ACIL ALLEN

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Report to the Australian Energy Regulator

Review of EvoEnergy's gas demand forecasts

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1 Introduction

In June 2020, EvoEnergy submitted its draft regulatory proposal to the AER, which was informed by a set of detailed demand and customer numbers forecasts for the ACT and Queanbeyan-Palarang gas distribution network produced by the Centre for International Economics (CIE). While the AER accepted most components of the demand forecasts, it asked EvoEnergy to incorporate the latest usage and customer numbers data for the 2019-20 financial year, as well as requesting further evidence to support the post model adjustments applied incorporating the impact of the ACT Government Policy on future gas volumes and connections.

In response, EvoEnergy revised the forecasts incorporating additional historical data as well as forecasts of the relevant drivers such as ACT population, gas prices and NSW households. EvoEnergy's post model adjustments were also revised to incorporate the results of a consumer survey undertaken by Sagacity Research. This led to a significant change in the revised forecasts compared to those provided in the draft submission.

ACIL Allen have been commissioned by the Australian Energy Regulator to review EvoEnergy's revised gas demand and customer numbers forecasts for the 2021-26 Access Arrangement period. Specifically, we have been asked to provide advice and comment on:

- The reasonableness of the Sagacity online survey in predicting likely customer behaviour
- The reasonableness of the post model adjustments proposed by the Centre of International Economics (CIE)
- The reasonableness of the top-down assessment proposed by Core Energy and Research (CORE)
- Provide analysis on the comparability/reconciliation of the CIE and CORE findings
- Provide or suggest an alternative demand forecast if necessary that is based on either previous AER accepted methodologies or alternative methodologies that better meet the NGO.

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2.1 Overview

EvoEnergy commissioned the Centre for International Economic (CIE) to develop their independent forecasts of customer numbers and gas demand for EvoEnergy's gas distribution network.

The model was split into a base model which is econometric in nature and a post model adjustment which takes into account factors that are not present within the historical data. The main driver of the post model adjustment is the ACT Government's Climate Change Strategy 2019-2025 which aims to achieve a target of net zero emissions by 2045.

A key component of the Climate Change Strategy is the Energy Efficiency Improvement Scheme (EEIS). The EEIS was first introduced in 2013 and recently extended to include the objective of reducing gas consumption by encouraging a shift to electricity. This includes amending planning regulations to remove mandating of reticulated gas in greenfield developments in 2021-22 as well as moving to all electric in-fill development from 2023.

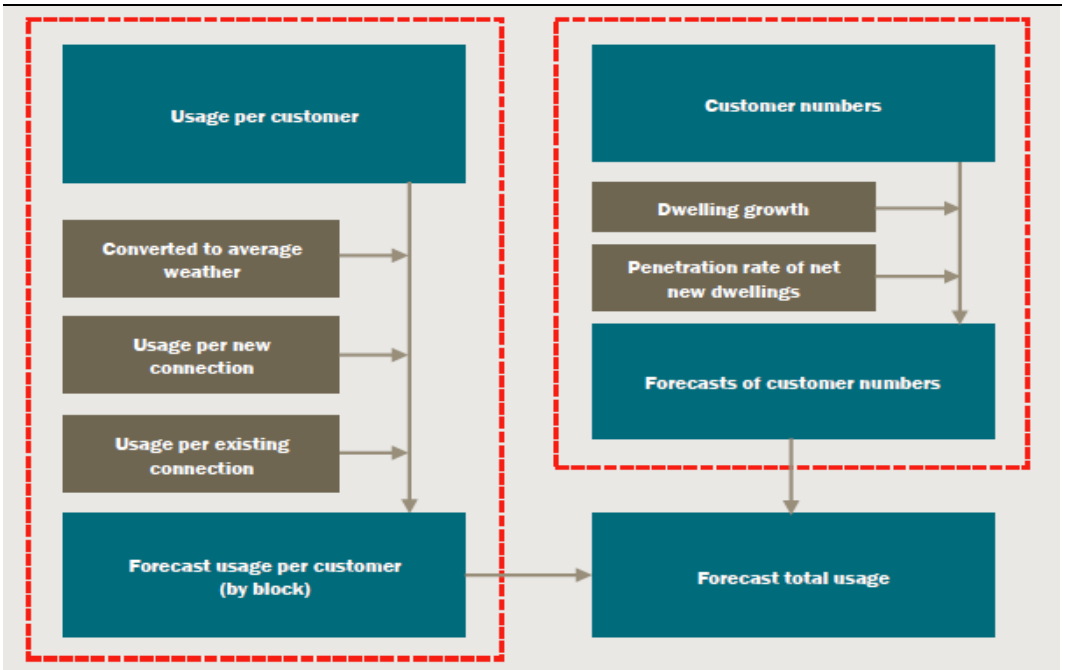
2.2 Base model

CIE's base model is split into two tariff classes: Volume customers and Demand customers.

Volume customers are further divided into residential and small business customers.

The residential customers are further subdivided into detached dwellings and high-rise dwellings. This is a reasonable split given that detached dwellings and higher density dwellings have different usage profiles, with higher density housing connections using significantly less gas per connection. Separate models were created for usage per customer and connections which were then combined to create a total volume forecast.

Figure 2.1 Residential gas usage and customers



Source:CIE

The key drivers of residential customers are population growth, the price of connecting to and using gas, the price of alternative energy sources, and government policy.

The gas usage per customer is driven by weather, price of gas, building type, design and size and increasing appliance efficiency over time. Both the customer numbers and gas usage per customer models appear to be well-specified, incorporating the most important drivers within the estimated models.

ACIL Allen considers that the econometrically driven approach of the CIE base model is reasonably sound and broadly consistent with best practice forecasting principles set out by AEMO.

2.3 Post model adjustments

In response to the EEIS policies to remove the mandating of reticulated gas in greenfield developments in 2021-22 and move to all electric in-fill development from 2023, the CIE applied as post model adjustments the assumptions of no new greenfield connections in the ACT after 1 July 2021 and no new connections of any kind in the ACT after 1 January 2023.

We consider these two post model adjustments to be reasonable under the circumstances. By removing the requirement for gas reticulation in new suburbs, the ACT Government will ensure that new connections at greenfield developments will be severely curtailed or completely eliminated. We consider that the assumptions of no new greenfield connections to the gas distribution network after 1 July 2021 and no new in-fill connections from January 2023 are reasonable.

In addition to these post model adjustments, the CIE has further increased the number of zero consuming, suspended, or abolished existing customers in line with a survey of gas customers commissioned by EvoEnergy.

EvoEnergy commissioned a customer survey which was undertaken by Sagacity. The survey targeted homeowners rather than renters and 30,000 customers were initially invited to participate. Of these, 1,886 respondents completed the survey of which 1,757 respondents are homeowners, equating to an overall response rate of 6.3%.

The stated objectives of the survey were to:

— Understand the current desire for gas and stated future intentions.
— Provide a time continuum that details the future uncertainty for gas.
— Determine the impact of potential rebates for switching to electrical appliances.
— Understand attitudes towards alternative fuels, including solar and renewable gas.
— Determine awareness of the net zero carbon target, and the impact on customers.

The CIE then took these survey responses and converted them into a post model adjustment that was deducted from the base or unadjusted forecast.

This was done by estimating the weighted likelihood that a typical owner occupier would either reduce their gas consumption to zero or disconnect from the network entirely. The calculations were based on three questions from the survey and the likelihood of switching away from gas within the next 5 years was derived by combining respondents' answers to questions about the timing of replacement and the likelihood of switching which was taken as the midpoint of the probability response.

The methodology was applied to 87,880 owner occupied gas connections, resulting in an estimated 17,460 connections to be zero consuming, suspended or abolished over the next 5 years. The CIE then allocated the 17,460 connections across the three categories by applying current proportions and resulting in 2,826 abolishments, 2,100 suspensions and 12,534 zero consuming customers over the next 5 years.

ACIL Allen has serious concerns about the use of the Sagacity customer survey by CIE to quantify the impact of existing customers intentions to switch appliances from gas to electricity. These concerns are outlined in the following sub-sections.

2.3.1 Response rate of only 6.3% may be indicative of a non-representative sample

EvoEnergy quote a response rate of 6.3% and consider this to be commendable.

While this might be an adequate result under some circumstances, we do not consider a response rate as low as 6% to be suitable for the purposes to which the survey is being used.

The Australian Bureau of Statistics (ABS) would never consider a survey with a response rate that low to be fit for publication. For example, census returns generally exceed 95%. Standard business surveys regularly reach response rates around 90%.

Moreover, Sagacity have not published any measure of the statistical uncertainty associated with the calculated estimates. No statistical measure of uncertainty renders these derived estimates unreliable.

Low response rates raise the probability of a non-representative sample in two ways:

— Response is biased towards those who care more about environmental issues and also those who feel disgruntled at the gas company for high bills and poor service etc.
— In both cases this results in a bias towards over-stating the likelihood that they will reduce or terminate their reliance on gas

While Sagacity offered respondents a chance of winning a $100 cash prize for their participation, we do not consider this enough to overcome the selection bias towards groups with strong feelings against gas. In fact, the low response rate indicates that the offer had little effect in encouraging participation in the survey. People are regularly bombarded with prize offers and have become largely desensitized by them as a result.

2.3.2 Stated preferences are not the same as revealed preferences (Hypothetical bias and upward biased results)

What people say they will do and what they do are two different things. Considerable evidence[1] relating to the problematic nature of stated preference surveys as part of contingent valuation methods has accumulated over time. The questions asked in the Sagacity survey are hypothetical in nature. Hypothetical bias arises when the respondent has little or no market experience of the question being asked. It is reasonable to assume that decisions to replace gas appliances are not regular in nature but tend to occur when an appliance breaks down after a long period (up to 15 years or more) of operation. Decisions to switch from gas appliances to electric do not occur frequently. The literature also shows that there is a tendency for people's stated intentions to purchase new products tend to be upward biased.

The hypothetical bias is made worse by several attributes of the survey that make it even more difficult for respondents to reliably estimate the timing and likelihood of shifting from gas to electric appliances:

1. The questionnaire is very long leading to respondent fatigue. Respondents are forced to answer questions quickly without carefully considering the key factors in each decision. This is despite the key calculations being based on only 3 questions out of a total of approximately 65.
2. Questions on the likelihood and timing of appliance changes do not bring up any costs that would be incurred in switching from gas to electric appliances. This is a flaw in the survey and can only exacerbate any existing biases. While questions in the survey raise the possibility of receiving a rebate or subsidy, they do not raise or mention the possibility of any costs involved with switching. This means that the respondent has been made aware of the benefit of switching but not the cost. Several respondents took the opportunity to provide this feedback on their survey from.
3. The questions do not provide the option of 'Don't know or don't care', forcing the respondent to commit to an answer when they may be unable or unwilling to provide a well-considered response. It is our view that omitting this option potentially leads to biased results. This was mentioned by at least one respondent in the feedback provided.

2.3.3 Probabilities used by the CIE to estimate the likelihood of switching are not reliable

The approach used by CIE to convert survey responses into probabilities is problematic. While the probabilities applied are the midpoints of a set of specified ranges in the survey questions, the uncertainty associated with respondents' answers cannot be objectively measured or quantified. Most people generally have a poor understanding of concepts like probability and could not be expected to accurately measure the probability of an event such as changing appliances, especially given that many of the respondents will only change their appliance when it needs replacing, and they do not know with any precision when this will happen.

2.3.4 Intentions to replace appliance may be driven by other factors that are already captured by the base model

The intention to replace gas appliances may be driven by other factors such as rising gas prices. This can lead to double counting as the trend of declining gas usage caused by higher gas prices is already accounted for in the base model. The survey does not adequately deal with this problem.

[1] See Hausman, J (2012), *'Contingent Valuation: From Dubious to Hopeless'*, Journal of economic Perspectives- Volume 26, Number 4- Fall 2012.

2.3.5 Sagacity survey is not sufficiently reliable for the purpose of forecasting gas demand and customer numbers

Given all the issues presented above, ACIL Allen does not consider that the CIE approach to calculating the post model adjustment based on the Sagacity survey is sufficiently reliable for the purpose of predicting gas demand and customer connections. In our view, any post model adjustment should be based on empirical evidence based on actual consumer responses to real data and information, rather than a survey that was not adequately designed to make accurate quantitative assessments.

The Sagacity survey was designed to give an indication of consumer views and in our view, is successful in doing so, but has not been designed to be used by CIE in the way that it has. We consider that it carries some weight as an indication of consumer perceptions but cannot be used as an accurate measure of the likelihood of some action based only on a stated intention.

2.4 Review of Core Energy and Resources analysis

To provide further validation for their post model adjustment, EvoEnergy engaged Core Energy and Resources (CORE) to provide an independent assessment of the impact of the ACT Governments climate change initiatives. In their report CORE were quick to recognise that there is very little data to support the recent changes to the ACT Climate change strategy and the EEIS. For this reason, they have a adopted an approach that is predominantly based on their own professional judgement gathered over 25 years of experience.

In their assessment they do not distinguish between appliance switching and dwelling disconnections.

The ACT Government Climate Change Strategy sets out a target for 60,000 households to not be connected to gas by 2025, rising to 90,000 in 2030 and all households by 2045.

CORE have expressed the view that the 60,000 target by 2025 will be “highly challenging” and that additional incentives or mandates will be required to ensure the target is achieved.

CORE’s ‘best estimate’ is for impacted connections of 7,500 dwellings per annum on average at an annual demand impact of 266,250 GJ per year. Based on the 2020 level of demand, this is a 4.1% annual reduction in demand rising to 20.4% by 2026. CORE also provides a high and low scenario. Under the high scenario, cumulative demand is 23.1% lower than the 2020 level, while under the low scenario, cumulative demand is 16.4% below the level observed in 2020.

We consider the high and low bands around the base projection are much narrower than implied by the underlying uncertainty surrounding the forecasts over the next five years. It is our view that the lower bound of the range should be lower, incorporating the possibility that the expected upsurge in the shift from gas to electricity is slower than anticipated and more in line with observed data from the EEIS and historical trends in the usage of gas per household which have been declining over time.

CORE have assumed that 90,000 households fall within the low-mid consuming households’ category and that 4.5% or 4,000 connections per annum at an average consumption of 38GJ would be affected. CORE assess that there are about 50,000 customers in the high use category and assess that 1% of these households will switch away from gas equivalent to 500 impacted connections per annum at an average consumption of 48 GJ per impacted connection.

CORE’s estimates of impacted households do not appear to be based on data, but rather top-down professional judgement. While we respect CORE’s experience in and understanding of gas markets and networks, we believe that the recent nature of the EEIS rebate and other ACT government policies makes it very difficult to predict the future trajectory of switching from gas to electricity.

3 Alternative approach to the forecasts and post model adjustment

ACIL Allen recommends that the following components of the CIE forecasting methodology are reasonable and should be retained as part of any amended forecasting methodology:

- Base model based on updated historical data and forecast inputs
- The post model adjustment which assumes no new greenfield developments from 1 July 2021
- The post model adjustment which assumes no new in-fill connections from January 2023.

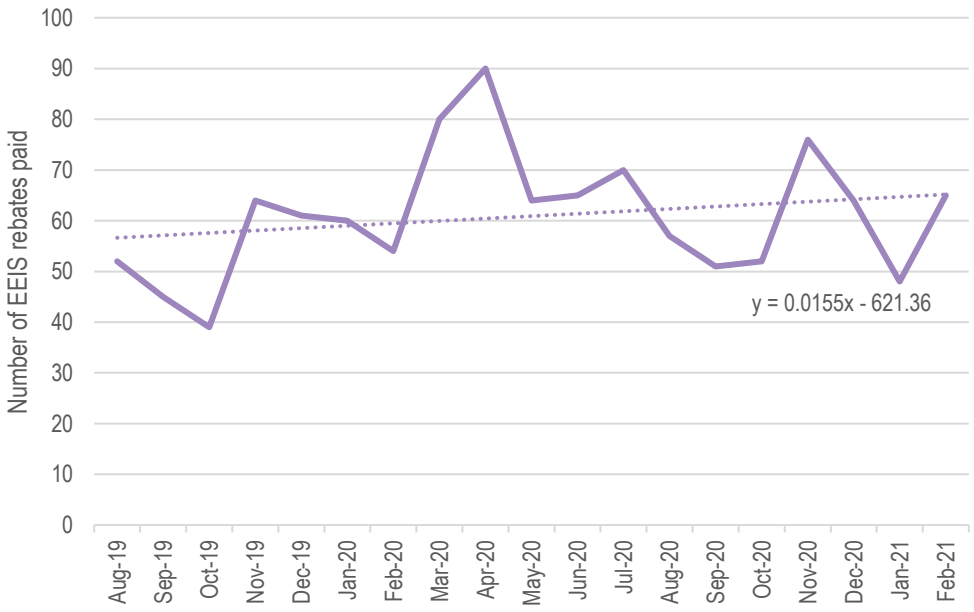
The post-model adjustment which is based on the answers to questions in the Sagacity survey is not reliable and should not be retained as part of the forecasting process.

Instead, we propose that the total number of abolishments, suspensions and zero consuming connections should be estimated based on the extrapolation of a linear trend in the actual number of EEIS rebates paid for the replacement of ducted gas heaters with reverse cycle air conditioners.

This follows a similar methodology to that of CIE's original forecasts, but instead takes advantage of additional data and makes an allowance for growth in the take up of the rebate over the next regulatory period.

Figure 3.1 shows the actual number of EEIS rebates paid from August 2019 to February 2021.

Figure 3.1 Number of EEIS rebates paid, August 2019 to February 2021, monthly



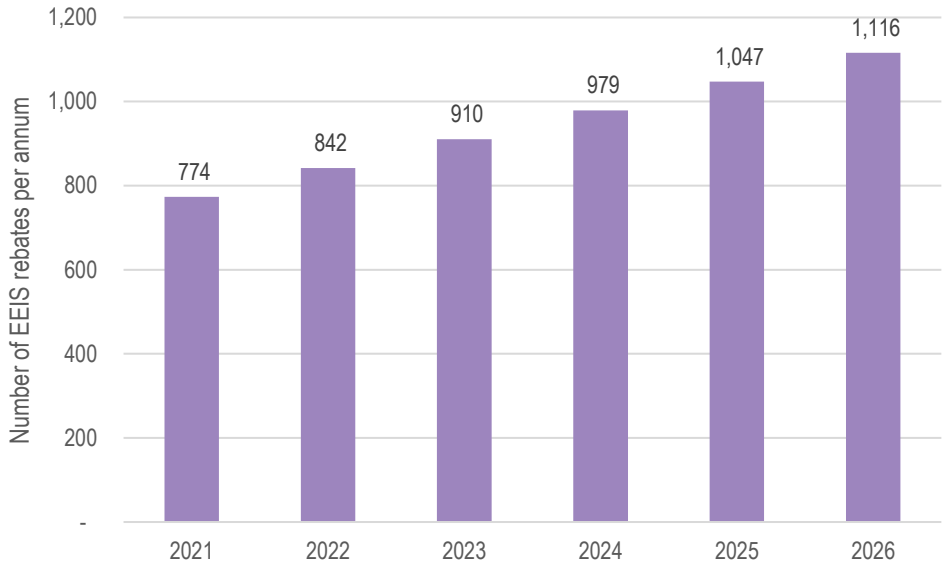
Source: ActewAGL Retail

While this is a simplistic approach that is based on only 19 months of data, it is still based on actual behaviour and does allow for increasing take up of the EEIS rebate over time.

If we use the projected number of EEIS rebates as a proxy for the total number of abolishments, suspensions and zero consuming connections then over the five year period from 2021-22 to 2025-26 there will be a total of 5,688 abolishments, suspensions and zero consuming customers.

Figure 3.2 shows the projected number of EEIS rebates claimed in each year of the next regulatory period. The number of rebates is projected to increase from 774 in 2020-21 to 1,116 by 2025-26.

Figure 3.2 Forecast number of EEIS rebates per annum



Source: ACIL Allen

3.1 Post model adjustment of customer numbers (exits and zero consuming)

To allocate the 5,688 customers between abolishments, suspensions and zero consuming customers we have adopted the same split is that applied by CIE in their updated forecast. That is, 81.8% of the customers getting the rebate fall into the category of suspensions and zero consuming customers and 18.2% are treated as abolishments. The impact on total active customer numbers and total customers for individual volume tariff is shown in **Table 3.1** below.

Table 3.1 Projected number of active and total customers, CIE updated versus ACIL Allen.

EOFY	Active connections-CIE updated	Active customers-ACIL Allen	Total customers-CIE updated	Total customers-ACIL Allen
2020	154,050	154,050	155,428	155,428
2021	146,903	149,169	158,090	158,335
2022	144,841	149,366	158,982	159,463
2023	142,401	149,175	159,489	160,199
2024	139,037	148,053	159,064	159,995
2025	135,665	146,916	158,632	159,776
2026	132,285	145,763	158,192	159,541

Source:CIE and ACIL Allen

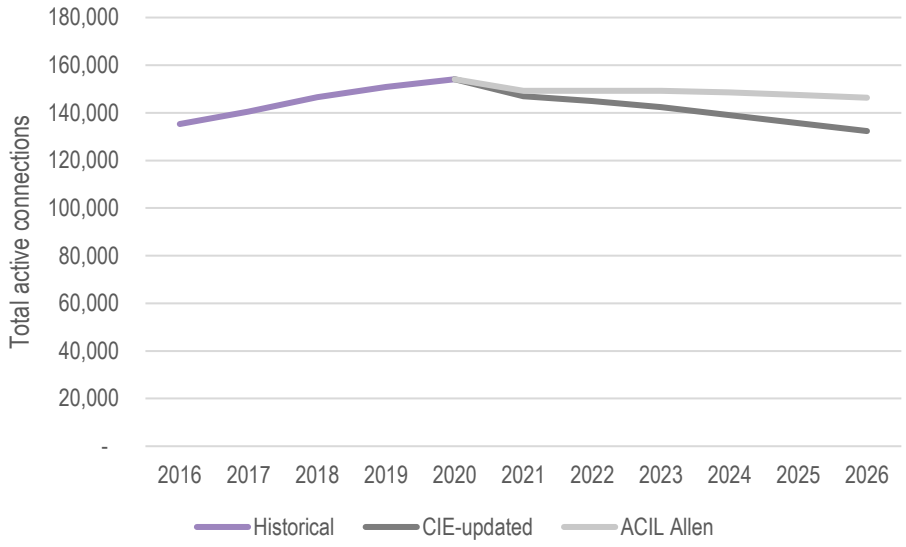
EOFY	Active connections-CIE updated	Active customers-ACIL Allen	Total customers-CIE updated	Total customers-ACIL Allen

Under the CIE's updated forecast of January 2021, the number of active customers is projected to decline to 132,285 by the end of 2025-26 from 154,050 in 2019-20. Using ACIL Allen's approach, the number of active customers declines also, but only to 145,763 by the end of 2025-26.

The total number of customers (including zero consuming customers and suspensions) increase from 155,428 at the end of 2019-20 to 158,192 under the CIE's updated forecasts, while the post model adjustment applied by ACIL Allen results in 159,541 total customers by the end of the next regulatory period.

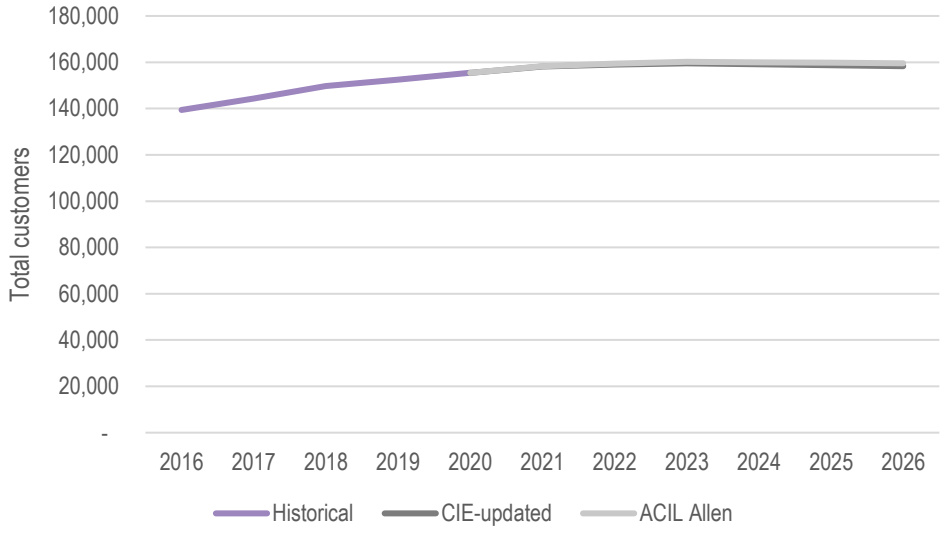
Figure 3.3 and **Figure 3.4** present the data in the table graphically.

Figure 3.3 Total active connections, End of financial year



Source:CIE, ACIL Allen

Figure 3.4 Total customers, End of financial year



Source: CIE, ACIL Allen

3.2 Post model adjustment of gas volumes

The impact on gas volumes is calculated using a similar methodology to that used by CIE in their original forecasts. For each of the EEIS rebate received to switch from a gas space heating system to electric, we assume that the gas usage per unit is 102 GJ per annum.

Table 3.2 shows the post model adjustment calculated by ACIL Allen as a percentage of each year's unadjusted average residential gas volume per customer. For comparison we also show CIE's original post model adjustment as well as its adjusted calculation based on the Sagacity survey.

Table 3.2 Post model adjustment as percentage of each year's unadjusted average volume

Year	CIE original	CIE adjusted	ACIL Allen
2020-21	0.8%	3.6%	0.7%
2021-22	1.2%	7.1%	2.2%
2022-23	1.6%	10.8%	3.9%
2023-24	2.0%	14.5%	5.7%
2024-25	2.4%	18.3%	7.7%
2025-26	2.8%	22.3%	9.8%

Source: CIE and ACIL Allen

Under the ACIL Allen approach based on actual historical EEIS data, the post model adjustment reaches 9.8% in 2025-26 of the average residential gas volumes consumed in that year. This compares to the CIE's original adjustment of 2.8% and is considerably less than the 22.3% adjustment imposed using the responses from the Sagacity survey.

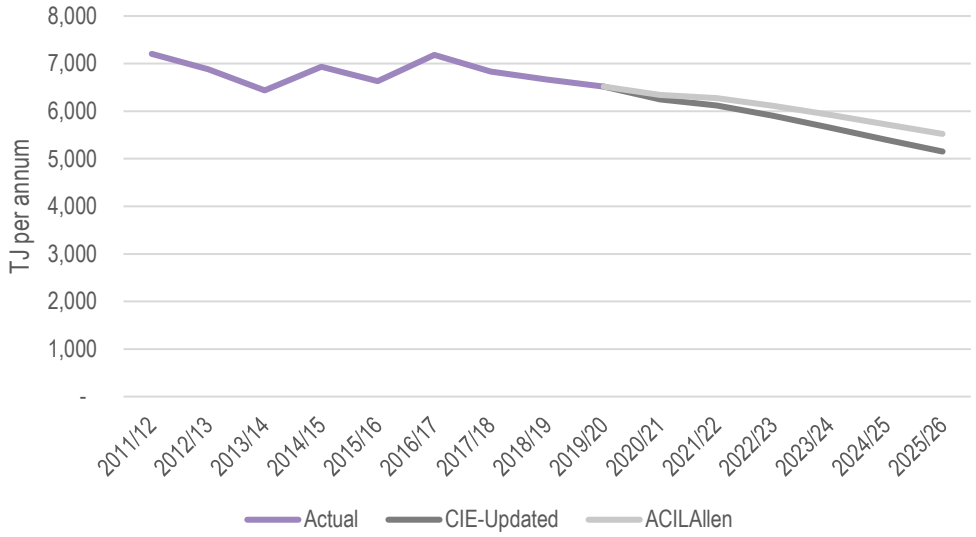
Table 3.3 shows the impact of the ACIL Allen post model adjustment on total forecast gas volumes for individual volume tariff against CIE's adjusted forecast presented in its January 2021 update.

Table 3.3 Forecast total gas volumes, CIE and ACIL Allen

Year	CIE updated	ACIL Allen
2020-21	6,244	6,341
2021-22	6,118	6,275
2022-23	5,901	6,115
2023-24	5,657	5,926
2024-25	5,400	5,720
2025-26	5,151	5,522

Figure 3.5 presents the results in the table in graphical format.

Figure 3.5 Historical and forecast gas volumes- CIE updated and ACIL Allen



Source:CIE, ACIL Allen

The figure shows that the CIE post model adjustment results in lower forecast gas volumes compared to the ACIL Allen amended forecast. By 2025-26, CIE's updated forecast for total gas volumes is 5,151 TJ compared to the ACIL Allen forecast of 5,522 TJ (or 7% higher).