



Final decision

Gas distribution service providers

Post-tax revenue model handbook

April 2020

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Contents

Shortened forms.....	5
1 Introduction.....	6
1.1 Role of the model	6
1.2 Confidentiality	6
1.3 Process for revision.....	6
2 The model.....	7
2.1 Overview of the PTRM.....	7
2.2 DMS input sheet	8
2.3 PTRM input sheet.....	9
2.3.1 Opening capital base and opening tax asset base	13
2.3.2 Forecast capital expenditure—as incurred	15
2.3.3 Forecast immediate expensing of capital expenditure— as incurred.....	15
2.3.4 Forecast asset disposals—as incurred	15
2.3.5 Forecast capital contributions—as incurred.....	15
2.3.6 Forecast net capital expenditure—as incurred	15
2.3.7 Forecast operating expenditure	15
2.3.8 Revenue adjustments	16
2.3.9 Tax.....	16
2.3.10 Cost of capital	16
2.3.11 Debt and equity raising costs—transaction costs	17
2.3.12 Price/revenue constraint for the current regulatory year	17
2.3.13 Straight-line depreciation option for opening capital base	18
2.3.14 Year-by-year tracking depreciation on opening capital base	18
2.3.15 Depreciation option for opening TAB	18
2.3.16 Year-by-year tracking depreciation on opening TAB	18
2.3.17 Energy delivered forecast	18
2.3.18 Base year tariff for tariff calculations.....	19
2.3.19 Base year prices per tariff component	19

2.3.20	Forecast sales quantities per tariff component	19
2.4	WACC sheet.....	19
2.5	Assets sheet	20
2.5.1	Rolling forward the capital base and depreciation	22
2.6	Analysis sheet	23
2.6.1	Building block approach to deriving cash flows.....	25
2.6.2	Taxation and related costs and benefits	26
2.6.3	Cash flow analysis	27
2.7	Forecast revenues sheet	29
2.8	X factors sheet.....	31
2.9	Revenue summary sheet	34
2.10	Equity raising costs sheet.....	37
2.11	Chart 1–Revenue sheet.....	39
2.12	Chart 2–Price path sheet	40
2.13	Chart 3–Building blocks sheet.....	41
3	Process for annual return on debt update.....	43
3.1	Setting X factors for the final decision.....	43
3.2	Updating X factors annually	44

Shortened forms

Shortened form	Extended form
AER	Australian Energy Regulator
ARS	ancillary reference services
ATO	Australian Tax Office
capex	capital expenditure
CPI	consumer price index
DMS	data management system
DV	diminishing value
IRR	internal rate of return
NGL	National Gas Law
NGR	National Gas Rules
NPV	net present value
opex	operating expenditure
PTRM	post-tax revenue model
PV	present value
RBA	Reserve Bank of Australia
RFM	roll forward model
sheets	Microsoft Excel worksheets
TAB	tax asset base
WACC	weighted average cost of capital
WARL	weighted average remaining life

1 Introduction

This handbook sets out the Australian Energy Regulator's (AER) post-tax revenue model (PTRM) to be used as part of the building block approach for reference services of gas distribution service providers. The PTRM is a series of Microsoft Excel worksheets (sheets) developed in accordance with the requirements of the National Gas Rules (NGR).¹ We prepare and publish the PTRM in accordance with the consultation procedures set out in the NGR.²

1.1 Role of the model

Gas distribution service providers are required to submit a completed PTRM to us as part of their access arrangement proposals.³

We use the PTRM to determine the total revenue consistent with the building block approach as specified in rule 76 of the NGR. The PTRM's purpose is to derive X factors that form part of the tariff variation mechanism for reference services under rule 97 of the NGR.

1.2 Confidentiality

Our obligations regarding confidentiality and the disclosure of information provided to us by a business are governed by the *Competition and Consumer Act 2010 (Cth)*, the National Gas Law (NGL) and the NGR.

1.3 Process for revision

We may amend or replace the PTRM from time to time in accordance with rule 75A(3) of the NGR. We will publish a revised version of this handbook to accompany each new version of the PTRM we amend or replace in the future.

A version number and an effective date of issue will identify each version of this handbook.

¹ NGR, rr. 75B, 76 and 78.

² NGR, r. 75A.

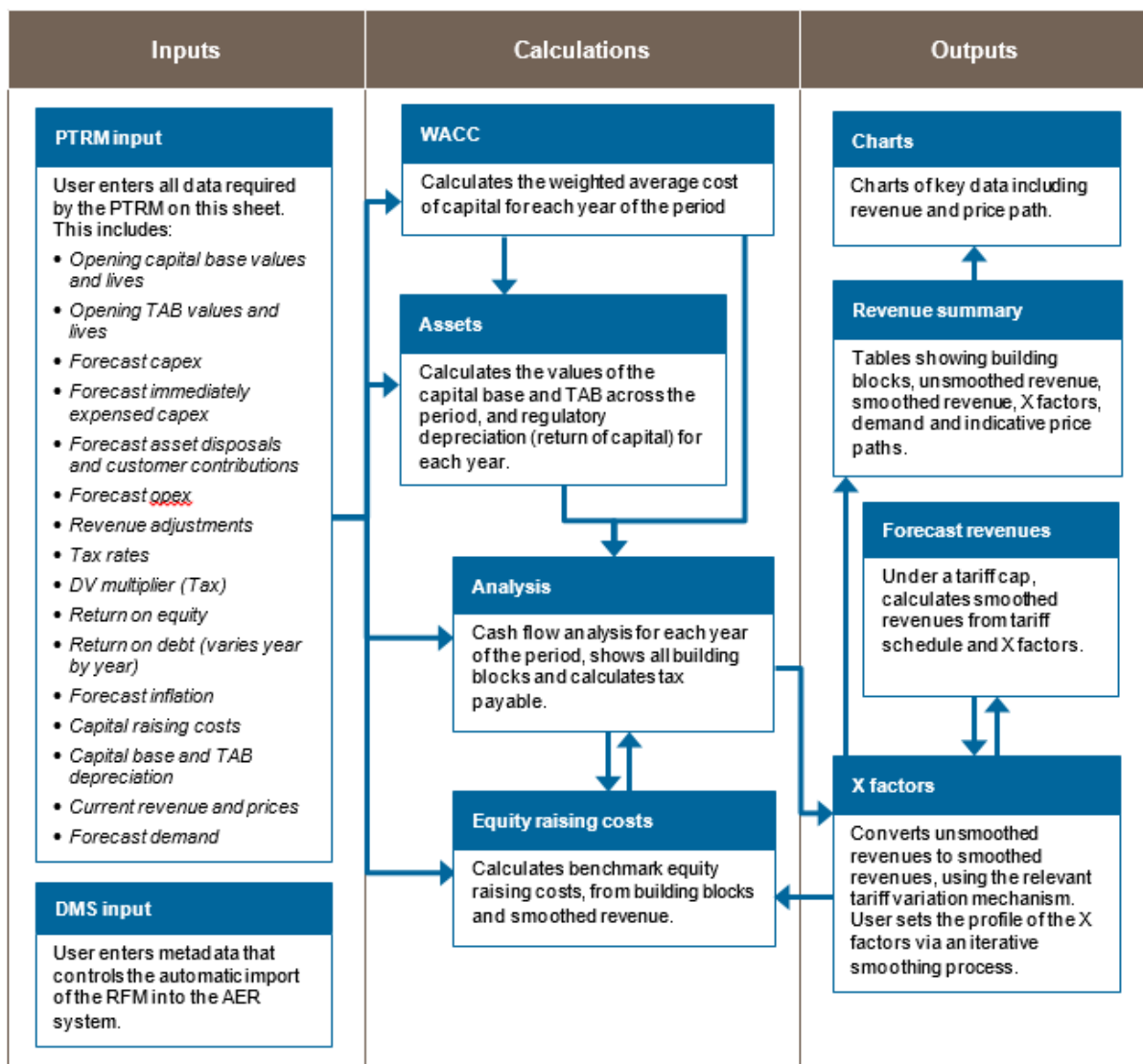
³ NGR, rr. 72(3) and 75A(2)

2 The model

2.1 Overview of the PTRM

The PTRM is used to calculate the revenue requirement for a given access arrangement period. Specifically, the PTRM is a set of sheets combined into one workbook that perform iterative calculations to derive the total revenues and X factors for each regulatory year of the access arrangement period from a given set of inputs.⁴ The PTRM allows the user to enter these inputs. It then calculates and displays the outputs. Figure 1 provides an overview of this process.

Figure 1 Overview of the PTRM spreadsheets



In Figure 1, each box represents a sheet within the PTRM. Sheets are classified as primarily about inputs (left column), calculations (centre column) or outputs (right column). The flow of

⁴ The Microsoft Excel workbook which constitutes the PTRM was created in Microsoft Excel 2016. The AER recommends this or a later version of Microsoft Excel be used to apply the model.

data is therefore from left to right, and simplified links between the sheets are shown with blue arrows.

To operate the PTRM, the user enters all the required data on the **PTRM input** sheet—for example, forecast capital expenditure (capex) across the access arrangement period. Determination of these inputs often requires considerable analysis, but this occurs outside the PTRM. In this sense, the inputs to the PTRM are outputs from other parts of the access arrangement proposal (or final decision).

The PTRM then uses this data to undertake a building block assessment of revenues, consistent with the requirements of the NGR.⁵ Under this approach, total unsmoothed revenue is set to equal the total costs of the benchmark service provider. Total costs are derived by adding up a number of different types of costs, labelled building blocks. The **Analysis** sheet sets out each of these building blocks, and calculates the tax building block (since the PTRM explicitly models the effect of corporate taxes). This gives the total unsmoothed revenue for the gas distribution service provider.

The **X factors** sheet is where smoothed revenue is derived from unsmoothed revenue. This process will require user input, as they choose the relevant tariff variation mechanism (weighted average price cap, revenue cap or revenue yield cap) and numerically define the percentage change of real smoothed revenue from year to year within the period (these values are labelled 'X factors').⁶ This process is known as 'smoothing' and makes use of the inbuilt Excel programming language (macros).⁷

Finally, there are a number of presentation sheets which include summary output tables and charts.

The PTRM is configured to perform:

- the interim calculations automatically whenever an input is recorded
- revenue smoothing calculations and equity raising cost updates manually via buttons that trigger built in macros.

The user should not alter the names of any sheets or defined name ranges within the PTRM. These PTRM components are used by the macros and when automatically importing into our data management system (DMS). If these elements are changed, errors may occur.

2.2 DMS input sheet

The **DMS input** sheet captures business specific, non-financial information that is required for us to import the PTRM into our DMS. To allow this automatic import to take place, the user should not change the layout of this sheet.

⁵ NGR rr. 72(3) and 75B(2).

⁶ This requires the total smoothed and unsmoothed revenues to be equal in net present value (NPV) terms.

⁷ Note that this is an iterative process, because changing smoothed revenue alters equity raising costs, changing equity raising costs alters unsmoothed revenue, and changing unsmoothed revenue alters smoothed revenue.

Entity details for the relevant business are recorded in rows 14 to 16. These will be stored in the DMS and control the headings displayed at the top of other sheets in the PTRM.

Context details for the PTRM are recorded in the lower section. Many of these details (such as the dates of the access arrangement period) are automatically populated from the **PTRM input** sheet and so the cells here are hidden. The stage of the access arrangement process is set in cell C32 using a drop down menu.⁸ If this is not enough description to uniquely identify the PTRM submission, a description should be placed in cell C39 (for example, a resubmission of the proposal PTRM with revised data values after an error was corrected).

The tariff variation mechanism (tariff cap, revenue cap, revenue yield cap) is also specified here in cell C42. This determines which smoothed revenue amounts are imported into the DMS from the **X factors** and **Revenue Summary** sheets. Note that the user will still have to select the relevant smoothing operation (using the macro buttons provided) on those sheets.

Figure 2 provides an example of the **DMS input** sheet.

Figure 2 DMS input sheet

	A	B	C	D	E	F	G	H	I	J	K	
1												
2		Aus Gas - DMS Input - DNSP PTRM - version 1						Input cells are in blue				
3												
4												
5												
6		This sheet requests information that allows the AER to automatically import the PTRM into our data management system (DMS).										
7		This sheet's metadata relates to the business and context for the PTRM (rather than the PTRM itself).										
8		Only change blue input cells. Some rows are hidden. To facilitate the automatic import, please do not delete or add rows on this sheet.										
9		This hidden data is automatically populated based on data entered on the PTRM input sheet.										
10		Throughout the rest of the workbook, defined name ranges are used to identify data that is imported into the DMS.										
11												
12		Entity details										
13												
14		Trading name	Australian Distribution Co. (Gas)									
15		ACN / ABN	11 222 333 444									
16		Business short name	Aus Gas									
17												
18												
19		Regulatory process details										
20												
32		Source	Regulatory proposal									
		Amended model submission - reason										
39												
42		Form of control	Tariff cap									
43												

2.3 PTRM input sheet

The **PTRM input** sheet provides for key input variables to be entered in the PTRM. These are automatically linked to corresponding cells in the relevant sheets. Values should be entered into each cell that has light blue shading. This sheet comprises of the following sections:

- opening capital base and opening tax asset base (TAB) (section 2.3.1)
- forecast capex—as incurred (section 2.3.2)
- forecast immediate expensing of capex—as incurred (section 2.3.3)

⁸ For example, whether the PTRM relates to the regulatory proposal, draft decision, revised regulatory proposal or final decision.

- forecast asset disposals—as incurred (section 2.3.4)
- forecast capital contributions—as incurred (section 2.3.5)
- forecast net capex—as incurred (section 2.3.6)
- forecast operating expenditure (opex) (section 2.3.7)
- revenue adjustments (section 2.3.8)
- expected taxation rate (section 2.3.9)
- tax losses carried forward (section 2.3.9)
- diminishing value multiplier (section 2.3.9)
- cost of capital (section 2.3.10)
- debt and equity raising costs—transaction costs (section 2.3.11)
- price/revenue constraint for the current year (section 2.3.12)
- straight-line depreciation option for opening capital base (section 2.3.13)
- year-by-year tracking depreciation on opening capital base (section 2.3.14)
- depreciation option for opening TAB (section 2.3.15)
- year-by-year tracking depreciation on opening TAB (section 2.3.16)
- energy delivered forecast (section 2.3.17)
- base year prices per tariff component (sections 2.3.18 and 2.3.19)
- current and forecast quantities per tariff component (section 2.3.20).

The only inputs specified outside of the **PTRM input** sheet are:

- inputs related to the automatic import into the DMS (on the **DMS input** sheet)
- inputs used when deriving smoothed revenue (on the **X factors** sheet)
- input of the tariff variation mechanism for equity raising costs purposes (on the **Equity raising costs** sheet).

These cells are also marked with light blue shading and are discussed in their relevant sections below.

Figure 3 and Figure 4 provide examples of the **PTRM input** sheet.

Figure 3 PTRM input sheet–first screenshot

J	K	L	M	N	O	P	Q	R	S			
1	Aus Gas - PTRM input - DNSP PTRM - version 1											
2	Input cells are in blue											
3												
4												
5	Opening Capital Base and Opening Tax Asset Base for 2020-21 (\$m Nominal)											
6	Asset Class Name	Opening Asset Value	Assets Under Construction	Remaining Life	Standard Life	Opening Tax Value	Tax Remaining Life	Tax Standard Life	Base Regulatory Year	Length of Access Arrangement Period (Year)		
7	Asset Class 1	1,024.10		19.5	60.0	442.46	11.7	20.0	2020-21	5		
8	Asset Class 2	891.27		26.1	60.0	354.01	11.5	20.0				
9	Asset Class 3	879.06		26.8	40.0	230.29	12.0	20.0				
10	Asset Class 4	333.72		5.7	15.0	60.25	1.7	10.0				
11	Asset Class 5	309.66		5.7	15.0	167.79	6.3	15.0				
12	Asset Class 6	28.16		5.4	7.0	17.50	3.0	4.0				
13	Asset Class 7	3.04		5.0	5.0	3.00	3.7	5.0				
14	Asset Class 8	589.26		n/a	n/a	244.21	n/a	n/a				
53	Asset Class 47											
54	Asset Class 48											
55	Asset Class 49	57.06		29.0	40.0	29.36	33.4	40.0				
56	Asset Class 50	1.18		3.7	5.0	7.60	3.7	5.0				
57	Total	3910.52	0.00	25.0	35.0	1566.76						
58	Forecast Capital Expenditure – As Incurred (\$m Real 2019-20)											
59	Year	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	
60	Pipelines	55.00	13.00	9.00	17.00	28.00	-	-	-	-	-	
61	Service Pipes	22.00	11.00	55.00	9.00	11.00	-	-	-	-	-	
62	Supply Regulators/Valve Stations	11.00	11.00	11.00	11.00	11.00	-	-	-	-	-	
63	SCADA	10.00	10.00	10.00	10.00	10.00	-	-	-	-	-	
64	Meters	9.00	9.00	9.00	9.00	9.00	-	-	-	-	-	
65	Computer Equipment	6.00	6.00	6.00	6.00	6.00	-	-	-	-	-	
66	Vehicles	7.00	7.00	7.00	7.00	7.00	-	-	-	-	-	
67	Land and Easements	6.00	6.00	6.00	6.00	6.00	-	-	-	-	-	
107	Spare straight-line tax asset class											
108	Buildings	5.00	5.00	5.00	5.00	5.00	-	-	-	-	-	
109	In-house software	4.00	4.00	4.00	4.00	4.00	-	-	-	-	-	
110	Equity raising costs	2.33					-	-	-	-	-	
111	Total	139.33	84.00	124.00	86.00	99.00	-	-	-	-	-	
112										\$	532.33	
113	Forecast Immediate Expensing of Capital Expenditure – As Incurred (\$m Real 2019-20)											
114	Year	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	
115	Pipelines	10.00	10.00	10.00	10.00	10.00	-	-	-	-	-	
116	Service Pipes						-	-	-	-	-	
117	Supply Regulators/Valve Stations						-	-	-	-	-	
118	SCADA						-	-	-	-	-	
119	Meters						-	-	-	-	-	
120	Computer Equipment						-	-	-	-	-	
121	Vehicles						-	-	-	-	-	
122	Land and Easements						-	-	-	-	-	
161	Spare straight-line tax asset class											
162	Buildings						-	-	-	-	-	
163	In-house software						-	-	-	-	-	
164	Equity raising costs						-	-	-	-	-	
165	Total	10.00	10.00	10.00	10.00	10.00	-	-	-	-	-	
166										\$	50.00	
167	Forecast Asset Disposal – As Incurred (\$m Real 2019-20)											
168	Year	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	
169	Pipelines						-	-	-	-	-	
170	Service Pipes						-	-	-	-	-	
171	Supply Regulators/Valve Stations						-	-	-	-	-	
172	SCADA						-	-	-	-	-	
173	Meters						-	-	-	-	-	
174	Computer Equipment						-	-	-	-	-	
175	Vehicles	1.00	1.00	1.00	1.00	1.00	-	-	-	-	-	
176	Land and Easements	1.00	1.00	1.00	1.00	1.00	-	-	-	-	-	
215	Spare straight-line tax asset class											
216	Buildings						-	-	-	-	-	
217	In-house software						-	-	-	-	-	
218	Equity raising costs						-	-	-	-	-	
219	Total	2.00	2.00	2.00	2.00	2.00	-	-	-	-	-	
220										\$	10.00	
221	Forecast Customer Contributions – As Incurred (\$m Real 2019-20)											
222	Year	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	
223	Pipelines						-	-	-	-	-	
224	Service Pipes	5.00	5.00	5.00	5.00	5.00	-	-	-	-	-	
225	Supply Regulators/Valve Stations						-	-	-	-	-	
226	SCADA						-	-	-	-	-	
227	Meters	2.00	2.00	2.00	2.00	2.00	-	-	-	-	-	
228	Computer Equipment						-	-	-	-	-	
229	Vehicles						-	-	-	-	-	
230	Land and Easements						-	-	-	-	-	
269	Spare straight-line tax asset class											
270	Buildings						-	-	-	-	-	
271	In-house software						-	-	-	-	-	
272	Equity raising costs						-	-	-	-	-	
273	Total	7.00	7.00	7.00	7.00	7.00	-	-	-	-	-	
274										\$	35.00	
275	Forecast Net Capital Expenditure – As Incurred (\$m Real 2019-20)											
276	Year	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	
277	Pipelines	55.00	13.00	9.00	17.00	28.00	-	-	-	-	-	
278	Service Pipes	17.00	6.00	50.00	4.00	6.00	-	-	-	-	-	
279	Supply Regulators/Valve Stations	11.00	11.00	11.00	11.00	11.00	-	-	-	-	-	
280	SCADA	10.00	10.00	10.00	10.00	10.00	-	-	-	-	-	
281	Meters	7.00	7.00	7.00	7.00	7.00	-	-	-	-	-	
282	Computer Equipment	6.00	6.00	6.00	6.00	6.00	-	-	-	-	-	
283	Vehicles	6.00	6.00	6.00	6.00	6.00	-	-	-	-	-	
284	Land and Easements	5.00	5.00	5.00	5.00	5.00	-	-	-	-	-	
323	Spare straight-line tax asset class											
324	Buildings	5.00	5.00	5.00	5.00	5.00	-	-	-	-	-	
325	In-house software	4.00	4.00	4.00	4.00	4.00	-	-	-	-	-	
326	Equity raising costs	2.33					-	-	-	-	-	
327	Total	130.33	75.00	115.00	77.00	90.00	-	-	-	-	-	
328										\$	487.33	
329	Forecast Operating and Maintenance Expenditure (\$m Real 2019-20)											
330	Year	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30
331	Controllable opex		50.00	50.00	50.00	50.00	50.00	-	-	-	-	-
332	Corporate		10.00	10.00	10.00	10.00	10.00	-	-	-	-	-
333	Other		2.00	2.00	2.00	2.00	2.00	-	-	-	-	-
334												
335												
336												
337												
338												
339	Ancillary Reference Services		1.000	1.500	2.000	1.500	2.000	-	-	-	-	-
340	Debt raising costs		1.90	1.84	1.75	1.68	1.59	-	-	-	-	-
341	Total		64.90	65.34	65.75	65.18	65.59	-	-	-	-	-
342										\$	326.76	
343	Revenue Adjustments (\$m Real 2019-20)											
344	Year	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	
345	Opex Efficiency Mechanism Carryover											Tax Income? Yes
346	Capital Expenditure Sharing Scheme											Tax Expense? Yes
347												
348												
349												
350												
351												
352												
353												
354												

The PTRM can accommodate input data for an access arrangement period of up to 10 years. Input cells outside of the relevant access arrangement period should be left blank.

The PTRM is configured to use the straight-line method as the default position for calculating depreciation for the opening capital base and forecast capex for capital base purposes. For the tax depreciation of the TAB, the PTRM applies the straight-line method as the default position for calculating depreciation of the opening tax asset values. The diminishing value (DV) method is applied to the forecast capex values for tax depreciation purposes. However, there are some exceptions to the DV method. The PTRM allows assets relating to in-house software, buildings and equity raising costs to be depreciated using the straight-line method.⁹ If the user intends to propose using other depreciation profiles, it is recommended that they raise this prior to lodgement.¹⁰

2.3.1 Opening capital base and opening tax asset base

The opening capital base is the value of assets on which a return will be earned. The opening TAB is used to calculate depreciation for tax purposes. The **PTRM input** sheet requires a value for the opening capital base (broken into asset classes in rows 7 to 56) and opening TAB at the start of the first regulatory year of the next access arrangement period.¹¹ The capital base and TAB will differ each regulatory year to reflect forecast capex, asset disposals, capital contributions and regulatory depreciation (for the capital base) or tax depreciation (for the TAB).

The recorded input values are linked to the **Assets** sheet, which also calculates depreciation for the next access arrangement period. Notes have also been included for various cells with specific comments and explanations about the relevance of the inputs.

Asset class name

The asset classes/names are recorded in column G. It is important that the asset classes recorded in the capital base section match the asset classes for which capex, disposals and capital contributions are reported in other input sections. This allows the PTRM to model depreciation consistently across the asset classes.

The PTRM is configured to accommodate up to 50 asset classes. The number of asset classes used in the PTRM will vary between businesses.¹² However, for each business the asset classes for existing assets used in the PTRM should be consistent with that used in the AER's roll forward model (RFM). This allows the closing capital base values determined in the RFM to be used as inputs to the opening capital base values in the PTRM. Capital base values by asset class derived from the RFM may be aggregated or disaggregated

⁹ Asset classes 47–50 in the PTRM provide for this. To be exempt from the DV method and apply the straight-line method for tax depreciation, assets related to in-house software must satisfy the definition under section 995.1 of the ITAA and ATO tax ruling 2016/3. Likewise assets relating to buildings must satisfy the definition of a capital work under section 43.20 of the ITAA and ATO tax ruling 97/25. Equity raising costs are to be depreciated under the straight-line method in accordance with section 40.880 of the ITAA.

¹⁰ The depreciation profiles would be subject to satisfying the requirements of rules 88, 89 and 90 of the NGR.

¹¹ The button at the left of row 53 may be pressed to display/hide rows 37 to 52 (asset classes 31 to 46).

¹² Asset classes 47–50 are designed to apply the straight-line method for tax depreciation purposes for assets related to 'In-house software', 'Buildings' and 'Equity raising costs'. Asset class 50 is specifically for equity raising costs and uses several defined name ranges to implement the iterative equity raising cost update when smoothing total revenue.

when forming inputs for the PTRM where this demonstrably improves the accuracy or administrative convenience of asset calculations.

Opening asset value

The opening asset values for each asset class are recorded in column J and are manually sourced from the closing asset value for each asset class as determined in the RFM.

Assets under construction

The value of assets under construction for each asset class, where relevant, is recorded in column K.¹³ The total value of assets under construction as at the start of the first regulatory year of the next access arrangement period (cell K57) is rolled into the opening capital base value (cell J57).

Remaining life

The weighted average remaining life (WARL) of the asset classes is recorded in column L, based on the economic life of the assets.¹⁴ These data may not be required depending on the option for depreciating the opening capital base selected in section 2.3.13 in which case 'n/a' may be input to these cells.

Standard life

The standard life of the asset classes is recorded in column M and measures how long the infrastructure would physically last had it just been built.

Opening tax asset value

The opening tax asset values for each asset class are sourced from the closing tax asset values which have been determined in the RFM and are recorded in column N. Assets valued for tax purposes should include the value of contributed assets.

Tax remaining life

The weighted average tax remaining lives of each asset class for taxation purposes are recorded in column O based on the tax lives specified by the Australian Tax Office (ATO) for the category of assets and commissioning dates. These data may not be required depending on the option for depreciating the opening TAB selected in section 2.3.15 in which case 'n/a' may be input to these cells.

Tax standard life

The tax standard lives of each asset class are recorded in column P and should reflect the tax effective lives specified in tax rules or determinations published by the ATO.

¹³ Inputs for assets under construction will only be relevant for any user that previously recognised capex on an as-commissioned basis.

¹⁴ Generally, these can be derived based on the WARL of all individual assets in the class.

Base regulatory year

The regulatory year for the start of the next access arrangement period is recorded in cell Q7.

Length of access arrangement period

The number of years in the next access arrangement period is recorded in cell R7.

2.3.2 Forecast capital expenditure—as incurred

Forecast capex (in gross terms and inclusive of capital contributions) values for the next access arrangement period are recorded for each regulatory year in rows 61 to 110¹⁵ (by asset class).¹⁶ Capex is rolled into the capital base when spending is incurred. These inputs must be reported in real terms based on start of year one dollar terms.

2.3.3 Forecast immediate expensing of capital expenditure—as incurred

Forecast immediate expensing of capex (as incurred) values are recorded for the regulatory year in which the immediate expensing is expected to take place, in rows 115 to 164 (by asset class). These values are linked to the calculation of tax depreciation in the **Assets** sheet. These inputs must be reported in real terms based on start of year one dollar terms.

2.3.4 Forecast asset disposals—as incurred

Forecast asset disposal (as incurred) values are recorded for the regulatory year in which the disposal is expected to take place, in rows 169 to 218 (by asset class). These inputs must be reported in real terms based on start of year one dollar terms.

2.3.5 Forecast capital contributions—as incurred

Forecast capital contributions (as incurred) values are recorded for the regulatory year in which the contribution is expected to be made, in rows 223 to 272 (by asset class). These inputs must be reported in real terms based on start of year one dollar terms.

2.3.6 Forecast net capital expenditure—as incurred

This section on forecast net capex does not require inputs to be recorded. For each asset class, forecast net capex is calculated based on the recorded forecast capex less forecast asset disposals and forecast capital contributions. Forecast net capex (as incurred) values are displayed in rows 277 to 326 and form part of the roll forward of projecting the capital base in the **Assets** sheet. These values are assumed to be in real terms based on start of year one dollar terms.

2.3.7 Forecast operating expenditure

Opex typically includes items such as wages and salaries, leasing costs, costs associated with maintaining assets, input costs and other service contract expenses paid to third

¹⁵ Row 110 (asset class 50) is designed to be used for equity raising costs only.

¹⁶ The button at the left of row 111 may be pressed to display/hide rows 61 to 110 (asset classes 1 to 50).

parties. The forecast opex values for each year are recorded in rows 331 to 338. This section also includes inputs for ancillary reference services¹⁷ (ARS) in row 339 and displays benchmark debt raising costs in row 340. These line items are not strictly related to opex, but are included in this section based on the practice of treating them as opex line items in calculating building block revenues. The input for ARS is the only opex line item to require an input for year $t-1$.¹⁸ Benchmark debt raising costs do not require inputs to be recorded because the calculation is formula-driven. These inputs must be reported in real terms based on start of year one dollar terms.

The forecast total opex values (row 341) are linked to the **Analysis** sheet to calculate the total revenue.

2.3.8 Revenue adjustments

Any additional revenue adjustments applying to the next access arrangement period are recorded in rows 345 to 354.¹⁹ These are linked to the total building block revenue calculations in the **Analysis** sheet. Each line item in this section can be set to be treated as a tax income and/or a tax expense. These settings are determined by the drop down options in cells R345 to S354. Totals for each combination of tax income and tax expense settings are in rows 355 to 359. These inputs must be reported in real terms based on start of year one dollar terms.

2.3.9 Tax

The expected corporate tax rates are recorded for each year in row 363. The tax rates are linked to the **WACC** sheet to calculate the average tax rate and to the **Analysis** sheet to estimate the tax payable, as part of calculating total revenue.

Any tax losses carried forward from the previous period are included in cell F366. This value can be obtained from the approved PTRM for the previous access arrangement period (based on latest update).

The DV depreciation multiplier (as determined by the ATO) is recorded for each regulatory year in row 369. The multiplier is linked to the **Assets** sheet to calculate the rate to depreciate capex incurred in that regulatory year that is subject to the DV method of tax depreciation.

2.3.10 Cost of capital

The cost of capital section (rows 373 to 376 and row 379) records the following parameters:

¹⁷ These are services ancillary to the provision of a service provided by means of a pipeline, relating to particular activities that are provided only when customers request them. This may include services such as special meter reads, disconnection at street level, and meter investigation.

¹⁸ Where the base year for tariff calculations is year 1 (section 2.3.18) no ARS input is required for year $t-1$.

¹⁹ The PTRM templates include sample revenue adjustments line items, which should be treated as basic examples of the type of revenue adjustments (and tax treatments) that might be included. The examples should not be read as indicating the AER's position on the tax implications of these particular revenue adjustments.

- inflation rate²⁰
- return on equity
- gamma—value of imputation (franking) credits
- proportion of debt funding
- trailing average portfolio return on debt for each year of the access arrangement period.

Each of these parameters is linked to the **WACC** sheet to calculate the weighted average cost of capital (WACC). The approach or method for determining each parameter is specified in rule 87 of the NGR or the AER *Rate of return instrument*.²¹ Rows 380 to 381 contain content driven help which will display cautions or guidance based on input to this sheet and the **X factors** sheet.

2.3.11 Debt and equity raising costs—transaction costs

The debt and equity raising costs section (rows 386 to 390) records the following parameters:

- imputation credit payout ratio
- subsequent equity raising costs
- dividend reinvestment plan costs
- dividend reinvestment plan take up
- debt raising costs.

The values for the imputation credit payout ratio, equity raising and dividend reinvestment costs, and the dividend reinvestment take up are linked to the **Equity raising cost** sheet to calculate the allowance for benchmark equity raising costs associated with capex. The debt raising costs value represents the unit allowance and is linked to row 340 of the **PTRM input** sheet to calculate the overall benchmark debt raising costs to be included in the opex allowance.

2.3.12 Price/revenue constraint for the current regulatory year

Cells G394 and G395 record current values of total revenue and revenue yield subject to these tariff variation mechanisms and may not be required depending on the tariff variation mechanism we determine. These values are linked to the **X factors** sheet and are used for projecting smoothed forecast revenues based on total (unsmoothed) revenue.

²⁰ Rule 75B(2)(b) of the NGR requires us to specify in the PTRM a methodology that is likely to result in the best estimate of expected inflation. We use an approach that calculates the geometric average based on the inflation forecasts for two years sourced from the latest available Reserve Bank of Australia's (RBA's) *Statement of monetary policy* and the mid-point of the RBA's target inflation band for eight years (see AER, *Final position, Regulatory treatment of inflation*, December 2017, p. 114).

²¹ AER, *Rate of return instrument*, December 2018.

2.3.13 Straight-line depreciation option for opening capital base

The PTRM provides the user an option at cell E399 (drop down function) to select whether the straight-line depreciation of the opening capital base is to be calculated using the WARL or year-by-year tracking methods. If the year-by-year tracking method is selected, the depreciation of the opening capital base in the asset roll forward will reflect the inputs at section 2.3.14. If the WARL method is selected, the capital base roll forward calculations will use the remaining life inputs provided in section 2.3.1 to calculate depreciation of the opening capital base.

2.3.14 Year-by-year tracking depreciation on opening capital base

When the year-by-year tracking depreciation method is selected, the forecast real straight-line depreciation of the opening capital base values for each regulatory year are recorded at rows 404 to 453. Otherwise, there is no need to record any inputs in this section if the WARL method is selected. The forecast real straight-line depreciation of the opening capital base values are calculated in the depreciation module of the RFM and must be reported in real terms based on start of year one dollar terms. Where selected, these values are used in calculating the roll forward of the capital base in the **Assets** sheet.

2.3.15 Depreciation option for opening TAB

The PTRM provides the user an option at cell E458 (drop down function) to select whether the depreciation of the opening TAB is to be calculated using the WARL or year-by-year tracking methods. If the year-by-year tracking method is selected, the depreciation of the opening TAB in the tax asset roll forward will reflect the inputs at section 2.3.16. If the WARL method is selected, the TAB roll forward calculations will use the tax remaining life inputs provided in section 2.3.1 to calculate depreciation of the opening TAB.

2.3.16 Year-by-year tracking depreciation on opening TAB

When the year-by-year tracking depreciation option is selected, the forecast depreciation of the opening TAB values for each regulatory year are recorded at rows 463 to 512. Otherwise, there is no need to record any inputs in this section if the WARL method is selected. The forecast depreciation of the opening TAB values are calculated in the depreciation module of the RFM and must be reported in nominal terms based on end of year dollar terms. Where selected, these values are used in calculating the roll forward of the TAB in the **Assets** sheet.

2.3.17 Energy delivered forecast

Row 517 records total forecast energy delivered. Energy delivered forecasts may be obtained from the most recent Australian Energy Market Operator's *Gas statement of opportunities*, a gas distribution service providers' annual planning report or other relevant industry sources. These data are used in calculating the price constraint under a revenue yield tariff variation mechanism in the **X factors** sheet. They are also used in the **Revenue summary** sheet to calculate the average price impact.

2.3.18 Base year tariff for tariff calculations

The PTRM provides the user an option at cell E521 (drop down function) to select the base year for the forecast tariffs calculated in the **Forecast revenues** sheet. If the t option is selected, base year prices (section 2.3.19) will reflect year 1 prices for tariff components. Estimated sales quantities for the year prior to the commencement of the access arrangement period (t-1) will also not be required (section 2.3.20). Instead, reference tariffs for year 2 onwards will be based on the entered information for year 1 and the corresponding X factors in the **X factor** sheet.²² If the t-1 option is selected, base year prices (section 2.3.19) will reflect current prices (t-1) for tariff components. Estimated sales quantities for t-1 are also required. In this case, reference tariffs for each year of the access arrangement period will be based on the entered information for year t-1 and the X factors in the **X factor** sheet.

2.3.19 Base year prices per tariff component

Where the t-1 option for base year tariffs is selected, prices by tariff component for the final regulatory year of the current access arrangement period are recorded in rows 526 to 595. Where the t option for base year tariffs is selected, prices by tariff component for the first regulatory year of the next access arrangement period are recorded.

These data are used in the PTRM's calculation of a tariff cap and may not be required depending on the tariff variation mechanism we determine. Where used, this section of the model and its dependent calculations in the **Forecast revenues** sheet may need to be amended to incorporate the components and tariff structures of the user.

2.3.20 Forecast sales quantities per tariff component

Forecast quantities for each tariff component for the next access arrangement period are recorded in rows 602 to 671 (years 1 to 5) and rows 680 to 749 (years 6 to 10). Where the t-1 option for base year tariffs is selected, estimated sales quantities for each tariff component in the final year of the current access arrangement period are also recorded in this section. These data are used in the PTRM's calculation for the tariff cap and may not be required depending on the tariff variation mechanism we determine. As for pricing data discussed above, this section of the model and its dependent calculations may need to be amended to suit the user. Where quantities are not available or appropriate for the entire regulatory year (e.g. customer numbers) they will need to be approximated using a method agreed to by us.

2.4 WACC sheet

The **WACC** sheet determines for each regulatory year of the next access arrangement period the required return on equity, return on debt and the WACC using the relevant cost of capital parameters from the **PTRM input** sheet. Some of these will be constant across the access arrangement period, but the return on debt (and therefore the overall WACC) may vary year-to-year.

²² The first year X factor in the **X factors** sheet will also not be required.

The effective tax rates derived from the cash-flow analysis are also reported in the **WACC** sheet, including various measures of the WACC calculated from the forecast cash-flows in the **Analysis** sheet.²³ The effective tax rates for equity and debt (cells G27 and G28) are copied from the **Analysis** sheet through the smoothing process at the start of an access arrangement period (section 3.1).²⁴ The nominal pre-tax return on debt (row 14) and the nominal post-tax return on equity (row 10) are multiplied by the debt and equity components of the capital base to determine the return on capital building block.²⁵

The cash-flow derived rates shown in column R are designed as checks to ensure certain parameters are internally consistent with those derived by formula at the time of the final decision. This process is discussed further in section 3.

Figure 5 provides an example of the **WACC** sheet.

Figure 5 WACC sheet

Year	2020-21	2021-22	2022-23	2023-24	2024-25	Final decision checks
Inflation Rate	2.50%	2.50%	2.50%	2.50%	2.50%	This column contains calculations that presume a constant WACC. They are therefore to be used at the start of the access arrangement period (prior to any annual debt updates).
Value of Imputation Credits (gamma)	59%	59%	59%	59%	59%	
Proportion of Equity Funding	40%	40%	40%	40%	40%	
Proportion of Debt Funding	60%	60%	60%	60%	60%	
Post-tax Nominal Return on Equity	6.50%	6.50%	6.50%	6.50%	6.50%	6.50%
Post-tax Real Return on Equity	3.90%	3.90%	3.90%	3.90%	3.90%	3.90%
Corporate Tax Rate	30.00%	30.00%	30.00%	30.00%	30.00%	
Nominal Pre-tax Return on Debt	5.88%	5.69%	5.49%	5.30%	5.06%	
Real Pre-tax Return on Debt	3.30%	3.11%	2.92%	2.73%	2.50%	
Formula approximations of WACC						Cashflow derivations of WACC
Nominal Vanilla WACC	6.13%	6.01%	5.90%	5.78%	5.64%	5.73%
Real Vanilla WACC	3.54%	3.43%	3.31%	3.20%	3.06%	3.15%
Post-tax Nominal WACC	5.68%	5.58%	5.48%	5.38%	5.25%	5.09%
Post-tax Real WACC	3.11%	3.01%	2.91%	2.81%	2.69%	2.52%
Pre-tax Nominal WACC	6.58%	6.46%	6.35%	6.23%	6.09%	6.19%
Pre-tax Real WACC	3.98%	3.87%	3.75%	3.64%	3.50%	3.60%
Nominal Tax Allowance	0.90%	0.88%	0.87%	0.85%	0.83%	1.10%
Real Tax Allowance	0.87%	0.86%	0.84%	0.83%	0.81%	1.07%
Effective Tax Rate for Equity (from relevant cashflows)	35.62%	35.62%	35.62%	35.62%	35.62%	35.62%
Effective Tax Rate for Debt (effective debt shield)	30.35%	30.35%	30.35%	30.35%	30.35%	30.35%

At the start of an access arrangement period, indicative cashflow-calculated average of Te and Td are copied over to this sheet. These calculations presume a constant WACC so Te/Td are not be updated during a access arrangement period when annually updating the return on debt - the same Te/Td are used from the final decision.

Numbers in White cells are calculated on this sheet from input parameters.
Numbers in Orange cells are transferred from relevant sheets

2.5 Assets sheet

The **Assets** sheet calculates the value of the capital base and TAB for each regulatory year of the next access arrangement period in real (start of year one) and nominal dollar terms.²⁶ It also calculates both regulatory and tax depreciation. The **Assets** sheet displays 55 years of data to allow estimation of the effective tax rate.

Figure 6 provides an example of the **Assets** sheet.

²³ These link to the cash-flow analysis excluding the effect of revenue adjustments, which is the relevant basis for checking that the target return on equity has been met.

²⁴ These effective tax rates for equity (Te) and debt (Td) are indicative values only. The cash-flow calculations presume a constant WACC is maintained across the access arrangement period.

²⁵ See rows 23 to 26 in the **Analysis** sheet, which calculate the return on capital and provide a breakdown of the return on equity and return on debt.

²⁶ The TAB is calculated in nominal dollar terms only, consistent with tax rules.

Figure 6 Assets sheet

Year	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31
Aus Gas - Asset Roll Forward - DNSP PTRM - version 1												
Inflation Assumption (CPI % increase)	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%
Cumulative Inflation Index (CPI end period)	100%	102.5%	105.1%	107.7%	110.4%	113.1%	116.0%	118.9%	121.8%	124.9%	128.0%	131.2%
Opening Capital Base	3,910.5											
Real Net Capital Expenditure (capex)	132.6	76.3	116.9	78.2	91.4	-	-	-	-	-	-	-
Pipelines	56.0	13.2	9.1	17.3	28.4	-	-	-	-	-	-	-
Service Pipes	17.3	6.1	50.8	4.1	6.1	-	-	-	-	-	-	-
Supply Regulators/Valve Stations	11.2	11.2	11.2	11.2	11.2	-	-	-	-	-	-	-
SCADA	10.2	10.2	10.2	10.2	10.2	-	-	-	-	-	-	-
Meters	7.1	7.1	7.1	7.1	7.1	-	-	-	-	-	-	-
Computer Equipment	8.1	8.1	8.1	8.1	8.1	-	-	-	-	-	-	-
Vehicles	6.1	6.1	6.1	6.1	6.1	-	-	-	-	-	-	-
Land and Easements	5.1	5.1	5.1	5.1	5.1	-	-	-	-	-	-	-
Spare straight-line tax asset class	-	-	-	-	-	-	-	-	-	-	-	-
Buildings	5.1	5.1	5.1	5.1	5.1	-	-	-	-	-	-	-
In-house software	4.1	4.1	4.1	4.1	4.1	-	-	-	-	-	-	-
Equity raising costs	2.4	-	-	-	-	-	-	-	-	-	-	-
Nominal Net Capex	135.9	80.1	125.9	86.3	103.4	-	-	-	-	-	-	-
Pipelines	57.4	13.9	9.9	19.1	32.2	-	-	-	-	-	-	-
Service Pipes	17.7	6.4	54.7	4.5	6.9	-	-	-	-	-	-	-
Supply Regulators/Valve Stations	11.5	11.8	12.0	12.3	12.6	-	-	-	-	-	-	-
SCADA	10.4	10.7	10.9	11.2	11.5	-	-	-	-	-	-	-
Meters	7.3	7.5	7.7	7.8	8.0	-	-	-	-	-	-	-
Computer Equipment	8.3	8.5	8.8	9.0	9.2	-	-	-	-	-	-	-
Vehicles	6.3	6.4	6.6	6.7	6.9	-	-	-	-	-	-	-
Land and Easements	5.2	5.3	5.5	5.6	5.7	-	-	-	-	-	-	-
Spare straight-line tax asset class	-	-	-	-	-	-	-	-	-	-	-	-
Buildings	5.2	5.3	5.5	5.6	5.7	-	-	-	-	-	-	-
In-house software	4.2	4.3	4.4	4.5	4.6	-	-	-	-	-	-	-
Equity raising costs	2.4	-	-	-	-	-	-	-	-	-	-	-
Asset Values (\$m Real 2019-20)												
Real Straight-line Depreciation		251.8	258.8	267.1	271.4	267.7	153.8	150.8	154.8	151.6	148.4	140.3
Pipelines		64.1 ²	64.1 ²	64.1 ²	64.1 ²	64.1 ²	64.1 ²	64.1 ²	64.1 ²	64.1 ²	64.1 ²	53.1 ⁷
Service Pipes	0											
Supply Regulators/Valve Stations	1		0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33
SCADA	2			0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22
Meters	3				0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
Computer Equipment	4					0.29	0.29	0.29	0.29	0.29	0.29	0.29
Vehicles	5						0.47	0.47	0.47	0.47	0.47	0.47
Land and Easements	6											
Buildings	7											
In-house software	8											
Equity raising costs	9											
Pipelines	10		64.1	65.1	65.3	65.4	65.7	66.2	66.2	66.2	66.2	66.2
Service Pipes			33.5	33.6	33.9	40.7	33.4	33.5	33.5	33.5	33.5	33.5
Supply Regulators/Valve Stations			21.7	22.0	22.3	22.6	22.8	23.0	23.0	23.0	23.0	23.0
SCADA			63.4	64.1	64.6	65.5	66.2	0.3	0.3	6.6	6.6	6.6
Meters			53.3	53.7	53.2	53.7	60.2	4.6	4.6	4.6	4.6	4.6
Computer Equipment			5.7	6.9	8.0	8.1	8.2	7.8	6.8	5.6	4.6	3.5
Vehicles			2.2	1.3	3.3	4.2	5.2	6.1	4.3	3.7	2.4	1.2
Land and Easements			-	-	-	-	-	-	-	-	-	-
Buildings			-	-	-	-	-	-	-	-	-	-
In-house software			-	-	-	-	-	-	-	-	-	-
Equity raising costs			-	-	-	-	-	-	-	-	-	-
Real Residual Capital Base (end period)	3,910.5	3,791.3	3,608.8	3,458.6	3,265.4	3,089.1	2,935.3	2,784.5	2,629.6	2,478.0	2,329.6	2,189.3
Real Residual Capital Base (start period)	-	3,910.5	3,791.3	3,608.8	3,458.6	3,265.4	3,089.1	2,935.3	2,784.5	2,629.6	2,478.0	2,329.6
Asset Values (\$m Nominal)												
Inflation on Opening Capital Base		97.8	97.2	94.8	93.1	90.1	87.4	85.1	82.7	80.1	77.4	74.6
Nominal Straight-line Depreciation		258.1	271.9	287.7	299.6	302.9	178.4	179.2	188.6	189.4	190.0	184.1
Nominal Regulatory Depreciation		160.3	174.7	192.9	206.5	212.8	91.0	94.1	105.9	109.3	112.6	109.5
Nominal Residual Capital Base (end period)	3,910.5	3,886.1	3,791.5	3,724.5	3,604.4	3,495.0	3,404.0	3,309.9	3,204.0	3,094.7	2,982.0	2,872.5
Inflated Nominal Residual Capital Base (start period)	-	4,008.3	3,983.3	3,886.3	3,817.6	3,694.5	3,582.4	3,489.1	3,392.6	3,284.1	3,172.1	3,056.6
Tax Values (\$m Nominal)												
Tax Depreciation		168.7	185.7	156.1	167.0	167.3	160.6	149.2	124.4	120.8	115.4	33.4
Pipelines		38.7 ²	38.7 ²	38.7 ²	38.7 ²	38.7 ²	38.7 ²	38.7 ²	38.7 ²	38.7 ²	38.7 ²	6.3 ⁹
Service Pipes	0											
Supply Regulators/Valve Stations	1		4.61	4.15	3.74	3.36	3.03	2.72	2.45	2.21	1.99	1.79
SCADA	2			0.32	0.28	0.26	0.23	0.21	0.19	0.17	0.15	0.14
Meters	3				0.11	0.10	0.09	0.08	0.07	0.06	0.06	0.05
Computer Equipment	4					0.77	0.70	0.63	0.56	0.51	0.46	0.41
Vehicles	5						2.04	1.83	1.65	1.48	1.34	1.20
Land and Easements	6											
Buildings	7											
In-house software	8											
Equity raising costs	9											
Pipelines	10		43.0	53.6	54.0	53.7	54.3	44.6	44.0	43.5	43.0	42.6
Service Pipes			33.6	35.9	36.8	42.4	33.8	37.3	36.4	35.6	34.8	34.2
Residual Tax Value (end period)	1,566.8	1,538.8	1,439.3	1,414.6	1,340.4	1,282.8	1,122.1	972.9	848.6	727.8	612.4	579.0
Summary of Asset Roll Forward (\$m Nominal)												
Capital Base roll forward												
Opening Capital Base		3,910.5	3,886.1	3,791.5	3,724.5	3,604.4	-	-	-	-	-	-
Net Capex		135.9	80.1	125.9	86.3	103.4	-	-	-	-	-	-
Straight-line Depreciation		- 258.1	- 271.9	- 287.7	- 299.6	- 302.9	-	-	-	-	-	-
Inflation on Opening Capital Base		97.8	97.2	94.8	93.1	90.1	-	-	-	-	-	-
Closing Capital Base		3,886.1	3,791.5	3,724.5	3,604.4	3,495.0	-	-	-	-	-	-
Check		ok	ok	ok	ok	ok						
TAB roll forward												
Opening TAB		1,566.8	1,538.8	1,439.3	1,414.6	1,340.4	-	-	-	-	-	-
Net Capex (without cap cons)		133.6	78.8	123.8	85.0	101.8	-	-	-	-	-	-
Capital Contributions		7.2	7.4	7.5	7.7	7.9	-	-	-	-	-	-
Tax Depreciation		- 168.7	- 185.7	- 156.1	- 167.0	- 167.3	-	-	-	-	-	-
Closing TAB		1,538.8	1,439.3	1,414.6	1,340.4	1,282.8	-	-	-	-	-	-
Check		ok	ok	ok	ok	ok						

2.5.1 Rolling forward the capital base and depreciation

For consistency, depreciation in a period must equal the difference between the asset value at the start and end of the period. Further, as depreciation is intended to represent the return of capital over the life of the asset, accumulated depreciation should not exceed the initial actual capital cost of the infrastructure.

The opening capital base (cell F9) and real forecast net capex values (rows 10 to 60) displayed in this sheet are sourced from the **PTRM input** sheet. Nominal forecast net capex values are displayed in rows 61 to 111. The modelling of capex in the PTRM is based on a full as-incurred approach. Under this approach the return on capital and the return of capital are calculated based on as-incurred forecast net capex.

Capex is assumed to be incurred evenly throughout the regulatory year and therefore a timing assumption is adopted that on average places capex half-way through the year. However, the PTRM calculates the return on capital based on the opening capital base for each regulatory year and capex is not added to the capital base until the end of the regulatory year in which the expenditure on the asset is incurred. To address this timing difference of modelling the real capex, a half-year real vanilla WACC is provided (capitalised and recovered over the life of the assets) to compensate for the six-month period before capex is included in the capital base (rows 11 to 60).²⁷ This is calculated using the specific half-year real vanilla WACC applying to the year in which the expenditure is incurred.

Real asset values are displayed in rows 115 to 767. Real straight-line depreciation is calculated in rows 115 to 765. It uses the opening capital base, forecast capex and depreciation of opening capital base (where selected) values, and asset lives from the **PTRM input** sheet. The individual depreciation profiles for each asset class can be viewed by expanding rows 116 to 765. The roll forward of the closing capital base in real dollar terms (start of year one) for each regulatory year is calculated in row 766.

Nominal asset values are displayed in rows 771 and 775. To compensate the business for inflation, the residual value of the capital base at the end of each regulatory year is adjusted upwards for the amount of expected inflation in that regulatory year. This adjustment is calculated in row 771. The change in the nominal value of the capital base from regulatory year to year is calculated by adjusting the closing capital base (row 774) for forecast net capex and the regulatory depreciation allowance. Regulatory depreciation (row 773) is calculated as the nominal straight-line depreciation (row 772), less the inflation adjustment on the opening capital base (row 771).

Depreciation for tax purposes and the tax asset value over time are calculated in rows 779 to 1430. These are based on the tax asset values, forecast capex, immediate expensing of forecast capex and depreciation of opening TAB (where selected) values, and tax asset lives from the **PTRM input** sheet. Where the year-by-year tracking depreciation option is selected in section 2.3.15, depreciation of the opening TAB will reflect the values in section 2.3.16. If

²⁷ The half-year real vanilla WACC is calculated as the square root of $(1 + \text{real vanilla WACC}) - 1$ to account for the compounding effect on an annual rate.

the WARL option is selected, depreciation of the opening TAB is calculated using the straight-line method. The straight-line depreciation method is also used to calculate tax depreciation of forecast capex for certain asset classes where this approach is required under the tax rules.²⁸ For all other forecast capex, tax depreciation is calculated using the DV method. The formula used to calculate DV tax depreciation is presented as:

$$D_t = \left(\text{Nominal net capex}_i^{29} - \sum_{n=0}^{t-1} D_n \right) \times \text{DV multiplier}^{30} \div \text{tax standard asset life}^{31}$$

where:

D_t is the tax depreciation in year t

$D_0 = 0$

$t = 1, 2, 3, \dots$

$i = \text{year } 0$

Capex recognised for tax purposes is net of disposals and immediately expensed capex, but includes the value of capital contributions. Immediately expensed capex for each regulatory year (section 2.3.3) is added to the total tax depreciation of each asset class for that year.³²

The individual tax depreciation profiles for each asset class can be viewed by expanding rows 780 to 1429. Tax depreciation is calculated separately because asset values and asset lives for tax purposes generally differ from those for regulatory purposes.

A summary of the roll forward of the capital base is set out in rows 1434 to 1438. A summary of the roll forward of the TAB is set out in rows 1443 to 1447.

2.6 Analysis sheet

The **Analysis** sheet itemises the building block costs, which are then added together to calculate the total unsmoothed revenue. The **Analysis** sheet displays 55 years of data so that the effective tax rate can be estimated.

The **Analysis** sheet also includes an analysis of the forecast cash flows. This analysis provides rate of return measures estimated from forecast revenues and costs, including: expected pre-tax and post-tax returns on equity, effective tax rates, the effective cost of debt and selected measures of the WACC.

Figure 7 and Figure 8 provide examples of the **Analysis** sheet.

²⁸ Asset classes 47–50 provide for this.

²⁹ Gross capex (section 2.3.2) net of disposals (section 2.3.4) and immediately expensed capex (section 2.3.3).

³⁰ Section 2.3.9.

³¹ Section 2.3.1.

³² For example, regulatory year one immediately expensed capex for the first asset class is added to cell G792 on the **Assets** sheet.

Figure 7 Analysis sheet—first screenshot

Year	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31
Aus Gas - Cash Flow Analysis - DNSP PTRM - version 1												
Year												
Inflation Assumption (CPI % increase)	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%
Cumulative Inflation Index (CPI end period)	100.0%	102.5%	105.1%	107.7%	110.4%	113.1%	116.0%	118.9%	121.8%	124.9%	128.0%	131.2%
Time Varying WACC												
Time Varying Return on Debt	5.88%	5.89%	5.49%	5.30%	5.06%	5.06%	5.06%	5.06%	5.06%	5.06%	5.06%	5.06%
Time Varying Nominal Vanilla WACC	6.13%	6.01%	5.90%	5.78%	5.64%	5.64%	5.64%	5.64%	5.64%	5.64%	5.64%	5.64%
Cumulative Discount Factor	100.0%	106.1%	112.5%	119.1%	126.0%	133.1%	140.6%	148.6%	156.9%	165.8%	175.1%	185.0%
Inverse Cumulative Discount Factor	100.0%	94.2%	88.9%	83.9%	79.3%	75.1%	71.1%	67.3%	63.7%	60.3%	57.1%	54.1%
Annual Building Blocks (\$m Nominal)												
Capital Base (start period)	(nominal value)	3,910.5	3,887.4	3,785.4	3,716.6	3,595.3	3,485.1	3,393.4	3,298.5	3,191.7	3,081.6	2,968.1
- Equity	40.00%	1,564.2	1,555.0	1,514.2	1,486.6	1,438.1	1,394.1	1,357.4	1,319.4	1,276.7	1,232.6	1,187.2
- Debt	60.00%	2,346.3	2,332.4	2,271.3	2,230.0	2,157.2	2,091.1	2,036.0	1,979.1	1,915.0	1,849.0	1,780.8
Revenue Building Blocks												
Nominal Vanilla WACC		239.7	233.7	223.2	214.7	202.7	196.4	191.3	185.9	179.9	173.7	167.3
Return on Capital		101.7	101.1	98.4	96.6	93.5	90.6	88.2	85.8	83.0	80.1	77.2
- Return on Equity	6.50%	138.0	132.6	124.7	118.1	109.2	105.8	103.0	100.2	96.9	93.6	90.1
- Return on Debt												
Return of Capital (regulatory depreciation)		156.6	182.1	194.7	207.6	213.6	91.8	94.9	106.7	110.1	113.5	109.4
Opex		66.5	68.7	70.8	71.9	74.2	-	-	-	-	-	-
Revenue Adjustments		(2.7)	(1.7)	5.8	7.1	2.7	-	-	-	-	-	-
Tax Payable		18.6	35.3	49.7	50.4	51.1	8.5	11.5	23.2	24.7	26.7	52.4
Less Value of Imputation Credits	58.50%	(10.9)	(20.6)	(29.1)	(29.5)	(29.9)	(5.0)	(6.7)	(13.6)	(14.4)	(15.6)	(30.6)
Revenue Subtotal		467.9	497.4	515.1	522.3	514.4	291.7	291.0	302.3	300.3	298.3	298.5
Additional Tax Income calculations												
- Add Capital Contributions		7.2	7.4	7.5	7.7	7.9	-	-	-	-	-	-
- Deduct Non-tax Income Revenue Adjustments		-	-	-	-	-	-	-	-	-	-	-
Revenue For Tax Assessment Subtotal		475.1	504.8	522.6	530.0	522.3	291.7	291.0	302.3	300.3	298.3	298.5
Tax Expenses												
- Opex		66.5	68.7	70.8	71.9	74.2	-	-	-	-	-	-
- Tax Depreciation		171.1	187.6	155.6	164.9	165.9	157.5	149.6	124.8	121.2	115.8	33.8
- Interest		138.0	132.6	124.7	118.1	109.2	105.8	103.0	100.2	96.9	93.6	90.1
- Tax Expense Revenue Adjustments		(2.7)	(1.7)	5.8	7.1	2.7	-	-	-	-	-	-
Total Tax Expenses		373.0	387.2	357.0	362.0	352.0	263.4	252.7	224.9	218.1	209.4	123.9
Tax Calculation												
Corporate tax rate		0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Taxable Income		62.1	117.6	165.7	168.0	170.3	28.4	38.3	77.3	82.2	88.9	174.6
- Pre-tax Income		102.1	117.6	165.7	168.0	170.3	28.4	38.3	77.3	82.2	88.9	174.6
- Tax Loss Carried Forward		(40.0)	-	-	-	-	-	-	-	-	-	-
Tax Payable		18.6	35.3	49.7	50.4	51.1	8.5	11.5	23.2	24.7	26.7	52.4
Value of Imputation Credits	58.50%	(10.9)	(20.6)	(29.1)	(29.5)	(29.9)	(5.0)	(6.7)	(13.6)	(14.4)	(15.6)	(30.6)
(intermediate tax calculation)		18.6	35.3	49.7	50.4	51.1	8.5	11.5	23.2	24.7	26.7	52.4
Cash Flow Analysis Below This Line												
Net Present Values												
Capital Base (start period)	Project NPV Check	(8.0)	3,910.5	3,887.4	3,785.4	3,716.6	3,595.3	3,485.1	3,393.4	3,298.5	3,191.7	3,081.6
PV for Returns on and of Asset Only		4,237.6	386.3	415.8	417.9	422.4	416.2	288.2	286.2	292.6	290.0	287.2
PV for Capex Only		448.8	133.5	80.1	125.9	86.3	103.4	-	-	-	-	-
PV for End of Period Assets		121.8	-	-	-	-	-	-	-	-	-	-
Nominal Cash Flow Analysis												
Capital Expenditure		3,910.5	133.5	80.1	125.9	86.3	103.4	-	-	-	-	-
Interest Payments		-	138.0	132.6	124.7	118.1	109.2	105.8	103.0	100.2	96.9	93.6
Repayment of Debt		(2,346.3)	13.9	61.2	41.3	72.8	66.1	55.1	57.0	64.0	66.1	65.7
Analysis Including Revenue Adjustments												
Nominal Cash Flow to Equity Holders												
- Pre-tax	Te = 35.50%	7.88%	(1,564.2)	116.0	154.8	152.4	173.1	161.5	130.8	131.0	138.1	137.3
- Post-tax		4.96%	(1,564.2)	97.4	119.5	102.7	122.7	110.4	122.3	119.5	114.9	112.6
- Post-tax + Value of Imputation Credits		6.55%	(1,564.2)	108.3	140.2	131.8	152.2	140.3	127.3	126.2	128.4	125.5
Real Cash Flow to Equity												
- Pre-tax		5.06%	(1,564.2)	113.2	147.4	141.5	156.8	142.7	112.8	113.3	109.9	106.7
- Post-tax		2.40%	(1,564.2)	96.0	113.8	95.4	111.2	97.6	105.5	100.5	94.3	90.2
- Post-tax + Value of Imputation Credits		3.95%	(1,564.2)	105.6	133.4	122.4	137.9	124.0	109.8	106.2	105.4	101.7
Net Cash Flow to Debt												
Cash flow to debt before Tax calculation		5.21%	(2,346.3)	151.9	193.8	166.0	190.9	175.3	160.9	160.0	164.2	163.0
Deduction Utilised to Reduce Tax				138.0	132.6	124.7	118.1	109.2	105.8	103.0	100.2	96.9
Unutilised Deductions Carried Forward				-	-	-	-	-	-	-	-	-
Net Cash Flow to Debt		Td = 30.35%	3.63%	(2,346.3)	110.5	154.0	128.6	155.4	142.6	129.1	134.1	133.9
Nominal Cash Flows to Assets												
Cash flow to Asset		6.21%	(3,910.5)	267.9	348.6	318.4	364.0	336.8	291.7	291.0	302.3	298.3
Cash flow to Asset Post-tax		5.11%	(3,910.5)	249.2	313.4	268.7	313.6	285.7	283.2	279.5	279.1	271.6
Cash flow to Asset Real		3.62%	(3,910.5)	261.3	331.8	295.7	329.8	297.7	251.6	244.8	240.4	233.0
Cash flow to Asset Real Post-tax		2.54%	(3,910.5)	243.2	298.3	249.5	284.1	252.5	244.2	235.1	229.0	212.2
Check on Vanilla WACC Cash Flow (nom)		5.75%	(3,910.5)	260.1	334.0	297.8	343.1	315.6	286.2	286.2	292.6	287.2
Check on Vanilla WACC Cash Flow (real)		3.17%	(3,910.5)	253.8	317.9	276.5	310.8	278.9	248.5	240.8	240.2	224.4
Analysis Excluding Revenue Adjustments (check target WACC is met)												
Restatement of Figures Above												
Intermediate Tax Calculation (excluding revenue adjustments)		18.6	35.3	49.7	50.4	51.1	8.5	11.5	23.2	24.7	26.7	52.4
Imputation Credit Value (excluding revenue adjustments)		(10.9)	(20.6)	(29.1)	(29.5)	(29.9)	(5.0)	(6.7)	(13.6)	(14.4)	(15.6)	(30.6)
Revenue Subtotal (excluding revenue adjustments)		470.6	499.1	509.3	515.2	511.6	291.7	291.0	302.3	300.3	298.3	298.5
Taxable Income Before Loss Carried Forward (excluding revenue adjustments)		102.1	117.6	165.7	168.0	170.3	28.4	38.3	77.3	82.2	88.9	174.6
Taxable Income (excluding revenue adjustments)		62.1	117.6	165.7	168.0	170.3	28.4	38.3	77.3	82.2	88.9	174.6
Tax Payable (excluding revenue adjustments)		18.6	35.3	49.7	50.4	51.1	8.5	11.5	23.2	24.7	26.7	52.4
Tax Loss Carried Forward (excluding revenue adjustments)		(40.0)	-	-	-	-	-	-	-	-	-	-
Nominal Cash Flow to Equity Holders (excluding revenue adjustments)												
- Pre-tax	Te = 35.62%	7.63%	(1,564.2)	118.7	156.5	146.6	166.1	158.8	130.8	131.0	138.1	137.3
- Post-tax		4.91%	(1,564.2)	100.0	121.2	96.9	115.7	107.7	122.3	119.5	114.9	112.6
- Post-tax + Value of Imputation Credits		6.50%	(1,564.2)	110.9	141.9	126.0	145.1	137.6	127.3	126.2	128.4	125.5
Real Cash Flow to Equity (excluding revenue adjustments)												
- Pre-tax		5.01%	(1,564.2)	115.8	148.0	136.1	150.4	140.3	112.8	113.3	109.9	106.7
- Post-tax		2.38%	(1,564.2)	97.6	115.4	80.0	104.8	95.2	105.5	100.5	94.3	90.2
- Post-tax + Value of Imputation Credits		3.90%	(1,564.2)	108.2	135.0	117.0	131.5	121.6	109.8	106.2	105.4	101.7
Net Cash Flow to Debt (excluding revenue adjustments)												
Cash flow to Debt before Tax Calculation		5.21%	(2,346.3)	151.9	193.8	166.0	190.9	175.3	160.9	160.0	164.2	163.0
Deduction Utilised to Reduce Tax				138.0	132.6	124.7	118.1	109.2	105.8	103.0	100.2	96.9
Unutilised Deductions Carried Forward				-	-	-	-	-	-	-	-	-
Net Cash Flow to Debt		Td = 30.35%	3.63%	(2,346.3)	110.5	154.0	128.6	155.4	142.6	129.1	134.1	133.9
Nominal Cash Flows to Assets												
Cash Flow to Asset		6.19%	(3,910.5)	270.5	350.3	312.6	356.9	334.1	291.7	291.0	302.3	298.3

Figure 8 Analysis sheet—second screenshot

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
123		Cash Flow to Asset Post-tax			5.09%	(3,910.5)	252.0	308.7	261.9	306.5	283.1	283.7	279.3	278.9	275.5	271.5	246.8
124		Cash Flow to Asset Real			3.59%	(3,910.5)	266.0	325.6	288.6	322.4	294.8	250.9	244.6	247.9	240.3	232.9	228.2
125		Cash Flow to Asset Real Post-tax			2.53%	(3,910.5)	245.8	293.8	243.2	277.6	250.2	244.7	235.0	228.9	220.6	212.1	186.1
126		Check on Vanilla WACC Cash Flow (nom)			5.73%	(3,910.5)	264.1	328.2	290.5	335.3	312.6	288.0	286.0	292.5	289.9	287.1	277.6
127		Check on Vanilla WACC Cash Flow (real)			3.15%	(3,910.5)	257.6	312.4	269.8	303.8	276.3	248.3	240.6	240.0	232.1	224.3	211.6
128																	
129		Return on Equity - Individual Years															
130																	
131		Return on Equity															
132		Cash flow with Imputation				111.4	138.9	125.4	144.9	137.5	127.3	126.2	128.4	127.0	125.5	121.3	
133		Add back Capex				135.9	80.1	125.9	86.3	103.4	-	-	-	-	-	-	-
134		Less Nominal Depreciation of Capital Base				(160.3)	(174.7)	(192.9)	(206.5)	(212.8)	(91.0)	(94.1)	(105.9)	(109.3)	(112.6)	(109.5)	
135		Add Debt Repayment				14.6	56.8	40.2	72.1	65.6	54.6	56.5	63.5	65.6	67.6	65.7	
136		Gives Nominal Return to Equity				101.7	101.0	98.6	96.8	93.7	90.9	88.5	86.1	83.3	80.5	77.5	
137		Less Inflation in Equity Component				(39.1)	(38.9)	(37.9)	(37.2)	(36.0)	(34.9)	(34.0)	(33.1)	(32.0)	(30.9)	(29.8)	
138		Gives Real Return to Equity				62.6	62.2	60.7	59.6	57.7	55.9	54.5	53.0	51.3	49.5	47.7	
139		%ROE (1 year)				6.50%	6.50%	6.50%	6.50%	6.50%	6.50%	6.50%	6.50%	6.50%	6.50%	6.50%	
140		%real ROE (1 year)				3.90%	3.90%	3.90%	3.90%	3.90%	3.90%	3.90%	3.90%	3.90%	3.90%	3.90%	
141																	
142		Equity at Start of Period				1,564.2	1,554.4	1,516.6	1,489.8	1,441.8	1,398.0	1,361.6	1,323.9	1,281.6	1,237.9	1,192.8	
143																	
144		Return on Equity - Access Arrangement Period															
145																	
146		Revenue				-	475.1	490.9	507.5	514.1	511.1	-	-	-	-	-	-
147		Less Opex				-	(66.5)	(68.7)	(70.8)	(71.9)	(74.2)	-	-	-	-	-	-
148		Less Interest				-	(138.0)	(132.6)	(124.9)	(118.4)	(109.5)	-	-	-	-	-	-
149		Less Tax				-	(20.7)	(33.4)	(49.0)	(49.4)	(50.4)	-	-	-	-	-	-
150		Plus Imputation Credits				-	12.1	19.5	28.6	28.9	29.5	-	-	-	-	-	-
151		Less Capex				(3,910.5)	(135.9)	(80.1)	(125.9)	(86.3)	(103.4)	-	-	-	-	-	-
152		Less Loan Repayments				2,346.3	(14.6)	(56.8)	(40.2)	(72.1)	(65.6)	-	-	-	-	-	-
153		Capital Base Residual Value				-	-	-	-	-	1,398.0	-	-	-	-	-	-
154		Post-tax Return on Equity				(1,564.2)	111.4	138.9	125.4	144.9	1,535.5	-	-	-	-	-	-
155																	
156		IRR (during access arrangement period)					6.50%										
157		Target (during access arrangement period)					6.50%										
158																	
159																	
160		Summary for Generation of Graphs															
161		Return on Capital				239.7	233.6	223.5	215.2	203.2	197.0	191.9	186.6	180.6	174.4		
162		Opex				66.5	68.7	70.8	71.9	74.2	-	-	-	-	-	-	-
163		Revenue Adjustments				-	-	-	-	-	-	-	-	-	-	-	-
164		Return of Capital				160.3	174.7	192.9	206.5	212.8	91.0	94.1	105.9	109.3	112.6		
165		Net Tax Costs				8.6	13.9	20.3	20.5	20.9	3.0	4.8	9.6	10.2	11.0		
166		Building Block Total				475.1	490.9	507.5	514.1	511.1	291.0	290.8	302.1	300.1	298.1		
167																	
168		Revenue Forecasts in Absence of Corporate Tax				466.5	477.0	487.2	493.6	490.2	288.0	286.0	292.5	289.9	287.1		
169																	
170																	
171																	
172																	
173																	
174																	

2.6.1 Building block approach to deriving cash flows

Rules 75B(2)(a) and 76 of the NGR require the AER to apply the building block approach to assess the revenues required by a gas distribution service provider to recover the full cost of providing regulated reference services. This revenue requirement includes a commercial return on its investment.

The key building blocks are:

- the return on capital (row 23) comprising:
 - the post-tax return on equity (row 25)
 - the return on debt (or the interest payments incurred) required to service borrowings (row 26)
- the regulatory depreciation or return of capital (row 28)
- opex including ARS (row 30)
- revenue adjustments (row 32)
- net tax liabilities payable—the figure is net in the sense that it is the annual tax payable in relation to the gas distribution pipeline (row 34) less the value of imputation credits available to investing shareholders (row 35).

The costs are determined for each regulatory year of the next access arrangement period to derive the building block subtotal (row 37). There is an additional adjustment to reflect the

taxation implications of additional revenues from capital contributions (row 40) and revenue adjustments for non-tax income revenue adjustments (row 41). Because the costs can fluctuate from year to year, the total revenue (which includes the additional revenue adjustments) is smoothed over the next access arrangement period to give the forecast revenue (see section 2.7).

As a result of the PTRM's particular timing assumptions, i.e. all cash flows with the exception of capex are assumed to occur at the end of each regulatory year, there is no need to include an allowance for working capital in the modelling.³³

2.6.2 Taxation and related costs and benefits

Tax is payable on revenue less tax costs recognised by the ATO. Tax-deductible costs include interest or debt servicing, tax depreciation, opex and tax expense revenue adjustments (rows 46 to 49).

Spreadsheet calculations

Tax payable in relation to the gas distribution pipeline for each regulatory year is calculated in rows 40 to 57, in four steps:

1. Pre-tax income (row 55) is calculated as the revenue subtotal plus capital contributions (row 40) less non-tax income revenue adjustments (row 41) less total tax expenses (row 50).
2. Tax loss carried forward is calculated (row 56).
3. Taxable income (row 54) is then the sum of the above.
4. Tax payable (row 56) is calculated by multiplying the taxable income with the corporate tax rate (row 52).

The tax expenses (rows 46 to 49) used in calculating the pre-tax income for the regulatory year are the same as those in the building blocks (rows 26 to 32) with the exception of depreciation and revenue adjustments. In the case of the revenue building blocks, regulatory depreciation (row 28) is calculated based on the economic life of the asset (see rows 115 to 765 and 771 to 773 of the **Assets** sheet). Tax depreciation is generally based on a much shorter tax life or calculated in a different way (see rows 779 to 1429 of the **Assets** sheet). For revenue adjustments, the tax implications of each individual adjustment are set out on the **PTRM input** sheet (section 2.3.8). Those revenue adjustments which are treated as a non-tax income will be removed from pre-tax income (row 41). Similarly, those revenue adjustments which are treated as a tax expense will reduce pre-tax income (row 49). Where the revenue adjustments are included as both tax income and tax expense, the two effects will cancel out.

The tax payable is recognised as a building block cost and added to the revenue building blocks (row 34). Offsetting this tax cost is the benefit shareholders receive from imputation

³³ The timing of the capex cash flow is assumed to be mid-year.

credits (gamma). This offsetting benefit is equal to gamma multiplied by the tax payable and is recorded in rows 35 and 58.

2.6.3 Cash flow analysis

Calculations in the cash flow analysis section provide a comprehensive check on the validity of revenue decisions to ensure that the outcomes are consistent with the assumptions forming the basis of the building block approach. The **Analysis** sheet is designed to check the desired rate of return on equity that can be expected from the regulated revenue stream.

Net present values

The total returns on and of capital (comprising the capital base and capex) is calculated in row 65. The present value (PV) for these cash flows at the start of the first regulatory year of the next access arrangement period is calculated in cell F65. The PV for capex is calculated in cell F66 and the PV of the end of period assets is calculated in cell F67. The sum of the PV of the returns on and of the capital base and capex, less the residual value of assets is calculated in cell F64. This projected net present value (NPV) for the capital base check cell should be equal to zero, which indicates that the asset is receiving the correct returns.

Rows 74 to 127 set out cash flow analysis including (rows 77 to 95) and excluding (rows 99 to 127) revenue adjustments. Cash flow analysis excluding revenue adjustments allows the user to ensure that the target rate of return is being met. Cash flow analysis including revenue adjustments can be used to identify the incremental effects of revenue adjustments, which will cause the return on equity outcome to differ from the base return on equity. To enable the analysis excluding revenue adjustments, several cash flows terms must be restated, including the tax payable calculation. This takes place in rows 99 to 106. Aside from the different base data (including or excluding revenue adjustments), the mechanics of the calculations in each section are identical, and so they are discussed together.

Net cash flows available to equity holders

Net nominal pre-tax cash flows to equity holders (row 77 and row 109) are represented by nominal revenues less:

- opex
- capex
- interest payments
- any repayment of debt in the period.

Net nominal post-tax cash flow to equity holders (row 78 and 110) is obtained by further deducting the tax expense of the business. Rows 79 and 111 add back the value of imputation credits to calculate the net post-tax benefits available to equity holders in a period.

The internal rate of return (IRR) of the net cash flows over the life of the assets is calculated in column E. The key IRR is the net post-tax returns to equity holders inclusive of imputation

credits (r_e). The determined r_e should be validated by the estimated cash flows (rows 79 and 111).

The corresponding real cash flows and the respective IRRs are calculated in rows 81 to 83 and 113 to 115.

The difference in the IRR applying to pre-tax and post-tax cash flows to equity allows the effective rate of tax ($T_e = 1 - r_{\text{post}}/r_{\text{pre}}$) to be calculated (cells D77 and D109). This can then be used as an input to the formula-based WACC calculations.

It is important to note that the formula-based WACC calculations will only provide an approximation of the actual WACC outcomes implied by the cash flow calculations. In practice, T_e is generally below the corporate tax rate for assets that can be depreciated at a faster rate for tax purposes.

Net cash flows necessary to service debt and the effective debt shield

The cost of debt is reduced by the value of the 'debt shield' (rows 86 and 118) in calculating tax liabilities. Where the interest expense in a regulatory year reduces taxable income by a corresponding amount, the net cost of debt for investors is reduced by the corporate tax rate.

However, where the taxable income is so low that the full interest deduction is not required to reduce tax liabilities to zero, the value of the debt shield benefit is deferred to the following regulatory year. This effect is analysed in rows 86 to 88 and rows 118 to 120. That part of interest expense used to defer tax is calculated in each regulatory year (rows 86 and 118) and the unused part carried forward is embodied in the tax loss carried forward calculation (rows 87 and 119). This allows the net cost to the firm of paying debt holders, after taking account of the tax concession, to be calculated.

The IRR calculation (cells E88 and E120) represents the effective cost of debt, which is generally well below the nominal cost of debt based on the current interest rates.

Nominal cash flows to assets and calculation of WACC estimates

The cash flows to the different sources of capital (debt and equity) have been presented above, but the cash flows to the assets as a whole are of interest since these aggregate numbers characterise the nature of the regulated business.

The IRRs from these cash flows are the WACC estimates expected from the application of the regulatory framework and have greater validity than any formula based approximations. The cash flow calculations from the section excluding revenue adjustments are then reported on the **WACC** sheet. These are the relevant IRRs for comparison against the formula-based approximations derived from the return on equity and return on debt inputs. It should be noted that the WACC outcomes are calculated for reporting purposes only. They are not required for setting revenues since the modelling already provides the requisite revenue forecasts.

Return on equity analysis

The next two sections demonstrate that the desired return on equity is being achieved in each year of the access arrangement period, and across the access arrangement period as a whole. In accordance with this aim, they use the cash flows after removal of revenue adjustments. In essence they expand on the calculations presented in row 111.

The first section (rows 131 to 140) demonstrates the return to equity holders on an annual basis. The second section (rows 146 to 157) demonstrates the return to equity holders across the entire access arrangement period.

Summary for generation of graphs

Rows 161 to 166 provide a summary table presenting total revenue components in accordance with the categories listed in the NGR.³⁴ These values are referred to in the **Chart 3–Building blocks** sheet.

2.7 Forecast revenues sheet

The **Forecast revenues** sheet is relevant to the calculation of X factors under the tariff cap variation mechanism. Prices are sourced from the **PTRM input** sheet and escalated by the forecast inflation rate and X factors from the **X factors** sheet to derive notional prices for each year of the access arrangement period.³⁵ These prices are multiplied by the forecast quantity data from the **PTRM input** sheet to derive a notional forecast smoothed revenue amount in row 7, which is intended to equal (in NPV terms) the building block requirement in the **X factors** sheet.

The calculations in this sheet are automated and do not require inputs. The display of forecast quantities and revenues has been split into two sections—years 1 to 5, and years 6 to 10. The grouping controls can be used to hide all columns relating to years 6 to 10 (for instance, if the access arrangement period is only 5 years long). This sheet is, however, based on a generic tariff structure and may require amendment by each user to suit its own tariff schedules. Those using the PTRM for tariff variation mechanisms other than a tariff cap will not be required to use the **Forecast revenues** sheet. Pricing data in this sheet need not be the same as the annual tariff proposal as tariff structures can change, and demand forecasts revised, annually.

Figure 9 provides an example of the **Forecast revenues** sheet.

³⁴ NGR, r. 76.

³⁵ If 't' is selected as the base year for tariffs (section 2.3.18), then year 1 tariffs are sourced from the **PTRM input** sheet, and year 2 tariffs onwards are calculated using the inflation rate and X factors.

Figure 9 Forecast revenues sheet

Year	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30
Aus Gas - Forecast Revenues - DNSP PTRM - version 1											
Total Forecast Revenues (\$ Nominal)											
Total Revenue	\$ -	\$ 980,225,160	\$ 1,252,133,867	\$ 1,276,637,268	\$ 1,300,119,867	\$ 1,323,663,157	\$ 1,222,708,606	\$ 1,252,362,342	\$ 1,280,081,459	\$ 1,300,867,605	\$ 1,332,722,473
Ancillary Reference Services (ARS)	\$ -	\$ 1,025,000	\$ 1,575,938	\$ 2,153,781	\$ 1,655,719	\$ 2,262,816	\$ -	\$ -	\$ -	\$ -	\$ -
Total Revenue	\$ -	\$ 981,250,160	\$ 1,267,809,804	\$ 1,299,791,049	\$ 1,317,775,586	\$ 1,349,925,973	\$ 1,222,708,606	\$ 1,252,362,342	\$ 1,280,081,459	\$ 1,300,867,605	\$ 1,332,722,473
Forecast Sales Quantities											
Quantities											
Year	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	
Residential A	0	408,000	416,160	424,483	432,973	441,632	450,465	459,474	468,664	478,037	487,598
Residential B	0	102,000	104,040	106,121	108,243	110,408	112,616	114,869	117,166	119,509	121,899
Residential C	0	102,000	104,040	106,121	108,243	110,408	112,616	114,869	117,166	119,509	121,899
Small Business A	0	20,400	20,808	21,224	21,649	22,082	22,523	22,974	23,433	23,902	24,380
Small Business B	0	20,400	20,808	21,224	21,649	22,082	22,523	22,974	23,433	23,902	24,380
Small Business C	0	20,400	20,808	21,224	21,649	22,082	22,523	22,974	23,433	23,902	24,380
Large Business A	0	10,200	10,404	10,612	10,824	11,041	11,262	11,487	11,717	11,951	12,190
Large Business B	0	10,200	10,404	10,612	10,824	11,041	11,262	11,487	11,717	11,951	12,190
Large Business C	0	10,200	10,404	10,612	10,824	11,041	11,262	11,487	11,717	11,951	12,190
Total	0	703,800	717,876	732,234	746,878	761,816	777,052	792,593	808,445	824,614	841,106
Forecast Prices											
Prices											
Year	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	
Residential A	\$0.00	\$250.00	\$315.50	\$317.00	\$318.00	\$320.00	\$322.00	\$323.00	\$325.00	\$327.00	\$328.00
Residential B	\$0.00	\$250.00	\$315.50	\$317.00	\$318.00	\$320.00	\$322.00	\$323.00	\$325.00	\$327.00	\$328.00
Residential C	\$0.00	\$250.00	\$315.50	\$317.00	\$318.00	\$320.00	\$322.00	\$323.00	\$325.00	\$327.00	\$328.00
Small Business A	\$0.00	\$500.00	\$633.00	\$633.00	\$637.00	\$640.00	\$643.00	\$647.00	\$650.00	\$653.00	\$657.00
Small Business B	\$0.00	\$500.00	\$633.00	\$633.00	\$637.00	\$640.00	\$643.00	\$647.00	\$650.00	\$653.00	\$657.00
Small Business C	\$0.00	\$500.00	\$633.00	\$633.00	\$637.00	\$640.00	\$643.00	\$647.00	\$650.00	\$653.00	\$657.00
Large Business A	\$0.00	\$1,000.00	\$1,266.00	\$1,266.00	\$1,273.00	\$1,280.00	\$1,287.00	\$1,293.00	\$1,300.00	\$1,307.00	\$1,314.00
Large Business B	\$0.00	\$1,000.00	\$1,266.00	\$1,266.00	\$1,273.00	\$1,280.00	\$1,287.00	\$1,293.00	\$1,300.00	\$1,307.00	\$1,314.00
Large Business C	\$0.00	\$1,000.00	\$1,266.00	\$1,266.00	\$1,273.00	\$1,280.00	\$1,287.00	\$1,293.00	\$1,300.00	\$1,307.00	\$1,314.00
Total	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Forecast Revenues (\$ Nominal)											
Revenues											
Year	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	
Residential A	\$0	\$102,000,000	\$131,107,561	\$133,440,041	\$137,760,955	\$141,130,517	\$144,898,945	\$148,856,466	\$152,933,308	\$157,139,710	\$161,476,912
Residential B	\$0	\$25,500,000	\$3,276,890	\$3,360,010	\$3,445,239	\$3,532,629	\$3,622,236	\$3,714,116	\$3,808,327	\$3,904,927	\$4,003,978
Residential C	\$0	\$25,500,000	\$3,276,890	\$3,360,010	\$3,445,239	\$3,532,629	\$3,622,236	\$3,714,116	\$3,808,327	\$3,904,927	\$4,003,978
Small Business A	\$0	\$10,200,000	\$1,310,756	\$1,344,004	\$1,378,096	\$1,413,052	\$1,448,895	\$1,485,647	\$1,523,331	\$1,561,971	\$1,601,591
Small Business B	\$0	\$10,200,000	\$1,310,756	\$1,344,004	\$1,378,096	\$1,413,052	\$1,448,895	\$1,485,647	\$1,523,331	\$1,561,971	\$1,601,591
Small Business C	\$0	\$10,200,000	\$1,310,756	\$1,344,004	\$1,378,096	\$1,413,052	\$1,448,895	\$1,485,647	\$1,523,331	\$1,561,971	\$1,601,591
Large Business A	\$0	\$10,200,000	\$1,310,756	\$1,344,004	\$1,378,096	\$1,413,052	\$1,448,895	\$1,485,647	\$1,523,331	\$1,561,971	\$1,601,591
Large Business B	\$0	\$10,200,000	\$1,310,756	\$1,344,004	\$1,378,096	\$1,413,052	\$1,448,895	\$1,485,647	\$1,523,331	\$1,561,971	\$1,601,591
Large Business C	\$0	\$10,200,000	\$1,310,756	\$1,344,004	\$1,378,096	\$1,413,052	\$1,448,895	\$1,485,647	\$1,523,331	\$1,561,971	\$1,601,591
Total	\$0	\$214,200,000	\$275,257,877	\$282,224,087	\$288,940,006	\$296,674,086	\$304,426,786	\$312,198,578	\$319,989,947	\$327,801,390	\$335,633,416

2.8 X factors sheet

The **X factors** sheet reflects the requirements of rules 92 and 97 regarding the equalisation of revenues, namely that a mechanism must be included to ensure that the total and forecast revenue for reference services are equal in NPV terms. To do so, the PTRM implements a CPI-X methodology.

X factors must be included in the PTRM for the access arrangement period in accordance with rule 72(1)(k) of the NGR. The AER will assess this in accordance with the provisions listed above, but may also consider other relevant factors such as price stability,³⁶ cash-flow adequacy and longer term pricing goals.

The PTRM provides for X factor calculations (usually called 'smoothing') under three basic tariff variation mechanisms, namely a tariff cap, revenue cap and revenue yield cap. Through these calculations, the X factor is simply a price or revenue adjustment mechanism. It does not relate to actual productivity improvements in the operations of a business. However, this does not mean that the AER ignores productivity improvements when assessing a business's building block proposal. Instead, the AER includes any expectation of productivity gains directly into the forecasts of costs.

When smoothing across the access arrangement period, it is necessary to iteratively update equity raising costs as well. This is because the estimate of equity raising costs is dependent on the smoothed revenue profile, but in turn the smoothed revenue is dependent on the estimate of equity raising costs. Hence, there are a number of macros built into the PTRM which jointly smooth revenues while iteratively updating equity raising costs. It is possible to stop the automatic updating of equity raising costs using the drop down menu in cell H16.

Across each of the three tariff variation mechanisms (tariff cap, revenue cap or revenue yield cap) there are two basic types of smoothing operation:

- Select the 'Apply default smoothing' button that changes all X factors. This default path first entails setting the forecast revenue (calculated using the relevant tariff variation mechanism) for the first year equal to the total revenue for that year (this will show as a change to the X factor in year 1, sometimes referred to as P0). Next, the macro calculates the single (constant) X factor which can be applied to all remaining years of the next access arrangement period so that the NPVs of smoothed and unsmoothed revenues across the entire period are equal. Equity raising costs will be updated as well.
- Alternatively, it might be necessary (including during the annual debt update) to adjust the X factor for a specific year only. This type of smoothing changes just one X factor so that the NPVs of smoothed revenue and unsmoothed revenue across the access arrangement period are equal.

³⁶ This may include ensuring the value of forecast revenue and the total revenue in the final regulatory year of the access arrangement period is as close as reasonably possible. The AER in its regulatory decisions has considered a divergence of up to 3 per cent between the smoothed revenue and unsmoothed revenue for the final year of the access arrangement period to be reasonable if this can achieve smoother price changes for customers across multiple access arrangement periods.

In both cases, equity raising costs will be iteratively updated while smoothing (unless this default option is turned off, as noted above).

The WACC (row 7), values of forecast inflation rates (row 10) and building block total revenue (rows 30 to 37) are sourced from other sections of the model and are used for the calculations in all three tariff variation mechanisms. All NPV calculations in this sheet reflect the time varying WACC (row 7) which arises as a result of the return on debt varying each year. The cumulative discount rate is calculated in row 8. When the return on debt is updated within the access arrangement period, these discount rates will change as a result, and so too will the NPV of the total revenue and forecast revenue.³⁷

The process for annually updating the return on debt is described further in section 3. There is a drop down menu in cell F21 which allows the user to input the year of the annual return on debt update. This drop down menu will not affect underlying calculations, but instead drives the presentation of content-sensitive help in this sheet (and in the **PTRM Input** sheet). Rows 23 to 26, 53, 54, 69 and 89, will display caution notes/guidance based on logical tests of the PTRM.

Gas distribution service providers may also earn revenue from providing ARS, which are inputs into a number of calculations in the PTRM, including the setting of tariffs and calculation of equity raising costs. However, the PTRM removes these revenues from the total revenue prior to the smoothing process (rows 35 to 37). This is because ARS costs are typically recovered from specific customers and so this revenue stream does not need to be included in total revenue for smoothing purposes.

X factors under a price cap

Under the tariff cap variation mechanism, row 49 provides the inputs for the profile of X factors. These are used along with the expected inflation rate to escalate prices in the **Forecast revenues** sheet and derive the nominal smoothed revenues which are listed in row 46. Revenue can be smoothed using the buttons at rows 51 to 52, either by applying the default smoothing approach (changing all X factors as described above) or changing a single specific year's X factor. Smoothing operations will equate the NPV of the smoothed revenue (cell R46) and the NPV of the unsmoothed revenue (cell R41).

The difference between the values of the unsmoothed revenue and smoothed revenue for the final year of the access arrangement period is listed in cells R43 (nominal dollars) and R44 (percentage of unsmoothed revenue).

X factors under a revenue cap

Under the revenue cap tariff variation mechanism, row 65 provides the inputs for the profile of X factors. These are used, along with the expected inflation rate, to derive the nominal smoothed revenue for each regulatory year of the access arrangement period in row 62. The value of the forecast revenue is escalated directly by CPI-X. Revenue can be smoothed

³⁷ This is not the only change that flows from a change to the return on debt—the return on capital and return of capital building blocks will change, and therefore so will the tax building block.

Figure 11 X factors sheet–second screenshot

	D	E	F	G	H	I	J	K	Q	R	S	T	U	
55	Revenue Cap Calculation (\$m, Nominal)													
56	Unsmoothed - Total Revenue	468.28	466.87	495.85	512.95	520.63	512.10			\$2,108.93	NPV (unsmoothed)			
58				9.48	First year difference (\$m)						15.80	Final year difference (\$m)		
59				2.0%	First year difference (%)						3.1%	Final year difference (%)		
61	Smoothed - Forecast Revenue	468.28	476.35	488.74	501.46	514.51	527.90			\$2,108.93	NPV (smoothed)			
63	X Factors		P_0	X_02	X_03	X_04	X_05							
64	positive P0, X imply real decrease in price/ revenue constraint		0.76%	-0.10%	-0.10%	-0.10%	-0.10%			\$0.00	NPV difference (smoothed vs unsmoothed)			
65														
66	Apply default smoothing (revenue cap)		Set P0 (rev cap)	Set X2 (rev cap)	Set X3 (rev cap)	Set X4 (rev cap)	Set X5 (rev cap)							
67														
68														
69														
70														
71	Revenue Yield/Average Revenue Cap Calculation (\$m, Nominal)													
72	Unsmoothed - Total Revenue	37.23	466.87	495.85	512.95	520.63	512.10			\$2,108.93	NPV (unsmoothed)			
73				-428.23	First year difference (\$m)						-467.24	Final year difference (\$m)		
74				-91.7%	First year difference (%)						-91.2%	Final year difference (%)		
75	Forecast Energy Throughput (GJ)	82,000	83,022	84,066	85,132	86,221	87,332							
76	Revenue Yield (\$/GJ)	453.97	465.32	476.95	488.88	501.10	513.63							
77	Smoothed - Forecast Revenue	37.23	38.63	40.10	41.62	43.20	44.86			\$174.95	NPV (smoothed)			
78	X Factors		P_0	X_02	X_03	X_04	X_05							
79	positive P0, X imply real decrease in price/ revenue constraint									(\$1,933.98)	NPV difference (smoothed vs unsmoothed)			
80														
81	Apply default smoothing (revenue yield)		Set P0 (rev yield)	Set X2 (rev yield)	Set X3 (rev yield)	Set X4 (rev yield)	Set X5 (rev yield)							
82														
83														
84														
85														
86														
87														
88														

2.9 Revenue summary sheet

The **Revenue summary** sheet outlines the following:

- rows 7 to 13 display the building blocks in nominal dollar terms
- rows 17 to 27 display a summary of smoothed revenue amounts in nominal dollar terms and X factors for the three tariff variation mechanisms
- rows 31 to 37 display the building blocks in real dollar terms (start of year one)
- rows 41 to 51 display a summary of smoothed revenue amounts in real dollar terms (start of year one) and X factors for the three tariff variation mechanisms.

The price path analysis section presents summary values for the forecast price path, which in broad terms is the smoothed revenue divided by forecast demand:

- rows 55 and 83 display the forecast energy (demand) for the access arrangement period
- rows 57 to 79 use the smoothed revenues for the three tariff variation mechanisms to calculate indicative revenue, price paths and price indices in nominal dollar terms
- rows 85 to 107 use the smoothed revenues for the three tariff variation mechanisms and calculate indicative revenue, price paths and price indices in real dollar terms (start of year one).

The price path analysis differs slightly based on the tariff variation mechanism:

- Under a tariff cap, the smoothed revenue in each year reflects the tariff breakdown (forecast quantities x prices) sourced from the **Forecast revenues** sheet. The starting

point for the tariff cap price path is an indicative price calculated as the final year estimated revenue divided by forecast total energy demand.³⁸ To calculate the price path, this starting value is escalated each year of the access arrangement period using the CPI-X pricing formula. Hence, the X factors will align with the real change in this price path (row 90).

- Under a revenue cap, the smoothed revenue is directly targeted by the tariff variation mechanism and so the X factors will align with the real change in revenue (row 95). The smoothed revenue is divided by forecast total energy demand to produce the indicative price path. This also provides an indication of the extent to which the revenue cap will adjust prices in response to changes in (forecast) demand.
- Under a revenue yield cap, the revenue yield is directly targeted by the tariff variation mechanism and so the X factors will align with the real change in the price path (row 106). Hence, the price path is not just illustrative in this case, and is used to then derive the forecast revenue (reversing the operation undertaken in the two other tariff variation mechanisms).

Under each tariff variation mechanism, calculations show the percentage change year-on-year (in both nominal and real terms) and the average yearly change across the access arrangement period.³⁹

Figure 12 provides an example of the **Revenue summary** sheet.

³⁸ This preserves comparability with the other two tariff variation mechanisms.

³⁹ The average yearly change is calculated as the geometric mean (not the arithmetic mean), and therefore reflects the cumulative impact of year-on-year percentage changes across the access arrangement period. In other words, the value shown in column S (where labelled 'Average yearly change') is the percentage change that, if applied to every year in the access arrangement period, would arrive at the total cumulative change across the period.

Figure 12 Revenue summary sheet

#	AE	C	D	E	F	G	H	I	J	K	Q	R	S	T	U
2			Aus Gas - Revenue and Price Summary - DNSP PTRM - version 1												
4			Year	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	Total					
5			Building Block Components (\$m Nominal)												
7			Return on Capital		239.68	233.71	223.15	214.75	202.66	1,113.96					
8			Return of Capital (regulatory depreciation)		156.62	182.10	194.70	207.61	213.58	954.62					
9			Operating Expenditure		66.52	68.65	70.81	71.94	74.20	352.13					
10			Revenue Adjustments		2.67	1.68	5.82	7.06	2.72	11.25					
11			Net Tax Allowance		7.73	14.64	20.63	20.92	21.20	85.12					
12			Less: Ancillary Reference Services		1.03	1.58	2.15	1.66	2.26	8.67					
13			Total Revenue (unsmoothed)	468.28	466.87	495.85	512.95	520.63	512.10	2,508.39		2,108.93		NPV	
15			Revenue Smoothing (\$m Nominal)												
17			Tariff Cap												
18			Forecast Revenue (smoothed)	468.28	476.07	489.26	501.65	514.41	527.55	2,508.93		2,108.93		NPV	
19			X factors		5.24%	1.11%	1.35%	1.35%	1.35%						
21			Revenue Cap												
22			Forecast Revenue (smoothed)	468.28	476.35	488.74	501.46	514.51	527.90	2,508.97		2,108.93		NPV	
23			X factors		0.76%	-0.10%	-0.10%	-0.10%	-0.10%						
25			Revenue Yield												
26			Forecast Revenue (smoothed)	468.28	38.63	40.10	41.62	43.20	44.86	208.41		174.95		NPV	
27			X factors		0.00%	0.00%	0.00%	0.00%	0.00%						
29			Building Block Components (\$m Real 2019-20)												
31			Return on Capital		233.83	222.45	207.22	194.55	179.12	1,037.18					
32			Return of Capital (regulatory depreciation)		152.80	173.33	180.80	188.08	188.78	883.79					
33			Operating Expenditure		64.90	65.34	65.75	65.18	65.58	326.76					
34			Revenue Adjustments		2.60	1.60	5.40	6.40	2.40	10.00					
35			Net Tax Allowance		7.54	13.93	19.16	18.95	18.74	78.32					
36			Less: Ancillary Reference Services		1.00	1.50	2.00	1.50	2.00	8.00					
37			Total Revenue (unsmoothed)	468.28	455.48	471.95	476.33	471.66	452.62	2,328.04					
39			Revenue Smoothing (\$m Real 2019-20)												
41			Tariff Cap												
42			Forecast Revenue (smoothed)	468.28	464.45	465.88	465.83	466.03	466.27	2,328.28					
43			X factors		5.24%	1.11%	1.35%	1.35%	1.35%						
45			Revenue Cap												
46			Forecast Revenue (smoothed)	468.28	464.73	465.19	465.66	466.12	466.59	2,328.30					
47			X factors		0.76%	-0.10%	-0.10%	-0.10%	-0.10%						
49			Revenue Yield												
50			Forecast Revenue (smoothed)	468.28	37.69	38.16	38.65	39.14	39.65	193.29					
51			X factors		0.00%	0.00%	0.00%	0.00%	0.00%						
53			Price Path Analysis (\$ Nominal)												
54			Forecast Energy	TJ	82	83	84	85	86	87					
57			Tariff Cap												
58			Forecast Revenue	\$m Nominal	483.43	476.07	489.26	501.65	514.41	527.55	9.13%		Total cumulative change		
59			Annual Percentage Impact on Revenues	%		-1.52%	2.77%	2.53%	2.54%	2.55%	1.76%		Average yearly change		
61			Price Path	\$/GJ	5,895.48	5,726.50	5,804.36	5,869.15	5,934.66	6,000.91	1.79%		Total cumulative change		
62			Annual Percentage Impact on Prices	%		-2.87%	1.36%	1.12%	1.12%	1.12%	0.36%		Average yearly change		
63			Price Path Index		1.00	0.97	0.98	1.00	1.01	1.02					
65			Revenue Cap												
66			Forecast Revenue	\$m Nominal	468.28	476.35	488.74	501.46	514.51	527.90	12.73%		Total cumulative change		
67			Annual Percentage Impact on Revenues	%		1.72%	2.60%	2.60%	2.60%	2.60%	2.43%		Average yearly change		
69			Price Path	\$/GJ	5,710.73	5,737.60	5,813.83	5,890.44	5,967.42	6,044.78	5.85%		Total cumulative change		
70			Annual Percentage Impact on Prices	%		0.47%	1.33%	1.32%	1.31%	1.30%	1.14%		Average yearly change		
71			Price Path Index		1.00	1.02	1.04	1.07	1.10	1.13					
73			Revenue Yield												
74			Forecast Revenue	\$m Nominal	37.23	38.63	40.10	41.62	43.20	44.86	20.50%		Total cumulative change		
75			Annual Percentage Impact on Revenues	%		3.78%	3.79%	3.80%	3.81%	3.82%	3.80%		Average yearly change		
77			Price Path	\$/GJ	453.97	465.32	476.95	488.88	501.10	513.63	13.14%		Total cumulative change		
78			Annual Percentage Impact on Prices	%		2.50%	2.50%	2.50%	2.50%	2.50%	2.50%		Average yearly change		
79			Price Path Index		1.00	1.03	1.05	1.08	1.10	1.13					
81			Price Path Analysis (\$ Real 2019-20)												
82			Forecast Energy	TJ	82	83	84	85	86	87					
85			Tariff Cap												
86			Forecast Revenue	\$m Real	483.43	464.45	465.88	465.83	466.03	466.27	-3.55%		Total cumulative change		
87			Annual Percentage Impact on Revenues	%		-3.93%	0.28%	0.03%	0.04%	0.05%	-0.72%		Average yearly change		
89			Price Path	\$/GJ	5,895.48	5,586.83	5,524.67	5,450.09	5,376.51	5,303.93	-10.03%		Total cumulative change		
90			Annual Percentage Impact on Prices	%		-5.24%	-1.11%	-1.15%	-1.35%	-1.35%	-2.09%		Average yearly change		
91			Price Path Index		1.00	0.95	0.94	0.92	0.91	0.90					
93			Revenue Cap												
94			Forecast Revenue	\$m Real	468.28	464.73	465.19	465.66	466.12	466.59	-0.36%		Total cumulative change		
95			Annual Percentage Impact on Revenues	%		-0.76%	0.10%	0.10%	0.10%	0.10%	-0.07%		Average yearly change		
97			Price Path	\$/GJ	5,710.73	5,597.66	5,533.68	5,469.86	5,406.19	5,342.70	-6.44%		Total cumulative change		
98			Annual Percentage Impact on Prices	%		-1.98%	-1.14%	-1.15%	-1.16%	-1.17%	-1.32%		Average yearly change		
99			Price Path Index		1.00	0.99	0.99	0.99	1.00	1.00					
101			Revenue Yield												
102			Forecast Revenue	\$m Real	37.23	37.69	38.16	38.65	39.14	39.65	6.50%		Total cumulative change		
103			Annual Percentage Impact on Revenues	%		1.25%	1.26%	1.27%	1.28%	1.29%	1.27%		Average yearly change		
105			Price Path	\$/GJ	453.97	453.97	453.97	453.97	453.97	453.97	0.00%		Total cumulative change		
106			Annual Percentage Impact on Prices	%		0.00%	0.00%	0.00%	0.00%	0.00%	0.00%		Average yearly change		
107			Price Path Index		1.00	1.00	1.00	1.00	1.00	1.00					

2.10 Equity raising costs sheet

In raising new equity capital a business may incur costs such as legal fees, brokerage fees, marketing costs and other transaction costs. These are upfront expenses, with little or no ongoing costs over the life of the equity. While the majority of the equity a firm will raise is typically obtained at its inception, there may be points in the life of a firm—for example, during significant capital expansions—where it chooses additional external equity funding (instead of debt or internal funding) as a source of capital, and accordingly may incur equity raising costs.

The benchmark cash flow analysis applied by the AER to determine the extent to which equity raising associated with capex is required has been discussed in detail in previous gas decisions.⁴⁰ Broadly, the analysis uses the PTRM cash flows to calculate the amount of retained earnings (taking account of cash flows such as revenue, opex, interest payments, tax payment dividends, and dividend reinvestment plans). The amount of retained earnings is deducted from the equity component of forecast capex (while maintaining the benchmark level of gearing) to determine any external equity requirement. The **Equity raising costs** sheet sets out the benchmark cash flow analysis.

The opening capital base and capex values (rows 7 and 8) are sourced from the **Assets** sheet. Based on this information the capex rate is calculated and displayed in row 9. The capex rate indicates the proportion of the capex relative to the opening capital base but does not affect the calculation of equity raising costs by itself.

The tax payable values (row 13) are sourced from the **Analysis** sheet and are used in combination with parameters (such as the corporate tax rate and imputation credit payout ratio) from the **PTRM input** sheet to calculate the dividends payable (row 14). A proportion of dividends that are paid out to investors are assumed to be reinvested in the business. The amount of dividends reinvested by investors is displayed at row 15 and is used in the benchmark cash flow analysis to determine retained cash flows.

The drop down menu in row 19 allows the selection of the tariff variation mechanism so that the smoothed revenue cash flows are sourced from the correct section of the **X factors** sheet. This drop down menu may be automatically updated when running a smoothing macro using the buttons in the **X factors** sheet. If the drop down option to 'update ERC when smoothing (default)' in the **X factors** sheet (cell H16) is selected, then running a smoothing macro will set the drop down menu in the **Equity raising costs** sheet (cell G19) to the relevant tariff variation mechanism (based on which smoothing button was pressed).⁴¹

The benchmark cash flow analysis set out in rows 21 to 36 are undertaken in nominal dollar terms and is used to determine the equity raising costs as follows:

⁴⁰ AER, *Final decision, Jemena Gas Networks access arrangement 2010–15*, June 2010, pp. 88–91.

⁴¹ If the drop down menu to 'do NOT update ERC when smoothing' (**X factors** sheet, cell H16) is selected, then running a smoothing button will not change the equity raising cost tariff variation mechanism (**Equity raising cost** sheet, cell G19). This means that the tariff variation mechanism used to smooth the X factors and the tariff variation mechanism used to iteratively determine equity raising cost may not align.

- The revenues (row 21) sourced from the **X factors** sheet, inclusive of ARS and less expenses such as opex, interest payments, tax payable and other revenue adjustments (rows 22 to 25) sourced from the **Analysis** sheet provides the internal cash flow (row 26).
- The internal cash flow less dividends paid out to shareholders (row 27) provides the retained cash flow (row 28).
- The capex funding requirement (row 32) is sourced from row 8, adjusted to remove the gross-up for the WACC provided in the PTRM to account for the assumed timing of the incurrence of capex, which is not relevant for financing purposes. The debt component (row 33) represents the increase in debt funding and is sourced from the **Analysis** sheet, whereby to maintain the benchmark level of gearing, the level of debt must equal 60 per cent of the capital base rather than capex. The residual of capex funding requirement less the increase in debt funding gives the equity component (row 34), which represents the amount of capex that must be funded through retained earnings and then new equity.
- The equity component less retained cash flow (row 35), where it is insufficient, indicates the additional equity requirement (row 36).⁴²

Rows 40 to 42 display the equity component, retained cash flow and additional equity requirement in real dollar terms (based on start of year one) by converting the nominal dollar equivalents set out in rows 34 to 36. Dividend reinvestment, also in real dollar terms, is displayed in row 44 by converting the nominal dollar equivalent as set out in row 15.

If the total equity requirement over the next access arrangement period is above zero, cell Q48 calculates the total dividend reinvestment plan requirement based on the total amount set out at Q44. The total external equity requirement over the next access arrangement period is calculated at cell Q49 by taking the difference between the total equity requirement and the total dividend reinvestment. Cell Q50 displays the sum of the total dividend reinvestment plan requirement and the total external equity requirement. This is the total equity requirement.

Based on the total amount of dividends reinvested (cell Q48) and the external equity requirement (cell Q49) the cost for each of these component (sourced from the **PTRM input** sheet) is calculated in cells Q52 and Q53 respectively. The sum of these components provides the total equity raising costs in real dollar terms (start of year one) and is displayed at cell Q54. A positive value for the total equity raising costs over the next access arrangement period indicates that the calculated benchmark equity raising costs should be allowed and recovered for the gas distribution pipeline.

The equity raising cost calculations must be performed iteratively because they are both an input to and an output from the building block calculation.⁴³ In other words, a change in the

⁴² Where there is sufficient retained cash flow to cover the equity component of capex, the amounts shown in row 36 would be negative.

equity raising cost will change the total revenue and subsequently forecast revenue, which in turn changes the equity raising cost. Further, the equity raising cost calculation depends on both unsmoothed building block components (for instance, the outgoing cash flows each year) and the smoothed forecast revenue (for instance, the available revenue each year). Accordingly, changes to the profile of forecast (smoothed) revenues can change the required equity raising cost, starting the cycle again.

By default, the smoothing macros in the **X factors** sheet perform these iterative calculations for equity raising costs at the same time. However, this function can be disabled using the drop-down menu in cell H16 of the **X factors** sheet.

Figure 13 provides an example of the **Equity raising costs** sheet.

Figure 13 Equity raising costs sheet

Year	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	Total
Capital Base and Capex (\$m Nominal)											
Opening Capital Base	4,008.29	3,984.59	3,880.08	3,809.53	3,685.23	-	-	-	-	-	19,367.71
Capex	133.50	80.14	125.88	86.34	103.37	-	-	-	-	-	529.23
Capex Rate	3.33%	2.01%	3.24%	2.27%	2.81%	0.00%	0.00%	0.00%	0.00%	0.00%	2.73%
Dividend Assessment (\$m Nominal)											
Tax Payable	18.63	35.27	49.71	50.40	51.09	-	-	-	-	-	205.10
Dividends	39.13	74.07	104.38	105.84	107.30	-	-	-	-	-	430.72
Dividend Reinvestment	11.74	22.22	31.31	31.75	32.19	-	-	-	-	-	129.22
Benchmark Cash Flows (\$m Nominal)											
Select reference tariff variation mechanism for ERC calculation	Tariff cap		In almost all cases, this should be the same reference tariff variation mechanism as used to smooth on the X factor tab								
Revenue (smoothed, incl ARS)	477.09	490.83	503.81	516.07	529.81	-	-	-	-	-	2,517.61
Opex	66.52	68.65	70.81	71.94	74.20	-	-	-	-	-	352.13
Interest Payment	138.00	132.64	124.73	118.12	109.18	-	-	-	-	-	622.68
Revenue Adjustments	-	2.67	1.68	5.82	7.06	2.72	-	-	-	-	11.25
Tax Payable	18.63	35.27	49.71	50.40	51.09	-	-	-	-	-	205.10
Internal Cash Flow	256.60	255.95	252.75	268.55	292.62	-	-	-	-	-	1,326.45
Dividends	39.13	74.07	104.38	105.84	107.30	-	-	-	-	-	430.72
Retained Cash Flow (excl. dividend reinvestment)	217.47	181.87	148.36	162.71	185.32	-	-	-	-	-	895.73
Benchmark Capex Funding (\$m Nominal)											
Capex Funding Requirement	129.59	77.83	122.32	83.95	100.58	-	-	-	-	-	514.27
Debt Component	-	13.87	61.18	41.29	72.76	66.13	-	-	-	-	255.23
Equity Component	143.46	139.01	163.62	156.71	166.70	-	-	-	-	-	769.50
Retained Cash Flow (excl. dividend reinvestment)	217.47	181.87	148.36	162.71	185.32	-	-	-	-	-	895.73
Equity Requirement (SEO)	-	74.01	42.86	15.25	6.00	18.62	-	-	-	-	126.23
Benchmark Capex Funding (\$m Real 2019-20)											
Equity Component	139.96	132.31	151.94	141.97	147.34	-	-	-	-	-	713.52
Retained Cash Flow (excl. dividend reinvestment)	212.17	173.11	137.77	147.41	163.80	-	-	-	-	-	834.25
Equity Requirement	-	72.20	40.80	14.16	5.43	16.45	-	-	-	-	120.72
Dividend Reinvestment	11.45	21.15	29.08	28.76	28.45	-	-	-	-	-	118.90
Equity Raising Costs (\$m Real 2019-20)											
Dividend Reinvestment Plan Requirement											-
External Equity (SEO) Requirement											-
Total Equity Requirement											-
Dividend Reinvestment Plan Costs											-
External Equity Raising (SEO) Costs											-
Total Equity Raising Costs											-

2.11 Chart 1–Revenue sheet

The **Chart 1–Revenue** sheet displays charts for each tariff variation mechanism that incorporates the:

- nominal and real unsmoothed revenues

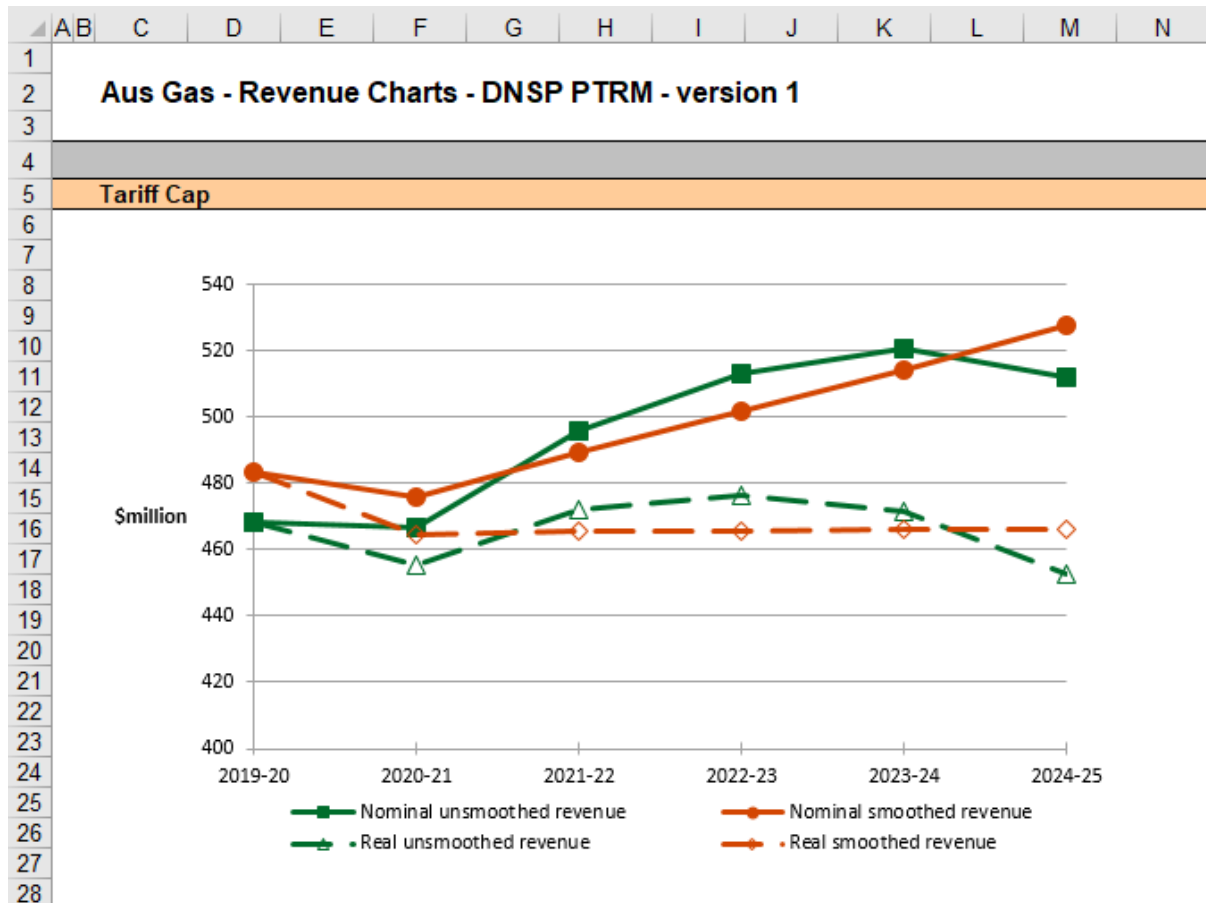
⁴³ This does not mean that the calculation method for the entire workbook needs to be set to manual or iterative (under Options -> Formulas -> Calculation options). The implementation in the PTRM is such that direct values are entered in the **PTRM input** sheet, so there is no circular reference, and the iterative updates are managed via macros when smoothing. Hence, the calculation option can be left as automatic, without iteration.

- nominal and real smoothed revenues derived under the three tariff variation mechanisms.

This information is sourced from the **Revenue summary** sheet.

Figure 14 provides an example of the **Chart 1–Revenue** sheet.

Figure 14 Chart 1–Revenue sheet



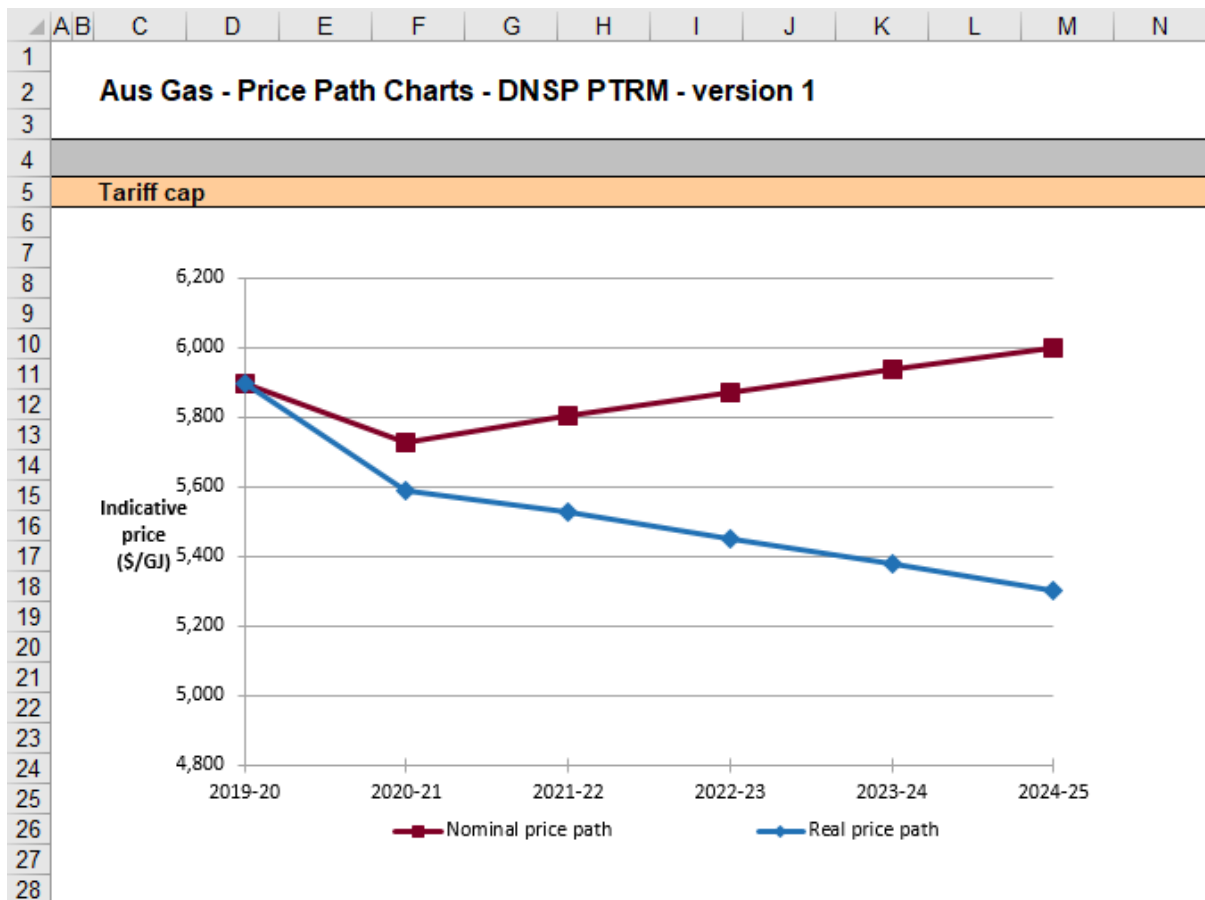
Note: This screenshot only shows an example chart for the tariff cap variation mechanism. However, the **Chart 1–Revenue** sheet also includes similar charts for the revenue cap and revenue yield tariff variation mechanisms.

2.12 Chart 2–Price path sheet

The **Chart 2–Price path** sheet displays charts for each tariff variation mechanism that incorporate the value of average prices (approximated by forecast revenues divided by total energy demand forecast, or the revenue yield value) in nominal and real dollar terms (start of year one). This information is sourced from the **Revenue summary** sheet.

Figure 15 provides an example of the **Chart 2–Price path** sheet.

Figure 15 Chart 2–Price path sheet



Note: This screenshot only shows an example chart for the weighted average price cap tariff variation mechanism. However, the **Chart 2–Price path** sheet also includes similar charts for the revenue cap and revenue yield tariff variation mechanisms.

2.13 Chart 3–Building blocks sheet

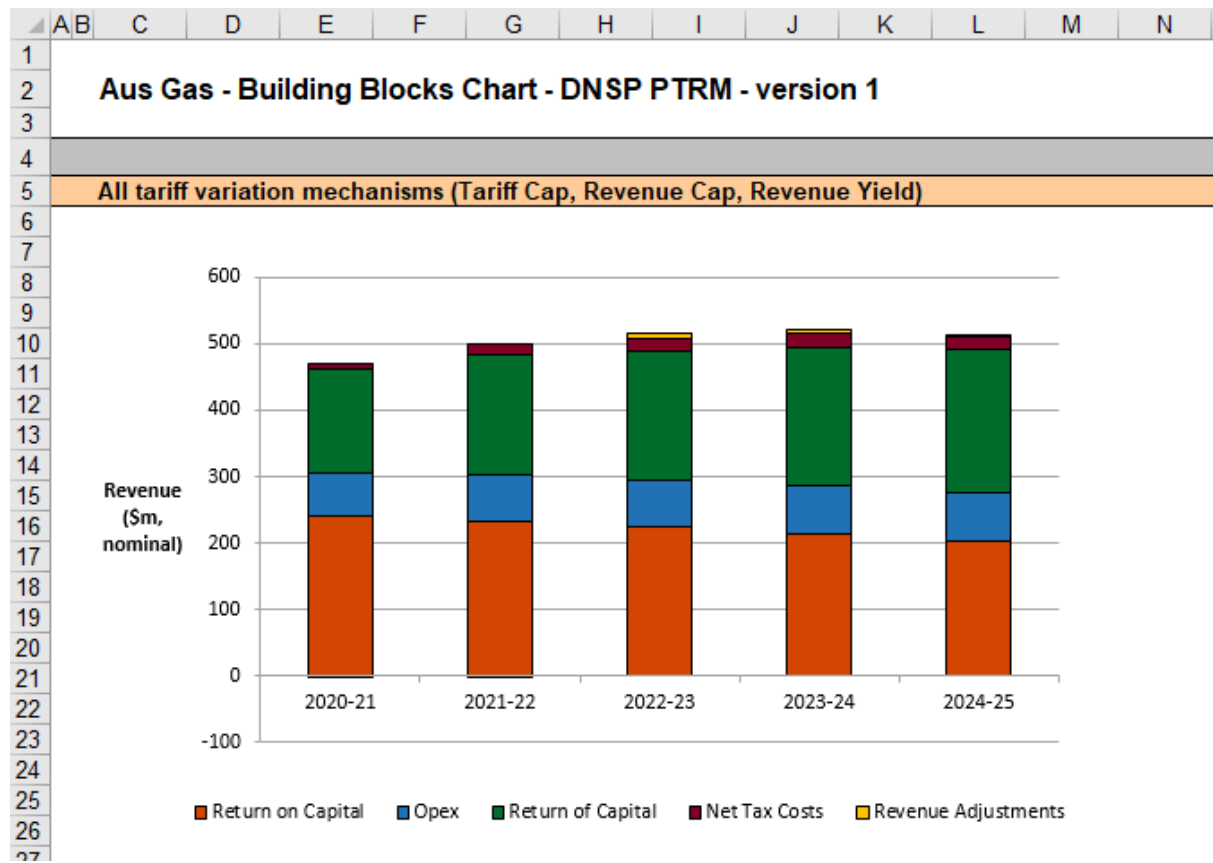
The **Chart 3–Building blocks** sheet displays the various building block cost components making up the total revenue:

- return on capital
- regulatory depreciation
- opex (including ARS)
- net tax costs
- carry-over and other revenue adjustments.

This information is sourced from the **Analysis** sheet.

Figure 16 provides an example of the **Chart 3–Building blocks** sheet.

Figure 16 Chart 3–Building blocks sheet



3 Process for annual return on debt update

This section sets out the process to set X factors at the time of the final decision, and the default process for annual updates of the return on debt. Some aspects of this approach will be guided by policy decisions to be made during individual determinations. However, following the process set out below will likely result in the basis for calculations that is consistent with the requirements of rule 87 of the NGR and our *Rate of return instrument*.

3.1 Setting X factors for the final decision

1. Complete all inputs to the **PTRM input** sheet. This requires a trailing average portfolio return on debt value for the length of the access arrangement period in G379 to P379.⁴⁴ Where there are no further forecast values entered further than the first year of the forecast access arrangement period, the PTRM adopts the most recent trailing average portfolio return on debt entered.
2. In the **X factors** sheet, ensure that the equity raising costs update option (cell H16) is set to 'update ERC when smoothing (default)'. This will ensure the equity raising cost calculations are iteratively updated as part of setting the X factors.⁴⁵
3. In the **X factors** sheet, check that cell F21 is set to the first year of the next access arrangement period. This will ensure the correct checks and warnings operate for the model. It will also ensure that the effective tax rates in the **WACC** sheet are updated to reflect the derived rates in the **Analysis** sheet.
4. In the **X factors** sheet, apply revenue smoothing in the section relating to the chosen tariff variation mechanism:
 - a. If applying the default X factor path (year 1 total revenue = year 1 forecast revenue; $X_2=X_3=X_4=X_5$; $NPV(\text{total revenue}) = NPV(\text{forecast revenue})$), press the button labelled 'Apply default smoothing (...)' where '(...)' describes the relevant tariff variation mechanism (either tariff cap, revenue cap or revenue yield).
 - b. If applying an alternative smoothing path, in the section relating to your chosen tariff variation mechanism (tariff cap, revenue cap or revenue yield), manually enter values for all X factors except one. Then press the relevant button to calculate the final remaining X factor (so that $NPV(\text{total revenue}) = NPV(\text{forecast revenue})$). This final X factor can be any of the X factors in the access arrangement period (including the first year, which is labelled as 'P0' by convention instead of 'X1'). These buttons are located under the relevant X factors and are also labelled with the relevant tariff variation mechanism.
 - c. In either case, it is necessary to consider the resulting difference between the final year total revenue and forecast revenue for the chosen tariff variation mechanism

⁴⁴ Also, the year-by-year tax rates (row 363) only require the first year (cell G363) to be entered; the PTRM will apply this tax rate to later years where there is no explicit tax rate entered.

⁴⁵ The 'do NOT update ERC when smoothing' option can be selected for certain analysis that seeks to isolate the impact of equity raising cost from the revenue requirement.

(shown in cells R43 and R44 for the tariff cap; in cells R59 and R60 for the revenue cap; and cells R75 and R76 for the revenue yield). If this difference would not meet the standard practice of minimising variance between total and forecast revenue in the last regulatory year of the access arrangement period, return to step (b) and manually adjust one or more X factors again (ensuring that the final X factor adjustment uses the relevant button so as to jointly smooth for the revenue and equity raising cost calculations).

3.2 Updating X factors annually

To update the X factors annually for the trailing average portfolio return on debt use the following steps:

1. In the **X factors** sheet, select the relevant year of update in cell F21.
2. In the **PTRM input** sheet (row 379), enter or update the trailing average portfolio return on debt values up to and including the relevant year of update, consistent with that selected in cell F21 of the **X factors** sheet.⁴⁶ Caution notes will appear in rows 380 to 381 of the **PTRM input** sheet to show which inputs are necessary. No other inputs should be changed.
3. In the **X factors** sheet, ensure the equity raising cost update option (cell H16) is set to 'update ERC when smoothing (default)'.
4. In the **X factors** sheet, apply smoothing to recalculate the X factor by using the button for the relevant year as identified in step 1 and for the relevant tariff variation mechanism. The correct year for update will be identified by a caution note in the rows (rows 53, 69 and 89) under the smoothing X factor buttons for the three tariff variation mechanisms. Only the relevant tariff variation mechanism should be used. It is important that the X factors for past years in the access arrangement period are not altered, since these X factors reflect the revenue (and price) outcomes from those years. Further, the default approach is that only the X factor for the year of update should be altered (rather than multiple X factors, for this year and remaining years within the access arrangement period).⁴⁷ This means that the impact of increases/decrease in that year's return on debt will be fully reflected in price changes in that year. For example, under a revenue cap tariff variation mechanism, to re-smooth for a return on debt update in year 2 the button labelled 'Set X2 (rev cap)' would be used, and all other X factors as determined during the final decision process would remain unaltered.

⁴⁶ By default, the PTRM will use either the most recent return on debt value as the forecast for later years or an estimated return on debt value as calculated during the access arrangement decision (where the return on debt is not yet known). Hence, at each annual update the forecast for the remaining years in the access arrangement period will be updated.

⁴⁷ If a user was to propose an alternative approach (for instance, where multiple X factors were changed in response to a given year's annual return on debt update) this would need to be assessed as part of an individual determination and approved as part of the final decision.