



DRAFT DECISION
Australian Gas Networks
Victoria and Albury gas access
arrangement
2018 to 2022

Attachment 13 – Demand

July 2017

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Note

This attachment forms part of the AER's draft decision on the access arrangement for AGN's Victoria and Albury gas distribution networks for 2018-22. It should be read with all other parts of the draft decision.

The draft decision includes the following documents:

Overview

Attachment 1 - Services covered by the access arrangement

Attachment 2 - Capital base

Attachment 3 - Rate of return

Attachment 4 - Value of imputation credits

Attachment 5 - Regulatory depreciation

Attachment 6 - Capital expenditure

Attachment 7 - Operating expenditure

Attachment 8 - Corporate income tax

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Attachment 10 - Reference tariff setting

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Shortened forms

Shortened form	Extended form
AER	Australian Energy Regulator
AGN	Australian Gas Networks
ATO	Australian Tax Office
capex	capital expenditure
CAPM	capital asset pricing model
CESS	Capital Expenditure Sharing Scheme
CPI	consumer price index
CCP	Consumer Challenge Panel
DRP	debt risk premium
EBSS	Efficiency Benefit Sharing Scheme
ERP	equity risk premium
Expenditure Guideline	Expenditure Forecast Assessment Guideline
gamma	Value of Imputation Credits
GSL	Guaranteed Service Level
MHQ	maximum hourly quantity
MRP	market risk premium
NGL	national gas law
NGO	national gas objective
NGR	national gas rules
NPV	net present value
opex	operating expenditure
PTRM	post-tax revenue model
RAB	regulatory asset base
RBA	Reserve Bank of Australia
RIN	regulatory information notice
TAB	Tax asset base
UAFG	Unaccounted for gas
WACC	weighted average cost of capital
WPI	Wage Price Index

13 Demand

This attachment sets out our assessment of the demand forecasts for AGN for the 2018–22 access arrangement period. Demand is an important input into the derivation of AGN's reference tariffs. It also affects operating expenditure (opex) and capital expenditure (capex), which are linked to network growth (new connections).¹

13.1 Draft decision

We accept AGN's demand forecasts for the 2018–22 access arrangement period. Based on the information before us, we are satisfied that AGN's proposed demand forecasts comply with rule 74(2) of the National Gas Rules (NGR). This attachment discusses demand forecasts for both the Victorian and Albury networks, unless explicitly stated otherwise.

The reasons for the AER's decision are discussed in Section 13.4 below.

13.2 AGN's proposal

AGN engaged Core Energy Group Pty Ltd (CE) to prepare its demand forecasts in its Victoria and Albury networks for the 2018–22 access arrangement period. A summary of the key aspects of AGN's demand forecasts are set out in Table 13-1 (Tariff R and C) and Table 13-2 (Tariff D).

AGN separates Tariff V customers into tariff sub-categories: Tariff R (residential)² and Tariff C (commercial)³. Tariff D customers are AGN's largest business customers.⁴

¹ Our draft decisions on AGN's capex and opex are respectively set out in Attachments 6 and 7 to this draft decision.

² Customers that use gas for residential purposes. Please refer to AGN, *Final Plan - Access Arrangement Information for our Victorian and Albury natural gas distribution networks 2018-2022* – 20161222 (AGN, *Victoria and Albury Final Plan*, December 2016), p. 151.

³ Business customers who use less than 10 terajoules of gas each year (which equates to an annual retail gas bill of around \$200 000 or less). See AGN, *Victoria and Albury Final Plan*, December 2016), p. 151.

⁴ These customers are expected to consume more than 10TJ per annum. AGN, *Attachment 13.1 - Core Energy Group - Gas Demand Forecast - AGN Victoria and Albury Gas Access Arrangement 2018-22 - December 2016* (Core Energy group, *Gas Demand Forecast*, December 2016), p.70.

Table 13-1: AGN's demand forecasts for Tariff R and C for the 2018–22 access arrangement period (Victoria and Albury networks)

	2018	2019	2020	2021	2022
Net Residential Connection numbers	648,388	661,344	674,447	687,772	701,320
Residential Consumption per connection (GJ)	44.3	43.4	42.5	41.6	40.8
Tariff R Demand (TJ)	28,732	28,680	28,667	28,605	28,587
Net Commercial Connection numbers	22,511	22,658	22,806	22,954	23,103
Commercial Consumption per connections (GJ)	343.0	341.5	340.3	338.9	336.7
Tariff C Demand	7,722	7,737	7,760	7,779	7,778

Source: AGN proposed demand forecasts, AGN, *Victoria and Albury Final Plan*, December 2016. This includes estimates for Victoria and Albury.

Table 13-2: AGN's demand forecasts for Tariff D (GJ MHQ) for the 2018–22 access arrangement period (Victoria and Albury networks)

	2018	2019	2020	2021	2022
Demand (GJ MHQ)	6,260	6,261	6,291	6,293	6,295

Source: AGN Proposed demand forecasts, AGN, *Victoria and Albury Final Plan*, December 2016. This includes estimates for Victoria and Albury.

Notes: Industrial customers are charged on a capacity basis. AGN therefore forecast capacity measured as the maximum amount of gas expected to be used within a single hour (referred to as gigajoules (GJ) of Maximum Hourly Quantity (GJ MHQ))

AGN forecast total residential gas demand (Tariff R) to decrease by around 0.2 per cent per year over 2018–22 access arrangement period.⁵ This compares to 0.6 per cent per year in the current access arrangement period. This relatively flat state of

⁵ AGN, *Victoria and Albury Final Plan*, December 2016, p. 157.

growth is due to forecast reductions in consumption per connection of 2.2 per cent per year being offset by net customer growth of 2 per cent per year.⁶

AGN forecast total commercial demand (Tariff C) to increase by 0.2 per cent over the 2018–22 access arrangement period.⁷ This compares to 0.8 per cent per year in the current access arrangement period. This slight growth is due to a fall of 0.5 per cent per year in consumption per connection being offset by increases in commercial net connections of 0.7 per cent per year.⁸

Industrial demand is forecast to increase by 0.1 per cent over the 2018–22 access arrangement period. This compares to 0.9 per cent increase per year in the current access arrangement period.

13.2.1 Core Energy methodology

Forecasts of gas demand for Tariff R and C are based on a forecast of net connection numbers multiplied by forecast consumption per connection.

13.2.1.1 Forecasting Tariff R and C net connection numbers

For both Tariff R and C, CE used historical connection data from 2008 to 2015 as a starting point. This data was split by zone.⁹

To forecast these connection numbers, CE undertook regression analysis to determine whether a statistical relationship exists between the historical connections data and variables that might be drivers of connections growth.

For Tariff R on the Victorian network, the historical net connections data was regressed on Housing Industry Association (HIA) new dwelling starts data by type — detached and multi-unit — to determine what kind of statistical relationship, if any, exists between the two data sets. This statistical relationship informed the forecast for net connections. Forecast net connections for each year for each zone were then obtained by incorporating the net change in connections to the existing number of connections in 2015.¹⁰

For Tariff R on the Albury network, these forecasts were based on the historical annual average rate which CE assumed is likely to continue into the forecast period.¹¹

For Tariff C, CE was not able to establish a relationship between historical gross state product (GSP) and growth in Tariff C connections. CE therefore applied the average

⁶ AGN, *Victoria and Albury Final Plan*, December 2016, p. 156.

⁷ AGN, *Victoria and Albury Final Plan*, December 2016, p. 159.

⁸ AGN, *Victoria and Albury Final Plan*, December 2016, p. 159.

⁹ Central, North, Murray Valley, Bairnsdale and Albury.

¹⁰ Core Energy group, *Gas Demand Forecast*, December 2016, p.32.

¹¹ Core Energy group, *Gas Demand Forecast*, December 2016, p.48.

growth rate of new connections in the historical period between 2008 and 2015 to derive forecasts of net connections.¹²

For all Tariff R and Tariff C, CE also made a post-model adjustment, based on AGN's intention to remove all zero-consuming meters¹³ from the network over a two year period, beginning 1 January 2017 to 31 December 2018.

13.2.1.2 Forecasting Tariff R and C consumption per connection

The influence of weather conditions on Tariff R and Tariff C historical consumption per connection data (2008 to 2015) was removed through a weather normalisation process. Further, the historical impact of own and cross price elasticity effects were removed to avoid accounting for expected future changes twice when determining the impact of a forward price path on gas demand.¹⁴ For each zone, CE then analysed the drivers of growth in historical consumption per connection to determine whether this trend is likely to change over the forecast period. It then identified any adjustments required in forecast consumption per connection by examining whether a statistical relationship exists with key variables (such as government policy, efficient trends, appliance switching, and energy price movements).¹⁵

13.2.1.3 Forecasting Tariff D

For this customer group, CE has forecast annual consumption volumes/demand (TJ) and capacity (GJ MHQ). Typically, however, Tariff D customers are charged on a capacity basis, according to a rolling 12 month MHQ.¹⁶

CE categorised industrial customers into three distinct categories; namely, surveyed customers,¹⁷ customers whose historical consumption had a significant relationship with gross value add (GVA) and trend customers, which are those customers who do not fall into the other categories such that the forecast is based on historical trends.

CE forecast Tariff D demand by firstly reviewing the historical consumption levels for each individual industrial user. If survey results from users were available, CE used this information to inform it to forecast demand over the access arrangement period. For those Tariff D customers that belong to a particular segment (per the Australian and New Zealand Standard Industrial Classification (ANZIC) classification) but for whom survey results were not available, CE established a relationship between

¹² Core Energy group, *Gas Demand Forecast*, December 2016, p.36-7.

¹³ There are meters on AGN's network for which there is no associated consumption for a period greater than 12 months. This situation arises due to vacant properties or if supply has been cut off as a result of non-payment. Please see, Core Energy group, *Gas Demand Forecast*, December 2016, p.34.

¹⁴ Core Energy group, *Gas Demand Forecast*, December 2016, p.25.

¹⁵ Core Energy group, *Gas Demand Forecast*, December 2016, p.25.

¹⁶ Core Energy group, *Gas Demand Forecast*, December 2016, p.70.

¹⁷ GJ MHQ is forecast according to known load changes obtained via responses from surveys to customers (see Core Energy group, *Gas Demand Forecast*, December 2016, p.70).

changes in these customers' Tariff D demand GVA to forecast demand. For the remaining customers, their forecast demand was based on the historical trend.¹⁸

13.3 AER Assessment approach

The NGR require that access arrangement information for a full access arrangement proposal for a distribution pipeline must include usage of the pipeline over the earlier access arrangement period showing:

- minimum, maximum and average demand for each receipt and delivery point; and customer numbers in total and by tariff class for each receipt or delivery point.¹⁹
- to the extent that it is practicable to forecast pipeline capacity and utilisation of pipeline capacity over the access arrangement period, a forecast of pipeline capacity and utilisation of pipeline capacity over that period and the basis on which the forecast has been derived.²⁰

The NGR also require that forecasts and estimates:²¹

- are arrived at on a reasonable basis; and
- represent the best forecast or estimate possible in the circumstances.

We consider that there are two important considerations in assessing whether demand forecasts are arrived at on a reasonable basis and whether they represent the best forecasts possible in the circumstances.²² These are:

- the appropriateness of the forecast methodology – this involves consideration of how the demand forecast has been developed; and
- whether or not relevant factors have been taken into account in developing demand forecasts.

To determine whether AGN's proposed demand forecasts are arrived at on a reasonable basis and are the best possible forecasts in the circumstances, we have reviewed:

- information provided by AGN as part of its proposed access arrangement
- the data inputs used to implement the forecasting methodology.
- Core Energy's demand model and its report on AGN's demand forecasts
- AGN's Access arrangement information
- AGN's responses to the regulatory information notice (RIN).²³

¹⁸ Core Energy group, *Gas Demand Forecast*, December 2016, p.70).

¹⁹ NGR, r. 72(1)(a)(iii).

²⁰ NGR, r. 72(1)(d).

²¹ NGR, r. 74(2).

²² NGR, r. 74(2).

²³ AGN, *Attachment 1.6 - Albury RIN*, 4 January 2017 and AGN, *Attachment 1.5 - Victoria RIN*, 04 January 2017.

In making our draft decision, we had regard to:

- information provided by AGN as part of its proposed access arrangement;
- alternative methodologies for forecasting demand, while being cognisant of the idiosyncratic features of a given methodology compared to other possible alternatives;²⁴
- advice from ACIL Allen, who reviewed AGN's demand forecasts and provided independent advice on CE's methodology and assumptions; and
- additional information provided by AGN in response to our information requests.
- public submissions during the consultation process.

13.3.1 Interrelationships

We have considered the relevant interrelationships between different components of AGN's access arrangement as part of our analysis.

This includes the effect of forecast demand on the amount of conforming capex, efficient and prudent opex, and tariffs in the 2018–22 access arrangement period. In particular, the demand forecasts:

- impact approved tariff V connections capex, given the number of new connections affects the amount of approved connections capex
- impact approved opex, given the forecast total connections numbers and total consumption (output growth) is used in deriving the additional opex required to service the larger network
- impact tariffs, given they depend on forecast consumption (demand) per connection. In simple terms, tariffs are determined by cost divided by quantity (where quantity is measured by demand per connection). This means that an increase in forecast quantity has the effect of reducing the tariff
- are impacted by AGN's proposed marketing program.

13.4 Reasons for draft decision

We are satisfied that AGN's forecasting methodology and the assumptions applied for calculating demand are arrived at on a reasonable basis. As such we consider that AGN's demand forecasts represent the best estimate possible in the circumstance.²⁵

Similarly, the AER's Consumer Challenge Panel (CCP11) indicated they are satisfied with AGN's demand forecast, as the forecasts were consistent with the feedback that

²⁴ ACIL Allen, *Review of demand forecasts for Australian Gas Networks*, June 2017, pp. A-2.

²⁵ NGR, r. 74(2).

AGN received in during its stakeholder engagement process.²⁶ The reasons for our decision are discussed below.

13.4.1 Minimum, maximum and average demand

Under the NGR, AGN's access arrangement must include minimum, maximum and average demand for the earlier access arrangement period.²⁷ AGN's access arrangement information response to our RIN satisfy these requirements.²⁸

13.4.2 Forecast pipeline capacity and utilisation

The NGR require that to the extent practicable, the access arrangement information should include forecast pipeline capacity and utilisation of pipeline capacity over the access arrangement period.²⁹

AGN did not provide this information in its access arrangement information. However, AGN's distribution network is a meshed network made up of interconnected pipes, and there are a number of considerations that mean that calculating forecast capacity and utilisation is not practicable.

13.4.3 Demand forecasts for Tariff R and C

Consistent with ACIL Allen's conclusions, our draft decision is to accept AGN's forecast of Tariff R and Tariff C. We consider that AGN's forecasts of Tariff R and Tariff C consumption per connection and net connection numbers were arrived at on a reasonable basis and represent the best forecasts possible in the circumstances.³⁰ Similarly, the CCP11 indicated they are satisfied with AGN's demand forecast.

Notably, AGN's forecasts differ slightly to that of CE's, which do not account for any anticipated impacts of AGN's proposed marketing program. Attachment 7 discusses our draft decision on AGN's proposed marketing program. AGN's forecasts are adjusted to take account of the impact of this marketing program, which results in incremental increases of 293 new connections and loads of 0.3PJ over the 2018-22 access arrangement period.³¹ This adjustment appears reasonable to us.

Thus, for this draft decision we accept AGN's forecasts for Tariff R and Tariff C consumption per connection, net connection numbers and total demand forecasts for the 2018–22 access arrangement period. We note that the HIA forecasts were updated in March 2017, and expect AGN, in its revised proposal, to revise its forecasts for Tariff R net connections accordingly.

²⁶ Consumer Challenge Panel (CCP11), *Response to proposals from AGN, AusNet and Multinet for the 2018-22 access arrangement*, 03 March 2017, pp.39-40

²⁷ NGR, r. 72(1)(a)(iii)(A).

²⁸ AGN, *Victoria and Albury Final Plan*, December 2016, page 156-160

²⁹ NGR, r.72(1)(d).

³⁰ NGR, r. 74.

³¹ ACIL Allen, *Review of the Demand Forecasts for Australian Gas Networks*, April 2017, p. 14.

13.4.3.1 Forecast of consumption per connection

Weather normalisation

CE applied the Effective Degree Day (EDD) index which estimates a 'normal' weather trend. Based on 2008–2015 historical data this results in a long-term declining rate of –7.8 EDD per year.³²

In assessing CE's EDD index, ACIL Allen compared it against other recent studies of weather trends in Victoria, including AEMO's weather analysis in the 2016 National Gas Forecasting Report (NGFR).³³ CE's results are broadly consistent with AEMO's forecast of –6.8 decline in EDD per year for Victoria over the next 20 years. We agree with ACIL Allen's assessment that CE's weather normalisation methodology is sound and that its application leads to a reasonable estimate of future 'normal' weather.

Adjustments to the historical and future trend for Tariff R and C

CE adjusted the future trend to forecast Tariff R consumption per connection by applying an own price elasticity of –0.3 and a cross price elasticity of 0.1. For Tariff C consumption, it applied an own price elasticity of –0.35. Forecast gas prices were derived using CE's proprietary model, a methodology which we have accepted in previous determinations.³⁴ CE forecasts gas prices to increase during the access arrangement period due to wholesale price increases captures own price elasticity across four lagged periods (years).³⁵ Forecast retail electricity prices were based on the Victorian 2016-20 electricity distribution determinations.³⁶

Having regard to ACIL Allen's advice, we are satisfied with CE's assumption that recent activity suggests that gas prices, due to wholesale price increases, are likely to increase over the access arrangement period. We are also satisfied with the elasticity estimates forecast for the access arrangement period, and the resulting effect on Tariff R and C demand.

CE also found that certain economic variables such as GSP, Gross Household Disposal Income per capita and State Final Demand do not establish a reliable or

³² Effective Degree Day Index captures the combined impact of temperature, wind and sunshine on gas consumption. It attempts to take into account the weather-related parameters that may affect consumer behaviour in relation to gas consumption. Higher EDD corresponds to colder temperature and higher demand per connection, as more gas is required for heating; Core Energy group, *Gas Demand Forecast*, December 2016, pp. 41-46.

³³ ACIL Allen, *Review of demand forecasts for Australian Gas Networks*, June 2017, pp. 18-20.

³⁴ Core Energy group, *Gas Demand Forecast*, December 2016, p.53.

³⁵ Core Energy group, *Gas Demand Forecast*, December 2016, p.52.

³⁶ CE extrapolated the last two years. CE assumed that the movement in gas prices in 2021 and 2022 is equal to the movement observed in 2020. As for the Albury network, CE based the forecast on our determination on Essential Energy Distribution determination 2015/16 to 2018/19. CE extrapolated the movement in price based on the 2018/19 value. See Core Energy group, *Gas Demand Forecast*, December 2016, p.105-7.

statistically significant relationship to residential consumption per connection. As such, their impact was not included in the forecast. ACIL Allen agreed with this approach.³⁷

We accept CE's methodology and consider that the derived estimates are arrived at on a reasonable basis and represent the best estimate possible in the circumstances.

13.4.3.2 Forecast of new connection numbers

Consistent with ACIL Allen's conclusions, we consider that AGN's forecast of residential and commercial connection numbers is arrived at on a reasonable basis and represents the best estimate in the circumstances. We found that the methodology used to derive net connection numbers is sound.

We note that Origin Energy supports AGN's customer number forecasts.³⁸ However, the CCP11 questioned whether AGN has adequately allowed for decreases in penetration rates.³⁹ On further review, we are satisfied that, despite CE not explicitly relying on penetration rates in its methodology, implicit in the reduction in net connections growth is a reduction in penetration rates, that being 2 per cent per year over the forecast access arrangement period.⁴⁰

Residential net new connections

ACIL Allen has advised us that despite concerns about some aspects of CE's methodology,⁴¹ which is based on a statistical relationship between HIA new dwelling starts and net residential connections, the forecast is reasonable in the circumstances. In particular, the results of its sensitivity and comparative analysis did not differ significantly from that of CE's. For instance, it found that CE's residential new connection forecast is similar to a forecast of connection growth, trending the 2008-2015 average growth rate forward to 2022.⁴²

While the statistical relationship between new dwelling starts and net residential connections is not very strong, we recognise that this is likely due to the small sample size.⁴³ We agree with ACIL Allen's view that the CE model should be updated using the latest HIA housing forecast as part of AGN's revised access arrangement proposal.⁴⁴

In addition, ACIL Allen advised us that removing zero consuming meters is a primary contributor to the net connections forecast exhibiting a trend that is lower than the

³⁷ ACIL Allen, *Review of demand forecasts for Australian Gas Networks*, June 2017, p.29.

³⁸ Origin Energy, *Victorian gas access arrangement review 2018-22 - Response to gas distribution business' proposal*, 10 March 2017, p.2.

³⁹ Consumer Challenge Panel, *Response to proposals from AGN, AusNet and Multinet for the 2018-22 access arrangement*, 03 March 2017, pp.39-40

⁴⁰ This compares to the historical growth rate of 2.5 per cent over the 2008–15 period.

⁴¹ ACIL Allen, *Review of demand forecasts for Australian Gas Networks*, June 2017, p. 21-5.

⁴² ACIL Allen, *Review of demand forecasts for Australian Gas Networks*, June 2017, p.3.

⁴³ ACIL Allen, *Review of demand forecasts for Australian Gas Networks*, June 2017, p.4.

⁴⁴ ACIL Allen, *Review of demand forecasts for Australian Gas Networks*, June 2017, p.4.

historical average over the years 2008–15.⁴⁵ We have considered ACIL Allen's analysis in this regard and consider the forecast of Tariff R net connections to be reasonable.

We expect AGN to revise its Tariff R forecasts in its revised proposal based on the most recent HIA data

Commercial net new connections

In contrast to residential connection numbers, CE has applied the historical average annual growth to a base year (2015) to forecast net new commercial customers. This followed a step-change adjustment to remove zero consuming meters in 2017 and 2018.⁴⁶

CE has considered the relationship between GSP and historical commercial customers. The results did not establish a robust relationship. Therefore, we are satisfied that historical growth is a reasonable estimate in the circumstance.

ACIL Allen did not raise concerns with CE's methodology to forecast commercial new connections. In particular, ACIL Allen did not identify a significant relationship between economic activity and new commercial customer numbers.⁴⁷ ACIL Allen suggested that whilst other approaches to forecasting could be considered, it is unclear whether they would result in a more reliable forecast.⁴⁸

With respect to zero consuming meters, ACIL Allen attribute their removal to the net connections commercial forecast being 7.1 per cent lower than the historical trend.⁴⁹

Therefore, based on all the information before us, we consider that the commercial net new connections forecast is arrived at on a reasonable basis and represents the best forecast possible in the circumstances.⁵⁰

13.4.4 Demand forecasts for Tariff D

Consistent with ACIL Allen's assessment, we are satisfied that AGN's forecast for Tariff D customers is arrived at on a reasonable basis and the best forecast possible in the circumstances.

Given the widely differing characteristics of industrial customers, we agree with ACIL Allen's view that applying an econometric based forecasting approach is not ideal. Instead, we consider that CE's method of using survey results to forecast future gas

⁴⁵ ACIL Allen, *Review of demand forecasts for Australian Gas Networks*, June 2017, p.30.

⁴⁶ Core Energy group, *Gas Demand Forecast*, December 2016, p.62.

⁴⁷ ACIL Allen, *Review of demand forecasts for Australian Gas Networks*, June 2017, p. 27.

⁴⁸ ACIL Allen, *Review of demand forecasts for Australian Gas Networks*, June 2017, p. 28.

⁴⁹ ACIL Allen, *Review of demand forecasts for Australian Gas Networks*, June 2017, p. 31.

⁵⁰ NGR, r. 74.

demand for these customers is reasonable. AEMO also uses this methodology develop estimates for industrial customers' demand in the NGFR.⁵¹

In its review, ACIL Allen notes that there is an inherent degree of uncertainty in any forecast of industrial MHQ given the relatively small number of large industrial customers and the asymmetric nature of their MHQ requirements. For instance, the start-up or closure of just one industrial site could significantly change future MHQ requirements. Therefore, we accept CE's method of relying on customer surveys.

⁵¹ AEMO, *National Gas Forecasting Report, December 2016*, p.13.