



Final decision

Gas transmission service providers

Post-tax revenue model handbook

April 2020

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Shortened forms

Shortened form	Extended form
AER	Australian Energy Regulator
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 transmission 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 transmission 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 for each regulatory year of an access arrangement period. The smoothed revenues are used to calculate the reference tariffs at which transmission services will be offered.

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.

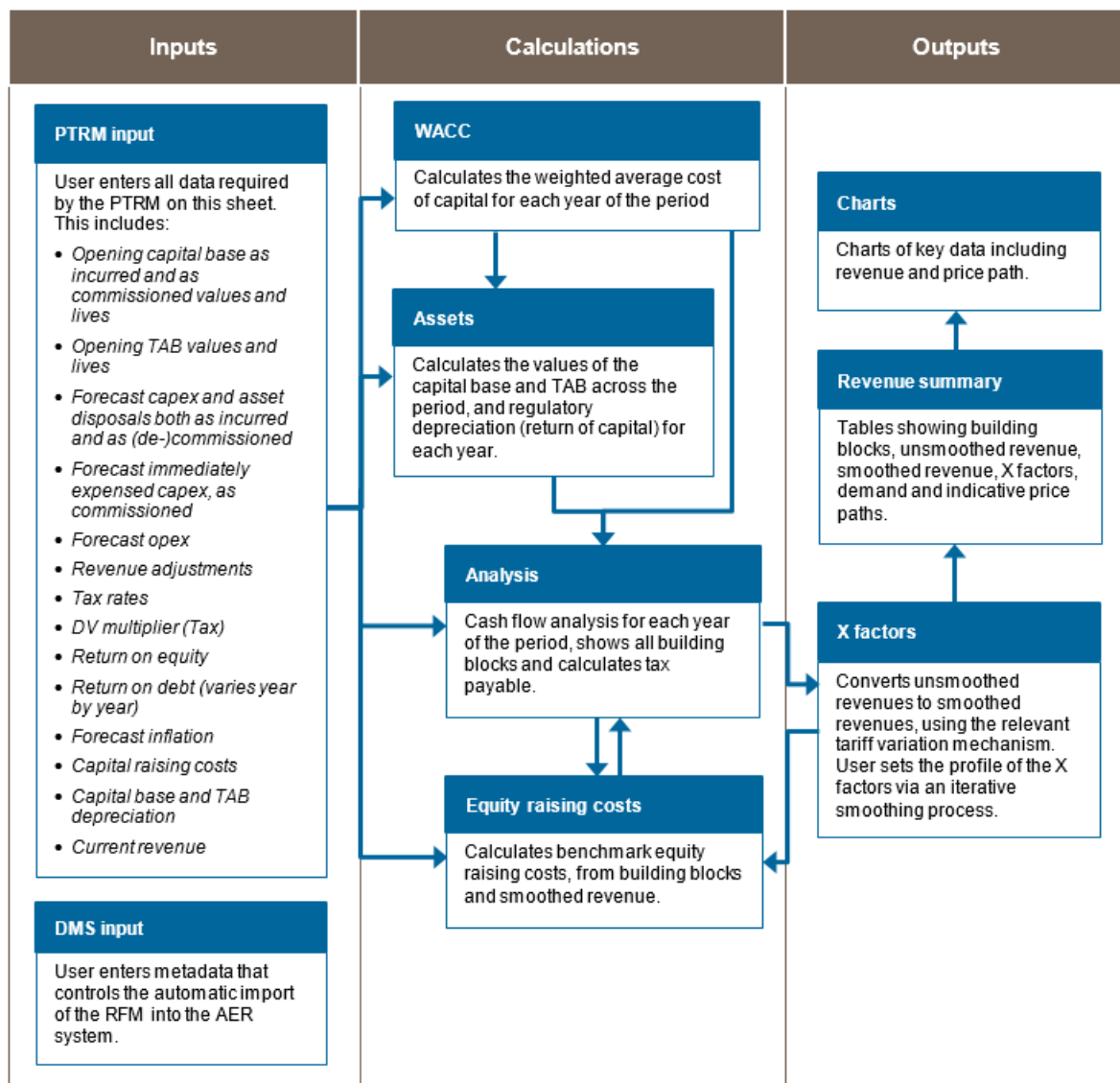
³ NGR, rr. 72(3) and 75A(2).

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 the 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 transmission service provider.

The **X factors** sheet is where smoothed revenue is derived from unsmoothed revenue. This process will require user input, as they choose whether to numerically define either the percentage change of real smoothed revenue from year to year within the period (these values are labelled 'X factors') or make individual entries for forecast revenue derived from an external tariff model for each year of the period.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:

- interim calculations automatically whenever an input is recorded
- revenue smoothing calculations and equity raising costs 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 regulatory 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 C33 (for example, a resubmission of the proposal PTRM with revised data values after an error was corrected).

The tariff variation mechanism (revenue cap, revenue yield cap, tariff cap) is also specified here in cell C34. 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	
1											
2		Aus Gas - DMS Input - TNSP 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 Transmission Co. (Gas)								
15		ACN / ABN	11 222 333 444								
16		Business short name	Aus Gas								
17											
18											
19		Regulatory process details									
20											
21											
32		Source	Regulatory proposal								
33		Amended model submission - reason									
34		Form of control	Tariff cap								
35											

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 asset disposals—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 net capex—as incurred (section 2.3.4)
- forecast capex—as commissioned (section 2.3.5)
- forecast immediate expensing of capex—as commissioned (section 2.3.6)
- forecast asset disposals—as decommissioned (section 2.3.7)
- forecast net capex—as commissioned (section 2.3.8)
- forecast operating expenditure (opex) (section 2.3.9)
- revenue adjustments (section 2.3.10)
- expected taxation rate (section 2.3.11)
- tax losses carried forward (section 2.3.11)
- diminishing value multiplier (section 2.3.11)
- cost of capital (section 2.3.12)
- debt and equity raising costs—transaction costs (section 2.3.13)
- forecast revenue for the current year (section 2.3.14)
- straight-line depreciation option for opening capital base (section 2.3.15)
- year-by-year tracking depreciation on opening capital base (section 2.3.16)
- depreciation option for opening TAB (section 2.3.17)
- year-by-year tracking depreciation on opening TAB (section 2.3.18)

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).

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

Figure 3, Figure 4 and Figure 5 provide examples of the **PTRM input** sheet.

Figure 3 PTRM input sheet–first screenshot

Asset Class Name	Opening Asset Value (Partially As Incurred)	Opening Asset Value (As Commissioned)	Average Remaining Life (Year)	Standard Life (Year)	Opening Tax Asset Value	Average Tax Remaining Life (Year)	Tax Standard Life (Year)	Base Regulatory Year	Length of Access Arrangement Period (Year)
Asset Class 1	1,302.23	1,433.94	30.2	55.0	752.20	15.0	20.0	2026-27	5
Asset Class 2	775.26	929.72	21.1	30.0	452.46	13.5	20.0		
Asset Class 3	891.26	944.61	28.1	40.0	642.89	10.8	20.0		
Asset Class 4	41.85	73.24	4.5	7.0	31.25	2.5	4.0		
Asset Class 5	106.51	155.71	3.7	5.0	154.29	3.8	5.0		
Asset Class 6	707.17	696.08	n/a	n/a	291.04	n/a	n/a		
Asset Class 7									
Asset Class 8									
Asset Class 9									
Asset Class 10									
Asset Class 11									
Asset Class 12									
Asset Class 13									
Asset Class 14									
Asset Class 15									
Asset Class 16									
Asset Class 17									
Asset Class 18									
Asset Class 19									
Asset Class 20									
Asset Class 21									
Asset Class 22									
Asset Class 23									
Asset Class 24									
Asset Class 25									
Asset Class 26									
Asset Class 27									
Asset Class 28									
Asset Class 29									
Asset Class 30									
Asset Class 47									
Spare straight-line tax asset class	112.74	133.98	18.8	40.0	62.85	23.5	40.0		
Buildings									
In-house software									
Equity raising costs	4.01	6.00	8.0	15.0	-	0.0	5.0		
Total	4,042.19	4,393.52			2,389.99				

Forecast Capital Expenditure – As Incurred (\$m Real 2019-20)	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30
Year	60.00	60.00	60.00	60.00	60.00	-	-	-	-	-
Pipelines	60.00	60.00	60.00	60.00	60.00	-	-	-	-	-
Compressors	77.00	77.00	77.00	60.00	60.00	-	-	-	-	-
Supply Regulators	77.00	88.00	88.00	99.00	110.00	-	-	-	-	-
Computer Equipment	20.00	22.00	22.00	18.50	5.50	-	-	-	-	-
Vehicles	30.00	30.00	30.00	30.00	30.00	-	-	-	-	-
Land and Easements	11.00	11.00	11.00	11.00	11.00	-	-	-	-	-
Spare straight-line tax asset class										
Buildings	11.00	11.00	4.40	5.00	5.50	-	-	-	-	-
In-house software	33.00	18.50	7.70	9.90	8.00	-	-	-	-	-
Equity raising costs										
Total	319.00	315.50	300.10	291.40	290.00	-	-	-	-	-

Forecast Asset Disposal – As Incurred (\$m Real 2019-20)	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30
Year	18.00	18.00	18.00	18.00	18.00	-	-	-	-	-
Pipelines										
Compressors	5.00	5.00	5.00	5.00	5.00	-	-	-	-	-
Supply Regulators	3.00	3.00	3.00	3.00	3.00	-	-	-	-	-
Computer Equipment										
Vehicles										
Land and Easements										
Spare straight-line tax asset class										
Buildings										
In-house software										
Equity raising costs										
Total	18.00	18.00	18.00	18.00	18.00	-	-	-	-	-

Forecast Net Capital Expenditure – As Incurred (\$m Real 2019-20)	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30
Year	52.00	52.00	52.00	52.00	52.00	-	-	-	-	-
Pipelines	52.00	52.00	52.00	52.00	52.00	-	-	-	-	-
Compressors	72.00	72.00	72.00	55.00	55.00	-	-	-	-	-
Supply Regulators	74.00	85.00	85.00	96.00	107.00	-	-	-	-	-
Computer Equipment	20.00	22.00	22.00	18.50	5.50	-	-	-	-	-
Vehicles	30.00	30.00	30.00	30.00	30.00	-	-	-	-	-
Land and Easements	11.00	11.00	11.00	11.00	11.00	-	-	-	-	-
Spare straight-line tax asset class										
Buildings	11.00	11.00	4.40	5.00	5.50	-	-	-	-	-
In-house software	33.00	18.50	7.70	9.90	8.00	-	-	-	-	-
Equity raising costs										
Total	301.00	297.50	282.10	273.40	272.00	-	-	-	-	-

Forecast Capital Expenditure – As Commissioned (\$m Real 2019-20)	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30
Year	60.00	60.00	60.00	60.00	60.00	-	-	-	-	-
Pipelines	60.00	60.00	60.00	60.00	60.00	-	-	-	-	-
Compressors	77.00	77.00	77.00	60.00	60.00	-	-	-	-	-
Supply Regulators	77.00	88.00	88.00	99.00	110.00	-	-	-	-	-
Computer Equipment	20.00	22.00	22.00	18.50	5.50	-	-	-	-	-
Vehicles	30.00	30.00	30.00	30.00	30.00	-	-	-	-	-
Land and Easements	11.00	11.00	11.00	11.00	11.00	-	-	-	-	-

The PTRM is also configured to recognise capex on a partially as incurred (hybrid) approach.¹¹ As such, two RABs determined on the basis of as incurred capex and as commissioned capex are required to calculate the return on capital and the return of capital respectively.

2.3.1 Opening capital base and opening tax 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 values for the opening capital base (broken into asset classes in rows 7 to 56) and opening TAB at the start of the first year of the next access arrangement period.¹² The capital base and TAB will differ each year to reflect forecast capex (as incurred for the capital base or as commissioned for the TAB), asset disposals 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 number of asset classes recorded in the capital base section matches the number of asset classes identified in the capex section. This allows the PTRM to model consistent depreciation 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.¹³ However, for each business the number of asset classes for existing assets used in the PTRM should be consistent with that used in the AER's roll forward model (RFM) to allow 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 when forming inputs for the PTRM where this demonstrably improves the accuracy or administrative convenience of asset calculations.

Opening asset value (partially as incurred)

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

¹¹ The partially as incurred method for recognising capex calculates the return on capital based on an as incurred approach and the return of capital (regulatory depreciation) is based on an as commissioned approach.

¹² The button at the left of row 53 may be pressed to display/hide rows 37 to 52 (asset classes 31 to 46).

¹³ 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 costs update when smoothing total revenue.

Opening asset value (as commissioned)

The opening asset values for each asset class are recorded in column K and are manually sourced from the closing asset values (as commissioned) for each asset class determined in the RFM.

Average remaining life

The weighted average remaining lives (WARL) of each asset class are recorded in column L, based on the economic lives of the assets, and are manually sourced from the closing remaining lives for each asset class determined in the RFM (using a weighted average method). These data may not be required depending on the option for depreciating the opening capital base selected in section 2.3.15 in which case 'n/a' may be input to these cells.

Standard life

The standard lives of each asset class are recorded in column M and measure 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 manually sourced from the closing tax asset values which have been determined in the RFM and are recorded in column N.

Average 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 2.3.17 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.

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

The forecast capex (as incurred, in gross terms) values for the next access arrangement period are recorded for each year in rows 61 to 110¹⁴ (by asset class).¹⁵ 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 asset disposals—as incurred

The forecast asset disposal (as incurred) values are recorded for the year in which the disposal is expected to take place, in rows 115 to 164 (by asset class). These inputs must be reported in real terms based on start of year one dollar terms.

2.3.4 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. Forecast net capex (as incurred) values are displayed in rows 169 to 218 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.

2.3.5 Forecast capital expenditure—as commissioned

The forecast capex (as commissioned, in gross terms) values are recorded for each year 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 immediate expensing of capital expenditure—as commissioned

Forecast immediate expensing of capex (as commissioned) values are recorded for the regulatory year in which the immediate expensing is expected to take place, in rows 277 to 326 (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.

2.3.7 Forecast asset disposals—as decommissioned

The forecast decommissioned asset disposal values are recorded for each year in rows 331 to 380 (by asset class). These inputs must be reported in real terms based on start of year one dollar terms.

2.3.8 Forecast net capital expenditure—as commissioned

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 the value of decommissioned assets. Forecast net capex (as commissioned) values are displayed in

¹⁴ Row 110 (asset class 50) is designed to be used for equity raising costs only.

¹⁵ The button at the left of row 111 may be pressed to display/hide rows 61 to 110 (asset classes 1 to 50).

rows 385 to 434 and are used to calculate depreciation in the **Assets** sheet. These values are assumed to be in real terms based on start of year one dollar terms.

2.3.9 Forecast operating expenditure

Opex typically includes items such as wages and salaries, leasing costs, costs associated with maintaining transmission assets, input costs and other service contract expenses paid to third parties. The forecast opex values for each year are recorded in rows 439 to 447. Row 448 displays benchmark debt raising costs and does not require inputs to be recorded because the calculation is formula-driven, and is based on the practice of treating the allowance as an opex line item. These inputs must be reported in real terms based on start of year one dollar terms.

The forecast total opex values (row 449) are linked to the **Analysis** sheet to calculate the total revenue.

2.3.10 Revenue adjustments

Any additional revenue adjustments applying to the next access arrangement period are recorded in rows 453 to 462.¹⁶ 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 R453 to S462. Totals for each combination of tax income and tax expense settings are in rows 463 to 467. These inputs must be reported in real terms based on start of year one dollar terms.

2.3.11 Tax

The expected corporate tax rates are recorded for each year in row 471. 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 the total revenue.

Any tax losses carried forward from the previous period are included in cell F474. 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 477. The multiplier is linked to the **Assets** sheet to calculate the rate to depreciate capex commissioned in that regulatory year that is subject to the DV method of tax depreciation.

2.3.12 Cost of capital

The cost of capital section (rows 481 to 484 and row 487) records the following parameters:

¹⁶ 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 rate¹⁷
- 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*.¹⁸ Rows 488 to 489 contain content driven help which will display cautions or guidance based on input to this sheet and the **X factors** sheet.

2.3.13 Debt and equity raising costs—transaction costs

The transaction cost of financing section (rows 494 to 498) 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 costs** 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 448 of the **PTRM input** sheet to calculate the overall benchmark debt raising costs to be included in the opex allowance.

2.3.14 Forecast revenue for the current year

Cell G502 records the final year forecast revenue for the current access arrangement period. It is linked to the **X factors** and **Revenue summary** sheets, and helps provide historical comparisons for forecast smoothed revenues over the next access arrangement period.

¹⁷ 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. 11).

¹⁸ AER, *Rate of return instrument*, December 2018.

2.3.15 Straight-line depreciation option for opening capital base

The PTRM provides the user an option at cell E506 (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 2.3.16. If the WARL method is selected, the capital base roll forward calculations will use the average remaining life inputs provided in section 2.3.1 to calculate depreciation of the opening capital base.

2.3.16 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 511 to 560. 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.

2.3.17 Depreciation option for opening TAB

The PTRM provides the user an option at cell E565 (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 depreciation is selected, the depreciation of the opening TAB in the tax asset roll forward will reflect the inputs at section 2.3.18. If the WARL method is selected, the TAB roll forward calculations will use the average tax remaining life inputs provided in section 2.3.1 to calculate depreciation of the opening TAB.

2.3.18 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 570 to 619. 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.

2.4 WACC sheet

The **WACC** sheet determines for each 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 now vary year-to-year.

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.¹⁹ 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).²⁰ The nominal pre-tax return on debt (row 14) and the nominal post-tax cost of equity (row 10) are multiplied by the debt and equity components of the capital base (partially as incurred) to determine the return on capital building block.²¹

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 6 provides an example of the **WACC** sheet.

Figure 6 WACC sheet

	A	B	C	D	E	F	G	H	I	J	K	Q	R	S	T	U
1																
2		Aus Gas - Cost of Capital Parameters - TNSP PTRM - version 1														
3																
4		Year					2020-21	2021-22	2022-23	2023-24	2024-25		Final decision checks			
5																
6		Inflation Rate	f	Constant		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).			
7		Value of Imputation Credits (gamma)	γ	Constant		59%	59%	59%	59%	59%						
8		Proportion of Equity Funding	E/V	Constant		40%	40%	40%	40%	40%						
9		Proportion of Debt Funding	D/V	Constant		60%	60%	60%	60%	60%						
10		Post-tax Nominal Return on Equity	Re	Constant		6.50%	6.50%	6.50%	6.50%	6.50%						
11		Post-tax Real Return on Equity	Rre	Constant		3.90%	3.90%	3.90%	3.90%	3.90%		6.50%	3.90%			
12																
13		Corporate Tax Rate	T	Varying		30.00%	30.00%	30.00%	30.00%	30.00%						
14		Nominal Pre-tax Return on Debt	Rd	Varying		5.85%	5.66%	5.46%	5.27%	5.08%						
15		Real Pre-tax Return on Debt	Rrd	Varying		3.27%	3.08%	2.89%	2.70%	2.51%						
16																
17							Formula approximations of WACC					Cashflow derivations of WACC				
18		Nominal Vanilla WACC		Varying		6.11%	6.00%	5.88%	5.76%	5.65%			5.72%			
19		Real Vanilla WACC		Varying		3.52%	3.41%	3.30%	3.18%	3.07%			3.14%			
20		Post-tax Nominal WACC		Varying		5.68%	5.57%	5.47%	5.37%	5.27%			5.29%			
21		Post-tax Real WACC		Varying		3.10%	3.00%	2.90%	2.80%	2.70%			2.73%			
22		Pre-tax Nominal WACC		Varying		6.24%	6.12%	6.01%	5.89%	5.77%			6.01%			
23		Pre-tax Real WACC		Varying		3.65%	3.54%	3.42%	3.31%	3.19%			3.42%			
24		Nominal Tax Allowance		Varying		0.56%	0.55%	0.54%	0.52%	0.51%			0.71%			
25		Real Tax Allowance		Varying		0.55%	0.54%	0.52%	0.51%	0.49%			0.70%			
26																
27		Effective Tax Rate for Equity (from relevant cashflows)	Te			11.34%	11.34%	11.34%	11.34%	11.34%			23.91%			
28		Effective Tax Rate for Debt (effective debt shield)	Td			29.93%	29.93%	29.93%	29.93%	29.93%			30.26%			
29																
30																
31																
32																
33																
34																
35																

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 year of the next access arrangement period in real (start of year one) and nominal dollar terms.²² It also calculates both regulatory and tax depreciation. The **Assets** sheet displays 55 years of data so that the effective tax rate can be estimated.

Figure 7 provides an example of the **Assets** sheet.

¹⁹ 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.

²⁰ 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.

²¹ See rows 24 to 27 in the **Analysis** sheet, which calculate the return on capital and provide a breakdown of the return on equity and return on debt.

²² The TAB is calculated in nominal dollar terms only, consistent with tax rules.

Figure 7 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
Aus Gas - Asset Roll Forward - TNSP 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%
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%
Opening Capital Base	4,042.2										
Real Net Capital Expenditure (capex)		306.3	302.5	286.7	277.7	276.1	-	-	-	-	-
<i>Pipelines</i>		50.9	50.8	50.8	50.8	50.8	-	-	-	-	-
<i>Compressors</i>		73.3	73.2	73.2	55.9	55.8	-	-	-	-	-
<i>Supply Regulators</i>		75.3	86.4	86.4	97.5	108.6	-	-	-	-	-
<i>Computer Equipment</i>		20.3	22.4	22.4	16.8	5.6	-	-	-	-	-
<i>Vehicles</i>		30.5	30.5	30.5	30.5	30.5	-	-	-	-	-
<i>Land and Easements</i>		11.2	11.2	11.2	11.2	11.2	-	-	-	-	-
<i>Spare straight-line tax asset class</i>		-	-	-	-	-	-	-	-	-	-
<i>Buildings</i>		11.2	11.2	4.5	5.1	5.6	-	-	-	-	-
<i>In-house software</i>		33.6	16.8	7.8	10.1	8.1	-	-	-	-	-
<i>Equity raising costs</i>		-	-	-	-	-	-	-	-	-	-
Nominal Net Capex		313.9	317.8	308.8	306.5	312.4	-	-	-	-	-
<i>Pipelines</i>		52.1	53.4	54.7	56.1	57.4	-	-	-	-	-
<i>Compressors</i>		75.1	76.9	78.8	61.7	63.2	-	-	-	-	-
<i>Supply Regulators</i>		77.2	90.8	93.0	107.6	122.9	-	-	-	-	-
<i>Computer Equipment</i>		20.9	23.5	24.1	18.5	6.3	-	-	-	-	-
<i>Vehicles</i>		31.3	32.1	32.8	33.6	34.5	-	-	-	-	-
<i>Land and Easements</i>		11.5	11.8	12.0	12.3	12.6	-	-	-	-	-
<i>Spare straight-line tax asset class</i>		-	-	-	-	-	-	-	-	-	-
<i>Buildings</i>		11.5	11.8	4.8	5.6	6.3	-	-	-	-	-
<i>In-house software</i>		34.4	17.6	8.4	11.1	9.2	-	-	-	-	-
<i>Equity raising costs</i>		-	-	-	-	-	-	-	-	-	-
Asset Values (\$m Real 2019-20)											
Real Straight-line Depreciation		270.8	229.9	239.1	238.4	241.4	240.4	224.9	214.7	203.2	191.9
<i>Pipelines</i>		60.3	60.3	60.3	60.3	60.3	60.3	60.3	60.3	60.3	60.3
<i>Compressors</i>		60.4	61.3	62.2	63.2	64.1	65.0	65.0	65.0	65.0	65.0
<i>Supply Regulators</i>		46.3	48.2	51.2	53.6	53.8	54.0	54.0	54.0	54.0	54.0
<i>Computer Equipment</i>		-	-	-	-	-	-	-	-	-	-
<i>Vehicles</i>		-	-	-	-	-	-	-	-	-	-
<i>Land and Easements</i>		-	-	-	-	-	-	-	-	-	-
<i>Buildings</i>		-	-	-	-	-	-	-	-	-	-
<i>In-house software</i>		-	-	-	-	-	-	-	-	-	-
<i>Equity raising costs</i>		-	-	-	-	-	-	-	-	-	-
Real Residual Capital Base (end period)	4,042.2	4,077.7	4,150.3	4,198.0	4,237.3	4,272.1	4,031.7	3,806.8	3,592.1	3,388.9	3,197.0
Real Residual Capital Base (start period)	-	4,042.2	4,077.7	4,150.3	4,198.0	4,237.3	4,272.1	4,031.7	3,806.8	3,592.1	3,388.9
Asset Values (\$m Nominal)											
Inflation on Opening Capital Base		101.1	104.5	109.0	113.0	116.9	120.8	116.9	113.1	109.4	105.8
Nominal Straight-line Depreciation		277.5	241.5	257.5	263.1	273.1	278.8	267.4	261.6	253.8	245.6
Nominal Regulatory Depreciation		176.5	137.0	148.5	150.1	156.1	157.9	150.5	148.5	144.4	139.8
Nominal Residual Capital Base (end period)	4,042.2	4,179.6	4,360.5	4,520.8	4,677.2	4,833.5	4,675.6	4,525.1	4,376.6	4,232.2	4,092.4
Inflated Nominal Residual Capital Base (start period)	-	4,143.2	4,284.1	4,469.5	4,633.8	4,794.2	4,954.3	4,792.5	4,638.2	4,486.0	4,338.0
Tax Values (\$m Nominal)											
Tax Depreciation		185.3	210.2	251.7	260.5	270.4	248.5	216.6	195.3	181.6	170.2
<i>Pipelines</i>		53.4	53.4	53.4	53.4	53.4	53.4	53.4	53.4	53.4	53.4
<i>Compressors</i>		63.2	68.1	72.1	75.9	78.8	71.2	63.4	63.8	66.4	65.1
<i>Supply Regulators</i>		34.6	41.9	48.2	55.1	53.2	52.4	50.6	48.0	45.8	46.3
<i>Computer Equipment</i>		-	-	-	-	-	-	-	-	-	-
<i>Vehicles</i>		-	-	-	-	-	-	-	-	-	-
<i>Land and Easements</i>		-	-	-	-	-	-	-	-	-	-
<i>Buildings</i>		-	-	-	-	-	-	-	-	-	-
<i>In-house software</i>		-	-	-	-	-	-	-	-	-	-
<i>Equity raising costs</i>		-	-	-	-	-	-	-	-	-	-
Residual Tax Value (end period)	2,390.0	2,515.3	2,617.6	2,667.9	2,658.3	2,644.8	2,396.2	2,179.6	1,984.4	1,802.8	1,632.6
Summary of Asset Roll Forward (\$m Nominal)											
Capital Base roll forward											
Opening Capital Base		4,042.2	4,179.6	4,360.5	4,520.8	4,677.2	-	-	-	-	-
Net Capex		313.9	317.8	308.8	306.5	312.4	-	-	-	-	-
Straight-line Depreciation		- 277.5	- 241.5	- 257.5	- 263.1	- 273.1	-	-	-	-	-
Inflation on Opening Capital Base		101.1	104.5	109.0	113.0	116.9	-	-	-	-	-
Closing Capital Base		4,179.6	4,360.5	4,520.8	4,677.2	4,833.5	-	-	-	-	-
Check		ok	ok	ok	ok	ok					
TAB roll forward											
Opening TAB		2,390.0	2,515.3	2,617.6	2,667.9	2,658.3	-	-	-	-	-
Net Capex		310.6	312.6	302.0	251.0	256.8	-	-	-	-	-
Tax Depreciation		- 185.3	- 210.2	- 251.7	- 260.5	- 270.4	-	-	-	-	-
Closing TAB		2,515.3	2,617.6	2,667.9	2,658.3	2,644.8	-	-	-	-	-
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 (rows 10 to 60) values 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 partially as incurred approach. Under this approach the return on capital is calculated based on as incurred forecast net capex and the return of capital (depreciation) is calculated based on as commissioned 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 in 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).²³ 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 (as commissioned) 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 year is calculated in row 766.

Nominal asset values are displayed in rows 771 to 775. To compensate the business for inflation, the residual value of the capital base at the end of each year is adjusted upwards for the amount of expected inflation in that year. This adjustment is calculated in row 771. The change in the nominal value of the capital base from year to year in nominal dollar terms is calculated by adjusting the closing capital base (row 774) for forecast net capex (as incurred) 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 is calculated in rows 779 to 1430. These are based on the tax asset values, forecast capex (as commissioned), immediate expensing of forecast capex, and depreciation of opening TAB (where selected), and tax asset lives from the **PTRM input** sheet. Where the year-by-year tracking depreciation option is selected in section 2.3.17, depreciation of the opening TAB will reflect the values in section 2.3.18. If the WARL option is selected, depreciation of the opening TAB is calculated using the straight-line method. The straight-line method is also used to calculate tax depreciation of forecast capex for certain asset classes where this approach is

²³ 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.

required under the tax rules.²⁴ For all other forecast capex, tax depreciation is calculated using the DV method. The formula used to calculate DV tax depreciation is presented as:

$$D_t = \left(\text{Nominal net capex}_i^{25} - \sum_{n=0}^{t-1} D_n \right) \times \text{DV multiplier}^{26} \div \text{tax standard asset life}^{27}$$

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 on an as commissioned basis and is net of disposals and immediately expensed capex. Immediately expensed capex for each regulatory year (section 2.3.6) is added to the total tax depreciation of each asset class for that year.²⁸

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 1446.

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 8 and Figure 9 provide examples of the **Analysis** sheet.

²⁴ Asset classes 47–50 provide for this.

²⁵ Gross capex (section 2.3.5) net of disposals (section 2.3.7) and immediately expensed capex (section 2.3.6).

²⁶ Section 2.3.11.

²⁷ Section 2.3.1.

²⁸ For example, year one immediately expensed capex for the first asset class is added to cell G792 on the **Assets** sheet.

Figure 8 Analysis sheet—first screenshot

Year	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28		
Aus Gas - Cash Flow Analysis - TNSP PTRM - version 1											
Year	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28		
Inflation Assumption (CPI % increase)		2.50%	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%		
Cumulative Inflation Index (CPI end period)	100.00%	102.50%	105.06%	107.69%	110.38%	113.14%	115.97%	118.87%	121.84%		
Time Varying WACC											
Time Varying Return on Debt		5.85%	5.66%	5.46%	5.27%	5.08%	5.08%	5.08%	5.08%		
Time Varying Nominal Vanilla WACC		6.11%	6.00%	5.88%	5.76%	5.65%	5.65%	5.65%	5.65%		
Cumulative Discount Factor	100.0%	106.1%	112.5%	119.1%	125.9%	133.1%	140.6%	148.5%	156.9%		
Inverse Cumulative Discount Factor	100.0%	94.2%	88.9%	84.0%	79.4%	75.2%	71.1%	67.3%	63.7%		
Annual Building Blocks (\$m Nominal)											
Capital Base (start period)		4,042.2	4,179.6	4,360.5	4,520.8	4,677.2	4,833.5	4,675.6	4,525.1		
- Equity	40.00%	1,616.9	1,671.8	1,744.2	1,808.3	1,870.9	1,933.4	1,870.2	1,810.0		
- Debt	60.00%	2,425.3	2,507.8	2,616.3	2,712.5	2,806.3	2,900.1	2,805.3	2,715.1		
Revenue Building Blocks											
Nominal Vanilla WACC		247.0	250.6	256.3	260.5	264.1	272.9	264.0	255.5		
Return on Capital											
- Return on Equity	6.50%	105.1	108.7	113.4	117.5	121.6	125.7	121.6	117.7		
- Return on Debt		141.9	141.9	143.0	143.0	142.5	147.2	142.4	137.8		
Return of Capital (regulatory depreciation)		176.5	137.0	148.5	150.1	156.1	157.9	150.5	148.5		
Operating Expenditure		94.3	96.6	77.6	101.6	104.2	-	-	-		
Revenue adjustments		5.1	14.7	8.6	4.4	-	-	-	-		
Tax Payable		19.3	12.2	3.5	2.4	2.5	12.0	19.0	24.3		
Less Value of Imputation Credits	58.50%	(11.3)	(7.1)	(2.0)	(1.4)	(1.5)	(7.0)	(11.1)	(14.2)		
Revenue Subtotal		530.9	504.0	492.4	517.6	525.4	435.8	422.3	414.1		
Additional Tax Income calculations											
- Deduct Non-Tax Income Revenue Adjustments		-	-	-	-	-	-	-	-		
Revenue for Tax Assessment Subtotal		530.9	504.0	492.4	517.6	525.4	435.8	422.3	414.1		
Tax Expenses											
- Opex		94.3	96.6	77.6	101.6	104.2	-	-	-		
- Tax Depreciation		185.3	210.2	251.7	260.5	270.4	248.5	216.6	195.3		
- Interest		141.9	141.9	143.0	143.0	142.5	147.2	142.4	137.8		
- Tax Expense Revenue Adjustments		5.1	14.7	8.6	4.4	-	-	-	-		
Total Tax Expenses		426.6	463.5	480.9	509.5	517.0	395.8	359.0	333.1		
Tax Calculation											
Corporate Tax Rate		30.00%	30.00%	30.00%	30.00%	30.00%	30.00%	30.00%	30.00%		
Taxable Income		64.3	40.5	11.5	8.1	8.4	40.1	63.3	81.0		
- Pre-tax Income		104.3	40.5	11.5	8.1	8.4	40.1	63.3	81.0		
- Tax Loss Carried Forward		(40.0)	-	-	-	-	-	-	-		
Tax Payable		19.3	12.2	3.5	2.4	2.5	12.0	19.0	24.3		
Value of Imputation Credits	58.50%	11.3	7.1	2.0	1.4	1.5	7.0	11.1	14.2		
(intermediate tax calculation)		19.3	12.2	3.5	2.4	2.5	12.0	19.0	24.3		
Cash Flow Analysis Below This Line (\$m Nominal)											
Net Present Values											
Capital Base (start period)	Project NPV Check	(0.0)	4,042.2	4,179.6	4,360.5	4,520.8	4,677.2	4,833.5	4,675.6	4,525.1	
PV for Returns on and of Asset Only		5,263.1	423.5	387.6	404.8	410.6	420.2	430.8	414.5	404.0	
PV for Capex Only		1,315.9	313.9	317.8	308.8	306.5	312.4	-	-	-	
PV for End of Period Assets		95.0	-	-	-	-	-	-	-	-	
Nominal Cash Flow Analysis											
Capital Expenditure		4,042.2	313.9	317.8	308.8	306.5	312.4	-	-		
Interest Payments		-	141.9	141.9	143.0	143.0	142.5	147.2	142.4	137.8	
Repayment of Debt		(2,425.3)	(82.5)	(108.5)	(96.2)	(93.9)	(93.8)	94.8	90.3	89.1	
Analysis Including Revenue Adjustments											
Nominal Cash Flow to Equity Holders											
- Pre-tax	Te = 25.93%	7.38%	(1,616.9)	63.3	56.1	59.3	60.4	60.1	193.8	189.6	187.1
- Post-tax		5.47%	(1,616.9)	44.0	43.9	55.8	57.9	57.6	181.8	170.6	162.8
- Post-tax + Value of Imputation Credits		6.63%	(1,616.9)	55.3	51.0	57.9	59.4	59.1	188.8	181.8	177.1
Real Cash Flow to Equity											
- Pre-tax		4.76%	(1,616.9)	61.7	53.4	55.1	54.7	53.2	167.1	159.5	153.6
- Post-tax		2.90%	(1,616.9)	42.9	41.8	51.9	52.5	50.9	156.8	143.6	133.7
- Post-tax + Value of Imputation Credits		4.03%	(1,616.9)	53.9	48.6	53.7	53.8	52.2	162.8	152.9	145.3
Net Cash Flow to Debt											
Cash Flow to Debt before Tax Calculation		5.19%	(2,425.3)	59.5	33.4	46.8	49.1	48.7	242.0	232.7	226.9
Deduction Utilised to Reduce Tax				141.9	141.9	143.0	143.0	142.5	147.2	142.4	137.8
Unutilised Deductions Carried Forward				-	-	-	-	-	-	-	-
Net Cash Flow to Debt	Td = 30.26%	3.62%	(2,425.3)	16.9	(9.2)	3.9	6.2	6.0	197.8	190.0	185.6
Nominal Cash Flows to Assets											
Cash Flow to Asset		6.09%	(4,042.2)	122.8	89.5	106.1	109.5	108.8	435.8	422.3	414.1
Cash Flow to Asset Post-tax		5.30%	(4,042.2)	103.5	77.3	102.6	107.0	106.3	423.8	403.3	389.8
Cash Flow to Asset Real		3.50%	(4,042.2)	119.8	85.2	98.5	99.2	96.2	375.8	355.3	339.9
Cash Flow to Asset Real Post-tax		2.73%	(4,042.2)	100.9	73.6	95.3	97.0	94.0	365.4	339.3	319.9
Check on Vanilla WACC Cash Flow (nominal)		5.77%	(4,042.2)	114.7	84.4	104.7	108.4	107.8	430.8	414.5	404.0
Check on Vanilla WACC Cash Flow (real)		3.19%	(4,042.2)	111.9	80.4	97.2	98.2	95.3	371.5	348.7	331.6
Analysis Excluding Revenue Adjustments (check target WACC is met)											
Restatement of Figures Above											
Intermediate Tax Calculation (excluding revenue adjustments)			19.3	12.2	3.5	2.4	2.5	12.0	19.0	24.3	
Imputation Credit Value (excluding revenue adjustments)			(11.3)	(7.1)	(2.0)	(1.4)	(1.5)	(7.0)	(11.1)	(14.2)	
Revenue Subtotal (excluding revenue adjustments)			525.8	489.3	483.8	513.2	525.4	435.8	422.3	414.1	
Taxable Income Before Loss Carried Forward (excluding revenue adjustments)			104.3	40.5	11.5	8.1	8.4	40.1	63.3	81.0	

Figure 9 Analysis sheet—second screenshot

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
103		Taxable Income (excluding revenue adjustments)					64.3	40.5	11.5	8.1	8.4	40.1	63.3	81.0
104		Tax Payable (excluding revenue adjustments)					19.3	12.2	3.5	2.4	2.5	12.0	19.0	24.3
105		Tax Loss Carried Forward (excluding revenue adjustments)				(40.0)	-	-	-	-	-	-	-	-
106														
107		Nominal Cash Flow to Equity Holders												
108		- Pre-tax	Te =	26.28%	7.25%	(1,616.9)	58.1	41.4	50.7	56.0	60.1	193.8	189.6	187.1
109		- Post-tax			5.34%	(1,616.9)	38.8	29.2	47.2	53.5	57.6	181.8	170.6	162.8
110		- Post-tax + Value of Imputation Credits			6.50%	(1,616.9)	50.1	36.3	49.3	55.0	59.1	188.8	181.8	177.1
111		Real Cash Flow to Equity												
112		- Pre-tax			4.63%	(1,616.9)	56.7	39.4	47.1	50.7	53.2	167.1	159.5	153.6
113		- Post-tax			2.77%	(1,616.9)	37.9	27.8	43.9	48.5	50.9	156.8	143.6	133.7
114		- Post-tax + Value of Imputation Credits			3.90%	(1,616.9)	48.9	34.6	45.7	49.8	52.2	162.8	152.9	145.3
115		Net Cash Flow to Debt												
116		Cash Flow to Debt before Tax Calculation			5.19%	(2,425.3)	59.5	33.4	46.8	49.1	48.7	242.0	232.7	226.9
117		Deduction Utilised to Reduce Tax					141.9	141.9	143.0	143.0	142.5	147.2	142.4	137.8
118		Unutilised Deductions Carried Forward					-	-	-	-	-	-	-	-
119		Net Cash Flow to Debt	Td =	30.26%	3.62%	(2,425.3)	16.9	(9.2)	3.9	6.2	6.0	197.8	190.0	185.6
120		Nominal Cash Flows to Assets												
121		Cashflow to Asset			6.04%	(4,042.2)	117.6	74.8	97.5	105.0	108.8	435.8	422.3	414.1
122		Cashflow to Asset Post-tax			5.25%	(4,042.2)	98.3	62.6	94.0	102.6	106.3	423.8	403.3	389.8
123		Cashflow to Asset Real			3.45%	(4,042.2)	114.8	71.2	90.5	95.2	96.2	375.8	355.3	339.9
124		Cashflow to Asset Real Post-tax			2.68%	(4,042.2)	95.9	59.6	87.3	93.0	94.0	365.4	339.3	319.9
125		Check on Vanilla WACC Cash Flow (nominal)			5.72%	(4,042.2)	109.6	69.7	96.0	104.0	107.8	430.8	414.5	404.0
126		Check on Vanilla WACC Cash Flow (real)			3.14%	(4,042.2)	106.9	66.4	89.2	94.2	95.3	371.5	348.7	331.6
127														
128		Return on Equity - Individual Years												
129														
130		Return on Equity												
131		Cashflow with Imputation					50.1	36.3	49.3	55.0	59.1	188.8	181.8	177.1
132		Add back Capex					313.9	317.8	308.8	306.5	312.4	-	-	-
133		Less Nominal Depreciation of Capital Base					(176.5)	(137.0)	(148.5)	(150.1)	(156.1)	(157.9)	(150.5)	(148.5)
134		Add Debt Repayment					(82.5)	(108.5)	(96.2)	(93.9)	(93.8)	94.8	90.3	89.1
135		Gives Nominal Return to Equity					105.1	108.7	113.4	117.5	121.6	125.7	121.6	117.7
136		Less Inflation in Equity Component					(40.4)	(41.8)	(43.6)	(45.2)	(46.8)	(48.3)	(46.8)	(45.3)
137		Gives Real Return to Equity					64.7	66.9	69.8	72.3	74.8	77.3	74.8	72.4
138		%ROE (1 year)					6.50%	6.50%	6.50%	6.50%	6.50%	6.50%	6.50%	6.50%
139		%real ROE (1 year)					3.90%	3.90%	3.90%	3.90%	3.90%	3.90%	3.90%	3.90%
140														
141		Equity at Start of Period					1,616.9	1,671.8	1,744.2	1,808.3	1,870.9	1,933.4	1,870.2	1,810.0
142														
143		Return on Equity - Access Arrangement Period												
144														
145		Revenue					-	525.8	489.3	483.8	513.2	525.4	-	-
146		Less Opex					-	(94.3)	(96.6)	(77.6)	(101.6)	(104.2)	-	-
147		Less Interest					-	(141.9)	(141.9)	(143.0)	(143.0)	(142.5)	-	-
148		Less Tax					-	(19.3)	(12.2)	(3.5)	(2.4)	(2.5)	-	-
149		Plus Imputation Credits					-	11.3	7.1	2.0	1.4	1.5	-	-
150		Less Capex					(4,042.2)	(313.9)	(317.8)	(308.8)	(306.5)	(312.4)	-	-
151		Less Loan Repayments					2,425.3	82.5	108.5	96.2	93.9	93.8	-	-
152		Capital Base Residual Value					-	-	-	-	-	1,933.4	-	-
153		Post-tax Return on Equity					(1,616.9)	50.1	36.3	49.3	55.0	1,992.5	-	-
154														
155		IRR (during access arrangement period)												
156		Target (during access arrangement period)												
157														
158		Summary for Generation of Graphs												
159														
160		Return on Capital					247.0	250.6	256.3	260.5	264.1	272.9	264.0	255.5
161		Opex					94.3	96.6	77.6	101.6	104.2	-	-	-
162		Revenue Adjustments					5.1	14.7	8.6	4.4	-	-	-	-
163		Return of Capital					176.5	137.0	148.5	150.1	156.1	157.9	150.5	148.5
164		Net Tax Costs					8.0	5.0	1.4	1.0	1.0	5.0	7.9	10.1
165		Building Block Total					530.9	504.0	492.4	517.6	525.4	435.8	422.3	414.1
166														

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 transmission 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 (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 transmission pipeline (row 34) less the value of imputation credits available to investing shareholders (row 35).

The costs are determined for each 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 non-tax income revenue adjustments (row 40). 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 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.²⁹

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 45 to 48).

Spreadsheet calculations

Tax payable in relation to the gas transmission pipeline for each year is calculated in rows 40 to 56, in four steps:

1. Pre-tax income (row 54) is calculated as the revenue subtotal less non-tax income revenue adjustments (row 40) less total tax expenses (row 49).
2. Tax loss carried forward is calculated (row 55).
3. Taxable income (row 53) 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 costs (rows 45 to 48) used in calculating the pre-tax income for the 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 2.3.10). Those revenue adjustments which are treated as a non-tax

²⁹ The timing of the capex cash flow is assumed to be mid-year.

income will be removed from pre-tax income (row 40). Similarly, those revenue adjustments which are treated as a tax expense will reduce pre-tax income (row 48). 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 the value of imputation credits (gamma). This offsetting benefit is equal to the value of imputation credits multiplied by the tax payable and is recorded in rows 35 and 57.

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 64. The present value (PV) for these cash flows at the start of the first year of the next access arrangement period is calculated in cell F64. The PV for capex is calculated in cell F65, and the PV of end of period assets in cell F66. 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 F63. 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 73 to 126 set out cash flow analysis including (rows 76 to 94) and excluding (rows 98 to 126) 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 98 to 105. 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 76 and row 108) 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 77 and 109) is obtained by further deducting the tax expense of the business. Rows 78 and 110 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 78 and 110).

The corresponding real cash flows and the respective IRRs are calculated in rows 80 to 82 and 112 to 114.

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 D76 and D108). 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 substantially 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 85 and 117) in calculating tax liabilities. Where the interest expense in a 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 a later period. This effect is analysed in rows 85 to 87 and rows 117 to 119. That part of interest expense used to defer tax is calculated in each year (rows 85 and 117) and the unused part carried forward is embodied in the tax loss carried forward calculation (row 86 and 118). 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 E87 and E119) 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 110.

The first section (rows 130 to 139) demonstrates the return to equity holders on an annual basis. The second section (rows 145 to 156) demonstrates the return to equity holders across the entire access arrangement period.

Summary for generation of graphs

Rows 160 to 165 provide a summary table presenting total revenue components in accordance with the categories listed in the NGR.³⁰

2.7 X factors sheet

It is common for the revenue stream resulting from the building block approach to be lumpy over the access arrangement period (e.g. because of a lumpy capex profile). These revenues, designed to deliver expected cost recovery, is regarded as undesirable because it can lead to price shocks for end users. Accordingly, rules 92 and 97 of the NGR require the AER to implement a revenue equalisation mechanism to smooth the time profile of revenues within an access arrangement period. We do this by implementing a tariff variation mechanism which ensures that total and forecast revenues over the course of an access arrangement period are equal in terms of present values.

The tariff variation mechanism is simply a price adjustment mechanism, and the operation of this mechanism is known as smoothing. The X factor is simply a price adjustment mechanism, and deriving the X factors is usually called smoothing. It does not relate to actual productivity improvements in the operations of a gas transmission service provider. However, this does not mean that the AER ignores productivity improvements when assessing a gas transmission service provider's revenue proposal. Instead, the AER includes any expectation of productivity gains directly into the forecasts of costs.

The **X factors** sheet applies the smoothing methodology under two tariff variation mechanisms, namely a CPI-X methodology and a more direct revenue targeting approach. Both smoothing approaches can be used interchangeably, and target the unsmoothed nominal revenues—that is, total revenue. Total revenue (rows 36 and 40) is sourced from the **Analysis** sheet. Under this approach, unsmoothed revenues for the access arrangement period are to be set equal to the smoothed revenues in NPV terms.

³⁰ NGR, r. 76.

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 G16.

X factors smoothing

Under the CPI-X revenue smoothing methodology, the smoothed revenue for each year of an access arrangement period is determined by escalating the prior year revenue by CPI-X, where the X factors are set so that the NPV of smoothed and unsmoothed revenues are equal.

The first macro that applies this approach has been set up to automatically calculate the default smoothing path. First, this entails setting the smoothed revenue for the first year equal to the unsmoothed revenue for that year (this will show as a change to the X factor in year 1, sometimes referred to as P_0). 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 NPV of smoothed and unsmoothed revenue is the same. To implement this macro, click on the button labelled 'Apply default smoothing'. After the calculation is completed, the required X factors will show in row 49.

Alternatively, it might be necessary to adjust the X factor for a specific year only. This includes when the user nominates its own smoothed revenue profile for each year in row 45 or during the annual debt update process. The buttons at rows 50 to 51 can be used to ensure that the NPVs of the smoothed and unsmoothed revenue streams are equal—that is, the difference between the NPVs is zero (cell R51). These buttons will iteratively update equity raising costs while smoothing that particular year's X factor (unless this default option is turned off, as noted above). This approach also allows some of the cost recovery to be deferred to subsequent years of the access arrangement period, as opposed to the revenue targeting approach below.

Revenue targeting smoothing

An alternative approach the user may take is to directly target a particular year's smoothed revenue for any change required to ensure revenue equalisation. This approach allows the user with forecast revenues in an external tariff model to input these revenues directly into the PTRM. Under this approach, macro buttons (rows 46 to 47) are available for each year of the access arrangement period to isolate any changes required—for equity raising costs and ensuring NPV neutrality—to that year's revenue forecast. Each button adjusts the corresponding year's forecast revenue only, while iteratively updating equity raising costs.³¹

The nominal smoothed revenue, based on either the nominated set of X factors or through direct input of forecast revenues to the PTRM, is displayed in row 45. The difference

³¹ Unless automatic updating of equity raising costs is turned off, in which case the only changes to the targeted revenue figure is to ensure NPV neutrality between total revenue and forecast revenue.

between the final year unsmoothed revenue and smoothed revenue is presented in cells R42 (nominal dollars) and R43 (percentage of unsmoothed revenue).

All NPV calculations in this sheet reflect the time varying WACC (row 7) which arises as a result of the return on debt (potentially) 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 unsmoothed revenue and smoothed revenue.³²

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 24 to 27, and row 53, will display caution notes/guidance based on logical tests of the PTRM.

Figure 10 provides an example of the **X factors** sheet.

Figure 10 X factors sheet

Year	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	
Discount Rates							
Nominal Vanilla WACC (varying)		6.11%	6.00%	5.88%	5.76%	5.65%	
Cumulative Discount Rate	1.00	1.06	1.12	1.19	1.26	1.33	
Inflation Assumption (CPI % increase) (constant)							
Cumulative Inflation Index (CPI end period)	1.00	1.03	1.05	1.08	1.10	1.13	
Instructions and Warnings							
The buttons below the row of X factors will smooth total revenue, while also iteratively updating equity raising costs. If you do not intend to update equity raising costs, use this drop down menu. <input type="button" value="update ERC when smoothing (default)"/>							
The "Default Smooth" option will set year 1 smoothed revenue equal to year 1 unsmoothed revenue, and then determine the constant X factor for all remaining years so that total NPV(smoothed) = NPV (unsmoothed). Hence, it should only be used at the start of the access arrangement period - adjust the X factor for individual years when updating the return on debt within a period.							
Select year of update for annual cost of debt: <input type="button" value="2020-21"/> This option affects which cautions are displayed (shown in this section, the sections below and on the input page) and the import into the DMS.							
Cautions: This section is blank because no cautions are active.							
Building Block Components (\$m, Nominal)							
Return on Capital		247.04	250.49	256.17	260.36	263.96	
Return of Capital (regulatory depreciation)		177.84	138.42	148.11	149.70	155.75	
Operating Expenditure		94.26	96.64	77.55	101.59	104.16	
Revenue Adjustments		(2.67)	(1.68)	5.82	7.06	2.72	
Net Tax Allowance		4.93	1.97	0.66	-	-	
Total Revenue (unsmoothed)		521.41	485.83	488.31	518.72	526.57	
Revenue Equalisation Calculation (\$m, Nominal)							
Unsmoothed - Total Revenue	500.00	521.41	485.83	488.31	518.72	526.57	
		-17.00	First year difference (\$m)			-15.11	Final year difference (\$m)
		-3.26%	First year difference (%)			-2.87%	Final year difference (%)
Smoothed - Forecast Revenue	500.00	504.41	506.17	507.92	509.69	511.46	
To smooth a particular year's revenue directly		<input type="button" value="Set rev_01"/>	<input type="button" value="Set rev_02"/>	<input type="button" value="Set rev_03"/>	<input type="button" value="Set rev_04"/>	<input type="button" value="Set rev_05"/>	
X Factors		<input type="button" value="P_0"/>	<input type="button" value="X_02"/>	<input type="button" value="X_03"/>	<input type="button" value="X_04"/>	<input type="button" value="X_05"/>	
positive P0, X imply real decrease in price/revenue constraint		1.58%	2.10%	2.10%	2.10%	2.10%	
	<input type="button" value="Apply default smoothing"/>	<input type="button" value="Set P_0"/>	<input type="button" value="Set X_02"/>	<input type="button" value="Set X_03"/>	<input type="button" value="Set X_04"/>	<input type="button" value="Set X_05"/>	
						-0.00	NPV difference (smoothed vs unsmoothed)
SMOOTHING REVENUE BASED ON BUILDING BLOCK MODEL							
Under the building block approach significant year to year variations in costs, forecast tariff demand and pricing can lead to undesirable lumpiness in calculated pricing designed to deliver the expected cost recovery.							
To minimise price shock, the revenue can be smoothed <i>within an access arrangement period</i> while maintaining the key principle of cost recovery under the building block approach. This is done by allowing some cost recovery to be diverted to adjacent years within the access arrangement period.							
This is done through a revenue equalisation mechanism as required by the National Gas Rules (rule 92) such that the NPV of the expected smoothed forecast revenue (cell R45) must equal the NPV of total revenue (cell R40).							

³² 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.

2.8 Revenue summary sheet

The **Revenue summary** sheet outlines the various building blocks. The building blocks and unsmoothed total revenue are summarised in rows 7 to 12. The smoothed forecast revenue and the X factors for the next access arrangement period are summarised in rows 16 and 17 respectively. The equivalent building blocks, unsmoothed and smoothed revenues, and X factors for the next access arrangement period in real dollar terms (start of year one) are also summarised in rows 21 to 31. All this information is sourced from the **Analysis** and **X factors** sheets.

Figure 11 provides an example of the **Revenue summary** sheet.

Figure 11 Revenue summary sheet

	D	E	F	G	H	I	J	K	Q	R	S	T	U
1	AEC												
2	Aus Gas - Revenue and Price Summary - TNSP PTRM - version 1												
3													
4	Year	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	Total					
5	Building Block Components (\$m Nominal)												
6													
7	Return on Capital		247.04	250.49	256.17	260.36	263.96	1,278.02					
8	Return of Capital (regulatory depreciation)		177.84	138.42	148.11	149.70	155.75	789.82					
9	Operating Expenditure		94.26	96.64	77.55	101.59	104.16	474.20					
10	Revenue Adjustments		(2.67)	(1.68)	5.82	7.06	2.72	11.25					
11	Net Tax Allowance		4.93	1.97	0.66	-	-	7.56					
12	Total Revenue (unsmoothed)	500.00	521.41	485.83	488.31	518.72	526.57	2,540.85			2,140.99	NPV	
13	Revenue Smoothing (\$m Nominal)												
14													
15	Forecast Revenue (smoothed)	500.00	504.41	506.17	507.92	509.69	511.46	2,539.65			2,140.99	NPV	
16	Annual Change in Forecast Revenue (%)		0.9%	0.3%	0.3%	0.3%	0.3%	n/a					
17													
18	Building Block Components (\$m Real 2019-20)												
19													
20													
21	Return on Capital		241.01	238.42	237.88	235.87	233.30	1,186.49					
22	Return of Capital (regulatory depreciation)		173.51	131.75	137.53	135.62	137.66	716.07					
23	Operating Expenditure		91.96	91.98	72.02	92.04	92.06	440.06					
24	Revenue Adjustments		(2.60)	(1.60)	5.40	6.40	2.40	10.00					
25	Net Tax Allowance		4.81	1.87	0.62	-	-	7.30					
26	Total Revenue (unsmoothed)	500.00	508.69	462.42	453.45	469.94	465.41	2,359.91					
27	Revenue Smoothing (\$m Real 2019-20)												
28													
29	Forecast Revenue (smoothed)	500.00	492.11	481.78	471.66	461.75	452.06	2,359.36					
30	Annual Change in Forecast Revenue (%)		-1.6%	-2.1%	-2.1%	-2.1%	-2.1%	n/a					
31													
32													

2.9 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.³³ 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.

³³ AER, *Final decision, Jemena Gas Networks access arrangement 2010–15*, June 2010, pp. 88–91.

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 **Inputs** 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 benchmark cash flow analysis set out in rows 19 to 34 are undertaken in nominal dollar terms and is used to determine the equity raising costs as follows:

- The revenues (row 19) sourced from the **X factors** sheet less expenses such as opex, interest payments, tax payable and other revenue adjustments (rows 20 to 23) sourced from the **Analysis** sheet provides the internal cash flow (row 24).
- The internal cash flow less dividends paid out to shareholders (row 25) provides the retained cash flow (row 26).
- The capex funding requirement (row 30) 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 31) 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 32), 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 33), where it is insufficient, indicates the additional equity requirement (row 34).³⁴

Rows 38 to 40 displays 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 32 to 34. Dividend reinvestment also in real dollar terms is displayed in row 42 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 Q46 calculates the total dividend reinvestment plan requirement based on the total amount set out at Q42. The total external equity requirement over the next access arrangement period is calculated at cell Q47 by taking the difference between the total equity requirement and the total dividend reinvestment. Cell Q48 displays the sum of the total dividend

³⁴ Where there is sufficient retained cash flow to cover the equity component of capex, the amounts shown in row 34 would be negative.

reinvestment plan requirement and the total external equity requirement. This is the total equity requirement.

Based on the total amount of dividends reinvested (cell Q46) and the external equity requirement (cell Q47) the cost for each of these component (sourced from the **PTRM input** sheet) is calculated in cells Q50 and Q51 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 Q52. 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 transmission pipeline.

The equity raising costs calculations must be performed iteratively because they are both an input to and an output from the building block calculation.³⁵ In other words, a change in the equity raising costs will change the total revenue and subsequently forecast revenue, which in turn changes the equity raising costs. Further, the equity raising costs 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 costs, 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 G16 of the **X factors** sheet.³⁶

Figure 12 provides an example of the **Equity raising costs** sheet.

³⁵ 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 on 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.

³⁶ In that case, the equity raising costs entered (in two places) in the **PTRM input** sheet will not be updated to reflect the calculation in the **Equity raising costs** sheet. A caution will appear in the **X factors** sheet (cell D26) when the relevant values do not align.

Figure 12 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	4,143.25	4,282.72	4,466.63	4,631.30	4,792.06	-	-	-	-	-	22,315.96
Capex	313.91	317.85	308.76	306.55	312.43	-	-	-	-	-	1,559.49
Capex Rate	7.58%	7.42%	6.91%	6.62%	6.52%	0.00%	0.00%	0.00%	0.00%	0.00%	6.99%
Dividend Assessment (\$m Nominal)											
Tax Payable	11.88	4.74	1.60	-	-	-	-	-	-	-	18.22
Dividends	24.94	9.96	3.36	-	-	-	-	-	-	-	38.25
Dividend Reinvestment	7.48	2.99	1.01	-	-	-	-	-	-	-	11.48
Benchmark Cash Flows (\$m Nominal)											
Revenue (smoothed)	504.41	506.17	507.92	509.69	511.46	-	-	-	-	-	2,539.65
Opex	94.26	96.64	77.55	101.59	104.16	-	-	-	-	-	474.20
Interest Payment	141.94	141.86	142.87	142.88	142.40	-	-	-	-	-	711.95
Revenue Adjustments	(2.67)	(1.68)	5.82	7.06	2.72	-	-	-	-	-	11.25
Tax Payable	11.88	4.74	1.60	-	-	-	-	-	-	-	18.22
Internal Cash Flow	259.00	264.61	280.08	258.15	262.19	-	-	-	-	-	1,324.03
Dividends	24.94	9.96	3.36	-	-	-	-	-	-	-	38.25
Retained Cash Flow (excl. dividend reinvestment)	234.06	254.65	276.73	258.15	262.19	-	-	-	-	-	1,285.78
Benchmark Capex Funding (\$m Nominal)											
Capex Funding Requirement	304.74	308.73	300.06	298.08	303.97	-	-	-	-	-	1,515.57
Debt Component	81.64	107.66	96.39	94.11	94.01	-	-	-	-	-	473.80
Equity Component	223.10	201.07	203.67	203.97	209.96	-	-	-	-	-	1,041.77
Retained Cash Flow (excl. dividend reinvestment)	234.06	254.65	276.73	258.15	262.19	-	-	-	-	-	1,285.78
Equity Requirement (SEO)	(10.96)	(53.58)	(73.06)	(54.18)	(52.23)	-	-	-	-	-	(244.01)
Benchmark Capex Funding (\$m Real 2019-20)											
Equity Component	217.66	191.38	189.13	184.79	185.57	-	-	-	-	-	968.53
Retained Cash Flow (excl. dividend reinvestment)	228.35	242.38	256.97	233.87	231.74	-	-	-	-	-	1,193.31
Equity Requirement	(10.69)	(51.00)	(67.84)	(49.08)	(46.17)	-	-	-	-	-	(224.78)
Dividend Reinvestment	7.30	2.84	0.93	-	-	-	-	-	-	-	11.08
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											-

2.10 Chart 1–Revenue

The **Chart 1–Revenue** sheet displays a chart that incorporates the:

- nominal and real unsmoothed revenues
- nominal and real smoothed revenues.

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

Figure 13 provides an example of the **Chart 1–Revenue** sheet.

2.11 Chart 2–Building blocks

The **Chart 2–Building blocks** sheet displays the various building block cost components making up the total revenue:

- return on capital
- regulatory depreciation
- opex
- net tax costs

- carry-over and other revenue adjustments.

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

Figure 14 provides an example of the **Chart 3–Building blocks** sheet.

Figure 13 Chart 1–Revenue sheet

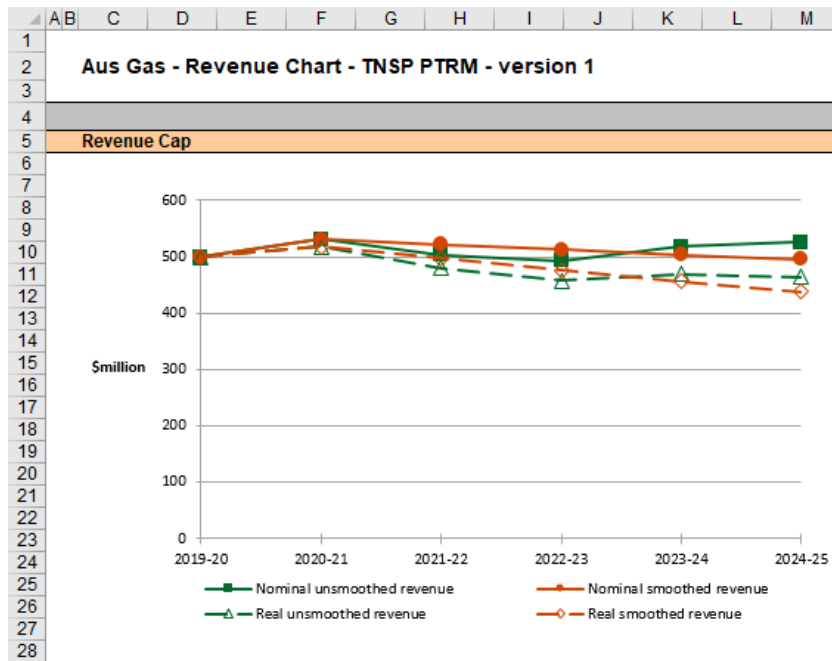
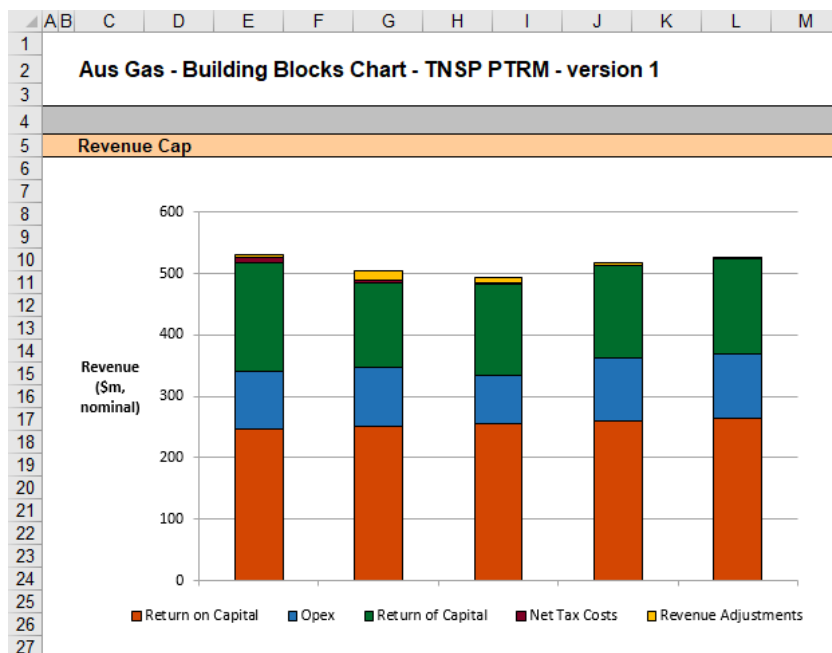


Figure 14 Chart 2–Building blocks sheet



3 Process for annual return on debt update

This section sets out the default 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 or forecast revenue for the final decision

1. Complete all inputs in the **PTRM input** sheet. This requires a trailing average portfolio return on debt value for the length of the access arrangement period in G487 to P487.³⁷ 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 G16) is set to 'update ERC when smoothing (default)'. This will ensure that the equity raising costs calculations are iteratively updated as part of setting the X factors.³⁸
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:
 - a. If applying the default X factor smoothing 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'.
 - b. If applying an alternative smoothing path under the X factor approach, manually enter values for all X factors (cells G49:P49) 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 also labelled as 'P0').
 - c. If forecast (smoothed) revenues are calculated externally to the PTRM, manually enter the forecast revenue values (cells G45:P45), then press the relevant year's button to ensure NPV neutrality between total (unsmoothed) and forecast (smoothed) revenues. The chosen year for smoothing can be any of the forecast revenue entries in the access arrangement period (including the first year).

³⁷ Also, the year-by-year tax rates (row 471) only require the first year (cell G471) to be entered; the PTRM will apply this tax rate to later years where there is no explicit tax rate entered.

³⁸ The 'do NOT update ERC when smoothing' option can be selected for certain analysis that seeks to isolate the impact of equity raising costs from the revenue requirement.

- d. In all cases, it is necessary to consider the resulting difference between the final year total revenue and smoothed revenue (shown in cells R42 and R43). 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) or (c) and manually adjust one or more of either the X factors or the forecast revenues again (ensuring that the final adjustment uses the relevant button so as to jointly smooth for the revenue and equity raising costs calculations).

3.2 Updating X factors or forecast revenue annually

To update the X factors or forecast revenue 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 487), 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.³⁹ Caution notes will appear in rows 488 to 489 of the **PTRM input** sheet to show which inputs are necessary. No other inputs should be changed.
3. In the **X factors** sheet, ensure that the equity raising costs update option (cell G16) is set to 'update ERC when smoothing (default)'.
4. In the **X factors** sheet, apply smoothing to recalculate either the X factor or forecast revenue using the button for the relevant year as identified in step 1. The correct year for update will be identified by a caution note in row 53 under the smoothing macro buttons. It is important that the X factors and forecast revenues for past years in the access arrangement period are not altered, since these reflect the revenue outcomes from those years. Further, the default approach is that only the X factor or forecast revenue for the year of update should be altered (rather than multiple X factors or forecast revenue figures, for this year and remaining years within the access arrangement period).⁴⁰ 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, to re-smooth for a return on debt update in year 2, either the button labelled 'Set X_02' or 'Set rev_02' would be used. Where 'Set X_02' is used all other X factors as determined during the final decision process would remain unaltered. Similarly, where 'Set rev_02' is used all other forecast revenue figures would remain unaltered.

³⁹ 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.

⁴⁰ If a user was to propose an alternative approach (for instance, where multiple X factors or forecast revenue values 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.