



**Australian  
Gas Networks**

**Attachment 13.1**

## **Core Energy – Gas Demand Forecast**

**Final Plan 2023/24 – 2027/28**

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July 2022

# Gas Demand Forecast

AGN Victoria & Albury Gas Access Arrangement

Financial Years ending 30 June 2024-2028

28 June 2022



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## Glossary

AA	Access Arrangement
ABS	Australian Bureau of Statistics
ACQ	Annual Consumption Quantity
AER	Australian Energy Regulator
CORE	Core Energy & Resources Pty Ltd
D/C	Demand per Connection
EDD	Effective Degree Day
Existing connections	Connections recorded on 30 June 2021, as reduced by disconnections and zero consuming meter removals in subsequent years
GAAR, AA	Gas Access Arrangement
GJ	Gigajoule
MD/HR	Medium Density/High Rise
MHQ	Maximum Hourly Quantity.
New Connections	Connections recorded from 1 July 2021 onward
NGR	National Gas Rules
PJ	Petajoule
Prior Review Period; Prior Access Arrangement	The Access Arrangement Period: 1 <sup>st</sup> January 2018 to 31 December 2022
Review Period	The Access Arrangement Period: 1 <sup>st</sup> July 2023 to 30 June 2028
Tariff C	Commercial customers
Tariff D	Industrial customers
Tariff R	Residential customers
Tariff V	Sum of Tariff R (residential) and Tariff C (commercial) customers
Vic	Victoria

## 1. Introduction

### 1.1. Report Scope

This report has been prepared by Core Energy & Resources Pty Ltd (“CORE”) for the purpose of providing AGN with an independent forecast of gas customers and gas demand for the AGN Vic and Albury natural gas distribution networks for the five-year (Financial Year) Review Period from 1 July 2023 to 30 June 2028 (“Review Period”).

We acknowledge that this report and related models, will form part of AGN Vic and Albury’s Access Arrangement (“AA”) Proposal submission to the Australian Energy Regulator (“AER”). This report should be read in conjunction with the Gas Demand Model and Weather Normalisation Model (both Confidential and Not for Public Disclosure).

CORE has taken all reasonable steps to ensure this report, and the approach to deriving the forecasts referred to within this report, comply with Part 9, Division 2 of the National Gas Rules (“NGRs”). This division outlines “access arrangement information relevant to price and revenue regulation” and particularly relevant provisions that CORE has complied with - ss 74 and 75:

#### 74. Forecasts and estimates

- (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 possible in the circumstances.

#### 75. Inferred or derivative information

Information in the nature of an extrapolation or inference must be supported by the primary information on which the extrapolation or inference is based.

### 1.2. Overview of AGN Victorian & Albury Network

The AGN Victorian & Albury combined gas distribution network services had approximately 730,000 customers at end FY2021. The networks serve customers in the following geographic zones:

Central (around ~607,000 customers)

- encompasses the CBD of Melbourne, the inner to outer north-western suburbs of Melbourne, as well as the outer south-eastern suburbs of Melbourne to Longford in the Gippsland

Northern (~86,000 customers)

- adjacent to the northern parts of the Central Zone and extends to the southern edge of the Murray Valley (Victoria) and Albury zones; it includes the towns of Echuca, Shepparton, Wangaratta, and Wodonga

Murray Valley Victoria (~9,000 customers)

- covers the towns of Chiltern, Rutherglen, Yarrawonga, and Strathmerton on the Victorian side of the Murray River

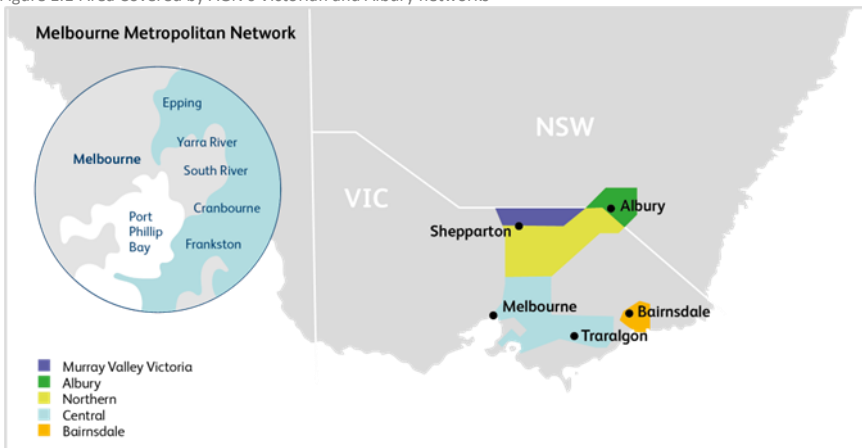
Bairnsdale (~5,000 customers)

- covers the towns of Bairnsdale and Paynesville located in south-east of Victoria

Albury (~24,000 customers)

- the network serves customers in the city of Albury, as well as surrounding areas extending to Jindera north of Albury:

Figure 1.1 Area Covered by AGN’s Victorian and Albury networks



The majority of AGN’s customer base and supplied volume stems from Tariff R sector demand. A typical household in this network consumes approximately 44 GJ p.a. (2021) across the following uses:

- Space/room heating - 65%
- Water heating - 30%
- Cooking - 5%

In this report, reference will be made to three customer segments - Tariff R, Tariff C and Tariff D as defined in Table 1.1 below.

Table 1.1 Customer Segments used for Tariff Classification

Customer Segment	Description	Customer No.	Volume	MHQ
Tariff R & C (<10TJ)	Throughout this report, the residential and commercial volume tariff customer groups will be referred to as Tariff R and Tariff C customers, respectively and Tariff V collectively. However separate forecasts, using different drivers of demand, have been derived for each of residential and commercial segments and for each geographic zone  Tariff R and Tariff C customers are expected to consume less than 10 terajoules (“TJ”) of gas per year. The provision of gas delivery for these customers is a volume haulage service.	✓ sum of components	✓ sum of components	Not required
Tariff D (>10TJ)	Consists of industrial customers that are expected to consume more than 10 TJ of gas per year. The provision of gas delivery for these customers is a demand (Capacity) haulage service.  Throughout this report, the demand tariff customer group is referred to as Tariff D customers.	✓	✓	✓

## 2. Executive Summary

### 2.1. Methodology Overview

The following figures outline the method adopted by CORE to derive connection and demand forecasts for Tariff R, Tariff C and Tariff D customers. The approach is largely consistent with that adopted to derive forecasts for prior access arrangements accepted by the AER. However, certain modifications to CORE’s approach have been made to address new circumstances relating to COVID-19, Commonwealth and Victorian Government energy policy, and uncertainties relating to global, national and Victorian State economic performance.

Figure 2.1 Tariff R & Tariff C Methodology Summary

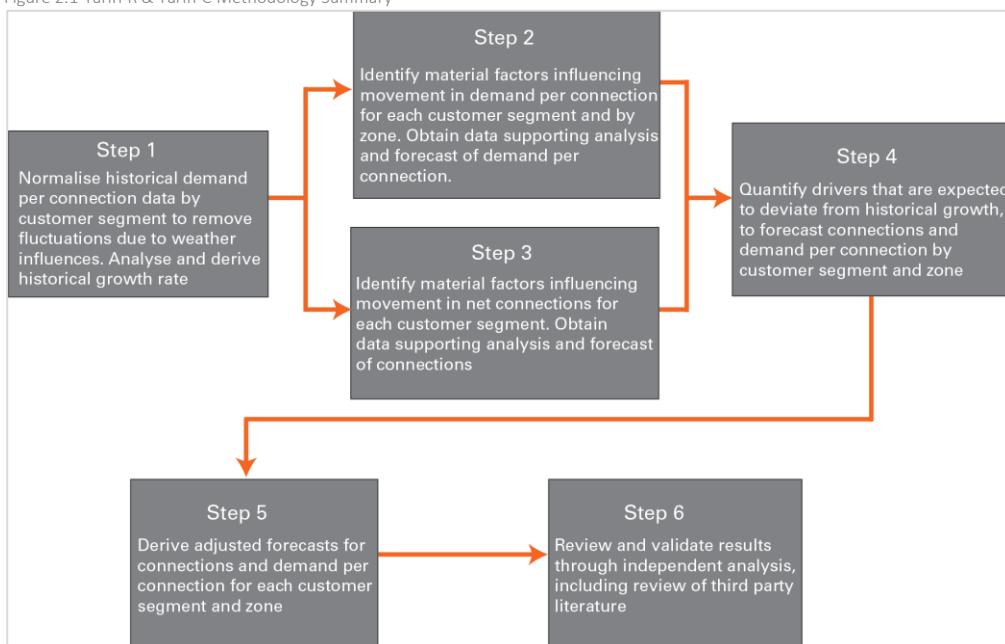
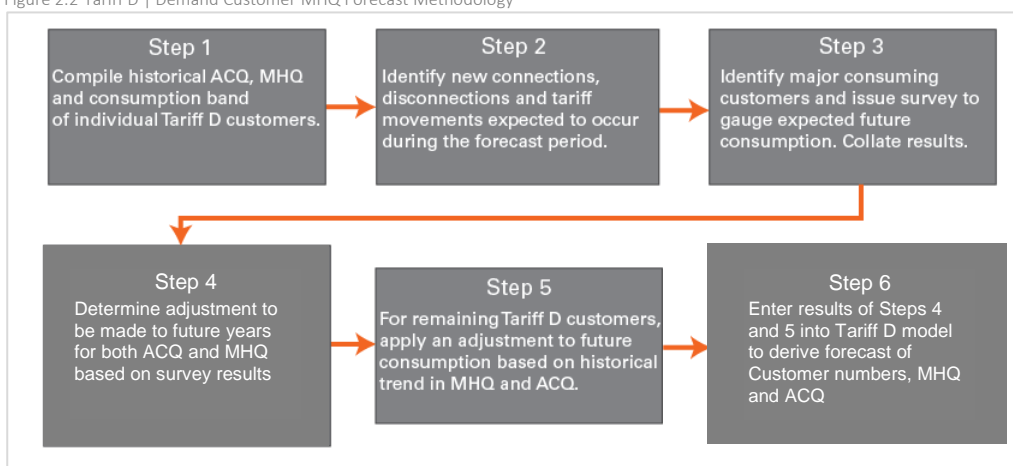


Figure 2.2 Tariff D | Demand Customer MHQ Forecast Methodology



Further detail regarding the steps undertaken to derive forecasts of Tariff V customer connections and demand is presented in Sections 5 and 6 of this report.

## 2.2. Forecast Summary – all tariff Classes

CORE has developed demand forecasts for the AGN Vic and Albury networks for the FY 2023-24 to 2027-28 access arrangement, having regard to drivers of demand for Tariff R and Tariff C, and MHQ for Tariff D, as summarised in the following tables.

Table 2.1 AGN Vic &amp; Albury Demand Forecast | FY 2023-4 to 2027-8

Tariff	2023-4	2024-5	2025-6	2026-7	2027-8	5-year Growth
Tariff R Demand   TJ	30,516,905	29,975,585	29,520,117	28,927,488	28,428,576	-1.76%
Tariff C Demand   TJ	8,305,074	8,217,470	8,316,868	8,393,948	8,473,327	0.51%
<b>Total Tariff V</b>	<b>38,821,979</b>	<b>38,193,056</b>	<b>37,836,985</b>	<b>37,321,437</b>	<b>36,901,903</b>	<b>-1.26</b>
<b>Tariff D – MHQ   GJ</b>	<b>5,009</b>	<b>4,958</b>	<b>4,896</b>	<b>4,888</b>	<b>4,849</b>	<b>-0.80</b>

Table 2.2 AGN Vic Demand Forecast | FY 2023-4 to 2027-8

Tariff	2023-4	2024-5	2025-6	2026-7	2027-8	5-year Growth
Tariff R Demand   TJ	29,476,681	28,925,653	28,456,080	27,852,056	27,337,875	-1.87%
Tariff C Demand   TJ	8,026,028	7,939,144	8,035,383	8,110,064	8,186,970	0.50%
<b>Total Tariff V</b>	<b>37,502,709</b>	<b>36,864,797</b>	<b>36,491,463</b>	<b>35,962,120</b>	<b>35,524,845</b>	<b>-1.35%</b>
<b>Tariff D – MHQ   GJ</b>	<b>4,946</b>	<b>4,898</b>	<b>4,839</b>	<b>4,834</b>	<b>4,797</b>	<b>-0.76%</b>

Table 2.3 Albury Demand Forecast | FY 2023-4 to 2027-8

Tariff	2023-4	2024-5	2025-6	2026-7	2027-8	5-year Growth
Tariff R Demand   TJ	1,040,224	1,049,932	1,064,037	1,075,433	1,090,701	1.19%
Tariff C Demand   TJ	279,046	278,327	281,485	283,884	286,357	0.65%
<b>Total Tariff V</b>	<b>1,319,270</b>	<b>1,328,258</b>	<b>1,345,522</b>	<b>1,359,317</b>	<b>1,377,058</b>	<b>1.08%</b>
<b>Tariff D – MHQ   GJ</b>	<b>62</b>	<b>59</b>	<b>57</b>	<b>54</b>	<b>52</b>	<b>-4.36%</b>

The following paragraphs of this report present a concise overview of the demand forecasts for each tariff class and later sections provide further detail.



### 2.3. Residential Summary

Figure 2.3 Residential Connections and Demand (GJ)

Residential Demand	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	Growth 2023-4-2027-8
Total Vic	30,111,354	30,118,070	29,476,681	28,925,653	28,456,080	27,852,056	27,337,875	-1.87%
Albury	1,007,094	1,035,546	1,040,224	1,049,932	1,064,037	1,075,433	1,090,701	1.19%
<b>Total Vic &amp; Albury</b>	<b>31,118,448</b>	<b>31,153,616</b>	<b>30,516,905</b>	<b>29,975,585</b>	<b>29,520,117</b>	<b>28,927,488</b>	<b>28,428,576</b>	<b>-1.76%</b>
Closing Net Connections	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	Growth 2023-4-2027-8
Total Vic	695,963	707,081	715,795	727,169	737,945	748,762	759,559	1.49%
Albury	23,728	23,909	24,092	24,537	24,989	25,449	25,918	1.84%
<b>Total Vic &amp; Albury</b>	<b>719,692</b>	<b>730,990</b>	<b>739,887</b>	<b>751,706</b>	<b>762,934</b>	<b>774,212</b>	<b>785,477</b>	<b>1.51%</b>
Average Net Connections	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	Growth 2023-4-2027-8
Total Vic	689,169	701,522	711,438	721,482	732,557	743,354	754,160	1.47%
Albury	23,514	23,819	24,001	24,314	24,763	25,219	25,684	1.71%
<b>Total Vic &amp; Albury</b>	<b>712,682</b>	<b>725,341</b>	<b>735,439</b>	<b>745,796</b>	<b>757,320</b>	<b>768,573</b>	<b>779,844</b>	<b>1.48%</b>
Demand per Average Connection	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	Growth 2023-4-2027-8
Total Vic	43.69	42.93	41.43	40.09	38.84	37.47	36.25	-3.29%
Albury	42.83	43.48	43.34	43.18	42.97	42.64	42.47	-0.51%
<b>Total Vic &amp; Albury</b>	<b>43.66</b>	<b>42.95</b>	<b>41.49</b>	<b>40.19</b>	<b>38.98</b>	<b>37.64</b>	<b>36.45</b>	<b>-3.19%</b>

#### AGN Vic

Highlights of AGN Vic Tariff R demand forecast include:

- demand is forecast to decline at -1.87% between 2023-24 and 2027-28, from 29.5 PJ to 27.3 PJ; attributable to a projected reduction in demand per connection, offset partially by growth in connections.
- closing connections are forecast to increase by 1.49% between 2023-24 and 2027-28, from approximately 716,000 to 760,000; attributable largely to HIA derived growth in forecast new dwellings and offset partially by removal of zero consuming meters.
- demand per connection is forecast to fall by -3.29% between 2023-24 and 2027-28, from 41.43 GJ to 36.25 GJ; driven by a combination of factors including continuation of observed historical trend and the impact of Victorian Government policy which targets reduction in future gas consumption.

The following figures summarise historical normalised values and forecasts for Tariff R demand, connections, and demand per connection for the total AGN Vic network. The Charts present a six-year history, two transitional years and a five-year forecast for the Review Period.

CORE notes that in formulating its forecast that historical data was considered from 2008-9 to 2020-21, however the historical time series has been shortened for chart presentation purposes. The full time series is addressed in the demand model and are considered in formulating all demand forecasts, Commercial connection forecasts and allocation of demand to Zones.

Figure 2.4 Residential Demand (GJ)

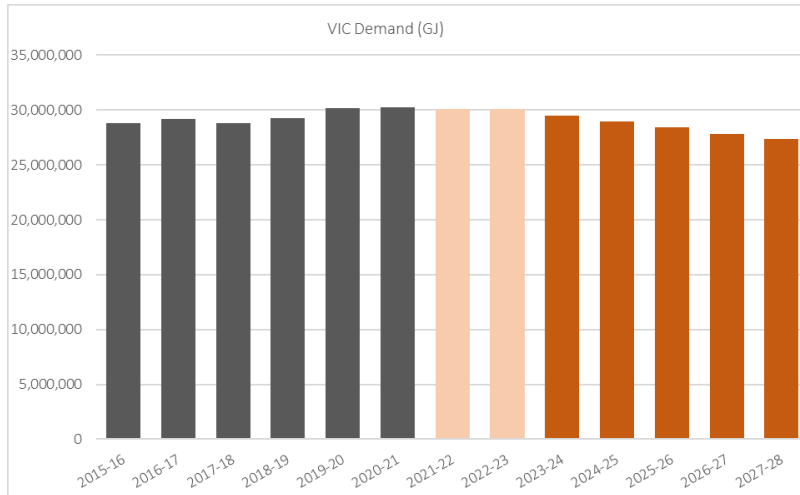


Figure 2.5 Residential Closing Connections (No.)

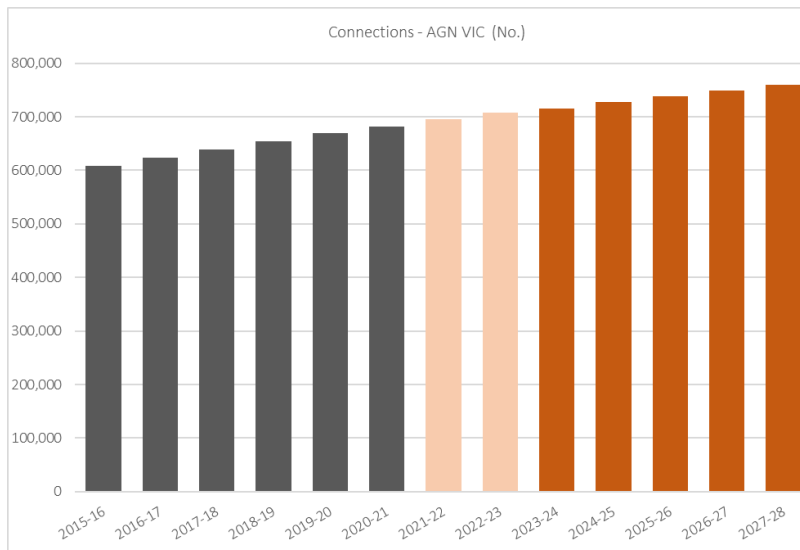
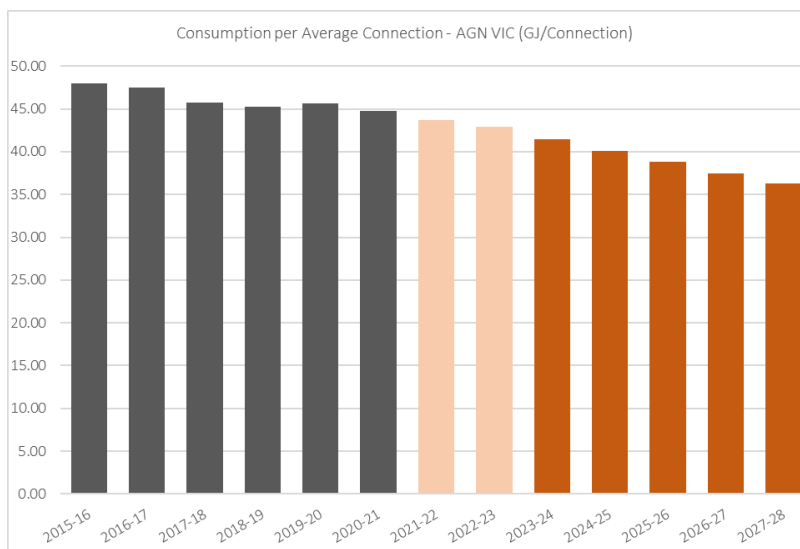


Figure 2.6 Average Residential Demand per Connection (GJ)



## Albury

Highlights of Albury Tariff R demand forecast include:

- demand is forecast to increase by an annual average of 1.19% between 2023-24 and 2027-28, from 1.04 PJ to 1.09 PJ; attributable to a projected by growth in connections, offset partially by a fall in demand per connection.
- closing connections are forecast to increase by 1.84% between 2023-24 and 2027-28, from 24,092 to 25,918; attributable largely to HIA derived growth in forecast new dwellings.
- average demand per connection is forecast to fall by -0.51% between 2023-24 and 2027-28, from 43.34 GJ to 42.47 GJ; driven largely by a continuation of observed historical trend.

The following figures summarise historical normalised values and forecasts for Tariff R demand, connections, and demand per connection for the total AGN Vic network. The Charts present a six-year history, two transitional years and a five-year forecast for the Review Period.

CORE notes that in formulating its forecast that historical data was considered from 2008-9 to 2020-21, however the historical time series has been shortened for chart presentation purposes, as noted above for AGN Vic.

Figure 2.7 Residential Demand (GJ)

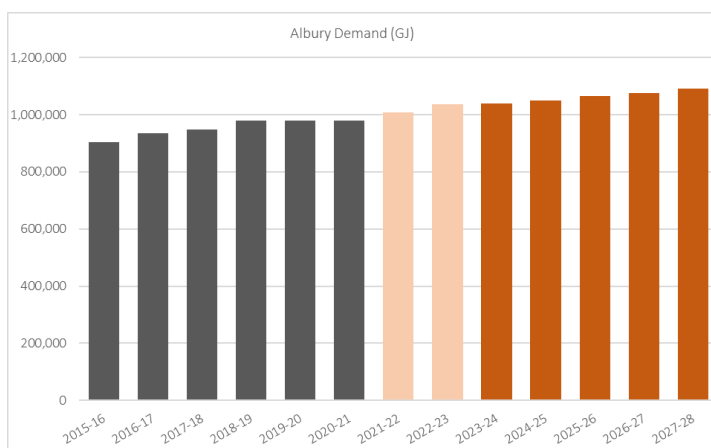


Figure 2.8 Residential Connections (No.)

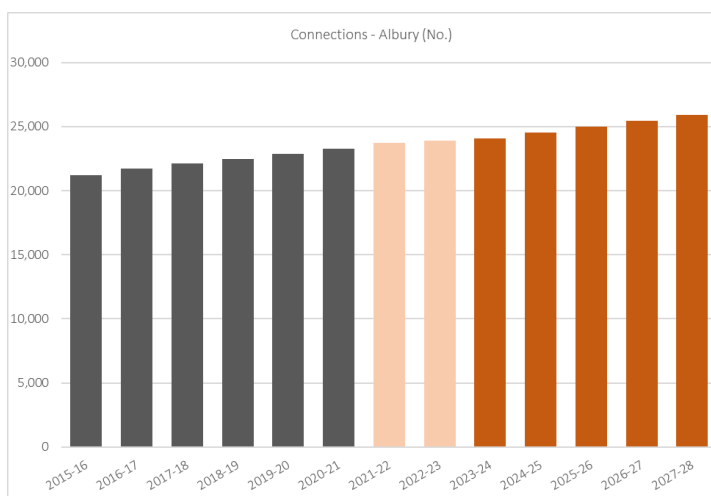
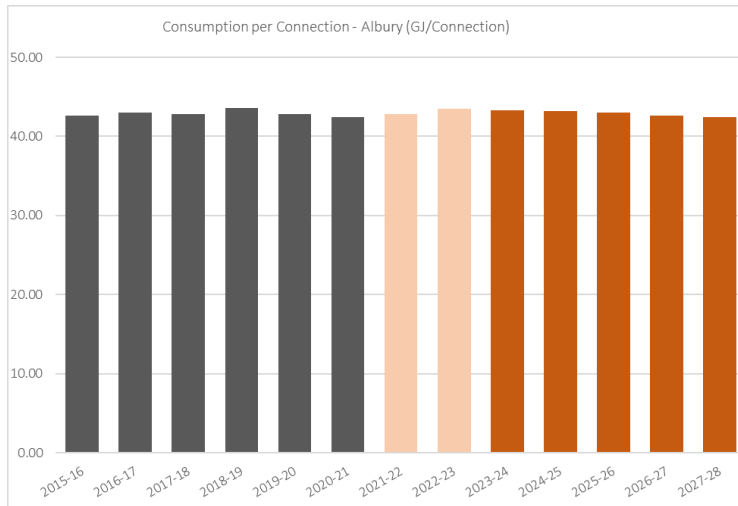


Figure 2.9 Residential Demand per Connection (GJ)



## 2.4. Commercial Summary

Table 2.4 AGN Vic and Albury Commercial Connections and Demand

Consumption									
Consumption	Units	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	Growth 2023-4-2027-8
Total VIC	GJ	7,022,858	7,928,314	8,026,028	7,939,144	8,035,383	8,110,064	8,186,970	0.50%
Albury	GJ	290,864	291,121	279,046	278,327	281,485	283,884	286,357	0.65%
<b>Vic &amp; Albury</b>	<b>GJ</b>	<b>7,313,723</b>	<b>8,219,436</b>	<b>8,305,074</b>	<b>8,217,470</b>	<b>8,316,868</b>	<b>8,393,948</b>	<b>8,473,327</b>	<b>0.51%</b>
Closing Connections									
Closing Connections	Units	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	Growth 2023-4-2027-8
Total VIC	No.	24,168	23,262	22,352	22,473	22,594	22,716	22,838	0.539%
Albury	No.	943	921	900	904	908	912	916	0.44%
<b>Vic &amp; Albury</b>	<b>No.</b>	<b>25,111</b>	<b>24,183</b>	<b>23,252</b>	<b>23,377</b>	<b>23,502</b>	<b>23,628</b>	<b>23,754</b>	<b>0.54%</b>
Average Connections									
Average Connections	Units	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	Growth 2023-4-2027-8
Total VIC	GJ/Connection	24,159	23,715	22,807	22,412	22,533	22,655	22,777	-0.03%
Albury	GJ/Connection	941	932	911	902	906	910	914	0.09%
<b>Vic &amp; Albury</b>	<b>GJ/Connection</b>	<b>25,100</b>	<b>24,647</b>	<b>23,718</b>	<b>23,315</b>	<b>23,439</b>	<b>23,565</b>	<b>23,691</b>	<b>-0.02%</b>
Consumption per Average Connection									
Consumption/Connection	Units	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	Growth 2023-4-2027-8
Total VIC	GJ/Connection	290.70	334.32	351.91	354.23	356.60	357.98	359.44	0.53%
Albury	GJ/Connection	309.09	312.32	306.41	308.51	310.66	311.95	313.31	0.56%
<b>Vic &amp; Albury</b>	<b>GJ/Connection</b>	<b>291.39</b>	<b>333.49</b>	<b>350.17</b>	<b>352.46</b>	<b>354.82</b>	<b>356.21</b>	<b>357.66</b>	<b>0.53%</b>

### AGN Vic

Highlights of the AGN Vic Tariff C demand forecast include:

- demand is forecast to increase at an annual average rate of 0.50% between 2023-24 and 2027-28, from 8.0 PJ to 8.2 PJ: driven largely by an increase in demand per connection.
- closing connections are forecast to increase by 0.54% between 2023-24 and 2027-28, from 22,352 to 22,833 due largely to the continuation of the historical trend in net connections and the removal of ZCM.
- demand per connection is forecast to increase by 0.53% between 2023-24 and 2027-28, from 354.23 GJ to 359.44 GJ.

The following figures summarise a six-year history, two transitional years and a five-year forecast for the Review Period for the AGN Vic.

Figure 2.10 Commercial Demand (GJ)

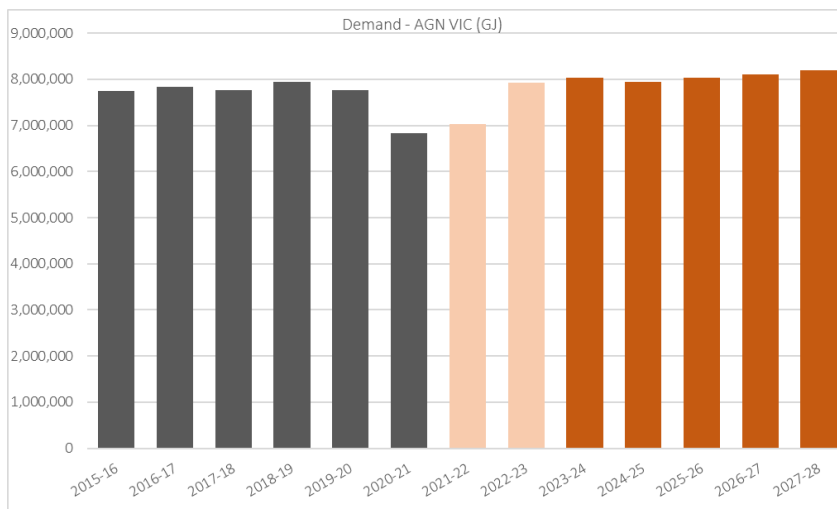


Figure 2.11 Commercial Connections (No.)

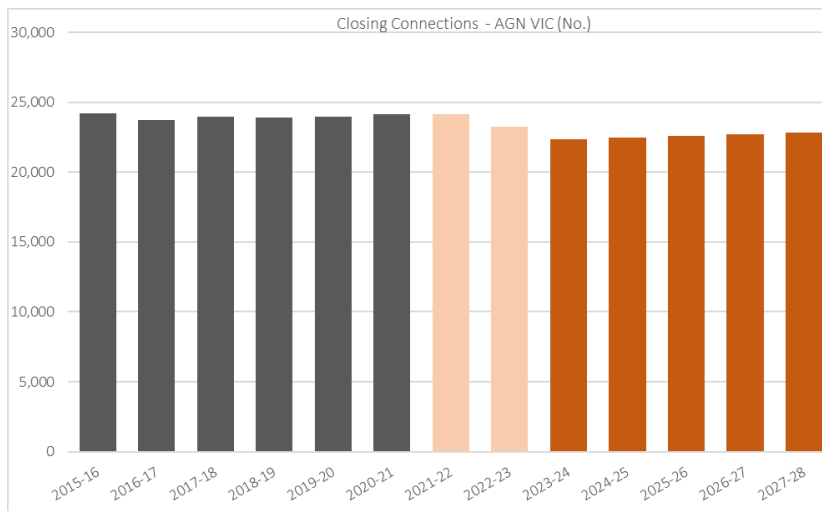
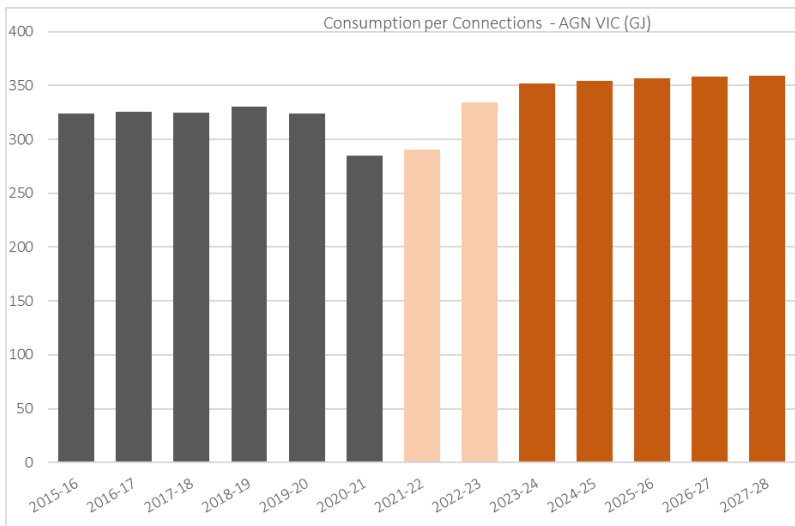


Figure 2.12 Commercial Demand per Average Connection (GJ)



**Albury**

Highlights of the Albury Tariff C demand forecast include:

- demand is forecast to increase at an annual average rate of 0.65% between 2023-24 and 2027-28, from 279,046 GJ to 286,357 GJ: driven by increases in both connections and demand per connection.
- closing connections are forecast to increase by 0.44% between 2023-24 and 2027-28, from 911 to 914 due to the continuation of the historical trend in net connections.
- closing demand per connection is forecast to increase by 0.56% between 2023-24 and 2027-28, from 306.41 GJ to 313.31 GJ.

The following figures summarise a six-year history, two transitional years and a five-year forecast for the Review Period for Albury.

Figure 2.13 Commercial Demand (GJ)

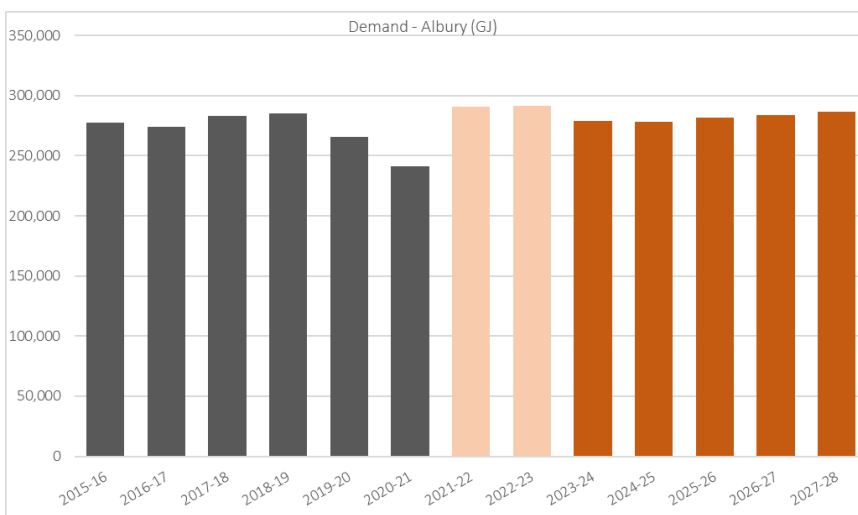


Figure 2.14 Commercial Connections (No.)

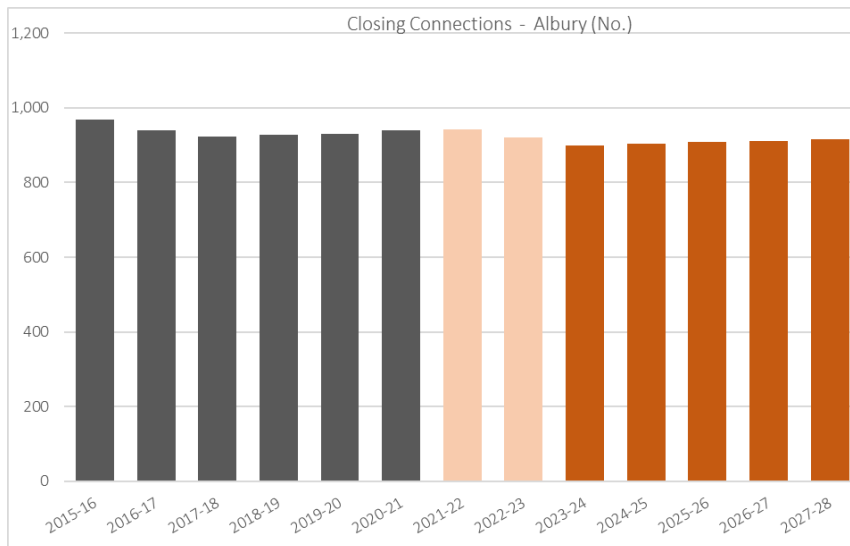
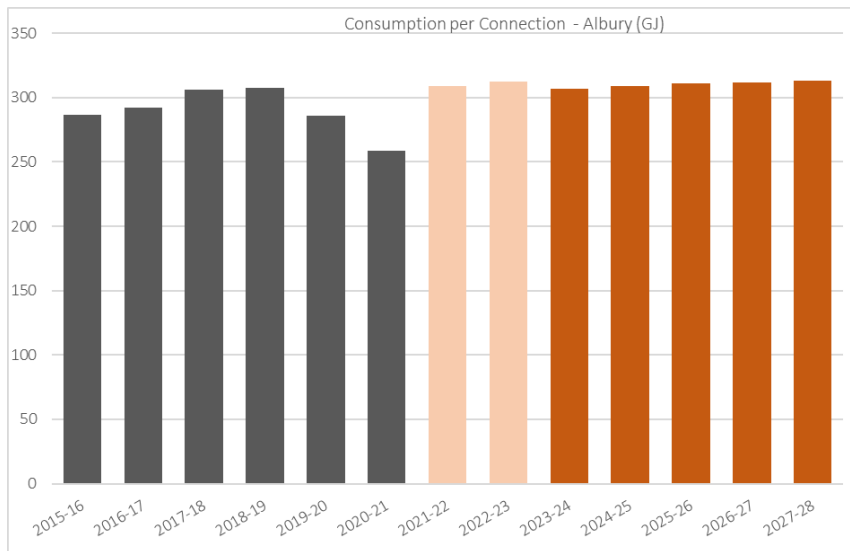


Figure 2.15 Commercial Demand per Average Connection (GJ)



## 2.5. Industrial Summary

Figure 2.16 AGN Vic and Albury Industrial Segment

Closing Connections								
Closing Connections	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	Growth 2023-4-2027-8
Total VIC	273	277	280	284	287	291	294	1.24%
Albury	7	7	7	7	7	7	7	0%
<b>Vic &amp; Albury</b>	<b>280</b>	<b>284</b>	<b>287</b>	<b>291</b>	<b>294</b>	<b>298</b>	<b>301</b>	<b>1.21%</b>
Average Connections								
Average Connections	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	Growth 2023-4-2027-8
Total VIC	272	275	278	282	285	289	293	1.24%
Albury	7	7	7	7	7	7	7	0.00%
<b>Vic &amp; Albury</b>	<b>279</b>	<b>282</b>	<b>285</b>	<b>289</b>	<b>292</b>	<b>296</b>	<b>300</b>	<b>1.21%</b>
Consumption: MHQ								
Consumption	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	Growth 2023-4-2027-8
<b>Total Vic</b>	<b>4,847.30</b>	<b>4,972.59</b>	<b>4,946.45</b>	<b>4,898.39</b>	<b>4,839.31</b>	<b>4,834.06</b>	<b>4,797.18</b>	-0.76%
Albury	68.00	65.04	62.20	59.49	56.89	54.41	52.04	-4.36%
<b>Vic &amp; Albury</b>	<b>4,915</b>	<b>5,038</b>	<b>5,009</b>	<b>4,958</b>	<b>4,896</b>	<b>4,888</b>	<b>4,849</b>	-0.80%
Consumption: ACQ								
Consumption	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	Growth 2023-4-2027-8
<b>Total Vic</b>	<b>17,082,853.03</b>	<b>17,326,935.29</b>	<b>17,008,517.10</b>	<b>16,675,029.35</b>	<b>16,348,111.31</b>	<b>16,027,633.56</b>	<b>15,713,469.22</b>	-1.96%
Albury	300,952.37	296,528.37	292,169.40	287,874.51	283,642.76	279,473.21	275,364.95	-1.47%
<b>Vic &amp; Albury</b>	<b>17,383,805</b>	<b>17,623,464</b>	<b>17,300,687</b>	<b>16,962,904</b>	<b>16,631,754</b>	<b>16,307,107</b>	<b>15,988,834</b>	-1.95%

Highlights of AGN Vic and Albury Tariff D demand forecast include:

- AGN Vic: Connections increasing from 280 to 294; Albury stable at 7
- AGN VIC ACQ falling by -1.96% between 2023-24 and 2027-28, from 17.0 PJ to 15.7 PJ; Albury ACQ falling by -1.47%
- AGN Vic MHQ decreasing by -0.76% between 2023-24 and 2027-28, from 4,946 to 4,797 GJ; Albury MHQ falling by -4.36%

The following figures present charts of historical data and forecasts for Tariff D demand, connections, and demand per connection for the AGN Vic and Albury networks. CORE notes that historical data was considered from 2008-9 to 2020-21, however the historical time series has been shortened for chart presentation purposes, as noted earlier.



Figure 2.17 Connections

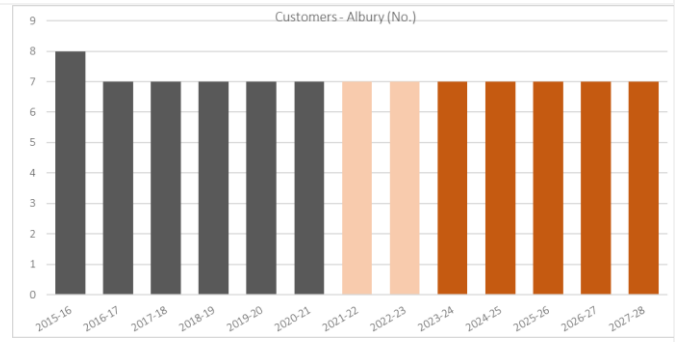
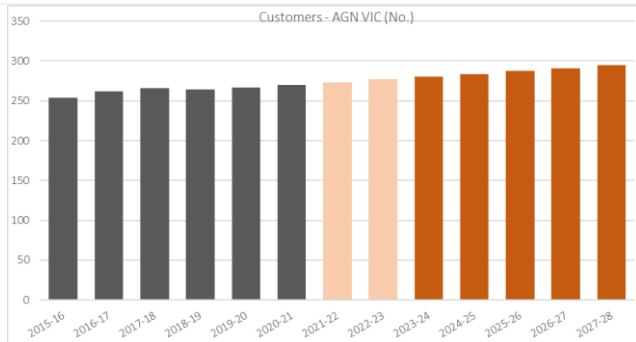


Figure 2.18 MHQ

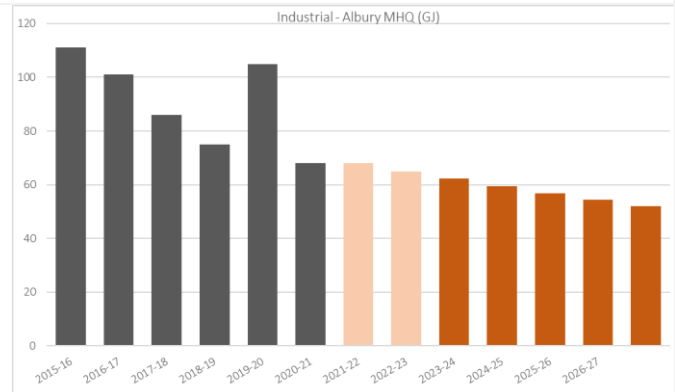
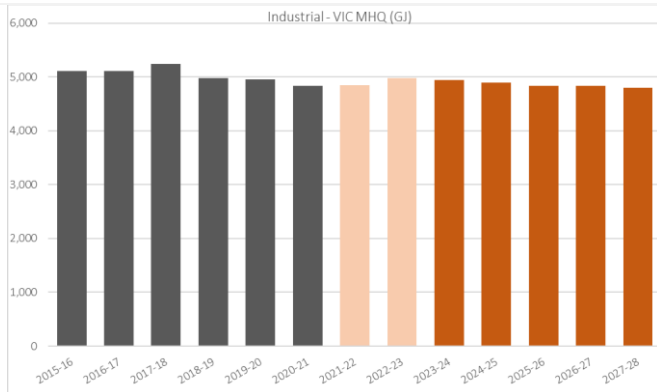
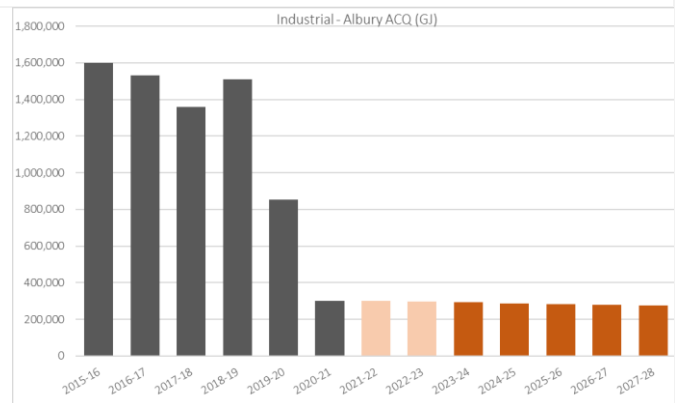
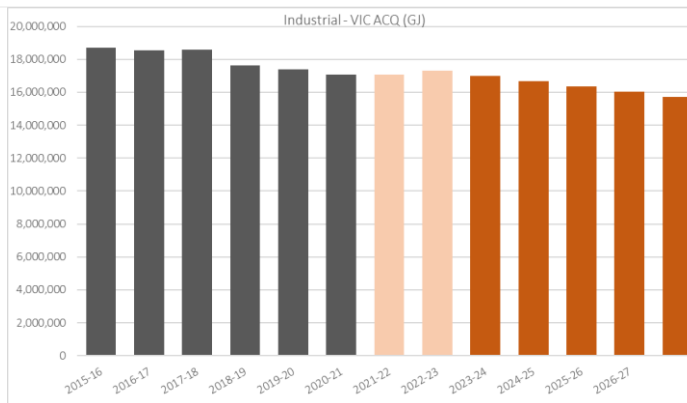


Figure 2.19 ACQ



## 2.6. Allocation by AGN Vic Zones

Core has allocated forecast connections, demand per connection and demand between the four AGN Vic network zones – Central, North, Murray Valley, and Bairnsdale, for the Residential and Commercial segments and Connections, MHQ and ACQ for the Industrial segment.

The allocation has taken the following factors into consideration:

- Historical trend (pre COVID) in connections and demand per connection
- Likely change in future trends having regard to publicly available research and references

The allocation commences with an allocation to regions other than the Central region and the Central region is then allocated the balance.

The result is summarised in the following figures.

## 2.6.1. Residential Allocation

Figure 2.20 Residential

	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	Growth 2023-4-2027-8
<b>Demand</b>								
Central	26,812,193	26,758,082	26,069,289	25,454,802	24,905,415	24,219,702	23,621,911	
North	2,860,912	2,910,515	2,948,530	3,000,056	3,065,372	3,132,110	3,200,301	
Murray Valley	214,437	218,790	221,865	226,419	232,488	238,720	245,118	
Bairnsdale	223,812	230,683	236,997	244,376	252,805	261,524	270,545	
<b>Total</b>	<b>30,111,354</b>	<b>30,118,070</b>	<b>29,476,681</b>	<b>28,925,653</b>	<b>28,456,080</b>	<b>27,852,056</b>	<b>27,337,875</b>	<b>-1.87%</b>

<b>Closing Connections</b>								
Central	597,206	606,793	613,932	622,792	630,986	639,151	647,223	
North	84,786	85,942	87,123	89,074	91,069	93,109	95,194	
Murray Valley	8,792	8,923	9,058	9,310	9,569	9,835	10,108	
Bairnsdale	5,179	5,423	5,682	5,993	6,322	6,668	7,033	
<b>Total</b>	<b>695,963</b>	<b>707,081</b>	<b>715,795</b>	<b>727,169</b>	<b>737,945</b>	<b>748,762</b>	<b>759,559</b>	<b>1.49%</b>
<b>Average Connections</b>								
Central	591,594	602,000	610,362	618,362	626,889	635,068	643,187	
North	83,858	85,364	86,532	88,098	90,072	92,089	94,152	
Murray Valley	8,673	8,857	8,991	9,184	9,439	9,702	9,971	
Bairnsdale	5,044	5,301	5,553	5,838	6,157	6,495	6,850	
<b>Total</b>	<b>689,169</b>	<b>701,522</b>	<b>711,438</b>	<b>721,482</b>	<b>732,557</b>	<b>743,354</b>	<b>754,160</b>	<b>1.47%</b>

<b>Demand per Connection</b>								
Central	45.32	44.45	42.71	41.16	39.73	38.14	36.73	
North	34.12	34.10	34.07	34.05	34.03	34.01	33.99	
Murray Valley	24.73	24.70	24.68	24.65	24.63	24.61	24.58	
Bairnsdale	44.37	43.52	42.68	41.86	41.06	40.27	39.49	
<b>Total</b>	<b>43.69</b>	<b>42.93</b>	<b>41.43</b>	<b>40.09</b>	<b>38.84</b>	<b>37.47</b>	<b>36.25</b>	<b>-3.29%</b>

## 2.6.2. Commercial Allocation

Figure 2.21 Commercial Allocation

	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	Growth 2023-4- 2027-8
<b>Demand</b>								
Central	6,130,693	7,046,767	7,172,186	7,096,015	7,185,980	7,254,292	7,324,732	
North	756,754	748,725	724,601	716,097	723,518	731,016	738,591	
Murray Valley	62,694	61,834	60,166	59,332	59,307	59,282	59,257	
Bairnsdale	72,717	70,988	69,075	67,700	66,578	65,474	64,389	
<b>Total</b>	<b>7,022,858</b>	<b>7,928,314</b>	<b>8,026,028</b>	<b>7,939,144</b>	<b>8,035,383</b>	<b>8,110,064</b>	<b>8,186,970</b>	<b>0.50%</b>

	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	Growth 2023-4- 2027-8
<b>Closing Connections</b>								
Central	20,347	19,559	18,768	18,858	18,948	19,039	19,129	0.48%
North	3,314	3,196	3,077	3,095	3,113	3,131	3,150	0.59%
Murray Valley	373	369	364	369	375	380	386	1.45%
Bairnsdale	133	138	143	150	158	166	174	4.89%
<b>Total</b>	<b>24,168</b>	<b>23,262</b>	<b>22,352</b>	<b>22,473</b>	<b>22,594</b>	<b>22,716</b>	<b>22,838</b>	<b>0.539%</b>

	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	Growth 2023-4- 2027-8
<b>Average Connections</b>								
Central	20,353	19,953	19,164	18,813	18,903	18,994	19,084	
North	3,305	3,255	3,136	3,086	3,104	3,122	3,140	
Murray Valley	371	371	366	367	372	378	383	
Bairnsdale	130	135	141	147	154	162	170	
<b>Total</b>	<b>24,159</b>	<b>23,715</b>	<b>22,807</b>	<b>22,412</b>	<b>22,533</b>	<b>22,655</b>	<b>22,777</b>	<b>-0.03%</b>

	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	Growth 2023-4- 2027-8
<b>Demand per Connection</b>								
Central	301.22	353.16	374.26	377.19	380.15	381.94	383.82	
North	228.99	230.02	231.04	232.07	233.10	234.14	235.19	
Murray Valley	169.13	166.64	164.18	161.76	159.37	157.02	154.70	
Bairnsdale	558.91	524.01	491.30	460.62	431.87	404.90	379.62	
<b>Total</b>	<b>290.70</b>	<b>334.32</b>	<b>351.91</b>	<b>354.23</b>	<b>356.60</b>	<b>357.98</b>	<b>359.44</b>	<b>0.53%</b>

### 2.6.3. Industrial Allocation

The industrial allocation has regard to historical trends in connections, MHQ and ACQ, by aggregating annual values for each industrial customer. Further adjustments are made based on survey response and known movements in specific customers within each zone.

The result is summarised in the following figure.

Figure 2.22 Industrial Allocation by Zone

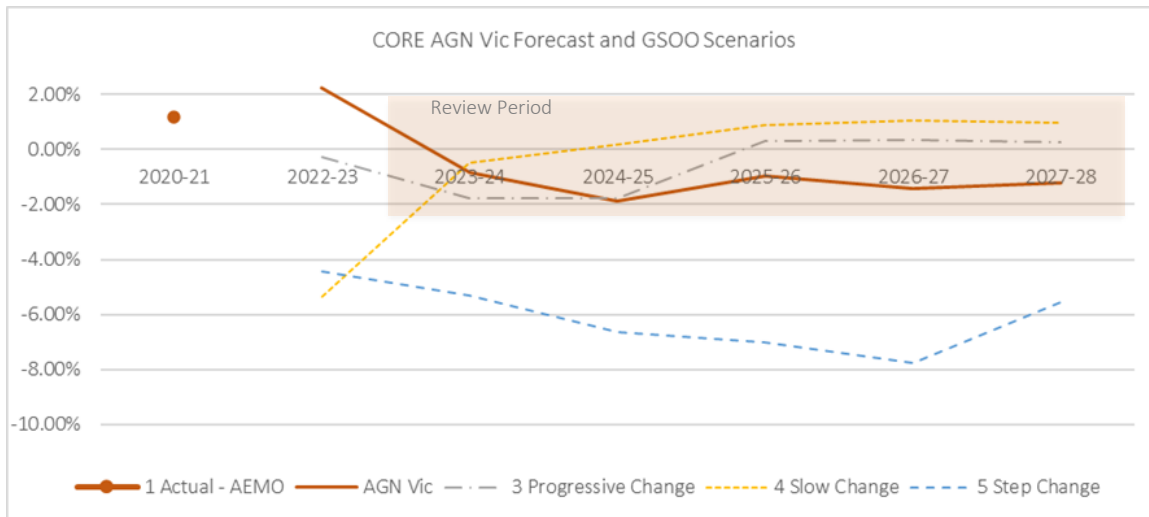
	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	Growth 2023-4-2027-8
<b>Connections</b>								
Central	213	217	220	224	227	231	234	
Bairnsdale	3	3	3	3	3	3	3	
Murray Valley	7	7	7	7	7	7	7	
North	50	50	50	50	50	50	50	
<b>Total Vic</b>	<b>273</b>	<b>277</b>	<b>280</b>	<b>284</b>	<b>287</b>	<b>291</b>	<b>294</b>	<b>1.24%</b>
<b>MHQ</b>								
Central	3,356	3,466	3,434	3,402	3,369	3,337	3,305	<b>-0.95%</b>
Bairnsdale	20	21	22	23	24	26	27	<b>5.17%</b>
Murray Valley	380	386	391	397	403	409	415	<b>1.48%</b>
North Adjusted	1,091	1,100	1,099	1,076	1,042	1,062	1,050	<b>-0.91%</b>
<b>Total Vic</b>	<b>4,847</b>	<b>4,973</b>	<b>4,946</b>	<b>4,898</b>	<b>4,839</b>	<b>4,834</b>	<b>4,797</b>	<b>-0.76%</b>
<b>ACQ</b>								
Central	11,475,178	11,816,072	11,607,109	11,399,862	11,194,372	10,990,677	10,788,812	<b>-1.81%</b>
Bairnsdale	103,240	106,967	110,829	114,830	118,975	123,270	127,720	<b>3.61%</b>
Murray Valley	1,837,471	1,832,693	1,827,928	1,823,176	1,818,436	1,813,708	1,808,992	<b>-0.26%</b>
North total								
<b>Total Vic</b>								
North less Survey History								
North Base trend	3,648,114	3,512,769	3,382,445	3,256,957	3,136,123	3,019,773	2,907,740	<b>-3.71%</b>
North survey increase	18,850	58,434	80,205	80,205	80,205	80,205	80,205	
North	<b>3,666,964</b>	<b>3,571,203</b>	<b>3,462,650</b>	<b>3,337,162</b>	<b>3,216,328</b>	<b>3,099,978</b>	<b>2,987,945</b>	<b>-3.62%</b>
<b>Total Vic</b>	<b>17,082,853</b>	<b>17,326,935</b>	<b>17,008,517</b>	<b>16,675,029</b>	<b>16,348,111</b>	<b>16,027,634</b>	<b>15,713,469</b>	<b>-1.96%</b>

### 2.7. Validation

CORE has compared the R&C demand forecast set out above, against the R&C forecast presented by AEMO in the 2022 Gas Statement of Opportunities (GSOO).

While the GSOO forecast is for Victoria as a whole, CORE has compared forecast average growth rates under AEMO defined scenarios, against the combined CORE Tariff R and C (collectively Tariff V) AGN Vic forecasts. The result is summarised in the following figure.

Figure 2.23 Comparison of AEMO GSOO Scenario annual movements and CORE AGN Vic forecast annual movements for R&C segment.



CORE has undertaken an analysis of the variance between GSOO Scenarios and CORE forecasts, as presented in Section 9 below. CORE considers the variances to be reasonable, having regard to differences between the AGN Vic network and Victoria as a whole, and differences between the relatively broad Scenarios defined by AEMO and the AGN Vic-specific focus adopted by CORE.

## 3. Methodology

### 3.1. Principles of the Approach

#### **Leading Economic and Statistical Theory**

Developed from a strong foundation of economic theory and empirical methods, COREE's approach dissects real world phenomena by utilising a rigorous methodology. Where applicable, forecasts integrate leading economic research and industry standards.

#### **Discipline and Compliance**

Forecasting completed by CORE strictly adheres to the requirements of the NGR. All forecasts have been derived on a reasonable basis, utilising primary information where available to result in the best forecast under the circumstances. CORE maintains a current assessment of domestic and international forecasting analysis, and precedents have been followed where appropriate. This includes previous AA decisions from the AER and ERA, and reports from the Australian Energy Market Operator ("AEMO"). Additionally, material from the United States ("US") Department of Energy, International Energy Agency and other leading international energy agencies, are consistently reviewed. CORE has considerable experience in network demand forecasting and the current approach integrates leading approaches that are demonstrated in Australia and abroad.

#### **Balance of Top-down and Bottom-up Analysis**

CORE evaluates key drivers using both top-down and bottom-up analysis. This ensures that all direct and indirect factors are identified then appropriately quantified.

Relevant historical trends are neither overlooked nor overstated with the true underlying trends derived by establishing a strong foundation ahead of the analysis of each demand driver.

#### **Elimination of Bias**

To produce an unbiased forecast, data is carefully screened to ensure that no part of the forecast is influenced by inputs that consistently over or under-predict outcomes. Apparent outliers are reviewed and CORE ensures that all data sourced from third parties is independent, accurate and unbiased.

#### **Rigour, Transparency and Validation**

CORE maintains two levels of validation in the forecasting approach:

1. Data outcomes and sources are validated by independent third-party sources
2. Secondly, an extensive literature review is completed, for sections of the approach where independent validation is not readily available.

All inputs, calculations and outputs are clearly set out in a transparent manner.

The methodology adopted by CORE involves four primary elements:

1 Approach to normalising historical demand to remove the impact of abnormal weather influences (Section 4)

2 Approach to deriving a forecast of Tariff R demand (Section 5)

3 Approach to deriving a forecast of Tariff C demand (Sections 6)

4 Approach to deriving a forecast of Tariff D demand (Section 7)

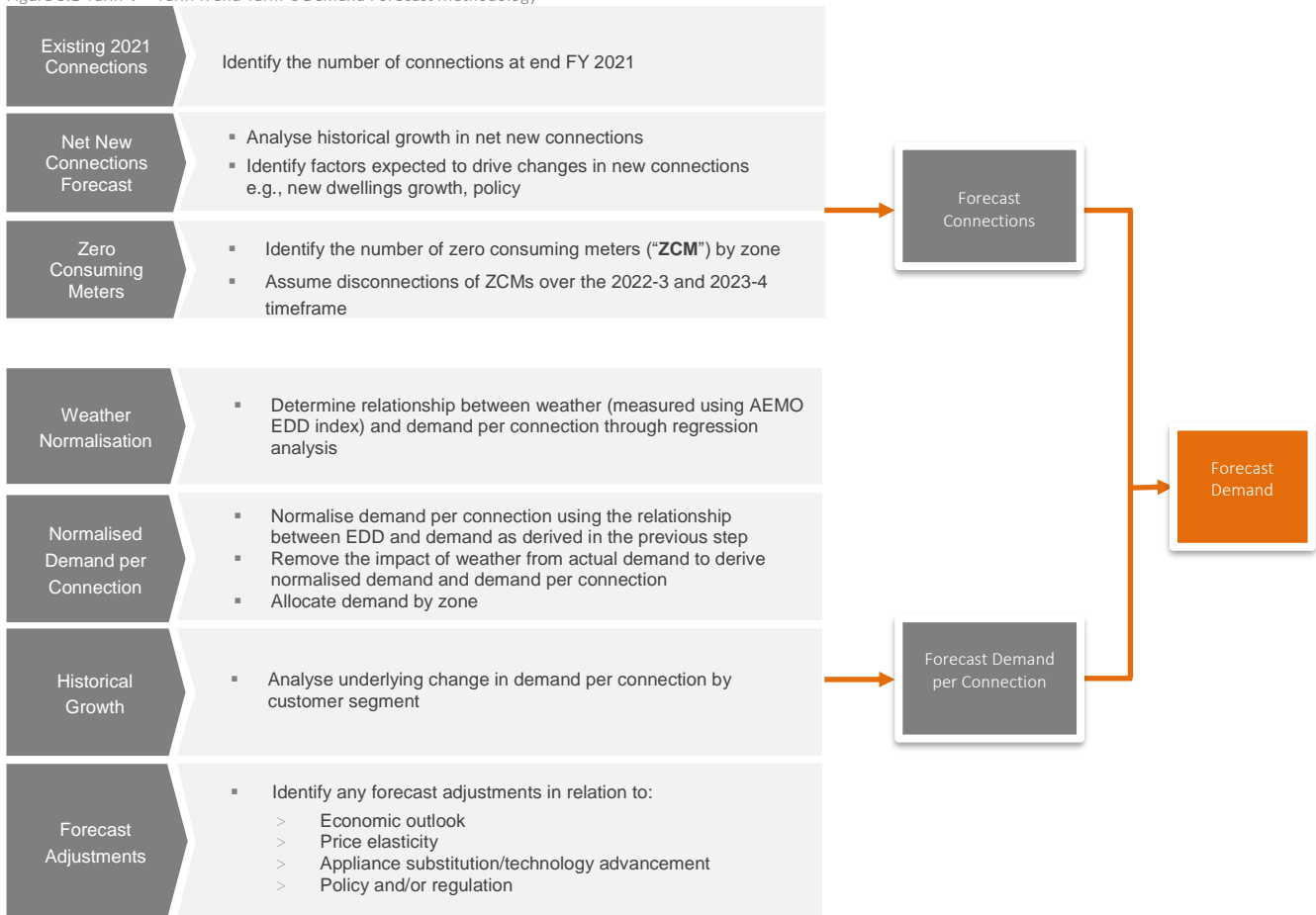
CORE's methodology considers all recent AA demand forecast proposals, draft, and final decisions, which ensures that CORE maintains a best-practice approach, compliant with the NGR.

The approach is largely consistent with that adopted to derive forecasts for prior access arrangements accepted by the AER, including AGN Victoria and Albury - 2018-22. However, certain modifications to CORE's approach have been made to address new circumstances relating to COVID-19, Commonwealth and Victorian Government energy policy, and uncertainties relating to global, national and Victorian State economic performance.

### 3.2. Tariff R&C

The approach used to develop forecasts for Tariff R and Tariff C customers are similar. Key elements of the approach are summarised in the following figure and the following paragraphs of this report.

Figure 3.1 Tariff V – Tariff R and Tariff C Demand Forecast Methodology



The following paragraphs provide further explanation of specific elements of CORE’s approach to deriving the forecasts for the Review period.

### 3.2.2. Derivation of Tariff R Connection Forecasts using HIA Data and Regression Analysis

Tariff R forecast connections are based on linear regression analysis. The regression model uses HIA commencement data (lagged one year as a basis for estimating dwelling completions) and Net Residential connection data as inputs. The resulting X variable coefficient and intercept are applied to HIA future commencement estimates to derive forecast Net residential completions.

Attachments 1 and 2 provide further detail regarding the specifics of this process.

### 3.2.3. Weather Normalisation of Historical Actual Demand per Connection using AEMO EDD Data

It is widely accepted that Tariff R and Tariff C demand is influenced by weather. Therefore, to remove unusual influences on historical annual demand per connection, CORE has applied a weather normalisation process, which is consistent with approaches used in prior access arrangement demand forecast developed by CORE, which were approved by the AER.

The approach used by CORE to normalise Tariff R and Tariff C demand per connection is addressed in Section 4.

### 3.2.4. Price Elasticity of Demand

Consistent with the approach adopted by CORE to forecast demand in prior access arrangements approved by the AER, CORE has addressed the impact of movements in gas prices and electricity prices on both historical and forecast demand and demand per connection.



CORE's approach involves three primary processes:

- Adjustment of historical demand and demand per connection for the impact of movements in historical gas and electricity prices. This ensures that historical data and trends used as an input to forecasting have been appropriately adjusted for price elasticity – both Own (Gas Price influence) and Cross Price (electricity price influence) elasticity.
- Adjustment of future demand and demand per connection to reflect the Own-price elasticity. This involves estimating expected future movements in gas price each year and the related annual bill for an average Tariff R and Tariff C customer and applying an elasticity factor to estimate the expected impact on future demand. The factors used are consistent with factors used in prior demand forecasts developed by CORE for access arrangement which have been approved by the AER.
- Adjustment of future demand and demand per connection to reflect the Cross-price elasticity. This involves estimating expected future movements in electricity price each year and the related annual bill for an average Tariff R and Tariff C customer and applying an elasticity factor to estimate the expected impact on future demand. The factors used are consistent with factors used in prior demand forecasts developed by CORE for access arrangement which have been approved by the AER.

Further detail regarding the calculation of specific adjustments relating to price elasticity are addressed in Sections 5 and 6.

#### 3.2.5. Impact of COVID

Unless otherwise stated:

- CORE has relied on historical data trends derived for the historical period to 2018-19 only, as the COVID impacted 2019-20- and 2020-21-year data is unreliable as a basis for deriving future forecasts.
- CORE has used 2018-19 as the Opening D/C for the 2021-22 year, on the basis that the data for COVID impacted 2019-20- and 2020-21-year data is unreliable as a basis for deriving future forecasts.

#### 3.2.6. Economic Influences

Due to the impact of COVID and broader economic volatility associated with energy price movements, international geopolitical and economic circumstances, CORE has not been able to define reliable correlations between economic indicators such as GSP, and MVA and Tariff C or Tariff D demand over recent years as a time series. Therefore, CORE has placed increased reliance on historical trend and supporting analysis to develop forecasts. CORE considers this to be the most appropriate basis to derive best estimates under the circumstances, in accordance with the NGR.

#### 3.2.7. Allocation of Connection and Demand by Network Zone

The scope of CORE's engagement includes allocation of AGN Vic connections and demand between five Zones – Central, North, Murray Valley and Bairnsdale. Albury is addressed as a separate Zone and therefore does not require further allocation.

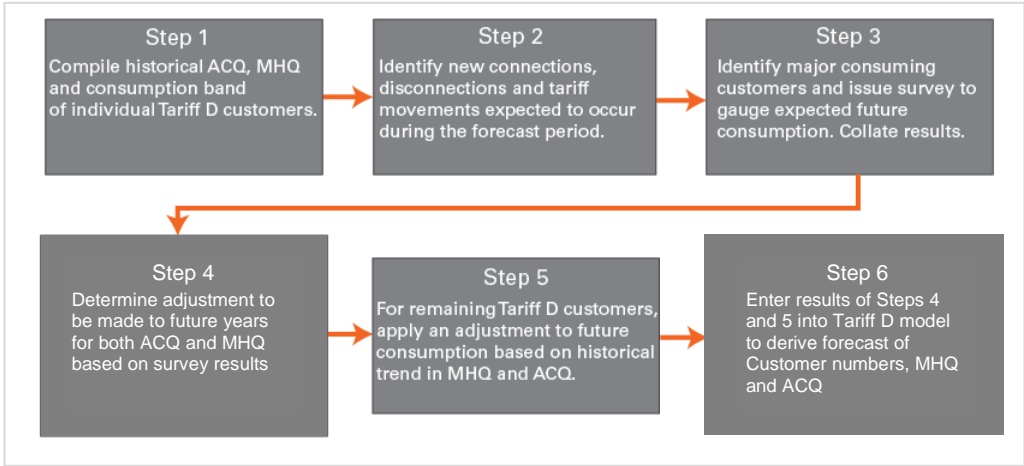
This process commences with CORE's forecast for the AGN Vic network in aggregate. The results are then allocated between the Zones, having regard to relevant historical trends, and supporting data and information.

Section 8 of this report and the accompanying Demand Model provide further detail regarding the allocation for each of the Tariff R, Tariff C and Tariff D customer segments.

### 3.3. Tariff D

The methodology adopted to derive a forecast of MHQ for the Review Period is summarised in the following Figure.

Figure 3.2 Tariff D | Demand Customer MHQ Forecast Methodology



Historical Customer numbers, MHQ and ACQ for both the network as a whole and the individual Zones have been analysed to determine historical trends to be used to derive forecasts for each year during the Review Period. CORE determined that more recent years (2015-16 to 2018-19 (Pre COVID impact) were the most appropriate reference points due to material changes in trend in one or more regions, during the prior period.

For this Review period CORE has modified its approach to derivation of Tariff D forecasts, due in large part to the impact of COVID on 2019-20 and 2020-21 demand and demand per connection. In the prior Review period CORE used some statistical analysis, in conjunction with analysis of prior trends, to derive the Tariff D forecast. During the current period CORE has not been able to gain confidence in the statistical relationship between movements in demand associated with economic factors and movements attributable to COVID-19 and other factors such as geopolitical factors, national and international economic influences. Therefore, CORE has undertaken extended analysis of historical trends to provide a stronger basis for the forecasts.

CORE considers that its revised approach meets the requirements of the NGR and provides the best estimate under the circumstances.

## 4. Weather Normalisation of Demand

### 4.1. Introduction

Gas demand is materially influenced by weather, particularly in the Tariff R and Tariff C segments. Accordingly, the impact of varying weather on historical Tariff R and Tariff C gas demand and demand per connection has been ‘normalised’ to provide a consistent basis for analysing historical data and trends used in demand forecasting.

CORE has adopted a weather normalisation methodology based on AEMO’s Victoria forecasting guidelines, which favours the application of Effective Degree Days (“EDD”). EDD accounts for additional climatic factors including but not limited to sunshine hours, wind chill, and seasonality.

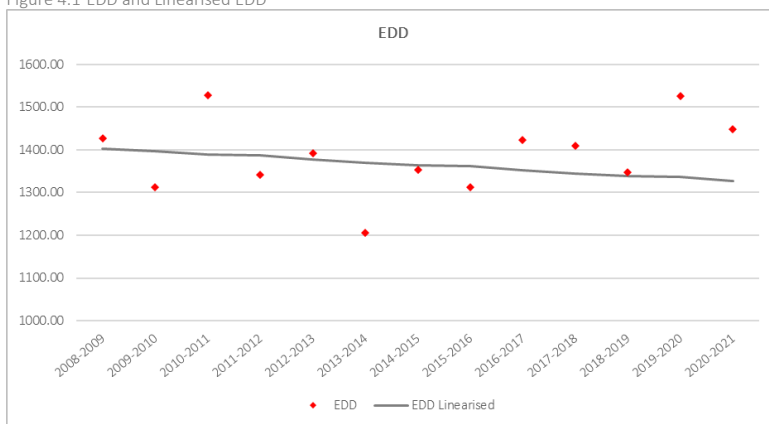
### 4.2. EDD Index

The weather index selected for weather normalisation is AEMO’s EDD<sub>312</sub> (2012) index for both the Victorian and Albury networks. AEMO has endorsed the EDD<sub>312</sub> as a more rigorous approach than EDD<sub>129</sub> or HDD indices. CORE notes that an AEMO EDD<sub>312</sub> approach was approved by the AER in previous access arrangements (“AA”).

CORE has used the monthly EDD data developed by AEMO, as reported via its public data portal.

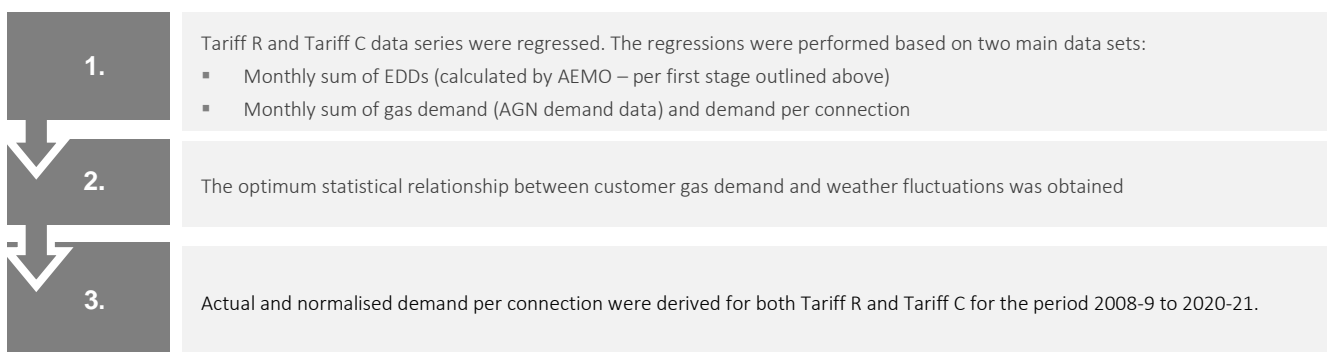
Figure 4.1 summarises the resulting annualised EDD and linearised EDD for the 2008-9 to 2020-21 period.

Figure 4.1 EDD and Linearised EDD



#### 4.2.2. Weather Normalised Demand Model

The EDD<sub>312</sub> Weather Index has been used in regression analysis together with AGN’s historical Tariff R and Tariff C demand data as summarised below.



CORE considers this process to be compliant with s 74(2) of the NGRs. Forecasts are constructed on a reasonable basis, with data from a reliable source, and representing the best forecasts possible in the circumstances. A confidential weather normalisation model is to be read in conjunction with this report.

4.2.3. Weather Normalisation results

The following Figures and Tables provide an overview of the actual and normalised demand and demand per connection for the Residential and Commercial segments.

4.2.3.1 AGN Victoria

Residential

Figure 4.2 Tariff R – Actual and Normalised Demand

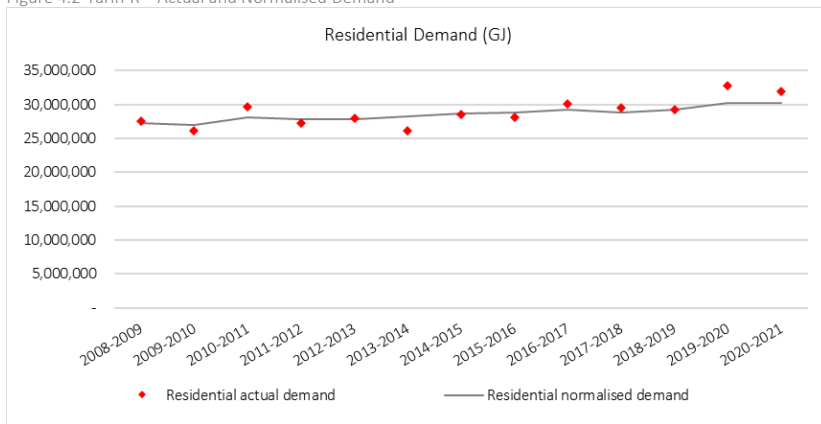
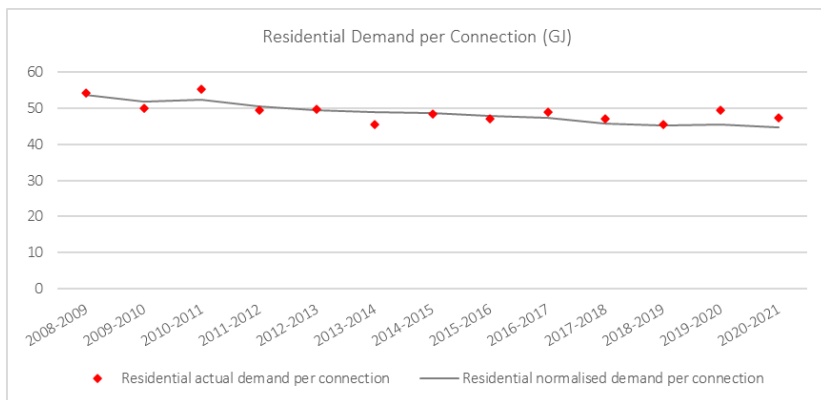


Figure 4.3 Tariff R – Actual and Normalised D/C



Commercial

Figure 4.4 Tariff C – Actual and Normalised Demand

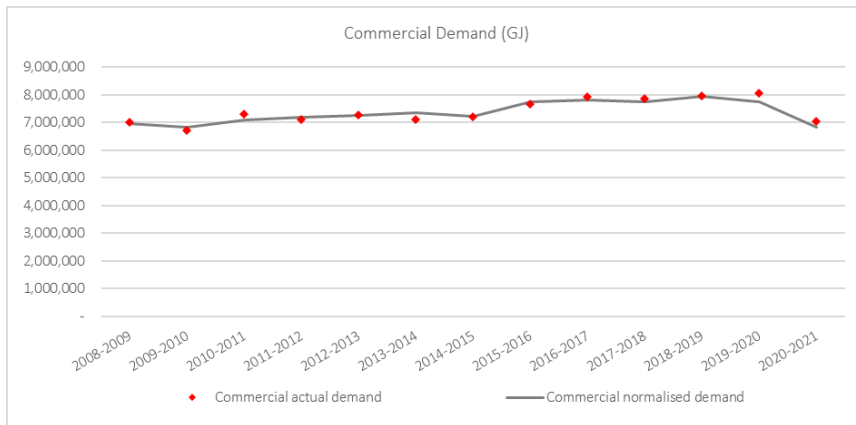
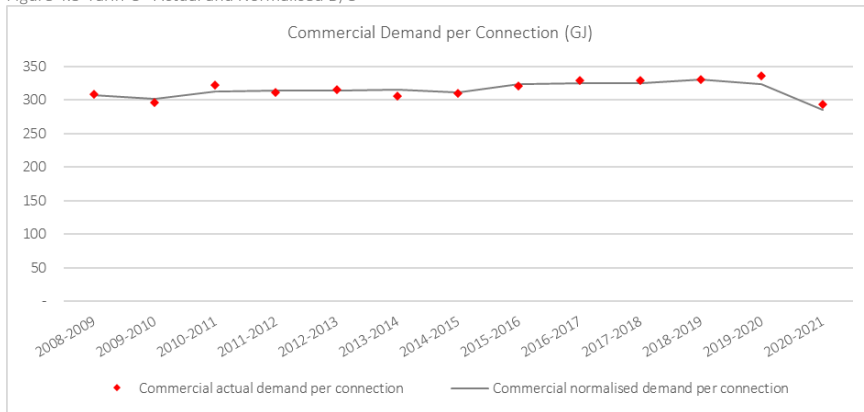


Figure 4.5 Tariff C - Actual and Normalised D/C



4.2.3.2 Albury

Residential

Figure 4.6 Tariff R – Actual and Normalised Demand

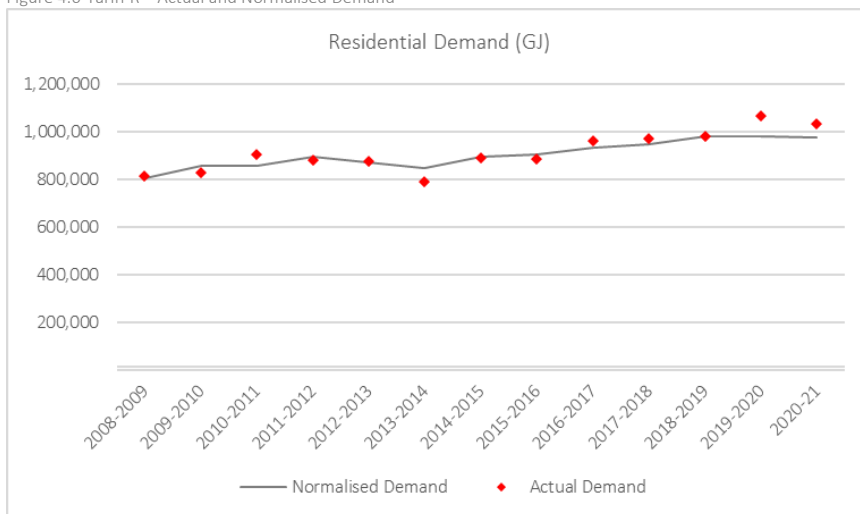
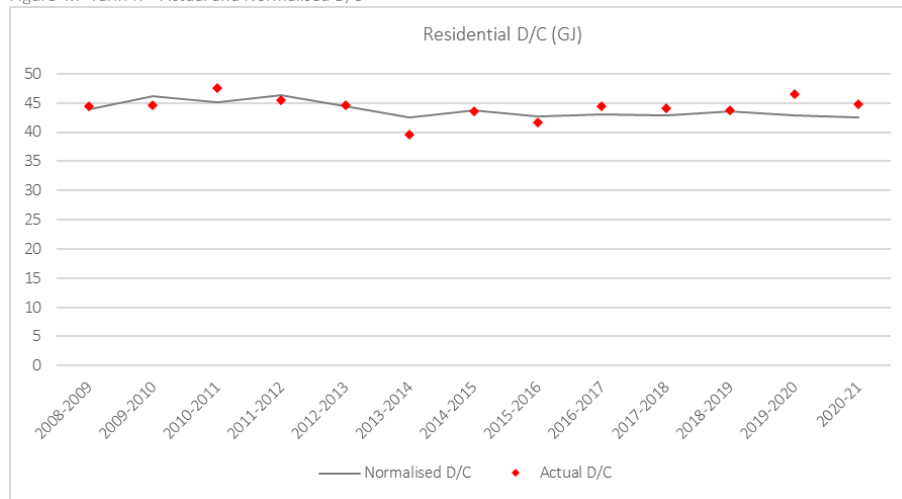


Figure 4.7 Tariff R – Actual and Normalised D/C



Commercial

Figure 4.8 Tariff C – Actual and Normalised Demand



Figure 4.9 Tariff C - Actual and Normalised D/C

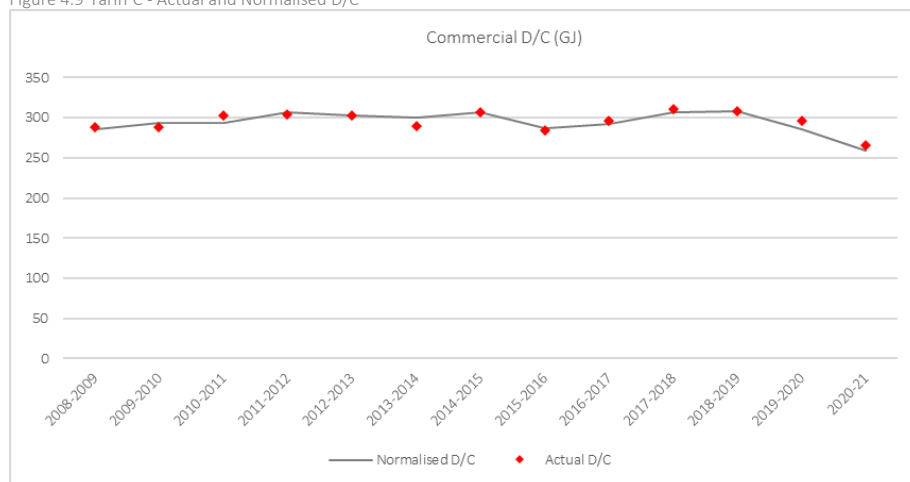


Table 4.1 AGN Vic Weather Normalisation Summary

<b>Summary - Vic</b>														
EDD Weather Normalisation														
Financial Year		2008-2009	2009-2010	2010-2011	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	2019-2020	2020-2021
<b>EDD   Linearisation</b>														
Linearised EDD		1,402	1,396	1,390	1,387	1,377	1,371	1,364	1,362	1,351	1,345	1,339	1,336	1,326
EDD		1,427	1,313	1,528	1,342	1,393	1,205	1,353	1,313	1,423	1,409	1,347	1,526	1,448
Difference		25	(82)	138	(45)	16	(166)	(11)	(48)	72	64	8	190	122
<b>Residential   Linearisation</b>														
Residential normalised demand	(GJ)	27,261,284	26,999,338	28,114,113	27,799,079	27,874,824	28,209,092	28,664,919	28,840,992	29,208,139	28,796,861	29,240,322	30,196,213	30,253,960
Residential actual demand	(GJ)	27,497,038	26,080,947	29,623,188	27,266,699	28,027,867	26,193,510	28,517,600	28,194,772	30,103,068	29,598,520	29,308,241	32,791,704	31,946,380
Difference	(GJ)	235,754	(918,391)	1,509,074	(532,381)	153,043	(2,015,583)	(147,319)	(646,220)	894,929	801,659	67,919	2,595,492	1,692,420
Residential normalised demand per connection	(GJ/no.)	53.72	51.85	52.53	50.49	49.37	48.89	48.66	47.99	47.49	45.71	45.26	45.63	44.78
Residential actual demand per connection	(GJ/no.)	54.24	50.13	55.41	49.56	49.70	45.44	48.43	46.98	48.99	47.03	45.43	49.59	47.33
Difference	(GJ)	.52	(1.72)	2.88	(.93)	.33	(3.46)	(.23)	(1.01)	1.50	1.33	.17	3.96	2.55
Closing Connections		513,458	527,232	542,323	557,312	570,532	582,536	595,037	607,999	623,311	638,227	654,530	669,088	682,374
<b>Commercial   Linearisation</b>														
Commercial normalised demand	(GJ)	6,959,567	6,830,217	7,105,107	7,187,335	7,253,102	7,361,630	7,235,652	7,753,040	7,828,130	7,757,713	7,937,601	7,759,610	6,835,995
Commercial actual demand	(GJ)	6,995,772	6,706,359	7,309,947	7,119,783	7,277,241	7,100,891	7,215,896	7,656,962	7,941,216	7,855,844	7,948,989	8,057,441	7,030,022
Difference	(GJ)	36,205	(123,859)	204,840	(67,552)	24,139	(260,739)	(19,757)	(96,077)	113,086	98,132	11,388	297,831	194,026
Commercial normalised demand per connection	(GJ/no.)	308	301	313	315	315	316	311	324	325	325	331	324	285
Commercial actual demand per connection	(GJ/no.)	309	296	322	312	316	305	310	321	330	329	331	337	293
Difference	(GJ)	1.6	(5.4)	9.1	(2.9)	1.0	(10.9)	(.7)	(3.2)	4.7	4.2	.5	12.5	8.0

Table 4.2 Albury Weather Normalisation Summary

<b>Summary - Albury</b>														
EDD Weather Normalisation														
<b>Note: Albury is based on same EDD relationships as for AGN Vic</b>														
Financial Year		2008-2009	2009-2010	2010-2011	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	2019-2020	2020-2021
<b>EDD   Linearisation</b>														
Linearised EDD	(°C)	1,402	1,396	1,390	1,387	1,377	1,371	1,364	1,362	1,351	1,345	1,339	1,336	1,326
EDD	(°C)	1,427	1,313	1,528	1,342	1,393	1,205	1,353	1,313	1,423	1,409	1,347	1,526	1,448
Difference	(°C)	25	(82)	138	(45)	16	(166)	(11)	(48)	72	64	8	190	122
<b>Residential   Linearisation</b>														
Residential normalised demand	(GJ)	806,010	858,007	856,455	897,425	871,305	849,406	894,813	903,700	934,078	946,892	979,354	979,911	978,192
Residential actual demand	(GJ)	813,810	829,523	903,390	880,869	877,116	789,370	890,604	884,678	963,550	974,354	983,056	1,064,888	1,032,912
Difference	(GJ)	7,800	(28,484)	46,935	(16,556)	5,811	(60,036)	(4,209)	(19,021)	29,472	27,462	3,702	84,977	54,721
Residential normalised demand per connection	(GJ/no.)	43.93	46.07	45.11	46.36	44.34	42.51	43.77	42.62	43.00	42.81	43.58	42.86	42.46
Residential actual demand per connection	(GJ/no.)	44.36	44.54	47.58	45.50	44.64	39.51	43.56	41.72	44.36	44.05	43.74	46.57	44.84
Difference	(GJ)	.43	(1.53)	2.47	(.86)	.30	(3.00)	(.21)	(.90)	1.36	1.24	.16	3.72	2.38
		.9904	1.0343	.9480	1.0188	.9934	1.0761	1.0047	1.0215	.9694	.9718	.9962	.9202	.9470
Closing Connections		18,488	18,789	19,209	19,504	19,801	20,205	20,678	21,204	21,721	22,119	22,475	22,865	23,299
<b>Commercial   Linearisation</b>														
Commercial normalised demand	(GJ)	254,674	258,524	261,419	277,260	276,460	275,394	285,028	277,463	274,275	282,960	285,153	265,372	241,105
Tariff Commercial actual demand	(GJ)	256,029	253,875	268,982	274,677	277,370	265,922	284,367	274,743	278,252	286,591	285,617	275,571	247,948
Difference	(GJ)	1,355	(4,649)	7,563	(2,583)	910	(9,472)	(661)	(2,720)	3,978	3,632	464	10,200	6,843
Commercial normalised demand per connection	(GJ/no.)	286	293	294	307	302	300	307	287	292	306	308	286	259
Commercial actual demand per connection	(GJ/no.)	288	288	302	305	303	289	306	284	296	310	308	297	266
Difference	(GJ)	(1.5)	5.3	(8.5)	2.9	(1.0)	10.3	.7	2.8	(4.2)	(3.9)	(.5)	(11.0)	(7.3)
		.9947	1.0183	.9719	1.0094	.9967	1.0356	1.0023	1.0099	.9857	.9873	.9984	.9630	.9724
Closing Connections		890	881	919	902	914	919	928	968	939	924	927	929	939



## 5. Residential, Tariff R Forecast

### 5.1. Residential Demand

Forecast residential demand is the product of Average Connections and Demand per connection. These elements, together with Closing connections, which is the basis for calculating Average connections, are summarised in the following table.

Table 5.1 AGN Vic & Albury Residential Demand

Residential Demand	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	Growth 2023-4-2027-8
Total Vic	30,111,354	30,118,070	29,476,681	28,925,653	28,456,080	27,852,056	27,337,875	-1.87%
Albury	1,007,094	1,035,546	1,040,224	1,049,932	1,064,037	1,075,433	1,090,701	1.19%
<b>Total Vic &amp; Albury</b>	<b>31,118,448</b>	<b>31,153,616</b>	<b>30,516,905</b>	<b>29,975,585</b>	<b>29,520,117</b>	<b>28,927,488</b>	<b>28,428,576</b>	<b>-1.76%</b>
Closing Net Connections	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	Growth 2023-4-2027-8
Total Vic	695,963	707,081	715,795	727,169	737,945	748,762	759,559	1.49%
Albury	23,728	23,909	24,092	24,537	24,989	25,449	25,918	1.84%
<b>Total Vic &amp; Albury</b>	<b>719,692</b>	<b>730,990</b>	<b>739,887</b>	<b>751,706</b>	<b>762,934</b>	<b>774,212</b>	<b>785,477</b>	<b>1.51%</b>
Average Net Connections	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	Growth 2023-4-2027-8
Total Vic	689,169	701,522	711,438	721,482	732,557	743,354	754,160	1.47%
Albury	23,514	23,819	24,001	24,314	24,763	25,219	25,684	1.71%
<b>Total Vic &amp; Albury</b>	<b>712,682</b>	<b>725,341</b>	<b>735,439</b>	<b>745,796</b>	<b>757,320</b>	<b>768,573</b>	<b>779,844</b>	<b>1.48%</b>
Demand per Average Connection	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	Growth 2023-4-2027-8
Total Vic	43.69	42.93	41.43	40.09	38.84	37.47	36.25	-3.29%
Albury	42.83	43.48	43.34	43.18	42.97	42.64	42.47	-0.51%
<b>Total Vic &amp; Albury</b>	<b>43.66</b>	<b>42.95</b>	<b>41.49</b>	<b>40.19</b>	<b>38.98</b>	<b>37.64</b>	<b>36.45</b>	<b>-3.19%</b>

The forecast -1.76% reduction in residential demand during the Review Period is primarily the result of a forecast reduction in demand per average connection of -3.19%, offset partially by forecast growth in Average connections of +1.48% (derived from Closing connections which are forecast to grow by +1.51%).

Further detail regarding the derivation of Connections and Average Demand per Connection is set out in the following paragraphs.

#### 5.1.2. Residential Connections

The forecast of residential connections is derived as follows, unless otherwise stated within this report:

- Actual closing connections for the 2020-21 financial year are used as the opening position for the 2021-22 transitional year.
- Modelled 2021-22 forecast connections for AGN Vic are adjusted to take into consideration latest available actual 2021-22 YTD connection data.
- Net connections are added to the Opening balance. For AGN Vic net growth in connections is derived for each forecast year to 2027-28, based on regression analysis of historical HIA dwelling commencement data (lagged by one year to estimate completions and gas connection timing) and net historical residential connections within the AGN Vic network. Resulting

coefficients (Intercept and X variable), are applied against HIA forecasts to derive forecasts of annual AGN Vic residential net completions. For Albury, a historical trend is used to forecast connections.

- Removing Zero Consuming Meters (ZCM), over the two-year period 2022-3 and 2023-4, based on analysis of historical consumption data. This is consistent with AGN policy as agreed with retailers, whereby AGN does not charge fees for connections where a plug or locks have been applied.
- (AGN Vic only) Deducting the impact of a committed “VEU” Program has been derived by determining the number of households that are likely to move from full or partial gas to electricity only.

The forecast of AGN Vic Residential connections, including the impact of each of the above factors, is summarised in the following table.

Table 5.2 AGN Vic Residential Closing Connections

	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28
<b>Opening Net Connections, before Adjustments</b>	<b>682,374</b>	<b>695,963</b>	<b>707,081</b>	<b>715,795</b>	<b>727,169</b>	<b>737,945</b>	<b>748,762</b>
2022 reduction based on May YTD actual	-3,844						
Net new connections	17,433	16,603	14,196	12,375	11,777	11,818	11,797
ZCM		4,484	4,482				
Policy		-1,001	-1,001	-1,001	-1,001	-1,001	-1,001
<b>Closing Net Connections</b>	<b>695,963</b>	<b>707,081</b>	<b>715,795</b>	<b>727,169</b>	<b>737,945</b>	<b>748,762</b>	<b>759,559</b>

Table 5.3 Albury Residential Closing Connections

	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28
Opening	23,299	23,728	23,909	24,092	24,537	24,989	25,449
New net connections	429.43	437.35	440.67	444.06	452.24	460.58	469.06
ZCM		257	257				
Closing	<b>23,728</b>	<b>23,909</b>	<b>24,092</b>	<b>24,537</b>	<b>24,989</b>	<b>25,449</b>	<b>25,918</b>

The resulting Closing connections are then used to derive a forecast of Average connections by calculating the sum of the opening and closing connections in each year and dividing the result by two, as summarised in the following table.

Table 5.4 AGN Vic &amp; Albury Residential Average Connections

Average Net Connections	Units		2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	Growth 2023-4-2027-8
Total Vic	Number		689,169	701,522	711,438	721,482	732,557	743,354	754,160	1.47%
Albury	Number		23,514	23,819	24,001	24,314	24,763	25,219	25,684	1.71%
<b>Total Vic &amp; Albury</b>	Number		<b>712,682</b>	<b>725,341</b>	<b>735,439</b>	<b>745,796</b>	<b>757,320</b>	<b>768,573</b>	<b>779,844</b>	<b>1.48%</b>

Further explanation of the derivation of the elements referenced in above Figure is provided in the following paragraphs.

#### Reduction in Opening 2021-22 connections based on YTD actuals (weather normalised)

AGN has advised CORE of the most recent YTD connections for the 2021-22 year. CORE has extrapolated this balance to 30 June 2022 – a deduction of 3,844 connections from the forecast modelled. CORE considers it most likely that the reduction is due to delays in completing residential dwellings – greater than the 12-month period from commencement (based on HIA data), assumed by CORE.

## New Net Connections

CORE has undertaken linear regression analysis as a basis for forecasting new AGN Vic Residential connections.

The regression analysis uses HIA data (set out in Attachment 1) and AGN Vic historical Net connection data (set out in Attachment 2) as inputs. The regression model delivers an x variable coefficient and intercept as outputs. These factors are applied against HIA future dwelling commencement data to derive forecasts of Net New connections.

Attachment 2 provides further detail of the regression analysis undertaken by CORE.

### 5.1.3. Residential Demand per Connection

The forecast of residential demand per connection is derived as follows:

- Actual demand per connection for the 2018-19 financial year is used as the opening position for the 2021-22 transitional year, on the basis that the following two-year results were impacted by COVID, and 2018-19 is expected to be a reasonable basis for the opening 2021-22 year, unless otherwise updated based on latest available data.
- Applying the trend in D/C observed for the period 2008-9 to 2018-19 for each year from 2021-22 to 2027-28.
- Adjusting the historical trend and forecasts for the impact of price elasticity – both own and cross price
- Removing the demand attributable to ZCM customers (as modelled is based on average for all customers).
- (AGN Vic only) Deducting the impact of a committed “VEU” Program has been derived by determining the number of households that are likely to reduce demand (particularly room and water heating).
- Determine the weighted average of forecast New and Existing customers due to varying levels of D/C between the two groups.
- Adjusting the forecasts for the impact of price elasticity – both own and cross price, based on forecast movements in residential gas and electricity bills and related prices.

The forecast of AGN Vic Residential Demand per Connection, including the impact of each of the above factors, is summarised in the following table.

Table 5.5 AGN Vic Residential Demand per Connection

AGN Vic	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28
<b>Opening - Existing</b>	<b>44.75</b>	<b>43.93</b>	<b>42.95</b>	<b>41.98</b>	<b>40.74</b>	<b>39.53</b>	<b>38.34</b>
LT trend before elasticity adj.	-0.75	-0.74	-0.72	-0.71	-0.69	-0.67	-0.65
LT elasticity impact GJ	-0.07	-0.06	-0.06	-0.06	-0.06	-0.06	-0.06
ZCM Adj.		0.28	0.27				
Policy Impact - retained connections		-0.48	-0.48	-0.49	-0.49	-0.49	-0.49
Policy Impact - disconnections		0.03	0.02	0.02	0.02	0.02	0.02
	<b>43.93</b>	<b>42.95</b>	<b>41.98</b>	<b>40.74</b>	<b>39.53</b>	<b>38.34</b>	<b>37.16</b>
Weighting impact (Exist and New)	-0.198	-0.372	-0.509	-0.666	-0.698	-0.776	-0.845
Price Elasticity (Own and Cross price) GJ	-0.04	0.35	-0.04	0.01	0.01	-0.09	-0.07
<b>Closing - Weighted</b>	<b>43.69</b>	<b>42.93</b>	<b>41.43</b>	<b>40.09</b>	<b>38.84</b>	<b>37.47</b>	<b>36.25</b>

The forecast of Albury Residential Demand per Connection, including the impact of each of the above factors, is summarised in the following table.

Table 5.6 Albury Residential Demand per Connection

Existing	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28
Opening	43.09	43.01	43.40	43.81	43.73	43.65	43.57
Trend reduction in D/C	-0.18%	-0.18%	-0.18%	-0.18%	-0.18%	-0.18%	-0.18%
ZCM		0.47	0.48				
Existing D/C	<b>43.01</b>	<b>43.40</b>	<b>43.81</b>	<b>43.73</b>	<b>43.65</b>	<b>43.57</b>	<b>43.49</b>
<b>New</b>							
	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28
Existing	43.01	43.40	43.81	43.73	43.65	43.57	43.49
New % of Existing	82%	82%	82%	82%	82%	82%	82%
New D/C	<b>35.27</b>	<b>35.59</b>	<b>35.92</b>	<b>35.86</b>	<b>35.79</b>	<b>35.73</b>	<b>35.66</b>
<b>Weighted</b>							
Weighted price prior to elasticity adjustment	<b>42.87</b>	<b>43.12</b>	<b>43.38</b>	<b>43.17</b>	<b>42.96</b>	<b>42.75</b>	<b>42.54</b>
Elasticity adjustment %	-0.09%	0.82%	-0.09%	0.03%	0.03%	-0.24%	-0.18%
Elasticity adjustment GJ	-0.04	0.36	-0.04	0.01	0.01	-0.10	-0.08
Weighted new and existing	<b>42.83</b>	<b>43.48</b>	<b>43.34</b>	<b>43.18</b>	<b>42.97</b>	<b>42.64</b>	<b>42.47</b>

Further explanation of the derivation of these elements of the forecast follow.

### Opening, Existing Customer Demand

Due to differences in average annual demand per connection between Existing and New customers, CORE derives a forecast of each customer type as a basis for calculating the weighted average demand per connection for Tariff R.

The Opening balance of Existing connections is the Closing balance of Existing connections from the prior year.

### Long Term Trend Impact

CORE has determined the long-term average annual rate of change in demand per connection, based on actual (weather normalised) results for the ten-year period 2008-9 to 2018-19 – a declining rate of -1.69% for AGN Vic and -0.04 for Albury.

This trend is further dissected into a price elasticity element and an underlying trend, so that the total price elasticity impact can be considered. The price elasticity adjusted trend is -1.83% for AGN Vic and -0.18% for Albury.

### ZCM adjustment

CORE has adjusted Demand per Connection for the impact of Zero Consuming Meters. This adjustment is required as modelled demand per connection is initially based on the average of all connections. Therefore, demand per connection must be adjusted to reflect that ZCM's have no D/C, and thus the average attributable to them within the base modelled demand must be added back, which increases D/C for the remaining Existing connections.

The calculation of the adjustment for the two impacted years – 2022-23 and 2023-24 is as follows.

Table 5.7 Impact of ZCM removal on AGN Vic Residential Demand per Connection

Calculation Element	2022-23	2023-24
1. Opening Existing Connections	695,963	707,081
2. Number of ZCM	4,484	4,482
3. 2 above divided by 1	0.64%	0.63%
4. Existing Customer D/C	43.93	42.95
5. Impact of ZCM removal (3. x 4.)	<b>0.28</b>	<b>0.27</b>

Table 5.8 Impact of ZCM removal on Albury Residential Demand per Connection

Calculation Element	2022-23	2023-24
6. Opening Existing Connections	23,299	23,042
7. Number of ZCM	257	257
8. 2 above divided by 1	1.10%	1.10%
9. Existing Customer D/C	43.01	43.4
10. Impact of ZCM removal (3. x 4.)	<b>0.47</b>	<b>0.48</b>

### Victorian Government Policy Impact

CORE has derived an estimate of the impact of a committed Victorian Energy Upgrade program on forecast demand per connection for AGN Vic, Albury is assumed not to be impacted.

The Program targets the replacement of room heating and other appliances with electric appliances, for 250,000 dwellings.

CORE has estimated the impact of the program as follows:

- Estimated the number of dwellings likely to be impacted within the AGN Vic network – 32.4% or 81,000 over six years, equivalent to 13,500 per year
- Estimating the number of dwellings which are likely to disconnect and the number which are likely to remain connected to the network in each of the six years

- 1,001 per annum estimated to disconnect, assuming that room heating is the only form of gas use – based on analysis of AGN Vic gas use outside of winter heating season
  - the remainder of 12,499 assumed to remain connected
- Estimating the likely reduction in gas usage (same for both disconnecting and customers remaining connected), by analysing the lower levels of room heating and some water heating usage within the AGN Vic network in the 2018-19 year (pre COVID) – average of 26 GJ per dwelling per annum

The forecast reduction in demand per connection is summarised as follows.

Table 5.9 Impact of VEU Policy on AGN Vic Residential Demand per Connection – Customers remaining connected

Calculation Element	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28
1. Opening Existing connections	678,530	673,045	667,562	666,562	665,561	664,560
2. Number of customers remaining connected	12,499	12,499	12,499	12,499	12,499	12,499
3. Reduction in demand per dwelling p.a. (GJ)	26	26	26	26	26	26
4. Total reduction in demand p.a (GJ) (2. X 3.)	32,4974	32,4974	32,4974	32,4974	32,4974	32,4974
5. Impact on VEU affected customers remaining connected (4. divided by 1.)	<b>0.48</b>	<b>0.48</b>	<b>0.49</b>	<b>0.49</b>	<b>0.49</b>	<b>0.49</b>

Table 5.10 Impact of VEU Policy on AGN Vic Residential Demand per Connection – Customers disconnecting

Calculation Element	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28
1. Opening Existing connections	678,530	673,045	667,562	666,562	665,561	664,560
2. Opening Existing connection D/C	43.93	42.95	41.98	40.74	39.53	38.34
3. Number of customers disconnecting	1,001	1,001	1,001	1,001	1,001	1,001
4. Reduction in demand per dwelling p.a. (GJ)	26	26	26	26	26	26
5. Impact on VEU affected customers disconnecting (3. divided by 1.) x (2. – 4.)	<b>0.03</b>	<b>0.03</b>	<b>0.02</b>	<b>0.02</b>	<b>0.02</b>	<b>0.02</b>

## Weighting Impact

As previously stated, there is a material difference between the average D/C of Existing connected customers and D/C observed for New connecting customers. CORE has analysed recent year data and has determined that Net New connections average 82% of the D/C averaged by Existing connected customers. This is attributable primarily to variances in dwelling size, dwelling occupancy, the types of appliances connected and higher building and appliance efficiency.

The Weighting factor adjustment has been derived as follows.

Table 5.11 I

Table 5.12 Impact of Weighting of New and Existing connections on Residential Demand per Connection.

Calculation Element	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28
1. Existing D/C Pre-Policy adjustment	43.93	42.95	41.98	40.74	39.53	38.34
2. New D/C at 82%	35.22	34.42	33.41	32.42	31.44	30.47
3. Existing connection %	97.50%	95.19%	93.26%	91.54%	90.19%	88.75%
4. New connection %	2.50%	4.81%	6.74%	8.32%	9.81%	11.25%
5. Weighting impact = 1. – ((1. X 3.) +(2. x 4.))	<b>-0.37</b>	<b>-0.51</b>	<b>-0.67</b>	<b>-0.70</b>	<b>-0.78</b>	<b>-0.85</b>

### Price Elasticity Impact (Own and Cross Price Elasticity)

CORE has undertaken analysis of independent third-party disclosures to derive estimates of historical and future Residential gas and electricity prices, as a basis for calculating annual movements in prices. Where data is not available in the public domain, CORE has addressed the gaps through rigorous research and analysis.

The following Table summarises the approach used to calculate the impact of Own and Cross Price elasticity on forecast Demand per Connection.

Table 5.13 Own Price Elasticity Impact on Residential Demand per Connection.

Calculation Element	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28
1. Derive estimate of movement in gas price for each year during the Review Period (and prior years due to Own Price adjustment being lagged over 5 years)	0.49%	-4.42%	0.19%	-1.27%	-0.03%	0.52%	1.25%
2. Apply an Own-Price elasticity factor based on the tables presented below.	<b>-0.210%</b>	<b>0.492%</b>	<b>0.289%</b>	<b>0.349%</b>	<b>0.224%</b>	<b>0.038%</b>	<b>-0.166%</b>
3. Derive estimate of movement in electricity price for each year during the Review Period	1.21%	3.33%	-3.79%	-3.15%	-1.92%	-2.81%	-0.14%
4. Apply a Cross-Price elasticity factor based on the tables presented below.	0.121%	0.333%	-0.379%	-0.315%	-0.192%	-0.281%	-0.014%
5. Use Pre elasticity adjusted, Weighted D/C as the base for deriving price elasticity adjusted D/C	43.73	42.58	41.47	40.08	38.83	37.56	36.31
6. Price-elasticity Impact % (2+4)	-0.089%	0.825%	-0.091%	0.034%	0.032%	-0.244%	-0.180%
7. Price Elasticity Impact GJ	<b>-0.04</b>	<b>0.35</b>	<b>-0.04</b>	<b>0.01</b>	<b>0.01</b>	<b>-0.09</b>	<b>-0.07</b>

The elasticity factors used are consistent with those approved by the AER in prior access arrangements.

The Cross-price factor is applied against the change in electricity price within the year. This results in a 0.10% change in demand for each 1% movement in electricity price.

The Own-Price factors are applied over five years as set out below and presented within the accompanying Demand model. This results in an 0.3% change in demand for each 1% movement in gas price.

Table 5.14 Own Price and Cross Price Elasticity factors used

Cross Price Elasticity - Res	0.1
Own Price Elasticity - Res	
$\Delta p(t)$	-0.13
$\Delta p(t-1)$	-0.08
$\Delta p(t-2)$	-0.05
$\Delta p(t-3)$	-0.03
$\Delta p(t-4)$	-0.01
<b>Total</b>	<b>-0.3</b>

Further detail of this calculation is available in the Demand model which accompanies this report

#### 5.1.4. Residential Demand

Forecast residential demand is the product of Average Connections and Demand per connection as summarised in the following table.

Table 5.15 AGN Vic &amp; Albury Residential Demand

Residential Demand	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	Growth 2023-4-2027-8
Total Vic	30,111,354	30,118,070	29,476,681	28,925,653	28,456,080	27,852,056	27,337,875	-1.87%
Albury	1,007,094	1,035,546	1,040,224	1,049,932	1,064,037	1,075,433	1,090,701	1.19%
<b>Total Vic &amp; Albury</b>	<b>31,118,448</b>	<b>31,153,616</b>	<b>30,516,905</b>	<b>29,975,585</b>	<b>29,520,117</b>	<b>28,927,488</b>	<b>28,428,576</b>	<b>-1.76%</b>



## 6. Commercial, Tariff C Forecast

Table 6.1 Commercial Forecast Summary

Consumption									
Consumption	Units	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	Growth 2023-4-2027-8
Total VIC	GJ	7,022,858	7,928,314	8,026,028	7,939,144	8,035,383	8,110,064	8,186,970	0.50%
Albury	GJ	290,864	291,121	279,046	278,327	281,485	283,884	286,357	0.65%
<b>Vic &amp; Albury</b>	<b>GJ</b>	<b>7,313,723</b>	<b>8,219,436</b>	<b>8,305,074</b>	<b>8,217,470</b>	<b>8,316,868</b>	<b>8,393,948</b>	<b>8,473,327</b>	<b>0.51%</b>
Closing Connections									
Closing Connections	Units	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	Growth 2023-4-2027-8
Total VIC	No.	24,168	23,262	22,352	22,473	22,594	22,716	22,838	0.539%
Albury	No.	943	921	900	904	908	912	916	0.44%
<b>Vic &amp; Albury</b>	<b>No.</b>	<b>25,111</b>	<b>24,183</b>	<b>23,252</b>	<b>23,377</b>	<b>23,502</b>	<b>23,628</b>	<b>23,754</b>	<b>0.54%</b>
Average Connections									
Average Connections	Units	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	Growth 2023-4-2027-8
Total VIC	GJ/Connection	24,159	23,715	22,807	22,412	22,533	22,655	22,777	-0.03%
Albury	GJ/Connection	941	932	911	902	906	910	914	0.09%
<b>Vic &amp; Albury</b>	<b>GJ/Connection</b>	<b>25,100</b>	<b>24,647</b>	<b>23,718</b>	<b>23,315</b>	<b>23,439</b>	<b>23,565</b>	<b>23,691</b>	<b>-0.02%</b>
Consumption per Average Connection									
Consumption/Connection	Units	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	Growth 2023-4-2027-8
Total VIC	GJ/Connection	290.70	334.32	351.91	354.23	356.60	357.98	359.44	0.53%
Albury	GJ/Connection	309.09	312.32	306.41	308.51	310.66	311.95	313.31	0.56%
<b>Vic &amp; Albury</b>	<b>GJ/Connection</b>	<b>291.39</b>	<b>333.49</b>	<b>350.17</b>	<b>352.46</b>	<b>354.82</b>	<b>356.21</b>	<b>357.66</b>	<b>0.53%</b>

### AGN Vic

Highlights of the AGN Vic Tariff C demand forecast include:

- demand is forecast to increase at an annual average rate of 0.50% between 2023-24 and 2027-28, from 8.0 PJ to 8.2 PJ: driven largely by an increase in demand per connection.
- closing connections are forecast to increase by 0.54% between 2023-24 and 2027-28, from 22,352 to 22,838 due largely to the continuation of the historical trend in net connections and the removal of ZCM.
- demand per connection is forecast to increase by 0.53% between 2023-24 and 2027-28, from 351.91 GJ to 359.44 GJ.

The following figures summarise a six-year history, two transitional years and a five-year forecast for the Review Period for the AGN Vic.

Figure 6.1 Commercial Demand (GJ)

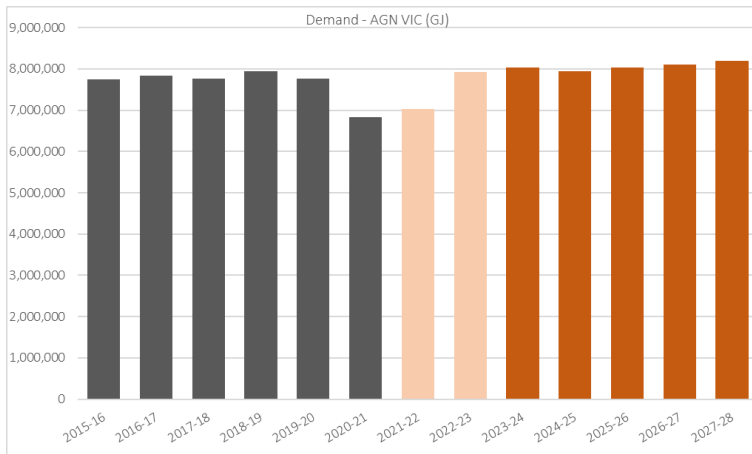


Figure 6.2 Commercial Connections (No.)

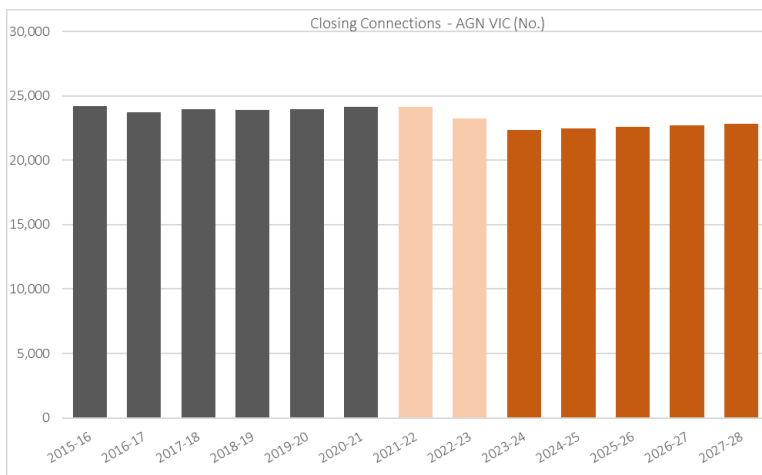
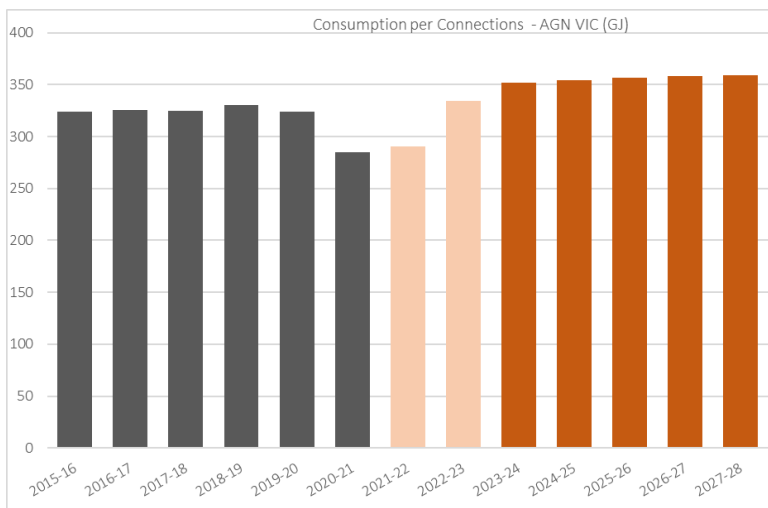


Figure 6.3 Commercial Demand per Average Connection (GJ)



## Albury

Highlights of the Albury Tariff C demand forecast include:

- demand is forecast to increase at an annual average rate of 0.65% between 2023-24 and 2027-28, from 279,046 GJ to 286,357 GJ: driven by increases in both connections and demand per connection.
- closing connections are forecast to increase by 0.44% between 2023-24 and 2027-28, from 900 to 916 due to the continuation of the historical trend in net connections.
- closing demand per connection is forecast to increase by 0.56% between 2023-24 and 2027-28, from 306.41 GJ to 313.31 GJ.

The following figures summarise a six-year history, two transitional years and a five-year forecast for the Review Period for Albury.

Figure 6.4 Commercial Demand (GJ)

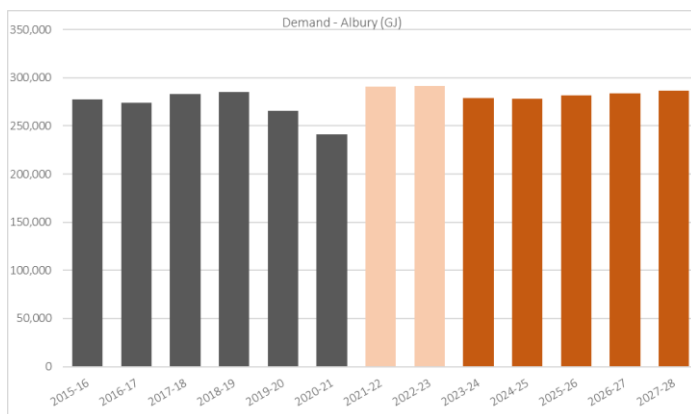


Figure 6.5 Commercial Connections (No.)

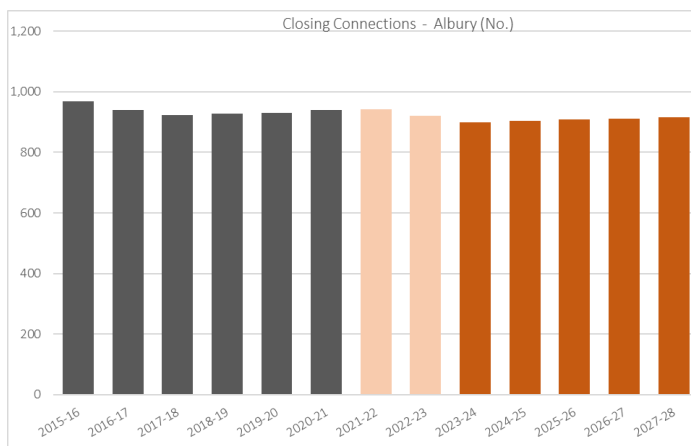
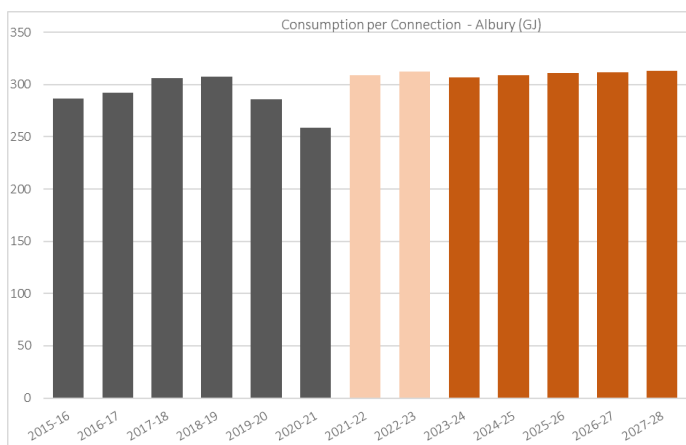


Figure 6.6 Commercial Demand per Average Connection (GJ)



Further detail relating to the derivation of Commercial Connections, Demand per Connection and Demand follow.

### 6.1.2. Commercial Connections

The forecast of commercial connections for AGN Vic and Albury is derived as follows:

- Actual connections for the 2020-21 financial year for both AGN Vic & Albury are used as the opening position for the 2021-22 transitional year
- Making an adjustment to AGN Vic opening connections based on actual YTD results – reduce by 111
- Adding net growth (decline) in connections for both AGN Vic & Albury, which is derived for each forecast year to 2027-28, based on the historical trend between 2008-9 and 2018-19, 0.54% for AGN Vic and 0.44% for Albury
- Deducting Zero Consuming Meters (ZCM), for AGN Vic only, which have been derived by analysis of AGN Vic historical consumption data, over the two-year period 2022-3 and 2023-4 – total of 2,072 for AGN Vic and 51 for Albury

The forecast AGN Vic and Albury Commercial connections, including the impact of each of the above factors, is summarised in the following table.

Table 6.2 AGN Vic and Albury Commercial Closing Connections

AGN Vic	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28
Opening	24,149	24,168	23,262	22,352	22,473	22,594	22,716
2022 adjustment based on May YTD actual	-111						
Trend increase (0.539%)	130	130	125	121	121	122	123
ZCM Removal		1,037	1,035				
<b>Closing</b>	<b>24,168</b>	<b>23,262</b>	<b>22,352</b>	<b>22,473</b>	<b>22,594</b>	<b>22,716</b>	<b>22,838</b>

Albury	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28
Opening	939	943	921	900	904	908	912
Trend increase (0.44%)	4	4	4	4	4	4	4
ZCM removal		26	25				
<b>Closing</b>	<b>943</b>	<b>921</b>	<b>900</b>	<b>904</b>	<b>908</b>	<b>912</b>	<b>916</b>

The resulting Closing connections are then used to derive a forecast of Average connections by calculating the sum of the opening and closing connections in each year and dividing the result by two, as summarised in the following table.

Table 6.3 AGN Vic and Albury Commercial Average Connections

Average Connections	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	Growth 2023-4-2027-8
Total VIC	24,159	23,715	22,807	22,412	22,533	22,655	22,777	-0.03%
Albury	941	932	911	902	906	910	914	0.09%
<b>Vic &amp; Albury</b>	<b>25,100</b>	<b>24,647</b>	<b>23,718</b>	<b>23,315</b>	<b>23,439</b>	<b>23,565</b>	<b>23,691</b>	<b>-0.02%</b>

### 6.1.3. Commercial Demand per Connection

The forecast of Commercial Demand per Connection is derived as follows:

- Actual demand per connection for the 2018-19 financial year is used as the opening position for the 2021-22 transitional year, on the basis that the following two-year results were impacted by COVID, and 2018-19 is a reasonable basis for the opening 2021-22 year.
- Adjusting 2021-22-year connections balance for actual YTD 2022 connections, extrapolated to 30 June 2022
- Applying the trend in D/C observed for the period 2008-9 to 2018-19 (adjusted for gas and electricity price movements) for each year from 2021-22 to 2027-28.
- Adjusting the historical trend and forecasts for the impact of price elasticity – both own and cross price
- Removing the demand attributable to ZCM customers (as modelled base demand is based on average for all connections) – for AGN Vic only.
- Adjusting the forecasts for the impact of price elasticity – both own and cross price, based on forecast movements in residential gas and electricity bills and related prices.

The forecast of AGN Vic & Albury Residential Demand per Connection, including the impact of each of the above factors, is summarised in the following table.

Table 6.4 Commercial Demand per Connection

<b>AGN Vic</b>	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28
Opening	330.73	290.70	334.32	351.91	354.23	356.60	357.98
Less adjustment for 2022 based on May 2022 YTD	-41.57						
Post COVID recovery		28.00					
Trend increase - elasticity adjusted	1.80	1.59	1.82	1.92	1.93	1.94	1.95
ZCM Impact		12.47	14.88				
<b>Subtotal</b>	<b>290.96</b>	<b>332.76</b>	<b>351.02</b>	<b>353.83</b>	<b>356.16</b>	<b>358.55</b>	<b>359.94</b>
Elasticity Adjustment	-0.09%	0.47%	0.26%	0.11%	0.12%	-0.16%	-0.14%
D/C post elasticity adjustment	<b>290.70</b>	<b>334.32</b>	<b>351.91</b>	<b>354.23</b>	<b>356.60</b>	<b>357.98</b>	<b>359.44</b>
<b>Albury</b>	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28
Opening	307.61	309.09	312.32	306.41	308.51	310.66	311.95
Trend increase in D/C	0.57%	0.57%	0.57%	0.57%	0.57%	0.57%	0.57%
ZCM Impact		8.52	8.48				
Movement - annual	1.76	1.77	1.79	1.76	1.77	1.78	1.79
D/C pre elasticity adjustment	<b>309.37</b>	<b>310.86</b>	<b>305.63</b>	<b>308.17</b>	<b>310.28</b>	<b>312.44</b>	<b>313.74</b>
Elasticity Adjustment	-0.09%	0.47%	0.26%	0.11%	0.12%	-0.16%	-0.14%
D/C post elasticity adjustment	<b>309.09</b>	<b>312.32</b>	<b>306.41</b>	<b>308.51</b>	<b>310.66</b>	<b>311.95</b>	<b>313.31</b>

Further explanation of the derivation of these elements of the forecast is set out in the following paragraphs.

### Long Term Trend Impact

CORE has determined the long-term average annual rate of change in demand per connection, based on actual (weather normalised) results for the ten-year period 2008-9 to 2018-19 – +0.55% for AGN Vic and +0.57% for Albury.

### ZCM adjustment

CORE has adjusted Demand per Connection for the impact of Zero Consuming Meters. This adjustment is required as modelled demand per connection is initially based on the average of all connections. Therefore, demand per connection must be adjusted to reflect the fact that ZCM's have no D/C, and thus the average D/C attributable to them within the base modelled demand must be added back, which increases D/C for the remaining Existing connections.

The calculation of the adjustment for the two impacted years – 2022-23 and 2023-24 is set out in the following table.

Table 6.5 Impact of ZCM removal on AGN Vic Residential Demand per Connection

Calculation Element	2022-23	2023-24
1. Opening Connections	24,168	23,262
2. Number of ZCM	1,037	1,035
3. 2 above divided by 1	4.3%	4.4%
4. Customer D/C	290.70	334.32
5. Impact of ZCM removal (3. x 4.)	<b>12.47</b>	<b>14.88</b>

Table 6.6 Impact of ZCM removal on Albury Residential Demand per Connection

Calculation Element	2022-23	2023-24
6. Opening Connections	943	921
7. Number of ZCM	26	25
8. 2 above divided by 1	2.8%	2.7%
9. Customer D/C	309.09	312.32
10. Impact of ZCM removal (3. x 4.)	<b>8.52</b>	<b>8.48</b>

### Price Elasticity Impact (Own and Cross Price Elasticity)

CORE has undertaken analysis of independent third-party disclosures to derive estimates of historical and future gas and electricity prices, as a basis for calculating annual movements in prices. Where data is not available in the public domain, CORE has addressed the gaps through rigorous research and analysis. CORE has used the same percentage movements in gas price and electricity price for both Residential and Commercial segments.

The following Table summarises the approach used to calculate the impact of Own and Cross Price elasticity on forecast Demand per Connection.

Table 6.7 Own Price Elasticity Impact on AGN Vic and Albury Residential Demand per Connection.

Calculation Element	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28
1. Derive estimate of movement in gas price for each year during the Review Period (and prior years due to Own Price adjustment being lagged over 5 years)	0.49%	-4.42%	0.19%	-1.27%	-0.03%	0.52%	1.25%
2. Derive an Own-Price elasticity adjustment based on the elasticity factors presented below.	-0.21%	0.14%	0.63%	0.43%	0.32%	0.12%	-0.12%
3. Derive estimate of movement in electricity price for each year during the Review Period	1.21%	3.33%	-3.79%	-3.15%	-1.92%	-2.81%	-0.14%
4. Derive a Cross-Price elasticity adjustment based on the elasticity factors presented below.	0.12%	0.33%	-0.38%	-0.32%	-0.19%	-0.28%	-0.01%
5. Determine the combined elasticity impact to apply against pre-elasticity adjusted D/C (4. + 2.)	<b>-0.09%</b>	<b>0.47%</b>	<b>0.26%</b>	<b>0.11%</b>	<b>0.12%</b>	<b>-0.16%</b>	<b>-0.14%</b>

The elasticity factors used are consistent with those approved by the AER in prior access arrangements.

The Cross-price factor is applied against the change in electricity price within the year. This results in a 0.10% change in demand for each 1% movement in electricity price.

The Own-Price factors are applied over five years as set out below and presented within the accompanying Demand model. This results in an 0.35% change in demand for each 1% movement in gas price.

Table 6.8 Own Price and Cross Price Elasticity factors used

Cross Price - Commercial	0.10
Own Price - Commercial	
$\Delta p(t)$	-0.06
$\Delta p(t-1)$	-0.16
$\Delta p(t-2)$	-0.09
$\Delta p(t-3)$	-0.03
$\Delta p(t-4)$	-0.01
<b>Total</b>	<b>-0.35</b>

Further detail of this calculation is available in the Demand model which accompanies this report

#### 6.1.4. Commercial Demand

Forecast Commercial demand is the product of Average Connections and Demand per connection as summarised in the following table.

Table 6.9 Commercial Demand

Consumption	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	Growth 2023-4-2027-8
Total VIC	7,022,858	7,928,314	8,026,028	7,939,144	8,035,383	8,110,064	8,186,970	0.50%
Albury	290,864	291,121	279,046	278,327	281,485	283,884	286,357	0.65%
<b>Vic &amp; Albury</b>	<b>7,313,723</b>	<b>8,219,436</b>	<b>8,305,074</b>	<b>8,217,470</b>	<b>8,316,868</b>	<b>8,393,948</b>	<b>8,473,327</b>	0.51%

## 7. Industrial, Tariff D Forecast

Table 7.1 Tariff D – Industrial Forecast Summary

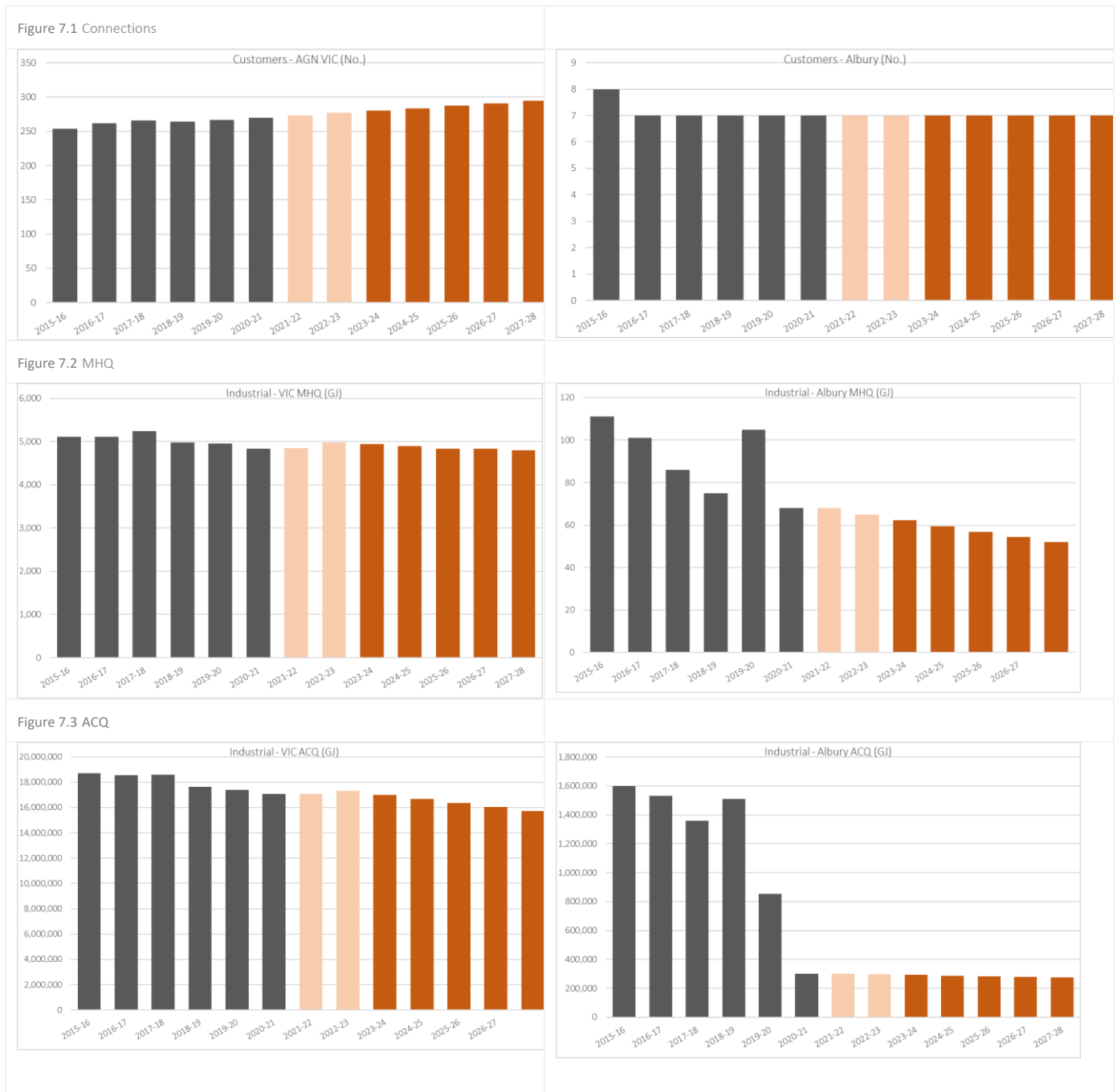
Closing Connections								
Closing Connections	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	Growth 2023-4-2027-8
Total VIC	273	277	280	284	287	291	294	1.24%
Albury	7	7	7	7	7	7	7	0%
<b>Vic &amp; Albury</b>	<b>280</b>	<b>284</b>	<b>287</b>	<b>291</b>	<b>294</b>	<b>298</b>	<b>301</b>	<b>1.21%</b>
Average Connections								
Average Connections	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	Growth 2023-4-2027-8
Total VIC	272	275	278	282	285	289	293	1.24%
Albury	7	7	7	7	7	7	7	0.00%
<b>Vic &amp; Albury</b>	<b>279</b>	<b>282</b>	<b>285</b>	<b>289</b>	<b>292</b>	<b>296</b>	<b>300</b>	<b>1.21%</b>
Consumption: MHQ								
Consumption	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	Growth 2023-4-2027-8
Total VIC Trend	4,837.00	4,940.66	4,902.62	4,864.87	4,827.41	4,790.24	4,753.35	-0.77%
Known adjustments	10.30	31.93	43.83	33.53	11.90	43.83	43.83	
<b>Total Vic</b>	<b>4,847.30</b>	<b>4,972.59</b>	<b>4,946.45</b>	<b>4,898.39</b>	<b>4,839.31</b>	<b>4,834.06</b>	<b>4,797.18</b>	<b>-0.76%</b>
Albury	68.00	65.04	62.20	59.49	56.89	54.41	52.04	-4.36%
<b>Vic &amp; Albury</b>	<b>4,915</b>	<b>5,038</b>	<b>5,009</b>	<b>4,958</b>	<b>4,896</b>	<b>4,888</b>	<b>4,849</b>	<b>-0.80%</b>
Consumption: ACQ								
Consumption	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	Growth 2023-4-2027-8
Total VIC Trend	17,064,003.43	17,268,501.55	16,928,312.07	16,594,824.33	16,267,906.29	15,947,428.53	15,633,264.19	-1.97%
Trend %	Equal 2020-21	-1.97%	-1.97%	-1.97%	-1.97%	-1.97%	-1.97%	
Known adjustments	18,849.60	58,433.76	80,205.05	80,205.05	80,205.05	80,205.05	80,205.05	
<b>Total Vic</b>	<b>17,082,853.03</b>	<b>17,326,935.29</b>	<b>17,008,517.10</b>	<b>16,675,029.35</b>	<b>16,348,111.31</b>	<b>16,027,633.56</b>	<b>15,713,469.22</b>	<b>-1.96%</b>
Albury	300,952.37	296,528.37	292,169.40	287,874.51	283,642.76	279,473.21	275,364.95	-1.47%
	Equal 2020-21	-1.47%	-1.47%	-1.47%	-1.47%	-1.47%	-1.47%	
<b>Vic &amp; Albury</b>	<b>17,383,805</b>	<b>17,623,464</b>	<b>17,300,687</b>	<b>16,962,904</b>	<b>16,631,754</b>	<b>16,307,107</b>	<b>15,988,834</b>	<b>-1.95%</b>

Highlights of AGN Vic and Albury Tariff D demand forecast include:

- AGN Vic: Connections increasing from 280 to 294; Albury stable at 7
- AGN VIC ACQ falling by -1.96% between 2023-24 and 2027-28, from 17.0 PJ to 15.7 PJ; Albury ACQ falling by -1.47%
- AGN Vic MHQ decreasing by -0.76% between 2023-24 and 2027-28, from 4,847 to 4,797 GJ; Albury MHQ falling by -4.36%

The following figures present charts of historical data and forecasts for Tariff D demand, connections, and demand per connection for the AGN Vic and Albury networks. CORE notes that historical data was considered from 2008-9 to 2020-21, however the historical time series has been shortened for chart presentation purposes. The full time series is set out in the accompanying demand model.





7.2. MHQ and ACQ Forecast

The MHQ and ACQ forecasting process involves two main elements:

- Applying a historical trend factor to opening year MHQ and ACQ (MHQ -0.77% for AGN Vic and -4.36% for Albury; ACQ -1.96% for AGN Vic and -1.47% for Albury). These factors are based on the observed trend during the 2011-12 to 2018-19 period. This period was selected as earlier years exhibited a varying trend due to historical circumstances not observed in subsequent years, and later years were impacted by COVID.
- Making known adjustments to demand in future years, based on survey response data.

## 8. AGN Vic Allocation of Connections and Demand by Zone

Core has allocated forecast connections, demand per connection and demand between the four AGN Vic network zones – Central, North, Murray Valley, and Bairnsdale, for the Residential and Commercial segments and Connections, MHQ and ACQ for the Industrial segment.

The allocation has taken the following factors into consideration:

- Historical trend (pre COVID) in connections and demand per connection
- Likely change in future trends having regard to publicly available research and references

The allocation commences with an allocation to regions other than the Central region and the Central region is then allocated the balance. The result is summarised in the following figures.

### 8.1. Residential Allocation

Figure 8.1 Residential Allocation - Demand

	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	Growth 2023-4-2027-8
<b>Demand</b>								
Central	26,812,193	26,758,082	26,069,289	25,454,802	24,905,415	24,219,702	23,621,911	
North	2,860,912	2,910,515	2,948,530	3,000,056	3,065,372	3,132,110	3,200,301	
Murray Valley	214,437	218,790	221,865	226,419	232,488	238,720	245,118	
Bairnsdale	223,812	230,683	236,997	244,376	252,805	261,524	270,545	
<b>Total</b>	<b>30,111,354</b>	<b>30,118,070</b>	<b>29,476,681</b>	<b>28,925,653</b>	<b>28,456,080</b>	<b>27,852,056</b>	<b>27,337,875</b>	<b>-1.87%</b>

Figure 8.2 Residential Allocation – Demand/Connection

	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	Growth 2023-4-2027-8
<b>Opening D/C</b>								
Central	45.61	45.32	44.45	42.71	41.16	39.73	38.14	
North	44.87	34.12	34.10	34.07	34.05	34.03	34.01	
Murray Valley	34.14	24.73	24.70	24.68	24.65	24.63	24.61	
Bairnsdale	24.75	44.37	43.52	42.68	41.86	41.06	40.27	
<b>Total</b>	<b>45.24</b>	<b>43.69</b>	<b>42.93</b>	<b>41.43</b>	<b>40.09</b>	<b>38.84</b>	<b>37.47</b>	
<b>Movement</b>								
Central	0.45	10.33	8.62	7.09	5.68	4.10	2.71	
North	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	
Murray Valley	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	
Bairnsdale	-0.87	-0.85	-0.84	-0.82	-0.80	-0.79	-0.77	
<b>Total</b>								
<b>Demand per Connection</b>								
Central	45.32	44.45	42.71	41.16	39.73	38.14	36.73	
North	34.12	34.10	34.07	34.05	34.03	34.01	33.99	
Murray Valley	24.73	24.70	24.68	24.65	24.63	24.61	24.58	
Bairnsdale	44.37	43.52	42.68	41.86	41.06	40.27	39.49	
<b>Total</b>	<b>43.69</b>	<b>42.93</b>	<b>41.43</b>	<b>40.09</b>	<b>38.84</b>	<b>37.47</b>	<b>36.25</b>	<b>-3.29%</b>

Figure 8.3 Residential Allocation – Connections

	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	Growth 2023-4-2027-8
<b>Opening Connections</b>								
Central	585,981	597,206	606,793	613,932	622,792	630,986	639,151	
North	82,929	84,786	85,942	87,123	89,074	91,069	93,109	
Murray Valley	8,554	8,792	8,923	9,058	9,310	9,569	9,835	
Bairnsdale	4,910	5,179	5,423	5,682	5,993	6,322	6,668	
<b>Total</b>	<b>682,374</b>	<b>695,963</b>	<b>707,081</b>	<b>715,795</b>	<b>727,169</b>	<b>737,945</b>	<b>748,762</b>	
<b>2022 Adjustment - YTD 2022</b>								
Central	-3,844							
North								
Murray Valley								
Bairnsdale								
<b>Total</b>	<b>-3,844</b>							
<b>New Net Connections</b>								
Central	15,069	14,176	11,726	9,861	9,195	9,166	9,073	
North	1,857	1,899	1,925	1,951	1,995	2,040	2,086	
Murray Valley	238	244	248	252	259	266	273	
Bairnsdale	269	284	297	311	328	346	365	
<b>Total</b>	<b>17,433</b>	<b>16,603</b>	<b>14,196</b>	<b>12,375</b>	<b>11,777</b>	<b>11,818</b>	<b>11,797</b>	
<b>Less ZCM</b>								
Central		3,588	3,587					
North		744	744					
Murray Valley		113	113					
Bairnsdale		39	38					
<b>Total</b>		<b>4,484</b>	<b>4,482</b>					
<b>Policy Impact</b>								
Central		-1,001	-1,001	-1,001	-1,001	-1,001	-1,001	
North								
Murray Valley								
Bairnsdale								
<b>Total</b>		<b>-1,001</b>	<b>-1,001</b>	<b>-1,001</b>	<b>-1,001</b>	<b>-1,001</b>	<b>-1,001</b>	
<b>Closing Connections</b>								
Central	597,206	606,793	613,932	622,792	630,986	639,151	647,223	
North	84,786	85,942	87,123	89,074	91,069	93,109	95,194	
Murray Valley	8,792	8,923	9,058	9,310	9,569	9,835	10,108	
Bairnsdale	5,179	5,423	5,682	5,993	6,322	6,668	7,033	
<b>Total</b>	<b>695,963</b>	<b>707,081</b>	<b>715,795</b>	<b>727,169</b>	<b>737,945</b>	<b>748,762</b>	<b>759,559</b>	<b>1.49%</b>
<b>Average Connections</b>								
Central	591,594	602,000	610,362	618,362	626,889	635,068	643,187	
North	83,858	85,364	86,532	88,098	90,072	92,089	94,152	
Murray Valley	8,673	8,857	8,991	9,184	9,439	9,702	9,971	
Bairnsdale	5,044	5,301	5,553	5,838	6,157	6,495	6,850	
<b>Total</b>	<b>689,169</b>	<b>701,522</b>	<b>711,438</b>	<b>721,482</b>	<b>732,557</b>	<b>743,354</b>	<b>754,160</b>	<b>1.47%</b>

## 8.2. Commercial Allocation

Figure 8.4 Commercial Allocation – Demand

	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	Growth 2023-4-2027-8
<b>Demand</b>								
Central	6,130,693	7,046,767	7,172,186	7,096,015	7,185,980	7,254,292	7,324,732	
North	756,754	748,725	724,601	716,097	723,518	731,016	738,591	
Murray Valley	62,694	61,834	60,166	59,332	59,307	59,282	59,257	
Bairnsdale	72,717	70,988	69,075	67,700	66,578	65,474	64,389	
<b>Total</b>	<b>7,022,858</b>	<b>7,928,314</b>	<b>8,026,028</b>	<b>7,939,144</b>	<b>8,035,383</b>	<b>8,110,064</b>	<b>8,186,970</b>	<b>0.50%</b>

Figure 8.5 Commercial Allocation – Connections

	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	Growth 2023-4-2027-8
<b>Opening Connections</b>								
Central	20,359	20,347	19,559	18,768	18,858	18,948	19,039	
North	3,295	3,314	3,196	3,077	3,095	3,113	3,131	
Murray Valley	368	373	369	364	369	375	380	
Bairnsdale	127	133	138	143	150	158	166	
	<b>24,149</b>	<b>24,168</b>	<b>23,262</b>	<b>22,352</b>	<b>22,473</b>	<b>22,594</b>	<b>22,716</b>	
<b>New</b>								
Central	99	99	95	90	90	90	90	
North	19	19	19	18	18	18	18	
Murray Valley	5	5	5	5	5	5	6	
Bairnsdale	6	7	7	7	7	8	8	
	<b>130</b>	<b>130</b>	<b>125</b>	<b>121</b>	<b>121</b>	<b>122</b>	<b>123</b>	
<b>Less 2022 Adjustment based on YTD</b>								
Central	-111							
North								
Murray Valley								
Bairnsdale								
	<b>-111</b>							
<b>Less ZCM</b>								
Central		887	886					
North		138	138					
Murray Valley		10	10					
Bairnsdale		2	1					
		<b>1,037</b>	<b>1,035</b>					
<b>Closing Connections</b>								
Central	20,347	19,559	18,768	18,858	18,948	19,039	19,129	0.48%
North	3,314	3,196	3,077	3,095	3,113	3,131	3,150	0.59%
Murray Valley	373	369	364	369	375	380	386	1.45%
Bairnsdale	133	138	143	150	158	166	174	4.89%
<b>Total</b>	<b>24,168</b>	<b>23,262</b>	<b>22,352</b>	<b>22,473</b>	<b>22,594</b>	<b>22,716</b>	<b>22,838</b>	<b>0.539%</b>
<b>Average Connections</b>								
Central	20,353	19,953	19,164	18,813	18,903	18,994	19,084	
North	3,305	3,255	3,136	3,086	3,104	3,122	3,140	
Murray Valley	371	371	366	367	372	378	383	
Bairnsdale	130	135	141	147	154	162	170	
<b>Total</b>	<b>24,159</b>	<b>23,715</b>	<b>22,807</b>	<b>22,412</b>	<b>22,533</b>	<b>22,655</b>	<b>22,777</b>	<b>-0.03%</b>

Figure 8.6 Commercial Allocation –Demand/ Connection

Demand/Connection	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	Growth 2023-4-2027-8
<b>Opening D/C</b>								
Central	293.55	301.22	353.16	374.26	377.19	380.15	381.94	
North	228.99	228.99	230.02	231.04	232.07	233.10	234.14	
Murray Valley	169.13	169.13	166.64	164.18	161.76	159.37	157.02	
Bairnsdale	558.91	558.91	524.01	491.30	460.62	431.87	404.90	
<b>Total</b>	<b>284.21</b>	<b>290.70</b>	<b>334.32</b>	<b>351.91</b>	<b>354.23</b>	<b>356.60</b>	<b>357.98</b>	
<b>Movement</b>								
Central	7.67	51.95	21.10	2.93	2.96	1.79	1.88	
North	0.00	1.02	1.03	1.03	1.03	1.04	1.04	
Murray Valley	0.00	-2.50	-2.46	-2.42	-2.39	-2.35	-2.32	
Bairnsdale	0.00	-34.89	-32.72	-30.67	-28.76	-26.96	-25.28	
<b>Demand per Connection</b>								
Central	301.22	353.16	374.26	377.19	380.15	381.94	383.82	
North	228.99	230.02	231.04	232.07	233.10	234.14	235.19	
Murray Valley	169.13	166.64	164.18	161.76	159.37	157.02	154.70	
Bairnsdale	558.91	524.01	491.30	460.62	431.87	404.90	379.62	
<b>Total</b>	<b>290.70</b>	<b>334.32</b>	<b>351.91</b>	<b>354.23</b>	<b>356.60</b>	<b>357.98</b>	<b>359.44</b>	<b>0.53%</b>

### 8.3. Industrial Allocation

The industrial allocation has regard to historical trends in connections, MHQ and ACQ, by aggregating annual values for each customer. Further adjustments are made based on survey response and known movements in specific customers within each zone.

The result is summarised in the following figure.

Figure 8.7 Industrial Allocation

Industrial	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	Growth 2023-4-2027-8
<b>Connections</b>								
Central	213	217	220	224	227	231	234	
Bairnsdale	3	3	3	3	3	3	3	
Murray Valley	7	7	7	7	7	7	7	
North	50	50	50	50	50	50	50	
<b>Total Vic</b>	<b>273</b>	<b>277</b>	<b>280</b>	<b>284</b>	<b>287</b>	<b>291</b>	<b>294</b>	<b>1.24%</b>
<b>MHQ</b>								
Central	3,356	3,466	3,434	3,402	3,369	3,337	3,305	<b>-0.95%</b>
Bairnsdale	20	21	22	23	24	26	27	<b>5.17%</b>
Murray Valley	380	386	391	397	403	409	415	<b>1.48%</b>
North total								
North less Survey History								
Base trend	1,081	1,068	1,055	1,043	1,030	1,018	1,006	<b>-1.19%</b>
North survey increase	10	32	44	34	12	44	44	
North Adjusted	1,091	1,100	1,099	1,076	1,042	1,062	1,050	<b>-0.91%</b>
<b>Total Vic</b>	<b>4,847</b>	<b>4,973</b>	<b>4,946</b>	<b>4,898</b>	<b>4,839</b>	<b>4,834</b>	<b>4,797</b>	<b>-0.76%</b>
<b>ACQ</b>								
Central	11,475,178	11,816,072	11,607,109	11,399,862	11,194,372	10,990,677	10,788,812	<b>-1.81%</b>
Bairnsdale	103,240	106,967	110,829	114,830	118,975	123,270	127,720	<b>3.61%</b>
Murray Valley	1,837,471	1,832,693	1,827,928	1,823,176	1,818,436	1,813,708	1,808,992	<b>-0.26%</b>
North	<b>3,666,964</b>	<b>3,571,203</b>	<b>3,462,650</b>	<b>3,337,162</b>	<b>3,216,328</b>	<b>3,099,978</b>	<b>2,987,945</b>	<b>-3.62%</b>
<b>Total Vic</b>	<b>17,082,853</b>	<b>17,326,935</b>	<b>17,008,517</b>	<b>16,675,029</b>	<b>16,348,111</b>	<b>16,027,634</b>	<b>15,713,469</b>	<b>-1.96%</b>

## 9. Validation

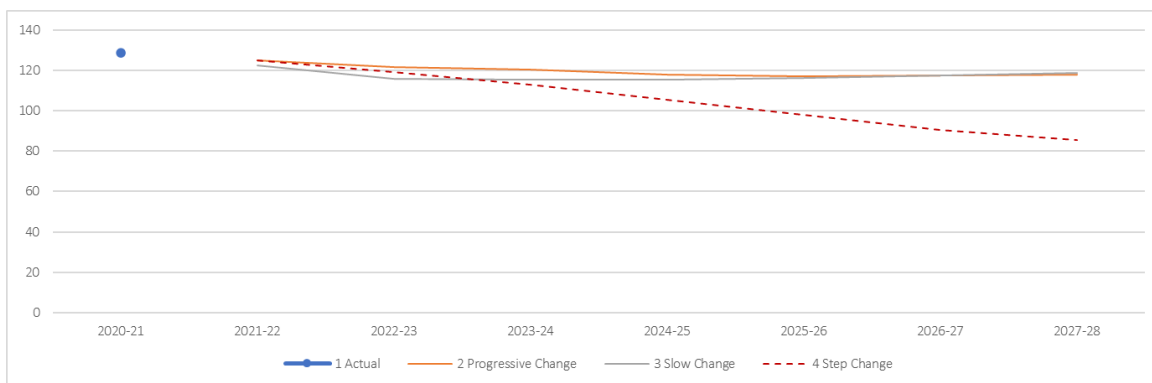
A key step undertaken by CORE, to ensure forecasts meet the requirements of the NGR, as summarised in the Introduction section of this report, is to validate inputs and results by reference to appropriate third-party disclosures:

- All inputs are from quality sources
- Results are cross-checked against analysis undertaken by highly qualified organisations

In this regard, forecast demand CORE has undertaken a comparison of its forecast against demand scenarios presented by AEMO in its 2022 Gas Statement of Opportunities (GSOO), as it relates to the Victorian R&C segment collectively. The GSOO does not provide the level of granularity required to separate Residential and Commercial elements. Further industrial demand combines Tariff D demand and industrial demand associated with customers outside distribution network and thus does not provide a suitable basis for validation purposes.

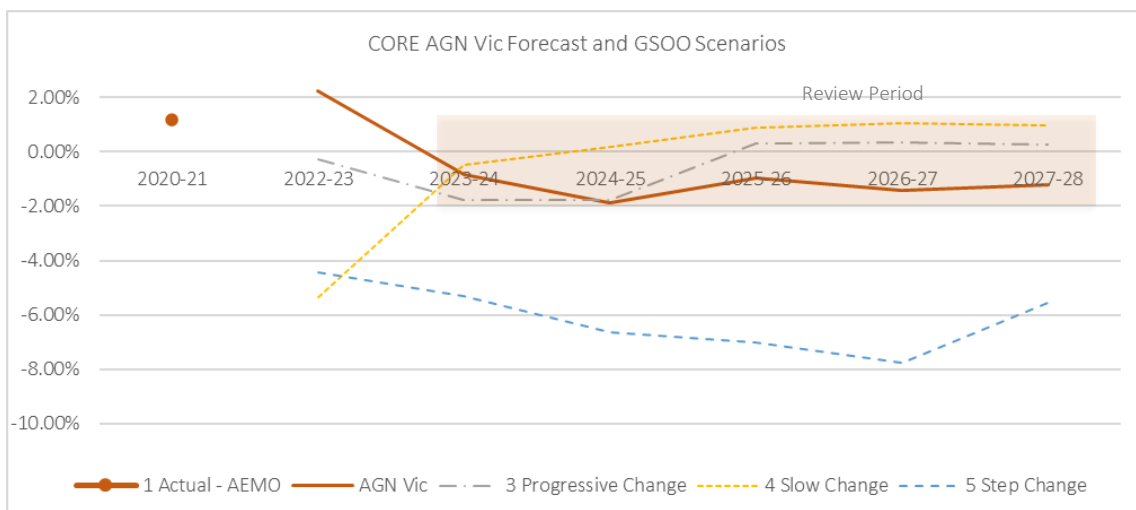
CORE considers the Progressive and Slow change scenarios to be the most appropriate for cross-check purposes, with Step change setting the lower boundary of potential demand for Victoria as a whole.

Figure 9.1 AEMO GSOO Scenarios – VIC R&C



The above time series is for Victoria R&C, as AEMO does not present forecasts by network. However, the annual demand movements can be compared against movements forecast by CORE for the AGN Vic network. The annual movements for the above AEMO scenarios and CORE’s forecast manual movements for AGN Vic network R&C demand (comparison not undertaken for Albury as outside the Vic area), is summarised in the following figure.

Figure 9.2 AEMO GSOO Scenario R&C annual movements and CORE AGN forecast annual movements



CORE has undertaken an analysis of the GSOO scenarios alongside the drivers of demand in its own forecast. CORE considers the variance between the AEMO scenarios to be reasonable on the following basis:

- **General:**
  - AEMO Victoria total vs AGN Vic specifically - AEMO does not differentiate between the trend between Victoria as a whole and the three major individual networks. The total Victorian trend will not necessarily reflect the trend relating to individual networks. CORE’s forecast does consider the AGN Vic network specifically.
  - CORE Forecast vs AEMO Scenario Analysis – CORE’s forecast is based on detailed actual data and information relating to the network, within the strict guideline of the NGR. AEMO scenarios are based on more broadly defined potential future forces.
  - Data Currency - AEMO’s scenarios are based on data which is less current than data considered by CORE (to June 2022). The GSOO report was released in March and was based on data which is likely to have been considered over numerous months prior to the release date. Further several inputs and assumption were based on 2021 data. For example, the gas price data used was dated December 2021 and released in 2022. Since the release of the report there have been significant increases in oil price linked LNG prices with consequences for retail gas prices relative to electricity.
  - GSOO specific issues - quotes from GSOO:
    - “Public policy and private investment in energy efficiency and electrification, which would reduce gas consumption. The extent to, and speed at, which business and household consumers switch from gas to electricity is uncertain.”
    - “The forecast level of annual domestic gas consumption varies widely across the range of plausible scenarios modelled in this GSOO, which assume different pathways for use of gas by industry, businesses, and households. The variation in future gas use between scenarios is apparent as early as next year and widens over the 20-year outlook period”.
    - “The number of households and commercial businesses connected to gas is forecast to fall under all scenarios and sensitivities except Low Gas Price, and to be lower than the 2021 GSOO forecasts in all scenarios and sensitivities”.
- **Forecasts/Scenarios**
  - **2021-22:** CORE’s forecast for 2021-22 is based on 11 months of actual data and therefore is the best estimate in the circumstances
  - **2022-3 to 2024-5:** There is a defensible variance between the CORE forecast and AEMO Progressive Scenario for the period, based on granular analysis of major drivers, including use of independent residential data from HIA
  - **2025-6 to 2027-8:** The CORE is more closely aligned with Commonwealth and Vic State targeted reductions in GHG emissions

## A1. Housing Industry Association (HIA) Dwelling Commencement Data

CORE has used dwelling commencement data sourced from the HIA (February 2022 edition), as an input to its Residential Connection forecasting model for the AGN Victoria network.

Following an analysis of a range of data series, CORE determined that the HIA data with the best fit against AGN Vic Net connections was the total dwellings starts, less 3 and 4 story residential blocks. CORE notes that the gas usage of average 3 and 4 storey blocks will classify them as Commercial connections.

The following Table summarises the HIA historical/actual dwelling commencement data used by CORE for regression analysis purposes (refer A.2 below).

Table 9.2 HIA Historical Data used by CORE for regression analysis purposes

Financial Year	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21
Total Dwelling Starts	51,625	64,872	68,423	64,179	75,631	62,255	58,886	67,121
Total Dwelling Starts - Lag 1	50,605	51,625	64,872	68,423	64,179	75,631	62,255	58,886
Total less 4 & 3 Storey	<b>37,900</b>	<b>39,264</b>	<b>43,272</b>	<b>48,163</b>	<b>47,077</b>	<b>54,023</b>	<b>48,397</b>	<b>47,035</b>

Following selection of the most robust regression model (refer A.2 below), CORE applied the resulting X coefficient and Intercept against the dwelling commencement projections provided by HIA, which are summarised in Table 8.3. CORE notes that the HIA projection series ended in 2025-26, which, when lagged by one year, provided the basis for the CORE 2026-27 forecast. In the absence of a better forecast CORE used the same projection of commencements used for the 2026-27 forecast to derive a forecast for 2027-28. CORE considers this to be reasonable given the downward/flattening HIA projection trend beyond 2023-24.

Table 9.3 HIA Projection Data used by CORE to forecast Net Residential Connections

Financial Year	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28
Total Dwelling Starts	65,355	55,432	51,040	50,443	51,610	53,382	
Total Dwelling Starts - Lag 1	67,121	65,355	55,432	51,040	50,443	51,610	53,382
Total less 4 & 3 Storey	57,684	54,478	45,684	39,163	37,034	37,189	37,189



## A2. Residential Net Connections – Regression Analysis

As outlined in the main body of this report, the Tariff R Connection forecast is based on linear regression analysis. The analysis is based on two data series:

- Historical actual dwelling completions data sourced from the Housing Industry Association, (HIA). The data used includes all dwellings other than three and four storey blocks, which are included within Tariff C due to average usage level). This data is lagged one year to provide an estimate of dwellings completions, which is the timing of any connection to the gas network. Further detail regarding the data series used is set out in A.1 above.
- Historical Net Residential New connection data sourced from AGN Vic for the period 2013-14 to 2020-21. The starting point was selected following an analysis of prior years, which indicated a significant change in trend commenced in 2013-14. CORE defined a range of models to determine the most statistically significant model, having regard to widely accepted tests.

The following table summarises the two data series used for regression analysis purposes.

Table 9.4 Data series used for Regression modelling analysis

Base Data								
	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21
Closing Connections	582,536	595,037	607,999	623,311	638,227	654,530	669,088	682,374
Net Connection Movement	12,004	12,396	13,067	15,312	14,916	16,303	14,558	13,268
HIA Data	37,900	39,264	43,272	48,163	47,077	54,023	48,397	46,823
Net/HIA	31.67%	31.57%	30.20%	31.79%	31.68%	30.18%	30.08%	28.34%

The model selected exhibited a strong statistical relationship, as evidenced by the following:

Table 9.5 Evidence of Statistical relationship between data series

Multiple R	0.9777
R Square	0.9559
Adjusted R Square	0.9471
Significance F	0.0001
X variable P value	0.0001

Accordingly, CORE applied the following X coefficient and intercept against the HIA future projections.

Table 9.6 Intercept and X variable coefficient

Coefficient X Variable	0.2782
Intercept	1438.3252

Table 9.7 HIA data

	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28
HIA Data	57,499	54,513	45,862	39,316	37,166	37,311	37,239

The result is the following forecast of Net residential connections

Table 9.8 Forecast net residential Connections

	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28
Forecast net connections	17,433	16,603	14,196	12,375	11,777	11,818	11,797
Net/HIA	30.32%	30.46%	30.95%	31.48%	31.69%	31.67%	31.68%

## A3. Victorian Government Energy Policy

### Introduction

Victoria has set targets to reduce greenhouse gas emissions by 28 to 33 per cent by 2025 and 45 to 50 per cent by 2030, as part of a broader commitment to achieve net zero emissions by 2050. In the 2020-21 State Budget, the Victorian Government committed to developing a Gas Substitution Roadmap to define a pathway to achieving these interim targets and net zero emissions.

CORE has undertaken a review of an extensive range of policy documents presented in the public domain, as a basis for defining which policies are expected to impact upon future demand within the AGN Vic network.

At the date of this report, many of the Programs proposed by the Victorian government have not been legislated, and therefore CORE considers there to be significant uncertainty in relation to both timing of future implementation and impact. CORE considers it prudent to focus its analysis on those Programs which have been implemented, with State budget support.

CORE's approach to forecasting, which incorporates analysis of historical trend in demand ensures that the historical impact of any programs is taken into consideration in developing forecasts. In addition, CORE considers it likely that one specific program will have a material impact on future demand within the AGN Vic network - the Victorian Energy Upgrades program (VEU) \$335 million heating upgrades program which targets 250,000 low-income households (including an estimated 150,000 households with old gas space heaters) to replace inefficient heaters with efficient reverse cycle air conditioners.

### Assessed Impact

CORE has forecast that the 250,000 homes will be impacted. Based on AGN Vic data relating to customers who use gas for room heating only (negligible use outside winter months), CORE estimates that 4.5% of these customers will become disconnected. The remainder are expected to substitute in favour of electricity room heating appliance replacement and a lower percentage of water heating appliance replacement – together averaging 26 GJ p.a. per household. This estimate is based on an analysis of the average room heating and water heating usage for AGN Vic customers. The allocation of this impact on each of the three main Victorian networks, has been based on residential connection share on 30 June 2021 as shown in the following tables.

Table 9.9 Network share of Vic gas connections

	Connections 30 June 2021	% Total Network Connections
<b>AGN VIC</b>	<b>682,374</b>	<b>32.4%</b>
Multinet	701,267	33.3%
Ausnet	738,801	34.3%
<b>Total Networks</b>	<b>1,383,641</b>	<b>100%</b>

The impact for AGN Vic includes two elements, involving 32.4% x 250,000 customers = 81,000 customers:

- a reduction in 6,005 connections, spread evenly over a six-year period (1,001 per year), and
- 74,995 customers who are forecast to reduce usage by an average of 26 GJ = 1.95 PJ, spread evenly over six years (12,499 customers per year x 26 GJ = annual demand reduction of 324,974GJ).

