Zincara

From strategy to action

Mount Barker Project
Australian Gas Networks
AGN

Prepared for

AUSTRALIAN ENERGY
REGULATOR

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1.   EXECUTIVE SUMMARY

In its 2016-2021 Access Arrangement submission to the Australian Energy Regulator (AER), the Australian Gas Networks (AGN) included a project to extend its gas network to Mount Barker, a town located southeast of Adelaide. The AER at that time rejected the proposal due to lack of supporting evidence. AGN has resubmitted its proposal in 2018 with additional information and the project is now the subject of the review.

The AER has therefore engaged Zincara P/L (Zincara) to provide advice on the reasonableness of the project

AGN said the cost for the project is conforming capital under NGR Rule 79 (1) and 79 (2). AGN provided a report from Frontier Economics justifying the project. In addition, AGN provided a cash flow model showing that the project is NPV positive when considering the project over a 30 year timeframe.

Zincara has examined the economic model by Frontier Economics and the AGN's cash flow model. In addition, Zincara has also reviewed the inputs into the economic models:

- Forecast tariff
- Forecast number of gas customers and the gas demand
- Transmission pipeline planning and cost
- Trunk reticulation cost
- Reticulation, services and meter costs
- Operating costs

Zincara considers the key inputs to be reasonable except for the residential gas demand. The residential gas demand is calculated by multiplying the gas consumption per customer and the forecast number of gas customers. The forecast number of customers is determined by calculating the forecast number of new homes multiplied by the residential gas penetration rate. Zincara has concerns about how the gas consumption per customer has been derived and the gas penetration rate.

The gas consumption per customer proposed by AGN for Mount Barker is 27.3 GJ/annum which is the average gas consumption in Mount Gambier from 2012 to 2016. Mount Gambier has been used due to its similar environmental conditions to Mount Barker. However, as can be seen in Table 4, the gas consumption per customer in Mount Gambier has been declining from 30.2 GJ/annum in 2012 to 25.3 GJ/annum in 2016. Given the trend, Zincara believes that the latest year gas consumption per customer (i.e. 2016) should be used and not the average.   This is further supported by Oakley Greenwood's report "Gas Price Trends Review 2017". The report showed that gas consumption per customer in South Australia (Figure 5) has been in decline from 22.1 GJ/annum in 2005 to 15.5 GJ/annum in 2016.

AGN also proposed that the penetration rate should be 95% which reflects the average penetration rate of new subdivisions of similar size in Greater Adelaide. Given the declining consumption rate, Zincara believes that these new customers would be using less gas than

27.3 GJ/annum if the average for the whole state is 15.5 GJ/annum. Without further information on the gas consumption per customer in the subdivisions and further justification to show that these subdivisions are similar to Mount Barker, Zincara does not consider it reasonable to use the penetration rate of the subdivisions. It is also worth noting that the penetration rate in Mount Gambier is only 71%.

As the NPV analysis is sensitive to the gas demand and as such the penetration rate and the consumption per customer, the issues identified above have raised a number of questions including:

1. What is the consumption per customer of the comparable subdivisions used to determine the penetration rate for Mount Barker (Table 3)?

2. Is there a history of declining consumption in these subdivisions?

3. Apart from the size of the subdivisions, are there any other similarities between these subdivisions and Mount Barker that can support using the subdivisions as representative of Mount Barker?

4. Given the declining consumption in Mount Gambier from 2012 to 2016 (Table 4), why is the average consumption from Mount Gambier used instead of the 2016 consumption?

5. If Mount Gambier has similar weather conditions as Mount Barker, could the Mount Gambier penetration rate be used for Mount Barker?

6. CE has used an annual 95% penetration rate, for the period 2021 to 2040, should there be some variation to reflect the current fluid energy markets (e.g. price of gas, solar cells and development in appliances)?

7. CE has also used constant annual gas consumption per customer for the period 2021 to 2036 and then a 1% drop in gas consumption due to appliance efficiency? What is the basis for this assumption?

Zincara therefore considers that the project would only comply with the relevant rules in the NGR if AGN's residential demand is resolved and the resultant scenario results in a positive NPV.

2. INTRODUCTION

2.1 BACKGROUND

In its 2016-2021 Access Arrangement submission to the Australian Energy Regulator (AER), the Australian Gas Networks (AGN) included a project to extend its gas network to Mount Barker, a town located southeast of Adelaide. The AER at that time rejected the proposal due to lack of supporting evidence. AGN has resubmitted its proposal in 2018 with additional information and the project is now the subject of this review.

The AER has therefore engaged Zincara P/L (Zincara) to provide advice on the reasonableness of the project. The specific terms of reference are:

- Review of project costing, staging and route selection;

- Review of economic assessment methodology;

- Review of key assumptions that underpin the economic analysis;

- Comment on the robustness of the sensitivity analysis; and

- Overall reasonableness of this application in meeting Rule 79 of the National Gas Rule (i.e. conforming capex of the NGR).

2.2 NATIONAL GAS RULE (NGR) RULE 79

The relevant section of the Rule 79 relating to this assignment is as stated below:

(1) Conforming capital expenditure is capital expenditure that conforms with the following criteria:

(a) The capital expenditure must be such as would be incurred by a prudent service provider acting efficiently, in accordance with accepted good industry practice, to achieve the lowest sustainable cost of providing services;

(b)The capital expenditure must be justifiable on ground stated in subrule (2)

(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; or

(c)The capital expenditure is necessary:

(i)To maintain and improve the safety of services;

(ii) To maintain the integrity of services; or

(iii) To comply with a regulatory obligation or requirement; or

(iv) To maintain the service provider's capacity to meet levels of demand for services existing at the time the capital expenditure is incurred (as distinct form projected demand that is dependent of an expansion of pipeline capacity); or

(d) The capital expenditure is an aggregate amount divisible into 2 parts, one referable to incremental services and the other referable to a purpose referred to in paragraph (c), and the former is justifiable under paragraph (b) and the latter under paragraph (c).

AGN stated that its Mount Barker's proposal is justified under Rule 79 (1) and Rule 79 (2).

2.3   APPROACH

Zincara's approach in assessing the reasonableness of AGN's application in meeting Rule 79 of the NGR is to carry out a desktop review of the business case and the supporting documentation provided by AGN. In carrying out its assessment, Zincara has accepted the information and data provided by AGN as accurate and has not verified the veracity of the information.

In the business case, Zincara examined how AGN has developed its economic benefit, the key inputs and the key assumptions used in the economic test. Zincara also reviewed the supporting documentation provided by AGN and the relevance of the supporting documentation in support of AGN's submission.

The conforming capital must also comply with NGR Rule 79 (1) (a) a stated in section 2.2. As such Zincara has applied the following tests in relation to prudence and efficiency:

"Prudence", means *caution in managing one's activities to avoid undesirable consequences[1]*. In the context of this project, Zincara has interpreted this to mean that for the project to proceed, the business case justifying the project, must be based on relevant, accurate and efficient data.

'Efficiency' means *functioning or producing effectively and with the least waste of effort[1].* This means that the choice of which option to adopt for the project must be made on the basis that the most effective solution has been adopted. The "least amount of effort" refers to the cost of the project and in that context the project must be carried out at market rates.

"Good industry Practice" means the actions that a prudent operator would adopt in similar Australian conditions.

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[1] Australian Concise Oxford Dictionary

3.   MOUNT BARKER JUSTIFICATION

3.1   INTRODUCTION

Mount Barker is 36 kms southeast of Adelaide. AGN said[2] that it is the largest town in the Adelaide Hills with a population of approximately 14,000 people and the Mount Barker region is one of the fastest growing areas in South Australia. The Mount Barker region includes Littehamption, Nairne and Kanmantoo which have manufacturing, food processing, logistics and mining businesses.

In 2010, the South Australian Government re-zoned surrounding rural land to residential, making available 1,300 hectares of land to be developed. The South Australian Government also released its 30-year plan for Greater Adelaide in 2010 and the plan identified the Mount Barker region as a key part of its Adelaide urban land supply. AGN indicated that multiple medium and large density estates are being developed in the east, south and west of Mount Barker and it expects approximately 6,800 new homes to be built in the next 20 years.

The area is currently not served by natural gas but does have some LPG reticulation. AGN believes that there is justification for extending the natural gas network to Mount Barker.

3.2   INVESTMENT ASSESSMENT

Under NGR Rule 79 (2), the capital expenditure is justified 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 result of the expenditure exceeds the present value of the capital expenditure.

AGN submitted that the project is justified under both (a) and (b).

3.2.1   Economic Value Test

AGN engaged Frontier Economics to undertake an analysis to determine if the Mount Barker project is justified by Rule 79 (2) (a). Frontier Economics concluded that the quantifiable benefits exceeded the economic costs of the Mount Barker project. In its report[3], Frontier Economics said:

"….. the net present value of the quantifiable benefits over the period 2019/20 to 2049/50 under our preferred approach is approximately $70 million and the net present value of the

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[2] Mount Barker Natural Gas Extension Business Case June 2018.
[3] Attachment 10 Frontier Economics – Economic Costs and Benefits of the Mt Barker Extension Final Report June 2018

economic costs of the Mt Barker extension over the same period is approximately $40 million. The result is a quantified net economic benefit of approximately $30 million."

Zincara has reviewed Frontier Economics' final report and does not have an issue with the conclusions reached by Frontier Economics.

3.2.2   Incremental Revenue Test

AGN carried out the incremental revenue test which compares the incremental revenue (revenue less operating costs) to the capital costs of the extension on a cash flow basis. AGN advised its model showed a positive out NPV outcome of $5.1 million over 30 years.

AGN's cash flow model[4] contained the details of the costs and revenue assumptions.

Zincara has examined the cash flow model and does not have an issue in relation to the conclusions.

3.3   ASSUMPTIONS TO THE ECONOMIC MODEL

The inputs used by the economic value test and the incremental revenue test are similar. Zincara has therefore reviewed the following key inputs:

- Forecast tariff;
- Forecast number of gas customers and the gas demand;
- Transmission pipeline planning and cost;
- Trunk reticulation cost;
- Reticulation, Services and meter costs; and
- Operating costs

3.4   FORECAST TARIFF

Under NGR 79 (4) (a), AGN is required to assess the project viability using prevailing tariffs or an estimate of the reference tariff that would have been set for comparable services. AGN has therefore used the Tanunda tariff for the Mount Barker residential and commercial customers. AGN advised that this is the most recent tariff approved by the AER for a major network expansion to service a new area at the fringe of the Adelaide metropolitan area.

Demand customers are subject to different tariffs depending on their locations. AGN has used the Riverland tariff for Monsanto South, Kanmantoo and Mount Barker. AGN said that these areas are close to the Riverland region.

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[4] 2018-06-05_Attachment 12-Mount Barker cashflow model _ confidential

Details of the tariffs are provided in the table below.

Table 1 Reference Tariffs

	$2017/18
Tariff R Tanunda Residential customers	
Fixed charge (per day)	0.3023
First 0.274 GJ (per GJ)	34.0875
Next 0.0219 GJ (per GJ)	15.0908
Additional GJ (per GJ)	5.1985
Tariff C Tanunda (Commercial)	
Fixed charge (per day)	0.6367
First 0.9863 GJ (per GJ)	16.9191
Next 4.2740 GJ (per GJ)	8.3509
Next 11.1780 GJ (per GJ)	3.5789
Additional GJ (per GJ)	2.0341
Tariff D Riverland	
50 GJ or less (fixed per month	3,423.5931
Next 50GJ (per GJ)	68.8617
Next 900GJ (per GJ)	42.9098
Additional GJ (per GJ)	8.9211

Source: Mount Barker Natural Gas Extension Business Case June 2018

Zincara considers this approach to be reasonable and consistent with the requirements of NGR 79 (4) (a).

3.5   FORECAST NUMBERS AND GAS DEMAND FOR GAS CUSTOMERS

AGN engaged Core Energy Group Pty Ltd (CE) to provide an independent forecast of the number of gas customers and their associated gas demand. The forecasts are for Mount Barker and the commercial and industrial customers along the Mount Barker mains extension. CE's report[5] is summarised below.

3.5.1   Residential Customers

CE has estimated the number of potential residential customers in the Mount Barker area using the following approach:

1. Derive the forecast number of dwellings per annum in Mount Barker Growth Area to 2040 using *forecast.id*.

2. Estimate the penetration of gas customers in the development area.

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[5] Attachment 4A Core Energy – AGN Mt Barker Final Report June 2018

3. Derive the forecast for the number of new customers in the Mount Barker growth area.

Dwellings Forecast

CE said that *forecast.id* has provided dwellings forecasts for the Mount Barker Growth Area to 2036. CE has then extrapolated the growth to 2040. *forecast.id* estimates of dwelling growth are shown in the table below.

Table 2 CE Dwelling Growth Forecast

Years	Dwelling Growth per annum	Total Number of New Dwellings
2021	207	207
2022 – 2026	322	1,612
2027 – 2031	357	1,786
2032 – 2036	360	1,800
2037 - 2040*	360	1,440
Total		**6,845**

Source: 2018.06.05_Attachment5_Core Energy_AGN_Mount_Barker_Model_Confidential
  *Numbers extrapolated from 2036

CE has assumed the same forecast growth from 2036 to 2040.

Penetration Rate

CE said that an appropriate gas penetration rate to apply for the Mount Barker extension is that which is currently evidenced in residential land developments of similar size. AGN provided CE with the data[6] which is shown in the table below.

Table 3 Penetration of gas connection in new Adelaide subdivisions

Subdivisions	Total Dwellings	Natural Gas Customers	Penetration
Andrew Farm	2,859	2,775	97%
Craigburn Farm	908	879	97%
Lightsview	1,828	1,767	97%
Northgate	1,154	1,132	98%
Seaford Heights	185	176	95%
Seaford Rise	2,401	2,195	91%
St Clair	900	824	92%
Total	10,235	9,748	95%

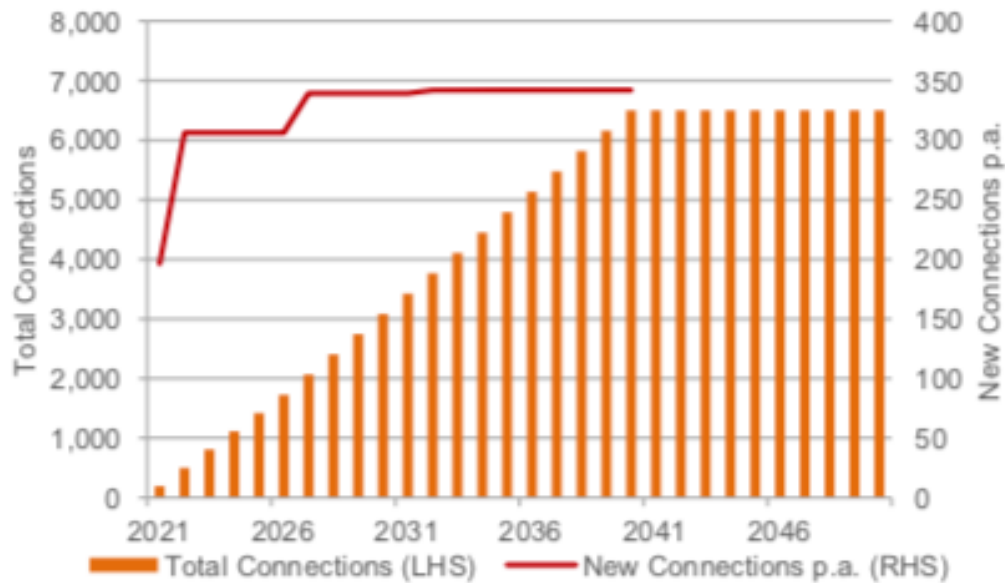Source: Attachment 4A Core Energy – AGN Mt Barker Final Report June 2018

CE has therefore used the penetration rate of 95% pa in its forecast for the period 2021 to 2040.

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[6] It is worth noting that the data in Table 1Table 3 is does not correlate with the data in Table 5 and Table 6 in AGN's Mount Barker Natural Gas Extension Business Case. However, the percentage penetration are similar.

Total Residential Customers

To get the number of residential customers, CE has multiplied the average penetration rate by the number of estimated new dwellings to get the number of new customers for the period. The number of residential customer customers are expected to rise from 196 in 2021 to 6,502 in 2040. The figure below shows the number of new customers until 2040.

Figure 1 Residential Customers No

Source: Attachment 4A Core Energy – AGN Mt Barker Final Report June 2018

3.5.2   Residential Gas Demand

The residential gas demand is calculated by the number of customers per year multiplied by the average consumption per customer.

CE derived the consumption per customer by examining the residential consumption in towns with similar climate and demographics to Mount Barker. Mount Gambier was selected as the town most similar characteristics. The consumption per customer in Mount Gambier is shown in the table below.

Table 4 Consumption per customer in Mount Gambier

| Region	2012	2013	2014	2015	2016	Average Consumption (GJ/annum)
Consumption per annum (GJ)	30.2	27.3	26.9	26.9	25.3	27.3
Number of MIRNS	109	199	270	377	443	

Source: Attachment 4A Core Energy – AGN Mt Barker Final Report June 2018

CE has adopted the average consumption of 27.3 GJ/annum from Mount Gambier as the proxy consumption for Mount Barker. CE indicated that Mount Barker has a higher average household size of (2.6 versus 2.3 persons), much higher median household income ($1,435 versus $1,052) and a higher percentage of dwellings with more than four bedrooms (37% versus 21%).

CE has assumed this consumption of 27.3 GJ/annum for 15 years followed by 1% reduction per annum to reflect more efficient appliances.

The calculated consumption for the period to 2040 is initially 5,300 GJ in 2021 and peaks at 169,000 GJ in 2040 as shown in the figure below.

Figure 2 Residential Consumption Demand (GJ)
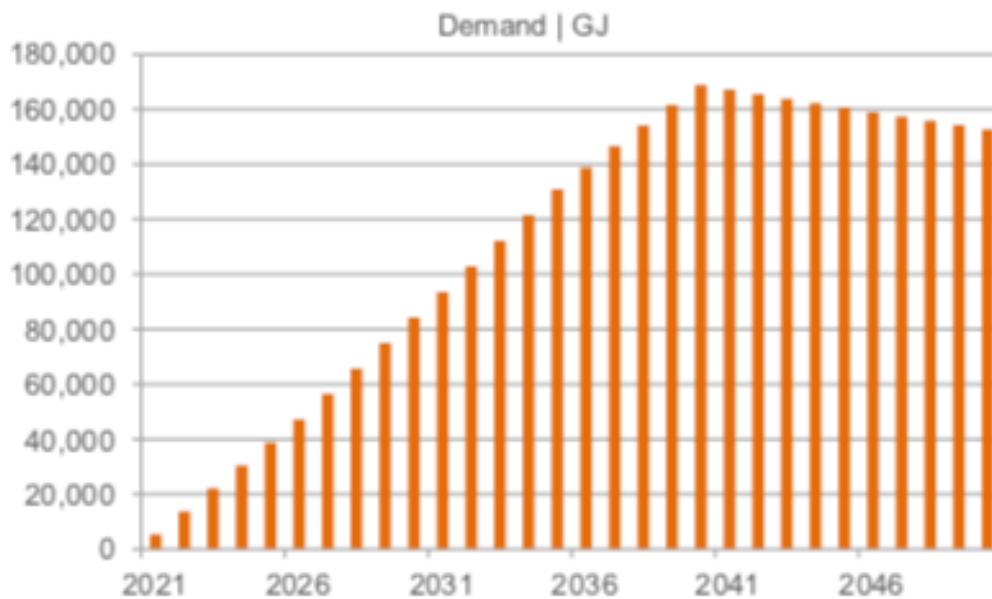
Source: Attachment 4A Core Energy – AGN Mt Barker Final Report June 2018

3.5.3 Number of Commercial Customers

Commercial Mount Barker customers were estimated using the following approach:

1. Estimate the ratio between Residential and Commercial customers using AGN SA historical data from 2014/15 to 2016/17; then

2. Estimate the number of new Commercial customers based on the ratio.

To estimate the number of commercial customers for the 20 years, CE used the statewide rate of commercial customers to residential customers. The forecast number of customers ranges from 5 customers per annum 2021 to 9 in 2040.

The number of commercial customers in Monarto South and Kanmantoo (which are on route of the pipeline) were determined from surveys carried out by AGN.

3.5.4 Commercial Customers Gas Demand

The gas demand for commercial customers is the number of customers multiplied by the gas consumption per customer.

CE used the statewide average for the gas consumption for commercial customers in Mount Barker and from AGN's estimates gathered during the surveys of Monarto South and Kanmantoo. The annual consumption per customer is shown below.

- Mount Barker - 273 GJ per annum
- Monarto South - ██████ per annum
- Kanmantoo - ██████ per annum

The total gas demand for commercial customers is shown in the figure below.

3.5.5 Number and Demand for Tariff D Industrial Customers

The industrial customers can be broken up into two geographical areas – Mount Barker and Monarto South. For Mount Barker, CE has used the statewide ratio of industrial customers to residential customers to estimate the number of industrial customers. The result is that there are two industrial customers. CE has assumed that the gas demand of 50 GJ Maximum Demand Quantity (MDQ).

In the case of Monarto South, AGN conducted a survey of LPG customers to determine the number of potential customers and their gas demand. AGN advised that a large food facility has indicated that it has expansion plans which will double its gas loads if natural gas is available.

3.5.6 Gas Demand for Industrial Customers

From its estimate for Mount Barker and the survey carried out by AGN for Monarto South, the total gas load for the industrial customers is shown in the figure below.

Figure 4 Industrial Customers MDQ GJ

Source: Attachment 4A Core Energy – AGN Mt Barker Final Report June 2018

3.5.7 Conclusion

The residential gas demand is a function of the number of gas customers multiplied by the gas consumption per customer.

The residential number of customers is calculated by the forecast number of new residential dwellings multiplied by the penetration rate. CE had used the data from *forecast.id* to forecast the number of residential dwellings. *forecast.id* had prepared the data for the Mount Barker District Council who used it for its projected growth for the next 20 years. Zincara therefore considers the use of this data for projecting future growth to be reasonable.

In relation to the penetration rate, CE considered[7]: "*the appropriate penetration rate to apply to the Mount Barker extension is that which is currently evidenced in residential land development of similar size*". CE's analysis showed that the number of residential dwellings in Mount Barker in 2021 is expected to be 1,171, which would be in the range of the number

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[7] Attachment 4A Core Energy – AGN Mt Barker Final Report June 2018 pg 8

of new dwellings in subdivisions shown in Table 3. CE has used the average penetration rate for the subdivisions to calculate number of gas customers per annum.

CE has applied the same penetration rate for the period from 2021 to 2040.

For the gas consumption per customer, CE has used the gas consumption per customer from Mount Gambier which has similar climatic conditions to Mount Barker. CE has adopted the average consumption of Mount Gambier of 27.3 GJ/annum for Mount Barker for the period 2021 to 2035 and 1% reduction in energy consumption from 2036 onward to reflect appliance efficiency.

Zincara is concerned that the penetration rate is derived from one area and the gas consumption per customer is derived from a totally separate area. The consumption per customer of 27.3 GJ/annum is considerably higher than the state average for a typical household of 15.5 GJ/annum in 2016 as shown in the figure below.

Figure 5 South Australian Typical Residential Gas Consumption per annum
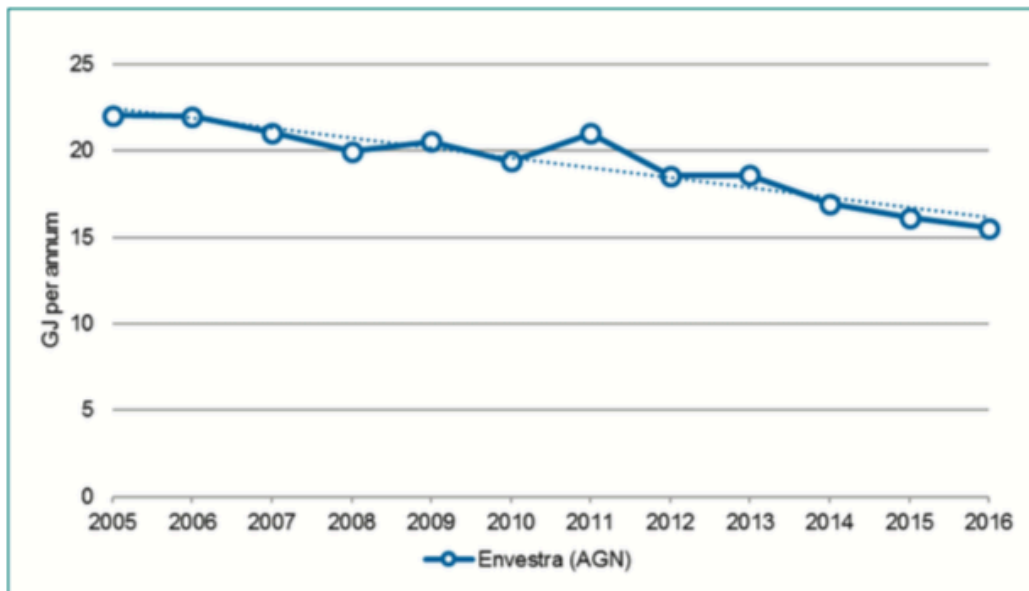
Source: Oakley Greenwood – Gas Price Trends Review 2017

The figure actually shows that for the period 2005 to 2016, the gas consumption per customer has reduced from 22.1 GJ/annum in 2005 to 15.5 GJ/annum in 2016. The reason given for the decline is that there has been an increasing use of electricity for household heating while the use of gas has been declining.

AGN has said that it has been able to achieve a penetration rate of over 90% in a considerable number of subdivision areas as shown in Table 3. Given the decline in consumption, the high penetration rate could mean that the new households are using less gas.

In addition, CE has used Mount Gambier's average consumption of 27.3 GJ/annum for the past five years as shown in Table 4. However, Table 4 also shows a declining trend from 30.2 GJ/annum in 2012 to 25.3 GJ/annum in 2016.   Using an average consumption would

disregard the trend that is occurring in Mount Gambier. Furthermore, the penetration rate in Mount Gambier is 71%[8].

As the cash flow analysis which calculates the NPV is sensitive to the penetration rate and consumption per customers, the issues identified above have raised a number of questions including:

1. What is the consumption per customer of the comparable subdivisions used to determine the penetration rate for Mount Barker (Table 3)?

2. Is there a history of declining consumption in these subdivisions?

3. Apart from the size of the subdivisions, are there any other similarities between these subdivisions and Mount Barker that can support using the subdivisions as representative of Mount Barker?

4. Given the declining consumption in Mount Gambier from 2012 to 2016 (Table 4), why is the average consumption from Mount Gambier used instead of the 2016 consumption?

5. If Mount Gambier has similar weather conditions as Mount Barker, could the Mount Gambier penetration rate be used for Mount Barker?

6. CE has used an annual 95% penetration rate, for the period 2021 to 2040, should there be some variation to reflect the current fluid energy markets (e.g. price of gas, solar cells and development in appliances)?

7. CE has also used constant annual gas consumption per customer for the period 2021 to 2036 and then a 1% drop in gas consumption due to appliance efficiency? What is the basis for this assumption?

As there are such a small number of commercial customers, Zincara considers the approach adopted by CE for determining the number of commercial customers for Mount Barker to be reasonable. Zincara also concurs with the approach of surveying commercial customers in Monarto South and Kanmantoo to determine the number of commercial customers.

A similar approach to commercial customers has been used to determine the number of industry customers and their gas consumption. Zincara concurs with this approach.

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[8] Attachment 6A Penetration Data June 2018

3.6   MOUNT BARKER TRANSMISSION PIPELINE

To determine the route for the transmission pipeline to supply Mount Barker, APA on behalf of AGN went through three stages:

- Concept Route Options Study
- Pre – FEED study
- FEED[9] study

Concept Route Options Study

In 2016, APA completed the desktop analysis of its options study taking into consideration the following factors[10]:

- Length;
- Amount of rock;
- Major crossings;
- Constrictions;
- Design and constructability issues;
- Environmental and community issues;
- Operational issues;
- Licence requirement;
- High level comparison of indicative capital expenditure.

The result of the study identified five options as detailed in the table below.

Table 5 Concept Route Options for Mount Barker Transmission Pipeline

Option	Description	Length (km)	Desktop Estimate ($ million)	Risk ranking score
A	Greenhill Rd to Mt Barker via SE Freeway	28	17.5	28
B	Greenhill Rd to Mt Barker via Sumer town and old Princess Highway	32	21.0	38
C	Greenhill Rd to Mt Barker via Summertown and Balhnnah	30	17.5	32
D	Murray Bridge to Mt Barker via old Princes Highway (39km)	39	22.8	30
E	Murray Bridge to Mt Barker via country roads and cross country	32	19.2	25
F	Murray Bridge to Mt Barker via old Princess Highway and others	36	20.6	25

Source: Mount Barker Natural Gas Extension Business Case June 2018
Note: The risk ranking has a highest score of 50 with a lower score indicating a relatively low risk.

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[9] FEED stands for Front End Engineering design. FEED is an engineering tool to develop a conceptual design to determine the technical requirements and capital costs.
[10] 2018.06.05 Attachment 9 Concept Route Options Study _ Confidential

APA shortlisted options E and F due to the lower risks with option F having greater opportunities to connect existing business in Monsanto South and Kanmantoo than option E.

Pre-Feed Study

APA conducted its pre-FEED study between July and November 2016 with the objectives of finalising the route and finalising the gas demand for the pipeline. Investigations at this stage identified an additional route, option G. Option G commences at a point between options E and F and passes through Monarto South before heading northwest to join the original route E. AGN advised that further investigation into the route selection, stakeholders engagement, demand study and economic analysis make option G the preferred route.

Details of option G as compared to options E and F are shown in the table below.

Table 6 Pre-FEED Options for the Mount Barker Transmission Pipeline

Option	Description	Length (km)	Desktop Estimate ($ million)
E	Murray Bridge to Mt Barker via country roads and cross country	32	20.3
F	Murray Bridge to Mt Barker via old Princess Highway and others	36	23.8
G	Murray Bridge to Mt Barker via Monarto zoo boundary, old Princess Highway and others	30	24.1

Source: Mount Barker Natural Gas Extension Business Case June 2018

Note: The costs for options E and F are different to those in Table 5 due to cost been inflated to 2016 $.

APA decided that the preferred route is option G due to its lower risk (hence less chance of cost overrun) and proximity to industry loads albeit at a higher cost.

FEED Study

In 2017, APA commenced its FEED study to define the project to the extent that capital expenditure so that capital expenditure can be sought from AGN. The work carried out at the FEED stage include:

- Developing the pipeline and facilities design for the tendering of the fabrication, construction and the procurement of equipment and materials.
- Finalising the cost estimates to +/- 10% accuracy using the tendered prices.
- Identifying major issues and attempting to resolve them to the extent possible.
- Seeking regulatory approvals.
- Develop implementation plan.

AGN advised[11] that at the end of November 2017, the FEED project was 54% completed with the transmission pipeline design at 71% completion and the procurement process at 61% completion.

As part of the pipeline design, APA also engaged with 220 stakeholders. They include various government departments, property owners and local indigenous groups.   APA advised that it would continue to communicate with other stakeholders as the project developed.

3.7   TRUNK RETICULATION

The FEED study has also identified the trunk reticulation mains to Mount Barker, Monarto South and Kanmantoo. The trunk main has been designed to the south and west of the Mt Barker township and the CBD area.

AGN advised that the cost estimates have used the benchmark unit rates as per the most recent AER final decision for the South Australian network.

3.8   CAPITAL COSTS FOR THE TRANSMISSION PIPELINE, FACILITIES AND TRUNK RETICULATION

APA has also updated its costs estimate for the transmission pipeline as prices from the tender process have been received. In relation to the trunk reticulation, details of the updated prices are shown in the table below.

AGN advised[12] that its preliminary costs for trunk mains in Kanmantoo and Monarto South were based on standard I&C unit mainlaying rates, with a 20% contingency.

Table 7 Updated Capital Cost Estimate

	Total FEED update Apr 2017 ($million)	Total Pre-FEED ($million)	Change ($million)
Pipeline			
Land and Approvals	4.3	2.7	1.6
Material	2.9	3.4	-0.5
Construction	11.8	9.8	2.0
Facilities	1.6	1.6	0.0
Contingency	2.4	4.0	-1.6
Total	**25.8**	**23.8**	**2.0**
Facilities	2.2	2.2	0
Reticulation trunk mains			
Mount barker CBD & Glen Lea	4.4	1.2	3.2
Monarto South	1.6	-	1.6
Kanmantoo	0.9	-	0.9
Mount Barker future estates	1.0	-	1.0
Total Reticulation trunk mains	**7.9**	**1.2**	**6.7**
Total Project Cost	**35.9**	**27.2**	**8.7**

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[11] Attachment 3 APA – Natural Gas to Mount Barker Headworks Summary Report
[12] Attachment 3 APA – Natural Gas to Mount Barker Headworks Summary Report

For the purpose of its business case and cash flow model, AGN has updated its cost to 2017/18 $ which is summarised below.

Table 8 Summary of Transmission, Facilities and Trunk Reticulation 2017/18

	$ million 2017/18
Pipeline	26.2
Offtake (facilities)	2.2
Trunk reticulation	7.9

Source: Mount Barker Natural Gas Extension Business Case June 2018

3.8.1   Conclusion

Zincara considers that the planning process adopted by AGN would be what you expect from a prudent service provider. The concept stage to determine the route options followed by a pre-FEED to finalise the route is what is expected in the gas industry. The FEED stage which comes after the concept stage is really to finalise the technical requirements and the project costs to seek capital approval. AGN's process is consistent with this approach.

APA on behalf of AGN has developed its costs[13] following a detailed assessment of the construction methodology, estimated contractors' cost and cost estimates for rock (from a rock specialist). APA indicated that it has applied a 10% contingency to the project.

The purpose of the FEED study is to complete the project scope so that each element of the project can be defined and cost estimates prepared for the element. A pipeline project as such would have a considerable number of elements which would include design, construction and material procurement. As such, it is not possible to completely define each element completely to the extent that there are no unknown. To allow for such unknowns, the project will have contingency amounts. As the elements are refined, the contingency amount will reduce (e.g. a initial project scope could have over 30% contingency). Given the status of the pipeline FEED study, it is reasonable to expect a 10% contingency.

Zincara therefore considers the transmission route selection and the project cost to be reasonable.

In relation to the trunk mains, AGN has designed a route to go from the termination of the transmission pipeline at the outskirts of Mount Barker township to a suitable point where AGN can commence its reticulation mains. This approach is typical industry standard.

The capital cost is based on a unit rate approved by the AER in the recent Access Arrangement decision.

Zincara therefore considers the route and cost to be reasonable.

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[13] Mount Barker Natural Gas Extension Business Case June 2018

3.9 RETICULATION, SERVICES AND METER COSTS

AGN advised that it has used AER approved benchmark unit rates for reticulation, meters and services where possible. The assumptions on unit rates in its 2018 submission are shown in the table below.

Table 9 Details of Unit Rates for Reticulation Mains, Services and Meters

	Unit Rates	Volume	Comments
Domestic reticulation per metre	███	██	Benchmark: AER approved unit rates inflated to $17/18
Metres per domestic lot	12m		FEED estimate based on APA experience for recent similar sized allotments in Gawler East and Buckland Park
I&C reticulation per metre	███	1	FEED estimate as per Interim FEED result inflated to $17/18
Domestic meter	███	██	Benchmark: AER approved unit rate inflated to $17/18
I&C meter	████	█	Benchmark: AER approved unit rate inflated to $17/18
Domestic service	██	██	Benchmark: AER approved unit rate inflated to $17/18
I&C Services	█████	█	Benchmark: AER approved unit rate inflated to $17/18
Demand connection cost	███	5	FEED estimate: Based on average of historic Tariff D connection costs exclusive of contribution and overheads analysis provided by APA

Source: Attachment 1 Comparison of Assumptions for unit rates
Mount Barker Natural Gas Extension Business Case June 2018

3.9.1 Conclusion

AGN's approach is to connect customers in new subdivision and has calculated the length of reticulation mains based on its estimated length of mains that it has to lay per customer. The length of main per customer is based on its experience in Gawler East and Buckland Park.   The cost of reticulation is the number of customers multiplied by the length of mains. As it is predominately proposed to connect new customers, Zincara considers this approach to be reasonable. The connection cost per customer is AER's approved rate from the current Access Arrangement. Zincara there considers the costs to be reasonable.

In relation to commercial customers, the length of mains has been estimated from its FEED study. Zincara considers this approach to be reasonable.

As AGN had adopted a similar approach for industrial customers, Zincara considers the costs to be also reasonable.

3.10   PROJECT STAGING

AGN's planning approach has been described in detailed above leaving the construction of the transmission pipeline, trunk mains and the rollout of the reticulation mains and meters. Details of these activities are in the following timetable[14]:

- Transmission pipeline construction   19/20
- Offtake construction   19/20
- Trunk construction   20/21 – 22/23
- Reticulation   20/21 – 40/41
- Services and meters   20/21 -40/41

Given that there has been work done to identify the permits and land rights issues, Zincara believes the construction of the pipeline and the trunk main in year 19/20 to be reasonable. The rollout of the reticulation main, services and meters are a function of the development of new estates which is based on the number of new customers identified by CE. Zincara also considers this approach to be reasonable.

3.11   OPERATING COSTS

The annual operating cost is calculated by the annual number of customers multiplied by the operating cost per customer. The annual number of customers has been discussed in section 3.5. AGN advised[15] the operating cost of $23 per customer is based on the Victorian Gas Distribution System Code inflated to 2017/18 $. The operating cost per customer is for activities such as meter reading and billing.

Zincara concurs with the use of this approach to calculate the annual operating cost. Zincara also considers that the operating cost per customer is reasonable given that a similar approach has been used in the Victorian Gas Distribution System Code

3.12   SENSITIVITY ANALYSIS

In relation to the cash flow model, the key variables that could affect the analysis have been discussed in the sections above. Zincara has generally found them to be reasonable. Zincara

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[14] 2018-06-05_Attachment 12-Mount Barker cashflow model _ confidential
[15] Attachment 1 Comparison of Assumptions

has therefore not carried out any sensitivity analysis in regard to varying each input to see the effect on the cash flow model.

In section 3.5.7, Zincara said that it is concerned that AGN has used 95% annual penetration rate for its 30 year analysis. Using AGN's cash flow model and all other assumptions staying the same, a penetration of between 75% and 80% will result in the NPV remaining negative for the 30 year period.

It is beyond the scope of this study to determine whether the annual penetration rate will drop to this level.

3.13 REASONABLENESS OF THE APPLICATION IN MEETING NGR RULE 79

AGN has submitted that this project complies with NGR Rule 79 (1) (a) and 79 (1) (b). In relation to Rule 79 (1) (b), AGN says that this project complies with Rule 79 (2) (a) and 79 (2) (b).

Zincara has examined the economic model by Frontier Economics and the AGN's cash flow model. In addition, Zincara has also reviewed the inputs into the economic model:

- Forecast tariff
- Forecast number of gas customers and the gas demand
- Transmission pipeline planning and cost
- Trunk reticulation cost
- Reticulation, Services and meter costs
- Operating costs

Except for the gas demand and the residential penetration rate which has an impact on the forecast number of gas customers and as such the gas demand, Zincara considers the other key inputs to be reasonable and consistent with the practice of a prudent service provider acting efficiently.

Zincara therefore considers that the project would only comply with the relevant rules in the NGR if AGN's residential demand is resolved and the resultant gas demand has a positive NPV result.

Appendix A

List of References

2018.06.05_Attachment 1_Comp Assump_Mount Barker_CONFIDENTIAL.pdf
2018.06.05_Attachment 9_Concept Route Options Study_CONFIDENTIAL.pdf
2018.06.05_Mount Barker Extension_Business Case_CONFIDENTIAL.pdf
2018.06.05_Attachment 11A_Frontier – Mt Barker Extension Economic Analysis_ CONFIDENTIAL.xlsx
2018.06.05_Attachment 12_Mount Barker cashflow model_CONFIDENTIAL.xlsx
2018.06.05_Attachment 10_Frontier – Economic Analysis Report_CONFIDENTIAL.pdf
2018.06.05_Attachment 4A_Core_Energy_AGN_Mount_Barker_Final_Report_CONFIDENTIAL.pdf
2018.06.05_Attachment 7_Consumption_Data_CONFIDENTIAL.xlsx
2018.06.05_Attachment 8_Customer Survey Summary_CONFIDENTIAL.pdf
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2018.06.05_Mount Barker Extension_Business Case_PUBLIC.pdf
2018.06.05_Attachment 10_Frontier-Economic Analysis Report_PUBLIC.pdf
2018.06.05_Attachment 2_Prev Info Req_Mount Barker_PUBLIC.pdf
2018.06.05_Attachment 1_Comp Assump_Mount Barker_PUBLIC.pdf
2018.06.05_Attachment 3_Natural Gas to Mt Barker Headworks Summary_PUBLIC.pdf
2018.06.05_Attachment 7_Consumption_Data_PUBLIC.xlsx
2018.06.05_Attachment 11B_Economic_Base_Case_Additional_Support_PUBLIC.pdf
2018.06.05_Attachment 8_Customer Survey Summary_PUBLIC.pdf
2018.06.05_Attachment 6B_Penetration_Rate_Additional_Support_PUBLIC.pdf
2018.06.05_Attachment 4B_Commercial_and_Industrial_Forecasts_Additional_Support_ PUBLIC.pdf
2018.06.05_Attachment 4A_Core_Energy_AGN_Mount_Barker_Final_Report_PUBLIC.pdf
2018.06.05_Attachment 6A_Penetration_Data_PUBLIC.xlsx