January 2017
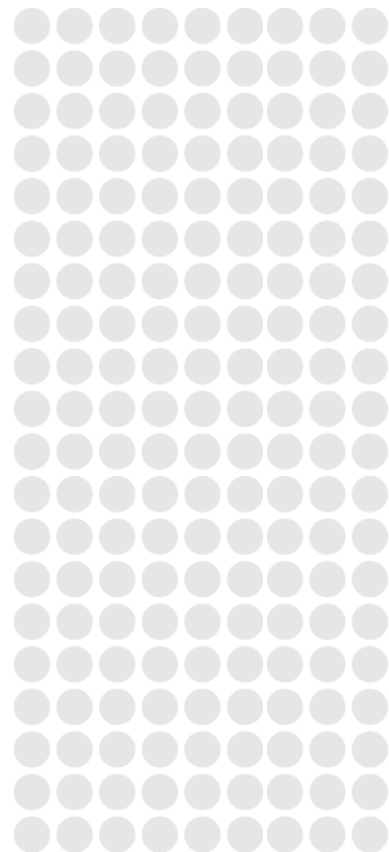
victorian transmission system
access arrangement information.

Effective 1 January 2018 to 31 December 2022

APA VTS Australia (Operations) Pty Limited

ACN 083 009 278

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1 Introduction

This Access Arrangement Information document has been prepared, in accordance with Rule 43(1) of the National Gas Rules (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 the APA VTS Australia (Operations) Pty Limited (ACN 083 009 278) (APA VTS) access arrangement for the Victorian Transmission System (VTS). The revised Access Arrangement commences on 1 January 2018.

A more detailed description of the Pipeline, including a map, is available on APA Group's website at www.apa.com.au, which shows the general location and key points of the Pipeline.

1.1 Structure of this document

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.

APA VTS'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 July 2013 to 31 December 2017) as required under the NGR. This information is included in Part 2 of the Access Arrangement Information. The remaining parts of this Access Arrangement Information are as follows:

- Part 3 establishes the capital base for the Access Arrangement Period (in this case spanning from 1 July 2013 to 31 December 2017), including forecast capital expenditure for the Access Arrangement Period;

- Part 4 discusses forecast utilisation for the Pipeline, including forecast customer numbers, reserved capacity and volumes used to derive tariffs;

- Part 5 outlines forecast operating expenditure for the Access Arrangement Period;

- Part 6 sets out key performance indicators for the Pipeline;

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

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- 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;

- Parts 9 and 11 discuss historical and proposed incentive mechanisms;

- Part 10 describes the Reference Services, 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.

As the previous Access Arrangement operated from 1 July 2013 to 31 December 2017, financial information related to 2013 is presented for the period from 1 July 2013 to 31 December 2013; all other financial information in this document is presented on a calendar year basis.

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 for calendar years 2013 to 2015, estimated costs for 2016, and forecast costs for financial year 2017.

Table 2.1: Capital expenditure by asset class over the earlier access arrangement period ($m nominal)

$m nominal	Jul-Dec 2013	2014	2015	2016 (e)	2017(f)
Pipelines	4.1	85.8	72.1	93.3	52.5
Compressors	8.4	27.8	7.8	6.3	1.0
City Gates & Field Regulators	1.1	5.1	8.4	1.5	3.5
Odourant Plants	-	-	-	-	-
Gas Quality	-	0.1	0.3	0.4	0.1
Other	1.9	5.1	5.0	3.5	11.9
General Building	0.0	0.2	1.0	0.1	0.0
General Land	-	-	-	-	-
Total Capex	15.6	124.2	94.5	105.0	69.0

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 for calendar years 2013 to 2015, estimated costs for 2016, and forecast costs for 2017.

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

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

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Table 2.2: Operating expenditure by category over the earlier Access Arrangement Period ($real 2017l)

	2013	2014	2015	2016(e)	2017(f)
Asset operations and management	15.2	15.0	16.8	17.6	18.4
Regulatory (Asset Licences)	0.4	0.5	0.3	0.3	0.3
Insurance	1.3	0.9	0.9	0.7	0.7
Corporate overheads costs	8.7	9.4	7.7	6.4	6.8
Allowances	2.1	2.3	2.2	2.1	2.2
Total operating expenditure	**27.8**	**28.1**	**27.9**	**27.1**	**28.4**

2.3   Pipeline usage

Pipeline minimum, maximum and average demand figures over the earlier Access Arrangement Period[4] are set out in Table 2.3 below. These figures are based on actual demand for calendar years 2013 to 2015, and estimated demand for 2016. 2013 demand is shown for the full year.

Table 2.3: Minimum, average and maximum demand by delivery point

Delivery point Minimum, Maximum and Average Demand (TJ/day)		2013	2014	2015	2016(e)
Exports Culcairn	MIN	1.3	0.0	0.0	3.2
	AVG	83.0	85.3	119.0	128.4
	MAX	49.3	27.0	38.9	62.1
Exports VicHub	MIN	0.0	0.0	0.0	0.0
	AVG	35.1	26.2	25.0	26.0
	MAX	8.4	5.7	5.2	5.7
Exports Port Campbell	MIN	0.0	0.0	0.0	0.0
	AVG	98.7	105.4	91.2	104.0
	MAX	26.2	27.3	30.5	21.3
GPG	MIN	0.0	0.0	0.0	0.0
	AVG	115.9	189.7	124.8	177.2
	MAX	7.2	11.0	8.6	13.0

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[4] As required by Rule 72(1)(a)(iii)(A)

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Table 2.4: Minimum, Average and Maximum demand by receipt point

Receipt point Minimum, Average and Maximum Demand (GJ)		2013	2014	2015	2016(e)
Longford (including VicHub)	MIN	159.1	186.9	144.5	226.0
	AVG	817.7	789.9	790.7	861.6
	MAX	459.9	435.8	466.3	578.6
Pakenham	MIN	1.1	1.2	2.0	2.2
	AVG	66.8	49.7	63.7	57.8
	MAX	46.5	38.0	41.1	49.2
Port Campbell	MIN	25.0	0.0	0.0	0.0
(Iona and SEAGas facilities)	AVG	349.4	351.6	396.3	341.9
	MAX	154.3	120.8	134.5	81.1
Culcairn	MIN	0.0	0.0	0.0	0.0
	AVG	16.3	84.7	60.0	66.0
	MAX	0.6	11.2	8.7	8.0

Pipeline customer numbers in total and by tariff class over the earlier Access Arrangement Period[5] are set out in Table 2.4 below. These figures are based on actual customer numbers for calendar years 2013 to 2015, estimated numbers for 2016, and forecast customer numbers for 2017.

Table 2.5: Customer numbers

	2013	2014	2015	2016(e)	2017(f)
Customer numbers	23	23	23	21	23

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

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3 The Capital Base

3.1 Opening Capital Base

3.1.1 Opening Capital Base for Access Arrangement Period

The Opening Capital Base for the Access Arrangement Period[6] is shown in Table 3.1 below.

Table 3.1: Opening Capital Base for the Access Arrangement Period ($m nominal)

$m nominal	1 July 2013	2014	2015	2016(e)	2017(f)
opening capital base	631.2	642.2	760.2	846.9	942.7
plus net conforming capex	15.9	128.6	98.5	109.4	72.1
plus speculative capex	0.0	0.0	0.0	0.0	0.0
plus reused redundant assets	0.0	0.0	0.0	0.0	0.0
less depreciation	-12.8	-26.5	-30.5	-33.6	-30.1
plus indexation	7.9	16.1	18.7	20.0	22.6
less redundant assets	0.0	0.0	0.0	0.0	0.0
less disposals	0.0	-0.2	0.0	0.0	-0.1
adjustment for previous period	0.0				
closing capital base	**642.2**	**760.2**	**846.9**	**942.7**	**1,007.3**

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.

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

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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.

Table 3.2:   Forecast capital expenditure by asset class over the Access Arrangement Period ($m real 2017)

$m real 2017	2018	2019	2020	2021	2022
Pipelines	37.8	21.4	6.0	3.6	0.5
Compressors	8.8	2.1	5.3	6.2	7.3
City Gates & Field Regs	0.0	0.6	0.4	0.7	0.2
Odourant Plants	0.1	0.0	0.0	0.0	0.0
Gas Quality	0.0	0.0	0.0	0.0	0.0
Other	9.8	6.7	4.6	8.5	7.2
Buildings	0.7	1.0	1.0	1.0	0.3
General Land	8.9	8.9	8.9	0.0	0.0
Total	**66.1**	**40.7**	**26.1**	**19.9**	**15.6**

APA VTS's capital expenditure forecast is derived based on purpose in categories as follows:

- Refurbishment and Upgrade capital expenditure – routine capital activities targeted at maintaining the Pipeline in good working order in the long term;

- Augmentation capital expenditure – expenditure required to maintain capacity to meet current customer demand and to provide additional capacity to meet future customer demand.

- Non-system capital expenditure is related to IT systems and software, motor vehicles, and plant and equipment which are not part of the Pipeline, but which are otherwise required to deliver Pipeline Services.

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

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Forecast conforming capital expenditure by category over the Access Arrangement Period in shown in Table 3.3 below.

Table 3.3: Forecast conforming capital expenditure by category over the Access Arrangement Period ($m real 2017)

$m real 2017	2018	2019	2020	2021	2022
Augmentation	29.4	14.4	11.0	-	-
Refurbishment and Upgrade	32.1	22.7	11.9	16.4	13.4
Non-System	4.6	3.5	3.2	3.5	2.3
Total	**66.1**	**40.7**	**26.1**	**19.9**	**15.6**

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 depreciation over the Access Arrangement Period ($m 2017)

$m real 2017	2018	2019	2020	2021	2022
Pipelines	19.6	20.1	20.7	20.8	21.0
Compressors	7.3	7.6	7.6	7.8	8.0
City Gates & Field Regulators	2.7	2.7	2.7	2.7	2.7
Odourant Plants	0.0	0.0	0.0	0.0	0.0
Gas Quality	0.0	0.0	0.0	0.0	0.0
Other	7.1	9.0	10.7	11.5	6.3
General Building	0.2	0.2	0.2	0.2	0.3
General Land	0.0	0.0	0.0	0.0	0.0
Total	**36.9**	**39.7**	**42.0**	**43.1**	**38.3**

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

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Table 3.5 sets out APA VTS's asset economic lives.

Table 3.5: Asset remaining economic lives (years)

	Standard life	Remaining life
Pipelines	55.0	37.9
Compressors	30.0	22.0
City Gates & Field Regulators	30.0	22.6
Odourant Plants	30.0	17.6
Gas Quality	10.0	9.0
Other	5.0	4.0
General Building	60.0	34.3
General Land	n/a	n/a

APA VTS has applied a straight-line methodology in determining future depreciation.

3.2.3   Forecast disposals

Forecast disposals for the Access Arrangement Period are set out in Table 3.6 below.

Table 3.6: Forecast disposals over the Access Arrangement Period ($m 2017)

	2018	2019	2020	2021	2022
Disposals	**0**	**0**	**0**	**0**	**0**

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.

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Table 3.7: Forecast redundant assets over the Access Arrangement Period ($m 2017)

	2018	**2019**	**2020**	**2021**	**2022**
Forecast redundant assets	0	0	0	0	0

3.2.5 *Projected Capital Base over the Access Arrangement 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 ($m nominal)

$m nominal	**2018**	**2019**	**2020**	**2021**	**2022**
Opening capital base	1007.3	1059.1	1082.6	1088.2	1085.4
plus indexation	20.1	21.2	21.7	21.8	21.7
plus forecast capex	69.3	43.5	28.5	22.1	17.8
less forecast depreciation	37.7	41.3	44.6	46.7	42.3
less forecast disposals	0.0	0.0	0.0	0.0	0.0
less forecast redundant assets	0.0	0.0	0.0	0.0	0.0
Closing capital base	**1059.1**	**1082.6**	**1088.2**	**1085.4**	**1082.5**

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

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4 Forecast network demand and utilisation

4.1 Forecast customer numbers and volumes

Forecast customer numbers and volumes by customer class for the access arrangement period are set out in Table 4.1 below.

Table 4.1: Forecast customer numbers and volumes by customer class over the Access Arrangement Period

	2018	2019	2020	2021	2022
Total	23	23	23	23	23

4.2 Forecast network capacity and utilisation

Forecast network capacity and utilisation for the Access Arrangement Period[10] is shown in Tables 4.2 through 4.5 below.

Table 4.2 – Pipeline capacity 2018-2022 – flows towards Melbourne (TJ/day)

Pipeline TJ/day	2018	2022
Longford to Melbourne	1030	1030
South West Pipeline	429	429
NSW Interconnect	125	125

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[10] As required by Rule 72(1)(d).

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Table 4.3 – Pipeline capacity 2018-2022 – flows away from Melbourne (TJ/day)

Pipeline TJ/day	2018	2022
South West Pipeline	102	150
NSW Interconnect	201 (summer) / 201 (winter)	201
Western Transmission System	28	28

Table 4.4 – Pipeline utilisation – Flows towards Melbourne

Pipeline	Average	Peak
Longford to Melbourne	45.5%	64.2%
South West Pipeline	15.8%	100%
NSW Interconnect	5.3%	52.8%

Table 4.5 – Pipeline utilisation – Flows away from Melbourne

Pipeline	Average	Peak
South West Pipeline	25.8%	97.9%
Victorian Northern Interconnect	39.5%	92.7%
Western Transmission System	35.9%	57.3%

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4.3 Forecast demand

Forecast maximum and average demand for the Pipeline over the Access Arrangement Period is shown in Table 4.3 below.

Table 4.6: Forecast maximum and average demand for the Pipeline over the Access Arrangement Period

	2018	2019	2020	2021	2022
Annual (PJ)					
Tariffs V&D[11]	181.99	179.91	177.58	176.73	174.90
GPG	5.27	1.79	1.88	0.59	0.80
Culcairn	29.60	29.60	29.60	29.60	29.60
VicHub	0	0	0	0	0
Sub-total	**216.86**	**211.30**	**209.06**	**206.92**	**205.30**
UGS/LNG refill	16.08	16.28	16.28	16.28	16.28
Total	**232.94**	**227.58**	**225.35**	**223.20**	**221.58**
1-in-2 Peak (TJ/day)					
Tariffs V&D	1,151.14	1,142.27	1,131.41	1,123.56	1,115.08
GPG	8.26	5.27	7.26	8.65	14.01
Culcairn	57.53	57.53	57.53	57.53	57.53
VicHub	0	0	0	0	0
UGS/LNG refill	0	0	0	0	0
Total	**1,216.94**	**1,205.07**	**1,196.20**	**1,189.74**	**1,186.63**
1-in-20 Peak (TJ/day)					
Per AEMO advice	1,258.21	1,249.12	1,237.67	1,229.03	1,220.10

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[11] Includes compressor fuel

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4.4   Forecast weather

Forecast standard weather and sensitivity to changes in weather for the pipeline over the access arrangement period is shown in Table 4.7 below.

Table 4.7:   Effective Degree Days (EDD) and weather sensitivity for the pipeline over the access arrangement period

	2018	2019	2020	2021	2022
Effective Degree Days (EDD)	1340	1340	1340	1340	1340
Weather Sensitivity (TJ/EDD)	50.0	50.0	50.0	50.0	50.0

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 by category over the Access Arrangement Period ($m real 2017)

$m real 2017	2018	2019	2020	2021	2022
Labour	11.5	11.5	11.6	12.0	12.1
Contractors	2.0	2.0	2.0	2.1	2.1
Insurance, Licences and Fees	1.0	1.0	1.0	1.0	1.0
Other operating costs	4.6	4.6	4.7	4.8	4.8
Corporate costs	6.6	6.7	6.7	6.9	7.0
Debt raising costs	0.1	0.1	0.1	0.1	0.1
Forecast operating expenditure	**25.7**	**25.9**	**26.0**	**26.8**	**27.1**

APA VTS's forecast of operating expenditure for the Access Arrangement Period has been prepared using the base year methodology. This methodology involves the following steps:

- Selection of an appropriate base year in which to measure costs;

- Modification of the base year costs to ensure that all costs required for future operation of the Pipeline are added to the base year costs, and all costs in the base year costs which are not relevant to future operation of the Pipeline are subtracted from the base year costs;

- Modification of base year costs as required to reflect changed consumer numbers, additional Pipeline facilities required to supply gas to these additional consumers, and increased loads from existing consumers;

- Modification of the base year costs to reflect changes in input costs anticipated over the Access Arrangement Period; and

- Modification of the base year costs to reflect appropriate productivity improvements.

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6   Key performance indicators

Key performance indicators for the Access Arrangement Period[12] are shown in Table 6.1 below.

Table 6.1: Key performance indicators ($m real 2017)

$m real 2017	2018	2019	2020	2021	2022
Opex per pipeline km	11,834	11,918	11,946	12,352	12,457
Opex per mmkm	30.13	30.35	30.42	31.45	31.72

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

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7 Rate of return and value of imputation credits

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.

The rate of return – the allowed rate of return of rule 87 of the NGR – is a nominal vanilla weighted average of an estimate of the return on equity and an estimate of the return on debt.

7.1 Gearing

In the nominal vanilla weighted average, the weight assigned to the estimate of the return on equity is 40%, and the weight assigned to the estimate of the return on debt is 60%.

7.2 Risk free rate of return

A risk free rate has been estimated 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 31 October 2016.

The estimate of the risk free rate of return is 2.24%.

7.3 Return on equity

The Sharpe-Lintner Capital Asset Pricing Model (SL CAPM), the foundation model of the AER's Rate of Return Guideline, has been used to estimate the return on equity.

The SL CAPM explains the expected return, $E(r_j)$, on financial asset j, as the sum of the rate of return on a risk free asset and a premium for risk:

$E(r_j) = r_f + \beta_j \times [E(r_M) - r_f],$

where r_f is the return on the risk free asset, and $\beta_j \times [E(r_M) - r_f]$ is the premium for risk. β_j is the beta for financial asset j, and $E(r_M)$ is the expected return on the market portfolio of assets. $E(r_M) - r_f$ is the market risk premium (MRP).

When using the SL CAPM to estimate the return on equity, APA VTS has departed, in two ways, from the methodologies set out in the Rate of Return Guideline.

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The Rate of Return Guideline requires that a range for beta based on empirical analysis using a set of Australian energy network businesses is to be established. Other information, in particular, empirical estimates of beta for overseas energy networks, and the theoretical principles underpinning Black's Capital Asset Pricing Model, is then to inform the selection of a point estimate from within the empirical range. This approach, the Rate of Return Guideline advises, leads to a point estimate of 0.7 for beta, chosen from within a range 0.4 to 0.7.

The empirical estimates from which the AER established its range were obtained using data for varying periods with the latest date being 28 June 2013. Subsequent estimations of beta, using data for periods through until September 2016, have shown an increase in beta since 2013. This was confirmed for APA VTS by econometric analysis carried out by Frontier Economics. Beta has clearly increased, and the range and point estimate of the Rate of Return Guideline are now obsolete.

APA VTS'Ss first departure from the methodologies of the Rate of Return Guideline has, therefore, been the use of an estimate of beta of 0.8 consistent with the current – higher – empirical estimates.

In the application of the SL CAPM, in accordance with the Rate of Return Guideline, an estimate is to be made of the term $E(r_M) - r_f$ as a single discrete variable. The AER considers a number of different methods for making this estimate, including the calculation of long term averages of historical risk premiums, estimation using the dividend growth model, and survey evidence.

This is conceptually incorrect: estimation of the term $E(r_M) - r_f$ as a single discrete variable is inconsistent with the economic principles from which SL CAPM is derived. The SL CAPM is derived from a theory of portfolio choice in which investors choose, at a point in time, portfolios comprising the risky financial assets which are available at that time, and a risk free asset which is assumed to be available at that time. Investors are assumed to know, at the time they make their portfolio choices:

- the expected rates of return on the risky assets which are available; and

- the rate of return on the risk free asset (which is known with certainty).

The term $E(r_M) - r_f$ is, then, the difference between an estimate of the expected return on the market, $E(r_M)$, calculated using the known expected returns on the risky assets available to investors at the time the model is

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applied, and the estimate of the risk free rate of return, r_f, at that time. The term $E(r_M) - r_f$ is not a single discrete variable.

APA VTS has, therefore, departed from the methodology of the Rate of Return Guideline when estimating the MRP of the SL CAPM. APA VTS has made separate estimates of the expected return on the market and the risk free rate at the time at which the model has been applied to estimate the (expected) return on equity.

APA VTS has estimated the risk free rate from the yields on Australian Government securities with terms to maturity of 10 years as noted in section 7.2 above. The expected return on the market has been estimated using the dividend growth model, and using historical data which can reasonably be expected to provide good evidence for what is essentially a forward looking parameter. APA VTS'Ss estimate of the expected return on the market is 10.0%.

APA VTS has then estimated the return on equity using the SL CAPM, with the following estimates for the parameters of the model:

- risk free rate: r_f = 2.24%;

- equity beta: β_j = 0.8; and

- $E(r_M)$: 10.0%.

The estimated rate of return on equity is 8.5%.

7.4 Return on debt

APA VTS has departed from the Rate of Return Guideline when estimating the return on debt. The Guideline proposes that the return on debt be estimated as a prospective and progressively implemented trailing average. APA VTS has estimated the return on debt as a simple historical trailing average of estimates of debt returns for each of the last 10 years.

The benchmark efficient entity of rule 87(3) is not a regulated entity which would have hedged its debt in a particular way in response to the prevailing regulatory regime in the way the Rate of Return Guideline proposes. The benchmark efficient entity is a firm with a degree of risk similar to APA VTS which operates in a workably competitive market. Such a firm would be expected to issue debt with a term to maturity of 10 years, and to stagger its debt issues to minimise refinancing risk, in the way the Rate of Return Guideline proposes, but without any need for hedging arrangements which

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would have to be "unwound". The trailing average approach to estimation of the return on debt can, therefore, be implemented immediately (without a period of transition).

Reserve Bank of Australia data for the yields on the bonds of Australian non-financial corporations rated BBB have been used to estimate terms of the trailing average.

Where necessary, the data have been extrapolated or interpolated in the way proposed by the AER, so that the estimates of the return on debt obtained (and which are the terms of the trailing average) are for terms to maturity of 10 years consistent with the assumption made in respect of the financing of the benchmark efficient entity.

The last, and most recent, term in the trailing average is an estimate of the return on debt made for October 2016. The earlier terms of the average have been calculated using data which were at intervals of multiples of twelve months prior to the last and most recent term.

Using Reserve Bank of Australia data for October 2016, and for October in each of the previous nine years, an estimate of the return on debt for the benchmark efficient entity is 7.47%.

7.5 Allowed rate of return

The allowed rate of return used in calculating the revised reference tariff of the VTS Access Arrangement is a weighted average of the estimated return on equity of 8.5%, and the estimated return on debt of 7.47%. The weightings assigned to the estimates of the return on equity and the return on debt are, respectively, 40% and 60%. The allowed rate of return is 7.88%.

7.6 Annual updating

As permitted by Rule 79(b), APA VTS will update the return on debt annually during the access arrangement period.

The return on debt will be estimated, immediately prior to commencement of the access arrangement period, as a historical trailing average of equally weighted annual debt returns, with the terms of the average spanning a period of 10 years. The most recent term in the trailing average shall be the debt return estimated using current market data; the oldest term will indicate the return on debt raised 10 years earlier.

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In the process of annual updating, the oldest term is to be dropped from the average, and a new term, estimated using current year data, is to be added. The new average will then become the updated return on debt to be used in the post-tax revenue model for the next and subsequent years of the access arrangement period.

The functionality which the AER has now built in to its post-tax revenue model is to be used to update the total revenue for the updated return on debt. The updated total revenue will then be used to recalculate the VTS reference tariffs for the next regulatory year of the access arrangement period. This approach has been advanced, in previous AER decisions, as the automatic application of a formula required by Rule 87(12).

The annual updating of the return on debt will effect a variation of the reference tariff for the VTS in each year of the access arrangement period. A full access arrangement must include a mechanism for variation of the reference tariff over the course of the access arrangement period, and APA VTS has incorporated the variation of the reference tariff effected by annual updating of the return on debt into the reference tariff variation mechanism of the VTS Access Arrangement.

7.7 Value of imputation credits

APA VTS has estimated gamma as the product of the distribution rate and theta, as proposed in the Explanatory Statement to the AER's Rate of Return Guideline.

For the distribution rate, APA VTS has used an estimate of 0.7, which has been made from Australian Taxation Office data for all equity, and which has previously been regarded as an estimate arrived at on a reasonable basis, and as representing the best estimate possible in the circumstances. It was the estimate proposed in the Rate of Return Guideline.

APA VTS has departed from the Rate of Return Guideline when estimating the theta. The Rate of Return Guideline proposed an estimate of 0.7.

For theta, APA VTS has used the estimate from an implied market value study: the estimate of 0.35 from the updated SFG study which was before the Australian Competition Tribunal in February 2016.[13]

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[13] *Applications by Public Interest Advocacy Centre Ltd and AusGrid Distribution* [2016] ACompT 1

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In successive decisions since *Energex* in 2011, the Tribunal has determined that gamma should be 0.25. Only in October 2016 has the Tribunal supported a different result.[14]

APA VTS has, therefore, used an estimate of 0.25 (= 0.7 x 0.35) for gamma in calculating revised reference tariffs for the VTS Access Arrangement.

In using an estimate of 0.25, APA VTS recognises that a Federal Court decision pertaining to gamma is still pending.

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[14] *Application by SA Power Networks* [2016] ACompT 11

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8   Taxation

APA VTS 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.

APA VTS has rolled forward its TAB using the same principles as the normal asset base rollforward. That is, APA VTS 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 31 December 2017 ($m nominal)

$m nominal	2013	2014	2015	2016(e)	2017(f)
Opening TAB	225.5	220.8	343.8	415.2	494.2
Net additions	4.0	140.5	94.9	103.9	69.9
Tax depreciation	-8.6	-17.6	-23.5	-24.9	-25.6
Closing TAB	**220.8**	**343.8**	**415.2**	**494.2**	**538.4**

Table 8.2: Forecast Tax Asset Base ($m nominal)

$m nominal	2018	2019	2020	2021	2022
Opening TAB	538.4	560.0	573.6	556.8	543.1
Net additions	56.9	52.1	24.5	28.6	24.7
Tax depreciation	-35.3	-38.5	-41.3	-42.4	-44.5
Closing TAB	**560.0**	**573.6**	**556.8**	**543.1**	**523.2**

The TAB is then applied to determine the corporate income tax allowance derived from the VTS 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.

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Table 8.3: Corporate income tax allowance ($m nominal)

$m nominal	2018	2019	2020	2021	2022
Tax allowance	4.8	5.1	5.3	5.7	3.8

9   Historical incentive mechanism

APA VTS's earlier access arrangement included Efficiency Benefit Sharing Scheme (EBSS) with a methodology for calculating the efficiency benefit sharing allowance to apply in the forecast period.

Under the EBSS, APA VTS retains any benefits (or penalties) for a period of five years after the year in which it was realised. This means that the benefits carry over into the next access arrangement period. The EBSS only applies to the first four years of an access arrangement period as the final year has not been completed when the calculation is made.

The calculation of the efficiency benefit for each year is cumulative, ie, benefits in a year accrue only to the extent that the savings in that year are greater than those already identified in prior years. This means that, especially in the later years of an access arrangement period, a saving from the originally approved operating and maintenance forecast can still generate a negative efficiency benefit.

The proposed carry-over of increments for efficiency gains or decrements for efficiency losses in the previous access arrangement period is shown below:[15]

Table 9.1: Incremental EBSS savings

$'000 (2011)	Jul-Dec 2013	2014	2015	2016	2017
Annual Efficiency	8.4	4.6	3.5	2.1	-

The forecast revenue requirement in Table 9.1 includes an allowance for these increments or decrements as follows:

Table 9.2: Efficiency carry over

$'000	2018	2019	2020	2021	2022
$2017	8.4	4.6	3.5	2.1	-
$ nominal	8.6	4.8	3.7	2.3	-

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

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10 Approach to tariff setting

10.1 Reference Services

APA GasNet provides one Pipeline Service, the Tariffed Transmission Service.

10.2 Tariff structure

The Tariffed Transmission Service is a zonal-distance-based volume tariff, with no capacity component.

10.3 Allocation of revenue to tariffs

Reference Tariffs are designed to recover the Total Revenue allocated to the Reference Service.

This approach equalises revenue derived from the application of Reference Tariffs with the total Reference Service revenue requirement, assuming that assumptions regarding costs and demand hold.

The forecast revenue requirement for the Access Arrangement Period is shown in Table 10.1 below.

Table 10.1: Forecast revenue requirement for the Access Arrangement Period ($m nominal)

$m nominal	2018	2019	2020	2021	2022
Return on capital	79.4	83.5	85.3	85.8	85.5
Return of capital	17.5	20.1	22.9	24.9	20.6
plus operating and maintenance	34.8	31.7	31.3	31.3	29.9
plus revenue adjustments	0.0	0.0	0.0	0.0	0.0
plus net tax allowance	4.8	5.1	5.3	5.7	3.8
Building block revenue requirement	**136.5**	**140.5**	**144.9**	**147.6**	**139.8**

The net present value of the Reference Tariff revenue stream when discounted at the nominal vanilla WACC of 7.88% is $567.3 million.

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Table 10.2: Reference Tariff revenue stream ($m nominal)

$m nominal	2018	2019	2020	2021	2022
Smoothed revenue path	**127.7**	**134.1**	**142.0**	**150.6**	**159.8**

The net present value of the Reference Tariff revenue stream when discounted at the nominal vanilla WACC of 7.88% is $567.3 million which is equal to the present value of the revenue requirement.

10.4   Reference Tariffs

Tariffs for Reference Services are set out in the Access Arrangement. Tariffs are published for 2018 ($2017) and are exclusive of Goods and Services Tax (GST).

10.4.1   Reference tariff variation mechanism

Reference Tariffs are varied in later years of the Access Arrangement Period through the operation of the Reference Tariff Variation Mechanism, which comprises:

- a Scheduled Reference Tariff Variation Mechanism - which applies in respect of each Regulatory Year of the Access Arrangement Period after the First Regulatory Year; and

- a Cost Pass-through Reference Tariff Variation Mechanism - under which APA VTS may seek to vary the Reference Tariffs as a result of a Cost Pass-through Event.

10.4.2   Scheduled Reference Tariff Variation Mechanism

The Reference Tariffs may be varied during the Access Arrangement Period in accordance with the formula specified in Schedule D of the VTS Access Arrangement. The principles given effect by application of the formula which, in fact, comprises a sequence of interrelated formulae, and the formulae themselves, are as follows.

Revenue control principles

(a)   Individual components of the Transmission Tariffs may be adjusted up or down for a given Regulatory Year after the First Regulatory Year provided that:

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(i)   the NPV of the actual revenues (AR) (determined as outlined below) achieved is no greater than the NPV of the adjusted target revenues (ATR) (determined as outlined below); and

(ii)   no component of the Transmission Tariffs can be increased by more than (CPI - X)*(1 + Y) for any Regulatory Year, where:

(A)   X is the tariff path factor prescribed for that Transmission Tariff component in the Access Arrangement; and

(B)   Y is 2%.

(b)   All monetary calculations and figures used in calculations for the variation of the components of the Transmission Tariffs are to be expressed in real dollar values using a CPI indexed at December 2017, and using the best estimate of the CPI at December of each year of the Fifth Access Arrangement Period.

(c)   All calculations and figures for determination of any price control formula component at any particular time must be the best estimate of that component at the relevant time using reported or actual (as the case may be) values where available and the best estimates of forecast values where required. For the purposes of this paragraph (c), the price control formula components include revenues, volumes, CPI, EDDs, costs passed through under the Cost Pass-through Reference Tariff Adjustment Mechanism, etc).

(d)   The NPV is to be calculated using a discount rate equal to the Real Vanilla WACC as approved for the Fifth Access Arrangement Period.

(e)   Separately report actual injection volume under of the price control model.

AR

Each determination of AR will be equal to the best estimate of the actual revenues received for the whole of the Fifth Access Arrangement Period at the time of calculation, using both actual data (Actual Revenues) (where available) and best estimates of forecast revenues (Forecast Revenues) where required.

For example, for a determination of AR in November 2018, the best estimate of actual revenues will be the Actual Revenues in 2017 and the Forecast Revenues expected for the remainder of the Fifth Access Arrangement

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Period. A determination of AR in subsequent years will use the Actual Revenues received where available, and the best revised forecasts for the remaining years, where the revised forecasts may differ from those forecasts made at earlier determinations.

ATR

For the price control formula, the target revenue (TR) for First Regulatory Year is $127.7 m in nominal 2018 dollars. Further, the total volume withdrawn from the VTS for the First Regulatory Year, excluding NRRV, is PJ.

ATR = VATR + RODA + PTA +CFA

where:

VATR   is volume adjusted target revenue calculated as outlined below;

RODA   is the return on debt adjustment for the Regulatory Year for which the components of the Transmission Tariffs are to be adjusted;

PTA   is the approved pass through amount from a Cost Pass-through Event; and

CFA   is, for the First Regulatory Year, the second carry-forward amount SCA calculated in accordance with clause D.7 of the access arrangement for the VTS applicable during the Fourth Access Arrangement Period, and is, for all other Regulatory Years in the Fifth Access Arrangement Period, zero.

Notes:

1. $RODA = NPVDIFF*(1 + RVWACC)^n$ where:

    (a)   NPVDIFF is the difference between:

        (i)   the net present value of the total revenue from the Post-Tax Revenue Model after updating the Trailing Average Portfolio Return on Debt for the Regulatory Year for which the components of the Transmission Tariffs are to be varied; and

        (ii)   the net present value of the total revenue from the Post-Tax Revenue Model immediately prior to updating the Trailing Average Portfolio Return on Debt for the Regulatory Year for which the components of the Transmission Tariffs are to be varied;

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    (b)   RVWACC is the Real Vanilla WACC as approved for the Fifth Access Arrangement Period; and

    (c)   n is the number of Years between the start of the Fifth Access Arrangement Period and the Regulatory Year for which the components of the Transmission Tariffs are to be varied.

2.   The best estimates of the CFA costs are included in the forecast of operating expenditure for the Fifth Access Arrangement Period, but the correct values for these factors will not be known until the first year of the Fifth Access Arrangement Period.

3.   CFA and PTA may be positive or negative.

VATR

$$VATR = \frac{TR}{TV} \times WAAV$$

where:

TR   is the target revenue as set out in Table 12.1 of the Access Arrangement Information, excluding NRRV;

TV   is the total volume withdrawn from the VTS as set out in section 4 of the Access Arrangement Information, excluding NRRV;

WAAV   is the weather adjusted actual volume, calculated as outlined below; and

NRRV   is, for the purposes of TR, the target revenue and for the purposes of TV, the volume, associated with:

    (i)   any transmission refills at WUGS or the LNG Storage Facility; and

    (ii)   the incremental Murray Valley tariff.

WAAV

$$WAAV = \left(VW + TS \times \left(Target\,EDD - Actual\,EDD\right)\right)$$

where:

VW   is the actual withdrawal from the VTS excluding NRRV;

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TS	is the weather sensitivity, being the increase in annual gas volumes for an increase of one in the annual EDD, as set out in Table 4.7 of the Access Arrangement Information;
Target EDD	is the measure of annual EDD as expected in a Regulatory Year as set out in Table 4.7 of the Access Arrangement Information; and
Actual EDD	is the actual measured EDD for a Regulatory Year, as reported in the AEMO APR or otherwise made available by AEMO.

First Carry-Forward Amount FCA

The first carry forward amount (FCA) will be calculated in the last year of the Fifth Access Arrangement Period. It will be included as a building block component in the first year of the Sixth Access Arrangement Period.

FCA will be determined according to the following formula:

$$FCA = ATR - AR$$

where AR and ATR are to be calculated using the best estimates and available data at the time of the determination of FCA.

For inclusion in the building block calculation for 2023, the FCA will be escalated for inflation from December 2017 to December 2023.

Second Carry-Forward Amount SCA

The second carry forward amount (SCA) will be calculated in the first year of the Sixth Access Arrangement Period as a correction to the determination of the FCA, using the correct actual values of all factors required in the determination of FCA. It will be included as a CFA in the determination of tariffs for 2023.

SCA will be determined according to the following formula:

$$SCA = Recalculated\,FCA - FCA$$

where Recalculated FCA is the same calculation as for FCA, except that it is to use the actual values for AR, ATR, AV, EDD, CPI and PTA.

For inclusion in the building block calculation for 2023, the SCA will be escalated for inflation from December 2017 to December 2023.

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10.4.3 Cost Pass-through Reference Tariff Adjustment 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 carbon cost event;
- 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; and
- a new gas market structure development event.

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

Forecast carbon costs, for the purpose of the carbon cost event included in clause 4.7.2 of the access arrangement, are as shown below:

Table 10.3: Forecast carbon costs

$'000	2018	2019	2020	2021	2022
	0	0	0	0	0

New gas market structure development event

The inclusion of "new gas market development" in the list of defined cost pass-through events is a change from the access arrangement approved by the AER in 2013. It is a consequence of the Victorian Government having sought, in 2015, a review of the DWGM by the AEMC as part of that organisation's wider East Coast Wholesale Gas Market and Pipeline Frameworks Review.

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The COAG Energy Council has given in-principle support to the AEMC's recommended transition of the DWGM to a new Southern Hub, which would operate on a continuous exchange-based trading model supported by a system of firm capacity rights. Implementation of the changes is to be a matter for the Gas Market Reform Group.

Transitioning the DWGM to a new Southern Hub is likely to require expenditures by APA VTS on systems, processes and procedures. The scope and magnitudes of these expenditures will depend on the specific market design chosen by the Gas Market Reform Group.

APA VTS is therefore proposing that, once they are known, its prudent and efficient costs of giving effect to a new Victorian market design be passed through for recovery via variation of the VTS Reference Tariffs.

11   Proposed incentive mechanism

APA VTS'S earlier access arrangement included an incentive mechanism with a methodology for calculating the efficiency benefit sharing allowance to apply in the forecast period.

APA VTS has retained this mechanism in the forecast period, subject to minor amendment.

Under the incentive mechanism, APA GasNet retains any benefits (or penalties) for a period of five years after the year in which it was realised. This means that the benefits carry over into the next access arrangement period.

The calculation of the efficiency benefit for each year is incremental, ie, benefits in a year accrue only to the extent that the savings in that year are greater than those already identified in prior years. This means that, especially in the later years of an access arrangement period, a saving from the originally approved operating and maintenance forecast can still generate a negative efficiency benefit.

Operating and maintenance costs for the purposes of the EBSS in Sections 8.2(e) and 8.2(f) of the access arrangement are as shown below:

Table 11.1: Forecast operating expenditure for EBSS purposes over the access arrangement period

$'000 ($2016 real)	2015	2016	2017	2018	2019	2020	2021
Controllable Opex	25.4	24.6	23.1	22.7	22.7	22.7	23.5

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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 ($m nominal)

$m nominal	2018	2019	2020	2021	2022
Return on capital	79.4	83.5	85.3	85.8	85.5
Return of capital	17.5	20.1	22.9	24.9	20.6
plus operating and maintenance	34.8	31.7	31.3	31.3	29.9
plus revenue adjustments	0.0	0.0	0.0	0.0	0.0
plus net tax allowance	4.8	5.1	5.3	5.7	3.8
Building block revenue requirement	**136.5**	**140.5**	**144.9**	**147.6**	**139.8**
Smoothed revenue requirement	**127.7**	**134.1**	**142.0**	**150.6**	**159.8**
X-factor	-	-6.0	-6.0	-6.0	-6.0

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