

# **Mount Barker Natural Gas Extension**

## **Response to AER Draft Decision**

November 2018

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# Contents

<b>1.</b>	<b>Summary of our response</b>	<b>3</b>
1.1.	Satisfaction of NGR 79 under conservative modelling	3
<b>2.</b>	<b>Revised modelling</b>	<b>5</b>
2.1.	Revised base case assumptions	7
2.1.1.	Extension of growth in new residential connections to 30 years	7
2.1.2.	Extending the network to existing areas of Mount Barker	8
2.1.3.	New and existing homes in the nearby towns of Nairne and Littlehampton	9
2.1.4.	New residential apartments	10
2.1.5.	Additional parties looking to connect new gas loads in the region	11
2.2.	Sensitivity analysis	12
2.2.1.	Connection and Consumption sensitivity	12
<b>3.</b>	<b>Addressing stakeholder challenges</b>	<b>13</b>
3.1.	Penetration rate	13
3.1.1.	Suburbs used to determine penetration rate	13
3.1.2.	Future penetration rate	14
3.1.3.	Consistency between the areas used to derive the penetration rate and the forecast consumption	15
3.2.	Forecast average consumption	15
3.3.	Tariff sensitivities	16
3.4.	Economic value model	18
3.5.	Other stakeholder feedback	19

# 1. Summary of our response

Australian Gas Networks (AGN) has prepared this submission in response to the Australian Energy Regulator's (AER) draft decision on AGN's application for advance determination under National Gas Rule (NGR) 80 on its Mount Barker gas network extension (the draft decision).

We support the AER's draft decision to approve \$33 million of proposed capital expenditure (capex) for the Mount Barker gas network extension project, and welcome the careful and considered approach the AER has taken to determining the value of this extension to South Australian customers. We note that only the actual prudent and efficient capex incurred on the Mount Barker project will be included in the South Australian regulatory asset base.

The Mount Barker region has been designated as a growth zone by State Government<sup>1</sup>, therefore the extension and reticulation of the gas network into the area is of strategic significance for regional development in South Australia. While a small number of stakeholders have challenged AGN to provide more evidence to substantiate some aspects of the modelling assumptions (which we address in this submission), there is clearly a desire for natural gas in Mount Barker.

In its draft decision, the AER determined the Mount Barker network extension as conforming capex under NGR 79(2)(a) – the economic value test. The AER found the economic value modelling to be robust and remains positive under a number of sensitivities. The AER did not find the same with regard to the present value test under NGR 79(2)(b).

Our response to the draft decision is therefore focused on demonstrating that forecast capex for the Mount Barker network extension is also conforming under NGR 79(2)(b). Our revised modelling provides for a positive NPV of \$27.7 million compared to the June 2018 submission of \$5.3 million. It should be noted that through this response we are not seeking additional capex to be included in the AER's draft decision advanced determination approval of \$33 million.

## 1.1. Satisfaction of NGR 79 under conservative modelling

As highlighted by the AER in its draft decision, we have taken a number of steps to demonstrate that the Mount Barker extension project satisfies the NGR. These include liaising with the Mount Barker community, conducting detailed modelling, and substantiating assumptions.

The AER has also engaged a technical consultant (Zincara) to test the costs and efficiency of the forecast, and applying its own sensitivity analysis to our economic and present value modelling.

Zincara found that the forecast capex for the Mount Barker network extension conforms to NGR 79(1), determining that the costs and approach for the transmission pipeline, trunk reticulation, reticulation, metering and services are reasonable. As per Zincara's (and the AER's) recommendation, we have excluded the \$2.4 million capex contingency originally proposed, and confirm that only the actual amount of capex incurred on the Mount Barker project will be included in the regulatory asset base.

In its assessment of whether the proposed Mount Barker network extension capex meets the criteria of NGR 79(2), the AER found AGN's forecasting methodology to be fit-for-purpose and the forecasts to be justifiable. The AER's sensitivity analysis found the economic modelling is resilient to reductions in demand and payback period, and that the Mount Barker extension is justifiable on the grounds set out in NGR 79(2)(a) – that the overall economic value of the expenditure is positive.

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<sup>1</sup> Regional Development Australia, public submission on Mount Barker Gas Network Extension, September 2018.

The AER's analysis of the Mount Barker network extension project's present value assessment signaled that the \$5.3 million net present value (NPV) over 30 years estimated by AGN was not as robust as the overall economic value assessment, and that a 10-15% reduction in a number of inputs results in a negative NPV. However, the AER observed that several significant factors that are likely to result in an uplift in demand were not included in AGN's present value modelling, and that the modelling itself is conservative.

We agree that the economic and present value modelling put forward in our June 2018 proposal is conservative. We adopted this conservative approach, as we considered it prudent not to overstate the potential benefits of the Mount Barker network extension, and wanted to demonstrate that the project meets the requirements of the NGR with demand assumptions reflecting the absolute minimum expected project scope.

We also adopted this outlook to demonstrate that, despite such conservatism, the project still delivers a positive NPV and therefore will not disadvantage our existing customers.

However, recognising the relatively small positive NPV that results from the June 2018 present value modelling, allied with a number of challenges from stakeholders on modelling inputs, we have taken the opportunity in this submission to provide additional analysis.

We have performed revised modelling that takes into account some of the additional customer connections and demand factors not included in our initial modelling. This revised modelling considers items the AER highlighted were absent from the initial estimates, including:<sup>2</sup>

- *Potential incremental revenue in extending natural gas to adjacent areas.*
- *Additional parties looking to connect new gas loads in the vicinity of Murray Bridge and Monarto as well as improvement to the security of supply in the region.*
- *Positive impacts residential growth might have in supporting commercial and industrial activities and its usage of gas.*
- *Positive impacts gas infrastructure might have in supporting economic growth in the region.*

We also include updated residential customer growth assumptions (and consequential commercial growth assumptions) by extending the forecast growth period to 30 years rather than assuming no further connections after year 20.

Incorporating these additional factors into the modelling results in a less conservative forecast, and one which is more likely to reflect the actual demand we would expect as a result of natural gas being available in the Mount Barker region. It also strengthens the results of the initial present value modelling, resulting in a revised base case with a positive NPV of \$27.7 million over 30 years (compared with a \$5.3 million positive NPV in the June 2018 business case).

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<sup>2</sup> As listed by the AER in section 5.2.2 of its draft decision.



## 2. Revised modelling

The economic value and present value modelling AGN submitted as part of the June 2018 Mount Barker network extension business case incorporated the most appropriate information and assumptions available to support our minimum base case. As discussed, the AER observed in its draft decision that we were conservative in respect of the demand projections which underpin the revenue assumptions included in the present value modelling.

In responding to stakeholder feedback, we have reviewed and tested assumptions used in the modelling. The revised present value model has been prepared for the Mount Barker project to demonstrate the capex as conforming under NGR 79(2)(b).

The requirements of NGR 79(2)(a) and (b) are as follows:

*(2) Capital expenditure is justifiable if:*

- (a) the overall economic value of the expenditure is positive; or*
- (b) the present value of the expected incremental revenue to be generated as a result of the expenditure exceeds the present value of the capital expenditure;*

The AER in its draft decision considered the forecast capex satisfies the criteria under NGR 79(1) and the economic value test under 79(2)(a). Only the present value test under NGR 79(2)(b) has been called into question by the AER and stakeholders. Our response therefore focusses on satisfying 79(2)(b).

We recognise the concerns of some stakeholders that despite the clear economic benefits of the proposed natural gas network extension, if a positive NPV is not achieved, then existing customers may end up subsidising customers in Mount Barker.

Though we disagree that this scenario will arise, we recognise the value in being able to demonstrate more robustly that a positive NPV will be achieved under a variety of sensitivities.

We have therefore revised the June 2018 modelling to account for the following assumptions:

- residential customer growth across the 30-year NPV period, rather than assuming no more connections after year 20;
- positive impacts residential growth might have in supporting commercial and industrial activities and its usage of gas;
- the impact of rezoning of the Mount Barker town centre to allow high density apartment development;
- additional parties looking to connect new gas loads in the vicinity of Murray Bridge and Monarto;
- positive impacts residential growth might have in supporting commercial and industrial activities and its usage of gas;
- reticulation and connection of existing homes in the established areas of Mount Barker; and
- reticulation and connection of new and existing homes in the nearby towns of Nairne and Littlehampton.

This results in a revised base case that is less conservative than the June 2018 position, but is more likely to represent the actual demand that would occur if the natural gas network was extended into the Mount Barker growth corridor.

We have also adjusted the costs associated with the revised base case. The cost increases associated with the additional customer connections are developed using unit rates taken from our South Australia Access Arrangement capital expenditure forecasting model, as is the case for our proposal to connect existing customers, or from unit rates already utilised in the June 2018 submission.

We were however required to estimate a specific cost for the proposed trunk main extension to Nairne and Littlehampton. These costs are shown in Attachment 2.

Importantly, although the costs associated with the project have increased due to the addition of new customers, we are not seeking an advanced determination for capital expenditure in excess of the \$33.3 million approved by the AER in the draft decision. This reflects the fact that the additional customers are forecast to connect after 2020/21, reflecting the staged program of the network extension.

Adjustments to costs within the revised present value model can be summarised as per the below:

- removing the \$2.4 million capex contingency as per the draft decision;
- adding \$21.9 million of capex for reticulation of the network to connect existing residential customers in Mount Barker (not captured in the June 2018 modelling);
- adding \$2.9 million of capex for trunk main to the towns of Nairne and Littlehampton;
- adding \$12.7 million of capex for reticulation within Nairne and Littlehampton;
- adding \$27.9 million of capex for additional services and meters to connect the increased number of residential customers to our network; and
- adding \$3.3 million of capex for additional services and meters to connect the increased number of commercial and industrial customers

Note that these cost adjustments have been made to reflect the revised base case for modelling purposes. As per NGR 79, on completion of the Mount Barker extension project, only the prudent and efficient capital costs actually incurred will be included in the regulated asset base.

The results of the revised present value modelling, including the impact of the revised assumptions, is presented in the following table.

Table 2.1 – Present value modelling – revised base case

Driver	Assumption changes	NPV impact (\$M)
<b>Original NPV</b>		<b>5.3</b>
Capex contingency	Remove capex contingency	2.6
Residential connection growth rate	Continue growth in residential connections beyond year 20 at the same growth rate	1.1
Commercial connection growth rate	Continue growth in commercial connections beyond year 20 at the same growth rate maintaining ratio to residential connections	0.5
Mount Barker Existing Homes	Add in connections from Mount Barker existing township	6.1
Extension to Nairne & Littlehampton	Add in connections flowing from the connection of Nairne and Littlehampton existing townships. This is a mix of new and existing homes.	4.1
Impact of residential rezoning in Mount Barker	Add in additional multi-storey building connections due to the rezoning of the Mount Barker town. 1,000 apartments at 8.8GJ.	1.2
Additional Monarto load	Add in additional load modelled on the basis of recent queries from various commercial parties wishing to connect to the natural gas network in Monarto	6.8
<b>Revised NPV</b>		<b>27.7</b>

The NPV of the revised base case is \$27.7 million. This compares favourably with the conservative June 2018 estimate of \$5.3 million. It should be noted that \$10.2 million of this additional NPV is due to the additional scope, which now includes reticulation of the existing Mount Barker township and reticulation of Nairne and Littlehampton. If we only take into account the original scope of the project, the revised NPV is \$17.5 million. Again, this is a considerably more robust outcome than the conservative June 2018 modelling.

Further information on and rationale for the assumptions in the revised base case is provided in section 2.1.

The revised base case maintains the following assumptions from the June 2018 modelling:

- penetration rate for new residential connections – 95%;<sup>3</sup>
- average residential consumption – 27.3 GJ per year; and
- tariffs - Tanunda (R) and (C), Riverland (D).

We acknowledge the concerns raised by the CCP8 and ECCSA/MEU on whether these assumptions are appropriate, and have therefore revisited each of these during the course of developing the revised base case. We maintain that the penetration rate, consumption and tariffs applied in the original modelling remain reasonable, and have provided further information in section 3 to justify these.

However, we recognise that variations in the penetration rate, average residential consumption and tariffs can impact the robustness of the modelling, and it is important to be reasonably confident that a positive NPV will be returned if any of these assumptions change.

We have therefore conducted sensitivity analysis on the revised base case to demonstrate that the present value of the Mount Barker extension project remains positive if forecast demand (as a function of penetration rate and consumption) changes. This sensitivity analysis is presented in section 2.2.

## 2.1. Revised base case assumptions

### 2.1.1. Extension of growth in new residential connections to 30 years

One of the key assumptions we have updated in the revised base case is the continued growth in residential connections in the Mount Barker growth region. The June 2018 business case included a conservative estimate of 6,502 new residential connections (Tariff R) over the next 20 years.

This forecast was developed by Core Energy using the 2017 *Forecast.id* estimates to inform the number of new residential dwellings. Core Energy also used a mix of statewide and extension specific factors based on recent greenfield projects across South Australia that bear similarities in climate, customer profile and construction type that impact on expected penetration.

The June 2018 estimate assumes growth in Mount Barker occurs only in the first 20 years, with no new connections in the remaining ten years of the 30-year NPV period. We noted in our June 2018 business case that this was likely to underestimate the total economic value of the project, with the network mains and inlets continuing to serve the area for up to 60 years.<sup>4</sup>

However, Mount Barker District Council advised in its public submission that:

*The current actual rate of growth in Mount Barker is around 400 new dwellings per annum and a little over 1,000 new residents per annum.*

<sup>3</sup> A penetration rate of 71% is applied for connection of existing non-LPG residential customers in Mount Barker.

<sup>4</sup> AGN June 2018 business case, page 14



and that:

*The total forecast growth arising from the 2010 State Government rezoning is an additional 12,000 dwellings and around 31,000 people.*

We have therefore revised our forecast for new residential connections in the Mount Barker growth area. We have maintained the same growth rate (which is lower than that currently being experienced in Mount Barker as indicated by Mount Barker District Council) beyond the original 20 years to year 30. This results in 9,922 residential connections by year 30, and better reflects the total forecast development of 12,000 dwellings identified by Mount Barker District Council.

The impact of adding these additional residential connections to the base case modelling increases the NPV by \$1.1 million, even though there is minimal revenue captured for those connecting in the later years, i.e. we have not included revenue beyond year 30 even for customers who connect in year 29.

As per the forecast of new residential connections, we have also extended the forecast number of new commercial customer (Tariff C) connections in Mount Barker by ten years. This modelling reflects *the positive impacts residential growth might have in supporting commercial and industrial activities and its usage of gas.*<sup>5</sup>

Consistent with the original modelling, we have maintained the same ratio to residential connections. This results in 252 commercial connections by year 30, compared with the 165 assumed in the June 2018 business case.

The impact of this adjustment is a \$0.5 million increase in the NPV over 30 years.

The inclusion of ten years of additional new residential and commercial connections while maintaining the June 2018 growth rate sufficiently improves the robustness of the present value modelling and should help reassure stakeholders that a positive NPV will be maintained.

### **2.1.2. Extending the network to existing areas of Mount Barker**

As highlighted by the AER, our initial proposal did not include any revenue relating to reticulating the network to existing residential areas. We also noted in our June 2018 business case that there was likely to be opportunity to actively pursue<sup>6</sup> connecting existing homes in Mount Barker to the extension. We have therefore updated the base case to reflect the incremental revenue and costs associated with connecting the existing residential customers in established areas of Mount Barker.

Given the take up of gas by existing homes in established areas is typically lower than in new developments, we have applied a lower penetration rate than the 95% we would expect to achieve in new developments.

As with other modelling assumptions, we have used the best information available in the circumstances to develop a reasonable forecast. Again, we have used Mount Gambier which has a 71% penetration rate of existing homes.

For our revised modelling, we have therefore assumed a penetration rate that grows steadily to the 71% rate that represents the average penetration rate of existing suburbs in Mount Gambier. This results in the inclusion of 3,864 homes over the next 30 years. We have also applied an average household consumption of 27.3 GJ per year.

There are, however, additional capital costs associated with reticulating the natural gas network to reach these existing customers in established subdivisions. These include:

- Higher reticulation costs of [REDACTED] per meter with an assumed 17 metres per allotment; and

<sup>5</sup> AER, draft decision, section 5.2.2.

<sup>6</sup> AGN submission, pages 7 & 11

- Higher service cost of [REDACTED] per service.

As with our June 2018 submission, we have applied the same unit rates as those used to develop our South Australian capex forecast for the current 2015/16 to 2020/21 Access Arrangement period. Including the estimated forecast revenue generated from these existing customers, offset by the costs of connecting them, increases the NPV of the project over 30 years by \$6.1 million.

### **2.1.3. New and existing homes in the nearby towns of Nairne and Littlehampton**

Public submissions on the Mount Barker network extension June 2018 business case from Mount Barker District Councillors Debs Buchmann and Carol Bailey, expressed an interest in the natural gas network being extended to towns adjacent to Mount Barker by way of two public submissions.<sup>7</sup>

We have therefore investigated the potential for extending the natural gas network to the towns of Nairne and Littlehampton as part of the Mount Barker project.

Consistent with our assumptions for Mount Barker, we have assumed the lower take up of gas by existing homes in established areas of 71% (detailed above) and 95% for new homes in new subdivisions.

We have assumed average household consumption of 27.3 GJ per year. Nairne and Littlehampton are situated just north of Mount Barker, across the South Eastern Freeway, and therefore have a near identical climate to Mount Barker.

Based on 2016 Census data and information provided in Councillor Buchmann's submission, we have estimated potential connections and growth in Nairne and Littlehampton. The results are presented in the following table.

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<sup>7</sup> Debs Buchmann and Carol Bailey, submissions on proposed gas network extension to Mount Barker, September 2018.

Table 2.2 – Population and dwelling data for Nairne and Littlehampton, as per 2016 Census data

Town	Residence type	Population	Dwellings	People per dwelling
Nairne	Existing homes	5,042	1,995	2.5
	Forecast new homes	1,378	530 <sup>8</sup>	2.6
	<b>Total</b>	<b>6,420</b>	<b>2,225</b>	<b>-</b>
Littlehampton	Existing homes	3,044	1,171	2.6
	Forecast new homes	416	160 <sup>9</sup>	2.6
	<b>Total</b>	<b>3,460</b>	<b>1,331</b>	<b>-</b>
<b>Total</b>	<b>Existing homes</b>	<b>8,086</b>	<b>3,166</b>	<b>-</b>
	<b>Forecast new homes</b>	<b>1,794</b>	<b>690</b>	<b>-</b>
	<b>Total</b>	<b>9,880</b>	<b>3,856</b>	<b>-</b>

This results in the inclusion of 2,248 existing (71% of 3,166 dwellings) and 655 (95% of 690 dwellings) new homes over the next 20 years. This results in a residential growth rate that is reasonably consistent with that estimated by *Forecast.id*<sup>10</sup> for Mount Barker.

We have also assumed the same ratio of commercial customer growth per residential growth as has been applied to our Mount Barker forecasts. This results in 74 industrial and commercial customers connecting over the 20-year estimating period. We assume the statewide average of 273 GJ per annum consumption for commercial customers.

The additional capital costs associated with reticulating the natural gas network to reach the existing customers in the nearby towns of Nairne and Littlehampton are summarised below:

- Additional \$2.9 million to construct the trunk main (refer Attachment 2);
- Higher residential reticulation costs of [REDACTED] per meter for existing homes with an assumed 17 metres per allotment;
- Higher service cost of [REDACTED] per service for existing homes;

Including the estimated forecast revenue generated from these new and existing customers in Nairne and Littlehampton, offset by the costs of connecting them, increases the NPV of the project over 30 years by \$4.1 million.

#### 2.1.4. New residential apartments

Mount Barker District Council is updating its Development Plan to improve the town centre of Mount Barker, with rezoning changes that aim to reinforce the Mount Barker town centre as the main retail, business and service centre in the greater Adelaide Hills. The Mount Barker District

<sup>8</sup> Based on forecast subdivision advice from Mount Barker District Council.

<sup>9</sup> We do not have data on forecast subdivisions in Littlehampton; therefore as a conservative estimate we have forecast half the growth rate of Nairne.

<sup>10</sup> *Forecast.id*, December 2017.



Council is also promoting more residential development in the centre, including medium and higher density housing, and apartments built above retail space. This will provide housing choice, increase the social vibrancy of the area and support business activity.

Within this context, the target of the council is to approve approximately 1,000 dwellings in medium to high density housing (4-5 levels) within the town centre, as part of the Town Centre Capacity Vision.<sup>11</sup>

In order to forecast consumption, we have utilised the data available from comparable apartment blocks connected to our network. The data show average consumption of 8.8 GJ per year per apartment.

For the purposes of our revised modelling, we have assumed the 1,000 apartments will be developed as ten apartment blocks each containing 100 apartments, developed at a rate of one every second year.

Including this additional residential demand in the base case results in a \$1.2 million increase in the Mount Barker network extension NPV.

### 2.1.5. Additional parties looking to connect new gas loads in the region

Following a submission from SEA Gas, which highlighted the *strong demand for natural gas in the subject region*<sup>12</sup>, the AER observed in its draft decision that AGN's modelling is conservative in that it does not include *additional parties looking to connect new gas loads in the vicinity of Murray Bridge and Monarto as well as improvement to the security of supply in the region*.<sup>13</sup>

In its submission, SEA Gas advised:

*We have recently fielded several enquiries from parties looking to connect to our Port Campbell to Adelaide (PCA) transmission line to supply potential new gas loads in the vicinity of Murray Bridge and Monarto. Unfortunately, the relatively high cost of developing dedicated off-takes from the SEA Gas PCA pipeline has thus far prohibited such proposals coming to fruition. However, AGN's proposal to extend to Mount Barker via Monarto would establish an alternative supply source with economies of scale that would facilitate the establishment of new loads in the region.*<sup>14</sup>

We have identified three customers who had previously sought to locate in Monarto South but had not due to the lack of availability of gas. These potential customers included a food processing facility, pet food manufacturer and brewery, consistent with the type of industry government and council are attempting to attract to the region, with an average load of 240 GJ MDQ. We have therefore included in the revised base case a forecast of three additional industrial customers with a projected demand of 240 GJ MDQ each.

However, even with the addition of these three customers our forecast of demand for the Monarto South Industrial Precinct is still relatively conservative.

The total rezoned area in the precinct is 300ha. If we assume a typical lot size of 1ha and an 80% occupancy rate over 20 years there is capacity for 240 large businesses in Monarto South. Assuming 20% will require gas, this equates to 48 gas connections. Combined with the average

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<sup>11</sup> Mount Barker Development Plan Amendment can be found at:

<https://www.mountbarker.sa.gov.au/webdata/resources/minutesAgendas/03-7%20March%20%202016%20print.pdf>

<sup>12</sup> SEA Gas, public submission on Mount Barker Gas Network Extension, September 2018.

<sup>13</sup> AER, Draft Decision, section 5.2.2.

<sup>14</sup> SEA Gas, public submission, September 2018.



large businesses consumption of approximately 1,850 GJ per year, this delivers additional NPV in excess of \$10 million.

We have elected not to add this into our revised cash flow analysis due to the relative imprecision of these assumptions. We have however added three additional industrial customers at 240 GJ MDQ that we have included in our analysis. This increases the revised base case NPV by around \$6.8 million.

## 2.2. Sensitivity analysis

To test the robustness of the present value modelling, and to satisfy stakeholders concerns about some of the input assumptions, we have conducted sensitivity analysis on the revised based case. The sensitivity analysis on the present value modelling considers:

- changes in residential, commercial and industrial gas demand (as a function of changes in penetration rate and average annual household consumption); and
- changes to residential and commercial penetration rate.

The updated present value model is attached in Attachment 1.

### 2.2.1. Connection and Consumption sensitivity

To demonstrate the robustness of the project NPV, we have adopted a similar approach to that applied by the AER in its sensitivity analysis of the economic value modelling, whereby a percentage reduction in residential demand may be the result of either a change in penetration rate, a change in consumption, or a combination of both.

The results are presented in the following table:

Table 2.4 – Present value sensitivity analysis – revised base case

		Penetration Rate					
		0%	-5%	-10%	-15%	-20%	-25%
Consumption	0%	27.7	23.9	20.0	16.2	12.3	8.5
	-5%	25.8	22.0	18.3	14.5	10.7	7.0
	-10%	23.8	20.2	16.5	12.8	9.2	5.5
	-15%	21.9	18.3	14.8	11.2	7.6	4.0
	-20%	20.0	16.5	13.0	9.5	6.0	2.5
	-25%	18.1	14.7	11.3	7.9	4.5	1.1

The results show that our project NPV can withstand very significant combined reductions in the key inputs of consumption and penetration rate.

### 3. Addressing stakeholder challenges

Existing gas customers will not be made worse off by the proposed extension given the positive NPV under the conservative assumptions modelled in our original submission in June 2018, or this response to the AER's draft decision. That said, we acknowledge the additional scrutiny from the AER and from stakeholders (in particular the CCP8), and understand the need to alleviate concerns that a positive NPV might not materialise under the present value test in NGR 79(2)(b).

In response to concerns raised by stakeholders, we have revisited some of the key assumptions relating to residential demand. The key assumptions queried by stakeholders were the penetration rate and forecast consumption. In our June 2018 business case, we proposed:

- 95% penetration rate based on the average of penetration rates in comparable new development areas
- 27.3 GJ per year forecast residential consumption based on the Mount Gambier new development average

Stakeholders also queried the impact of different tariffs, and whether increasing gas prices and the onset of new technology would result in lower gas demand over the longer term.

We have therefore reviewed our base data and methodology and sought additional data to validate the assumptions made, as discussed in the following sections.

#### 3.1. Penetration rate

In the June 2018 business case we applied a 95% penetration rate for Mount Barker. This was based on the average penetration rate across new subdivisions of a comparable size and development type<sup>15</sup> to those in Mount Barker.

Stakeholders have challenged the 95% penetration rate used, in particular the:

- selection of the suburbs used in calculation of the penetration rate;
- continuation of current penetration rate into the future; and
- consistency between the areas used to derive the penetration rate and the forecast consumption.

Our responses to these challenges are presented below.

##### 3.1.1. Suburbs used to determine penetration rate

The CCP8 raises concerns regarding the selection of suburbs, stating:

*We find it key that AGN has selected those suburbs whose growth in gas customers over the 2011/12 to 2016/17 period falls within the top 10% of all suburbs, and that this we feel may have biased the results upwards.*<sup>16</sup>

We understand the CCP8's concern, however, the criteria we have applied is to select suburbs that have new land release of a similar scale to Mount Barker and whose growth in gas customers is in the top 10% of all suburbs. We consider this is an appropriate test as these are two conditions (combined) that reflect the likely scenario in Mount Barker. We fully expect the growth in gas customers in Mount Barker (should natural gas become available) to be in the top 10% of suburbs,

<sup>15</sup> As listed in Table 5 of AGN's *Mount Barker Natural Gas Extension Business Case*, June 2018.

<sup>16</sup> CCP8, *Submission to the AER – AGN application regarding Mount Barker*, October 2018. Pages 4-5.

and that the growth figures would reflect those seen in the top 10% of suburbs over the past five years.

### 3.1.2. Future penetration rate

The CCP8 also states:

*AGN is forecasting that the penetration rate of 95% will remain unchanged throughout the period 2021 to 2040. Whatever value is used as the starting value in 2021 (and as stated above we believe 95% may be too high), should that starting value remain unchanged throughout the period 2021 to 2040?*

The CCP8 suggests pricing increases may reduce take-up of gas, and echoes the views of the Alternative Technology Association (ATA), suggesting that the onset of new technology and decarbonisation of the gas network may lead to customers choosing alternative fuels sources to gas. The CCP8 suggests *it would be reasonable for AGN to comment on the changing energy environment and reflect that in its analysis.*<sup>17</sup>

We recognise the concerns of the CCP8 and the ATA, and as a business are actively pursuing alternatives to natural gas and how gas network infrastructure may be used in the future. The economics of gas versus electricity is a complex issue with many subjective variables. However, there remains no definitive conclusions as to the impact of electricity on gas usage in the coming decades, particularly at the micro level.

For example, while solar voltaic systems and heat pumps may have increased in popularity more broadly, evidence in Mount Barker shows customers moving away from these technologies due to costs and more significantly climate constraints.<sup>18</sup> Heat pumps do not work well in colder locations and solar thermal electric systems are inefficient in cloudier areas – Mount Barker has both these climactic traits.

While it is difficult to accurately predict consumer preferences, there is no evidence to suggest price increases or new technology take-up will advance sufficiently over the forecast period to indicate the penetration rate will decline (on average) between 2021 to 2040.

Gas has a price elasticity of -0.3. While this in itself is relatively low, there are additional factors that influence a customer's fuel choice. A potential gas price increase in isolation is likely not sufficient to drive new residential connections away from gas. Natural gas remains a cheaper alternative to grid-connected electricity for the foreseeable future.

More importantly, it is not clear whether electricity will be the energy source to displace natural gas in the long term. Research in Victoria shows that the cost of decarbonising heating through hydrogen conversion of gas networks is 40% cheaper than via electrification.<sup>19</sup> We see a bright future for the gas industry in Australia and consider the decarbonisation of gas infrastructure to be a more cost-effective way of achieving emissions reductions than electrification.

Therefore, it is feasible that natural gas consumption – and more significantly gas infrastructure – will remain a key component of South Australia's energy mix and that connecting to gas networks will continue to be a rational choice for energy consumers as we transition to a low emission economy.

Taking this into consideration, it is difficult to pinpoint when a slower take-up of gas might occur. Therefore, consistent with the requirements of NGR 74, our assumption that the penetration rate

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<sup>17</sup> CCP8, *Submission to the AER – AGN application regarding Mount Barker*, October 2018, page 5.

<sup>18</sup> Refer to analysis provided in Attachment 11B to the June 2018 business case.

<sup>19</sup> For more information, please refer to this document:

[https://www.energynetworks.com.au/sites/default/files/08232018\\_decarbonising\\_victorian\\_gas\\_consumption\\_-\\_final.pdf](https://www.energynetworks.com.au/sites/default/files/08232018_decarbonising_victorian_gas_consumption_-_final.pdf)



will remain consistent over the next 30 years is reasonable and reflects the best possible estimate in the circumstances.

### 3.1.3. Consistency between the areas used to derive the penetration rate and the forecast consumption

Zincara and the CCP8 raise concerns on the consistency between areas used to derive the penetration rate and the forecast consumption. The CCP8 suggests the penetration rate of Mount Gambier be applied, which is the area we have also used to derive forecast consumption.

We agree Mount Gambier is a reasonable proxy, however, the 71% penetration rate assumed by CCP8<sup>20</sup> does not reflect the penetration rate amongst *new* dwellings in Mount Gambier. Rather this is the penetration rate across *existing* dwellings, which will necessarily be lower than greenfield developments.

We have therefore conducted a street-by-street analysis of Mount Gambier to gather penetration data of new developments. The data show the average penetration rate for new development streets in Mount Gambier is 91%.

We note that this penetration rate will understate the true gas connection rate due to the time lag between when an electricity meter is installed relative to a gas meter. An electricity meter is installed in the early stages of construction (to provide power to site) whereas the gas meter is installed at the end of a build, just before completion of the home. There will therefore be some houses in this sample that are recorded as having an electricity meter but no gas meter, even if these houses will be connected to the gas network at completion.

We also note that Mount Barker's climate is slightly cooler than Mount Gambier and that the scale of housing development within Mount Barker is significantly larger than Mount Gambier and more akin to the penetration rates achieved in large developments in Adelaide. We therefore maintain that a penetration rate of 95% for new developments in Mount Barker remains a reasonable assumption.

## 3.2. Forecast average consumption

In the June 2018 business case, we used a 27.3 GJ per year average consumption rate for new Mount Barker residential customers who connect to the natural gas network. This was derived by looking at residential consumption in towns with similar climate and demographics to Mount Barker. Mount Gambier was selected as the town with most similar characteristics and therefore the average consumption per customer of Mount Gambier (27.3 GJ per year) was applied for Mount Barker.

The AER notes Zincara's view that:

*...AGN's forecast usage assumption is considerably higher than the SA state average of 15.5 GJ/annum, which is also trending downwards. This downward trend in consumption is also present in Mount Gambier (average consumption has declined from 30.2 GJ/annum to 25.3 GJ/annum over the 2012 to 2016 period).<sup>21</sup>*

With regard to Mount Gambier, 2017 consumption data (which has become available since the June 2018 submission), shows an increase in average consumption in Mount Gambier compared to 2016. This increase in consumption occurs despite 2017 being a warmer year, with lower heating degree-day (HDD) measures than 2016:

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<sup>20</sup> The CCP8 derived the 71% penetration rate by dividing the number of active gas connections (8509) by the number of active electricity connections (12036).

<sup>21</sup> AER, Draft Decision, page 9.



Table 3.3 – Mount Gambier average consumption and heating/effective degree-day data 2012-2017.

	2012	2013	2014	2015	2016	2017	Ave.
Mount Gambier average annual residential consumption 2012 - 2016 (GJ)	30.2	27.3	26.9	26.9	25.3	26.7	27.3
Heating degree days	1,616	1,526	1,483	1,637	1,616	1,579	1,576.2

Given its similarity in climate we maintain that Mount Gambier new build consumption is the most reasonable basis for forecasting residential consumption in Mount Barker (consistent with NGR 74). With no clear evidence of a likely reduction in currently existing demand levels, we maintain that that the initially proposed 27.3 GJ per year represents the best forecast for Mount Barker.

It is also important to note that while the residential gas consumption is an important modelling input, it is not the sole driver for the Mount Barker network extension. As suggested by several stakeholders<sup>22</sup>, commercial customers are likely greater drivers of demand than assumed in the June 2018 business case. This lends itself to the conclusion that the actual demand for natural gas likely to arise in the Mount Barker region will be greater than originally estimated and that the project NPV after 30 years is likely to be positive.

### 3.3. Tariff sensitivities

As requested by the AER<sup>23</sup>, we would also like to alleviate stakeholder concerns (specifically those of the CCP8 and of the Energy Consumers Coalition of SA (ECCSA) / Major Energy Users (MEU)) around current and future tariff strategies.

ECCSA/MEU states:

*The ECCSA/MEU does not oppose the proposed extension per se, but is very concerned that its implementation should not impose any additional cost to existing consumers connected to the AGNSA network. The ECCSA/MEU has observed over the years that gas networks have been extended where the commercial assessments have been not properly executed with the result that existing consumers have incurred additional costs for their gas transport as a result of such network extensions.<sup>24</sup>*

We confirm that recovery of costs for this project will be cost reflective, in that existing gas customers will not be disadvantaged as a result this investment.

AGN's tariffs are subject to periodic review both internally and by the AER. As part of this review, AGN must ensure its tariffs meet the requirements of NGR 94, which are:

- (1) *For the purpose of determining reference tariffs, customers for reference services provided by means of a distribution pipeline must be divided into tariff classes.*
- (2) *A tariff class must be constituted with regard to:*
  - (a) *the need to group customers for reference services together on an economically efficient basis; and*
  - (b) *the need to avoid unnecessary transaction costs.*

<sup>23</sup> AER, Draft decision Mount Barker Gas Network Extension, October 2018, page 14.

<sup>24</sup> ECCSA/MEU, public submission on *RE: Mount Barker Gas Network Extension*, September 2018, page 2.

- (3) *For each tariff class, the revenue expected to be recovered should lie on or between:*
  - (a) *an upper bound representing the stand alone cost of providing the reference service to customers who belong to that class; and*
  - (b) *a lower bound representing the avoidable cost of not providing the reference service to those customers.*
- (4) *A tariff, and if it consists of 2 or more charging parameters, each charging parameter for a tariff class:*
  - (a) *must take into account the long run marginal cost for the reference service or, in the case of a charging parameter, for the element of the service to which the charging parameter relates;*
  - (b) *must be determined having regard to:*
    - (i) *transaction costs associated with the tariff or each charging parameter; and*
    - (ii) *whether customers belonging to the relevant tariff class are able or likely to respond to price signals.*

These criteria help ensure tariffs are efficient and constrained within reasonable bounds that reflect the value of service. We will continue to structure tariffs efficiently and do not foresee existing users' tariffs increasing as a result of the Mount Barker network extension. There will also be further opportunity for review and testing of tariffs in the forthcoming South Australian access arrangement review process for 2021-2026, which will commence in less than two years' time.

We also suggest that the ECCSA/MEU's concerns regarding commercial assessments not being properly executed<sup>25</sup> are mitigated to the extent that the commercial analysis and regulatory scrutiny applied to the Mount Barker network extension proposal has been exhaustive.

The fact that the project is NPV positive under conservative assumptions, and that the positive NPV is greater (and more robust) when additional demand factors in the Mount Barker region are included, indicates our existing customers will not cross subsidise those in Mount Barker.

We have also sought to alleviate concerns regarding the impact of changing natural gas tariffs over time. The relatively small positive NPV (and the high economic value) could be perceived to be due to unrealistically low tariffs. Therefore, if natural gas network tariffs were to increase, price elasticity means a higher retail tariff would result in lower demand and less economic benefit for customers.

In respect of the tariff used to underpin the Mount Barker Network Extension proposal, we note that NGR 79(4)(a) effectively requires application an existing tariff – that is we cannot propose a new tariff as part of this project proposal to the AER.

That said, we have however modelled the impact on demand of a 10% increase to tariffs. Our analysis applies a price elasticity of -0.3<sup>26</sup>, consistent with that applied to develop our demand forecasts for the most recent South Australian and Victorian Access Arrangement reviews. This elasticity indicates that a 10% increase in retail residential tariffs would result in a 3% decrease in residential demand.

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<sup>25</sup> ECCSA/MEU, public submission on Mount Barker Gas Network Extension, September 2018, page 2.

<sup>26</sup> AER, Draft decision Australian Gas Networks access arrangement - Attachment 13 - Demand - November 2015 for price elasticity, page 12

Under a scenario of a 10% increase to tariffs, natural gas remains cheaper than competing fuels, delivers a reduction in demand of 3%, which is offset by the additional revenue delivered by the higher tariff. The impact on NPV of a 10% increase to tariffs is to increase it by \$5.6m.

Notwithstanding the increased revenue that would be received from the higher tariffs, our sensitivity analysis shows that under the revised base case, the NPV remains positive even with a 25% reduction in residential demand.

The present value and economic value of the Mount Barker gas network extension is sufficiently resilient against the above tariff changes, and therefore satisfies the criteria of NGR 79(2)(a) and (b).

### 3.4. Economic value model

The key drivers of net benefit derived in the economic value model are the lower price of natural gas compared to alternative fuels (LPG and electricity) and total demand for natural gas, offset by the capital costs of providing and connecting customers to natural gas.

We note the queries of our assumption in the economic value modelling that the energy mix of the average residential customer under the base case is LPG for cooking and hot water, and electricity for space heating. The queries stem from a view that as LPG costs are high it is not obvious that the average residential customer would connect to LPG.

However the current energy decisions made by customers in Mount Barker would suggest otherwise. We note:

- Most new developments in Mount Barker provide access to reticulated LPG, and the take up rate is close to 100%, and
- Despite significant rebates of around \$1,000, the installation of heat-pump and solar thermal hot water systems in Mount Barker is low, averaging 35 installations per year, compared to an implied failure rate of 500 and almost 300 for new home builds.

We provided further support that the use of gas for cooking and hot water is a reasonable and realistic assumption for Mount Barker households in Attachment 11B to the June 2018 business case. Further, as Frontier Economics notes:

*new homes in South Australia are required to install a low-emission water heater, which include gas instantaneous heaters or gas storage heaters (from mains gas or LPG) but do not include traditional electric storage heaters.<sup>27</sup>*

However, noting that the costs of LPG are high, and the economic value of switching to natural gas from an all-electric household rather than an LPG/electric mix may be lower, we did run the economic value assessment with the assumption that customers are switching from an all-electric household in our June 2018 business case.

The results of this showed that the Mount Barker extension case compared to an all-electric base case is expected to produce economic benefits of \$7-17m.<sup>28</sup> As noted above our revised base case sees a larger increase in benefits than the increase in capital costs giving us confidence the economic value of our revised base case is even greater than that in our initial proposal.

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<sup>27</sup> Frontier Economics, *Economic costs and benefits of the Mt Barker extension*, December 2017, footnote 2, page 11.

<sup>28</sup> +\$7m is based on solar electric hot water energy consumption at the controlled load tariff of 19.25c/kW with no boost at peak times, +\$17m is based on solar electric hot water energy consumption at the average residential tariff of 37.99c/kW



### 3.5. Other stakeholder feedback

The majority of stakeholder feedback on the Mount Barker extension has been positive, with seven out of the ten public submissions made to the AER supporting the project. Submissions from the Alternative Technology Association (ATA), ECCSA/MEU and the CCP8 challenge some of our modelling assumptions, and we have addressed these in the previous sections and via our updated modelling.

For completeness, the following table summarises the queries from stakeholders regarding the economic and present value modelling, and our response to allay their concerns.

We are happy to discuss our response to these queries with the AER upon request.

Area	Issue	Stakeholder	Response
Penetration rate	Why is AGNs forecast penetration rate of 95% so much higher than the overall state average of 74%?	CCP8	<p>The 74% average penetration rate provided in Attachment 6A is the total gas penetration rate for South Australia. This includes new suburbs where gas access is available across the whole suburb, as well as those suburbs that currently have little or no access to gas. The penetration rate is therefore an average of full penetration suburbs and low or no penetration suburbs.</p> <p>The NPV prepared for the Mount Barker project assesses the costs and benefits for a new subdivision where all households will have gas access, and consequently uses a penetration rate that reflects this (95%).</p>
Penetration rate	Why have those specific suburbs been selected to determine the penetration rate? How does this compare to the penetration rate for the existing LPG gas supply service in newer Mount Barker developments?	Zincara	<p>Refer to section 3.1.1.</p> <p>We believe that suburbs that have new land release of a similar scale to Mount Barker and whose growth in gas customers is in the top 10% of all suburbs is an appropriate test. This is because these are two conditions (combined) that reflect the likely scenario in Mount Barker. We fully expect the growth in gas customers in Mount Barker to be in the top 10% of suburbs, and that the growth figures would reflect those seen in the top 10% of suburbs over the past five years.</p>
Penetration rate	Have gas price increases in recent years and potential for consumers to choose alternative heating sources been considered in determining penetration rate?	ECCSA & MEU	<p>Frontier Economic analysis considers forward price curves for gas and electricity. The results are still positive. This suggests rises in gas prices are not enough to change the equation from positive to negative.</p> <p>Our assumption for space heating of 8.7 GJ per year on average reflects that most customers will choose reverse cycle heating. Actual gas consumption by space heaters is approximately 20 GJ per year.</p> <p>NGR requires use of most reasonable estimates at the time – our latest connection trends in new housing estates are the best indicator for this going forward.</p>
Penetration rate	Should modelled penetration rates be reducing over time to cater for gas pricing, changes in economics, efficiency and effectiveness of gas appliances or adoption of	CCP8	Refer to section 3.1.2.



new alternative  
technologies?

Penetration rate	Have the number of gas customers been counted properly in deriving the penetration rate?	CCP8	Both electricity and gas connections are a count of "active" connections and do not include disconnections or customers with locks on meters.
Penetration rate / Forecast consumption	Concerns with the relationship between gas consumption per customer and the gas penetration rate for new subdivisions given the decline in residential gas consumption in recent years. Need to consider the penetration rate of new subdivisions of similar size when considering the gas consumption per customer in these subdivisions	Zincara	<p>Refer to section 3.1.</p> <p>In our submission, we used the available data for each variable. We considered two options to address the concern raised.</p> <p>As stated in our submission, climate and demographics are the biggest drivers of average consumption and therefore new builds in Mount Gambier reflect the best available proxy for proxy for Mount Barker.</p>
Forecast consumption	AGN's use of Mount Gambier consumption to forecast usage for Mount Barker when this is considerably higher than the SA state average of 15.5 GJ/annum	Zincara	As discussed in the June 2018 business case, the average usage for South Australia, which is dominated by Adelaide is not an appropriate comparison to Mount Barker (or Mount Gambier). Both Mount Barker and Mount Gambier are significantly colder than Adelaide, and have climates more aligned with Melbourne, which has an average consumption of around 50 GJ per year.
Forecast consumption	Concerns that the average gas consumption (both for Mount Gambier and total SA) is trending downwards over time and taking an average of the last 5 years may therefore be inappropriate	Zincara / CCP8	The most recent (2017) data for Mount Gambier shows an increase compared to the prior year, back to a level similar to 2014 and 2015. This is despite 2017 being a warmer year, with lower Heating Degree Days (HDD) compared with 2016.
Forecast consumption	The basis has not been provided for using a constant annual gas consumption per customer for the period 2021 to 2036 and then a 1% drop in gas consumption due to appliance efficiency	Zincara / CCP8	<p>This is discussed on page 9 of the Core Energy Report - the source for the efficiency reduction comes from AEMOs 2016 NGFR estimate of consumption per connection decline.<sup>29</sup></p> <p>The lifecycle of appliances is assumed to be 15 years on average, after which time appliances are most likely replaced with more efficient new appliances, contributing to a lower demand on average per household.</p>
Forecast consumption	The ECCSA/MEU notes that CE has an expectation that gas usage reduction due to	ECCSA & MEU	The average consumption used for Mount Barker was derived from the most recent available new build data for Mount Gambier, which new builds would already include efficient appliance and housing design.

<sup>29</sup> AEMO, *National Gas Forecasting Report for Eastern and South-Eastern Australia*, December 2016, page 35 Table 20.

increased efficiency in gas using equipment will only occur after 2035 as equipment is replaced. This belies the fact that the new equipment installed now as a result of the network extension will already include more efficient plant than that deduced from historic residential gas usage

Merits of Gas	ATA contests AGN's claim that households will be \$900 per year better off by establishing new homes as dual fuel rather than all-electric	ATA	<p>The \$900 saving discussed in the Mount Barker Business case is based on a comparison with customers consuming grid-connected electricity, which remains the predominant source of electricity for customers.</p> <p>AGN accepts that comparison modelling performed by different parties, and under different assumptions and variables, can potentially produce materially different outcomes. AGN stands by the assumptions and modelling included as Attachment 11B.</p> <p>As noted by CCP8, gas is not part of the ATA's vision<sup>30</sup>.</p>
Merits of Gas	ATA contests AGN's claim that greenhouse emissions will be 52% lower for dual fuel households than all-electric ones	ATA	As above, the reduction in greenhouse emissions reflects a comparison against grid connected electricity.
Discount rate	<p>AGN has used its current (nominal, pre-tax) weighted average cost of capital of 6.42% as the discount rate for the NPV analysis.</p> <p>The ECCSA/MEU submission considers that this WACC rate is "low" relative to potential future forecast, and that a WACC based on the RBA expectation of future risk free investment will have a neutral value some 150-200 bp higher than current levels.</p>	ECCSA/MEU	While there is almost certainty that the WACC will change (up or down) over the 30-year period of the project benefits that are included in the NPV, the NGR requires us to apply the current WACC. Additionally, we note the rate used is higher than the 2.5% discount rate used in the ATA analysis.

<sup>30</sup> CCP8, *Submission to the AER – AGN application regarding Mount Barker*, October 2018, page 6