

# Determining the fair value of Australia's water infrastructure assets

March 2010  
Deloitte Energy & Resources

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In the Australian context, water infrastructure assets may be valued for one or more purposes including: the basis for the determination of regulated water prices, asset replacement and management programs, the transfer of assets from one water business to another, impairment testing and determining carrying values for annual financial reporting.

The determination of asset valuations and accounting for major infrastructure projects are particularly challenging.

# Introduction

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As recent reports in Australia's major financial and business media make clear, there is growing awareness across the Australian public sector that the application of Australian accounting requirements, which are written principally for publically listed companies, is not always straightforward

For annual financial reporting purposes, Australian Accounting Standards provide entities with an accounting policy choice to measure property, plant and equipment (which would include water infrastructure assets) using either the cost model or the revaluation model<sup>1</sup>. The majority of water businesses within the Australian public sector currently measure their water infrastructure assets using the revaluation model.

Where the revaluation model of measurement is adopted, the water infrastructure assets will be recorded in the balance sheet at a revalued amount, being their fair value at the date of the revaluation less any subsequent accumulated depreciation and subsequent accumulated impairment losses. Further, revaluations will be required to be made with sufficient regularity to ensure that the carrying amount of the water infrastructure assets does not differ materially from that which would be determined using fair value at the reporting date<sup>2</sup>. In practice, this may require valuations to be 'refreshed' at each reporting date.

<sup>1</sup> AASB 116 Property, Plant and Equipment, paragraph 29

<sup>2</sup> AASB 116 Property, Plant and Equipment, paragraph 31

# Interpreting the accounting rules

## In this section, we explore the appropriateness of adopting the ‘income approach’ or the ‘depreciated replacement cost approach’ to determine the ‘fair value’ of water infrastructure assets

### What is fair value?

Fair value is defined in Australian Accounting Standards as ‘the amount for which an asset could be exchanged between knowledgeable, willing parties in an arm’s length transaction’<sup>3</sup>.

In the context of the definition of fair value:

- ‘Knowledgeable’ means that both the willing buyer and the willing seller are reasonably informed about the nature and characteristics of the particular asset (or group of assets), its actual and potential uses, and market conditions at the reporting date<sup>4</sup>
- A ‘willing buyer’ is motivated, but not compelled, to buy. This buyer is neither over-eager nor determined to buy at any price. The assumed buyer would not pay a higher price than a market comprising knowledgeable, willing buyers and sellers would require<sup>5</sup>
- A ‘willing seller’ is neither an over-eager nor a forced seller, prepared to sell at any price, nor one prepared to hold out for a price not considered reasonable in current market conditions. The willing seller is motivated to sell the asset at market terms for the best price obtainable. The factual circumstances of the actual asset owner are not a part of this consideration because the willing seller is a hypothetical owner (e.g. a willing seller would not take into account the particular tax circumstances of the actual asset owner)<sup>6</sup>
- An ‘arm’s length transaction’ is one between parties that do not have a particular or special relationship that makes prices of transactions uncharacteristic of market conditions. The transaction is presumed to be between unrelated parties, each acting independently<sup>7</sup>.

### Are there alternative measurement approaches to determine fair value?

In relation to the determination of the fair value of items of property, plant and equipment (which would include water infrastructure assets), Australian Accounting Standard AASB 116 Property, Plant and Equipment (AASB 116) includes the following relevant guidance<sup>8</sup>:

- ‘The fair value of items of property, plant and equipment is usually their market value determined by appraisal’
- ‘If there is no market-based evidence of fair value because of the specialised nature of the item of property, plant and equipment and the item is rarely sold, except as part of a continuing business, an entity may need to estimate fair value using an income or a depreciated replacement cost (DRC) approach’.

Given the nature of water infrastructure assets, market-based evidence of fair value is unlikely to exist and it would be appropriate to regard the assets as being specialised in nature. As outlined above, where this is the case, Australian Accounting Standards permit fair value to be estimated using an income approach or a DRC approach.

However, no guidance is provided in Australian Accounting Standards as to whether both methods are equally acceptable to all entities in all circumstances, or whether each of the available methods should only be applied in certain circumstances, as appropriate.

This is considered in more detail in the following section.

<sup>3</sup> AASB 116 Property, Plant and Equipment, paragraph 6

<sup>4</sup> AASB 140 Investment Property, paragraph 42

<sup>5</sup> AASB 140 Investment Property, paragraph 42

<sup>6</sup> AASB 140 Investment Property, paragraph 43

<sup>7</sup> AASB 140 Investment Property, paragraph 44

<sup>8</sup> AASB 116 Property, Plant and Equipment, paragraphs 32 and 33

# Restrictions and limitations on the approaches to determining fair value

## The case of 'not-for-profit' water businesses

Australian Accounting Standards permit fair value to be estimated using either an income approach or a DRC approach, in circumstances where there is no market-based evidence of fair value.

Although there are no explicit restrictions or limitations imposed by Australian Accounting Standards as to the adoption of either one of these methods, in practice, the appropriateness of each method should be assessed to ensure that its application will result in information that is relevant to the economic decision-making needs of the users of the financial statements. This is a matter of judgement and should be considered by each entity within the context of its specific circumstances.

Matters to be considered in ascertaining which method is most appropriate in the circumstances may include:

- The classification of the entity as either for-profit or not-for-profit<sup>9</sup> for the purposes of applying Australian Accounting Standards
- The regulatory regime within which the entity operates
- Whether the future economic benefits of the water infrastructure assets are primarily dependent on their ability to generate net cash inflows
- Whether the water infrastructure assets are 'cash-generating assets' within the meaning given by International Public Sector Accounting Standard IPSAS 26 Impairment of Cash-Generating Assets<sup>10</sup>.

IPSAS 26 describes cash generating assets as 'assets held with the primary objective of generating a commercial return. An asset generates a commercial return when it is deployed in a manner consistent with that adopted by a profit-orientated entity. Holding an asset to generate a 'commercial return' indicates that an entity intends to generate positive cash inflows from the asset (or from the cash-generating unit of which the asset is part) and earn a commercial return that reflects the risk involved in holding the asset.'<sup>11</sup>

By way of example, the future economic benefits of most, if not all, water infrastructure assets held by Australian not-for-profit water businesses would not be primarily dependent on the assets' ability to generate net cash inflows and, in these circumstances, such assets would be tested for impairment with reference to their 'DRC' (rather than with reference to their 'value-in-use', based on discounted cash flows)<sup>12</sup>.

Consistent with this approach, it would be most appropriate for such entities to estimate the fair value of their water infrastructure assets using a DRC approach. Or, putting it another way, it would be very difficult for Australian not-for-profit water businesses to support the adoption of the income approach.

Therefore, when considering the appropriateness of the available methods, in most instances, Australian not-for-profit water businesses would be limited to the adoption of the DRC approach to determine the fair value of water infrastructure assets.

## The case of 'for-profit' water businesses

The question of the appropriateness of each method to Australian for-profit water businesses is a much more difficult matter and is often subject to debate within the Australian water sector.

On the one hand, in the context of being public sector entities, the most relevant measure of the fair value of water infrastructure assets held by Australian for-profit water businesses is often argued to be DRC. Such value communicates to the users of the financial statements the cost of replacing the service capacity of the assets if they were lost or destroyed (i.e. the value to the public/water consumers). In the absence of guidance to the contrary within Australian Accounting Standards, this would appear to be a valid argument.

On the other hand, in the context of being classified as a for-profit entity for financial reporting purposes, the underlying value (to the entity) of the water infrastructure assets is their ability to generate future cash flows to provide a monetary return to the entity. If this wasn't the case, the water business would not be classified as a for-profit entity. Again, in the absence of guidance to the contrary within Australian Accounting Standards, this would appear to be a valid argument, at least in circumstances where the net present value of the cash flows generated from the use of the assets are less than the DRC of the assets.

However, as noted above, the appropriateness of adopting either of the two methods is a matter of judgement and should be considered by each entity within the context of its specific circumstances.

<sup>9</sup> For the purposes of applying Australian Accounting Standards, a not-for-profit entity is an entity whose principal objective is not to generate a profit.

<sup>10</sup> Australian public sector entities are not required to comply with International Public Sector Accounting Standards. However, such accounting standards are a useful source of guidance to the extent that they do not conflict with Australian Accounting Standards.

<sup>11</sup> IPSAS 26 Impairment of Cash-Generating Assets, paragraphs 13 and 14

<sup>12</sup> AASB 136 Impairment of Assets, paragraph Aus32.1

# Proposed changes to the relevant accounting standards



## What are the proposed changes to Australian Accounting Standards?

Currently, guidance regarding the determination of the fair value of assets and liabilities is contained within numerous Australian Accounting Standards. For example, as outlined above, guidance regarding the determination of the fair value of items of property, plant and equipment (which would include water infrastructure assets) is contained in AASB 116.

The Australian Accounting Standards Board (AASB) is currently proposing to issue a new accounting standard as a single source of guidance for all fair value measurements required or permitted by Australian Accounting Standards. When issued, this new accounting standard will replace the guidance currently contained within existing Australian Accounting Standards, including the guidance contained in AASB 116.<sup>13</sup>

The new accounting standard is expected to be finalised and issued in late 2010. These proposed changes will be directly relevant to the determination of the fair value of water infrastructure assets.

The core principle of the proposed new guidance is that 'fair value is the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date'<sup>14</sup>.

The reference to the 'price that would be received to sell an asset' is particularly important as it clearly establishes the requirement to determine fair value with reference to an 'exit price'. This is similar to the approach adopted to determine fair value (less costs to sell) under Australian Accounting Standard AASB 136 Impairment of Assets, which refers to 'the amount obtainable from the sale of an asset'<sup>15</sup>.

In relation to the determination of fair value, the proposals include the following relevant guidance:

- In the absence of an actual transaction to sell the asset at the measurement date, a fair value measurement assumes a hypothetical transaction at that date and considers the characteristics of market participants who would enter into the transaction<sup>16</sup>

- The fair value of the asset shall be measured using assumptions that market participants would use in pricing the asset<sup>17</sup> and considers a market participant's ability to generate economic benefits by using the asset or by selling it to another market participant who will use the asset in its highest and best use<sup>18</sup>.

The highest and best use of the asset must be determined from the perspective of market participants, even if the reporting entity intends a different use<sup>19</sup>. For example, the guidance indicates that if the asset would provide maximum value to market participants principally through its use in combination with other assets and liabilities as a group (as would most likely be the case in relation to water infrastructure assets held by a for-profit water business), the highest and best use of the asset would be 'in-use' and, accordingly, fair value would be measured using an 'in-use' valuation premise<sup>20</sup>

- Valuation techniques used to measure fair value must be consistent with the 'market approach' (using prices and other relevant information generated by the market), the income approach (using valuation techniques to convert future amounts, e.g. cash flows or income and expenses, to a single present amount) or the 'cost approach' (reflecting the amount that would currently be required to replace the service capacity of the asset, e.g. current replacement cost)<sup>21</sup>.

An entity should use valuation techniques that are appropriate in the circumstances and for which sufficient data is available to measure fair value, maximising the use of relevant observable inputs and minimising the use of unobservable inputs<sup>22</sup>. For example, the guidance indicates that the current replacement cost approach is generally appropriate for measuring the fair value of tangible assets using an 'in-use' premise because a market participant would not pay more for an asset than the amount for which it could replace the service capacity of that asset<sup>23</sup>.

**It is important to note that the above proposals have been developed in the context of financial reporting by for-profit entities only, and it is unclear at this time as to whether the AASB will make modifications to the proposals to accommodate not-for-profit entities.**

<sup>13</sup> The proposed amendments to Australian Accounting Standards are contained in Exposure Draft 181 Fair Value Measurement, issued by the Australian Accounting Standards Board in June 2009

<sup>14</sup> AASB Exposure Draft 181 Fair Value Measurement, paragraph 1

<sup>15</sup> AASB 136 Impairment of Assets, paragraph 6

<sup>16</sup> AASB Exposure Draft 181 Fair Value Measurement, paragraph 12

<sup>17</sup> AASB Exposure Draft 181 Fair Value Measurement, paragraph 14

<sup>18</sup> AASB Exposure Draft 181 Fair Value Measurement, paragraph 17

<sup>19</sup> AASB Exposure Draft 181 Fair Value Measurement, paragraph 18

<sup>20</sup> AASB Exposure Draft 181 Fair Value Measurement, paragraph 22

<sup>21</sup> AASB Exposure Draft 181 Fair Value Measurement, paragraph 38

<sup>22</sup> AASB Exposure Draft 181 Fair Value Measurement, paragraph 39

<sup>23</sup> AASB Exposure Draft 181 Fair Value Measurement, paragraph 38

# Implications of the proposed changes

In the context of its application to Australian for-profit water businesses, the proposals may effectively limit the appropriate valuation technique for measuring the fair value of water infrastructure assets to the lower of the DRC of the assets (the 'cost approach') and the net present value of the cash flows to be generated from the use of the assets (the income approach) using an 'in use' valuation premise. Whereas, Australian Accounting Standards currently appear to provide for-profit entities with the choice to estimate fair value using either an income approach or a DRC approach.

This potential limitation arises because the proposed new accounting rules require fair value to be estimated with reference to a hypothetical 'exit price', which must give consideration to a market participant's ability to generate economic benefits by using the asset, or by selling it to another market participant who will use the asset in its highest and best use. In relation to water infrastructure assets held by Australian for-profit water businesses:

- The assets would provide maximum value to market participants principally through their use in combination with other assets and liabilities as a group (i.e. by using the assets in the operation of a water business)
- A market participant would not pay more for the assets than the amount for which it could replace the service capacity of the assets (i.e. DRC of the assets)
- A market participant would not pay an amount equal to the DRC of the assets if such amount was unable to be recovered from the future cash flows to be generated by the assets.

Depending on the valuation methodology currently adopted, the proposed new accounting rules may impact upon the determination of the fair value of water infrastructure assets held by Australian water businesses.

However, given that Australian for-profit water businesses are already required to consider the future cash inflows that will be generated by the water infrastructure assets for the purposes of impairment testing (and assets must be written down to recoverable amount when they are impaired), the proposed new rules may not materially impact the ultimate carrying amount of the water infrastructure assets in the balance sheet. This will depend on the assumptions used in the cash flow analysis.

For example, there is a clear distinction between the concept of fair value and that of 'value in use' (as a method of determining the 'recoverable amount'<sup>24</sup> of assets or cash-generating units for the purpose of impairment testing). Under the proposed new guidance, fair value reflects the assumptions that market participants would use in pricing the asset<sup>25</sup> and considers a market participant's ability to generate economic benefits by using the asset or by selling it to another market participant who will use the asset in its highest and best use<sup>26</sup>. In contrast, 'value in use' reflects the entity's estimates, including the effects of factors that may be specific to the entity and not applicable to entities in general<sup>27</sup>.

## What are some of the practical matters to consider?

There can be a number of practical matters to be considered when applying the revaluation model of accounting for property, plant and equipment (including water infrastructure assets). These matters may include, for example:

- Frequency of revaluations and the potential use of indices between revaluation dates
- Allocation of the revalued amounts to items of property, plant and equipment and to components of items
- Impact on the calculation of depreciation expense
- Impact on the calculation of deferred tax balances
- Increased presentation and disclosure requirements for the annual financial report.

<sup>24</sup> In accordance with Australian Accounting Standard AASB 136 Impairment of Assets, paragraph 6, the 'recoverable amount' of an asset or a cash-generating unit is the higher of its 'fair value less costs to sell' and 'its value in use'.

<sup>25</sup> AASB Exposure Draft 181 Fair Value Measurement, paragraph 14

<sup>26</sup> AASB Exposure Draft 181 Fair Value Measurement, paragraph 17

<sup>27</sup> AASB 140 Investment Property, paragraph 49

### Are there any broader implementation or business matters that need to be considered?

There can be a number of broader implementation or business matters to be considered when applying the revaluation model of accounting for property, plant and equipment (including water infrastructure assets).

These matters may include, for example:

- Balance sheet volatility
- Variations (from year to year) in depreciation charges, impacting profit and dividends
- Modifications to the fixed asset register to accommodate revalued amounts (plus historical cost and tax depreciated balances, where required)
- What is the most appropriate valuation approach?
- Do experts need to be engaged?
- Interaction between the determination of fair value (for revaluation purposes) and testing assets for impairment. Can the processes be combined or streamlined?

### Conclusion on accounting rules

Australian accounting standards currently permit fair value to be estimated using either an income approach or a DRC approach, in circumstances where there is no market-based evidence of fair value. In this regard, the current practice of Australian water businesses is that most entities (both for-profit and 'not-for-profit') currently determine the fair value of water infrastructure assets using the DRC approach. However, in some circumstances (and only in relation to Australian for-profit water businesses), the income approach may also be an appropriate method.

However, irrespective of the method currently adopted to determine the fair value of water infrastructure assets, the appropriateness of the adopted method will need to be reconsidered in light of the proposed changes to Australian Accounting Standards, which are expected to be finalised and issued in late 2010.

### Current accounting policies employed by Australian for-profit water businesses

The following table summarises the accounting policies adopted for the measurement of water infrastructure assets by some of the major Australian for-profit water businesses:

**Table 1: Measurement of water infrastructure assets**

Entity name	Measurement basis *
South East Queensland Water	Revaluation model: fair value determined on the basis of DRC – 2009 Annual Report
Sydney Water	Revaluation model: fair value determined on the basis of depreciated current replacement cost – 2009 Annual Report
Melbourne Water	Cost model – 2009 Annual Report
Hobart Water	Revaluation model: fair value determined on the basis of DRC – 2009 Annual Report
South Australian Water	Revaluation model: fair value determined on the basis of written-down current cost – 2009 Annual Report

\* Irrespective of the measurement basis adopted, all water infrastructure assets are subject to impairment testing as part of the cash-generating unit(s) to which the assets belong. The recoverable amount of the cash-generating unit(s) is the higher of its 'fair value less costs to sell' and its 'value in use'. In the case of Sydney Water Corporation, this has resulted in its water infrastructure assets being recorded at recoverable amount (i.e. recoverable amount is less than DRC).

# Where there is no market bases for determining fair value: valuation techniques

## In this section, we look at the practical application of the DRC approach and the income approach to determining the fair value of water infrastructure assets

### Application of DRC and Depreciated Optimised Replacement (DORC) approaches

DRC and DORC are both methods of valuing assets. Relevant definitions are as follows:

- **Replacement cost** – simply the cost of replacing an asset. This is a current measure of asset value, rather than a historical value, as it considers what it would cost to construct or purchase the exact same asset today. Replacement cost can be estimated by observing market transactions for similar assets if possible, or be estimated by a valuation expert
- **DRC** – extends on the replacement cost concept by taking into account the accumulated use and wear of the asset. The depreciation methodology can vary for different asset classes, but depreciation is generally based on the age and/or usage (i.e. water volume) of the asset
- **DORC** – takes the replacement cost concept one step further, by removing or reducing the value of assets that are either unnecessary, obsolete or underutilised. Optimisation of an asset value seeks to measure the depreciated cost of replacing only the portion of the asset that is actually required. The process attempts to avoid over-valuing assets that have been over-engineered or 'gold-plated'. A typical example of over-engineering would be a water treatment plant with a capacity of 200ML/day that is servicing a community that only requires 50ML/day.

As set out in Table 1 on page 8, DRC, or derivations thereof, are commonly applied for the measurement of water infrastructure assets in for-profit water businesses. Further, as also stated previously, water infrastructure assets held by Australian not-for-profit water businesses would typically be tested for impairment with reference to their DRC (rather than with reference to their 'value-in-use', based on discounted cash flows).

In contrast, DORC is commonly used by regulators when setting a regulatory asset base (RAB). This application of optimisation is consistent with the principle that a regulated business' RAB value should be no more than the establishment cost incurred by a new business entering the market and providing the same services. Optimisation of a regulated business' RAB value is one of the key tools applied by regulators to prevent regulated businesses from earning excessive returns.

### Difficulties in the application of DORC

While the concept of DORC is elegant, in practice there are points of difficulty. Many types of water industry assets are relatively unique, customised to consumer demand, topography, soil type, ph value, catchment quality etc. As a result, estimates of DORC in the water industry ultimately incorporate a degree of subjectivity. A common source of contention between regulated businesses and regulators is competing DORC valuations.

Optimisation of excess capacity is also a point of difficulty. Many water assets are very long term assets with very low rates of technological obsolescence. As an extreme example, the modern sewerage system in Rome, Italy still utilises some assets installed by the ancient Roman Empire, dating back as far as 600 BC<sup>28</sup>. The installation of excess capacity in long-term capital-intensive assets such as dams and pipes to account for future population growth and economic activity is good planning practice.

Further, assumptions used in optimising assets can be a point of contention. A typical water business will grow incrementally as the community that it serves grows. An example may be the installation of a water pipe which services a community for 20–30 years, but must be eventually duplicated to meet rising demand. A strictly optimised asset base may reduce the value of these pipe assets because a new water business would simply install one large pipe at a lower overall cost, rather than two smaller pipes.

<sup>28</sup> <http://www.iath.virginia.edu/rome/Journal4Hopkins.pdf>

### Application of the income approach

The income approach is normally applied either by way of the Discounted Cash Flow (DCF) method or capitalisation of future maintainable earnings (CFME) method.

The income approach determines the value of the entity which is generating the cash flows. This is distinct from the replacement cost methodology discussed previously in that the replacement cost methodology primarily focusses on what it would cost to replace specific assets.

The DCF method estimates fair market value by discounting a company's future cash flows to their present value using an appropriate discount rate.

The DCF methodology is most appropriate where:

- Cash flows can be predicted with a degree of certainty
- Cash flows are lumpy or have not yet stabilised
- A company is in start-up
- Future cash flows are not expected to be reflective of historical performance
- Projects have a finite life.

The CFME approach is a short hand version of the DCF approach which can generally be applied when:

- Cash flows or earnings are stable
- The entity has an indefinite life.

The application of the CFME approach to water infrastructure assets is limited due to the likely lumpy nature of near term cash flows of forecast sustaining and replacement capital expenditure. This approach does however form the basis for the terminal value calculation in a DCF approach (addressed later in this section).

The DCF methodology primarily involves the following steps:

- Determine forecast free cash flows
- Determine an appropriate discount rate
- Determine the terminal value
- Discount the cash flows and the terminal value using the selected discount rate to derive the net present value of the cash flows to determine the business value.

### Cash flows

The forecast free cash flows represent the expected cash flows over the life of the business and should capture the company-specific long-term outlook. It is important to ensure that these cash flows properly and consistently consider the expected future performance of the business. Key factors include:

- Applying consistent growth metrics to revenue and expense items e.g. inflation rates, population growth, water use patterns
- Properly forecasting sustaining and replacement capital expenditure.

An assumption that historic depreciation and capital expenditure will be repeated is likely to be insufficient because, for example, replacement of infrastructure assets does not happen at a regular rate over the life of the asset (like depreciation), but rather at one time at the end of the asset's engineering life.

## Discount rate

Essentially the discount rate represents the cost of not investing the capital elsewhere, or the opportunity cost of capital. The discount rate must match the cash flows; neither can be considered in isolation:

- Equity cash flows, or cash flows which include financing cash flows, should be discounted at the cost of equity ( $K_e$ )
- Enterprise cash flows, or cash flows which do not incorporate financing cash flows, should be discounted at the weighted average cost of (equity and debt) capital (WACC)
- Pre-tax cash flows should be discounted using pre-tax discount rates and vice versa
- Nominal cash flows i.e. cash flows which include the effects of inflation, should be discounted using nominal discount rates; and real cash flows i.e. cash flows which do not include the effects of inflation, should be discounted using real discount rates.

The most common application is to apply a nominal after tax WACC to nominal, after tax, pre-financing cash flows. Nominal cash flows are more straight forward to estimate and can incorporate varying inflation escalation rates e.g. wage inflation rates to wages and materials indexes to costs of capital equipment. After tax cash flows can be more easily estimated to take account of tax allowances which are based in nominal (historic) costs.

Excluding financing cash flows prevents the inclusion of any value generated or destroyed through the financing of the assets. In general, financing should be considered separately from the value of the underlying business or asset.

The WACC is generally calculated by applying the following formula:

The diagram illustrates the WACC formula with callouts for its components:

$$WACC = \left( \frac{E}{V} * K_e \right) + \left( \frac{D}{V} * K_d * (1 - t_c) \right)$$

Callouts include:

- Debt and equity proportions (pointing to  $\frac{E}{V}$  and  $\frac{D}{V}$ )
- After-tax cost of debt (pointing to  $K_d * (1 - t_c)$ )
- Equity market risk premium (pointing to  $K_e = R_f + \beta (R_m - R_f)$ )

The components of the formulas are:

- $K_e$  = cost of equity capital
- $K_d$  = cost of debt
- $t_c$  = corporate tax rate
- $E/V$  = proportion of company funded by equity
- $D/V$  = proportion of company funded by debt
- $R_f$  = the risk free rate
- $R_m$  = the expected return on the market portfolio
- $\beta$  = beta, the systematic risk of the asset.

Certain components of the formulas are self explanatory; some of the more complex components are discussed below.

*The adjustment of the cost of debt ( $K_d$ ) by  $(1 - t_c)$*  reflects the tax deductibility of interest payments on debt funding

*The cost of equity ( $K_e$ )* is determined by applying the Capital Asset Pricing model (CAPM). CAPM calculates the minimum rate of return that the company must earn on the equity-financed portion of its capital to leave the market price of its shares unchanged. The CAPM is the most widely accepted and used methodology for determining the cost of equity capital.

*The risk free rate ( $R_f$ )* compensates investors for the time value of money and the expected inflation rate over the investment period. Historically this rate has been estimated with reference to the yield on the longest dated (ten year) Commonwealth Government Bonds (CGBs), the intention being to most closely match the term of the bond to the life of the business or the useful life of the asset.

In recent times, yields on CGBs appear to have been temporarily and artificially suppressed based on the notion that the Global Financial Crisis has caused a 'flight to quality' that has resulted in investors seeking safe haven assets for which a liquid market is available, such as CGBs.

This has increased demand, pushed up prices and consequently reduced the yields that investors could obtain. To deal with this issue current thinking tends towards applying trailing averages (e.g. five days) of the yield implied on hypothetical long dated (ten year) zero-coupon CGBs<sup>29</sup>.

*The market risk premium ( $(R_m - R_f)$  or MRP)* represents the risk associated with holding a market portfolio of investments, that is, the excess return a shareholder can expect to receive for the uncertainty of investing in equities as opposed to investing in a risk free alternative. The size of the MRP is dictated by the risk aversion of investors – the lower (higher) an investor's risk aversion, the smaller (larger) the MRP.

The MRP is not readily observable in the market and therefore represents an estimate based on available data. There are generally two main approaches used to estimate the MRP, the historical approach and the prospective approach, neither of which is theoretically more correct or without limitations. The former approach relies on historical share market returns relative to the returns on a risk free security; the latter is a forward looking approach which derives an estimated MRP based on current share market values and assumptions regarding future dividends and growth.

Studies on the historical risk premium approach generally indicate that the MRP would be in the range of 5.0% to 8.0%.<sup>30</sup> In recent years it has been common market practice in Australia in expert's reports and regulatory decisions to adopt a MRP of 6.0%. However, the recent severe decline worldwide in equity values and the difficulty companies are experiencing in raising equity capital may be indicative of investors demanding a greater MRP. In addition, current prospective measures appear to indicate an increase in the MRP.

*The beta ( $\beta$ ) coefficient* measures the systematic risk or non-diversifiable risk of an asset in comparison to the market as a whole. Systematic risk, as separate from specific risk, measures the extent that the return on the business or asset is correlated to market returns. A beta of 1.0 indicates that an equity investor can expect to earn the market return (i.e. the risk free rate plus the MRP) from this investment (assuming no specific risks). A beta of greater than one indicates greater market related risk than average (and therefore higher required returns) whereas a beta of less than one indicates less systematic risk than average (and therefore lower required returns).

The CAPM assumes, amongst other things, that rational investors seek to hold efficient portfolios, that is, portfolios that are fully diversified. One of the major conclusions of the CAPM is that investors do not have regard to specific risks (often referred to as unsystematic risk), which are assumed to be taken account of in the estimations of the cash flows.

*The geared or equity beta* can be estimated by regressing the returns of the business or investment against the returns of an index representing the market portfolio, over a reasonable time period.<sup>31</sup> However, there are a number of issues that arise in measuring historical betas that can result in differences, sometimes significant, in the beta observed depending on the time period utilised, the benchmark index and the source of the beta estimate. Due to these measurement limitations it is often preferable to have regard to sector averages or a pool of comparable companies rather than any single company's beta estimate.

<sup>29</sup> Explanation of the calculation of the yield on a hypothetical zero coupon bond is beyond the scope of this paper

<sup>30</sup> Centre for Research in Finance at the Australian Graduate School of Management, Morningstar Inc, ABN AMRO/ London Business School and Aswath Damodaran

<sup>31</sup>  $\beta$  measures can be obtained from financial data services like Bloomberg

## Terminal value

The terminal value (TV) is a large component of value in nearly all DCF valuations.

The TV represents the value of the continuing cash flows expected to be earned from the asset beyond the discrete estimation period adopted for the DCF valuation.

The shorter the discrete estimation period is, the larger will be the proportion of total value represented by the TV. For this reason, and considering the TV is sensitive to long term assumptions around the level of periodic earnings and capital expenditure, it is advisable not to make the discrete estimation period too short.

The discrete estimation period should cover sufficient time to cover early 'lumpy' cash flows (especially around sustaining and replacement capital expenditure) and periods of above or below 'long-term' growth, to a time where estimates of maintainable cash flows can be made with a degree of confidence, or are distant enough in the future, to reduce the sensitivity of the overall value to the TV.

The terminal value is derived using the following formula:

$$TV = \frac{C_n(1+g)}{(d-g)}$$

The components of the formula are:

- TV = terminal value
- C<sub>n</sub> = (normalised) cash flow at the last discrete forecast period
- g = long term growth rate
- d = discount rate.

The key factors in calculating the TV include:

- Normalising the final cash flow of the discrete estimation period to, for example, include a normal level of sustaining and replacement capital expenditure
- Estimating an enduring long-term growth rate in the cash flow, having regard to varying growth rates in various underlying discrete cash flow items.

## What cross checks of value can be used?

A commonly used industry rule of thumb for valuing regulated assets is the *RAB multiple*. The RAB multiple is calculated by dividing the enterprise value<sup>32</sup> of a comparable company with the sum of the regulated asset values<sup>33</sup> of that company.

Care should be taken to update any RAB applied to represent current dollars by adding additions and deducting disposals not incorporated, and indexing any value amount to take account of inflation.

The multiple so determined can then be compared to the multiple implied by the value determined for the subject asset on the DCF basis. In theory, where the WACC applied is the same as the regulatory return determined and the regulator and market have the same view as to the costs of operating the regulated asset, the RAB multiple should be one.

Comparable company *earnings multiples* reflect the value of the businesses as opposed to the business' regulated infrastructure assets only. Accordingly, these multiples will incorporate the value of other tangible and intangible assets and non-regulated sources of incomes.

By taking this into consideration and allowing for a control premium and other differences in operations, regulatory environments and locations of comparable companies in comparison to the asset being valued, comparable company earnings multiples provide a broader valuation cross check for the valuation of regulated assets.

Earnings multiples are calculated as follows:

$$\text{Earnings multiples} = \frac{\text{Enterprise value}}{\text{EBITDA}}$$

EBITDA = earnings before interest, tax, depreciation and amortisation

<sup>32</sup> The enterprise value of a company is determined by taking the equity value (i.e. market capitalisation adjusted for a control premium) deducting the value of any surplus assets and adding net debt. Surplus assets are those assets which are not part of the core or main business e.g. separate freehold landholdings

<sup>33</sup> Generally determined based on the DORC methodology discussed earlier in this paper

### What do the valuation outcomes mean in the context of the accounting rules?

Australian accounting standards currently permit fair value to be estimated using either an income approach or a DRC approach, in circumstances where there is no market-based evidence of fair value.

Valuations performed applying the DRC approach determine the replacement cost of the existing assets in their current state of repair. This does not recognise that a new player may develop assets differently and/or use more technologically advanced assets which may be more cost efficient to install and/or operate. The DRC methodology allows for these issues to determine the best estimate of a likely current cost of replacement. Both the DRC and DORC methodology should be determined 'subject to sufficient profitability' which is intended to ensure that these valuations do not determine a value in excess of sufficient underlying cash flow.

This brings into the picture income (cash flow) based valuation which considers the economic value generated by the assets and the business as opposed to the cost to replace. Income based methodologies would be applied by any potential acquirer and, accordingly, should be preferred where sufficient reliable cash flow or earnings information is available or can be prepared.





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Designed and produced by Aqua Media, AM\_MEL\_03/10\_040678

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