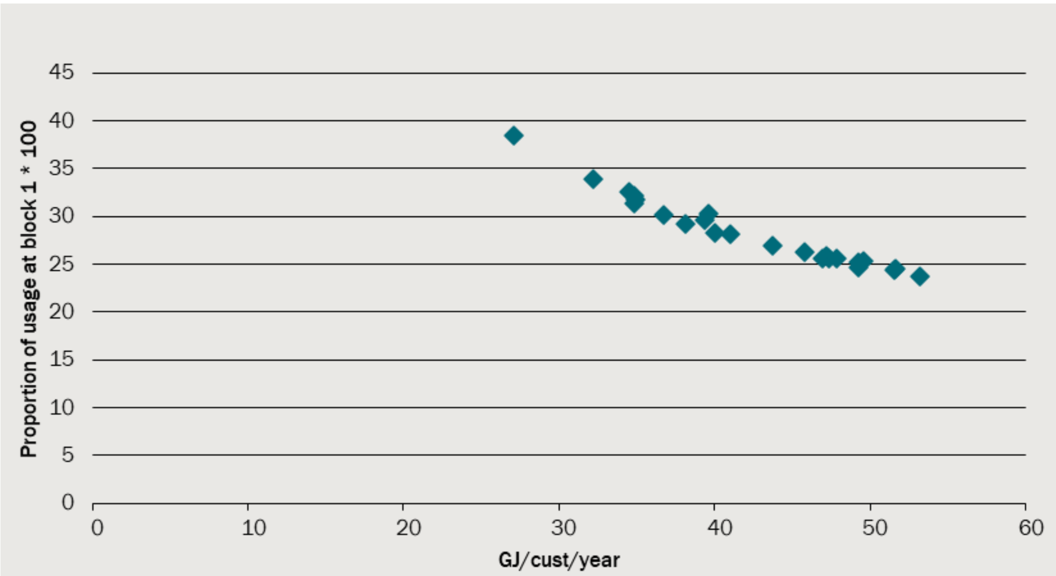
For the purpose of forecasting the impact of forecast changes in gas prices, we converted AEMO's -0.05 elasticity for heating load into an elasticity for each block and total usage using the historical average usage in each block and the estimated relationship between historical average usage and the proportion of usage in each block. The impacts on the volumes in each tariff block are estimated based on the historical relationship between total usage and the proportion of usage in each block.

6.9 Effective coefficient for gas prices

	Block 1	Block 2	Block 3	Block 4	Total usage
Ln_gas_price	-0.0146	-0.0425	-0.0431	0.0069	-0.0312

Source: CIE.

6.10 Relationship between average usage per residential customer and proportion of residential usage in block 1



Note: Each point represents a financial year

Data source: CIE analysis of Evoenergy billing data

Eight separate models were estimated with the log of average usage by the relevant customer type (residential or commercial) as the explanatory variable for the proportion of usage in each block. For example, a one per cent increase in average usage per residential customer is associated with a 0.2058 increase in the percentage of residential usage at block 1 (i.e. 0.2058 of a percentage point).

6.11 Models of the proportion of usage billed at each block

Independent variable	Block 1 proportion x 100	Block 2 proportion	Block 3 proportion	Block 4 proportion
Coefficient on ln(average usage per residential customer)	-20.58	21.05	1.05	-1.51
Coefficient on ln(average usage per commercial customer)	-2.04	-13.81	-11.33	27.18

Note: Dependent variable is ln(average usage per residential customer) or ln(average usage per commercial customer) in the residential and commercial models, respectively; Coefficients are derived from eight separate models.

Source: CIE.

The usage in each block by the average customer following an adjustment to total usage is calculated as:

$$= adjusted\ usage\left(\frac{unadjusted\ block\ X\ usage}{unadjusted\ usage} + \frac{\beta . ln\left(\frac{adjusted\ usage}{unadjusted\ usage}\right)}{100}\right)$$

Model of total usage

Table 6.12 presents the estimated coefficients and results of significance tests for our model of total residential usage. The coefficient of -0.0014 indicates that there has been a trend decline of 0.14 per cent per month (or 1.73 per cent per year) in gas consumption after accounting for other factors.

6.12 Results of residential usage estimation

Variable	Coeff.	t value
First stage		
Month (time trend)	-0.0014	-88.27
EDD	0.0043	705.09
Constant	7.8006	888.43
Second stage		
Year connected		
2002	0.0194	6.49
2003	0.0093	2.90
2004	0.0230	5.39
2005	-0.0034	-0.98

Variable	Coeff.	t value
2006	-0.1874	-41.39
2007	-0.2283	-54.30
2008	-0.2032	-50.46
2009	-0.2848	-65.55
2010	-0.3780	-95.54
2011	-0.4198	-110.82
2012	-0.5413	-145.39
2013	-0.5860	-170.15
2014	-0.5544	-152.33
2015	-0.4720	-137.38
2016	-0.6433	-147.57
2017	-0.5355	-155.85
2018	-0.6829	-189.40
2019	-0.6435	-159.14
2020	-0.6291	-164.05
2021	-0.6866	-171.30
2022	-0.7596	-180.53
2023	-0.8935	-165.18
2024	-1.2494	
NSW	0.0343	17.86
hdensity	-0.6154	-354.31
Existing	-0.2132	-91.25
Constant	0.2266	243.35

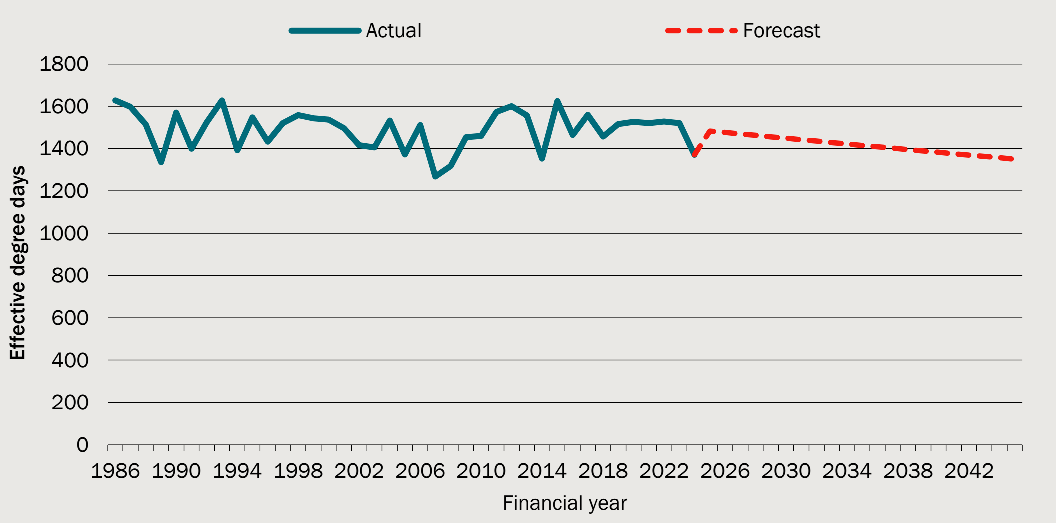
Source: CIE.

Approach to forecast compilation

Forecasts of effective degree days

The forecast for EDD is based on the historical average for each month from 1985 to 2024, with a projected annual decline of 0.47 per cent starting from June 2024. This is applied on a monthly basis (i.e. June 2026 EDD is forecast to be 0.47 per cent lower than June 2025) to account for seasonality. This decline is derived from AEMO's forecast of a 6.8 EDD decrease per year for Victoria, developed with strategic input from CSIRO and the Bureau of Meteorology[36], assuming the forecast is based on the five-year average EDD in Victoria, which is 1 451.[37]

6.13 Projected effective degree days



Data source: CIE.

Forecast of gas prices

The baseline model includes the short-term response to prices (while response in the form of appliance replacement and disconnection is captured by the switching model). AEMO's estimated price elasticity on heating load makes this distinction.

Forecast prices are made up of three components:

- Forecast wholesale gas prices (36 per cent of the current retail price)
- Forecast gas network prices, including government taxes and levies (28 per cent of the current retail price)
- Forecast retail margin and transmission prices (36 per cent of the current retail price).[38]

We used wholesale gas price forecasts from AEMO's 2024 *Gas Statement of Opportunities* (GSOO), developed by ACIL Allen. The forecasts included step change, progressive

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36 AEMO 2024. Gas Demand Forecasting Methodology Information Paper. For the 2024 Gas Statement of Opportunities covering Australia's East Coast Gas Market. March. Appendix A2.2 (https://aemo.com.au/-/media/files/gas/national_planning_and_forecasting/gsoo/2024/gas-demand-forecasting-methodology-2024.pdf?la=en, accessed 24/09/24)

37 AEMO 2024 Victorian Gas Planning Report Update. Gas transmission network planning for Victoria. March. (https://aemo.com.au/-/media/files/gas/national_planning_and_forecasting/vgpr/2024/2024-victorian-gas-planning-report-update.pdf?la=en, accessed 24/09/24)

38 https://www.climatechoices.act.gov.au/__data/assets/pdf_file/0005/2052482/Retail-price-impacts-of-the-gas-transition-ACT-Government-fact-sheet.pdf

change, and green energy exports scenarios with separate forecasts supplied for residential and commercial customers, industrial customers and gas-powered generators.

The scenarios in the GSOO step out a range of possible current and future trends in energy consumption, consumer energy investments, and technology costs, and are defined as follows:[39]

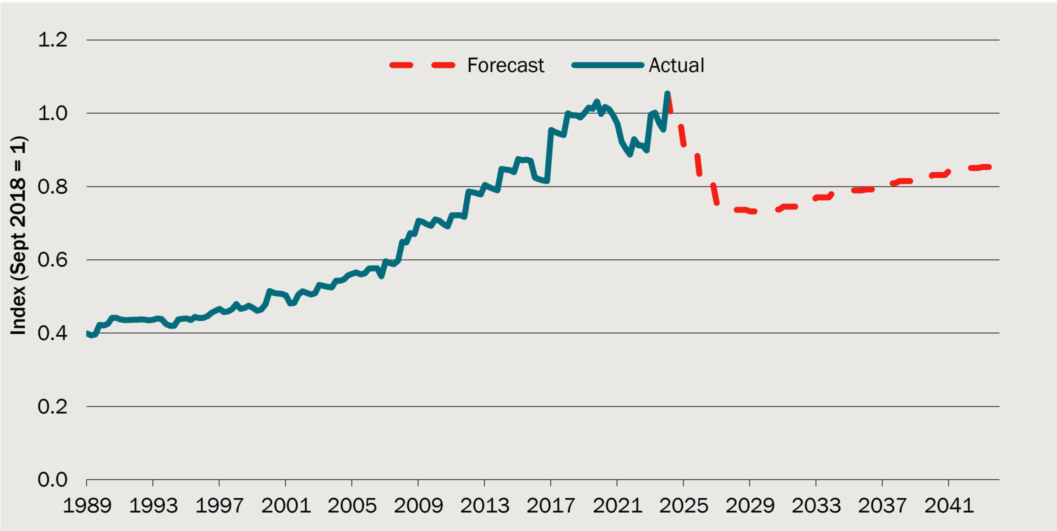
Step Change – achieves a scale of energy transformation that supports Australia's contribution to limiting global temperature rise to below 2°C compared to pre-industrial levels. Electrification is a key enabler to transition the economy at a pace aligned with beating the 2°C abatement target of the Paris Agreement. Consumer actions lead to rapid and significant continued investment in orchestrated consumer energy and include electrification of the transportation sector.

Green Energy Exports – reflects very strong decarbonisation activities domestically and globally aimed at limiting temperature increase to 1. °C, resulting in rapid transformation of Australia's energy sectors, including a strong use of electrification, green hydrogen and biomethane.

Progressive Change – meets Australia's current Paris Agreement commitment of 43% emissions reduction by 2030 and net zero emissions by 2050. This scenario has more challenging economic conditions, higher relative technology costs and more supply chain challenges relative to other scenarios.

We have used residential and commercial customer forecast for the step change scenario as this is identified as the most likely scenario.

6.14 Forecast wholesale gas price



Data source: CIE analysis of Evoenergy billing data.

Retail margin and transmission network prices were assumed to remain constant in real terms in the absence of a sound basis for forecasting otherwise.

39 AEMO 2024. 2024 Gas Statement of Opportunities (https://aemo.com.au/-/media/files/gas/national_planning_and_forecasting/gsoo/2024/aemo-2024-gas-statement-of-opportunities-gsoo-report.pdf?la=en, accessed 21/11/24), p. 15-16.

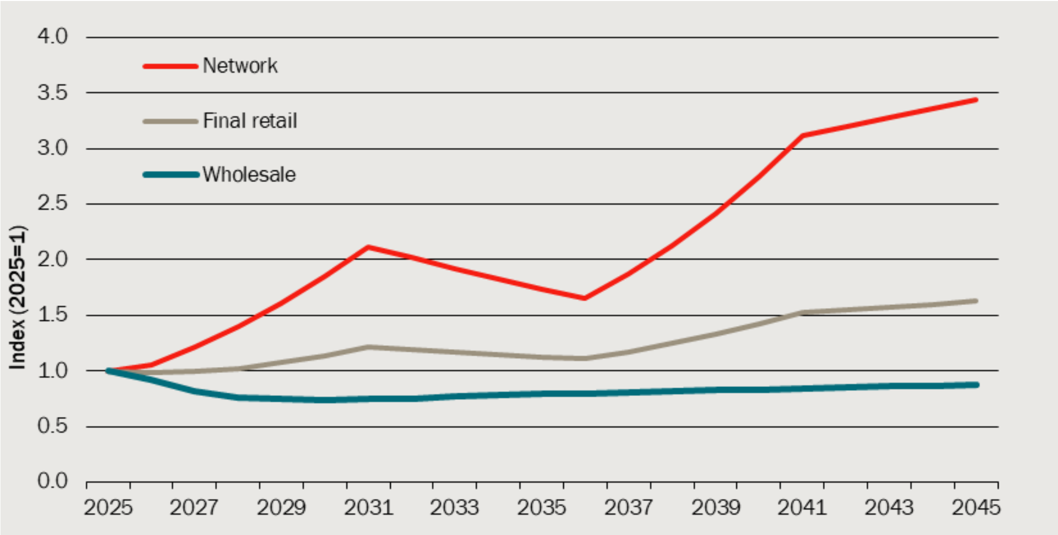
Gas network prices were estimated endogenously within the demand forecasting model, based on:

- Evoenergy's notional revenue requirement (based on Evoenergy's access arrangement proposal)
- Forecast pass-through of government fees and charges (Utilities Network Facilities Tax (UNFT) and Energy Industry Levy (EIL))
- Forecast weighted-average cost of capital for use as a discount rate
- Setting x-factors for 5-year regulatory periods to equate the present values of forecast revenue and the notional revenue requirement.

This required an iterative modelling approach, since updating network prices affects gas retail prices, which affects forecast gas demand (both via the short-term price response in the baseline model and the forecast disconnections in the switching model), which affects forecast revenue requiring prices to be updated again to equate revenue with the target.

The prices reached following convergence of the model as shown in chart 6.15. While network prices are expected to increase significantly, they currently form less than a third of the total gas bill, and, with wholesale prices expected to fall, final retail price increases are not expected to exceed 63 per cent.

6.15 Forecast gas prices



Data source: CIE demand forecasting model; Wholesale prices are the step change scenario for residential and commercial customers in ACIL Allen forecasts for AEMO's 2024 Gas Statement of Opportunities; Network price includes both building block costs and jurisdictional costs (UNFT and EIL).

Forecasting by customer type

Using the model parameter estimates, we develop forecasts of usage per customer for ACT and NSW customers and separately across the following categories of customers:

- Existing residential connections, split into
  - detached dwellings
  - medium density/high rise

- New residential connections, split into
  - detached dwellings
  - medium density/high rise

Since current policy in the ACT prohibits new gas network connections to buildings,[40] the usage forecasts for ACT include only existing residential connections.

Modelling these components separately means we estimate a separate value of usage per customer for each of these customer segments. Note that the constructed new connections coefficient is applied to usage per customer for all segments of new residential connections (NSW detached dwellings and NSW medium density/high rise).

The starting points for the usage forecasts are shown in table 6.16.

6.16 Starting points for usage per residential customer

Month	ACT detached dwellings	ACT med-high density	NSW detached dwellings	NSW med-high density
	GJ/month	GJ/month	GJ/month	GJ/month
Oct-23	2.09	1.12	2.21	1.01
Nov-23	1.22	0.93	1.62	0.88
Dec-23	0.94	0.87	0.98	0.65
Jan-24	0.82	0.82	0.90	0.61
Feb-24	0.86	0.78	0.98	0.60
Mar-24	1.40	0.91	1.80	0.94
Apr-24	2.26	1.02	2.22	1.05
May-24	3.90	1.28	3.39	1.33
Jun-24	4.78	1.38	5.31	2.00
Jul-24	5.08	1.48	5.61	2.15
Aug-24	4.16	1.38	4.61	1.91
Sep-24	2.97	1.22	2.67	1.17

Source: CIE analysis of Evoenergy billing data

Time trend in average residential consumption

The time trend was excluded from baseline forecasts of average residential consumption to ensure no double counting of impacts in the switching model. The time trend in the baseline forecast would include several effects, some of which would be covered by the switching modelling (e.g. appliance replacement) and some which would not (e.g. building efficiency improvements). Since there was no sound evidence on which to

40 ACT Government 2023. *Regulation to prevent new gas connections starts in December.* 30 November. Available at: https://www.cmtedd.act.gov.au/open_government/inform/act_government_media_releases/rattenbury/2023/regulation-to-prevent-new-gas-connections-starts-in-december#:~:text=A%20regulation%20to%20prevent%20new,to%20transition%20off%20fossil%20fuels.

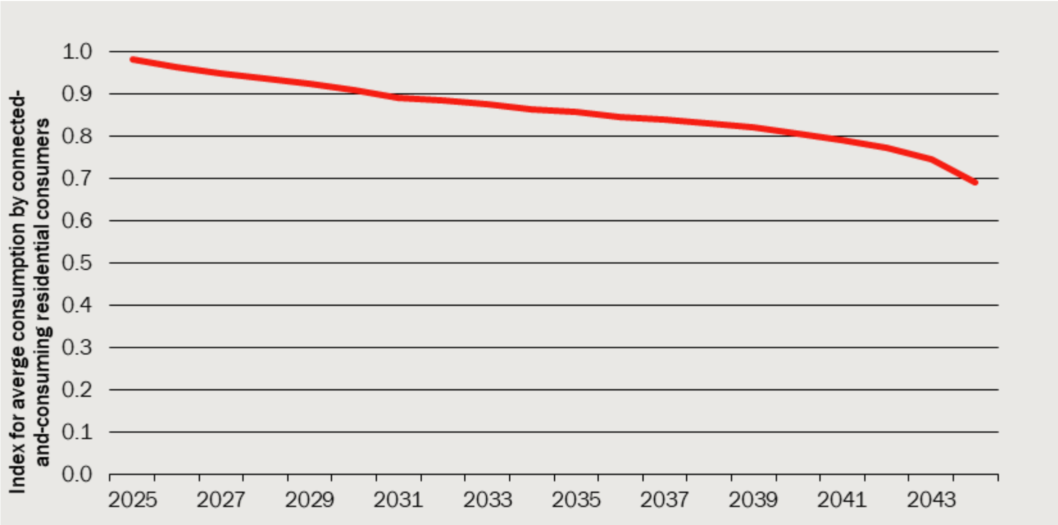
decompose the trend into these respective effects, we make the conservative assumption to omit the trend entirely.

Switching modelling

The switching model produces an index for average consumption, which captures two main effects:

- The change in the composition of the customer base from differing disconnection rates for customers of various sizes (in terms of gas usage), and
- For customers in the sample with multiple gas appliances, an assumption in the model that disconnection would involve a staged replacement of appliances for two years after the indicated disconnection date.

6.17 Forecast impact of appliance replacement and disconnection on average residential consumption

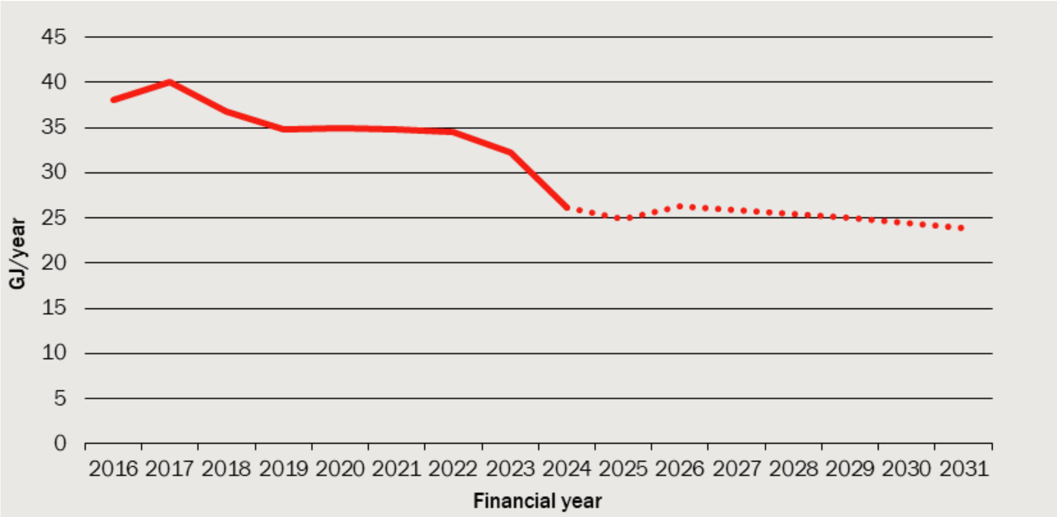


Data source: CIE demand forecasting model

Forecast residential usage per customer

Average usage per residential customer is forecast to increase slightly to 26.3 GJ in FY 2026 (from 26.1 GJ in FY 2024) due to a return to average weather and then decrease gradually to 23.9 GJ in FY 2031 due to appliance replacement, increasing gas prices, and the forecast gradual decrease in EDD (figure 6.18). Under our modelling assumptions, switching of a customer's major appliance translates within two years to disconnection from the gas network. This results in significant reductions in customer numbers, but a limited impact on average consumption. Should household staging of appliance replacement and disconnection occur over a longer period than we have assumed, customer numbers would remain higher than forecast, but average consumption would decrease below the levels forecast.

6.18 Forecast average usage per residential customer



Data source: CIE

7 Tariff VI commercial customer numbers

Commercial customers are businesses and other non-residential customers who connect to the gas network. Customer numbers, combined with per-customer usage, drive demand for gas.

Snapshot of commercial customer numbers

Data on business customer numbers used in this chapter are taken from the billing data provided to the CIE by Evoenergy. Customers are identified by their Meter Installation Registration Number (MIRN), which is a number assigned to each gas service (by Evoenergy as distributor).[41] We use customer numbers in the June quarter of each year (the months of April, May and June).

In June 2024, Evoenergy had 2 994 commercial customers (table 7.1). Of these, 87 per cent were located in the ACT, while 13 per cent were located in NSW (essentially Queanbeyan, Jerrabomberra and Bungendore). The proportion of customers in ACT and NSW is similar to the proportions for residential customers.

7.1 Residential customer numbers June 2024

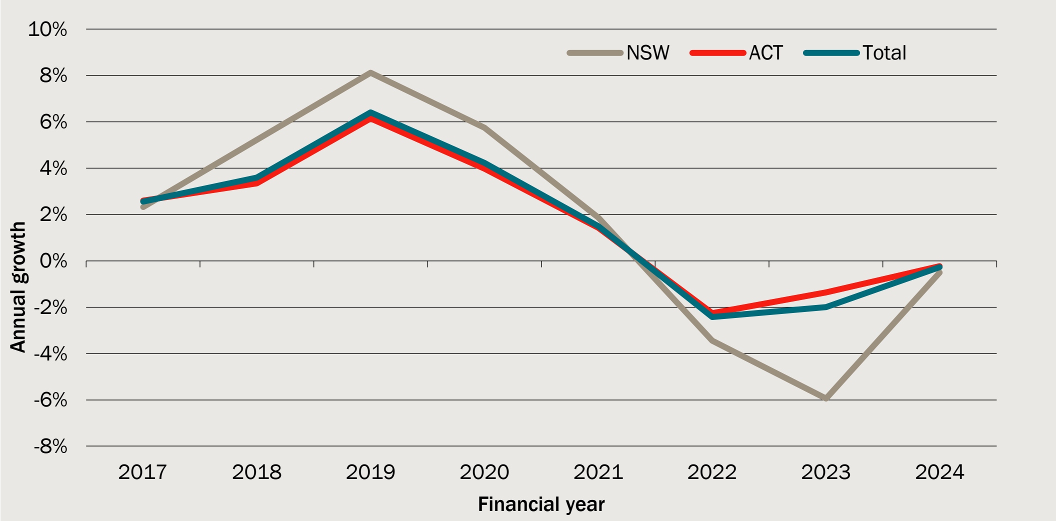
	Residential customer numbers	Share
ACT	2 600	87%
NSW	394	13%
Total	2 994	NA

Source: CIE analysis of billing data

Since 2022, the number of commercial customers has fallen (chart 7.2). This has likely been driven by ACT Government energy policy, including partial bans on greenfield connections and statements made in the lead up to release of the Integrated Energy Plan. Although there have not been any specific electrification policies for NSW, the growth rate pattern for new customers has mirrored that for the ACT. Also note, growth rates for NSW commercial customers exhibit more volatility, which is likely due to the smaller customer base.

41 Based on advice from Evoenergy, to classify customers into BUS, we use the database labels CONN_TYPE and MARKET_SEG, with CONN_TYPE taking precedence over MARKET_SEG in cases where the two labels give conflicting information.

7.2 Annual growth in commercial Tariff VI customers



Data source: CIE analysis of Evoenergy billing data.

Baseline modelling

A similar approach is taken to forecast commercial customers numbers as for residential. From year-to-year customer numbers are determined by the following relationship:

$$\begin{aligned} Customer\ number_t \\ &= Customer\ number_{t-1} + new\ connections_t \\ &- permanent\ disconnections_t - net\ disconnections_t \end{aligned}$$

Where

- New connections are due to either a new dwelling being connected to the gas network, or a dwelling being connected where previously there was no connection (i.e. when a new MIRN appears in the billing data)
- Permanent disconnections, which relate to meter removal (i.e. when a MIRN ceases to exist in the billing data)
- Net disconnections, which is the change in the stock of temporarily disconnected customers. This occurs where a customer is temporarily disconnected, and the meter is wadded. Over time connections may enter and leave this category.
- 'Customer number' is primarily made up of connected-and-consuming customers, but also includes a small number of connected-and-non-consuming customers.

The approach to forecast each of the components for commercial customers is summarised in table 7.3.

7.3 Approach to measure components

Component	NSW
$Customer\ number_{t-1}$	▪ Data or previous periods forecast

Component	NSW
	▪ Assume the number of connected-and-non-consuming MIRNs will remain a constant share of customer numbers.
$New\ connections_t$	▪ ACT: No growth from 2025/26 due to prohibition on new gas connections (see box 5.7). Estimate for 2024/25 based on actual data to April. ▪ NSW: 5-year average annual additions
$Permanent\ disconnections_t$	▪ 5-year average share of customer numbers
$Net\ disconnections_t$	▪ Disconnected MIRNs is then forecast as the residual (connected-and-non-consuming and permanently disconnected minus connected-and-non-consuming).

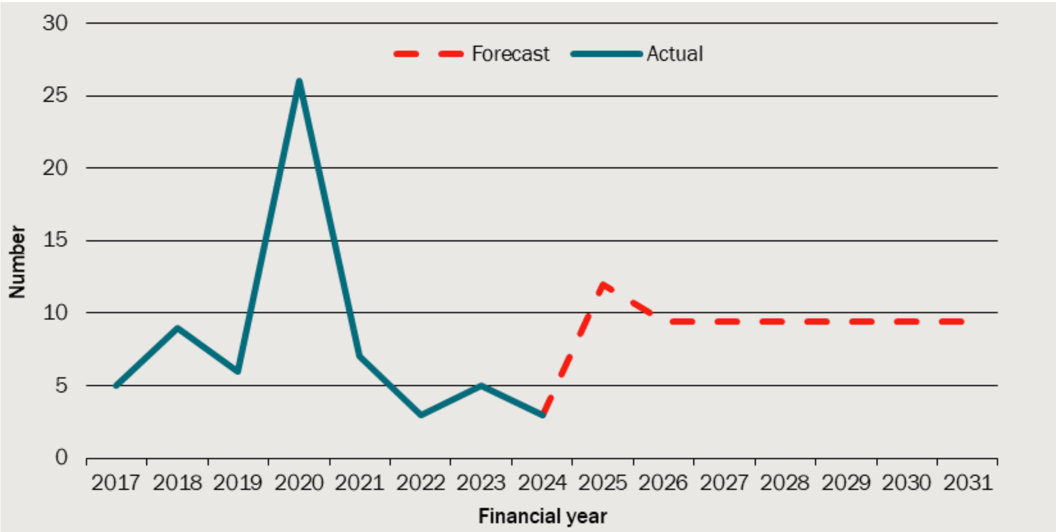
Source: CIE

New connections

As noted in chapter 5, we assume that from 2025/26 there will be no new gas connections in ACT. In 2024/25, we assume 26 new commercial connections in the ACT based on actual data to April.

To estimate new connections for NSW we estimated a 5-year average from 2019 through to 2023. This approach was taken as there is not a clear trend in the historical data, in particular with a large outlier in 2020 which saw 26 new connections. This approach was also chosen for parsimony, given the small number of new commercial customers in NSW.

7.4 New commercial connections in NSW



Note: FY 2025 is an estimate based on actual data to April.

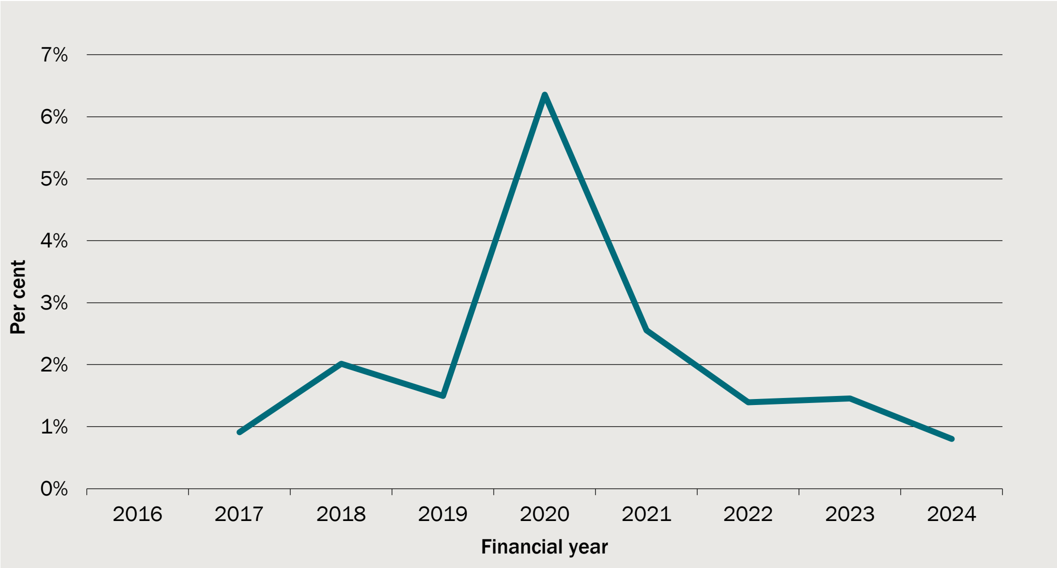
Data source: CIE analysis

We also considered whether there was:

- a relationship between new connections and GDP growth and growth in business count. This approach was not pursued due to a lack of data for the spatial area of Evoenergy's gas network in NSW. Using data for the ACT did not result in a strong relationship.

- a relationship between residential and commercial connections. New commercial connections as a share of new residential connections do not have a stable relationship (chart 7.5)

7.5 Ratio of new commercial customers to new residential customers

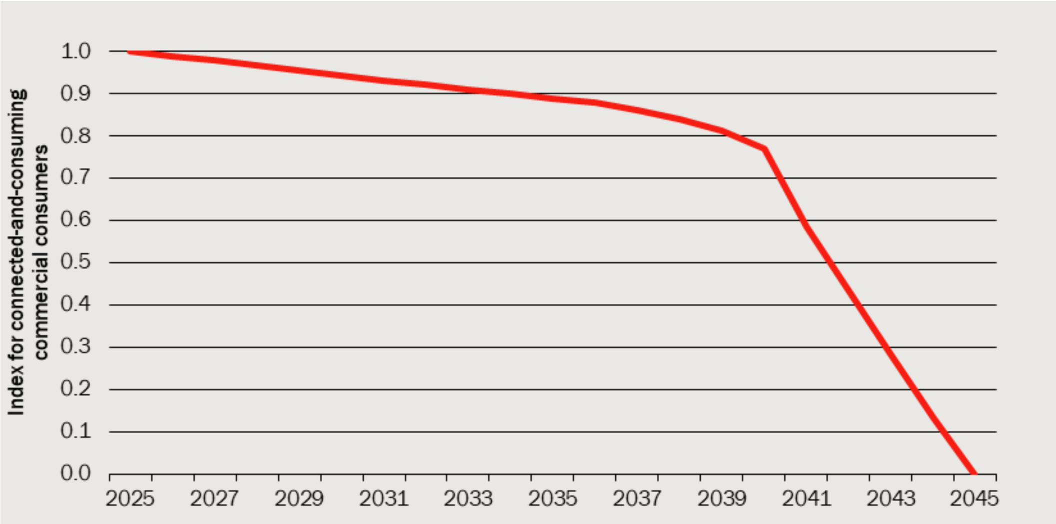


Data source: CIE analysis

Switching modelling

Commercial customers surveyed indicated much lower likelihoods of disconnection than residential customers. They also indicated a lower sensitivity to gas price increases, with limited bringing forward of usage reductions under scenarios with higher prices. The forecast proportion of existing connected-and-consuming customers (i.e. excluding new NSW connections) who will remain consuming is shown for each year to 2045 in figure 7.6. It shows forecast disconnections are relatively gradual until 2040 (the end of the third ACT Integrated Energy Plan) after which we assume Government actions will accelerate commercial disconnections to reach the 2045 net zero emissions target. Table 7.7 shows the decrease over the AA period 2026–31 is around 1.1 per cent per year.

7.6 Forecast connected-and-consuming commercial customers



Data source: CIE demand forecasting model

7.7 Index for forecast connected-and-consuming commercial customers 2026-2031

	2026	2027	2028	2029	2030	2031
Index	0.989	0.978	0.967	0.955	0.944	0.932

Source: CIE gas demand forecasting model

Allocation of customers no longer connected and consuming

As noted in chapter 5, customers no longer connected and consuming are captured in the switching model as a single category that needs to be disaggregated into:

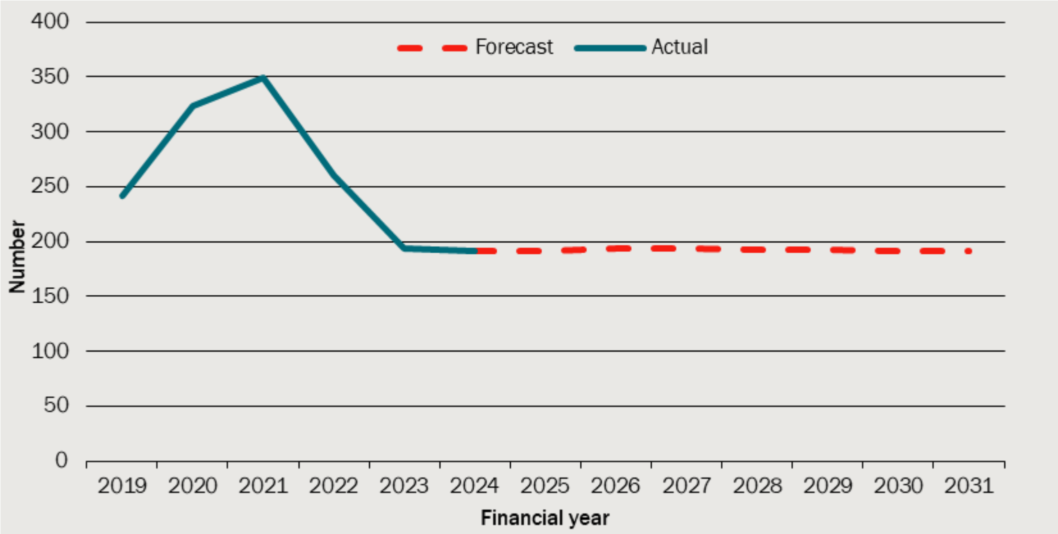
- connected-and-non-consuming customers, which occur when customers do not consume gas over a continuous 12-month period or longer, but remain connected to the gas network
- temporary disconnections, which occur where a customer is disconnected but the meter remains in place and is wadded
- permanent disconnections, which occur when a meter is removed, the corresponding MIRN is removed from the market and the MIRN is no longer billed.

We develop forecasts for the first and third items above, based on historical data, with temporary disconnections treated as a balancing item. Temporary disconnection is the status that is least expensive for a customer/retailer to choose under current pricing arrangements. The approach for each component is discussed in turn below.

Connected-and-non-consuming connections

Commercial connected-and-non-consuming customers are modelled using the same approach as for residential customers, set out in chapter 5. We assume that over time the number of connected-and-non-consuming MIRNs will remain a constant share of consuming connections, reflecting the underlying rate of connections which become non-consuming from time to time. Connected-and-non-consuming commercial MIRNs are expected to fall slightly, in line with the expected fall in the total number of connections due to electrification (chart 7.8).

7.8 Connected-and-non-consuming commercial MIRNs



Note: Connected-and-non-consuming MIRNs are those which are non-consuming for 12 or more consecutive months.

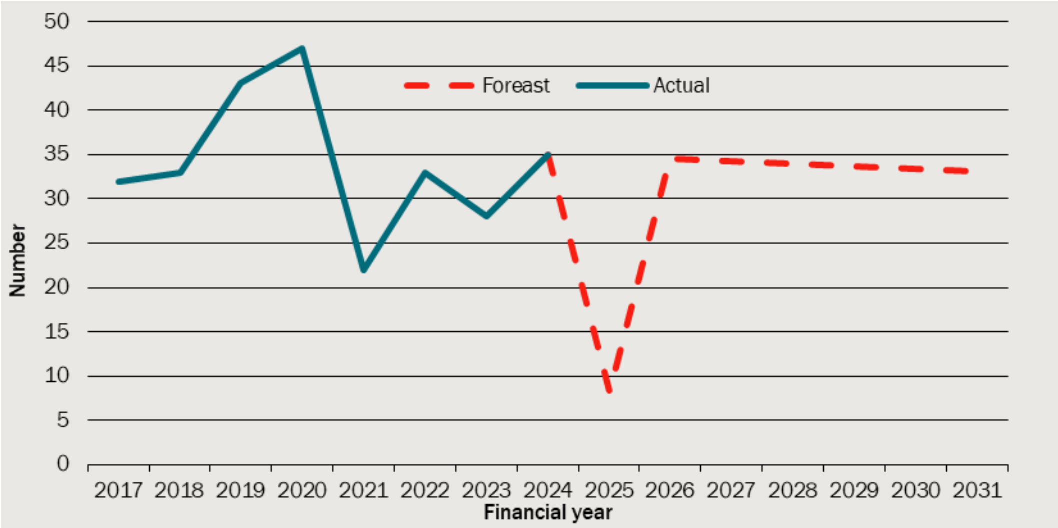
Data source: CIE analysis of Evoenergy billing data

Permanent disconnections

Permanent disconnections are when a meter is removed, the corresponding MIRN removed from the market and the MIRN is no longer billed. These occur when a site is redeveloped or when a customer switches to electric appliances and chooses not to use gas.

The annual number of permanent disconnections by commercial customers is expected to be around 30 per year over the AA period 2026–31 (chart 7.9).

7.9 Annual commercial permanent disconnections



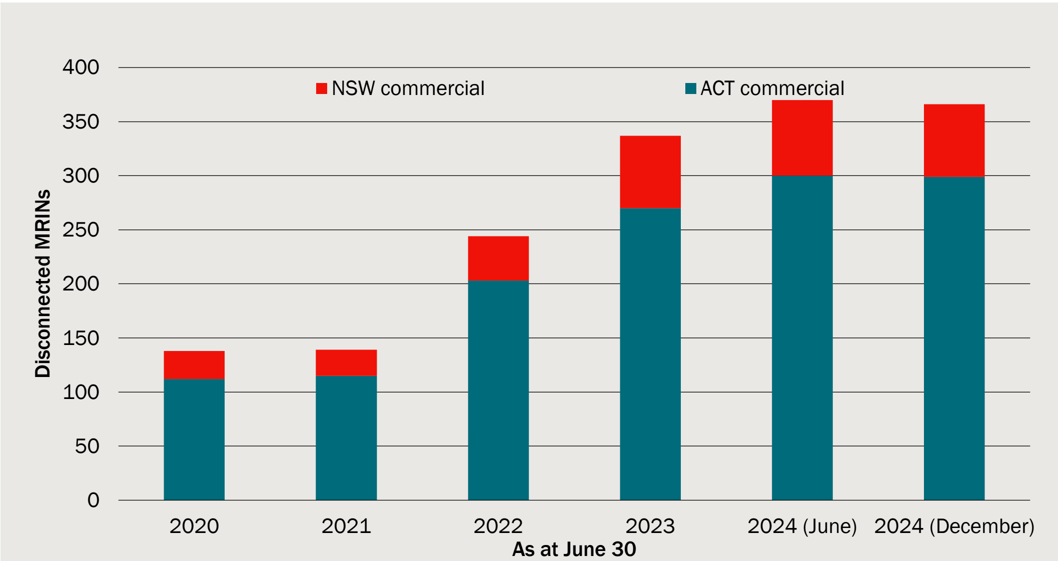
Note: FY 2025 is an estimate based on actual data to April.

Data source: CIE analysis of Evoenergy billing data.

Temporary disconnections

Like residential temporary disconnections, the stock of temporarily disconnected commercial customers has increased significantly (chart 7.10).

7.10 Stock of temporarily disconnected commercial customers



Data source: CIE analysis of Evoenergy billing data

This appears to have been driven by:

- gas to electricity switching, and
- an increase in the number of requests from retailers for temporary disconnections after pricing policy was changed during FY 2020 so that temporary disconnections no longer pay a fixed charge.

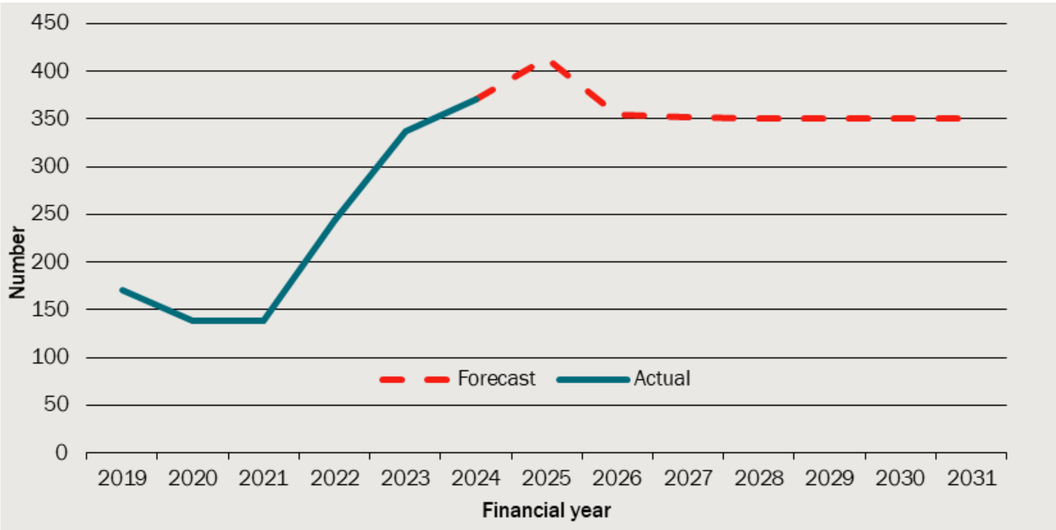
As for residential customers, we forecast commercial temporary disconnections as a residual, using the following identity:

$$\begin{aligned}&Temporary\ disconnectons\\&\qquad = Total\ connections - consuming\ connections\\&\qquad - Cumulative\ sum\ of\ permanent\ disconnections\\&\qquad - connected\ and\ nonconsuming\ connections\end{aligned}$$

This means the forecast for temporary disconnections is jointly driven by the projected electrification and the assumptions made for connected-and-non-consuming connections and permanent disconnections.

The number of additional long-term temporary disconnections added to the stock each year is forecast to remain around current levels (chart 7.11).

7.11 Flow of new long-term temporary disconnections of commercial MIRNs

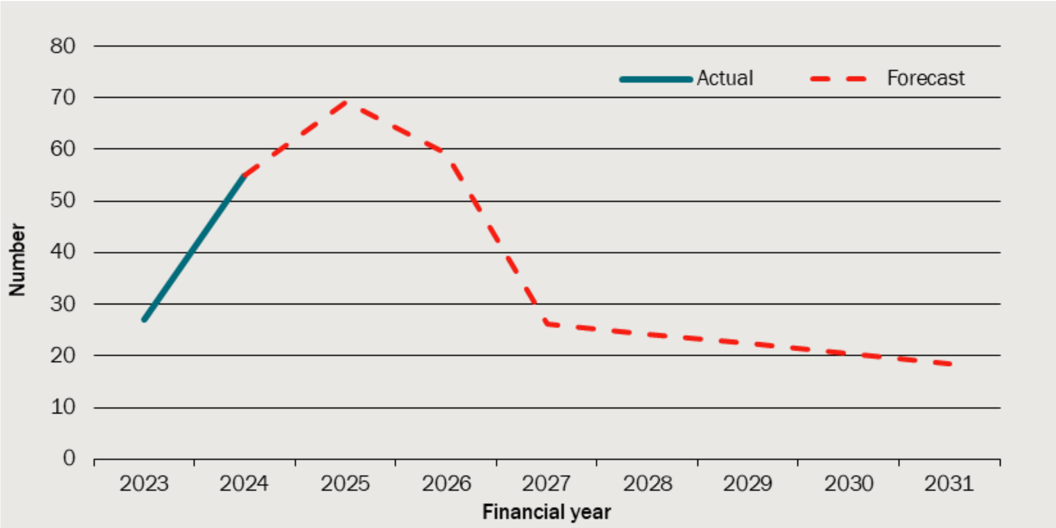


Note: FY 2025 is an estimate based on actual data to April.

Data source: CIE analysis of Evoenergy billing data

For the purpose of estimating ancillary charge quantities, we also consider additional temporary disconnections and reconnections that happen within a financial year, which are forecast at around 20 per year during the AA period 2026–31 (figure 7.12). The forecast is based on the average of total reconnections over the period FY 2021 to FY 2024 as a share of total customer numbers, disaggregated into residential and commercial reconnections based on the shares observed in available detailed data between July 2022 and December 2024.

7.12 Flow of short-term commercial temporary disconnections and reconnections



Note: FY 2025 is an estimate based on actual data to April

Data source: Evoenergy reconnection data.

Forecasts of commercial customer numbers

Table 7.13 shows the forecast total commercial customer numbers (average over financial year). The number of commercial connections in NSW is expected to grow, but this growth is more than offset by disconnections in the ACT, where there are no new connections forecast from 2025/26, resulting in a gradual decrease in total commercial customer numbers.

7.13 Forecast equivalent annual fixed charges – Tariff VI commercial

	ACT	NSW	Total
	Number	Number	Number
2023/24 (actuals)	2 603	395	2 998
2024/25	2 589	398	2 987
2025/26	2 589	408	2 997
2026/27	2 585	418	3 003
2027/28	2 556	425	2 981
2028/29	2 526	431	2 958
2029/30	2 496	438	2 934
2030/31	2 466	444	2 910

Source: CIE analysis of Evoenergy billing data and MIRN status reports

8 Tariff VI commercial usage per customer

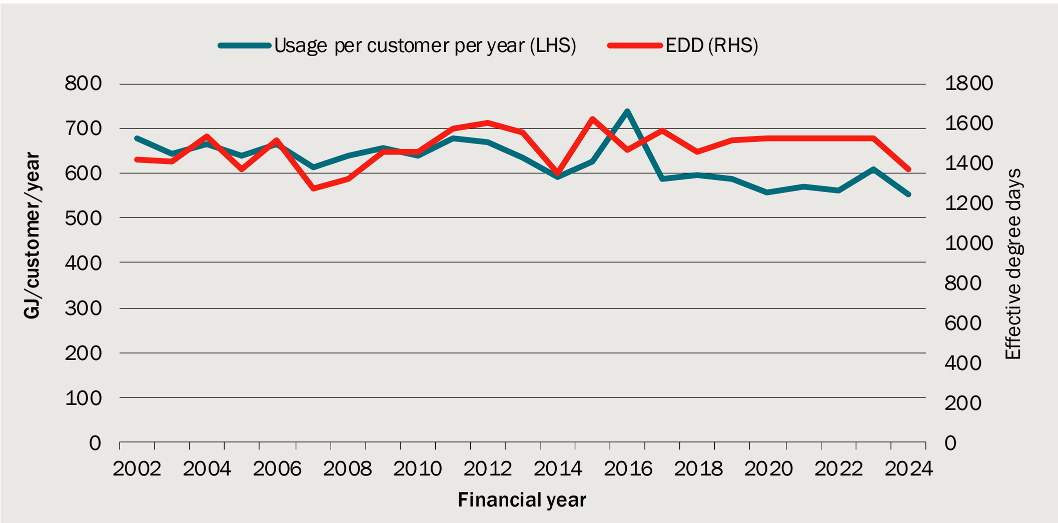
Customer numbers (discussed in the previous chapter) and usage (discussed here) combine to generate total consumption for gas by commercial customers.

The modelling approach for commercial usage per customer largely follows the same structure as modelling for residential usage per customer, with driver variables such as weather conditions and prices believed to be important. Having separate models for commercial customers enables us to model different responsiveness to prices and weather conditions. Note however, fewer opportunities are available for customer segmentation compared to residential customers, where differences in usage by dwelling type can be accounted for.

Snapshot of commercial customer usage

Over the past 20 years, average usage per commercial customer has trended slightly downwards, falling on average by 0.9 per cent per year over this time (chart 8.1). Average usage per customer in first differences (i.e., detrended) has a correlation coefficient with EDD of 0.17 compared to a correlation coefficient of 0.55 for detrended residential usage. This suggests commercial usage is positively related to EDD, albeit less strongly than is residential usage. The difference between EDD and usage per customer suggests the downward trend in consumption per customer is not related to weather.

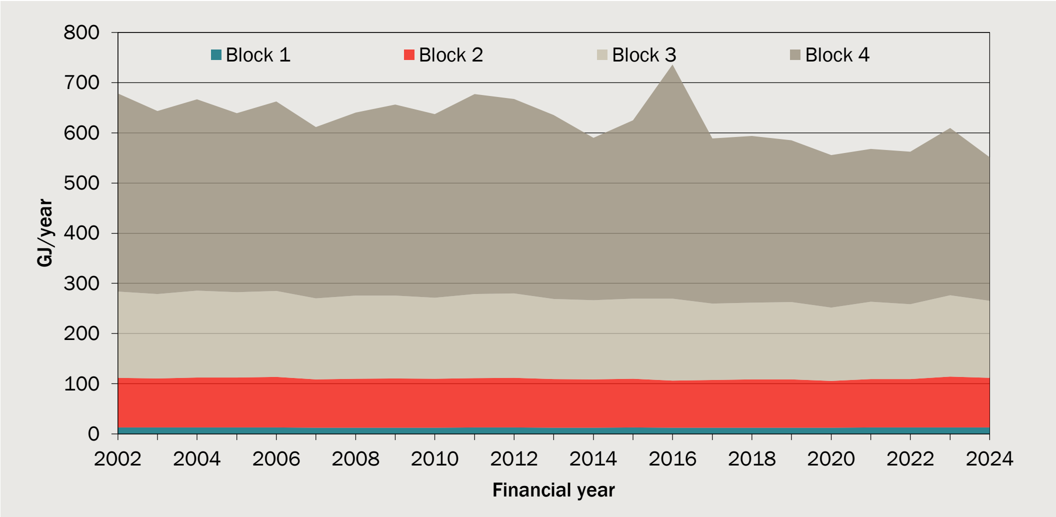
8.1 Average usage per commercial customer



Data source: CIE analysis of Evoenergy billing data

The majority of usage by commercial customers would be charged at block 3 and block 4 prices under the current Tariff VI thresholds (chart 8.2). Usage in blocks 1-3 is stable, with year-to-year variation mainly confined to block 4 usage.

8.2 Average commercial usage at proposed Tariff VI blocks



Data source: CIE analysis of Evoenergy billing data

Baseline modelling

Models of total usage

Table 8.3 presents the estimated coefficients and statistical significance for our chosen model of baseline commercial usage per customer. This is a fixed effects model, with the value of the fixed effect for each customer estimated in a second-stage regression.

As per the residential model, the dependent variable, *q_norm*, is the natural logarithm of gas usage normalised for the impact of prices. We used AEMO's 2024 GSOO elasticity assumption of -0.05 on heating load,[42] where base load was specified as 604.4 MJ/day for commercial customers, estimated using historical data for average consumption during summer.

The coefficient of -0.0013 indicates that there has been a trend decline of 0.13 per cent per month (or 1.53 per cent per year) in gas consumption after accounting for other factors.

42 AEMO 2024. Gas Demand Forecasting Methodology Information Paper for the 2024 Gas Statement of Opportunities covering Australia's East Coast Gas Market, March, p. 26.

8.3 Results of commercial usage estimation

Variable	Coeff.	t value
First stage		
Month (time trend)	-0.0013	-7.09
EDD	0.0051	37.99
Constant	11.4802	107.68
Second stage		
Year connected		
2002	-0.1432	-1.12
2003	-0.3072	-4.96
2004	-0.0016	-0.28
2005	-0.4505	-6.5
2006	-0.1307	-2.91
2007	0.7234	13.68
2008	0.1652	3.78
2009	0.1804	3.15
2010	0.1395	2.7
2011	-0.1288	-1.78
2012	0.2563	4.6
2013	0.2038	3.65
2014	0.3023	6.36
2015	0.2010	3.89
2016	0.0891	2.86
2017	0.5201	9.32
2018	0.0891	1.92
2019	0.3845	6.4
2020	0.2172	5.31
2021	0.4694	8.06
2022	0.0828	1.92
2023	0.2134	2.61
2024	0.1435	
NSW	-0.6903	-25.73
Constant	-1.7493	-137.49

Source: CIE

Switching modelling

The switching model produces an index for average consumption, which captures the indications given by commercial survey respondents about the reductions in gas usage they expect to make without fully disconnecting (see Chapter 5).

8.4 Index for forecast average usage per connected-and-consuming commercial customer 2026-2031

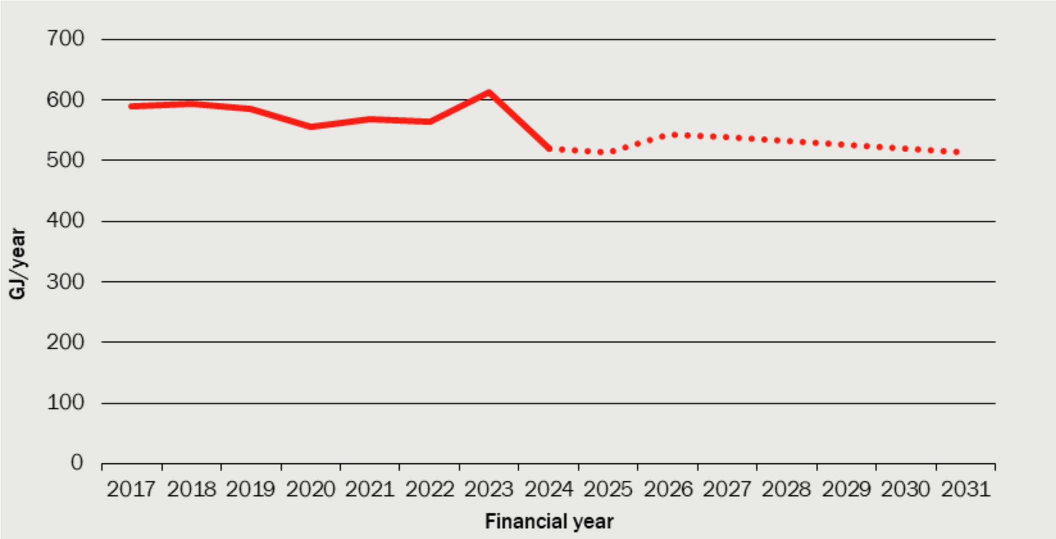
	2026	2027	2028	2029	2030	2031
Index	0.995	0.991	0.986	0.981	0.975	0.970

Source: CIE gas demand forecasting model

Forecast usage per commercial customer

Forecast average usage per commercial customer is forecast to decrease from 543 GJ in FY 2026 to 513 GJ in FY 2031. The main drivers of this decrease are fuel switching, increasing gas prices, and the forecast gradual decrease in EDD.

8.5 Forecast average usage per commercial customer



Data source: CIE

9 Tariff VI total usage

Total usage is derived by multiplying usage per customer by the number of customers for each subgroup. These projections combine the forecasts for residential and commercial customers contained in previous chapters to project usage by all individually metered volume customers.

Weighting end-of-year customer numbers

The customer numbers described in previous chapters were forecast as at end of financial year. It is important to account for the fact that the number of customers changes throughout the year. Sometimes, analysts use the midpoint between end-of-financial-year customer numbers to multiply per-customer usage. This approach will be accurate if both customer growth and usage are uniformly distributed over the year. Although customer growth can be lumpy, it is lumpy in unpredictable ways, so an assumption of uniformly distributed growth seems reasonable. An assumption of uniform usage is not reasonable, however, given the significant, predictable seasonality in usage in Evoenergy's network.

Analysis of weather-normalised monthly usage indicates a weight of 54 per cent should be placed on the opening customer number and 46 per cent on the closing customer number each financial year (46 per cent is derived from table 9.1 as 19.60/42.88).

9.1 Developing weights for end-of-financial-year customer numbers

	Usage/cust GJ	Weighting	Weighted usage
July	6.69	1/24	0.28
August	6.05	3/24	0.76
September	4.45	5/24	0.93
October	3.44	7/24	1.00
November	2.37	9/24	0.89
December	1.68	11/24	0.77
January	1.41	13/24	0.76
February	1.31	15/24	0.82
March	2.06	17/24	1.46
April	3.11	19/24	2.46
May	4.70	21/24	4.12
June	5.59	23/24	5.36
Total	**42.88**		**19.60**

Note: Usage per customer estimated using weather-normalised usage by all Tariff VI customers; the weighting column is the assumed proportion of annual customer growth that has taken place by the mid point of each month.

Source: CIE analysis of Evoenergy billing data

Specifically, total usage for the year 1 July t to 30 June t+1 is calculated as:

$$= usage\ per\ cust.\left(\left(1-\frac{19.60}{42.88}\right)customers_{30\ June\ t}+\frac{19.60}{42.88}customers_{30\ June\ t+1}\right)$$

For the purpose of forecasting the number of fixed charges, which depend on the distribution of customer growth, but not usage, over the year, we use a 50-50 weighting of the opening and closing customer numbers for the year.

Total Tariff VI usage

Over the forecast horizon, fixed charged quantities (customer numbers) and total usage are expected to fall (table 9.2). Now that the ACT has banned new gas connections and most customers are intending to replace gas appliances with electric alternatives when appliances reach end of life, the rate of decline in total connections is expected to increase to around 9 per cent per year by FY 2031. Usage per connection is forecast to increase in FY 2026, relative to the level observed under mild winter conditions in FY 2024 and FY 2025. It is expected to continue to increase as (smaller) residential customers disconnect at a significantly faster rate than (larger) commercial customers. Over the AA period 2026–31, the annual rate of decline in total usage is forecast to increase from 4.3 per cent in FY 2027 to 7.8 per cent in FY 2031.

9.2 Actual, estimated and forecast Tariff VI fixed charges and total usage

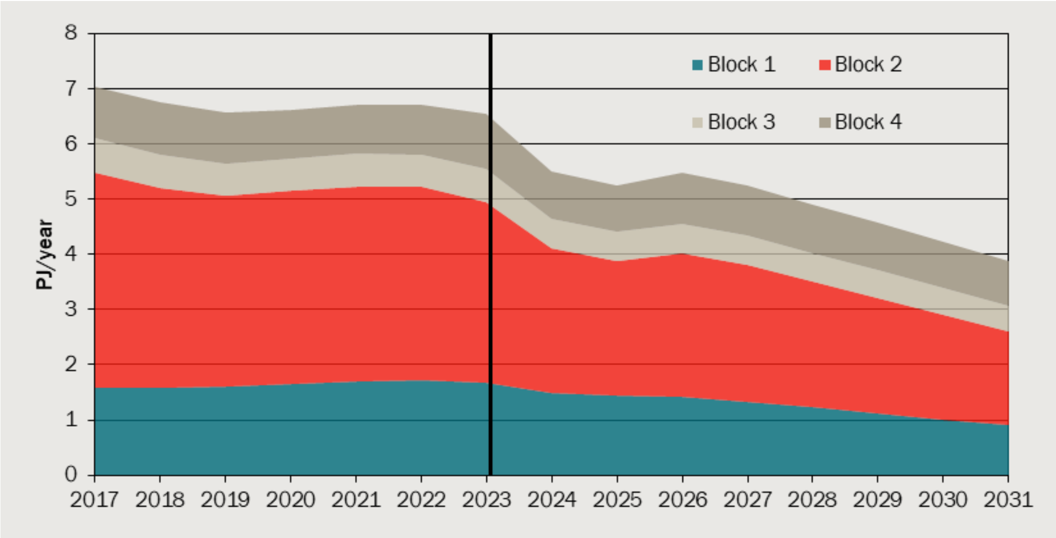
	Fixed charge quantities	Growth in fixed charge quantities	Usage per connection	Growth in usage per connection	Total usage	Growth in total usage
	Number	per cent	GJ/year	per cent	PJ/year	per cent
2016/17	139 640		50.4		7.0	
2017/18	144 461	3.5	46.8	-7.1	6.8	-3.9
2018/19	149 109	3.2	44.1	-5.8	6.6	-2.8
2019/20	153 069	2.7	43.2	-2.0	6.6	0.6
2020/21	155 862	1.8	43.1	-0.3	6.7	1.5
2021/22	156 314	0.3	43.0	-0.3	6.7	0.0
2022/23	155 121	-0.8	42.2	-1.9	6.5	-2.6
2023/24	153 966	-0.7	35.8	-15.2	5.5	-15.8
2024/25 (est.)	152 334	-1.1	34.5	-3.6	5.3	-4.7
2025/26	149 445	-1.9	36.6	6.2	5.5	4.2
2026/27	143 167	-4.2	36.6	-0.1	5.2	-4.3
2027/28	133 710	-6.6	36.7	0.4	4.9	-6.3
2028/29	123 544	-7.6	37.0	0.7	4.6	-7.0
2029/30	113 237	-8.3	37.3	0.9	4.2	-7.5
2030/31	103 319	-8.8	37.7	1.0	3.9	-7.8

Source: CIE analysis

This combination of results — with demand reductions occurring almost entirely due to disconnections, rather than reductions in average consumption — is driven by modelling assumptions that replacements of major appliances will translate within two years to disconnections. It is important to recognise that the number of connections and average consumption per connection are interrelated; for example, a slower staging of appliance replacement and disconnection by households would see a slower decline in connections and a steeper decline in average consumption.

The proportion of total usage allocated to blocks 1 and 2 is forecast to decrease as commercial customers are projected to form a larger share of the customer base over time (chart 9.3).

9.3 Actual and forecast total Tariff VI usage by proposed blocks



Data source: CIE analysis of Evoenergy billing data

Table 9.4 sets out the Tariff VI forecasts by pricing block.

9.4 Summary of Tariff VI forecasts

	Fixed charge	Usage				
		Block 1	Block 2	Block 3	Block 4	Total
	Number	GJ	GJ	GJ	GJ	GJ
2016/17	139 640	1 577 667	3 907 284	616 733	939 729	7 041 412
2017/18	144 461	1 590 534	3 605 420	619 375	951 328	6 766 657
2018/19	149 109	1 602 013	3 460 434	588 443	928 350	6 579 240
2019/20	153 069	1 651 113	3 514 642	561 070	892 426	6 619 250
2020/21	155 862	1 692 618	3 537 615	593 090	897 788	6 721 110
2021/22	156 314	1 711 967	3 513 801	588 489	904 849	6 719 106
2022/23	155 121	1 675 394	3 268 344	608 109	991 559	6 543 407
2023/24	153 966	1 491 282	2 624 167	539 081	853 100	5 507 629
2024/25	152 334	1 440 898	2 449 710	530 577	830 175	5 251 360
2025/26	149 445	1 408 779	2 609 497	539 732	915 136	5 473 144
2026/27	143 167	1 331 648	2 470 428	531 708	904 068	5 237 852
2027/28	133 710	1 228 262	2 281 946	516 838	882 385	4 909 431

	Fixed charge	Usage				
		Block 1	Block 2	Block 3	Block 4	Total
	Number	GJ	GJ	GJ	GJ	GJ
2028/29	123 544	1 119 746	2 085 704	501 288	859 738	4 566 476
2029/30	113 237	1 010 241	1 889 555	485 547	836 763	4 222 106
2030/31	103 319	904 753	1 702 064	470 062	813 796	3 890 675

Source: CIE

10 Tariff VB customer numbers and usage

The preceding chapters relate to individually metered residential customers and their usage. In addition to individually metered customers (referred to as Tariff VI customers), Evoenergy also has 17 customers which are boundary metered (referred to as Tariff VB customers). These customers are residential and/or commercial multi-unit properties where the meter is at the boundary of the property. Evoenergy does not meter each unit individually, though some VB customers may separately meter the units within their complex as part of the infrastructure they provide behind the Evoenergy meter.

Given there are so few of these customers in Evoenergy's network, we take a simple approach to forecasting customer numbers and usage.

Tariff VB customer numbers

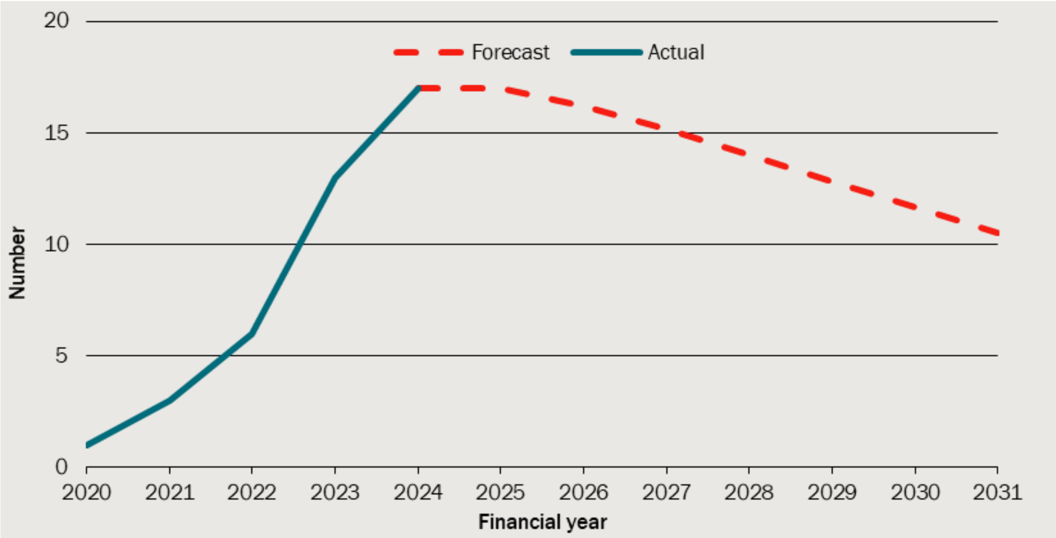
The timing of disconnections by Tariff VB customers is highly site specific and involves complex factors. For simplicity, Tariff VB customer numbers are assumed to decrease in line with the switching model index developed for residential customer numbers (see Chapter 5).

It is assumed there will be no new VB connections, reflecting:

- the prohibition of new gas connections in the ACT into the future, where most existing VB customers are located, and
- the apparent limited appetite of developers for the VB tariff in either the ACT or NSW.

These assumptions see the number of VB connections falling steadily to 10 customers by the end of the AA period 2026–31 (figure 10.1).

10.1 VB customer numbers



Source: CIE

Tariff VB usage

Total usage is estimating by assuming usage per customer grows at the same rate as medium density/high rise dwellings usage per customer (table 10.2). This assumes that the same drivers that affect Tariff IV customer consumption similarly impact tariff VB customers.

10.2 Summary of Tariff VB forecasts

	Customers	Usage Band 1	Usage Band 2	Usage Band 3	Usage Total
	Number	GJ	GJ	GJ	GJ
2023/24 (actual)	17	7 260	23 847	0	31 106
2024/25	17	7 188	22 706	0	29 894
2025/26	16	6 997	24 076	0	31 073
2026/27	15	6 540	22 413	0	28 953
2027/28	14	6 038	20 599	0	26 636
2028/29	13	5 510	18 703	0	24 213
2029/30	12	4 995	16 862	0	21 857
2030/31	11	4 508	15 131	0	19 639

Source: CIE

11 Tariff D customer numbers and usage

Tariff D customers are industrial or large government customers using more than 10 TJ per year. Evoenergy currently has 43 customers on this tariff.

Tariff D customers are charged for their usage in two ways depending on the tariff category of the customer:

- chargeable demand (CD) for customers on the capacity tariff, and
- throughput, for customers on the throughput tariff.

That is, some customers are charged based on the capacity they or their retailer contracts with Evoenergy and others are charged on the basis of their usage/throughput.

CD will be reset at the start of the access arrangement period, as the greater of:

- the ninth highest quantity of the customer's daily withdrawal for 12-month period prior to the next access arrangement commencing
- ten times the maximum hourly quantity on the day prior to the next access arrangement commencing, or
- the maximum daily quantity on the day prior to the next access arrangement commencing.

The first of these three measures is most likely to be used to set CD.

Evoenergy therefore requires forecasts for each Tariff D customer of annual usage and the ninth-highest usage day per year.

Forecasting approach

Tariff D demand forecasts are developed at an individual customer level, taking account of evidence from interviews with roughly half of the customers.

The baseline forecast for Tariff D customers uses weather normalised demand for 2023/24 as a starting point and is projected based on forecast EDD and the relationship between consumption and changes in EDD derived from the customer-level regressions. The weather normalisation is based on regressions of EDD against daily consumption over a period from 1 July 2002 (or customer connection, whichever is later) to 30 June 2024, separately for each customer. Forecast chargeable demand is assumed to have the same growth rate as forecast consumption.

'Switching model' adjustments for this customer class take the form of manual adjustments made at a customer level to reflect indications provided by customers in interviews about the profile over time of any expected reductions in gas usage and disconnection intentions. There are four customers expected to disconnect or move off the demand tariff by 2031. A further four customers expect to reduce their gas usage by 50 per cent or more by 2031 and a further eight customers expect to reduce their gas usage by around one quarter by 2031, as part of staged projects (for example to electrify buildings as they are renovated or redeveloped). The forecasts also account for these customers' expected profile of gas usage reductions leading up to 2045 and the impact of gas price increases on the timing of their usage reduction. Forecast gas price increases are estimated to reduce 2031 Tariff D consumption by just 0.07 per cent.

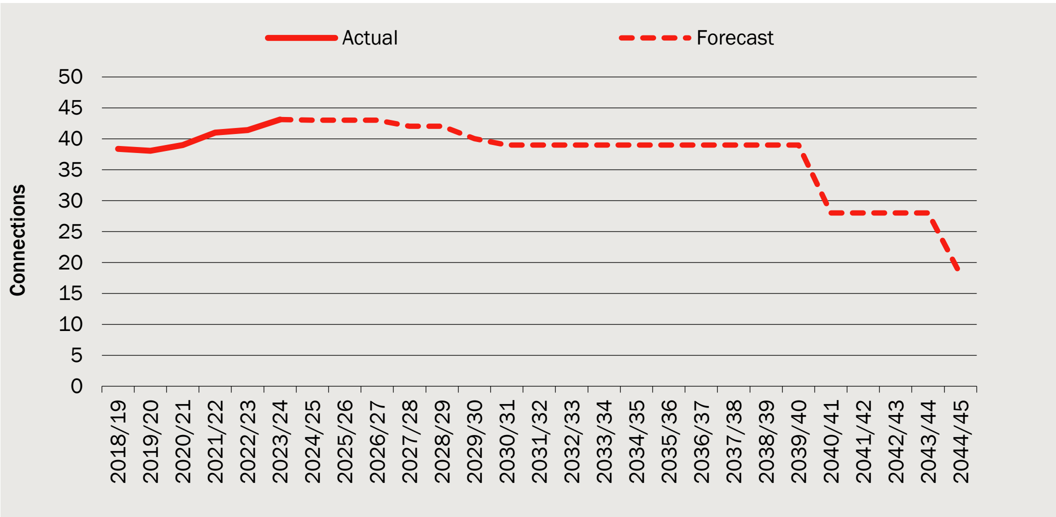
For other customers, we assumed:

- Public sector customers would decrease their gas usage to zero in a linear fashion between 2031 and 2041 (based on the ACT target of net zero emissions from ACT Government operations by 2040[43] and the Net Zero in Government Operations Strategy,[44] which states that "From 1 July 2026, where a contract is entered for the purchase or construction by or for the Commonwealth of office space, the office space must be all-electric where available" and "By 1 January 2040, entities should only lease or own office space that is all-electric.")
- Private sector customers would decrease their gas usage to zero in a linear fashion between 2041 and 2045.

Tariff D forecasts

The forecast number of Tariff D connections is illustrated in chart 11.1.

11.1 Actual and forecast Tariff D connections



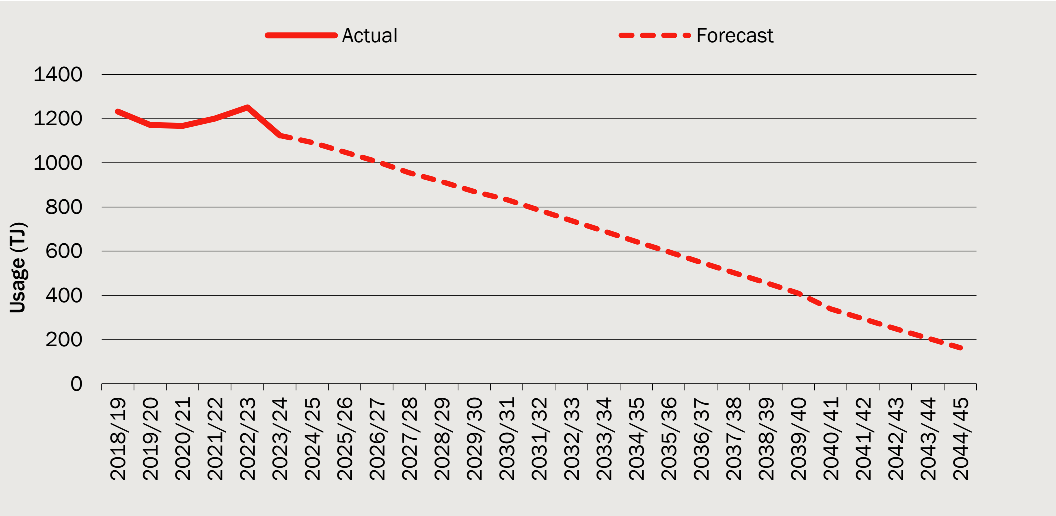
Data source: CIE analysis

Forecast total usage by Tariff D customers is illustrated in chart 11.2.

43 https://www.climatechoices.act.gov.au/climate-change/what-the-act-government-is-doing/zero-emissions-government, accessed 22/05/2025

44 https://www.finance.gov.au/sites/default/files/2023-11/Net_Zero_Government_Operations_Strategy.pdf, accessed 22/05/2025

11.2 Actual and forecast Tariff D usage



Data source: CIE analysis

Forecasts of chargeable demand follow a similar trajectory. The forecasts, by pricing block for the Demand Capacity tariff, over the AA period 2026–31, are set out in table 11.3.

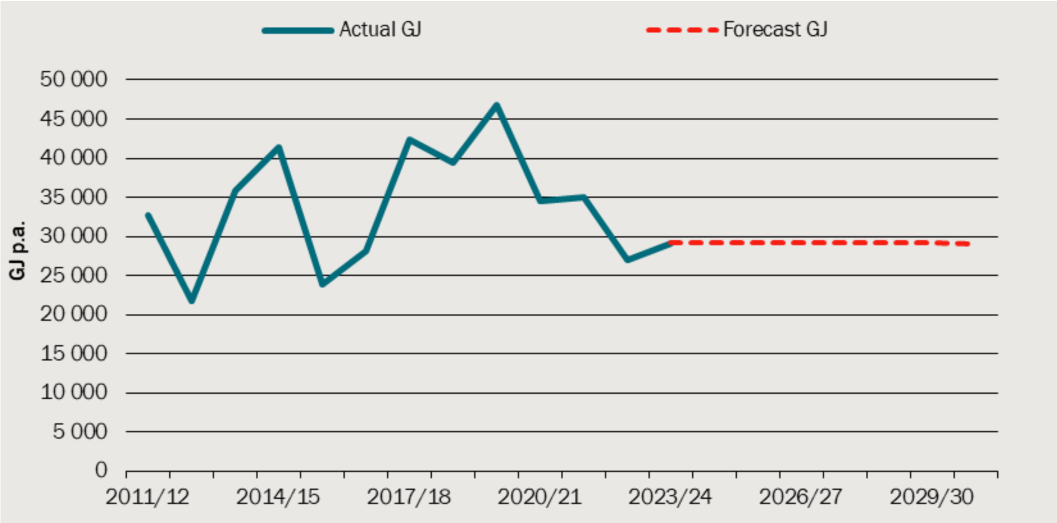
11.3 Forecast Demand Capacity tariff chargeable demand by block

	Usage	Chargeable demand Block 1	Chargeable demand Block 2	Chargeable demand Block 3	Chargeable demand Total
	TJ/year	GJ/day	GJ/day	GJ/day	GJ/day
2019/20	1172	1 968	2 188	2 120	6 275
2020/21	1166	1 968	2 205	2 133	6 306
2021/22	1199	1 973	2 325	2 165	6 464
2022/23	1250	1 980	2 233	2 266	6 480
2023/24	1124	1 989	2 159	1 894	6 043
2024/25	1092	1 986	2 086	1 770	5 842
2025/26	1049	1 980	1 993	1 646	5 619
2026/27	1005	1 964	1 897	1 537	5 397
2027/28	955	1 890	1 815	1 442	5 147
2028/29	915	1 855	1 696	1 385	4 936
2029/30	870	1 768	1 580	1 345	4 692
2030/31	834	1 678	1 529	1 305	4 512

Source: CIE analysis

Quantities for the Demand Throughput tariff are assumed to be relatively stable, since the one customer on that tariff is a private sector customer for which interview data were not available (figure 11.4).

11.4 Forecast Demand Throughput tariff volumes



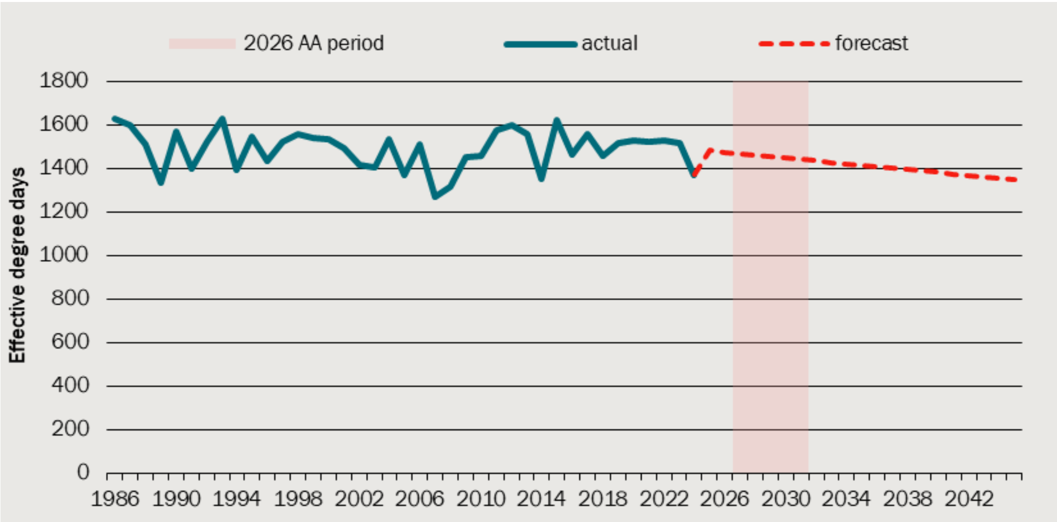
Data source: CIE analysis

A Effective degree days

Actual effective degree days (EDD) for the period 1 July 2014 to 1 December 2024 are sourced directly from AEMO data. Actual EDD for the period 1 January 1985 to 30 June 2014 are calculated by The CIE in accordance with AEMO's formula for ACT EDD.[45]

Forecast EDD is the historical average over the period 1985 to 2024, declining from June 2024 by 0.47 per cent per year to account for climate change. This decline is based on the 6.8 EDD per annum decrease forecast by AEMO for Victoria with strategic input from CSIRO and the Bureau of Meteorology,[46] assuming the base for the forecast is the average of the past five years of EDD in Victoria of 1451.[47]

A.1 Actual and forecast effective degree days



Data source: AEMO, Evoenergy, CIE analysis

45 AEMO 2023. Retail Market Procedures (NSW and ACT). Document ref: RETAILMARKET-14-4705. v29.0. Final. 31 March.

46 AEMO 2024. Gas Demand Forecasting Methodology Information Paper. For the 2024 Gas Statement of Opportunities covering Australia's East Coast Gas Market. March. Appendix A2.2 (https://aemo.com.au/-/media/files/gas/national_planning_and_forecasting/gsoo/2024/gas-demand-forecasting-methodology-2024.pdf?la=en, accessed 24/09/24)

47 AEMO 2024 Victorian Gas Planning Report Update. Gas transmission network planning for Victoria. March. (https://aemo.com.au/-/media/files/gas/national_planning_and_forecasting/vgpr/2024/2024-victorian-gas-planning-report-update.pdf?la=en, accessed 24/09/24)

B Regression output by block

Residential output

Table B.1 to B.4 present the results of residential usage estimation for each block.

B.1 Results of residential usage estimation – Block 1

Variable	Coef.	t value
First stage		
Month (time trend)	-0.0006	-56.29
EDD	0.0013	355.44
Constant	6.9005	1259.70
Second stage		
Year connected		
2002	0.0595	23.28
2003	0.0593	22.11
2004	0.0581	19.92
2005	0.0721	22.40
2006	0.0044	1.71
2007	-0.0415	-14.07
2008	-0.0035	-2.34
2009	-0.0604	-20.88
2010	-0.0919	-34.13
2011	-0.1109	-41.60
2012	-0.1928	-75.08
2013	-0.2223	-93.11
2014	-0.1778	-70.27
2015	-0.0926	-39.54
2016	-0.2452	-80.65
2017	-0.1331	-54.97
2018	-0.2566	-102.79
2019	-0.1852	-69.06
2020	-0.1897	-75.77
2021	-0.2481	-95.65
2022	-0.2920	-111.37

Variable	Coef.	t value
2023	-0.4275	-145.6
2024	-0.6587	
NSW	0.0390	28.29
Hdensity	-0.3335	-276.6
Existing	-0.2453	
Constant	0.1004	153.88

Source: The CIE.

B.2 Results of residential usage estimation – Block 2

Variable	Coef.	t value
First stage		
Month (time trend)	-0.0014	-77.02
EDD	0.0052	1067.05
Constant	7.5638	834.18
Second stage		
Year connected		
2002	-0.0364	-7.41
2003	-0.0525	-11.12
2004	-0.0406	-10.16
2005	-0.0880	-14.78
2006	-0.2799	-40.73
2007	-0.2624	-46.19
2008	-0.3401	-60.97
2009	-0.3592	-57.9
2010	-0.4592	-85.23
2011	-0.5288	-96.79
2012	-0.6204	-112.2
2013	-0.6605	-125.41
2014	-0.7570	-135.51
2015	-0.8024	-149.3
2016	-0.7767	-111.49
2017	-0.9269	-167.36
2018	-0.9749	-159.71
2019	-1.1255	-169.69
2020	-1.1090	-170.23
2021	-1.0666	-148.08

Variable	Coef.	t value
2022	-1.1893	-139.12
2023	-1.0619	-60.64
2024	-1.1899	
NSW	-0.0036	-3.78
Hdensity	-0.6937	-235.17
Existing	0.1958	
Constant	0.1760	146.65

Source: The CIE.

B.3 Results of residential usage estimation – Block 3

Variable	Coef.	t value
First stage		
Month (time trend)	0.0005	21.47
EDD	0.0029	89.60
Constant	6.5527	192.98
Second stage		
Year connected		
2002	-0.0683	-4.74
2003	-0.0731	-3.9
2004	-0.0769	-1.39
2005	-0.0374	-1.23
2006	-0.1206	-1.35
2007	0.0035	1.11
2008	0.2221	5.87
2009	0.4019	7.62
2010	0.4291	10.07
2011	0.3272	8.22
2012	0.5083	7.3
2013	0.5664	8.08
2014	0.5855	11.2
2015	0.6955	11.27
2016	0.3118	1.56
2017	0.6373	9.26
2018	0.7020	6.59
2019	0.5438	5.92
2020	1.4086	5.77

Variable	Coef.	t value
2021	0.8885	1.44
2022	0.6644	4.25
2023	0.6641	4.33
2024	1.2694	
NSW	0.0047	1.31
Hdensity	1.0711	21.2
Existing	-0.1438	
Constant	0.0103	-14.95

Source: The CIE.

B.4 Results of residential usage estimation – Block 4

Variable	Coef.	t value
First stage		
Month (time trend)	-0.0014	-2.09
EDD	0.0037	9.68
Constant	10.9289	26.31
Second stage		
Year connected		
2002	0.0000	
2003	0.0000	
2004	-1.9364	-0.55
2005	0.0000	
2006	-2.8653	-1.07
2007	-2.7426	-1.91
2008	1.9038	7.14
2009	1.4668	7.38
2010	0.5743	3.33
2011	-1.0393	-0.10
2012	-1.2799	0.75
2013	-0.1638	4.35
2014	0.0638	3.23
2015	0.4020	5.03
2016	0.0000	
2017	-0.9186	0.51
2018	-0.8622	0.73
2019	0.7987	4.78

Variable	Coef.	t value
2020	-0.4213	
2021	0.5704	
2022	-0.6771	2.01
2023	0.0023	2.21
2024	0.0000	
NSW	0.3228	-0.79
Hdensity	0.2393	-0.29
Existing	0.0000	
Constant	0.3250	-3.56

Source: The CIE.

Commercial output

Tables B.5 to B.8 present the results of commercial usage estimation for each block.

B.5 Results of commercial usage estimation – Block 1

Variable	Coef.	t value
First stage		
Month (time trend)	-0.0003	-6.07
EDD	0.0007	27.30
Constant	7.0418	237.74
Second stage		
Year connected		
2002	0.0361	4.59
2003	-0.0144	-2.7
2004	0.0583	5.21
2005	-0.0124	-2.28
2006	-0.0384	-3.87
2007	0.0602	7.14
2008	0.0843	9.42
2009	0.0569	4.21
2010	0.0134	2.01
2011	0.0405	4.85
2012	0.1065	10.56
2013	0.1047	10.96
2014	0.0959	11.98
2015	0.0933	9.77

Variable	Coef.	t value
2016	0.0935	10.21
2017	0.1575	12.54
2018	0.0638	5.45
2019	0.0881	8.9
2020	0.1103	15.41
2021	0.1593	16.79
2022	0.0883	9.6
2023	0.0620	4.81
2024	0.1298	
NSW	-0.0950	-20.19
Constant	-0.0034	-3.5

Source: The CIE.

B.6 Results of commercial usage estimation – Block 2

Variable	Coef.	t value
First stage		
Month (time trend)	-0.0003	-6.07
EDD	0.0009	33.65
Constant	9.3049	297.44
Second stage		
Year connected		
2002	-0.0534	-1.69
2003	-0.1458	-4.64
2004	0.0392	1.24
2005	-0.1772	-7.44
2006	0.0388	-0.23
2007	0.2630	12.89
2008	0.0057	-0.33
2009	0.1255	4.33
2010	0.1106	5.03
2011	-0.0355	0.17
2012	0.1303	5.24
2013	0.0392	3.23
2014	0.2068	9.62
2015	0.0571	3.37
2016	0.0315	4.14
2017	0.2301	9.64

Variable	Coef.	t value
2018	0.2005	7.22
2019	0.1332	7.12
2020	0.2173	6.4
2021	0.1401	6.23
2022	0.1080	6.23
2023	0.2119	5.53
2024	0.2177	
NSW	-0.1949	-15.39
Constant	-0.2189	-41.55

Source: The CIE.

B.7 Results of commercial usage estimation – Block 3

Variable	Coef.	t value
First stage		
Month (time trend)	-0.0005	-6.26
EDD	0.0014	34.54
Constant	10.4273	222.50
Second stage		
Year connected		
2002	-0.1431	-4.15
2003	-0.1471	-2.79
2004	-0.5124	-10.05
2005	-0.3417	-4.7
2006	-0.3100	-7.41
2007	0.0409	0.54
2008	-0.0930	-1.52
2009	-0.0540	-3.35
2010	-0.2177	-6.43
2011	-0.0937	-3.26
2012	-0.2095	-3.94
2013	-0.0768	0.86
2014	-0.1697	-6.51
2015	-0.3475	-8.94
2016	-0.2190	-4.33
2017	-0.2814	-9.4
2018	-0.3045	-6.44
2019	-0.1184	-4.53

Variable	Coef.	t value
2020	-0.1126	-5.6
2021	-0.4459	-10.42
2022	-0.2202	-7.14
2023	-0.0029	-1.28
2024	-0.4008	
NSW	-0.0641	-2.95
Constant	-0.3067	-33.03

Source: The CIE.

B.8 Results of commercial usage estimation – Block 4

Variable	Coef.	t value
First stage		
Month (time trend)	-0.0011	-3.68
EDD	0.0050	32.88
Constant	12.0056	83.30
Second stage		
Year connected		
2002	-0.0733	-0.74
2003	-0.2758	-1.48
2004	0.7630	4.44
2005	0.1195	0.81
2006	0.1547	1.4
2007	0.5513	8.05
2008	0.9592	7.71
2009	-0.0884	-1.06
2010	0.1766	2.67
2011	0.1278	1.22
2012	-0.0431	-0.51
2013	0.2614	3.91
2014	-0.0141	-0.34
2015	-0.3719	-5.05
2016	-0.3131	-2.99
2017	-0.2982	-3.37
2018	-0.0084	0.53
2019	-0.0550	0.25
2020	-0.6889	-2.35
2021	0.0393	2.02

Variable	Coef.	t value
2022	-0.3050	-4.61
2023	0.1772	2.05
2024	0.6233	
NSW	-0.4818	-6.91
Constant	-1.0772	-54.38

Source: The CIE

C Input parameters for residential choice model

Running costs

Energy consumption

The primary source for the energy consumption assumptions used in the demand model is a report by Alternative Technology Association published in 2018.[48] Energy consumption of existing gas appliances is reported for heaters, water heating and cooktops and varies by home size and whether a household is stay-at-home (table 11.2). Differences in energy consumption between existing and new gas appliances were based on annual running costs reported by Sustainability Victoria for appliances with different efficiency ratings.[49] New gas appliances are more efficient, using up to 17 per cent less energy compared to older and existing appliances.

C.1 Gas consumption assumptions, by appliance and household type

Household type	Space heating	Water heating	Cooking
	MJ/pa	MJ/pa	MJ/pa
New gas appliances, away-from-home			
Small home	38 289	4 551	2 000
Medium home	55 671	6 170	2 000
Large home	82 049	9 902	2 000
Factors for gas consumption			
Existing gas appliance	1.21	1.13	1.00
Stay-at-home household	1.08	1.00	1.00

Source: Alternative Technology Association (2018). Household fuel choice in the National Energy Market. Final Report. Revised July. pp. 41, 48, 50. (https://renew.org.au/wp-content/uploads/2018/08/Household_fuel_choice_in_the_NEM_Revised_June_2018.pdf, accessed 18/06/2025); Sustainability Victoria, Calculate heating running costs (https://www.sustainability.vic.gov.au/energy-efficiency-and-reducing-emissions/save-energy-in-the-home/heat-your-home-efficiently/calculate-heating-costs).

Energy consumption for new electric appliances varies between 3 252 and 278 kWh per annum, depending on the size of the home and type of appliance (table 5.6).

48 Alternative Technology Association (2018). Household fuel choice in the National Energy Market. Final Report. Revised July. pp. 41, 48, 50. (https://renew.org.au/wp-content/uploads/2018/08/Household_fuel_choice_in_the_NEM_Revised_June_2018.pdf, accessed 18/06/2025).

49 Sustainability Victoria, Calculate heating running costs (https://www.sustainability.vic.gov.au/energy-efficiency-and-reducing-emissions/save-energy-in-the-home/heat-your-home-efficiently/calculate-heating-costs).

C.2 Final energy consumption inputs, new electric appliances, by appliance type

Household type	Space heating	Water heating	Cooking
	kWh/pa	kWh/pa	kWh/pa
New electric appliances, away-from-home			
Small home	1454	548	278
Medium	2077	648	278
Large home	2908	879	278
Factors for electricity consumption			
Stay-at-home household	1.12	1.00	1.00

Source: Alternative Technology Association (2018). Household fuel choice in the National Energy Market. Final Report. Revised July. pp. 41, 48, 50. (https://renew.org.au/wp-content/uploads/2018/08/Household_fuel_choice_in_the_NEM_Revised_June_2018.pdf, accessed 18/06/2025)

Energy prices

Forecast gas prices are made up of three components:

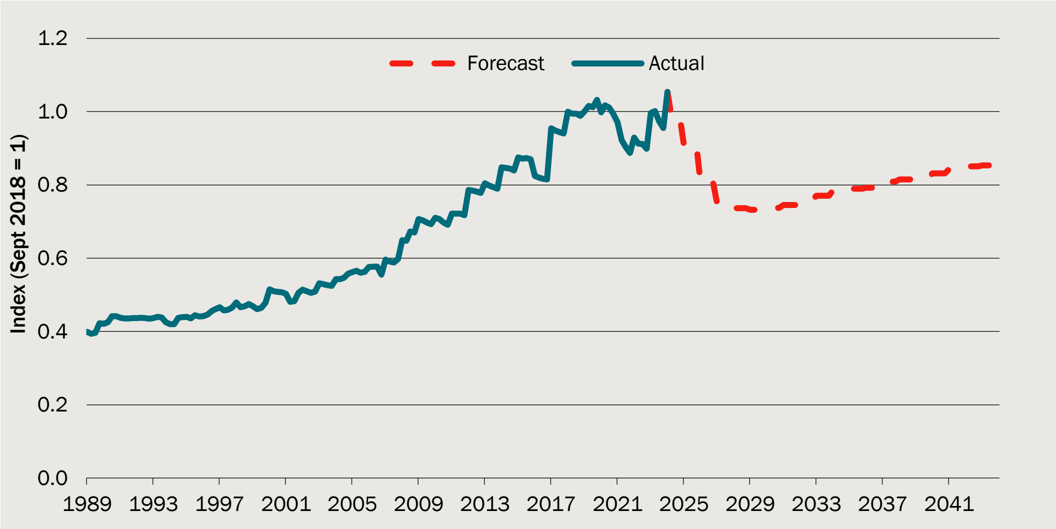
- Forecast wholesale gas prices (36 per cent of the current retail price)
- Forecast gas network prices (28 per cent of the current retail price)
- Forecast retail margin and transmission prices (36 per cent of the current retail price).[50]

We used wholesale gas price forecasts from AEMO's 2024 *Gas Statement of Opportunities* (GSOO), developed by ACIL Allen. We have used residential and commercial customer forecast for the step change scenario as this is identified as the most likely scenario (figure 7.13).[51]

50 https://www.climatechoices.act.gov.au/__data/assets/pdf_file/0005/2052482/Retail-price-impacts-of-the-gas-transition-ACT-Government-fact-sheet.pdf

51 AEMO 2024. 2024 Gas Statement of Opportunities, pp 15-16 (https://aemo.com.au/-/media/files/gas/national_planning_and_forecasting/gsoo/2024/aemo-2024-gas-statement-of-opportunities-gsoo-report.pdf?la=en, accessed 21/11/24).

C.3 Forecast wholesale gas price



Data source: CIE analysis of Evoenergy billing data.

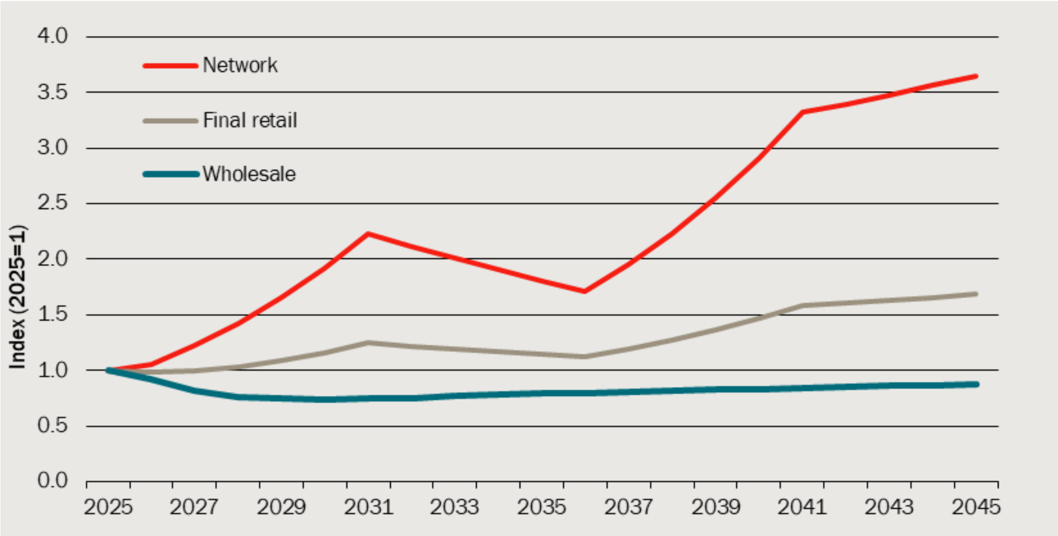
Retail margin and transmission network prices were assumed to remain constant in real terms in the absence of a sound basis for forecasting otherwise.

Gas network prices were estimated endogenously within the forecasting model, based on:

- Evoenergy's notional revenue requirement plus jurisdictional costs (UNFT and EIL)
- Forecast weighted-average cost of capital for use as a discount rate
- Setting x-factors for 5-year regulatory periods to equate the present values of forecast revenue and the notional revenue requirement.

This required an iterative modelling approach, since updating network prices affects gas retail prices, which affects forecast gas demand (both via the short-term price response in the baseline model and the forecast disconnections in the switching model), which affects forecast revenue requiring prices to be updated again to equate revenue with the target. The prices reached following convergence of the model as shown in chart 6.15.

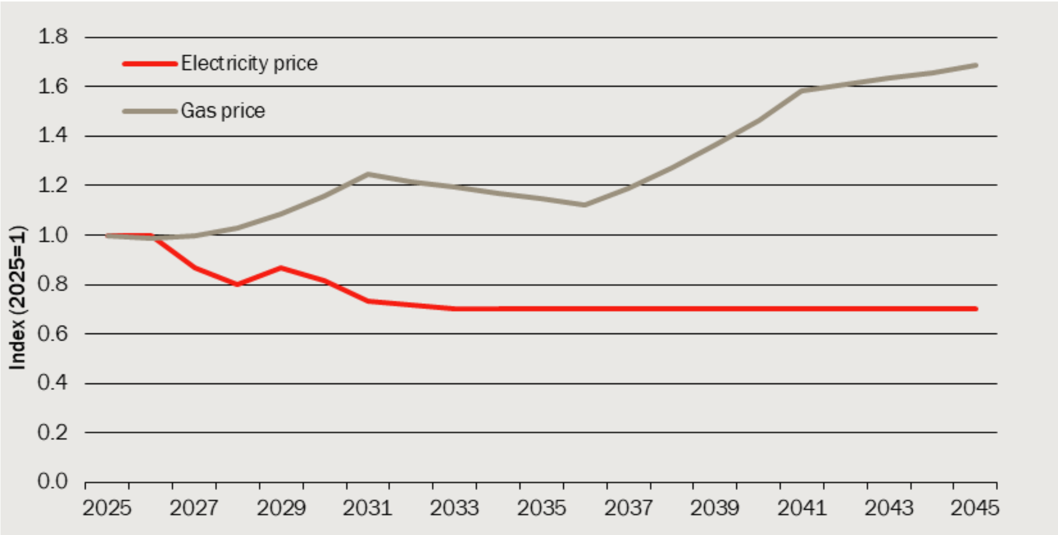
C.4 Forecast gas prices



Data source: CIE demand forecasting model; Wholesale prices are the step change scenario for residential and commercial customers in ACIL Allen forecasts for AEMO's 2024 Gas Statement of Opportunities.

Forecast electricity prices were based on AEMC's 2024 projection for the ACT (figure 2.7).

C.5 Forecast gas and electricity prices



Note: Base electricity price is $0.30/kWh. Base gas price is $238 p.a. plus $0.0158/MJ for the first 15 000 MJ p.a., plus $0.0082/MJ for the next 161 400 MJ p.a..

Data source: CIE demand forecasting mode; AEMC 2024. Residential electricity price trends. November. p.30. (https://www.aemc.gov.au/sites/default/files/2024-11/Price%20Trends%202024%20Final%20Report.pdf, accessed 23/5/25)

It was assumed that 50 per cent of electricity used by households with solar panels would cost the electricity price above and 50 per cent would be forgone feed-in tariff revenue of 8c/kWh.

Upfront costs

Appliance and installation costs

The appliance and installation cost assumptions for replacing gas appliances with new like-for-like gas appliances are based on costs reported in existing studies (table 4.2). Upfront costs for heaters are based on two sources, Frontier (2022)[52] and Acil Allen (2024).[53] Upfront costs for hot water systems and cooktops are based on costs reported in Frontier (2022).

Our assumption is based on a weighted average of the upfront costs reported in the Frontier and Acil Allen reports, where the weights are the proportion of respondents who reported to currently be using split and ducted heating systems in the survey.[54] It is assumed that respondents currently with a ducted system will incur the higher cost across the two sources and households with split systems will incur the lower cost.

C.6 Upfront appliance and installation costs, new (replacement) gas appliances

Household type	Assumption
	$
Heaters	
Small home	3318[a]
Medium home	4410[c]
Large home	6872[d]
Water	
All homes	2230[b]
Cooktop	
All homes	1375[b]

[a] Weighted average based on ducted and split system heating shares reported in survey. Based on typical cost estimate reported for archetype 2 from Frontier report. See https://gamaa.asn.au/wp-content/uploads/2022/07/Frontier-Economics-Report-GAMAA.pdf, pg. 32. Based on cost estimates reported for split system gas heat systems from Acil Allen's report. See https://www.aer.gov.au/system/files/2024-11/ACIL%20Allen%20-%20JGN%20demand%20review%20report%20-%20November%202024.pdf, pg. 24.

[b] Based on typical cost estimate reported for archetype 2 from Frontier report. See https://gamaa.asn.au/wp-content/uploads/2022/07/Frontier-Economics-Report-GAMAA.pdf, pg. 32.

52 Frontier 2022. Cost of switching from gas to electric appliances in the home. A report for the Gas Appliance Manufacturer's Association of Australia. 24 June. (https://gamaa.asn.au/wp-content/uploads/2022/07/Frontier-Economics-Report-GAMAA.pdf).

53 Acil Allen 2024. Review of Jemena Gas Network's demand forecasts. For the Australian Energy Regulator. 8 November. (https://www.aer.gov.au/system/files/2024-11/ACIL%20Allen%20-%20JGN%20demand%20review%20report%20-%20November%202024.pdf).

54 For example, 75.98 per cent and 24.02 per cent of respondents with medium homes reported to currently use ducted and split heat systems, respectively. Therefore, the central upfront cost estimate is calculated to be $5203(0.76) + 1900(0.24) = 4410$.

[c] Weighted average based on ducted and split system heating shares reported in survey. Based on typical cost estimates reported for archetype 3 from Frontier report. See https://gamaa.asn.au/wp-content/uploads/2022/07/Frontier-Economics-Report-GAMAA.pdf, pg. 35. Based on cost estimates reported for split system gas heat systems from Acil Allen's report. See https://www.aer.gov.au/system/files/2024-11/ACIL%20Allen%20-%20JGN%20demand%20review%20report%20-%20November%202024.pdf, pg. 24.

[d] Weighted average based on ducted and split system heating shares reported in survey. Based on cost estimates reported for ducted gas heat systems from Acil Allen's report. See https://www.aer.gov.au/system/files/2024-11/ACIL%20Allen%20-%20JGN%20demand%20review%20report%20-%20November%202024.pdf, pg. 24. Based on typical cost estimates reported for archetype 1 from Frontier report. See https://gamaa.asn.au/wp-content/uploads/2022/07/Frontier-Economics-Report-GAMAA.pdf, pg. 31.

The upfront appliance and installation costs of electric appliances were constructed in a similar manner. However, the cost of installing reverse-cycle air conditioners (RCAC) was reduced by 25 per cent on the assumption that:

- half of the cost can be attributed to cooling rather than heating, and
- the household's existing cooling appliance is on average halfway through its useful life, is made obsolete by the new RCAC, and had an undepreciated value equal to half the price of a RCAC.

C.7 Upfront appliance and installation costs, new electric appliances

Household type	Assumption
	$
Heaters	
Small home	10 852[a]
Medium home	12 189[b]
Large home	13 798[c]
Water	
Small home	4 633[c]
Medium home	4 633[c]
Large home	4 600[d]
Cooktop	
Small home	2 157[d]
Medium home	2 347[c]
Large home	2 347[c]

[a] Weighted average of split system and ducted electric heating systems, typical cost estimates from archetype 3 from Frontier report. See https://gamaa.asn.au/wp-content/uploads/2022/07/Frontier-Economics-Report-GAMAA.pdf, pg. 33.

[b] Weighted average of split system and ducted electric heating systems, typical cost estimates from archetype 1 from Frontier report. See https://gamaa.asn.au/wp-content/uploads/2022/07/Frontier-Economics-Report-GAMAA.pdf, pg. 31.

[c] Weighted average of split system and ducted electric heating systems, high cost estimates from archetype 3 from Frontier report. See https://gamaa.asn.au/wp-content/uploads/2022/07/Frontier-Economics-Report-GAMAA.pdf, pg. 35.

[d] Based on typical cost estimate reported for archetypes 2 and 3 from Frontier report. See https://gamaa.asn.au/wp-content/uploads/2022/07/Frontier-Economics-Report-GAMAA.pdf, pg. 33 and 35.

[e] Based on typical cost estimate reported for archetype 1 from Frontier report. See https://gamaa.asn.au/wp-content/uploads/2022/07/Frontier-Economics-Report-GAMAA.pdf, pg. 31.

Power supply upgrade cost

A cost of $5 000 for upgrading power supply to three-phase supply was applied only to large homes switching to electric heating.

Rebates for electrification

Rebate assumptions were based on offerings by ActewAGL Retail, the dominant energy retailer in the ACT, at the time the analysis was conducted (table C.8). ACT Government makes available additional incentives to vulnerable households through the Home Energy Support Program and Access to Electric Program, but we do not account for these additional incentives since we can't determine the eligibility of our sampled customers.

C.8 Rebates on new electric appliances

Household type	Assumption
	$
Heaters	
Small home	1 750
Medium home	3 000
Large home	3 000
Water	
Small home	0
Medium home	1 500
Large home	1 500
Cooktop	
Small home	0
Medium home	0
Large home	0

Source: actewagl.com.au/for-home/energy-efficient-homes/heating-and-cooling-upgrade/heating-and-cooling-upgrade-terms-and-conditions, accessed 4/6/25

Gas disconnection fee

The fee payable when disconnecting from gas was assumed to be $185. This is the current fee for a temporary disconnection. Temporary disconnection involves wadding the meter but leaving it in place, whereas a permanent disconnection involves removing the meter entirely. Permanent disconnections currently cost $948. Since gas fixed charges can be avoided by temporarily disconnecting, it is expected that most households will choose this option under the current pricing policy.

Interest-free loan scheme

The ACT Government offers interest-free loans up to $15 000 over 10 years under its Sustainable Household Scheme.[55] This offering effectively shifts some upfront costs into running costs, resulting in a reduced overall cost in present value terms. However, the

55 https://www.climatechoices.act.gov.au/__data/assets/pdf_file/0010/1861570/sustainable-household-scheme-guidelines-for-participants.pdf, accessed 4/6/25.

scheme is available only to ACT owner-occupiers with unimproved land value below $750 000. The scheme has been in place for several years. It also applies to solar, batteries, electric vehicles, and ceiling insulation and the maximum loan of $15 000 is a cumulative maximum across all products.

We estimated 33 per cent of our sample would be eligible for the loan scheme, based on taking the intersection of:

- households in the ACT (92 per cent)
- standalone houses (68 per cent)
- districts with average unimproved land value not exceeding $750 000 (83 per cent)
- households without solar who have income between $78 000 and $156 000 per year (i.e. who are unlikely to have already used the loan scheme for electric cars or solar, which is by far the product most used under the scheme)[56] (69 per cent).

For households assumed to be eligible, we calculated a loan amount equal to the minimum of $15 000 and the total cost of electrification before the loan. This amount was subtracted from the upfront cost of electric options for that household. An amount equal to 6.1 per cent of the loan amount was added to the annual running cost of electric options for that household. This is the annual amount payable each year of the asset's life that is equivalent in present value terms to repaying the $15 000 in equal nominal amounts over 10 years, assuming a real discount rate of 3.70 per cent and an asset life of 16 years.

56 https://www.climatechoices.act.gov.au/policy-programs/sustainable-household-scheme-dashboard, accessed 4/6/25

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