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Amadeus Gas Pipeline

Access Arrangement Information

Effective
1 July 2016 – 30 June 2021

August 2015

Contents

1. Introduction

1.1 Purpose of this document

This Access Arrangement Information (AAI) document has been prepared, in accordance with Rule 43(1) of the National Gas Rules 2008 (NGR), to provide Users and Prospective Users with sufficient information to understand the derivation of the Access Arrangement and its compliance with the NGR.

This Access Arrangement Information accompanies APT Pipelines (NT) Pty Limited's (APTNT's) access arrangement for the Amadeus Gas Pipeline. The revised access arrangement is expected to commence on 1 July 2016.

The Amadeus Gas Pipeline spans from the Palm Valley and Mereenie gas fields to Darwin. A more detailed description of the Covered Pipeline, including a map, is available on the APA Group website at www.apa.com.au, which shows key offtakes and inputs for the Pipeline, and intersections with other transmission pipelines.

1.1.1. Layout of this access arrangement information

This document follows the structure of Rule 72[1] setting out the requirements for content of the access arrangement information for a full access arrangement proposal.

APTNT's access arrangement proposal commences at the end of an earlier access arrangement period, and therefore contains information relevant to the earlier access arrangement period (in this case spanning from 1 August 2011 to 30 June 2016) as required under the Rules. This information is included in Part 2 of the AAI. The remaining parts of this AAI are as follows:

- Part 3 establishes the capital base for the access arrangement period (in this case proposed to span 1 July 2016 to 30 June 2021), including forecast capital expenditure for the access arrangement period;
- Part 4 discusses forecast pipeline demand, capacity and utilisation used to derive the reference tariff;
- Part 5 outlines forecast operating expenditure for the access arrangement period;
- Part 6 sets out key performance indicators for the pipeline;
- Part 7 sets out the rate of return used in the access arrangement;
- Part 8 outlines the approach to taxation and how the tax asset base has been calculated;

[1] All references to Rules or a particular Rule in this document refer to the National Gas Rules 2008, or part thereof, unless an alternative meaning is expressly stated.

- Parts 9 and 11 discuss historical and proposed incentive mechanisms;
- Part 10 describes the reference service, approach to tariff setting and reference tariff variation mechanism; and
- Part 12 sets out the total revenue requirement for the pipeline for each year of the access arrangement.

1.2 Basis of information in the access arrangement information

Unless otherwise stated, all information in the access arrangement revision proposal is provided in real 2015/16 dollars. Nominal values are brought to this basis using the Consumer Price Index (CPI) all groups, eight capital cities average June over June published by the Australian Bureau of Statistics (ABS) up to June 2015 (most recent CPI data available) and then using an annual forecast CPI of 2.5 per cent thereafter.

2. Information relevant to the earlier access arrangement period

2.1 Capital expenditure

Capital expenditure by asset class over the earlier access arrangement period[2] is set out in Table 2.1 below. These costs are based on actual costs in financial years 2011/12 to 2014/15, and forecast costs for financial year 2015/16.

Table 2.1 – Capital expenditure by asset class over the earlier access arrangement period ($2015/16)

$'000	2011/12	2012/13	2013/14	2014/15	2015/16 E	Total
Pipeline	2,549	14,280	1,364	1,150	9,784	29,128
Compression	0	0	0	0	0	0
Meter Station	1,565	802	847	774	1,623	5,611
SCADA & Communications	0	0	184	181	2,889	3,253
Operation & Management facilities	405	1,895	1,889	2,103	558	6,850
Building	0	0	0	0	0	0
Return Tariff Payment	0	0	0	0	0	0
Total	**4,520**	**16,977**	**4,284**	**4,207**	**14,854**	**44,842**

[2] As required by Rule 72(1)(a)(i)

2.2 Operating expenditure

Operating expenditure by category over the earlier access arrangement period[3] is set out in Table 2.2 below. These costs are based on actual costs in financial years 2011/12 to 2014/15, and forecast costs for financial year 2015/16.

Table 2.2 – Operating expenditure by category over the earlier access arrangement period ($2015/16)

$'000	2011/12	2012/13	2013/14	2014/15	2015/16 E	Total
Operations & Maintenance	9,791	11,648	9,935	9,976	12,281	**53,630**
Overheads	4,860	4,930	4,968	5,738	5,045	**25,540**
Sales & Marketing	69	69	69	69	69	**345**
Total	**14,719**	**16,646**	**14,971**	**15,783**	**17,395**	**79,515**

2.3 Pipeline usage

Pipeline minimum, maximum and average demand figures for each delivery point over the earlier access arrangement period are set out in Table 2.3 below. These values are based on actual demand in years 2011/12 to 2014/15, and forecast demand for year 2015/16.

Table 2.3 - Minimum, Maximum and average demand, and total volume by delivery point over the earlier access arrangement period

		2011/12	2012/13	2013/14	2014/15	2015/16 E
Delivery point	**Unit**					
Alice Springs	Min (TJ/d)	6.1	5.8	6.7	6.1	6.3
	Max (TJ/d)	13.0	13.4	14.1	12.2	13.0
	Average (TJ/d)	9.5	9.6	10.0	8.9	7.3
	Total (TJ/a)	3,465.6	3,505.4	3,642.3	3,255.7	2,673.5
Tennant Creek	Min (TJ/d)	0.6	0.5	0.6	0	0.5
	Max (TJ/d)	1.7	1.7	1.6	1.7	1.7
	Average (TJ/d)	1.2	1.2	1.2	1.1	1.0
	Total (TJ/a)	443.2	436.1	431.4	413.5	382

[3] As required by Rule 72(1)(a)(ii)

		2011/12	2012/13	2013/14	2014/15	2015/16 E
Elliot	Min (TJ/d)	0.07	0	0.07	0.07	0.07
	Max (TJ/d)	0.1	0.1	0.2	0.15	0.15
	Average (TJ/d)	0.1	0.1	0.1	0.1	0.1
	Total (TJ/a)	35	35.1	37.1	37.1	36.9
Daly Waters	Min (TJ/d)	2	0.9	1.4	1.5	1.5
	Max (TJ/d)	7.9	7	7.8	8.8	9.4
	Average (TJ/d)	6.0	6.3	6.0	7.3	8.0
	Total (TJ/a)	2,203.2	2,314.6	2,190.5	2,671.6	2,915.8
Mataranka	Min (TJ/d)	0	0	0	0	0
	Max (TJ/d)	0	0	0	0	0
	Average (TJ/d)	0	0	0	0	0
	Total (TJ/a)	0	0	0	0	0
Katherine	Min (TJ/d)	0	0	0	0	0
	Max (TJ/d)	4	4.9	3.6	6.2	6.2
	Average (TJ/d)	0.9	1.2	0.7	0.6	1.1
	Total (TJ/a)	340.7	443.5	252.5	225.9	415.8
Mt Todd	Min (TJ/d)	0	0	0	0	0
	Max (TJ/d)	0	0	0	0	0
	Average (TJ/d)	0	0	0	0	0
	Total (TJ/a)	0	0	0	0	0
Pine Creek	Min (TJ/d)	1.0	0.0	0.7	2.2	0
	Max (TJ/d)	5.9	5.7	5.8	5.9	5.8
	Average (TJ/d)	5.2	4.5	5.0	5.0	5.1
	Total (TJ/a)	1,885.7	1,646.7	1,820	1,808.7	1,864.4
Cosmo	Min (TJ/d)	0	0	0	0	0
	Max (TJ/d)	0	0	0	0	0
	Average (TJ/d)	0	0	0	0	0
	Total (TJ/a)	0	0	0	0	0
Ban Ban Springs	Min (TJ/d)	0	0	0	0	0
	Max (TJ/d)	0	0	0	0	0
	Average (TJ/d)	0	0	0	0	0
	Total (TJ/a)	0	0	0	0	0

		2011/12	2012/13	2013/14	2014/15	2015/16 E
Townend Road[4]	Min (TJ/d)	-	-	0	0	0.2
	Max (TJ/d)	-	-	0.045	0.7	1.30
	Average (TJ/d)	-	-	0.0	0.3	0.6
	Total (TJ/a)	-	-	0.1	124	202.8
Darwin City Gate	Min (TJ/d)	0.002	0.0	0.02	0.02	0.01
	Max (TJ/d)	0.1	0.2	0.3	0.2	0.2
	Average (TJ/d)	0.0	0.1	0.1	0.1	0.1
	Total (TJ/a)	10.4	25.6	25.8	27.3	24.4
Weddell	Min (TJ/d)	0.0	0.0	0.0	2.4	0.0
	Max (TJ/d)	17.3	16.6	20.8	25.7	26
	Average (TJ/d)	9.9	10.1	10.3	13.4	14.4
	Total (TJ/a)	3,595.9	3,701.7	3,773.1	4,892.1	5,249.2
Channel Island	Min (TJ/d)	16.7	17.8	16.3	15.2	15.2
	Max (TJ/d)	44.1	44.9	47.7	45.2	46
	Average (TJ/d)	31.6	30.5	31.3	30.2	31.0
	Total (TJ/a)	1,1520.1	11,120	11,439.8	11,031.1	11,323.2
Total volume	**Total (TJ/a)**	**23,499.8**	**23,228.7**	**23,612.6**	**24,487.0**	**25,088.0**

[4] New AGP delivery point from 2013/14

Pipeline user numbers for each delivery point over the earlier access arrangement period[5] are set out in Table 2.4 below. These figures are based on actual customer numbers in years 2011/12 to 2014/15, and forecast customer numbers for year 2015/16.

Table 2.4 - User numbers by delivery point over the earlier access arrangement period

Delivery points	2011/12	2012/13	2013/14	2014/15	2015/16 E
Alice Springs	1	1	1	1	1
Tennant Creek	1	1	1	1	1
Elliott	1	1	1	1	1
Daly Waters	2	2	2	2	2
Mataranka	0	0	0	0	0
Katherine	1	1	1	1	1
Mt Todd	0	0	0	0	0
Pine Creek	1	1	1	1	1
Cosmo	0	0	0	0	0
Ban Ban Springs	0	0	0	0	0
Townend Road	-	-	1	1	1
Darwin City Gate	2	1	1	1	1
Weddell	1	1	1	1	1
Channel Island	1	1	1	1	1

[5] As required by Rule 72(1)(a)(iii)(B)

3. The capital base

3.1 Opening capital base

The opening capital base for the access arrangement period[6] is shown in Table 3.1 below.

Table 3.1 – Capital base roll forward 2011/12 to 2015/16 ($nominal)

$'000	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16
Opening capital base	100,484	91,820	92,556	105,997	107,655	107,750
Plus net conforming capex	5,712 F	4,288	16,527	4,009	4,181	15,543
Plus speculative capex						
Plus reused redundant assets						
Less depreciation	-17,648	-5,047	-5,403	-5,456	-5,516	-3,139
Plus indexation	3,272	1,495	2,316	3,105	1,430	2,748
Adjustment for previous period						-2,291
Closing capital base	91,820	92,556	105,997	107,655	107,750	**120,611**

3.2 Projected capital base

The projected capital base for the access arrangement period is made up of the following components:

- Opening capital base; plus
- Forecast conforming capital expenditure; less
- Forecast depreciation; less
- Forecast disposals.

These components are described in the following sections, and the projected capital base is provided in section 3.2.5 below.

3.2.1. Forecast conforming capital expenditure for the access arrangement period

Forecast conforming capital expenditure by asset class over the access arrangement period[7] is set out in Table 3.2 below.

[6] As required by Rule 72(1)(b)

Table 3.2 – Forecast capital expenditure by asset class over the access arrangement period ($2015/16)

$'000	2016/17	2017/18	2018/19	2019 20	2020/21	Total
Pipeline	14,479	261	266	268	270	**15,544**
Compression	-	-	-	-	-	**0**
Meter Stations	1,200	1,076	717	727	575	**4,295**
SCADA & Communications	689	725	643	624	714	**3,395**
Operation & Management facilities	847	484	639	719	874	**3,563**
Building	3,126	-	-	-	-	**3,126**
Total	**20,341**	**2,546**	**2,265**	**2,339**	**2,434**	**29,924**

APTNT's capital expenditure forecast is has been derived based on purpose in categories as follows:

- *Expansion* capital expenditure, which is required to expand the capacity of the pipeline to meet demand both within the access arrangement period and beyond;
- *Replacement* capital expenditure, which is required to maintain the integrity of the pipeline and includes items such as replacement of instrumentation (for example metering, telemetry, remote terminal units), pipeline hardware (for example pipes, meter valves, regulators and fittings), site capital improvements (for example fencing and security), and specialised major spares; and
- *Non-system* capital expenditure, which relates to capital required for replacement of items such as office furniture and computer equipment.

Forecast conforming capital expenditure by category over the access arrangement period in shown in Table 3.3 below.

Table 3.3 – Forecast capital expenditure by category over the access arrangement period ($2015/16)

$ '000	2016/17	2017/18	2018/19	2019 20	2020/21	Total
Expansion	-	-	-	-	-	**0**
Replacement	15,935	1,600	1,253	1,271	1,129	**21,188**
Non-system	4,405	946	1,013	1,067	1,305	**8,736**
Total	**20,341**	**2,546**	**2,265**	**2,339**	**2,434**	**29,924**

[7] As required by Rule 72(1)(c)(i)

3.2.2. Forecast depreciation

Forecast depreciation by asset class over the access arrangement period[8] is shown in Table 3.4 below.

Table 3.4 – Forecast straight line depreciation over the access arrangement period ($nominal)

$'000	2016/17	2017/18	2018/19	2019 20	2020/21
Straight-line depreciation	4,870	5,439	5,709	5,993	5,285
Indexation	3,015	3,505	3,525	3,533	3,538
Regulatory depreciation	1,855	1,934	2,184	2,460	1,747

Remaining asset lives reflect the composite remaining economic life of assets in the class, reflecting that new assets will be included in the class at the full economic life, and are shown in Table 3.5 below.

Table 3.5 – Remaining Economic Lives

Asset Class	Economic life (years)	Average Remaining Economic Life (years)
Transmission Pipeline	80	59.6
Compressor Stations: Rotating Equipment Station Facilities	30	N/A
Regulation and Metering Stations Odorising Stations	50	37.6
SCADA	15	11.4
O&M Facilities	10	4.6
Buildings	40	N/A

3.2.3. Forecast disposals

Forecast disposals for the access arrangement period are set out Table 3.6 below.

Table 3.6 – Forecast disposals over the access arrangement period ($nominal)

$'000	2016/17	2017/18	2018/19	2019 20	2020/21
Disposals	0	0	0	0	0

[8] As required by Rule 72(1)(c)(ii)

3.2.4. Forecast redundant assets

The forecast of assets that will be made redundant in the access arrangement period in set out in Table 3.7 below.

Table 3.7 – Forecast redundant assets over the access arrangement period ($nominal)

$ '000	2016/17	2017/18	2018/19	2019 20	2020/21
Redundant assets	0	0	0	0	0

3.2.5. Projected capital base over the period

The projected capital base for the access arrangement period[9] is shown in Table 3.8 below.

Table 3.8 – Projected capital base for the access arrangement period ($nominal)

$'000	2016/17	2017/18	2018/19	2019/20	2020/21
Opening capital base	120,611	140,186	141,001	141,324	141,518
Plus indexation	3,015	3,505	3,525	3,533	3,538
Plus conforming capex	21,431	2,749	2,508	2,654	2,831
Less depreciation	4,870	5,439	5,709	5,993	5,285
Less forecast disposals	-	-	-	-	-
Less forecast redundant assets	-	-	-	-	-
Closing capital base	140,186	141,001	141,324	141,518	142,601

[9] As required by Rule 72(1)(c)

4. Forecast pipeline demand and utilisation

4.1 Forecast demand and user numbers

Forecast demand by delivery point over the access arrangement period is shown in Table 4.1 below.

Table 4.1 - Minimum, maximum and average demand and total volume by delivery point over the access arrangement period

		2016/17	2017/18	2018/19	2019/20	2020/21
Delivery points	**Unit**					
Alice Springs	Min (TJ/d)	6.3	6.3	6.3	6.3	6.3
	Max (TJ/d)	14.0	14.3	14.6	14.9	15.2
	Average (TJ/d)	7.5	7.6	7.8	7.9	8.1
	Total (TJ/a)	2,730.0	2,780.0	2,840.0	2,900.0	2,960.0
Tennant Creek	Min (TJ/d)	0.5	0.5	0.5	0.5	0.5
	Max (TJ/d)	1.7	1.7	1.7	1.7	1.7
	Average (TJ/d)	1.1	1.1	1.1	1.1	1.1
	Total (TJ/a)	386.0	390.0	394.0	398.0	402.0
Elliott	Min (TJ/d)	0.1	0.1	0.1	0.1	0.1
	Max (TJ/d)	0.2	0.2	0.2	0.2	0.2
	Average (TJ/d)	0.1	0.1	0.1	0.1	0.1
	Total (TJ/a)	37.0	37.0	37.0	37.0	37.0
Daly Waters	Min (TJ/d)	1.5	1.5	1.5	1.5	1.5
	Max (TJ/d)	9.4	9.4	9.4	9.4	9.4
	Average (TJ/d)	8.1	8.1	8.1	8.1	8.1
	Total (TJ/a)	2,956.5	2,956.5	2,956.5	2,956.5	2,956.5
Mataranka	Min (TJ/d)	-	-	-	-	-
	Max (TJ/d)	-	-	-	-	-
	Average (TJ/d)	-	-	-	-	-
	Total (TJ/a)	-	-	-	-	-
Katherine	Min (TJ/d)	-	-	-	-	-
	Max (TJ/d)	6.2	6.2	6.2	6.2	6.2
	Average (TJ/d)	1.2	1.2	1.2	1.2	1.2
	Total (TJ/a)	420.0	424.0	428.0	432.0	436.0
Mt Todd	Min (TJ/d)	-	-	-	-	-
	Max (TJ/d)	-	-	-	-	-
	Average (TJ/d)	-	-	-	-	-
	Total (TJ/a)	-	-	-	-	-

		2016/17	2017/18	2018/19	2019/20	2020/21
Pine Creek	Min (TJ/d)	-	-	-	-	-
	Max (TJ/d)	5.9	5.9	5.9	5.9	5.9
	Average (TJ/d)	5.1	5.1	5.1	5.1	5.1
	Total (TJ/a)	1,860.0	1,860.0	1,860.0	1,860.0	1,860.0
Cosmo	Min (TJ/d)	-	-	-	-	-
	Max (TJ/d)	-	-	-	-	-
	Average (TJ/d)	-	-	-	-	-
	Total (TJ/a)	-	-	-	-	-
Ban Ban Springs	Min (TJ/d)	-	-	-	-	-
	Max (TJ/d)	-	-	-	-	-
	Average (TJ/d)	-	-	-	-	-
	Total (TJ/a)	-	-	-	-	-
Townend Road	Min (TJ/d)	0.2	0.2	0.2	0.2	0.2
	Max (TJ/d)	1.3	1.3	1.3	1.3	1.3
	Average (TJ/d)	0.9	0.9	0.9	0.9	0.9
	Total (TJ/a)	310.6	310.6	310.6	310.6	310.6
Darwin City Gate	Min (TJ/d)	0.0	0.0	0.0	0.0	0.0
	Max (TJ/d)	0.2	0.2	0.2	0.2	0.2
	Average (TJ/d)	0.1	0.1	0.1	0.1	0.1
	Total (TJ/a)	24.4	24.4	24.4	24.4	24.4
Weddell	Min (TJ/d)	-	-	-	-	-
	Max (TJ/d)	27.0	27.6	28.2	28.8	29.5
	Average (TJ/d)	14.7	15.0	15.4	15.7	16.0
	Total (TJ/a)	5,365.0	5,483.0	5,604.0	5,727.0	5,853.0
Channel Island	Min (TJ/d)	15.2	15.2	15.2	15.2	15.2
	Max (TJ/d)	47.0	48.1	49.1	50.2	51.3
	Average (TJ/d)	31.7	32.4	33.1	33.8	34.6
	Total (TJ/a)	11,572.0	11,827.0	12,087.0	12,353.0	12,625.0
Total volume	**Total (TJ/a)**	**25,661.5**	**26,092.5**	**26,541.5**	**26,998.5**	**27,464.5**

Forecast user numbers by delivery point over the access arrangement period are shown in Table 4.2 below.

Table 4.2 - User numbers by delivery point over the access arrangement period

Delivery Points	2016/17	2017/18	2018/19	2019/20	2020/21
Alice Springs	1	1	1	1	1
Tennant Creek	1	1	1	1	1
Elliott	1	1	1	1	1
Daly Waters	1	1	1	1	1
Mataranka	0	0	0	0	0
Katherine	1	1	1	1	1
Mt Todd	0	0	0	0	0
Pine Creek	1	1	1	1	1
Cosmo	0	0	0	0	0
Ban Ban Springs	0	0	0	0	0
Townend Road	1	1	1	1	1
Darwin City Gate	1	1	1	1	1
Weddell	1	1	1	1	1
Channel Island	1	1	1	1	1

4.2 Forecast pipeline capacity and utilisation

Forecast pipeline capacity and utilisation are shown in Table 4.3 below.

Forecast capacity has been determined after modelling the current aggregate contracted demands on the pipeline, and then simulating the additional quantity that can be delivered without breaching the physical and contractual constraints on the pipeline.

Utilisation of the pipeline has been forecast using an estimate of the non-coincident maximum demand for all delivery points divided by the forecast capacity of the pipeline. The estimate of non-coincident demand has been derived from recent flow data extrapolated for the forecast years with an annual growth rate matching forecast volume growth.

Table 4.3 - Pipeline capacity and utilisation over the access arrangement period

	Units	2016/17	2017/18	2018/19	2019/20	2020/21
Pipeline capacity	TJ/day	120	120	120	120	120
Average utilisation of pipeline capacity	%	59	60	61	62	63

5. Forecast operating expenditure

Forecast operating expenditure by category over the access arrangement period is set out in Table 5.1 below.

Table 5.1 – Forecast operating expenditure over the access arrangement period ($2015/16)

$'000	2016/17	2017/18	2018/19	2019/20	2020/21	Total
Operations & Maintenance	9,101	10,062	10,997	8,929	9,402	**48,491**
Corporate	2,808	2,825	2,844	2,862	2,879	**14,219**
Sales & marketing	9	9	9	9	9	**47**
Debt raising costs	7	8	8	8	8	**39**
Total Forecast	**11,925**	**12,905**	**13,859**	**11,808**	**12,299**	**62,797**

APTNT has forecast its operating expenditure using a base year approach. The methodology to derive this forecast involves:

- Identification of an efficient base year and base year costs;
- Adjustment for step and scope changes including the removal from the base year of costs that are not indicative of future requirements and adding costs for new expenditures in future years not experienced in the past or embedded in the base year costs; and
- Escalation of costs for expected changes in input costs.

6. Key performance indicators

Key performance indicators for the access arrangement period[10] are shown in Table 6.1 below.

Table 6.1 – Key performance indicators for the access arrangement period ($2015/16)

Indicator	Unit	2016/17	2017/18	2018/19	2019/20	2020/21
Opex per km	$	7,371	8,176	9,000	7,859	8,391
Opex per mmkm	$	22.23	24.66	27.14	23.70	25.31

[10] As required by Rule 72(1)(f)

7. Rate of return

The return on the projected capital base included in the total revenue is determined as the product of a rate of return and the projected capital base at the beginning of each regulatory year of an access arrangement period.

Rule 72(g) requires the Access Arrangement Information to include:

> (g) the proposed return on equity, return on debt and *allowed rate of return*, for each regulatory year of the *access arrangement period*, in accordance with rule 87, including any departure from the methodologies set out in the *rate of return guidelines* and the reasons for that departure;

7.1 Return on equity

Rule 87(5) requires that, in determining the allowed rate of return, regard be had to relevant estimation methods, financial models, market data and other evidence.

Section 5 of the Rate of Return Guideline sets out the AER's preferred approach to estimating the return on equity. This approach refers the Sharpe-Lintner CAPM as the "foundation model". The AER uses the Sharpe-Lintner CAPM as the starting point for estimating the expected return on equity,[11] and consideration of directional and relative information, as well as ranges for other information, to inform the making of a point estimate for the expected return on equity.

Consistent with the Rules, APTNT has estimated the return on equity by having regard to:

- The AER "foundation model" version of the Sharpe-Lintner Capital Asset Pricing Model (Sharpe-Lintner CAPM or SLCAPM);
- The conceptually consistent application of the SLCAPM;
- Black's Capital Asset Pricing Model (Black CAPM);
- Dividend Growth Model; and
- Fama-French Three Factor Model.

7.1.1. Applying the Sharpe-Lintner CAPM

The Sharpe-Lintner CAPM represents the expected return on a particular financial asset, $E(r_i)$, as:

$$E(r_i) = r_f + \beta_i \times [E(R_m) - r_f)]$$

[11] Rate of Return Guideline, section 5.3.6, page 17.

The Sharpe-Lintner CAPM requires that values be assigned to three input variables. These are:

- the risk free rate of return, R_f;
- the equity beta, β; and
- the estimated return on a market portfolio of risky assets, $E(R_m)$.

Risk free rate

To estimate the risk free rate, APTNT has referred to Australian Government securities with a term to maturity of 10 years as the proxy for the risk free asset. The risk free rate of return is then to be estimated from the yields on these securities.

APTNT has estimated the risk free rate as the average of yields on Australian Government securities with terms to maturity of 10 years over the period of 20 consecutive business days ending 15 June 2015. This is consistent with the AER Rate of Return Guideline.

APTNT's estimate of the risk free rate of return is 2.93%.

Equity beta

The Rate of Return Guideline estimates the equity beta using a point estimate of 0.7. This value has been applied in the application of the AER's "foundation model" application of the SLCAPM.

However, in its July 2011 Final Decision on proposed revisions to the Access Arrangement for the AGP, the AER concluded that, having considered the National Gas Objective and the revenue and pricing principles, a point estimate of the equity beta of 0.8 was appropriate, and would allow the service provider an opportunity to recover at least its efficient costs incurred in providing reference services and meeting regulatory requirements.[12]

Since 2011, there has not been a significant change in the empirical evidence supporting a range for the equity beta. Furthermore, the circumstances of the AGP have not changed in any way which might require reassessment of relative riskiness. In consequence, a point estimate of 0.8 for the equity beta continues to be appropriate for use in the conceptually consistent application of the Sharpe-Lintner CAPM when estimating the return on equity for the AGP. This marks a departure from the AER Rate of Return Guideline.

[12] Australian Energy Regulator, *Final Decision Access arrangement proposal for the Amadeus Gas Pipeline*, July 2011, page 70.

Market risk premium

As discussed above, the Sharpe-Lintner CAPM represents the expected return on a particular financial asset, $E(r_i)$, as:

$$E(r_i) = r_f + \beta_i \times [E(R_m) - r_f)]$$

The first term on the right, r_f, is the return on the risk free asset available to investors. The composite term $[E(R_m) - r_f)]$ is sometimes referred to as the Market Risk Premium. Importantly, the term r_f which appears in the expression $[E(r_m) - r_f]$ is the return on the same risk free asset. In order to maintain the integrity of the model, the value assigned to it must be the same as the value assigned to the first r_f term in the equation representing the Sharpe-Lintner CAPM.

The AER's "foundation model" approach of the SLCAPM in the Rate of Return Guideline measures the Market Risk Premium as a parameter in its own right, to which it assigns a value of 6.5%, based on a long term average of observed excess returns. This approach inherently substitutes a long term historical average measure of the risk free rate, r_f, into the estimation of the SLCAPM. Estimating the risk free rate as a long term average as part of estimating the market risk premium as a long term average of the difference between the return on the market portfolio and the return on a proxy for the risk free asset is conceptually unsound in the context of application of the Sharpe-Lintner CAPM.

This 6.5% Market Risk Premium has been applied in the application of the AER "foundation model" approach to the SLCAPM, consistent with the AER Rate of Return Guideline.

However, the AER Rate of Return Guideline indicates a long term average nominal return on the market (after adjustment for the AER's view of the value to be attributed to imputation credits) in the range 9.9% to 12.7%.[13] If this long term average is taken as an estimate of the current expected return on the market, and the estimate of the risk free rate is currently 2.93%, then the composite term $[E(r_m) - r_f]$ in the Sharpe-Lintner CAPM should have a value between 6.97% and 9.77%. This has been applied in the conceptually consistent application of the SLCAPM. This marks a departure from the AER Rate of Return Guideline.

Estimate of the return on equity made using the SLCAPM

Applying the AER "foundation model" version of the SLCAPM estimates the return on equity with the following estimates for the input variables of the model:
r_f = 2.93%, β_i = 0.7, and $[E(r_m) - r_f]$ = 6.5%, as 7.48%.

Applying the conceptually consistent SLCAPM with the following estimates for the input variables of the model: r_f = 2.93%, β_i = 0.8, and $E(r_m)$ in the range of 9.0% to

[13] This range falls to 9.0% - 11.6% applying a value of 0.25 for Gamma. This marks a departure from the AER Rate of Return Guideline.

11.6%,[14] produces an estimate of the cost of equity in the range from 7.8% to 9.8%. The application of the conceptually consistent SLCAPM marks a departure from the AER Rate of Return Guideline.

7.1.2. Applying the Black CAPM

The Black CAPM was developed in response to the fact that early empirical work showed that the Sharpe-Lintner CAPM did not provide a good fit to observed equity returns data.

Fischer Black (among others) showed that when there is no risk free asset, and there is no riskless borrowing or lending, the expected return on any financial asset i, $E(r_i)$, is a linear function of β_i:

$$E(r_i) = E(r_z) + \beta_i \times [E(R_m) - E(r_z)]$$

where r_m is the return on the market portfolio, and r_z is the return on a zero beta portfolio.

The Black CAPM, like the Sharpe-Lintner CAPM, has three input variables: the return on the zero beta portfolio, beta, and the expected return on the market portfolio. The beta and the return on the market portfolio are the same as applied in the SLCAPM above.

Financial economists, SFG Consulting, have estimated the zero beta premium (the difference between the return on the zero beta portfolio and the risk free rate of return) to be 3.34%.[15] Using an estimate of 2.93% for the risk free rate, the corresponding estimate of the return on the zero beta portfolio is 6.27% (= 3.34% + 2.93%).

As discussed above, the return on the market portfolio is in the range 9.0% to 11.6%.

Using these estimate for the input variables ($E(r_z)$ = 6.27%, β = 0.8, $E(r_m)$ in the range 9.0% to 11.6%), the Black CAPM delivers a range for the estimate of the return on equity of 8.5% to 10.5%.

7.1.3. Applying the Dividend Growth Model

The present value to an equity investor, today (time 0), of the future dividends from investment in one share of the stock of a firm which is not expected to fail, is:

[14] Applying a factor of 0.25 for Gamma. This marks a departure from the AER Rate of Return Guideline.
[15] SFG Consulting, *Cost of equity in the Black Capital Asset Pricing Model Report for Jemena Gas Networks, ActewAGL, Networks NSW, Transend, Ergon and SA Power Network*, 22 May 2014.

$$PV_0 = \frac{D_1}{(1+r_i)} + \frac{D_2}{(1+r_i)^2} + \ldots + \frac{D_n}{(1+r_i)^n} + \ldots$$

where:

- D_j is the expected dividend on the share in year j, which is assumed to be paid at the end of year j; and
- r_i is the investor's discount rate, which is the required rate of return on equity.

If dividends are expected to grow at a constant annual rate g, the present value of the expected future dividends is:

$$PV_0 = \frac{D_1}{(1+r_i)} + \frac{D_1 \times (1+g)}{(1+r_i)^2} + \ldots + \frac{D_1 \times (1+g)^{n-1}}{(1+r_i)^n} + \ldots = \frac{D_1}{r_i - g}$$

provided $g < r_i$.

The price the investor would be prepared to pay for the share today (at time 0) is, then:

$$p_0 = \frac{D_1}{r_i - g}$$

Today's share price, p_0, is set in the market for financial assets, so that, given the expected dividend in one year, D_1, and the dividend growth rate, g, the investor's required rate of return on equity is:

$$r_i = \frac{D_1}{p_0} + g$$

This is the simplest form of the Dividend Growth Model. More complex forms of the model allow for variations in the growth of dividends.

Appendix E to the Explanatory Statement which accompanies the Rate of Return Guideline advises that the average of the Dividend Growth Model estimates of return on equity for five Australian energy infrastructure businesses is 14.7%.[16] This estimate was made assuming long-term real growth in dividends at a rate 1.0% below an expectation of long term GDP growth 3.0%, and expected inflation of 2.5%. It has been adjusted for the value of imputation credits using an estimate of the proportion of franked dividends of 0.75, and an estimate of the value of distributed imputation credits (theta) of 0.7.

[16] Australian Energy Regulator, *Explanatory Statement: Rate of Return Guideline*, December 2013, Appendix E, page 122.

If the estimate of the return on equity obtained from the AER's application of the Dividend Growth Model is adjusted for the value of imputation credits using the fraction γ of 0.25[17] proposed by APTNT, it reduces to 13.3%.

This latter estimate is still high when compared with estimates made by CEG for the return on equity for the same energy infrastructure businesses. CEG has reported estimates of 12.2% from a two-stage Dividend Growth Model, and 12.0% from a three stage model.[18]

There have been a number of recent estimates of the cost of equity derived using the Dividend Growth Model. APTNT has chosen to work with the lowest of these Dividend Growth Model estimates. The most recent SFG Consulting imputation-adjusted estimate, made for ATCO Gas Australia, is 10.8%.[19] In making this estimate, SFG has used methods (including imputation adjustment made using an estimate of γ of 0.25) which were described in earlier reports to the AER.[20]

The Dividend Growth Model provides a relatively wide range – 10.8% to 13.3% – for an estimate of the return on equity for energy infrastructure businesses. The variation is at least partially explained by the fact that the estimates were made at different times, and APTNT has used the most recent estimate – 10.8% made by SFG Consulting – in its estimation of the return on equity.

Direct estimation of the required return on equity under the DGM marks a departure from the AER Rate of Return Guideline.

7.1.4. Applying the Fama-French Three Factor Model

Since the work of Merton in 1973, financial economists have recognised that multiple factors are required to explain equilibrium asset prices. In the absence of clear theoretical guidance on what those factors should be, one line of research – extensively developed by Nobel Laureate Eugene Fama and Kenneth French – has pursued the empirical identification of relevant factors.

Fama and French proposed that these anomalies were interrelated and captured by a three-factor model of asset prices. The three factors were:

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[17] This marks a departure from the AER Rate of Return Guideline.

[18] CEG (Competition Economists Group), *Estimating the cost of equity, equity beta and MRP*, January 2015, page 20. CEG's report is Attachment 7.03 to Ausgrid's revised regulatory proposal which was submitted to the AER on 20 January 2015.

[19] SFG Consulting, *The required return on equity: Response to ATCO Gas Draft Decision*, 24 November 2014, page 73. SFG's report is Appendix 9.1 to ATCO Gas Australia's response to the Western Australian Economic Regulation Authority's October 2014 Draft Decision on proposed revisions to the Access Arrangement for the Mid-West and South West Gas Distribution Systems.

[20] SFG Consulting, *Alternative versions of the dividend discount model: and the implied cost of equity: Report for Jemena Gas Networks, ActewAGL, APA, Ergon, Networks NSW, Transend and TransGrid*, 15 May 2014.

- the excess return on the market portfolio, $[E(r_m) - r_f]$;
- the difference between the return on a portfolio of small capitalization shares and a portfolio of large capitalization shares (SML); and
- the difference between the return on a portfolio of high book-to-market shares and the return on a portfolio of low book-to-market shares (HML).

The Fama-French Three Factor Model is:

$$E(r_i) = r_f + \beta_{rm} \times [E(r_m) - r_f] + s \times SMB + h \times HML$$

Use of the model requires estimates for seven input variables:

- r_f is the risk free rate;
- β is the market beta;
- $E(r_m) - r_f$ is the market risk premium;
- s is the size factor "beta";
- SMB is the size factor;
- h is the value factor "beta"; and
- HML is the value factor.

APTNT has applied the model using its estimate of the risk free rate of 2.93%.

The beta factor for the market return, the size and value factor betas, and the size and value factors themselves, must all be estimated from share price and other data by expert econometricians. APTNT has used a suite of estimates recently made by SFG Consulting.[21]

SFG has used data from listed companies in Australia and the United States of America when estimating values for the betas, and for the size and value factors. These estimated values are summarised in Table 7-1.

Table 7-1 - SFG estimates of betas and factors for Fama-French Three Factor Model

Input variable	Australian data	U.S. data
Market return beta (beta)	0.48	0.87
Size factor beta (s)	0.03	-0.07
Size factor (SMB)	-0.43%	3.58%
Value factor beta (h)	0.30	0.12
Value factor (HML)	9.97%	4.81%

[21] SFG Consulting, *The Fama-French model: Report for Jemena Gas Networks, ActewAGL, Ergon, Transend, TransGrid, and SA PowerNetworks*, 13 May 2014.

APTNT has used the estimates in Table 7-1, together with the estimates in Table 7-2, to estimate the return on equity using the Fama-French Three Factor Model.

APTNT notes that the rate of return on the market portfolio shown in Table 7-2 has not been adjusted for any value which might to be attributed to the imputation credits available via Australian taxation law.

The resulting estimates of the return on equity, before and after adjustment for the value of imputation credits, are also shown in Table 7-2.

The adjustment for imputation credits has been made using the "Officer formula" with a value of 0.25 for the factor γ.[22]

Table 7-2 - Application of the Fama-French Three Factor Model

Input variable		
Risk free rate (r_f)	2.93%	
Market risk premium	6.11%	
Return on equity	**Using Australian factor estimates**	**Using U.S. factor estimates**
No adjustment for imputation credits	8.84%	8.57%
Adjusted for the value of imputation credits	9.79%	9.49%

SFG's factor estimates made using Australian data were made using data from a relatively small number of businesses. A larger data set was available for U.S. businesses. SFG therefore reported an estimate of the return on equity made using the Fama-French model which was a weighted average of the estimates made using Australian factor data and U.S. factor data.

When SFG's weighting (24% Australian data; 76% U.S. data) are used, the weighted averages of the estimates of the return on equity shown in Table 7-2 are:

- without adjustment for imputation credits: 8.64%;
- adjusted for the value of imputation credits: 9.56%.

Direct estimation of the required return on equity under the Fama French model marks a departure from the AER Rate of Return Guideline.

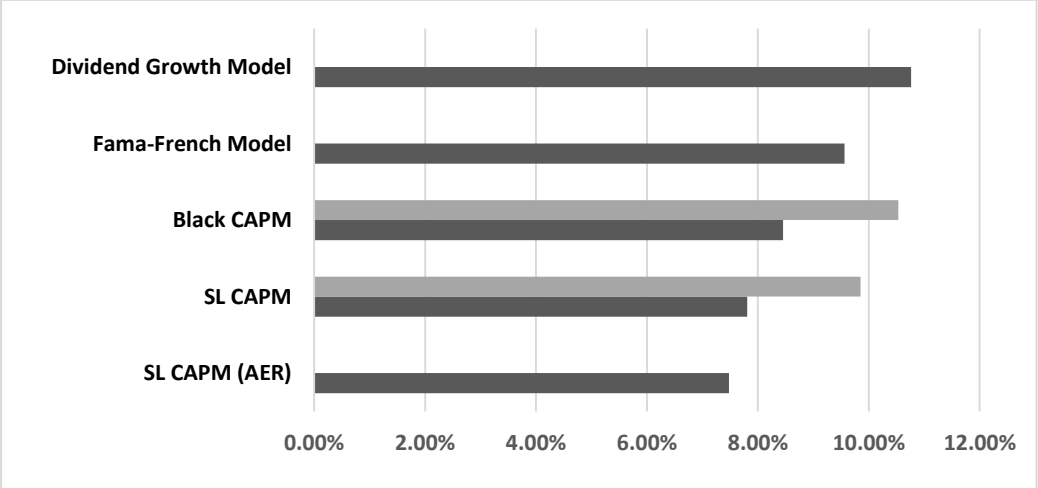
[22] $r_e(without\ credits) = r_e\,(with\ credits) \times (1-T)/[1-T\times(1-\gamma)]$, where T is the corporate tax rate. Applying a value of 0.25 for Gamma is a departure from the AER Rate of Return Guideline.

7.1.5. Estimating the return on equity

Four financial models have been identified as being relevant to estimating the return on equity of the benchmark efficient entity of rule 87. These four models – The Sharpe-Lintner Capital Asset Pricing Model (subdivided into the AER "foundation model" approach to the Sharpe-Lintner CAPM, and the conceptually consistent Sharpe-Lintner CAPM), the Black CAPM, the Dividend Growth Model, and the Fama-French Three Factor Model – deliver estimates of the return on equity which range from 7.48% to 10.8%.

Figure 7-1 shows the five return on equity estimates.

Figure 7-1 - return on equity estimates



The estimates made using the AER "foundation model" application of the Sharpe-Lintner CAPM and the Dividend Growth Model are, respectively, the lower and upper limits of the range of estimates.

The Black CAPM and the Fama-French Three Factor Model perform better empirically in equity return estimation than the Sharpe-Lintner CAPM. The Black CAPM indicates a return on equity in the range 8.5% to 10.5%, the range being fixed by uncertainty in the estimate of the expected return on the market (9.0% to 11.6%). The Fama-French Three Factor Model indicates an estimate of the return on equity of around 9.6%. This estimate has been made using an estimate of the market risk premium of 6.1%, which is consistent with an estimate of the expected return on the market of 9.0%. A higher estimate of the return on the market should lead to a higher estimate of the return on equity.

APTNT concludes that a reasonable point estimate of the return on equity is unlikely to be at either extremity of the range; it will fall within the range. The conceptually consistent Sharpe-Lintner CAPM indicates an estimate in the range 7.8% to 9.8%. The Black CAPM and the Fama-French Three Factor Model point to this estimate being around 9.5%. In light of the above considerations, APTNT has used as the single point estimate for the return on equity an estimate of 9.2%, which is a simple

average of the midpoint of the range for the conceptually consistent Sharpe-Lintner CAPM and the estimate obtained using the Black CAPM and the Fama-French Three Factor Model.

Explicitly referring to models other than the AER's application of the SLCAPM represents a departure from the AER Rate of Return Guideline.

7.2 Return on debt

Under the AER Rate of Return Guideline, the return on debt should be estimated using a trailing average portfolio approach applied on a forward looking basis with:

- the length of the trailing average being 10 years;
- the same weight applied to each of the 10 terms of the trailing average (equal weighting); and
- annual updating of the trailing average within the access arrangement period.

A service provider first applying rule 87 after November 2012 is to transition to the full trailing average over a period of 10 years commencing at the beginning of the first year of the next access arrangement period.

In the first year of the transition period, the rate of return on debt is to be estimated as the prevailing rate of return for that year. The Rate of Return Guideline requires, in effect, that the rate of return on debt be estimated using the "on-the-day" approach at the commencement of the Access Arrangement period, transitioning over a ten-year period to a trailing average approach.

The Rate of Return Guideline proposes that the rate of return on debt prevailing in year $x+1$ be estimated at time x as the sum of the risk free rate of return at time x and a debt risk premium. In this estimation of the prevailing return on debt:

- published yields from an independent third party data service provider are to be used;
- a credit rating of BBB+ from Standard and Poor's (or the equivalent from another recognised rating agency) is to be assumed but, if the published yields are not those for issues with BBB+ credit ratings (or the equivalent), then the published yields are to be those which most closely approximate yields on issues with BBB+ credit ratings; and
- published yields for debt with a term to maturity of 10 years are to be used or, if the third party data service provider does not publish yields for maturities of exactly 10 years, the yields are to be extrapolated to a term of 10 years.

7.2.1. Estimating the return on debt: trailing average portfolio approach

The trailing average portfolio approach of the Rate of Return Guideline is applied assuming the benchmark efficient entity has a broad BBB credit rating (BBB+, BBB, BBB-), and issues debt with a term to maturity of 10 years.

The estimate of the return on debt can be made from yields on the broad BBB rated issues of Australian non-financial corporations, which have been published by the Reserve Bank of Australia (RBA), and adjusted to reflect the 10 years term to maturity assumption.

Assuming an averaging period of 20 business days ending on 15 June 2015, and applying the method set out in recent AER decisions, the estimate of the return on debt obtained is 5.29%.[23]

Relative to yields on Australian Government securities with the same term to maturity (10 years), the debt risk premium in this estimate is 2.36%.

This return on debt is effectively an "on-the-day" rate of return at or about 15 June 2015.

However, it is not an estimate which contributes to achievement of a rate of return which is commensurate with the efficient financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to the service provider in respect of the provision of reference services. Only by chance could an on-the-day rate be a measure of the return on debt for a benchmark efficient entity which finances using debt with a term to maturity of 10 years, and which staggers its refinancing to reduce the risk of not being able to refinance debt when it matures. The estimate made of the return on debt will not – except by chance – contribute to achievement of the allowed rate of return objective of rule 87(3).

7.2.2. Estimating the return on debt: backwards looking trailing average with hedging of interest rate risk (hybrid approach)

A better estimate of the return on debt – one which more accurately represents the likely financing practice of the benchmark efficient entity, and which is therefore commensurate with the efficient financing costs of that entity – is obtained using a backwards looking trailing average.

However, a simple backwards looking trailing average is unlikely to provide an appropriate estimate. The gas regulatory regime has been in place for over 10 years

[23] Appendices A and B to Attachment 3 of the AER's April 2015 Final Decision in the Directlink transmission revenue determination (2015-16 to 2019-20) set out the method.

and, during that time, the AER has used an on-the-day estimate of the return on debt in the setting of reference tariffs. A benchmark efficient entity could be expected to have managed its interest rate risk during that time by hedging at least the base interest rate embedded in the allowed return on debt.

A backwards looking trailing average estimate of the return on debt can be made assuming a benchmark term to maturity of debt of 10 years and refinancing of one tenth of the debt portfolio each year. If the benchmark efficient entity were to fully hedge the base interest rate embedded in its return on debt it would:

- enter into a 10 years floating for fixed swap contract (pays floating, receives fixed) each time debt is refinanced; and
- enter into a 5 years fixed for floating swap contract (pays fixed, receives floating), for the entire debt portfolio, at the commencement of each regulatory period.

Under this framework, the estimated return on debt is the sum of:

- the on-the-day 5 years swap rate; and
- a backwards looking trailing average of debt risk premiums (relative to the 10 years swap rate) for the current year and the preceding nine years.

Debt risk premium

Estimating the return on debt using a backwards looking trailing average requires a series of historical debt risk premiums. APTNT has referred to the monthly series of the credit spreads of Australian non-financial corporations which the RBA began publishing in December 2013 (and which extends back to January 2005).

APTNT has utilised the RBA data in preference to the AER Rate of Return Guideline proposal to use of an average of the two debt risk premium data series (RBA and Bloomberg) when estimating the return on debt, because:

- No clear rationale has been provided for combining them. The two series are different, even though they appear to have been derived from the same underlying set of issued bonds.
- The RBA has published a comprehensive description of the methods it uses to compile its series of corporate bond spreads and yields, and others have been able to reproduce the results obtained by applying that method.[24]
- The Bloomberg data are provided as part of a commercial financial information service, and the methods which underlie their compilation are not clear to users, and especially to those who might use the data for regulatory purposes.

[24] Ivailo Arsov, Matthew Brooks and Mitch Kosev, "New Measures of Australian Corporate Credit Spreads", Reserve Bank of Australia Bulletin, December Quarter 2013, pages 15-16. APTNT understands that CEG (Competition Economists Group) has replicated the RBA credit spreads in work undertaken for service providers.

- The samples of bond issues which the RBA uses to estimate corporate bond spreads and yields are restricted to fixed rate bonds issued by Australian non-financial corporations raising at least A$ 100 million, or the equivalent in United States Dollars or Euros. The samples include issues with embedded options at longer maturities (bullet bonds, callable bonds, convertible and puttable bonds). Bond price data are sourced from the Bloomberg BVAL service, and may be supplemented with Bloomberg generic price data or prices from UBS. Credit spreads on foreign currency issues are hedged into Australian dollar equivalent spreads (foreign currency risk is completely hedged). The spreads are measured relative to swap rates, and to rates on Commonwealth Government bonds.

- The RBA corporate bond spreads and yields are available for Australian non-financial corporations with BBB credit ratings. They are available for corporations with the broad BBB credit rating assumed for the benchmark efficient entity.

- The RBA data are available for bond issues by Australian non-financial corporations with term to maturity of 10 years. They are available for corporations with the term to maturity of debt assumed for the benchmark efficient entity, although some extrapolation is usually required to obtain yield estimates for a term of exactly 10 years.

The RBA corporate bond spreads and yields series has significant advantages over the alternative:

- the method of construction is more transparent;
- the sample is larger due to the inclusion of bonds issued in foreign currencies; and
- the method is relatively robust, allowing for the estimation of spreads at longer maturities.[25]

APTNT has, therefore, used the RBA series in estimating the return on debt for the AGP.

Estimating the return on debt as a backwards looking trailing average

The average of the AFMA Interest Rate Swaps mid-rate for a term of 5 years over the period of 20 trading days to 15 June 2015 is 2.49%. Using the RBA corporate bond spreads and yields series for BBB rated bonds, the average spread to swap for the months of May in the period 2006 to 2015, extrapolated to a term to maturity of 10 years, is 2.52%. The estimate of the return on debt made as a backward looking trailing average with the embedded swap rate fully hedged is, then, 5.01% (= 2.52% + 2.49%).

The benchmark efficient entity is, however, unlikely to have fully hedged the base rate embedded in its cost of debt. Debt risk premiums – credit spreads – on corporate debt have been inversely related to the base rate (measured as either the

[25] Ibid.

yield on Australian Government bonds with the same term to maturity, or as the corresponding swap rate) for at least three decades. In these circumstances, a part of any increase in the base rate will be "naturally hedged" by a corresponding reduction in the debt risk premium.

In view of the natural hedge afforded by the long term inverse relationship between the base rate and the debt risk premium, a service provider concerned with minimising its interest rate risk would not hedge all of its interest rate exposure.

CEG has examined the relevant data, and has determined that hedging of around one third of the base rate exposure arising from the setting, by the regulator, of on-the-day returns on debt during the last decade would minimise the interest rate risk of the benchmark efficient entity.[26]

A backwards looking trailing average of the return on debt, made using the yields on debt for the months of May from 2006 to 2015 reported in the RBA series for BBB rated issues with term of 10 years, and without allowance for hedging of the base rate, is 7.60%.

The fully hedged return on debt estimate is, as above, 5.01%.

If, as CEG advises, interest rate risk minimisation requires that only one third of the debt portfolio be hedged, the estimated return on debt is 6.74% (= 0.33 x 5.01% + 0.67 x 7.60%).

This is the estimated return on debt of the benchmark efficient entity.

In estimating the return on debt for the AGP, APTNT has departed from the Rate of Return Guideline by using a backward looking trailing average approach with partial hedging of interest rate risk.

Adjusting for size

Both the trailing average return on debt estimation of the Rate of Return Guideline, and estimation as a backward looking trailing average as described by APTNT in the preceding paragraphs, assume that the benchmark efficient entity of rule 87 is able to directly access financial markets through bond issues. This may be the case for an efficient service provider which has a large investment in the physical assets required for reference service provision, and which refinances its debt in tranches of around $100 million. However, it is not the case for the benchmark efficient entity with a similar degree of risk as that which applies to APTNT in respect of the provision of the reference service using the AGP.

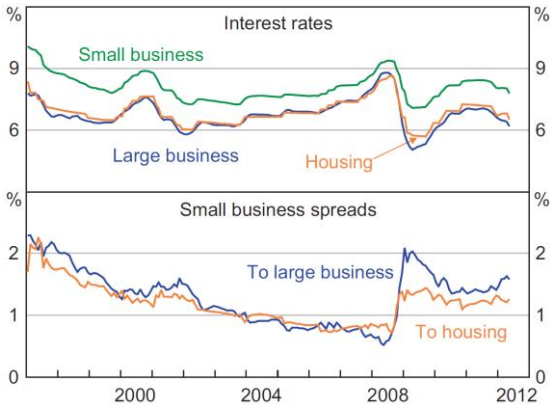
APTNT's proposed opening capital base for the AGP (1 July 2016) is $120.6 million. With gearing of 0.6, the total debt requirement is $72.4 million. If this debt were

[26] CEG (Competition Economists Group), *Efficient use of interest rate swaps to manage interest rate risk*. June 2015, page 4.

refinanced annually, on a 10 year cycle, to reduce refinancing risk, the annual requirement would be less than $7.2 million. Even if the debt were refinanced less frequently, the financing requirement would still be relatively small. The benchmark efficient entity is, in these circumstances, not a large business; it is a small to medium sized enterprise. Unlike large corporations, it would be unable to directly access financial markets through bond issues, and would need to obtain its debt from financial intermediaries, principally the commercial banks.[27]

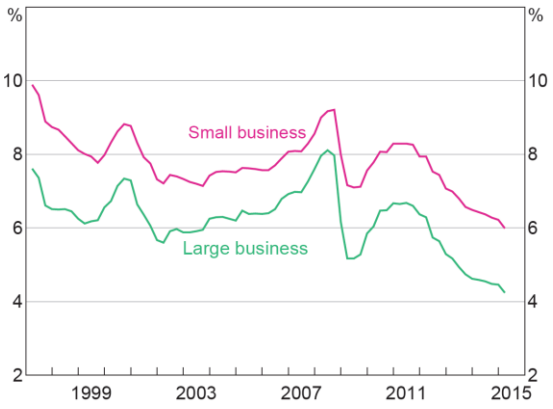
Size, and the need to access financial markets through intermediaries (rather than as the primary borrower), adds to the cost of debt. This is clearly shown in the graphs in Figure 7-2 and Figure 7-3.

Figure 7-2: Business lending rates and spreads



Source: Mihovil Matic, Adam Gorajek and Chris Stewart, "Small Business Funding in Australia", Reserve Bank of Australia, Small Business Finance Roundtable, May 2012, page 17.

Figure 7-3: Business lending rates



Source: Reserve Bank of Australia, *Statement on Monetary Policy*, May 2015, page 54.

The borrowing costs of small and medium sized enterprises are some 1.0% to 2.0% higher than the borrowing costs of large businesses.

The estimate of the return on debt which APTNT has made – 6.74% – is an average of estimates of the returns which debt investors were likely to have required from a large business with a credit rating in the BBB range if it had raised debt over a historical period (10 years) prior to commencement of the access arrangement period and had partially hedged its interest rate exposures. The debt financing costs of a smaller entity – an entity of the same scale as the benchmark efficient provider of the AGP reference service – will be higher. APTNT has therefore estimated that those costs will be 1.0% higher, and has estimated the return on debt to be 7.7%.

[27] Commonwealth of Australia, Financial System Inquiry Final Report, November 2014, page 15. Also, Mihovil Matic, Adam Gorajek and Chris Stewart, "Small Business Funding in Australia", Reserve Bank of Australia, Small Business Finance Roundtable, May 2012, page 16.

7.3 Gearing

The allowed rate of return of rule 87 is to be the weighted average of a return on equity and a return on debt determined on a nominal vanilla basis.[28] In a weighted average determined on a nominal vanilla basis, the weight to be given to the return on equity should be the proportion of equity in the total capital of the benchmark efficient entity (which is assumed to be financed by equity and debt). The weight to be given to the return on debt – the gearing – should be the proportion of debt in the total capital of the benchmark efficient entity.

Consistent with the AER Rate of Return Guideline, APTNT has used gearing of 0.6 to calculate the nominal vanilla weighted average of returns on equity and debt which is to be the allowed rate of return for the AGP.

7.4 Proposed allowed rate of return

APTNT's estimates of the return on equity and the return on debt are, respectively, 9.2% and 7.7%. Use of each of these estimates in determining the allowed rate of return for the AGP contributes to achievement of the allowed rate of return objective for the reasons set out above.

APTNT has calculated a nominal vanilla weighted average of its estimates of the return on equity and the return on debt, with the estimates weighted using the gearing of the benchmark efficient entity. That weighted average, 8.3%, is a rate of return commensurate with the efficient financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to the APTNT in respect of its provision of the reference service using the AGP.

APTNT therefore proposes an allowed rate of return of 8.3% for the AGP.

[28] Rules 87(4)(a) and (b).

8. Taxation

APTNT has adopted a post tax approach. Under this approach, the cash flows of the business include an estimate of the amount of tax payable on regulatory revenues.

APTNT has rolled forward its TAB using the same principles as the normal asset base rollforward. That is, APTNT has adopted the opening TAB in the earlier access arrangement period, and rolled it forward using actual capital expenditure. As the TAB is not indexed, it was not necessary to update the rollforward for outturn CPI increases. The TAB rollforward is shown in Table 8.1 and Table 8.2.

Table 8.1 – Tax Asset Base as at 30 June 2016 ($nominal)

$million	2011/12	2012/13	2013/14	2014/15	2015/16E
Opening TAB	3,904	6,421	20,713	22,635	24,659
Net additions	4,116	15,798	3,824	4,020	14,854
Tax Depreciation	-1,599	-1,505	-1,903	-1,996	-2,298
Closing TAB	6,421	20,713	22,635	24,659	37,215

Table 8.2 – Forecast Tax Asset Base ($nominal)

$million	2016/17	2017/18	2018/19	2019/20	2020/21
Opening TAB	37,215	55,567	54,727	53,480	52,207
Net additions	20,849	2,675	2,440	2,581	2,754
Tax Depreciation	-2,497	-3,515	-3,686	-3,854	-4,035
Closing TAB	55,567	54,727	53,480	52,207	50,926

The TAB is then applied to determine the corporate income tax allowance derived from the AER's Post Tax Revenue Model, as indicated in Table 8.3. This calculation of corporate income tax reflects a value for tax imputation credits, gamma, of 0.25.

Table 8.3 – Corporate income tax allowance ($nominal)

$million	2016/17	2017/18	2018/19	2019/20	2020/21
Tax allowance	1,102	1,039	1,070	1,105	848

9. Historical incentive mechanism

There was no incentive mechanism operative in the earlier access arrangement period giving rise to increments or decrements that need to be included in the revenue requirement for the access arrangement period[29].

[29] As required by Rule 72(1)(i)

10. Approach to tariff setting

10.1 Pipeline services

The Pipeline services offered under the access arrangement are as follows:

- Firm service – service for transport from any receipt points to any delivery points on the pipeline;
- Interruptible service – service for transport from any receipt points to any delivery points on the pipeline, where APTNT is entitled to cease receiving gas from, or delivering gas to, the user when pipeline capacity is constrained/curtailed, or to meet the capacity requirements of other users of the firm service;
- Negotiated service – service negotiated to meet the needs of a user which differ from those of the firm or interruptible service, including potential as available services.

The Firm service is offered as a reference service.

10.2 Tariff structure

The reference tariff for the Firm service is a capacity tariff based on firm Maximum Daily Quantities (MDQs) at each delivery point.

This tariff allows APTNT to recover its revenue requirement from users of the pipeline in proportion to their capacity requirements, which matches the reference service which is an ‘any direction’ service from between any receipt and delivery point.

10.3 Allocation of revenue to tariffs

The Reference tariff has been designed to recover the total revenue from the Reference Service. There is a single user class and therefore all revenues are allocated to that user class.

The total revenue requirement derived from the building block approach allocated to the Reference tariff is shown in Table 10.1below.

Table 10.1 – Total revenue requirement ($nominal)

$'000	2016/17	2017/18	2018/19	2019/20	2020/21
AGP building block revenue requirement	25,192	28,167	29,883	28,329	28,256

The present value of this revenue requirement, discounted at the WACC of 8.3 per cent, is $110.36 million.

The smoothed revenue requirement is shown in Table 10.2 below.

Table 10.2 – Smoothed revenue requirement

$'000	2016/17	2017/18	2018/19	2019/20	2020/21
Smoothed Revenue requirement	25,677	26,812	27,998	29,238	30,535

The present value of this revenue requirement, discounted at the WACC of 8.3 per cent, is $110.36 million.

10.4 Reference tariffs

The tariff for the reference service is set out in Schedule 1 of the access arrangement. The reference tariff is published for 2016/17 (in $2016/17) and is exclusive of goods and services tax (GST). The 2016/17 tariff that forms the starting point for the access arrangement period is $0.6896 per GJ of Delivery Point MDQ.

10.4.1. Reference tariff variation mechanism

The Reference Tariff for the Firm Service may be varied during the Access Arrangement Period through the operation of the Reference Tariff Variation Mechanism, which is made up of:

- A Scheduled Reference Tariff Variation Mechanism – which applies in respect of each year of the Access Arrangement Period; and
- A Cost Pass-through Reference Tariff Variation Mechanism - under which Service Provider may seek to vary the Reference Tariff as a result of occurrence of a Cost Pass-through Event.

10.4.2. Scheduled reference tariff variation mechanism

A symmetrical annual tariff variation adjustment formula adjusts the reference tariff on each 1 July of the access arrangement period in respect of changes to the Consumer Price Index (CPI) and to the return on debt.

These adjustments are intended to ensure an efficient tariff over the access arrangement period. Relevant values and formulae for the above parameters are set out in section 4.7 of the access arrangement.

10.4.3. Cost pass through reference tariff variation mechanism

A symmetrical cost pass through reference tariff variation mechanism is included in the access arrangement to allow the reference tariff to be adjusted to recover (or return) material incremental costs resulting from defined cost pass through events.

The cost pass through events defined in the access arrangement are:

- a regulatory change event;
- a service standard event;
- a tax change event;
- a terrorism event;
- an insurer credit risk event;
- an insurance cap event;
- a natural disaster event.

Part 4.7 of the access arrangement sets out the tariff variation process the materiality threshold for cost pass-through events.

11. Proposed incentive mechanism

The access arrangement does not include an incentive mechanism of the type described under the Rules[30], however APTNT faces incentives to reduce costs and increase demand over the access arrangement period compared with the forecast on which the access arrangement is based, as total revenue will not be adjusted to reflect differences between forecast and actual gas demand and/or business costs.

[30] See Rule 98

12. Total revenue

The total revenue requirement to be derived from pipeline services over the access arrangement period is shown in Table 12.1 below.

Table 12.1 – Total revenue requirement ($nominal)

$million	2016/17	2017/18	2018/19	2019/20	2020/21	Total
Return on capital	10,011	11,635	11,703	11,730	11,746	56,825
Return of capital	1,855	1,934	2,184	2,460	1,747	10,181
Operating expenditure	12,224	13,559	14,925	13,034	13,915	67,656
Benchmark tax liability	1,102	1,039	1,070	1,105	0,848	5,165
AGP Building Block revenue requirement	**25,192**	**28,167**	**29,883**	**28,329**	**28,256**	**139,827**