Attachment 10

Frontier Economics – Economic Costs and Benefits of the Mt Barker Extension Final Report

June 2018

Page intentionally left blank

Economic costs and benefits of the Mt Barker extension

A REPORT PREPARED FOR AUSTRALIAN GAS NETWORKS

December 2017

Economic costs and benefits of the Mt Barker extension

Economic costs and benefits of the Mt Barker extension

Figures

Tables

Executive Summary

Australian Gas Networks (AGN) has identified the Mt Barker region as suitable for natural gas reticulation, and proposes to construct gas pipelines and associated infrastructure to connect the region to natural gas (the Mt Barker extension).

Frontier Economics has been engaged to assess whether the proposed Mt Barker extension is justifiable under clause 79(2)(a) of the NGR; that is, whether the overall economic value of the capital expenditure for the proposed Mt Barker extension is positive.

The analysis that we have undertaken suggests that the quantifiable benefits of the Mt Barker extension exceed the economic costs of the Mt Barker extension. Indeed the quantifiable benefits materially exceed the economic costs: 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 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.

We note that there are a number of likely, or potential, economic benefits that we have not quantified in this report such as 'new' gas demand and reduced carbon emissions. A summary of quantified and unquantified costs and benefits is set out in Table 1.

Table 1: Summary of economic costs and benefits

Group	Economic value	Estimate	Comment
		Economic benefits	
End users	Net increase in consumer surplus associated with fuel switching from electricity and LPG.	~$70 million	Increase in consumer surplus is driven by the difference in the price of electricity or LPG and natural gas (once accounting for any difference in appliance efficiency).
End users	Increase in consumer surplus associated with 'new' demand.	Not quantified.	Increase in consumer surplus due to 'new' demand from the largest Monarto South Industrial customer could be ~$2 million.
End users	Increase in consumer surplus associated with demand growth due to elasticity of demand.	Not quantified.	Increase in consumer surplus due to LPG customers increasing demand when using lower-priced natural gas likely to be relatively small.
End users	Increase in consumer surplus associated with demand growth beyond 2039/40.	Not quantified.	Growth is likely to continue past 2039/40, materially increasing consumer surplus.
End users	Increase in consumer surplus associated with preference for gas.	Not quantified.	Information on relative value to customers of natural gas and LPG not available.
End users	Increase in consumer surplus in the event that there is a price on carbon (or carbon abatement is otherwise valued).	Not quantified.	Increase in consumer surplus due carbon price of $25/tCO^{2}e would be ~$0.75 million.
Gas producers	Increase in producer surplus associated with selling more gas.	Not quantified.	Wholesale gas price unlikely to increase, and likely to be equal to opportunity cost.
Gas retailers	Increase in producer surplus from providing services over a greater volume.	Not quantified.	Unlikely to be material given relative size of Mt Barker market.
Service provider	Increase in producer surplus from providing services over a greater volume.	Not quantified.	Unlikely to be material given relative size of Mt Barker market.
Total quantified benefits		**~$70 million**	
		Economic costs	
Service provider	Capital and operating cost of Mt Barker extension	~$40 million	Based on AGN's business case.
End users	The capital costs of buying and installing new gas appliances or converting existing appliances.	Not quantified.	Upfront appliance costs are comparable. Some additional cost to existing customers to alter/replace appliances, depending on the age of their current appliances. Likely to be relatively small.
Total quantified costs		**~$40 million**	
		Net benefits	
Quantified net benefit		**~$30 million**	

1 Introduction

1.1 Background

Australian Gas Networks (AGN) has identified the Mt Barker region as suitable for natural gas reticulation, and proposes to construct gas pipelines and associated infrastructure to connect the region to natural gas (the Mt Barker extension).

In order for the capital expenditure on the proposed Mt Barker extension to be included in AGN's capital base for regulatory purposes, the capital expenditure must be 'conforming' capital expenditure. Clause 79 of the National Gas Rules (NGR) sets out the criteria for capital expenditure to be 'conforming' capital expenditure. Clause 79(1) and 79(2) of the NGR are as follows:

(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 a 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; or

(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 from projected demand that is dependent on 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 has previously sought to have the Mt Barker extension approved under clause 79(2)(b) of the NGR as part of the 2016-21 Access Arrangement review. AGN made submissions to that effect in its Revised Access Arrangement proposal submitted to the Australia Energy Regulatory (AER) in January 2016. However, the AER formed a different view and determined that the present value of the incremental revenue to be generated as a result of the expenditure would not exceed the present value of the capital expenditure.

We understand that AGN has since developed and refined the assumptions underpinning the business case for the Mt Barker extension and that AGN considers it can now demonstrate that the capital expenditure on the Mt Barker extension is justifiable under clause 79(2)(b) of the NGR.

Nevertheless, AGN also propose to investigate whether the capital expenditure on the Mt Barker extension is justifiable under clause 79(2)(a) of the NGR. Clause 79(3) of the NGR limits what is to be considered economic value for the purposes of clause 79(2)(a):

> (3) In deciding whether the overall economic value of capital expenditure is positive, consideration is to be given only to economic value directly accruing to the service provider, gas producers, users and end users.

1.2 Frontier Economics' engagement

Frontier Economics has been engaged to assess whether the proposed Mt Barker extension is justifiable under clause 79(2)(a) of the NGR; that is, whether the overall economic value of the capital expenditure for the proposed Mt Barker extension is positive.

1.3 About this report

This report sets out our findings on whether the proposed Mt Barker extension is justifiable under clause 79(2)(a) of the NGR. This report is structured as follows:

- Section 2 describes our approach to assessing whether the overall economic value of the capital expenditure for the proposed Mt Barker extension is positive.
- Section 3 sets out the assumptions that we have used in our analysis.
- Section 4 sets out the results of our analysis.
- Section 5 discusses other unquantified and indirect economic benefits and costs that are likely to exist.
- Section 6 concludes.

2 Our approach

This section summarises the approach that we have adopted to assess whether the proposed Mt Barker extension is justifiable under clause 79(2)(a) of the NGR.

2.1 Overview

Our approach to assessing whether the proposed Mt Barker extension is justifiable under clause 79(2)(a) of the NGR is to assess changes in producer surplus and consumer surplus that would occur as a result of the proposed Mt Barker extension. In doing so, we have regard to direct benefits accruing to the service providers, gas producers, users (including retailers) and end users as outlined at clause 79(3). Therefore, wider benefits to taxpayers or consumers or producers of other goods and services are not included.

In order to estimate the direct benefits of the Mt Barker extension, it is necessary to model two states of the world over a reasonable timeframe:

- The state of the world in which the Mt Barker extension **does** proceed (the 'Extension Case'), and
- The state of the world in which the Mt Barker extension **does not** proceed (the 'Base Case').

In principle, gas consumption and production outcomes need to be estimated under each state of the world and it is the comparison of those outcomes that yields the benefits of the extension. In the case of an extension of the gas network to an area in which electricity and other fuels (such as LPG) are available, the key benefits that we have regard to are the following:

- Consumer surplus attributable to end users switching from electricity and other fuels to gas.
- Consumer surplus attributable to end users using gas for 'new' demand that is for purposes which they would not, or could not, use other fuels.
- Producer surplus to gas producers arising from additional sales of gas.
- Producer surplus to gas retailers and service providers arising from being able to offer services across a greater volume of gas sold and greater number of customers.

Increases in consumer surplus and producer surplus represent the benefit of the Mt Barker extension. The costs of the Mt Barker extension – being the present value of the sum of its capital and operating expenditures over the term of the assessment – are deducted from the benefits to derive the net economic value of the extension.

In practice, data availability can make quantifying the benefits of the Mt Barker extension (or any other extension) challenging. The approach that we adopt – including the benefits that we consider can be quantified – is discussed in the sections that follow.

2.2 Timeframe for the assessment

As discussed, in order to estimate the direct benefits of the Mt Barker extension, it is necessary to compare consumer surplus and producer surplus in the Base Case and the Extension Case.

Ideally, the period over which this comparison is undertaken would be the life of the assets that make up the Mt Barker extension. However, due to the availability of data, including data on future gas and electricity prices and forecasts of gas consumption in Mt Barker, we have undertaken this assessment over 31 years from 2019/20 to 2049/50. This modelling period is the same as that used by AGN in its cashflow model of the Mt Barker extension.

2.3 Consumer surplus

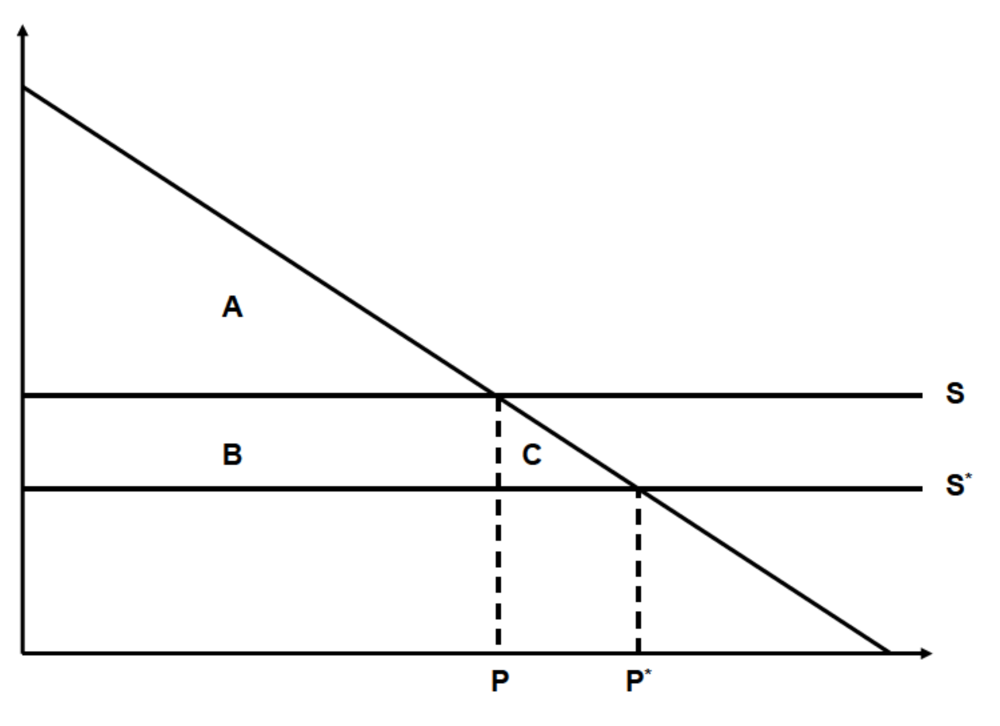
Consumer surplus is the difference between what consumers are willing to pay for a good or service and the amount they actually do pay for that good or service.

In order to assess the consumer surplus that would occur as a result of the proposed Mt Barker extension we need to compare the consumer surplus that would occur in the Base Case with the consumer surplus that would occur in the Extension Case. This difference will amount to the sum of the following:

- *For gas use that replaces other fuels*, the change in consumer surplus is the difference between the cost of the alternate fuel and the cost of gas. In other words, for gas use that replaces other fuels, the change in consumer surplus is the saving in the energy costs of customers; we are implicitly assuming the customers' willingness-to-pay for fuel is unchanged, so any reduction in the cost of purchasing that fuel is an increase in consumer surplus.
- *For gas use that represents 'new' demand (that is, gas use that does not replace other fuels)*, the difference in consumer surplus is the difference between the willingness-to-pay for gas and the cost of gas, over the volume of gas consumed.

A simple representation of this is shown in Figure 1. In this simple example we assume that all customers would switch from LPG to gas. We assume the willingness to pay for LPG and gas is represented by the demand curve D, the cost of LPG to these customers would be represented by the supply curve S and the cost of gas to these customers would be represented by the supply curve S^*. Consumer surplus is represented by the area above the supply curve and below the demand curve. Without the supply of gas, consumer surplus is represented by the area A. With the supply of gas, consumer surplus is represented by the sum of the areas A, B and C. The change in consumer surplus, therefore, is represented by the sum of the areas B and C. The area B represents the increase in consumer surplus *for gas use that replaces other fuels*. The area C represents the increase in consumer surplus *for gas use that represents 'new' demand*.

Figure 1: Diagrammatic representation of change in consumer surplus



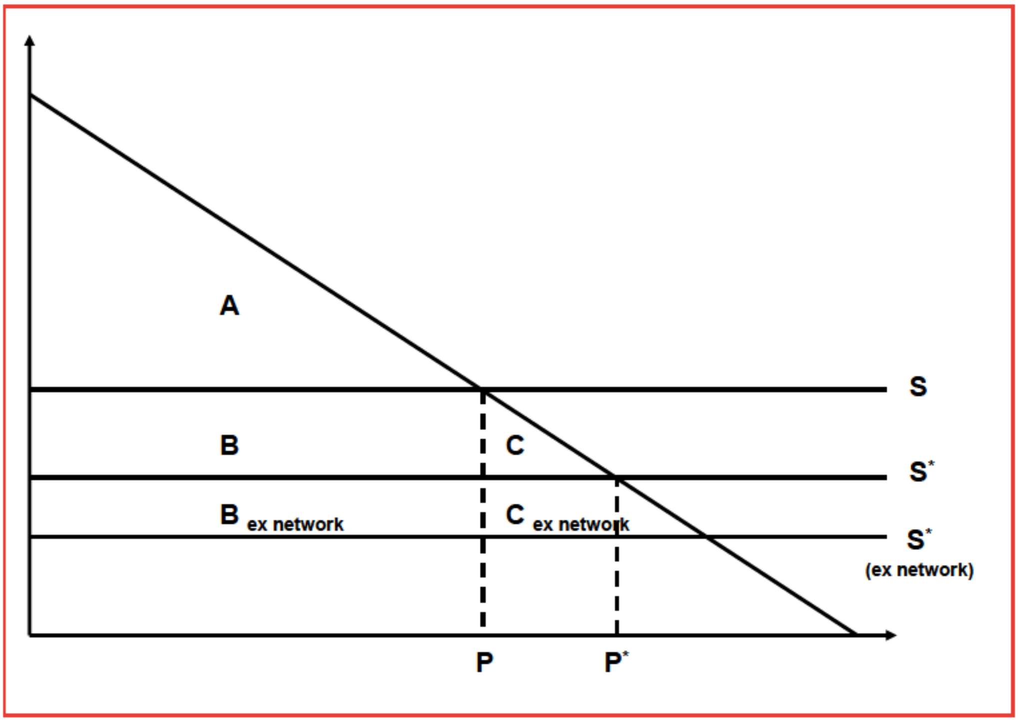
Before discussing the increase in consumer surplus in more detail below, it is useful first to discuss what we mean by the 'cost of gas'.

Ordinarily when calculating consumer surplus associated with the sale of gas we would deduct the price of gas from the willingness-to-pay for gas (as represented in Figure 1). This is the standard textbook approach. The price of gas for customers in Mt Barker would include a network tariff to AGN for the use of the pipeline and other infrastructure that make up the Mt Barker extension. However, given the data that we have available to us, we have taken a different approach: the 'cost of gas' that we deduct from the willingness-to-pay for gas is our estimate of the price of gas for customers in Mt Barker excluding the network tariff to AGN for the use of the pipeline and other infrastructure that make up the Mt Barker extension. That is, we are estimating the extent to which willingness-to-pay for gas is in excess of the wholesale gas costs, transmission pipeline costs and retail operating costs and margin that are involved in the supply of gas to customers in

Mt Barker. We then deduct from this estimate of consumer surplus the costs of the Mt Barker extension to determine whether the increase in consumer surplus is greater than the costs of the Mt Barker extension.

A simple representation of this is shown in Figure 2. Rather than estimating consumer surplus (and the change in consumer surplus) the traditional way as illustrated in Figure 1, we are also including the areas $B_{ex\ network}$ and $C_{ex\ network}$ in our estimate of consumer surplus.[1]

Figure 2: Diagrammatic representation of consumer surplus excluding network tariff for Mt Barker extension



The reason we adopt this approach is to avoid double counting the cost of the Mt Barker extension (which we would do if we calculated willingness-to-pay relative to total retail prices, including the network tariffs for the Mt Barker extension, and then deducted the cost of the Mt Barker extension). The alternative approach to avoid double counting the costs of the Mt Barker extensions would be to calculate willingness-to-pay in the standard way, relative to total retail prices (S^* in our example above), but not deduct the cost of the Mt Barker extension from the calculated consumer surplus (because the costs would already be included in the

1 Note that we do not estimate any consumer surplus that would be associated with customers actually facing a price lower than S^* (and therefore increasing consumption beyond P^*).

retail gas price). To do this, however, we would need to estimate cost-reflective tariffs over the modelling period.

Gas used that replaces other fuels

If gas becomes available in the Mt Barker region, some consumers will substitute other fuels for gas:

- Some consumers will replace consumption of electricity with consumption of gas. For these consumers, the difference in consumer surplus is the cost to the consumer of the electricity consumed in the Base Case but displaced in the Extension Case minus the cost of the gas consumption that displaces that electricity.
- Some consumers will replace consumption of LPG with consumption of gas. For these consumers, the difference in consumer surplus is the cost to the consumer of the LPG consumed in the Base Case that is displaced in the Extension Case minus the cost of the gas consumption that displaces that LPG.

With data on gas consumption that replaces other fuels, and the prices of other fuels and gas, this consumer surplus can be estimated.

Gas used that represents 'new' demand

If gas becomes available in the Mt Barker region, some consumers will use gas for purposes for which they would not use an alternate fuel in the Base Case. For these consumers, the consumer surplus is the difference between the willingness to pay for gas and the gas price, over the volume of gas consumed.

Estimates of willingness-to-pay for gas would generally only be available through a survey of customers, which is beyond the scope of this project. What we can reasonably assume is that the willingness-to-pay for gas is somewhat higher than the gas price (since consumers opt to consume gas at this price) and somewhat lower than the price of LPG (since consumers opt not to consume LPG in the Base Case). While we do not estimate this consumer surplus, we do discuss the possible magnitude of this consumer surplus in Section 5.

2.4 Producer surplus

Producer surplus is the difference between the amount a producer is willing to accept for its good or service and the price the producer actually receives for its good or service.

In order to assess the producer surplus to gas producers that would occur as a result of the proposed Mt Barker extension we need to compare the producer surplus that would occur in the Base Case with the producer surplus that would occur in the Extension Case.

Pricing dynamics in the wholesale gas market in eastern Australia are complex. However, the gas price assumption that we have adopted (as discussed in Section 3.3) suggests that the gas price in eastern Australia will be based on the LNG net-back price. In this case, additional gas production (due to the Mt Barker extension) is unlikely to increase the wholesale gas price, and the opportunity cost of additional gas is likely to be equal to the wholesale gas price. This being the case, there would be no increase in producer surplus as a result of the Mt Barker extension. For this reason, we do not attempt to quantify changes in producer surplus for gas producers.

The cost to AGN as the service provider to invest in the Mt Barker extension is likely to be equal to the opportunity cost of investing elsewhere. AGN also incurs fixed overheads in providing gas transportation services which are unlikely to increase due to additional demand in Mt Barker. Spreading these fixed costs over a greater volume of gas transported is likely to result in efficiency gains, reducing the cost per unit of gas transported. Given the increase in gas demand in Mt Barker is not significant compared to total gas transported by AGN, we have not attempted to quantify changes in producer surplus for AGN as the service provider, but note it may be positive.

Similar to AGN as the service provider, gas retailers incur fixed overheads in providing retailing services and are likely to see efficiency gains in being able to spread these costs across a greater volume of gas sold. Given the increase in demand in Mt Barker is not significant compared to total gas sold by retailers, we have not attempted to quantify changes in producer surplus for gas retailers, but note that it may be positive.

2.5 Cost of the Mt Barker extension

The costs of the Mt Barker extension that we consider are all capital and operating costs associated with the infrastructure that makes up the Mt Barker extension.

Given that we are undertaking our assessment over 31 years (including year 0), we have regard to capital costs and operating costs over this 31 year period. For capital costs, we amortise the capital cost over the economic life of the infrastructure, and account for those amortised costs over the 31 year period of our assessment.

3 Our assumptions

This section summarises the assumptions that we have adopted in estimating changes in consumer surplus that would occur as a result of the proposed Mt Barker extension (as discussed in Section 2.4, we do not attempt to quantify changes in producer surplus).

In order to quantify changes in consumer surplus, we need information on gas consumption, the willingness-to-pay for gas and the cost of gas. These are discussed in the following sections.

We then compare changes in consumer surplus with the cost of the Mt Barker extension. These cost estimates are also discussed in the following sections.

3.1 Gas consumption

AGN has engaged Core Energy Group to provide independent forecasts of gas connections and gas demand in the Mt Barker region in the event that the Mt Barker extension proceeds. The forecasts produced by Core Energy Group include forecast connections and consumption in Mt Barker as well as forecast connections and consumption along the route of the transmission extension to Mt Barker. The forecasts produced by Core Energy Group include forecast connections and consumption for three main customer segments:

- Tariff R residential customers.
- Tariff C commercial customers, who each fall into one of three categories (Mt Barker, Monarto South or Kanmantoo) depending on their location.
- Tariff D industrial customers, who each fall into one of two categories (Mt Barker or Monarto South) depending on their location.

Core Energy Group provides forecasts from 2020/21 to 2049/50 inclusive. However, AGN has only included growth in connections to 2039/40 in its cashflow assessment under 79(2)(b) of the NGR. Therefore, we also assume that for years past 2039/40, the forecast numbers remain constant at the 2039/40 value; that is, we assume that there is no ongoing growth in connections or consumption.

The forecasts of connections from Core Energy Group out to 2039/40 are set out in Table 2.

The forecasts of consumption from Core Energy Group out to 2039/40 are set out in Table 3.

Table 2: Forecast of number of connections

	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
Residential	0	196	503	809	1,115	1,421	1,728	2,067	2,406	2,746	3,085	3,424	3,766	4,108	4,450	4,792	5,134	5,476	5,818	6,160	6,502
Commercial	0	5	13	22	29	38	47	57	66	76	84	93	102	110	119	128	136	145	154	162	171
Industrial	0	0	0	1	2	3	3	3	3	3	3	4	4	4	4	4	4	4	4	4	5

Source: Core Energy Group forecasts. Provided by AGN.

Table 3: Forecast of annual consumption (TJ)

	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
Residential	0.0	5.4	13.7	22.1	30.4	38.8	47.2	56.4	65.7	75.0	84.2	93.5	102.8	112.2	121.5	130.8	140.2	149.5	158.8	168.2	177.5
Commercial	0.0	[redacted]																			
Industrial	0.0																				
Total	**0.0**	**6.6**	**17.0**	**43.9**	**114.9**	**139.3**	**155.7**	**173.2**	**190.7**	**208.2**	**219.6**	**239.2**	**250.7**	**262.3**	**273.9**	**285.4**	**297.0**	**308.6**	**320.2**	**331.7**	**350.5**

Source: Core Energy Group forecasts. Provided by AGN.

Because we are estimating willingness-to-pay for gas on the basis of the cost to customers of alternate fuels, as well as the aggregate gas consumption forecasts set out in Table 3, we also need estimates of the alternatives available to customers. That is, for each customer type, we need to know the following:

- How much of forecast gas consumption would represent switching from electricity to gas.
- How much of forecast gas consumption would represent switching from LPG to gas.
- How much of forecast gas consumption would represent 'new' demand, which does not reflect switching from some alternate fuel to gas.

AGN has provided us with estimates of these values for each customer type.

For the average residential customer in Mt Barker, AGN estimates annual consumption of 27.3 GJ, reflecting 3.0 GJ of gas used for cooking, 15.4 GJ of gas used for water heating and 8.9 GJ of gas used for space heating. In the absence of a natural gas connection, AGN considers that residential customers would use LPG for cooking and water heating[2] (requiring 18.4 GJ of LPG each year) and electricity for space heating (requiring an additional 0.7 MWh of electricity each year on average).

For a typical commercial customer in Mt Barker, AGN considers that LPG would be used in the absence of a natural gas connection.

For a typical industrial demand customer in Mt Barker or Monarto South, AGN considers that LPG would be used in the absence of a natural gas connection.

For the large industrial demand customer in Monarto South, AGN considers that, for half of their gas consumption, LPG would be used in the absence of a natural gas connection, and the other half of their gas consumption would represent 'new' demand.

These alternatives to gas consumption are summarised in Table 4. These estimates are assumed to remain constant throughout the period of our assessment.

Implicit in these estimates is that the availability of gas in Mt Barker would not generate 'new' demand for any customers other than for the large industrial demand customer in Monarto South. We discuss this assumption further in Section 5.

---

2 We note that 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.

Table 4: Alternatives to gas consumption

	Extension Case	Extension Case consumption consists of:		
	Average consumption per customer (GJ/a)	Average 'new' gas demand per customer (GJ/a)	Average electricity consumption per customer in place of gas (MWh/a)	Average LPG consumption per customer in place of gas (GJ/a)
Residential	27.3	0	0.7	18.4
Mt Barker Commercial	273	0	0	273
Monarto South Commercial	[redacted]	0	0	[redacted]
Kanmantoo Commercial	[redacted]	0	0	[redacted]
Mt Barker and Monarto South Industrial Demand	[redacted]	0	0	[redacted]
Monarto South large Industrial Demand	[redacted]	[redacted]	0	[redacted]

Source: AGN

3.2 Willingness-to-pay

For gas consumed in the Extension Case that replaces alternative fuels in the Base Case, our estimate of the willingness-to-pay for gas is based on the cost to customers of the alternative fuel. This requires estimates of the price of electricity and LPG for each of residential, commercial and industrial customers over our 31 year assessment period.

LPG prices

Some information is available about current LPG price offers for residential customers in South Australia, but these current offers may not necessarily reflect the prices that customers are actually paying. The situation is more difficult for commercial and industrial customers, for whom even current offers are not available.

For residential customers, we have estimates of both current gas prices in Mt Barker and current LPG prices in Mt Barker (based on residential pricing offers from Origin Energy and Elgas, both provided by AGN). Using the current retail gas price in Mt Barker, we calculate the gas bill and the average gas price for a residential customer that consumes the average consumption of 27.3 GJ/a. Similarly, using the current LPG price in Mt Barker we calculate the LPG bill and the average LPG price for a residential customer that consumes the average amount of 18.4 GJ/a for water heating and cooking. We use these average prices to calculate the ratio of the retail price of LPG to the retail price of gas for these residential customers. We calculate this as 130 per cent.

We then make the assumption that the price of LPG relative to the price of gas is the same for all customers. Using estimates of *gas* prices for residential, commercial and industrial customers (as discussed in Section 3.3) we can then infer LPG prices for residential, commercial and industrial customers. The implicit assumption here is that the additional cost (relative to gas) of supplying LPG to residential customers reflects the additional cost (relative to gas) of supplying LPG to customers generally.

Our estimates of average LPG prices are set out in Table 5.

Table 5: Estimated average retail LPG prices

	Average LPG price ($/GJ, real 2017/18, excluding GST)
Residential	$60.01
Mt Barker Commercial	$40.02
Monarto South Commercial	$24.22
Kanmantoo Commercial	$22.83
Mt Barker and Monarto South Industrial Demand	$14.61
Monarto South large Industrial Demand	$11.52

Source: Frontier Economics estimates.

Because we infer LPG prices based on the relationship between current residential LPG prices and current residential gas prices, the LPG prices over the 31 years of our assessment period follow the same path as gas prices over the 31 years of our assessment period (as discussed in Section 3.3).

Electricity prices

The actual electricity prices that residential, commercial and industrial customers in the Mt Barker region are currently paying are not readily available. Information is available about current *offers* for residential customers in South Australia, but these current offers will not necessarily reflect the prices that residential customers are actually paying; customers often remain on legacy contracts with prices that are different from those that are currently available. The situation is more difficult for large commercial and industrial customers, for whom even current offers are not available.

For residential customers, the electricity price that we use in our analysis is the average variable component[3] of a current Origin Energy domestic tariff available in South Australia. For commercial and industrial customers we infer an electricity tariff:

- For commercial customers, by multiplying the residential electricity price by the ratio of a commercial electricity price to a residential electricity price that we have previously calculated for South Australia in work that we have done for AEMO.[4]
- For industrial customers, by multiplying the residential electricity price by the ratio of an industrial electricity price to a residential electricity price that we have previously calculated for South Australia in work that we have done for AEMO.[5]

However, we note that the assumption that commercial and industrial customers would use LPG in the absence of natural gas, and therefore do not switch from electricity to natural gas, means that we do not make use of these commercial and industrial electricity prices.

Our estimates of current average electricity prices are set out in Table 6.

Table 6: Estimated average retail electricity prices

	Average electricity price (c/kWh, real 2017/18, excluding GST)
Residential and small business	37.99
Large business	24.64

Source: Frontier Economics estimates.

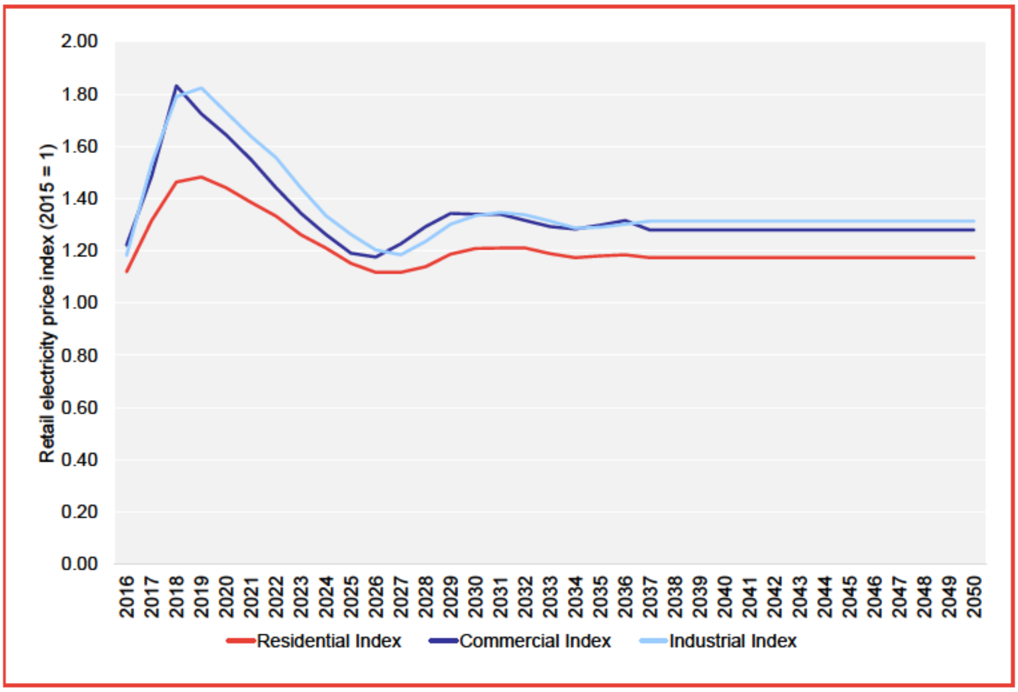
3 We only consider the variable component because we presume that no customer would disconnect from the electricity network as a consequence of connecting to AGN's gas network.

4 Independent Economics and Frontier Economics, *Economic and Energy Market Forecasts*, 2014.

5 Independent Economics and Frontier Economics, *Economic and Energy Market Forecasts*, 2014.

As well as current electricity prices we also need electricity prices over the 31 years of our assessment period. We base the price path for these electricity prices on the price path produced by Jacobs for AEMO's latest National Electricity Forecasting Report.[6] This price path is the price path used by AEMO in forecasting electricity demand in South Australia. This price path for residential, commercial and industrial customers in South Australia is reproduced in Figure 3.

Figure 3: Retail electricity price path in South Australia



Source: Jacobs, Retail electricity price history and projected trends, June 19 2017.

Note: The price path provided by Jacobs extends to 2036/37, while the period for our assessment extends to 2049/50. We have assumed that prices after 2036/37 remain flat in real terms.

3.3 Gas prices

We make use of gas prices in our analysis for two reasons:

- We use a retail gas price for residential, commercial and industrial customers as the basis for inferring LPG prices for these customers.

---

6 Jacobs, *Retail electricity price history and projected trends*, June 19 2017. Available here: https://www.aemo.com.au/-/media/Files/Electricity/NEM/Planning_and_Forecasting/EFI/Jacobs-Retail-electricity-price-history-and-projections_Final-Public-Report-June-2017.pdf

- We deduct from the retail gas price the network tariff component to calculate the retail gas price excluding AGN network tariffs. It is this that we use as the 'cost of gas' for the purposes of calculating the consumer surplus that we compare against the cost of the Mt Barker extension.

We discuss each of these in turn.

Retail gas prices

As with electricity prices, estimates of the gas prices that residential, commercial and industrial customers in the Mt Barker region are currently paying are not readily available. Some information is available about current *offers* for residential customers in South Australia (but not in Mt Barker, since gas is not currently available in Mt Barker), but these current offers will not necessarily reflect the prices that residential customers are actually paying; customers often remain on legacy contracts with prices that are different from those that are currently available. The situation is more difficult for commercial and industrial customers, for whom even current offers are not available.

For residential customers, the gas price that we use in our analysis is the average gas price for a residential customer that consumes the average consumption of 27.3 GJ/a, based on an estimate of the current gas price that a customer in Mt Barker would pay (as provided by AGN). We understand that this information from AGN is based on current the current gas price for a residential customer in a part of the network that is similar to Mt Barker.

For commercial and industrial customers we infer a gas tariff in the following way:

- We estimate the wholesale component and the retail component of the gas tariff for commercial and industrial customers based on estimates for South Australia we have previously calculated for AEMO. These estimates were used by AEMO in forecasting gas consumption for South Australia.
- Estimates of the network component of the gas tariff for Mt Barker for each customer type were provided by AGN.

Our estimates of current average gas prices are set out in Table 7.

Table 7: Estimated average retail gas prices

	Average gas price ($/GJ, real 2017/18, excluding GST)
Residential	$46.00
Mt Barker Commercial	$30.68
Monarto South Commercial	$18.57
Kanmantoo Commercial	$17.50
Mt Barker and Monarto South Industrial Demand	$11.20
Monarto South large Industrial Demand	$8.83

Source: Frontier Economics estimates.

Retail gas price excluding AGN network tariffs

To calculate retail gas prices excluding AGN network tariffs we deduct from the retail gas prices set out in Table 7 the estimate of the network component of the gas tariff for Mt Barker for each customer type that were provided by AGN.

Our estimates of current average gas prices excluding AGN network tariffs are set out in Table 7.

Table 8: Estimated average retail gas prices excluding AGN network tariffs

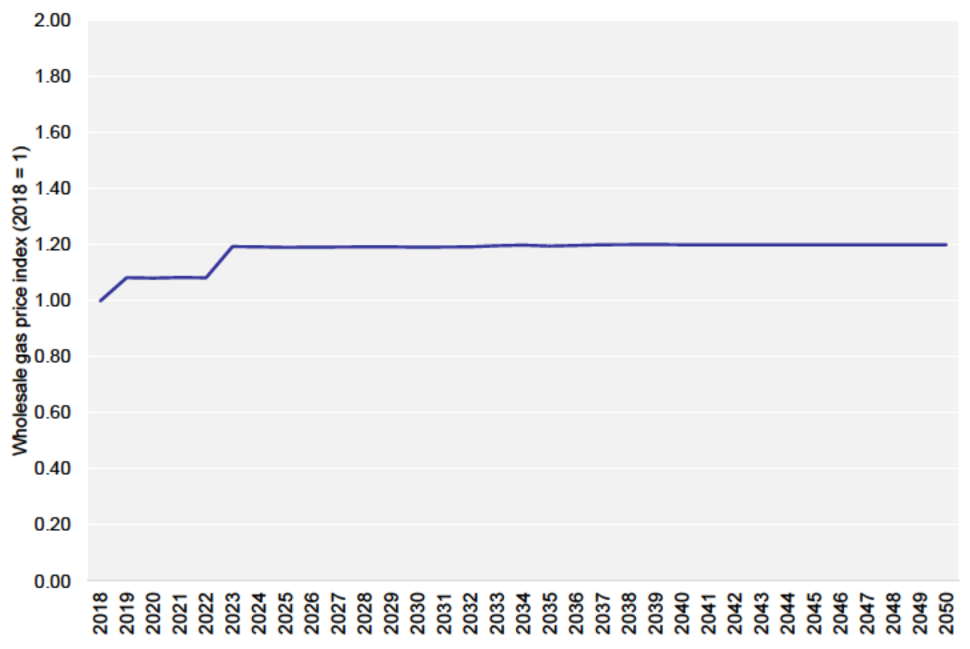
	Average gas price – excluding network tariffs ($/GJ, real 2017/18, excluding GST)
Residential	$23.30
Mt Barker Commercial	$12.91
Monarto South Commercial	$12.91
Kanmantoo Commercial	$12.91
Mt Barker and Monarto South Industrial Demand	$6.12
Monarto South large Industrial Demand	$6.12

Source: Frontier Economics estimates.

Gas price path

As well as current gas prices, we also need gas prices over the 31 years of our assessment period. We base the price path for these gas prices on the price path produced by Core Energy Group for AEMO's National Gas Forecasting Report.[7] This price path is the price path used by AEMO in forecasting gas demand in South Australia. Core Energy Group's price path is a price path for wholesale gas prices, so we use an estimate of the wholesale component of a retail bill (and an estimate of the wholesale component of a retail bill excluding network tariffs) and escalate that component using Core Energy Group's price path. We keep the rest of the retail bill constant in real terms. This price path for residential, commercial and industrial customers in South Australia is reproduced in Figure 4.

Figure 4: Gas price path in South Australia



Source: Core Energy Group, NGFR Gas Price Assessment, Final Report, October 2016

Note: The price path provided by Core Energy Group extends to 2041, while the period for our assessment extends to 2050. We have assumed that prices after 2041 remain flat in real terms.

---

7 Core Energy Group, NGFR Gas Price Assessment, Final Report, October 2016. Available here: http://www.aemo.com.au/-/media/Files/Gas/National_Planning_and_Forecasting/NGFR/2016/NGFR-Gas-Price-Review-Final-Report-October-2016.pdf

3.4 Cost of the Mt Barker extension

The costs of the Mt Barker extension that we consider are all capital and operating costs associated with the infrastructure that makes up the Mt Barker extension. These costs estimates have been provided to us by AGN, and are those that are used in AGN's business case. These are set out in Table 9.

3.5 Asset lives

The asset lives that we use to amortise the capital costs of the Mt Barker extension are 60 years for pipeline assets and 15 years for metering assets.

3.6 Discount rate

The discount rate that we use in calculating present values is the real discount rate that is used in AGN's business case – 3.94 per cent. This is the real pre-tax WACC as calculated by the AER in the current access arrangement for Australian Gas Networks (SA).[8]

8 https://www.aer.gov.au/networks-pipelines/determinations-access-arrangements/australian-gas-networks-sa-access-arrangement-2016-21/updates

Table 9: Costs of the Mt Barker extension

	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
Capital costs ('000s, incl overheads)	$29,738	$5,680	$2,168	$3,446	$863	$872	$774	$836	$836	$836	$827	$945	$833	$833	$833	$833	$918	$966	$970	$966	$881
Operating costs ('000s)	$0	$43	$50	$57	$64	$71	$78	$86	$94	$102	$674	$117	$125	$133	$141	$149	$157	$165	$173	$181	$824

	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
Capital costs ('000s, incl overheads)	$137	$151	$151	$151	$147	$147	$148	$148	$148	$148
Operating costs ('000s)	$189	$189	$189	$189	$189	$189	$189	$189	$189	$189

Source: AGN Mt Barker Business Case.

4 Our results

This section sets out the results of our analysis of the economic costs and benefits of the Mt Barker extension.

4.1 Summary of results

We find that the net present value of the economic benefit of the Mt Barker extension over the 31 year period 2019/20 to 2049/50 is $29,882,334.

We use the following sections to look at, in more detail, the components included in the net present value calculation, namely the benefits and costs associated with the Mt Barker extension.

4.2 Quantified economic benefits of the Mt Barker extension

Under the approach that we have adopted, the economic benefits consist of the increase in consumer surplus as a result of fuel switching.

This increase in consumer surplus is driven by two factors: the difference between the willingness-to-pay for gas (which is based on the price of the alternative fuel used in the Base Case) and the cost of gas (which we are taking as the retail price of gas excluding the network tariff to AGN); and the quantity of the alternative fuel that would be displaced under the Extension Case.

Prices

We first discuss the differences between the willingness-to-pay for gas and the cost of gas. As discussed, this calculation depends on the price of alternative fuel used in the Base Case (electricity or LPG) and the cost of gas under the Extension Case.

Based on the energy use assumptions that AGN has provided to us, the only substitution from electricity to gas is for residential customers who currently use electricity for space heating, but would use gas for space heating if the Mt Barker extension proceeds.

For this use, we show the difference between the willingness-to-pay for gas and the cost of gas in Figure 5. Figure 5 shows that, initially, the willingness-to-pay for gas to replace electricity use for residential space heating is higher than the cost of gas (which we are taking as the retail price of gas excluding the network tariff to AGN). However, this differential is short lived, lasting only until 2024. From 2024, the willingness-to-pay for gas to replace electricity use for residential space heating is lower than the cost of gas.

The implication of this is that even when we exclude the network tariff to AGN from our assessment at this stage, residential customers' willingness-to-pay for gas to replace electricity use for residential space heating is higher than the cost of gas only for a few years.

It is important to note that this result does not imply that customers make irrational financial decisions in choosing gas for space heating (or that AGN are assuming that customers make irrational financial decisions in the consumption estimates that they have provided). The result above, which suggests that the efficiency advantage of electricity in space heating is more than enough to outweigh the higher average price of electricity per unit of energy, is based on *average* prices for electricity and gas. But, of course, customers are likely to make economic decisions based on *marginal* prices.

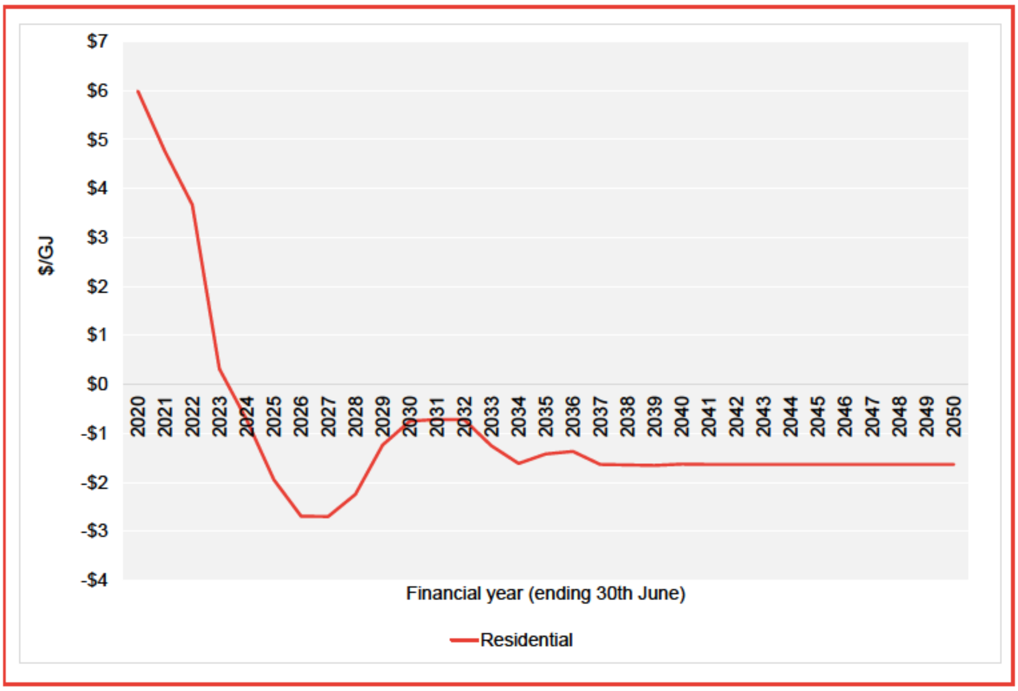
This difference between average and marginal prices is very relevant to the decision whether to choose gas for space heating or electricity for space heating because the tariff structures for gas and electricity are very different: gas tariffs are based on a declining block structure (with a substantially lower rate for the second block) while electricity tariffs have an inclining block tariff. This means that a customer that uses gas for cooking and hot water faces a substantially lower marginal price of gas as a result of also using gas for space heating; so much so that an average customer that uses gas for cooking and hot water will find it cheaper to also use gas for space heating rather than to use electricity for space heating.

While our analysis makes use of average prices, our analysis does account for the benefit to customers of the declining block structure of gas tariffs. It does this because the average gas price is calculated having regard to the fact that an average customer (using 27.3 GJ/a of gas) will consume a significant proportion of its gas at the lower rate. One simple way of understanding this is that the average residential customer (consuming 27.3 GJ/a of gas for a combination of cooking, water heating and space heating) achieves significantly more consumer surplus using gas in the Extension Case than using a combination of electricity and LPG in the Base Case.

Additionally, our assumption is that customers consider gas and electricity as perfect substitutes; if, in fact, customers place a higher value on gas space heating than electric space heating (due to its ambience, ability to heat larger spaces or lower carbon emissions, for example)[9] then there may be an increase in consumer surplus as a result of this switching.

9 Core Energy's demand forecasts for customers in Mt Barker shows higher average gas consumption in cooler climates, even for new homes. This supports the assumption that many customers will choose natural gas over electricity for their heating needs, likely for these reasons.

Figure 5: Difference between willingness-to-pay for gas and cost of gas – switching space heating from electricity to natural gas at average prices ($2017/18)



Source: Frontier Economics analysis

Notes:

1. *Figure 5 shows only residential customers, as AGN does not expect any other customer class to use electricity.*
2. *That Figure 5 shows that willingness-to-pay for gas is below the cost of gas for space heating at average prices does not imply that residential customers make irrational financial decisions in choosing gas for space heating. The declining block structure of gas tariffs means that, for an average residential customer with gas space heating, marginal gas prices are much lower than the average gas prices on which Figure 5 is based.*

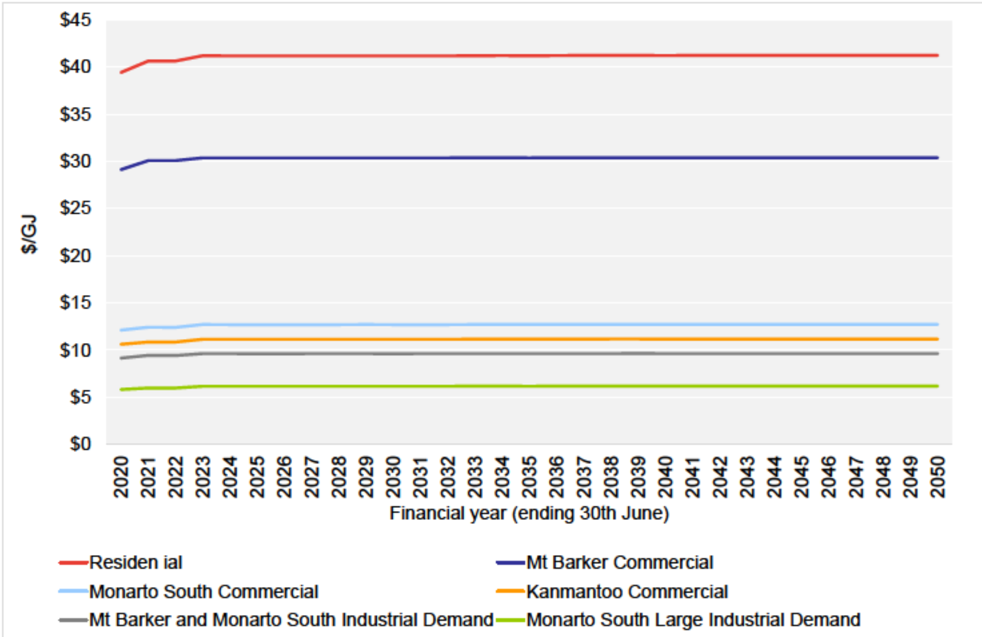
Based on the assumptions that AGN has provided to us, most of the fuel substitution that would occur if the Mt Barker extension proceeds is substitution of LPG use for gas use.

For this use, we show the difference between the willingness-to-pay for gas and the cost of gas in Figure 6.

Figure 6 shows that the willingness-to-pay for gas to replace LPG is higher than the cost of gas (which we are taking as the retail price of gas excluding the network tariff to AGN) for all users. This is ultimately driven by the assumption that the efficiency of gas use is the same as the efficiency of LPG use for all users, and that the LPG price is at a 30 per cent premium to the retail gas price (and therefore at a higher premium to the retail price of gas excluding the network tariff to AGN).

As a result, replacing LPG use with gas use does contribute to an increase in consumer surplus for all customers.

Figure 6: Difference between willingness-to-pay for gas and cost of gas – switching from LPG to natural gas at average prices ($2017/18)



Source: Frontier Economics analysis

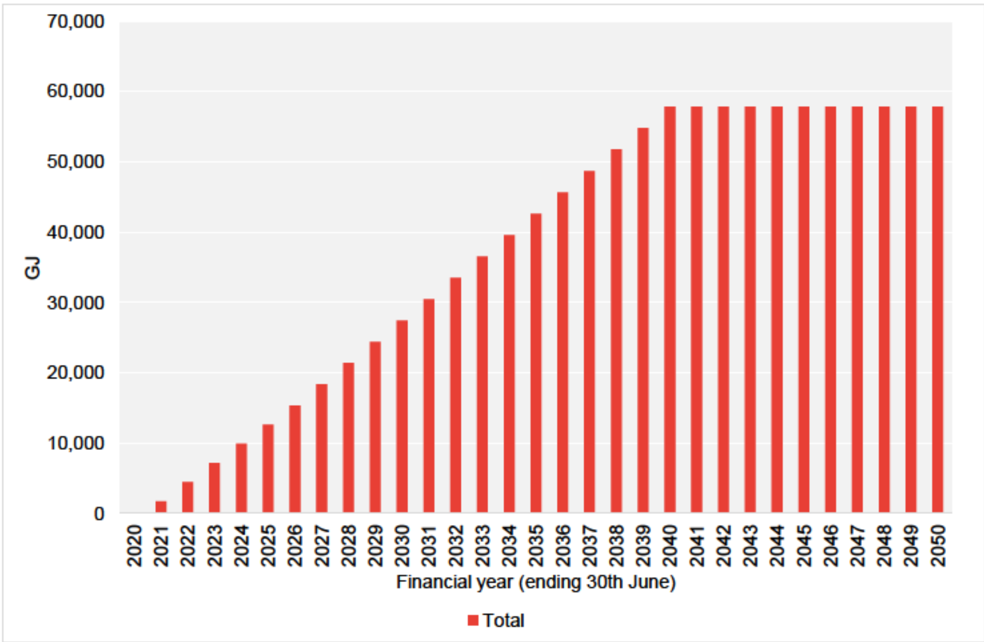
Quantity of fuel displaced

The second key determinant of the increase in consumer surplus is the quantity of electricity and LPG that would be replaced by gas if the Mt Barker extension proceeds.

Figure 7 shows the amount of forecast gas consumption in the Extension Case that represents switching from electricity to gas. Recall that this switching reflects switching of electricity space heating to gas space heating by residential customers.

Figure 8 show the amount of forecast gas consumption in the Extension Case that represents switching from LPG to gas. This reflects a combination of LPG to gas switching by all customers.

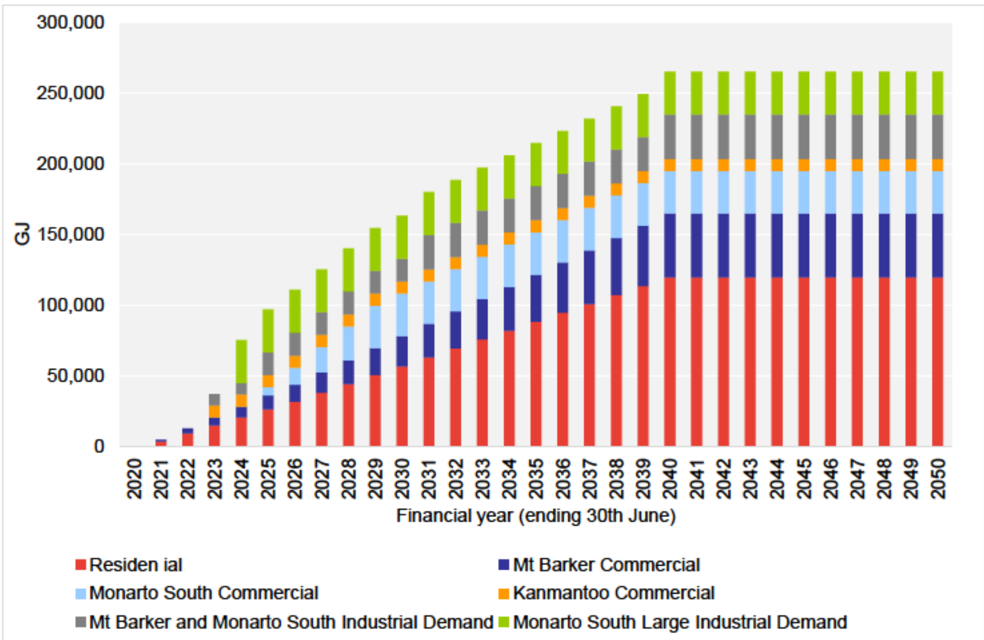
Figure 7: Gas consumption that represents switching from electricity



Source: Frontier Economics analysis

Note: Figure 7 shows only residential customers, as AGN does not expect any other customer class to use electricity.

Figure 8: Gas consumption that represents switching from LPG



Source: Frontier Economics analysis

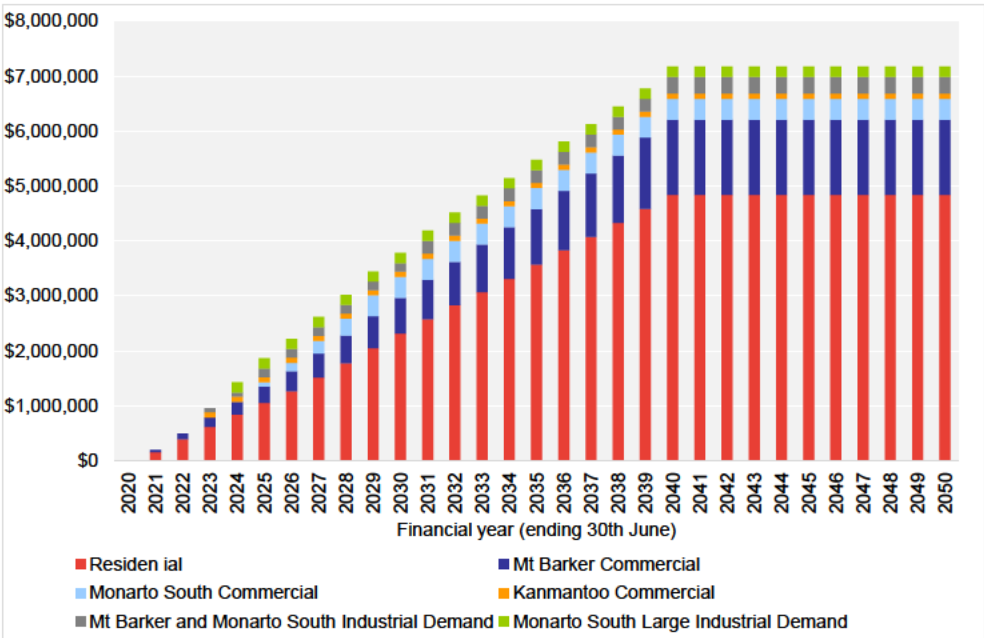
Increase in consumer surplus by customer type

Having looked at both the difference between the willingness-to-pay for gas and the cost of gas, and the quantity of the switching to gas if the Mt Barker extension proceeds, it is now possible to show the composition of the increase in consumer surplus by customer type over time. This is shown in Figure 9.

Residential customers see the largest increase in consumer surplus. This is due to both their relatively higher forecast gas consumption and the fact that they are estimated to experience the largest difference between LPG and natural gas prices. This is somewhat offset by the loss of consumer surplus as a result of switching from electric space heating to gas space heating, which for the reasons outlined in Section 4.2 may not be a true loss of consumer surplus.

The increase in consumer surplus for other customer classes is smaller. This is due to their relatively lower forecast gas consumption and the fact that they are estimated to experience smaller differences between LPG and natural gas prices.

Figure 9: Breakdown of increase in consumer surplus by customer type ($2017/18)



Source: Frontier Economics analysis

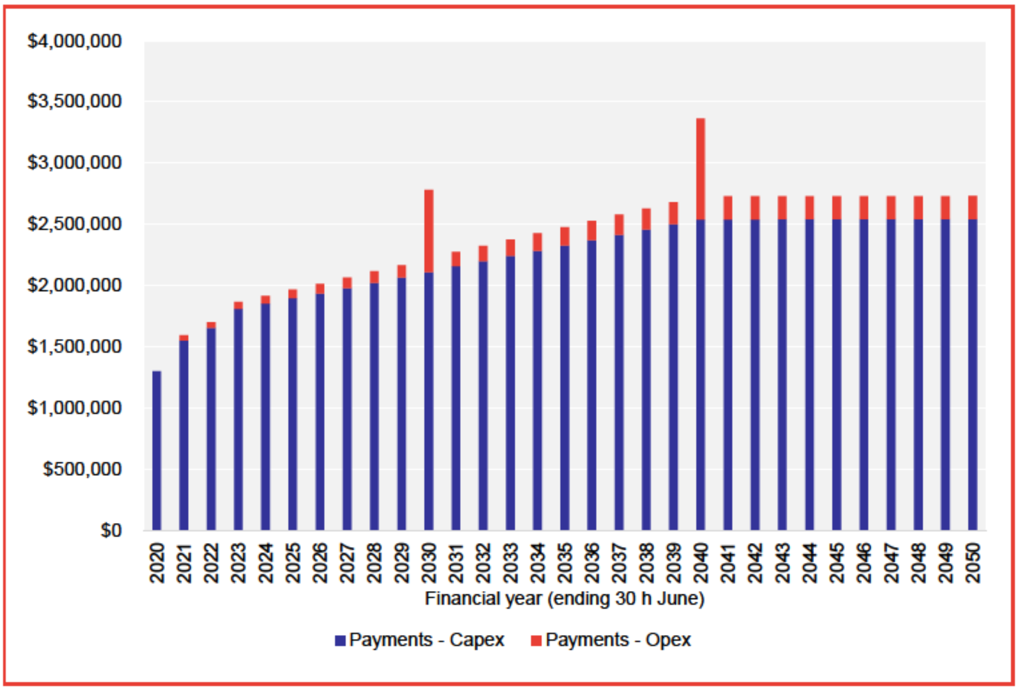
4.3 Economic cost of the Mt Barker extension

Figure 10 shows the breakdown of the costs of the Mt Barker extension by type over the period of our assessment.

As discussed, we have amortized the capital costs of the assets that make up the Mt Barker extension over the assets lives of the individual assets being considered. Pipeline capital costs incurred in 2020 are amortised and recovered over 60 years starting in 2020, pipeline capital costs incurred in 2021 are amortised and recovered over 60 years starting in 2021, and so on. The capital costs shown in Figure 10 represent the sum of the amortised costs in each year. These capital costs gradually increase over time, as each year additional capital costs are incurred (although most of the capital cost occurs during the first few years).

Operating costs make up a considerably smaller percent of total costs compared to capital costs, which is understandable for a capital intensive project such as this. Operating costs are also tied to the number of meters installed, which is why we see the costs increase as connections increase. The two spikes in operating costs in 2030 and 2040 reflect additional maintenance activities in these years including pigging and replacement/upgrades of meters, valves and regulators.

Figure 10: Breakdown of costs by type ($2017/18)



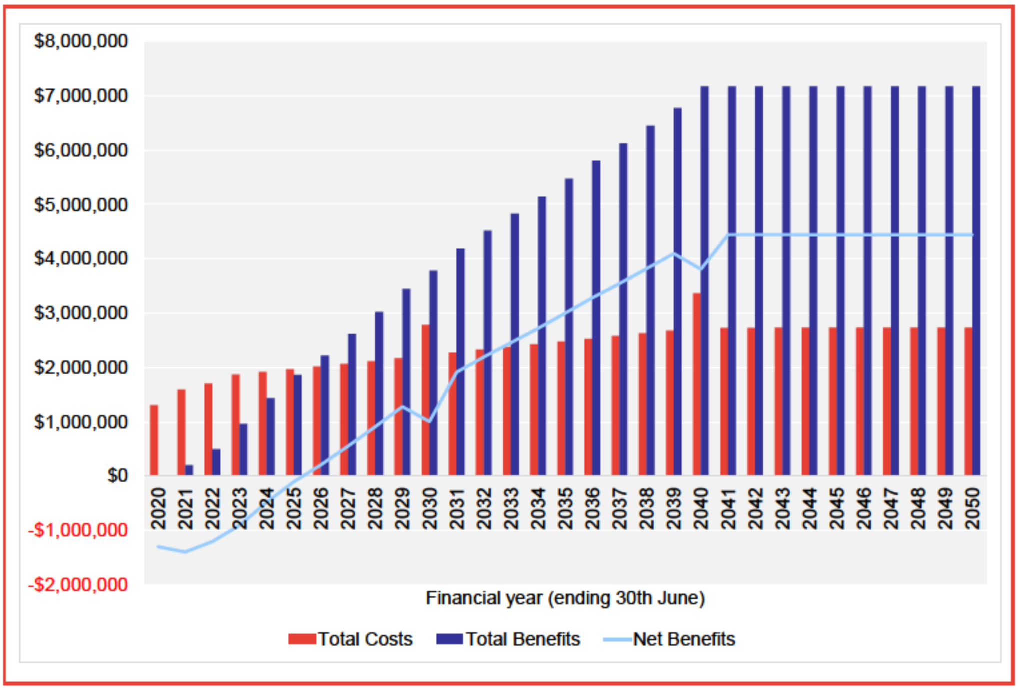
Source: Frontier Economics analysis

4.4 Net benefits

Figure 11 shows our quantification of the net economic benefits which would occur due to the Mt Barker pipeline extension.

Figure 11 is simply the combination of the increase in consumer surplus discussed in Section 4.2 and the costs discussed in Section 4.3. We have also added in a line to indicate the net annual benefits.

Figure 11: Net benefits ($2017/18)



Source: Frontier Economics analysis

There are a couple of key features of the trends in consumer surplus and economic costs that are shown in Figure 11.

First, benefits are 0 in 2020, which is due to the fact that there are no connections until 2021.

Second, the initial period of low connections and relatively high costs result in negative net benefits in the early years.

Third, costs grow at a much slower rate than consumer surplus, and as such, by 2026, benefits exceed costs. This trend is maintained for the remainder of the period and annual net benefits continue to grow up until 2039/40, beyond which we have assumed constancy in all forecasts.

Finally, even though there is a modest net economic cost in the first six years of the project, this is comfortably accounted for by larger benefits for the next 25 years of the project, leading to a positive economic benefit in net present value terms.

4.5 Other possible approaches

We would also note that there are a number of alternative approaches that we could have taken to quantifying the net economic benefit of the Mt Barker extension. We would make particular mention of two of these alternatives.

First, the approach we have taken to accounting for capital costs over the period of our assessment is to amortise the capital costs over the assumed life of the assets, sum these amortised amounts for each year of the period of our assessment, and take a net present value of these amounts. Given that the assumed life of pipeline assets is 60 years, implicit in this approach is that a proportion of the capital costs of the Mt Barker extension will not be recovered during the period of our assessment. We think this is appropriate, given that the pipeline will have remaining economic life, and presumably will continue to operate, beyond the end of 2049/50.

However, an alternative approach would have been to simply take the net present value of all the capital costs incurred during the period of our assessment. Under this approach, we would implicitly be comparing the net benefits during the period of our assessment, with total capital expenditure during the period of our assessment, ignoring the fact that the pipeline assets would have useful life beyond the period of our assessment. Even if we had taken this approach, we would still find that the net present value of the economic benefit of the Mt Barker extension over the 31 year period 2019/20 to 2049/50 is positive, at around $19 million.

Second, the approach that we have taken is to assess consumer surplus using the difference between willingness-to-pay and the retail price of gas excluding the network tariff to AGN, and to deduct from this the cost of the Mt Barker extension. As discussed previously, an alternative approach would be to assess consumer surplus using the difference between willingness-to-pay and the retail price of gas (including the network tariff to AGN). If we took this approach, we would not then need to deduct the cost of the Mt Barker extension from this benefit (because the cost would already be reflected in the retail price of gas). Under this approach we would find that the net present value of the economic benefit of the Mt Barker extension over the 31 year period 2019/20 to 2049/50 is positive, at around $13 million. Note this approach also includes total capital expenditure during the period of our assessment, ignoring the fact that the pipeline assets would have useful life beyond the period of our assessment.

4.6 Other possible discount rates

Our analysis uses AGN's real pre-tax WACC as the discount rate. We use this to discount both future costs and future consumer benefits. While AGN's real pre-tax WACC is reflective of the current commercial risks to AGN, it may not be reflective of consumers' time value of money (which may be lower, say around 2 per cent).

In contrast, using a real discount rate of 2 per cent to discount both future costs and future consumer benefits would result in a quantified net economic benefit of $63 million in present value terms.

5 Other benefits and costs

We note that there are a number of likely, or potential, economic benefits that we have not quantified in this report. These economic benefits include the following:

- **An increase in consumer surplus associated with 'new' demand**. The consumer surplus that we have quantified is the consumer surplus associated with switching from electricity or LPG to gas. This consumer surplus is driven by the difference in the price of electricity or LPG and gas (once accounting for any difference in appliance efficiency). However, we would also expect that there would be consumer surplus associated with gas use that represents 'new' demand. AGN have estimated that half of the gas consumption of the large Industrial Monarto South customer will represent 'new' demand. However, as we discuss, it is difficult to know what the willingness-to-pay for this gas is; what we can reasonably assume is that it is somewhere between the retail gas price and the retail LPG price. If we assume that the willingness-to-pay is half way between the retail gas price and the retail LPG price for this customer, then, based on the gas consumption forecasts provided by AGN, the present value of the additional consumer surplus from this gas consumption over the period 2019/20 to 2049/50 would be approximately $2 million.
- **An increase in consumer surplus associated with demand growth due to price elasticity**. We understand that the forecasts of gas consumption developed by Core Energy Group do not take into account a price elasticity of demand. We would expect customer's consumption will be responsive to prices, so that the cheaper retail gas price would result in increased consumption. To the extent that this occurs, we would expect that there would be an additional increase in consumer surplus associated with this consumption. We note this is most relevant for Commercial Monarto South and Kanmantoo and Industrial Mt Barker and Monarto South customers. This is because consumption estimates for Residential and Mt Barker Commercial customers are based on similar existing natural gas customers whose actual consumption would be relative to their price elasticity.
- **An increase in consumer surplus associated with demand growth beyond 2039/40**. The forecasts of gas connections and consumption developed by Core Energy Group extend to 2049/50. However, consistent with AGN's cashflow assessment under NGR 79(2)(b) we have only included growth up to 2039/40. As growth will occur beyond 2039/40, we expect there would be an additional increase in consumer surplus associated with this consumption.
- **An increase in consumer surplus associated with customers preferring gas to other fuels**. We have assumed that customers are indifferent between using electricity or LPG, and using gas. If, in fact, customers have a preference for using gas for certain purposes – for instance, because customers prefer

cooking with gas or prefer gas space heating – the Mt Barker extension would contribute to additional consumer surplus above what we have quantified.

- **An increase in producer surplus to gas producers, gas transporters, gas retailers and/or AGN**. We have assumed that none of gas producers, gas transporters, gas retailers or AGN achieve an increase in producer surplus as a result of the Mt Barker extension. As we discussed in reference to gas producers, we are implicitly assuming that the increase in gas production does not change the wholesale gas price and that the cost of additional gas production will be equal to the price. In reality, of course, this may not be the case. The increase in gas production, transportation and retailing due to the Mt Barker extension may result in additional economies of scale, and deliver an increase in producer surplus.
- **The economic benefit of gas having lower carbon emissions than electricity or LPG**. We have assumed in our modelling that there is no carbon price that would apply to electricity, gas or LPG production or sales. However, there is a genuine prospect over the period of our assessment that there will be a carbon price that applies (or that otherwise there will be a benefit to reduced carbon emissions). If this is the case, then there will be additional economic benefit if the production and supply of gas produces lower emissions than the production and supply of electricity and/or LPG. Given that AGN's estimate is that most natural gas consumption resulting from the Mt Barker extension would reflect switching from LPG to gas, the relative emissions associated with LPG and gas are particularly relevant. AGN estimates that the emissions associated with LPG production and supply are around 15 per cent higher than the emissions associated with gas production and supply, at least for residential customers. At a carbon price of $25/tCO_2e, this difference implies a benefit in present values terms over the period 2019/20 to 2049/50 of around $0.35 million for residential customers or $0.75 million if applied to all customers.

We also note that there are some economic costs that we have not calculated. The key economic costs that we have not calculated are the capital costs to customers of gas appliances. These economic costs include the following:

- For existing commercial and industrial customers, the capital cost of buying and installing gas appliances to replace existing LPG appliances, or the capital cost of converting existing LPG appliances to operate on gas. This cost would depend on whether or not appliances can be converted to operate on gas and, if not, at what point in their economic life the existing appliances are. The sooner existing appliances will need to be replaced anyway, the lower the additional cost of buying and installing gas appliances to replace them.
- For the new households that make up Core Energy Group's forecasts of residential customers, the capital costs of buying and installing gas appliances instead of electric or LPG appliances. For these customers, the economic cost

is determined by the difference between the cost of buying and installing new gas appliances and the cost of buying and installing new LPG and electric appliances. LPG and gas cooking and hot water appliances are comparable in price, and therefore there is no economic cost or benefit. We have not assessed whether the cost of buying and installing gas heating would be higher or lower than the cost of electric heating. It can depend on the preferred method of cooling. If the cost of buying and installing gas heating is lower, installing gas heating would represent an additional economic benefit rather than an additional economic cost.

Both of these represent one off costs and we expect they would not materially impact the overall positive benefit we have calculated.

Finally, we note that we have not attempted to quantify any broader economic benefits of the Mt Barker extension to the economy generally. These broader economic benefits are beyond the scope of the test under the NGR. Nevertheless, broader economic benefits may arise, including:

- To the extent that the lower price of gas results in an increase in gas consumption, this can be expected to reflect an increase in economic activity in the Mt Barker region. This increase in economic activity in the Mt Barker region would likely be associated with an increase in employment, and potentially an increase in wages. To the extent there is spare capacity in the region (land, labour, capital) there would likely be a multiplier effect as a result of increased expenditure in the region.
- An increase in economic activity and employment in the Mt Barker region is also likely to be reflected in an increase in economic activity and employment within South Australia. Economic activity and employment would be increased in South Australia unless the increased economic activity and employment in Mt Barker was the result of that economic activity relocating from elsewhere in the state to Mt Barker to take advantage of the availability of gas in Mt Barker. However, given that much of the state already has gas available, it is not obvious why the availability of gas in Mt Barker would attract economic activity from other parts of the state to Mt Barker.
- An increase in economic activity and employment in Mt Barker, Monarto South and Kanmantoo, and within South Australia generally would be expected to improve the state budget.

6 Conclusion

The analysis that we have undertaken suggests that the quantifiable benefits of the Mt Barker extension exceed the economic costs of the Mt Barker extension.

Indeed the quantifiable benefits materially exceed the economic costs: 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 economic costs of the Mt Barker extension over the same period is approximately $40 million. The net result is a quantified net economic benefit of approximately $30 million.

Even if we take a different approach to quantifying economic costs, by simply taking the net present value of all expenditure over the period 2019/20 to 2049/50 (rather than amortising capital costs over the full life of the assets) we still find that the quantifiable benefits materially exceed the economic costs: the net present value of the quantifiable benefits remains the same at approximately $70 million and the net present value of the economic costs of the Mt Barker extension would be approximately $51 million. The net result is a quantified net economic benefit of approximately $19 million.

Of course the results of our analysis depend on the assumptions that we have used. Changes in these assumptions – some of which we have sourced publicly and some of which have been provided by AGN – would bring about changes in our assessment of net economic benefit. However, given the quantified economic benefits are materially higher than the economic costs of the Mt Barker extension, we would expect that significant changes to these input assumptions would be required in order to bring about a result in which there is a negative net economic benefit.

We also highlight a number of economic benefits and costs which we have not quantified. Some of these are direct benefits and costs that, considered together, are likely to increase the overall economic value of the extension under the NGR. Further, there are broader economic benefits to the Mt Barker area and the economy generally that fall out of scope of the NGR.

FRONTIER ECONOMICS
BRISBANE | MELBOURNE | SINGAPORE | SYDNEY
Frontier Economics Pty Ltd 395 Collins Street Me bourne Victoria 3000
Tel: +61 (0)3 9620 4488 Fax: +61 (0)3 9620 4499 www.frontier-economics.com.au
ACN: 087 553 124 ABN: 13 087 553 124