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**Public version**

# Electricity and Gas Input Methodologies Determination Amendments (No.2) 2012

## Reasons Paper

Amendments made under s 52X of the Commerce Act 1986 to the timing of cash flows in the input methodologies applicable to customised price-quality path proposals for electricity and gas distribution businesses and gas transmission businesses contained in Decisions [2012] NZCC 26, [2012] NZCC 27, and [2012] NZCC 28

Date: 15 November 2012

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# Chapter 1: Introduction

## Purpose of this paper

1. This paper explains our decisions to amend certain input methodologies for electricity distribution businesses (EDBs), gas distribution businesses (GDBs) and gas transmission businesses (GTBs).

2. The decisions relate to the assumptions of the timing of cash flows used to determine customised price-quality paths (CPPs).

## Cash flow timing assumptions for CPPs

3. Suppliers of electricity lines services and gas pipeline services who are subject to a default price-quality path may apply for a customised price-quality path to better meet their particular circumstances.[1]

4. The requirements for making a CPP proposal, and determining a customised price path, are set out in the CPP input methodologies—which were originally determined in December 2010, and re-determined in September 2012.[2] These input methodologies include implicit assumptions for when various building block items used to determine the supplier's price path occur as forecast cash flows. Most of the forecast cash flow inputs were assumed to occur at year-end.

5. This amendment decision makes the timing of the cash flow assumptions explicit for the purposes of the CPP input methodologies. For clarity, it does not alter the regulatory framework or the interaction between the input methodologies.[3]

## Overview of our decisions

6. We have amended the assumptions in the CPP input methodologies to recognise the forecast timing of cash flow items. We consider these amendments will better promote the purpose of Part 4. A summary of our decisions on the amended cash flow timing assumptions for CPPs is set out in Table 1 overleaf.

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1 See s 53K of the Commerce Act 1986.

2 For more information on the re-determination of input methodologies please visit http://www.comcom.govt.nz/additional-input-methodologies-for-electricity-and-gas-dpps/.

3 See Commerce Commission, *Input Methodologies (Electricity Distribution and Gas Pipeline Services) Reasons Paper*, December 2010.

**Table 1: Overview of amended cash flow timing assumptions for CPPs**

| Building block item | Forecast timing assumption | Implementation in IM |
|---|---|---|
| **Revenue** | 20th day of the following month | Aggregate revenue received 148 days before year end |
| **Operating expenditure** | Evenly during the year | Aggregate opex paid at mid-year |
| **Commissioned assets** | Commissioning date | The cash flow is now reflected on a present value basis[4] |
| **Disposed assets** | Disposal date | Disposals have been removed from the building blocks formula, consistent with the original IMs[5] |
| **Tax** | Instalments during the year | Aggregate tax is paid at mid-year |
| **Other regulatory income** | Evenly during the year | Other regulatory income is received at mid-year |
| **Term credit spread differential allowance** | Evenly during the year | TCSD allowance occurs at mid-year |

## How we have given effect to the amendments

7. To give effect to our decisions on the cash flow timing assumptions for CPPs, we have amended the CPP input methodologies contained in the following determinations:

- *Electricity Distribution Services Input Methodologies Determination 2012*, [2012] NZCC 26, 28 September 2012 (the EDB Determination);
- *Gas Distribution Services Input Methodologies Determination 2012*, [2012] NZCC 27, 28 September 2012 (the GDB Determination); and
- *Gas Transmission Services Input Methodologies Determination 2012*, [2012] NZCC 28, 28 September 2012 (the GTB Determination).

[4] There is no change to the timing assumption for this building block item. However, consistent with the application of cash flows in other building block items, the calculation of the value of this item has been amended from the proportionate investment calculation which previously applied. It is now expressed as a year end present value calculation. Refer to Attachment A for the derivation of the applicable timing factor.

[5] Under the original input methodologies, asset disposals were only reflected as an adjustment to the cost of capital calculation. They were not modelled or included as a building block on their own account in the year of disposal. Amending the input methodologies at this time to bring disposals in as a building block item is outside of the scope of the consultation on cash flow timing assumptions. We have therefore not made an amendment to the building blocks to reflect the impact of forecast disposals of assets. Consistent with this approach, the adjustment to the cost of capital calculation in the year of disposal has been removed.

8. The details of the amendments are contained in the *Electricity and Gas Input Methodology Determination Amendments (No. 2) 2012* [2012] NZCC 34, 15 November 2012 (IM amendments determination).

9. A copy of the IM amendments determination can be viewed on our web site at: *http://www.comcom.govt.nz/amendments-and-clarifications/*

10. The amendments to the input methodologies take effect the day after this decision is published in the *Gazette*, and apply to any CPP applications received by the Commission after that date. This means the amendments will apply to CPP proposal applications submitted to us after the date of publication, including any applications made in the January/February 2013 CPP proposal window for EDBs.

**Structure of this paper**

11. The remainder of this paper is structured as follows:

    11.1 **Chapter 2: CPP input methodologies amendments for cash flow timing**—This chapter provides our reasons for our decisions on the amended cash flow timing assumptions for CPPs.

    11.2 **Attachment A: Derivation of CPP building blocks revenue formulae—**This attachment shows the derivation of the CPP building blocks revenue formulae for EDBs and GDBs, and separately for GTBs, to help CPP applicants prepare their price path modelling for a CPP proposal.

# Chapter 2: CPP input methodologies amendments for forecast cash flow timing

## Purpose

12. This chapter provides an overview of, and reasons for, our decisions on cash flow timings for CPPs. These reasons support the general framework for CPP cash flow timings set out the December 2010 input methodologies reasons paper, and replace reasoning outdated by the amendments where relevant.[6]

## Forecast cash flow timings for CPPs

13. More accurate modelling of the price path in CPP proposal applications will reduce the likelihood that a CPP applicant will under- or over-recover returns for the CPP regulatory period after taking account of the time value of money.[7] This will result in customised price paths that more accurately reflect the expenditure that would be seen in competitive markets, and in particular, limit any excessive profits that may arise when assuming end-of-year timing of cash flows.

14. This change in timing assumptions recognises that CPP applicants will incur and receive cash flows at various times throughout each year. Using the amended forecast cash flow timing assumptions in CPP proposals will more accurately reflect the forecast cash flows of the CPP applicant compared with using year-end assumptions.

    Our decisions on the forecast cash flow timing assumptions for CPPs are:

    14.1 ***Revenue***—*forecast even monthly revenues to be recognised as being received on the 20th day of each following month*. Suppliers generally expect to receive revenue from electricity distribution services or gas pipeline services on the 20th day of the month following supply. This is the industry standard, and late payment generally attracts additional fees or interest. Assuming that revenues are received evenly throughout the year on this basis is equivalent to assuming that forecast aggregate revenues are received slightly later than mid-year on average.[8] While there is some seasonality of accrued revenue, this is somewhat offset by the timing effect of when revenues are actually received. We expect that any forecast seasonality of revenues would not materially detract from this assumption.

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6 Supra n 3.

7 Providing incentives for suppliers to innovate and invest in replacement, upgraded, and new assets is referred to in s 52A(a) as part of the purpose of Part 4, as well as limiting the ability of suppliers to extract excessive profits in s 52A(1)(d). We consider our decisions promote both of these outcomes.

8 We have concluded that recognising revenues at 3 November (the mid point between 20 May and the following 20 May), which is 148 days prior to the end of the disclosure year, is the appropriate way to recognise this timing assumption in the building blocks formulae. In the case of GDBs or GTBs that have a disclosure year ending on other than 31 March, the date for recognition of forecast revenue cash flows will be 148 days prior to the end of each year in the CPP regulatory period.

14.2 ***Operating expenditure***—*to be recognised as occurring evenly during the year*. Operating expenditure is generally incurred on standard commercial terms, ie, the 20th day of the following month; and other expenses are often paid somewhat earlier, such as salaries and wages. Assuming that forecast operating expenditure is paid on this basis evenly throughout the year, then treating the aggregate operating expenditure as being paid mid-year is a reasonable approximation of the timing of operating expenditure.

14.3 ***Commissioned assets***—*to be recognised at commissioning date*. The CPP input methodologies provide for commissioned assets to be recognised according to their forecast commissioning dates. In conjunction with the works under construction allowance provided for in the input methodologies, in our view this provides a reasonable reflection of the actual timing of forecast capital project payments. To the extent this does not take into account cash payments that occur after the commissioning date, it would be to the benefit of regulated suppliers. The calculation of the notional deductible interest for the purposes of the tax building block continues to adopt the relevant forecast commissioning dates. There has been no change to that treatment.

14.4 ***Disposed assets***—*to be recognised at disposal date*. Consistent with the original CPP input methodologies treatment of forecast disposed assets, the value of disposed assets is not modelled as a cash flow. The cost of capital building block has been amended to remove the value of disposed assets from the forecast cost of capital in the year of disposal. The calculation of the notional deductible interest for the purposes of the tax building block continues to adopt the relevant forecast disposal dates. There has been no change to that treatment.

14.5 ***Tax***—*to be recognised as occurring evenly during the year*. Corporate tax is required to be paid on the provisional and terminal tax dates, which average out to later than mid-year. A mid-year timing assumption for the forecast tax amount is likely to be closer to actual cash flow timing than the end of year assumption originally implicit in the CPP building blocks formula.

14.6 ***Other regulatory income***—*to be recognised as being received evenly during the year*. An assumption that suppliers receive other regulatory income evenly during the year is consistent with a cash flow timing assumption that other regulatory income is received, in aggregate, at mid-year. As other regulatory income could generally expect to represent a relatively small proportion of overall income, we consider that there should not be any material difference between these different timing assumptions. However, a mid-year assumption is consistent with general revenue and operating expenditure, and in the interests of consistency these should be aligned.

14.7 ***Term credit spread differential allowance***—*to be recognised as occurring evenly during the year*. The costs of issuing debt generally occur in relation to the issue dates of the particular debt instruments, however an assumption that those costs occur, on average, evenly throughout the year is consistent with an expectation that an efficient firm would arrange its debt financing obligations to match its overall net cash flows. A mid-year timing assumption is consistent with this and would have the additional benefit of reflecting the calculation of the notional interest deduction for tax purposes on a mid-year basis.

15. The timing of depreciation and revaluations has not been reconsidered, since these are non-cash items in the context of the relevant CPP building blocks formulae.

**Consultation on cash flow timing**

16. This section provides a background to historic discussion of cash flow timings and provides our views on consultation on our August 2012 draft decisions.

*Background to our draft decision*

17. We first proposed the amended forecast cash flow timing as part of our July 2011 draft decision for the reset of the electricity default price-quality paths (DPPs). At that time, and in that context, submissions[9] were generally opposed to the amended cash flow timing assumptions, citing:

17.1 an additional level of complexity

17.2 inconsistency with the input methodologies for CPPs, on the basis that they originally included implicit year-end cash flow timing assumptions.

18. One of the points raised by submitters at that time was that more accurate timings could mean undue added complexity.[10]

19. The amended cash flow timings were retained in our December 2011 update paper for additional input methodologies for default price-quality paths, with clarifications to address some submitters' earlier concerns. The subsequent submissions were more favourable:

19.1 PwC (on behalf of Powerco) supported our proposal, stating "[it would] provide a close approximation for the timing of revenue for the EDBs under

[9] For example, Vector, *Submission to Commerce Commission on Draft Decision on Starting Price Adjustments for Electricity Distribution Businesses*, 24 August 2011, page 16.

[10] For example, Vector, *Submission to Commerce Commission on Draft Decision on Starting Price Adjustments for Electricity Distribution Businesses*, 24 August 2011, page 16.

the standard arrangement in the industry whereby EDBs invoice monthly in arrears and are paid on the 20th of the following month."[11]

19.2 Powerco's view was that it preferred the simplicity of the Australian/CPP approach, but acknowledged PwC's statement and accepted the Commission's proposed approach.[12]

ENA submitted that the cash flow timings should include explicit recognition of a lag between when revenue cash flows are received relative to expenditure cash flows (working capital allowance).[13]

*Our draft decision to amend CPP cash flow timing*

20. We released our draft CPP cash flow timing proposals for consultation in August 2012. The consultation papers included our draft decisions and reasons, and provided supplemental technical information including the proposed amendments to the input methodologies and the derivation of applicable building blocks formulae.[14]

21. We received two submissions in response to the August 2012 consultation; one each from ENA and PwC—both of which essentially covered similar points as the earlier DPP submissions.[15] We have considered both these submissions in making our final decision, and our views on cash flow timing in light of these submissions are set out below.[16]

22. CPPs are supplier-specific and allow for a greater level of detail than default price-quality paths. We proposed that cash flow timing assumptions could and should be made even more accurate, for instance, by having regard to forecast monthly or daily forecast transactions of individual suppliers.

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11 PwC*, Additional Input Methodologies for Default Price-Quality Paths: Process and Issues Paper (prepared as Appendix 2 to Powerco's report)*, 27 January 2012, page 7.

12 Powerco*, Submission on Additional Input Methodologies for Default Price-Quality Paths – Process and Issues Paper,* 27 January 2012*,* paragraphs 79-80.

13 ENA, *Submission on Additional Input Methodologies for Default Price-Quality Paths*, 27 January 2012, paragraph 25.

14 *Consultation on Electricity and Gas Input Methodologies: Cash flow timing for customised price-quality paths*, 10 August 2012, and *Supplement to the consultation on Electricity and Gas Input Methodologies: Cash flow timing for customised price-quality paths*, 31 August 2012.

15 ENA, *Submission on Consultation on Electricity and Gas Input methodologies: Cash flow timing for customised price-quality paths*, 21 September 2012, *Executive summary* on pages 2 and 3, and PwC, *Submission to the Commerce Commission on Electricity and gas Input Methodologies: Cash flow timing for customised price-quality paths, Made on behalf of 19 Electricity Distribution Businesses*, 21 September 2012, *Summary* on page 2.

16 In our August 2012 consultation we indicated we did not expect to hold technical consultation prior to making a final decision but would review this position in light of submissions. Having reviewed submissions and changes from our draft position, we concluded that an additional separate technical consultation was not required.

23. We concluded that, except for the existing CPP input methodologies cash flow timing for forecast commissioned assets, amending the input methodologies to reflect specific transactions for other building block items at this level of detail is not appropriate. The level of detail that would be required in a CPP proposal would be likely to exceed that typically employed by suppliers in their own cash flow planning. (particularly as forecasts in a CPP proposal would reach out over a regulatory period of up to five years).

24. Requiring a greater level of detail is likely to impose administrative costs on suppliers which outweigh the benefits of more accurate timing. It is possible that a CPP applicant may want to adopt more specific timings than those proposed (or less specific, if there are information constraints). In this case, the CPP applicant is able to apply for the input methodology to be varied for the purpose of its CPP by agreement with the Commission under s 53V(2)(c) of the Commerce Act 1986.

25. We consider that our CPP input methodologies amendments achieve an appropriate balance between the benefits of increased accuracy for CPPs while minimising the administrative costs of compliance, particularly in light of the expected materiality of the change for price paths.

26. CPPs fit within an overall regulatory framework encompassing DPPs, CPPs and information disclosure (ID). The amendments are consistent with the overall approach for cash flow timings for ID regulation which will apply, in the case of EDBs, from 2013, although small differences will exist in light of the regulatory purposes of each of the instruments. For example, cash flow timing assumptions are integral to the formulae in the schedules of the EDB and GPB ID determinations.[17] The reasons for those decisions are discussed in the EDB/GPB ID reasons paper.[18]

27. Notably, in response to our supplemental information (ie, the building blocks formulae derivations and the marked up drafting changes), ENA proposed an alternative arrangement of the elements of the building blocks formula and an amendment to the maximum allowable revenue (MAR) formula.

28. We concluded that neither of these changes are necessary to give effect to the amendments to the cash flow timing assumptions. The derivation of the items comprising the building blocks allowable revenue formulae in Attachment A is sufficiently clear that no further rearrangement of the items is required. The existing MAR definition is not affected by the change in the cash flow assumptions.

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[17] See the *Electricity Distribution Information Disclosure Determination 2012,* [2012] NZCC 22, *Gas Distribution Information Disclosure Determination 2012, [2012] NZCC 23*, and the *Gas Transmission Information Disclosure Determination 2012, [2012] NZCC 24*, 1 October 2012.

[18] *Information Disclosure for Electricity Distribution Businesses and Gas Pipeline Businesses: Final Reasons Paper*, 1 October 2012, paragraphs 3.22 to 3.36 and Attachment E.

## Attachment A: Derivation of CPP building blocks revenue formulae

### Purpose

29. This attachment provides an algebraic derivation that shows how the cash flow timing assumptions can be incorporated into the CPP 'building blocks allowable revenue before tax' formulae. Two approaches are described:

    29.1 Derivation using the deferred tax approach, applied to EDBs and GDBs; and

    29.2 Derivation using the tax payable approach, applied to GTBs.

### Derivation for deferred tax approach (EDB Determination and GDB Determination)

30. We derive in this part of the attachment a formula for the annual revenue requirement of a regulated business that is subject to a customised price path where a deferred tax approach is used for the determination of the tax allowance. The formula uses given cash flow timing assumptions, the opening RAB at the start of the year, the operating expenditure, the change in the deferred tax balance in the year and a number of other variables.

31. This derivation focuses on just one year in a regulatory period, not on a multi-year regulatory period as a whole. Under the input methodologies, the formulae derived would be used to calculate the building blocks revenue for each year, which would then be "smoothed" to form a CPI minus X price path.

### Variable definitions (EDBs and GDBs)

*Input variables*[19]

32. The following are the defined input variables for the derivation:

| | |
|---|---|
| $RAB_0$ | RAB at start of the year |
| $DT_0$ | Deferred tax asset value at the start of the year |
| WACC | Weighted Average Cost of Capital (used as the discount rate) |
| O | Operating Expenditure, net of pass through costs and recoverable costs |
| D | Regulatory Depreciation |
| $D_{tax}$ | Tax Depreciation |
| TCSD | Term Credit Spread Differential Allowance |
| NDI | Notional Deductible Interest (which includes TCSD) |
| PD | Permanent Differences |
| Reval | Revaluation |
| VCA | Value of Commissioned Assets |
| t | Company tax rate |
| RTA | Regulatory Tax Adjustments |

[19] These "Input Variables" are inputs to this derivation, not necessarily inputs to a spreadsheet model. For example, they include regulatory depreciation which is treated as a given input in this derivation, but it will be calculated from other parameters in any spreadsheet model.

| | |
|---|---|
| ΔDT | Increase in deferred tax asset value during the year |
| Dispos | Sum of the opening RAB value of assets disposed of during the year |
| ORI | Other Regulated Income |

*Derived values (i.e. formulae are provided in this derivation)*

33. The following are derived values obtained from the input variables and the following equations:

| | |
|---|---|
| $RAB_1$ | RAB at end of the year |
| $DT_1$ | Deferred tax asset value at the end of the year |
| TP | Tax Payable |
| TA | Tax Allowance |
| Rev | Revenue requirement from prices for the year, i.e. building blocks revenue before tax[20] |
| RIV | Regulatory Investment Value |

*Present value functions*

34. The following are the defined present value functions:

| | |
|---|---|
| $PV_{start}()$ | Present value as at the start of the year |
| $PV_{end}()$ | Present value as at the end of the year |
| $PV_{VCA}$ | Present value, as at the start of the year, of the value of commissioned assets, the timing of the associated nominal cash flows being the commissioning dates |

**Timing factors for EDBs and GDBs (except asset commissioning)**

35. The timing factor calculation for GTBs is the same as for EDBs and GDBs.

36. A timing factor (TF) reflects the year-end value of a cash flow that occurs part-way through the year. For example, operating expenditure, tax payments and interest payments are assumed to occur at mid year, so half a year of discounting at WACC is required to determine the equivalent value at year-end. Thus:

$$TF_{opex} = (1 + WACC)^{182/365}$$

$$TF_{tax} = (1 + WACC)^{182/365}$$

$$TF_{ORI} = (1 + WACC)^{182/365}$$

$$TF_{TCSD} = (1 + WACC)^{182/365}$$

[20] This is the revenue amount, excluding other regulatory income, received on the revenue date during the year, not an amount expressed in year-end terms.

37. Because they result in the same calculation, the above factors can be redefined as a single TF factor – 'TF' – reflecting a mid-year cash flow timing assumption in the CPP building blocks formula (see below).

38. Revenue has been assumed to occur with timing equivalent to being received on 3 November each year for suppliers with a 31 March regulatory balance date[21]. There are 148 days between 3 November and the end of the financial year on the following 31 March, which means that the timing factor for revenue is given by:

$$TF_{rev} = (1 + WACC)^{148/365}$$

39. This timing factor is also appropriate for regulated suppliers with a regulatory balance date other than 31 March (such as gas suppliers with a 30 June or 31 December balance date).

40. These TF values are applied when calculating the $PV_{end}()$ of a cash flow. For example:

$$PV_{end}(Rev) = Rev * TF_{rev}$$

41. The $PV_{end}()$ function can be applied in a similar fashion for each of the other cash flows.

**Timing factor for asset commissioning (EDBs and GDBs)**

42. The forecast timing of asset commissioning reflects assumptions specific to each CPP applicant.

43. Each CPP applicant must calculate the present value of its forecast value of commissioned assets for each year of the CPP regulatory period using the WACC as the discount rate.

44. The present value for each year would be as at the first day of that year.

45. If the total value of assets commissioned in a year is denoted as "VCA", and the present value of the series of individual amounts in a year is denoted by "$PV_{VCA}$", then the timing factor for the commissioned assets is calculated according to the formula for $TF_{VCA}$ derived below.

46. As $PV_{VCA}$ is the value of the commissioned assets discounted to the start of the year, the following quantity will be the value of the commissioned assets discounted to the end of the year:

$$PV_{VCA} * (1 + WACC)$$

[21] The 3 November date is the equivalent in time value of money terms to revenues being received in 12 equal monthly instalments on the 20th of the month following the provision of the service.

47. The timing factor $TF_{VCA}$ is the factor that relates the sum of the individual values of commissioned assets to the value discount to the end of the year, such that:

$$\text{Value of commissioned assets discounted to year-end} = TF_{VCA} * VCA$$

48. Equating these two methods of expressing the year-end values gives:

$$PV_{VCA} * (1 + WACC) = TF_{VCA} * VCA$$

49. Therefore:

$$TF_{VCA} = PV_{VCA} * (1 + WACC) / VCA$$

**Equations on which derivation is based (EDBs and GDBs)**

50. The equations which form the basis of this derivation are:

*Financial Capital Maintenance equation*

51. The following equation expresses the financial capital maintenance approach of having the opening total value[22] of the assets equal to the sum of the present value of cash flows over a year plus the discounted total asset value at the end of that year:

$$RAB_0 + DT_0 = PV_{start}(\text{Cash flows}) + (RAB_1 + DT_1)/(1 + WACC) \qquad 1$$

52. When applying this equation, the commissioning of an asset is treated as if it results in a cash flow, on the basis that at the time of asset commissioning, the supplier is treated as having to have paid the "value of commissioned asset", which includes an allowance for finance during construction.

*RAB roll-forward equation*

53. The roll-forward of the RAB from one year to the next[23] is reflected in the input methodologies by:

$$RAB_1 = RAB_0 + VCA - D + Reval - Dispos$$

54. However, as noted in Chapter 2, no proceeds of sale of disposed assets or costs of disposal amounts have been modelled in the forecast year of disposal, which is consistent with the approach currently used in the EDB Determination and GDB Determination. This means that the RAB roll-forward equation for the purposes of deriving the building blocks formula becomes:

$$RAB_1 = RAB_0 + VCA - D + Reval \qquad 2$$

[22] This total opening value includes the value of the deferred tax asset.

[23] This RAB roll-forward equation is consistent with the RAB roll-forward approach in the EDB IM of December 2010, Clauses and 2.2.4 and 5.3.6, (and equivalent clauses in the GDB IMs).

*Tax Allowance*

55. The tax allowance, in the absence of tax losses, is given by:[24]

$$TA = (Rev + ORI - O - D + PD + RTA) * t \quad (3)$$

*Deferred tax balance roll-forward*

56. The roll-forward of the deferred tax balance from one year to the next is given by:

$$DT_1 = DT_0 + \Delta DT \quad (4)$$

*Tax payable*

57. The formula for tax payable is as follows:

$$TP = TA + \Delta DT \quad (5)$$

*Year-end present values, relative to year-start*

58. The present value of a set of cash flows as at the end of the year is (1 + WACC) multiplied by the present value at the start of the year:

$$PV_{end}(\text{Cash flows}) = PV_{start}(\text{Cash flows}) * (1+ WACC) \quad (6)$$

**Derivation (EDBs and GDBs)**

59. The derivation of a formula for the annual revenue requirement is set out below, based on the six equations above (Equations 1 to 6).

60. Equation 1 multiplied by (1 + WACC) becomes, after applying Equation 6:

$$(RAB_0 + DT_0) * (1 + WACC) = PV_{end}(\text{Cash flows}) + RAB_1 + DT_1$$

61. Subtracting $(RAB_0 + DT_0)$ from each side of this equation gives:

$$(RAB_0 + DT_0) * WACC = PV_{end}(\text{Cash flows}) + RAB_1 - RAB_0 + DT_1 - DT_0$$

62. Recognising that the cash flows comprise Rev, O, VCA, TCSD, TP and ORI, and applying Equation 4 gives:

$$(RAB_0 + DT_0) * WACC = PV_{end}(\text{Rev, O, VCA, TCSD, TP and ORI}) + RAB_1 - RAB_0 + \Delta DT$$

[24] This tax allowance equation is consistent with the tax allowance approach in clause 5.3.13 of the 2010 Input Methodologies Determinations for EDBs (and equivalent clauses in the GDB IMs).

63. Equation 2 indicates that $RAB_1 - RAB_0 = VCA - D + Reval$, and applying this to the equation above gives:

$$(RAB_0 + DT_0) * WACC = PV_{end}(Rev, O, VCA, TCSD, TP \text{ and } ORI) + VCA - D + Reval + \Delta DT$$

64. Expanding the $PV_{end}()$ function above using the timing factors gives:

$$(RAB_0 + DT_0) * WACC = Rev*TF_{rev} - O*TF_{opex} - VCA*TF_{VCA} - TCSD * TF_{TCSD} - TP*TF_{tax} + ORI*TF_{ORI} + VCA - D + Reval + \Delta DT \quad 7$$

65. We define the variable, Regulatory Investment Value (RIV) as follows:

$$RIV = RAB_0 + DT_0$$

66. Substituting in Equation 7 the variable RIV for $RAB_0 + DT_0$ and substituting the right-hand-side of Equation 5 for TP gives:

$$RIV * WACC = Rev*TF_{rev} - O*TF_{opex} - VCA*TF_{VCA} - TCSD * TF_{TCSD} - (TA + \Delta DT) *TF_{tax} + ORI*TF_{ORI} + VCA - D + Reval + \Delta DT \quad 8$$

67. The expression for TA in Equation 3 is:

$$TA = (Rev + ORI - O - D + PD + RTA) * t$$

68. Substituting the right-hand-side of this expression for TA in Equation 8 gives:

$$RIV * WACC = Rev*TF_{rev} - O*TF_{opex} - VCA*TF_{VCA} - TCSD * TF_{TCSD} - ((Rev + ORI - O - D + PD + RTA) * t + \Delta DT) *TF_{tax} + ORI*TF_{ORI} + VCA - D + Reval + \Delta DT \quad 9$$

69. Collecting terms in Rev to the left-hand-side gives:

$$Rev*(TF_{rev} - t * TF_{tax}) = RIV * WACC + O*TF_{opex} + VCA*TF_{VCA} + TCSD * TF_{TCSD} + ((ORI - O - D + PD + RTA) * t + \Delta DT) *TF_{tax} - ORI*TF_{ORI} - VCA + D - Reval - \Delta DT$$

70. Dividing both sides of this equation by $TF_{rev} - t * TF_{tax}$ gives:

$$Rev = \left(RIV * WACC + O*TF_{opex} + VCA*TF_{VCA} + TCSD * TF_{TCSD} - Reval\right) / (TF_{rev} - t * TF_{tax}) + \left((ORI - O - D + PD + RTA) * t + \Delta DT\right) *TF_{tax} - ORI*TF_{ORI} - VCA + D - \Delta DT\right) / (TF_{rev} - t * TF_{tax})$$

71. Collecting terms in O together, and collecting terms in D together gives:

$$\begin{aligned}Rev = &\left(RIV * WACC + VCA*TF_{VCA} + TCSD * TF_{TCSD}\right)/(TF_{rev} - t * TF_{tax})\\ &+ \left(O*TF_{opex} - O * t * TF_{tax} + D - D * t * TF_{tax}\right.\\ &+ ((ORI + PD + RTA) * t + \Delta DT) * TF_{tax}\\ &\left. - ORI*TF_{ORI} - VCA - Reval - \Delta DT\right)/(TF_{rev} - t * TF_{tax})\end{aligned}$$

72. Similarly collecting terms in VCA, ORI and ΔDT together gives:

$$\begin{aligned}Rev = &\left(RIV * WACC + VCA*TF_{VCA} - VCA + TCSD * TF_{TCSD}\right)/(TF_{rev} - t * TF_{tax})\\ &+ \left(O*TF_{opex} - O * t * TF_{tax} + D - D * t * TF_{tax}\right.\\ &- ORI*TF_{ORI} + ORI * t * TF_{tax} + \Delta DT * TF_{tax} - \Delta DT\\ &\left. + (PD + RTA) * t * TF_{tax} - Reval\right)/(TF_{rev} - t * TF_{tax})\end{aligned}$$

73. Taking out the common factors VCA, O, D and ΔDT gives, after some re-ordering:

$$\begin{aligned}Rev = &\left(RIV * WACC + VCA*(TF_{VCA} - 1) + TCSD * TF_{TCSD} - Reval\right)/(TF_{rev} - t * TF_{tax})\\ &+ \left(O*(TF_{opex} - t * TF_{tax}) + D * (1 - t * TF_{tax}) - ORI*(TF_{ORI} - t * TF_{tax})\right.\\ &\left. + \Delta DT*(TF_{tax} - 1) + (PD + RTA) * t * TF_{tax} - Reval\right)\\ &/(TF_{rev} - t * TF_{tax}) \qquad 10\end{aligned}$$

74. In implementing Equation 10, we take the value of $TF_{TCSD}$, $TF_{opex}$, $TF_{tax}$ and $TF_{ORI}$ to be equal to each other as the timing to which each of these factors relates is mid year timing, or $TF_{mid}$.

75. Making these changes in Equation 10 gives:

$$\begin{aligned}Rev = &\left(RIV * WACC + VCA*(TF_{VCA} - 1) + TCSD * TF_{mid} - Reval\right)/(TF_{rev} - t * TF_{mid})\\ &+ \left(D * (1 - t * TF_{mid}) + O* TF_{mid} * (1 - t) - ORI* TF_{mid} * (1 - t)\right.\\ &\left. + \Delta DT*(TF_{mid} - 1) + (PD + RTA) * t * TF_{mid}\right)/(TF_{rev} - t * TF_{mid}) \qquad 11\end{aligned}$$

**Implementation of formula in EDB and GDB CPP IMs**

76. Substituting the terms in Equation 11 with the equivalent defined terms for building blocks allowable revenue before tax[25] in the EDB Determination (or GDB Determination) as it was prior to the current amendment gives the following corresponding expressions (defined terms in the IMs are **bolded**):

(**regulatory investment value** × **cost of capital**
+ total value of commissioned assets × ($TF_{VCA}$ - 1)
+ **term credit spread differential allowance** × TF - **total revaluation**)
÷ ($TF_{rev}$ - **corporate tax rate** × TF)

+ (**total depreciation ×** (1 – **corporate tax rate** × TF)

+ **forecast operating expenditure** × TF × (1 – **corporate tax rate**)

- **other regulated income** × TF × (1 – **corporate tax rate**)

+ (**closing deferred tax** – **opening deferred tax**) × (TF – 1)

+ (**permanent differences** + **regulatory tax adjustments**
- **utilised tax losses**)
× **corporate tax rate** × TF) ÷ ($TF_{rev}$ - **corporate tax rate** × TF)).

*Additional required definitions*

77. The following are the additional required definitions:

**TF** = $(1 + WACC)^{182/365}$

**$TF_{rev}$** = $(1 + WACC)^{148/365}$

$TF_{VCA} = PV_{VCA} \times (1 + WACC) / VCA$

**$PV_{VCA}$** is the sum **value of commissioned asset** discounted to the start of the year using **WACC** as the discount rate

[25] **Building blocks allowable revenue before tax =** (**regulatory investment value** × *cost of capital* + **term credit spread differential allowance** - **total revaluation***)* ÷ (1- **corporate tax rate**)
+ **total depreciation**
+ **forecast operating expenditure**
- **other regulated income**
+ (**permanent differences** + **regulatory tax adjustments** - **utilised tax losses**) ×
(**corporate tax rate** ÷ (1- **corporate tax rate**)).

**Total value of commissioned assets** is the sum value of assets commissioned in the year (ie, the closing RAB values which are the value of commissioned assets).

**Derivation for tax payable approach (GTB Determination)**

78. We derive in this part of the attachment a formula for the annual revenue requirement of a regulated business subject to a customised price path where a tax payable approach is used for the determination of the tax allowance. The formula accommodates given cash flow timing assumptions, the opening RAB at the start of the year, the operating expenditure, tax permanent and temporary differences and a number of other variables.

79. The approach is substantially similar to that used for EDBs and GDBs, with some minor differences.

80. This derivation focuses on just one year in a regulatory period, not on a multi-year regulatory period as a whole. Under the IMs, the formulae derived would be used to calculate the building blocks revenue for each year, which would then be "smoothed" to form a CPI minus X price path.

**Variable definitions (GTBs)**

*Input variables*[26]

81. The following are the defined input variables for the derivation:

| | |
|---|---|
| $RAB_0$ | RAB at start of the year |
| WACC | Weighted Average Cost of Capital (used as the discount rate) |
| O | Operating Expenditure, net of pass through costs and recoverable costs |
| D | Regulatory Depreciation |
| TCSD | Term Credit Spread Differential Allowance |
| NDI | Notional Deductible Interest (which includes TCSD) |
| PD | Permanent Differences |
| TD | Temporary Differences |
| Reval | Revaluation |
| VCA | Value of Commissioned Assets |
| t | Company tax rate |
| Dispos | Sum of the opening RAB value of assets disposed of during the year |
| ORI | Other Regulated Income |

[26] These "Input Variables" are inputs to this derivation, not necessarily inputs to a spreadsheet model. For example, they include regulatory depreciation which is treated as a given input in this derivation, but it will be calculated from other parameters in any spreadsheet model.

*Derived values (i.e. formulae are provided in this derivation)*

82. The following are derived values obtained from the input variables and the following equations:

| | |
|---|---|
| $RAB_1$ | RAB at end of the year |
| $DT_1$ | Deferred tax asset value at the end of the year |
| TP | Tax Payable |
| TA | Tax Allowance |
| Rev | Revenue requirement from prices for the year, ie, building blocks revenue before tax[27] |
| RIV | Regulatory Investment Value |

*Present value functions*

83. The following are the defined present value functions:

| | |
|---|---|
| $PV_{start}()$ | Present value as at the start of the year |
| $PV_{end}()$ | Present value as at the end of the year |
| $PV_{VCA}$ | Present value, as at the start of the year, of the value of commissioned assets, the timing of the associated nominal cash flows being the commissioning dates |

**Timing factors for GTBs (except asset commissioning)**

84. The timing factor calculation is the same as that for EDBs and GDBs.

85. The timing factor (TF) reflects the year-end value of a cash flow that occurs part way through the year. For example, operating expenditure, tax payments and interest payments are assumed to occur at mid year, so half a year of discounting at WACC is required to determine the equivalent value at year-end. Thus:

$$TF_{opex} = (1 + WACC)^{182/365}$$

$$TF_{tax} = (1 + WACC)^{182/365}$$

$$TF_{ORI} = (1 + WACC)^{182/365}$$

$$TF_{TCSD} = (1 + WACC)^{182/365}$$

[27] This is the revenue amount, excluding other regulatory income, received on the revenue date during the year, not an amount expressed in year-end terms.

86. Because they result in the same calculation, the above factors can be redefined as a single TF factor – 'TF' – reflecting a mid year cash flow timing assumption in the CPP building blocks formula (see below).Assuming a timing of revenue consistent with the derivation for deferred tax approach (see above) the timing factor for revenue is given by:

$$TF_{rev} = (1 + WACC)^{148/365}$$

87. These TF values are applied when calculating the $PV_{end}()$ of a cash flow. For example:

$$PV_{end}(Rev) = Rev * TF_{rev}$$

88. The $PV_{end}()$ function can be applied in a similar fashion for each of the other cash flows.

**Timing factor for asset commissioning (GTBs)**

89. The portions of the derivation set out here are the same as those for EDBs and GDBs.

90. As for EDBs and GDBs, each GTB CPP applicant must calculate the present value of its forecast value of commissioned assets for each year of the regulatory period using the WACC as the discount rate.

91. The present value for each year would be as at the first day of that year.

92. If the total value of forecast assets commissioned in a year is denoted as "VCA", and the present value of the series of individual amounts in a year is denoted by "$PV_{VCA}$", then the timing factor for the commissioned assets shall be calculated according to the formula for $TF_{VCA}$ derived below.

93. As PVVCA is the value of the commissioned assets discounted to the start of the year, the following quantity will be the value of the commissioned assets discounted to the end of the year:

$$PV_{VCA} * (1 + WACC)$$

94. The timing factor $TF_{VCA}$ is the factor that relates the sum of the individual values of commissioned assets to the value discount to the end of the year, such that:

$$\text{Value of commissioned assets discounted to year-end} = TF_{VCA} * VCA$$

95. Equating these two methods of expressing the year-end values gives:

$$PV_{VCA} * (1 + WACC) = TF_{VCA} * VCA$$

96. Therefore:

$$TF_{VCA} = PV_{VCA} * (1 + WACC) / VCA$$

**Equations on which derivation is based (GTBs)**

97. The equations which form the basis of this derivation are as follows:

*Financial Capital Maintenance equation*

98. The following equation expresses the financial capital maintenance approach of having the opening total value[28] of the assets equal to the sum of the present value of cash flows over a year plus the discounted total asset value at the end of that year:

$$RAB_0 + DT_0 = PV_{start}(\text{Cash flows}) + (RAB_1 + DT_1)/(1 + WACC)$$

where $DT_0$ and $DT_1$ refer to the deferred tax balance at the start and the end of the year respectively.

99. When applying this equation, the commissioning of an asset is treated as if it generates a cash flow on the basis that at the time of asset commissioning, the supplier is treated as having to have paid the "value of commissioned asset", which includes an allowance for finance during construction.

100. In the context of a tax payable approach, the tax allowance is set equal to tax payable, which means that no amount of deferred tax arises, i.e. $DT_0 = DT_1 = 0$. Thus the equation above becomes:

$$RAB_0 = PV_{start}(\text{Cash flows}) + RAB_1/(1 + WACC) \qquad 1$$

*RAB roll-forward equation*

101. The roll-forward of the RAB from one year to the next is reflected in the IMs by:

$$RAB_1 = RAB_0 + VCA - D + Reval - Dispos$$

102. However, as noted above, no proceeds of sale of disposed assets or costs of disposal amounts have been modelled in the forecast year of disposal, which is consistent with the approach currently used in the IM determinations. This means that the RAB roll-forward equation for the purposes of deriving the building blocks formula becomes:

$$RAB_1 = RAB_0 + VCA - D + Reval \qquad 2$$

[28] This total opening value includes the value of the deferred tax asset.

*Tax Allowance*

103. The tax allowance, in the absence of tax losses, is given by: [29]

$$TA = (Rev + ORI - O - D + PD + TD - NDI) * t \quad (3)$$

[29] This tax allowance equation is consistent with the tax allowance approach in Clause 5.3.13 of the 2010 IM Determination for GTBs.

*Tax payable*

104. For the tax payable approach, the tax payable amount is equal to the tax allowance:

$$TP = TA \quad (4)$$

*Year-end present values, relative to year-start*

105. The present value of a set of cash flows as at the end of the year is (1 + WACC) multiplied by the present value at the start of the year:

$$PV_{end}(\text{Cash flows}) = PV_{start}(\text{Cash flows}) * (1+ WACC) \quad (5)$$

**Derivation (GTBs)**

106. The derivation of a non-circular formula for the annual revenue requirement is set out below, based on the 5 equations above (Equations 1 to 5).

107. Equation 1 multiplied by (1 + WACC) becomes, after applying Equation 6:

$$RAB_0 * (1 + WACC) = PV_{end}(\text{Cash flows}) + RAB_1$$

108. Subtracting $RAB_0$ from each side of this equation gives:

$$RAB_0 * WACC = PV_{end}(\text{Cash flows}) + RAB_1 - RAB_0$$

109. Recognising that the cash flows comprise Rev, O, VCA, TCSD, TP and ORI, and applying Equation 4 gives:

$$RAB_0 * WACC = PV_{end}(\text{Rev, O, VCA, TCSD, TP and ORI}) + RAB_1 - RAB_0$$

110. Equation 2 indicates that $RAB_1 - RAB_0 = VCA - D + Reval$ , and applying this to the equation above gives:

$$RAB_0 * WACC = PV_{end}(\text{Rev, O, VCA, TCSD, TP and ORI}) + VCA - D + Reval \quad (6)$$

111. Expanding the $PV_{end}()$ function above using the timing factors gives:

$$RAB_0 * WACC = Rev*TF_{rev} - O*TF_{opex} - VCA*TF_{VCA} - TCSD * TF_{TCSD} - TP*TF_{tax} + ORI*TF_{ORI} + VCA - D + Reval \quad (7)$$

112. Rearranging this equation 7 and substituting the expression for TA from Equation 4 into this equation gives:

$$Rev*TF_{rev} = RAB_0 * WACC + VCA*(TF_{VCA} - 1) + TCSD * TF_{TCSD} – Reval + D + O*TF_{opex} + TA*TF_{tax} - ORI*TF_{ORI} \quad (8)$$

113. The expression for TA in Equation 3 is:

$$TA = (Rev + ORI - O - D + PD + TD - NDI) * t$$

114. Substituting the right-hand-side of this expression for TA in Equation 8 gives:

$$\begin{aligned} Rev*TF_{rev} &= RAB_0 * WACC + VCA*(TF_{VCA} - 1) \\ &+ TCSD * TF_{TCSD} - Reval + D + O*TF_{opex} \\ &+ (Rev + ORI - O - D + PD + TD - NDI) * t * TF_{tax} - ORI*TF_{ORI} \end{aligned} \quad 9$$

115. Collecting terms in Rev to the left-hand-side gives:

$$\begin{aligned} Rev*(TF_{rev} - t * TF_{tax}) &= RAB_0 * WACC + VCA*(TF_{VCA} - 1) \\ &+ TCSD * TF_{TCSD} - Reval + D \\ &+ O*TF_{opex} + (ORI - O - D + PD + TD - NDI) * t * TF_{tax} - ORI*TF_{ORI} \end{aligned}$$

116. Dividing both sides of this equation by $TF_{rev} - t * TF$ gives:

$$\begin{aligned} Rev = &\left(RAB_0 * WACC + VCA*(TF_{VCA} - 1) + TCSD * TF_{TCSD} - Reval\right) \\ &/ (TF_{rev} - t * TF_{tax}) \\ &+\left(D + O*TF_{opex} + (ORI - O - D + PD + TD - NDI) * t * TFtax \right. \\ &\left. - ORI*TFORI\right) / (TFrev - t * TFtax) \end{aligned}$$

117. Collecting terms in O together, collecting terms in D together and collecting terms in ORI together gives:

$$\begin{aligned} Rev = &\left(RAB_0 * WACC + VCA*(TF_{VCA} - 1) + TCSD * TF_{TCSD} - Reval\right) \\ &/ (TF_{rev} - t * TF_{tax}) \\ &+ \left(O*TF_{opex} - O * t * TF_{tax} + D - D * t * TF_{tax} \right. \\ &- ORI*TF_{ORI} + ORI * t * TF_{tax} + (PD + TD - NDI) * t * TF_{tax} \left.\right) \\ &/ (TF_{rev} - t * TF_{tax}) \end{aligned}$$

118. Taking out the common factors O, D and ORI gives, after some re-ordering:

$$\begin{aligned} Rev = &\left(RAB_0 * WACC + VCA*(TF_{VCA} - 1) + TCSD * TF_{mid} - Reval\right) \\ &/ (TF_{rev} - t * TF_{tax}) \\ &+ \left(O*(TF_{opex} - t * TF_{tax}) + D*(1 - t * TF_{tax}) \right. \\ &- ORI*(TF_{ORI} - t * TF_{tax}) + (PD + TD - NDI) * t * TF_{tax} \left.\right) \\ &/ (TF_{rev} - t * TF_{tax}) \end{aligned} \quad 10$$

119. In implementing Equation 10, we take the value of $TF_{TCSD}$, $TF_{opex}$, $TF_{tax}$ and $TF_{ORI}$ to be equal to each other as the timing to which each of these factors relates is mid year timing, or $TF_{mid}$.

120. Making these changes in Equation 10 gives:

$$\begin{aligned}Rev = &\mathbf{(}RAB_0 * WACC + VCA*(TF_{VCA} - 1) + TCSD * TF_{mid} - Reval\mathbf{)} \\ &/ (TF_{rev} - t * TF_{mid}) + \mathbf{(}D*(1 - t *TF_{mid}) \\ &+ O*TF_{mid} * (1 - t) - ORI* TF_{mid} * (1 - t) \\ &+ (PD + TD - NDI) * t *TF_{mid}\mathbf{)} \\ &/ (TF_{rev} - t * TF_{mid}) \end{aligned} \quad 11$$

**Implementation of formula in GTB CPP IM**

121. Substituting the terms in equation 11 above with the equivalent defined terms for **building blocks allowable revenue before tax**[30] in the GTB Determination as it was prior to the current amendments gives the following corresponding expression (defined terms in the IMs are **bolded**):

(**regulatory investment value** × **cost of capital**
+ total value of commissioned assets × ($TF_{VCA}$ - 1)
+ **term credit spread differential allowance** × TF - **total revaluation**)
÷ ($TF_{rev}$ - **corporate tax rate** × TF)

+ (**total depreciation** × (1 – **corporate tax rate** × TF)

+ **forecast operating expenditure** × TF × (1 – **corporate tax rate**)

- **other regulated income** × TF × (1 – **corporate tax rate**)

+ (**permanent differences** + **positive temporary differences**
- **negative temporary differences** - **tax depreciation**
- **notional deductible interest** - **utilised tax losses**)
× (**corporate tax rate** × TF) ÷ ($TF_{rev}$ - **corporate tax rate** × TF)).

*Additional required definitions*

122. The following are the additional required definitions:

**TF** = $(1 + WACC)^{182/365}$

**$TF_{rev}$** = $(1 + WACC)^{148/365}$

**$TF_{VCA}$** = **$PV_{VCA}$** x (1 + **WACC**) / **VCA**

[30] **Building blocks allowable revenue before tax =** (**regulatory investment value** × *cost of capital* + **term credit spread differential allowance** - **total revaluation** + **total depreciation***)* ÷ (1- **corporate tax rate**)
+ **forecast operating expenditure**
- **other regulated income**
+ (**permanent differences** + **positive temporary differences** - **negative temporary differences** - **tax depreciation** - **notional deductible interest** - **utilised tax losses**) × (**corporate tax rate** ÷ (1- **corporate tax rate**)).

**$PV_{VCA}$** is the sum **value of commissioned asset** discounted to the start of the year using **WACC** as the discount rate

**Total value of commissioned assets** is the sum value of assets commissioned in the year (ie the closing RAB values which are the value of commissioned assets).

**Derivation where regulatory net taxable income is negative (GTBs)**

123. Where the application of the above formulae results in the regulatory net taxable income being negative, an alternative derivation applies, as follows (equation numbers refer to those above for the 'tax payable' case):

Where net taxable income is negative, TA = TP = 0

124. Terms in TP in the PV of cash flows have therefore not been included.

125. Equation 1 multiplied by (1 + WACC) becomes, after applying Equation 6:

$$RAB_0 * (1 + WACC) = PV_{end}(\text{Cash flows}) + RAB_1$$

126. Subtracting $RAB_0$ from each side of this equation gives:

$$RAB_0 * WACC = PV_{end}(\text{Cash flows}) + RAB_1 - RAB_0$$

127. Recognising that the cash flows comprise Rev, O, VCA, TCSD, and ORI, and applying Equation 4 gives:

$$RAB_0 * WACC = PV_{end}(\text{Rev, O, VCA, TCSD and ORI}) + RAB_1 - RAB_0$$

128. Equation 2 indicates that $RAB_1 - RAB_0 = VCA - D + Reval$, and applying this to the equation above gives:

$$RAB_0 * WACC = PV_{end}(\text{Rev, O, VCA, TCSD, TP and ORI}) + VCA - D + Reval \quad 6$$

129. Expanding the $PV_{end}()$ function above using the timing factors gives:

$$RAB_0 * WACC = Rev*TF_{rev} - O*TF_{opex} - VCA*TF_{VCA} - TCSD * TF_{TCSD} + ORI*TF_{ORI} + VCA - D + Reval \quad 7$$

130. Rearranging this equation 7 and substituting the expression for TA from Equation 4 into this equation gives:

$$Rev*TF_{rev} = RAB_0 * WACC + VCA*(TF_{VCA} - 1) + TCSD * TF_{TCSD} - Reval + D + O*TF_{opex} - ORI*TF_{ORI} \quad 8$$

131. Dividing both sides of this equation by $TF_{rev}$ gives:

$$Rev = \left(RAB_0 * WACC + VCA*(TF_{VCA} - 1) + TCSD * TF_{TCSD} - Reval\right) / TF_{rev} + \left(D + O*TF_{opex} - ORI*TF_{ORI}\right) / (TF_{rev}) \quad 9$$

132. After rearranging:

$$Rev = \left(RAB_0 * WACC + VCA*(TF_{VCA} - 1) + TCSD * TF_{TCSD} - Reval + D\right) / TF_{rev} + O*TF_{opex} / TF_{rev} - ORI*TF_{ORI} / TF_{rev} \quad 10$$

133. In implementing Equation 10, we take the value of $TF_{TCSD}$, TFopex and $TF_{ORI}$ to be equal to each other as the timing to which each of these factors relates is mid year timing, or $TF_{mid}$.

134. Making these changes in Equation 10 gives:

$$Rev = \left(RAB_0 * WACC + VCA*(TF_{VCA} - 1) + TCSD * TF_{mid} - Reval + D\right) / TF_{rev} + O*TF_{mid} / TF_{rev} - ORI*TF_{mid} / TF_{rev} \quad 11$$

**Implementation of formula for negative net taxable income in GTB CPP IM**

135. Substituting the terms in equation 11 above with the equivalent defined terms for building blocks allowable revenue before tax[31] in the IM determination gives the following expression (defined terms in the IMs and those additional definitions referred to above are **bolded**):

> (**regulatory investment value** × **cost of capital**
> + **total value of commissioned assets** × (**$TF_{VCA}$** - 1)
> + **term credit spread differential allowance** × **TF**
> - **total revaluation** + **total depreciation**)
> ÷ **$TF_{rev}$**
>
> + **forecast operating expenditure** × **TF** ÷ **$TF_{rev}$**
>
> - **other regulated income** × **TF** ÷ **$TF_{rev}$**

*Additional required definitions*

136. The following are the additional required definitions:

> **TF** = $(1 + WACC)^{182/365}$
>
> **$TF_{rev}$** = $(1 + WACC)^{148/365}$
>
> **$TF_{VCA}$** = **$PV_{VCA}$** x (1 + **WACC**) / **VCA**
>
> **$PV_{VCA}$** is the sum **value of commissioned asset** discounted to the start of the year using **WACC** as the discount rate
>
> **Total value of commissioned assets** is the sum value of assets commissioned in the year (ie the closing RAB values which are the value of commissioned assets).

[31] **Building blocks allowable revenue before tax =** (**regulatory investment value** × *cost of capital* + **term credit spread differential allowance** - **total revaluation** + **total depreciation**)
+ **forecast operating expenditure**
- **other regulated income**