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## Report on WACC component of NBN Co's Special Access Undertaking

Prepared by Professor Bob Officer and Dr Steven Bishop

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## Background

This opinion has been prepared jointly by Professor Robert Officer and Dr Steven Ross Bishop.

Professor Robert Rupert Officer is a Professor Emeritus of the University of Melbourne and has been closely involved in company tax policy and the effect of changes in company tax systems since the early 1980's. He has written extensively on cost of capital matters. A brief Curriculum Vita is attached.

Dr Steven Ross Bishop is an Executive Director of Value Adviser Associates Pty Ltd, a business that specialises in business valuations and cost of capital estimation for regulatory and business purposes. A brief Curriculum Vita is attached.

We have been provided with a copy of the Federal Court Guidelines for Expert Witnesses. We have read and note the Guidelines. We declare that we have made all the inquiries that we believe are desirable and appropriate, within the timeframe permitted, and that no matters of significance that we regard as relevant have, to our knowledge, been withheld from this report.

## Terms of Reference and Summary of Advice

We have been asked for our independent advice on key aspects of the approach that NBN Co has adopted in setting an appropriate WACC within the Special Access Undertaking ["SAU"]. In particular we have been asked to address the matters listed below (the statement in square brackets will be used as the heading to address each matter). We provide a short answer to each matter (which should be read in the context of the longer answers provided later).

- "Please advise whether it is reasonable, having regard to the statutory criteria for NBN Co to propose, as part of the Long Term Revenue Constraint Methodology, a methodology utilising a nominal, post tax, plain-vanilla WACC for each financial year of the SAU by reference to the prevailing 10 year Commonwealth Government bond rate plus a constant mark-up. As part of your analysis, please confirm whether it is reasonable for NBN Co to propose a methodology that effectively seeks to achieve a set margin over an annually updated risk free rate" [**Use of Set Risk Margin**].

### Summary of Advice:

We conclude that it is 'reasonable' to set a WACC based on the long term government bond rate plus a real margin and varying with the long term bond rate but it is important to recognise the risks associated with this approach. These risks may offset the advantages of the approach if there is not an adequate recognition and allowance for them by the way of a margin over and above that set by the WACC. An outcome of the fixed margin approach will be that the value of the business will vary over time when the risk margin in the opportunity cost of capital differs from the set margin.

- Please advise whether it is reasonable, having regard to the statutory criteria, for the SAU to include a mechanism for the mandatory review by the ACCC of the approach to WACC, including the methodology for setting and reviewing the WACC (or WACC parameters, with that review to take place in the period between:
  - the date the NBN is declared to be fully built and operational by the Communications Minister under section 48 of the NBN Companies Act 2011; and



- when the Finance Minister declares that the conditions are suitable for the entering into and carrying out of an NBN Co sale scheme takes effect, under section 50(6) of the NBN Companies Act 2011'

but if that WACC review has not commenced by 30 June 2027, that review will take place between 1 July 2027 to 30 June 2028. **[WACC Review]**

**Summary of Advice:**

A mandatory review prior to sale will, most likely, lead to a WACC that is reflective of conditions at the time and therefore lead to a greater likelihood that the sale price will be closer to the RAB rather than higher or lower depending on the relativity of the set WACC to the prevailing WACC. However there is also the issue that there is a risk that the WACC is set such that the duration of the assets doesn't match the duration of the liabilities. In such a circumstance the WACC would need to be adjusted to reflect this.

- Please advise the effective WACC, using a comparable methodology based on the 10 year Commonwealth Government bond rate plus a mark-up, applied for regulatory purposes to other utilities (e.g. electricity and gas) and telecommunications companies in Australia **[Comparability with other Regulatory Rates]**.

**Summary of Advice:**

The conclusions from our review of other regulatory decisions are:

- The Telstra WACC risk margin has been quite stable at 343 basis points until recently when it has changed due to revision of the debt risk premium and the beta of equity;
  - Other regulatory determinations show volatility in the WACC risk margin with recent levels generally above both the Telstra WACC risk margin and the proposed 350 basis points for NBN Co. However the equity beta is higher, gearing is at 60 and the assumed debt rating is circa BBB;
  - The WACC risk premium can be expected to be variable rather than fixed over time.
- If you consider that NBN Co's proposed WACC methodology is reasonable, please advise your best estimate of the current WACC mark up for NBN Co? How does this relate to the 350 basis points proposed by NBN Co and with parameters used in other regulatory decisions? **[Estimate of WACC Risk Premium]**.

**Summary of Advice:**

Our best estimate of a current WACC risk margin for NBN Co. is circa 400 basis points. With the exception of the MRP, this estimate would accord with the approach taken in other regulatory decisions. We note that regulatory authorities have used 6% as an MRP (based on a 10 year risk free rate) however we are of the view that this does not reflect current economic circumstances and is not appropriate. If 6% is used rather than our estimate of 7% (and adjusted down due to a higher risk free rate over a 30 year period) then the margin is circa 354 basis points. Given the estimation error around the estimates a 350 basis point mark-up would fall within a reasonable confidence interval around this estimate.

- Please advise whether you consider that the following assumptions that have been used by NBN Co for the purpose of calculating the net tax allowance within the Long Term Revenue Constraint Methodology are reasonable:



- return on debt (inclusive of debt raising costs) = the actual interest expense recorded in NBN Co's statutory accounts for the relevant financial year;
- - gamma = 0.25, which would be reset each year to reflect the most recent final regulatory decision made in relation to gamma by a regulator (i.e. ACCC or AER), or the Australian Competition Tribunal."  
**[Reasonableness of Assumptions for Tax Allowance]**

**Summary of Advice:**

Typically the tax savings for price determinations will be estimated using the opportunity cost of debt that is used in the estimate of the WACC to ensure a consistent forward view of cash flow estimates and the required rate of return. The proposed approach will lead to a mismatch in the tax savings calculated this way and those arising from using the opportunity cost of debt used to estimate the WACC. However it is challenging to estimate the magnitude and materiality of any error in advance. The error will be the difference between the opportunity cost of debt and the actual cost multiplied by the effective tax rate (gamma adjusted). It can be positive or negative. This will be immaterial until all tax losses are used.

We are aware that the 0.25 is consistent with a recent decision made by the Australian Competition Tribunal ["ACT"] based on the most recent research available to it. We have reviewed this research and have no grounds for disagreeing with the decision, despite it being lower than our expectation. Given that the ACT provides an opportunity for AER decisions to be appealed we are comfortable with gamma being set in this way.



## Advice

### Interpretation of Reasonableness

We have had regard for the view and interpretation of reasonableness as described in Attachment 4 to the brief, "Overview of reasonableness criteria in Part XIC of the Competition and Consumer Act".

### Context for WACC

Under the SAU, NBN Co proposes to commit to an overall revenue constraint across all products using a building block model (i.e. one that includes an allowance for WACC) and a regulatory asset base ["RAB"] method. The latter has a WACC component within it to reflect the intra year capital expenditure and disposal profile (Schedule 7, S 3.2).

In this regard, we understand there are two distinct periods of interest for the overall revenue constraint<sup>1</sup>. The first is the Initial Cost Recovery period followed by the Building Block Revenue period.

The Initial Cost Recovery period will continue until the end of the financial year in which initial costs are recovered. During this period NBN Co will be subject to limits on price increases however unrecovered cost attracts a weighted average cost of capital ["WACC"] return component (Schedule 7, S5.3). Unrecovered costs are assessed by comparing actual revenue to an Annual Building Block Revenue Requirement (\$4.2) based on the RAB. It is appropriate to include a WACC component on the unrecovered cost account as is proposed. In effect, the unrecovered losses can be viewed as further investment in the business and therefore has an opportunity cost equal to the WACC.

In essence, the Building Block period commences in the first financial year after full recovery of the initial costs captured in the Initial Cost Recovery Account.

Of importance for our purpose is that a building block method is used in both periods; to assess the cost recovery amount each year in the Initial Cost Recovery period and to assess the annual maximum revenue in the Building Block Revenue period. It is proposed that the WACC in year t used in this approach be revised each year according to:

$$WACC_t = r_{ft} + 350 \text{ basis points}$$

Where  $r_{ft}$  is the risk free rate of interest calculated as the average yield on 10 year Commonwealth Government Securities averaged over the final 20 days of the preceding financial year; and we refer to the 350 basis points as the 'set WACC risk premium'.

Typically the annual return on capital component of the building block approach is calculated by applying a WACC to the RAB. The WACC is assessed as:

$$WACC = k_d \frac{D}{V} + k_e \frac{E}{V} \quad (1)$$

Where

$k_e$  is the expected return on equity or cost of equity

$k_d$  is the expected return on debt or cost of debt

$V$  is the market value of debt plus the market value of equity.  $D/V$  is the market value of debt as a proportion of the market value of equity and debt

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<sup>1</sup> This is not a detailed outline of the pricing arrangements. Details are available in the SAU. Individual products are subject to additional constraints in what is called the "First Period" which ends in 2017.



$E/V$  is the market value of equity as a proportion of the market value of equity and debt or  $(1 - D/V)$ .

The cost of debt is typically assessed by direct reference to debt risk premiums on traded corporate bonds, usually of 10 year maturity, which is added to an estimate of the risk free rate, usually an average of 20 days traded yields on 10 year maturing Commonwealth Treasury Bonds.

The cost of equity is not directly observable in capital markets consequently a model is required to guide the choice. Typically the Capital Asset Pricing Model ["CAPM"] is used for the purpose. The CAPM can be expressed as:

$$k_e = r_f + [k_m - r_f] \beta_e \quad (2)$$

Where  $k_e$  is the expected return on asset e or cost of equity if the asset is equity  
 $r_f$  is the nominal risk free rate of return  
 $k_m$  is the expected return on the market portfolio  
 $[k_m - r_f]$  is often called the expected market risk premium ["MRP"] being the amount by which investors will be rewarded for bearing the risk of the market portfolio which has a beta of 1  
 $\beta_e$  is the risk of asset e relative to the risk of the market or equity beta.

The risk free rate typically used is also used to estimate the risk premium on debt. Since both the cost of debt and the cost of equity have a common risk free rate then the WACC can be expressed as a risk free rate plus a risk premium as follows:

$$r_f + (WACC - r_f) = r_f + DRP \frac{D}{V} + ERP \frac{E}{V} \quad (3)$$

Or

$$(WACC - r_f) = DRP \frac{D}{V} + ERP \frac{E}{V} \quad (4)$$

Where  $WACC - r_f$  can be viewed as a WACC risk premium  
 $DRP$  is the debt risk premium or  $k_d - r_f$   
 $ERP$  is the equity risk premium or  $k_e - r_f$ .

The SAU proposes to use the prevailing risk free rate at each year and add 350 basis points to derive a WACC. While the brief does not refer to the source of the 350 basis points we use the relationships above to guide our response. This provides a reference point for assessing the reasonableness of the proposed approach.

### Use of Set Risk Margin.

"Please advise whether it is reasonable, having regard to the statutory criteria for NBN Co to propose, as part of the Long Term Revenue Constraint Methodology, a methodology using a nominal, post tax, plain vanilla WACC for each financial year of the SAU by reference to the prevailing 10 year Commonwealth Government bond rate plus a constant mark-up. As part of your analysis, please confirm whether it is reasonable for NBN Co to propose a methodology that effectively seeks to achieve a set margin over an annually updated risk free rate".



## Annual Adjustment

We assume the alternatives to an annual update include revising the WACC either more or less regularly.

As discussed below, in our view it is reasonable to propose a nominal, post tax plain vanilla WACC for each year, i.e. the current long term government bond rate ( $r_f$ ) plus a fixed real rate such as the 350 basis points proposed, providing the 'rules of the game' are clear to investors (and customers).

## Use of a set WACC risk margin

### Systematic Risk

We assume that an intent of the SAU is for NBN Co to be restricted to earn the WACC, as a maximum, over the period of the SAU. Put another way, the intent is that the market value of NBN Co be at most equal to the RAB (an NPV = 0 construct).

This will occur if the prevailing WACC at any point of time is either equal to the set WACC or if expected variations in the WACC in the future are effectively the same as the set WACC.

The only time we can have confidence that the set WACC will be equal to the 'market WACC' such that the return on the RAB sets NPV=0 is when the life of the asset(s) is consistent with the period over which the set WACC is estimated. When this does not occur there is likely to be 'windfall gains or losses' for the entity. Conceptually, it is the same as a bank failing to match the duration of their assets and liabilities – borrowing long and lending short or borrowing short and lending long expose the bank to risks that do not occur when the duration of assets and liabilities are matched.

At one extreme, the proposed set WACC risk premium and the WACC framework captured above can be reconciled if the equity and debt risk margin as well as gearing is held constant over the entire period of interest. For the ERP to be constant further requires both the MRP and the beta of equity to be constant or the product of the two to be constant.

However the WACC is an opportunity cost and there is no reason to suppose that it will only change with the risk free rate. There is evidence that the ERP and DRP change over time. Consequently there will be years when the set WACC risk premium will be above the prevailing opportunity cost and times when the opposite is the case.

We cannot easily assess the impact of changes over time. Perhaps Monte Carlo simulation using historically based distributions of ERP and DRP may assist form a view of the reasonableness of the use of a set WACC versus a variable WACC. The variable WACC arises from variations in ERP and DRP over time and use of the Monte Carlo analysis will inform the sort of 'risk margin' that might be required to adequately compensate for the exposure to the unexpected changes in risk margins. There is no model that can be used to set such a risk margin other than by positing various scenarios and ensuring the 'over' adequately compensate the 'unders', such as a Monte Carlo study based on historical parameters.<sup>2</sup>

Nevertheless it is possible to form a view about the likely impact of the use of the proposed approach on the value of the NBN Co business relative to the RAB. Since the building block approach sets a maximum annual revenue that NBN Co can earn then it is most

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<sup>2</sup> By 'overs' and 'unders' we mean when the set WACC is set too low the entity will lose money (at least in opportunity cost) and when the set WACC is too high the entity will gain money or 'rent' from its 'monopoly position'.





likely that the expected cash flow will be less than this amount. This arises from there being a limit on the upside but not on the downside, analogous to coupon paying debt. The analogy to debt arises because it has as a series of promised payments which are a maximum. The expected cash flow will be below this because of the probability of default i.e. there is downside but no upside. Consequently the expected cash flow will be lower than that required to earn the set WACC.

This means that if the prevailing WACC and the set WACC were the same currently but through time the market WACC is inconsistent with the set WACC, then NBN Co are exposed to the risk explained above. If this risk is uncompensated then it is likely to result in the value of NBN Co being below the RAB. For example, suppose that NBN Co was expected to earn the set WACC risk premium over time. In this case its value at any point in time (present value of the expected stream of cash flows) will be a function of the relationship between the prevailing market WACC risk premium over the remaining life of the assets and the best view of the set WACC risk premium over the same period. If the set WACC risk premium is the higher then the value of NBN Co will be above the RAB. The converse will also hold.

We are unable to assess how the relationship will hold over time. We can, however, form a view as to whether the proposed 350 basis points is a reasonable reflection of the current prevailing long term view of the WACC risk premium – this is addressed in another section below.

One advantage of the set WACC risk premium for defining a maximum 'profit' is its simplicity and avoidance of a complex and costly process of having a formal reset at defined intervals. It also removes one aspect of regulatory risk arising from unexpected changes in regulators decisions around WACC. However offsetting this is the (unknown by us at this time) possibility of 'excess' profits or losses which can only be identified with the benefit of hindsight.

It is important to point out the solution to this problem of setting a long term WACC (or the equivalent margin over the bond rate) is not overcome by frequently re-setting the WACC. If the assets are of a long term duration they have to be funded for the long term and re-setting a WACC to meet current market conditions only increases the risk arising from the imbalance between the 'duration' of the assets and the liabilities (the funding). Similarly, with the ACCC re-setting the WACC at a the time the NBN Co is to be sold there is the risk that the WACC that is set is inconsistent with the funding costs of the assets i.e. the 'duration' of the assets is inconsistent with the 'duration' of the liabilities.

We conclude that it is 'reasonable' to set a WACC based on the long term government bond rate plus a real margin and varying with the long term bond rate but it is important to recognise the risks associated with this approach. These risks may offset the advantages of the approach if there is not an adequate recognition and allowance for them by the way of a margin over and above that set by the WACC.

### **Insurable or Diversifiable Risk**

The WACC component of the building block approach provides for a return to investors for bearing systematic or non-diversifiable risk.

The business, is however, also exposed to downside risks. Some are explicitly insured and some are self-insured. The former will be recognised in the estimation of costs which form part of the building block approach. Ideally the actuarial equivalent cost of the self-insured cost is also recognised and included in the building block approach. However these latter costs are very hard to estimate and, for that reason, are often ignored.



One approach to recognising these costs is to increase the WACC. However if the actuarial cost is hard to estimate then so too will be the amount to adjust the WACC. Consequently one informal way to recognise the costs is to err on the 'high' side when estimating the WACC.

With actual construction and 'ramp-up' economic costs being capitalised in the ICRA then the need for an explicit adjustment for insurable risks is unlikely to be necessary as these will be recognised as actual costs with the passage of time.

## WACC Review

"Is it reasonable for the SAU to include a mechanism for the mandatory review by the ACCC of the approach to the WACC?" (Paraphrased question).

An important consideration is the likely constraints on demand at the price ranges set that will limit NBN Co's ability to achieve a sufficient cash flow to earn the set WACC. Substitutes, such as alternative networks, will place a ceiling on the price it can charge and may mean the set WACC becomes irrelevant. By way of example, our understanding is that a number of regulated businesses (e.g. water) are not earning their WACC based on the RAB. In this circumstance the set WACC is not influential in the expected cash flows as revenue is insufficient to 'cover' it.

The price paid by an acquirer of NBN Co in a sale will be related to value of the business under the control of the acquirer. This can be expressed as the present value of the expected cash flows discounted at the prevailing WACC. The expected cash flows will be influenced by the WACC used to set the maximum revenue NBN Co can earn. It is useful to consider two scenarios:

1. If the market demand at prevailing prices does enable the business to earn the set WACC, then clearly it does play a role in setting prices. In this case changing the set WACC will change the expected cash flows and therefore the assessed value. Thus changing the set WACC will affect the sale price of the business.

Potential purchasers of NBN Co in a sale will adjust the offer price to be in accord with expected cash flows - the higher the set WACC, the higher will be the expected sale price and vice versa i.e. revising the set WACC will lead to the same directional change in the sale price.

The view that the assets of NBN Co should earn the cost of capital is equivalent to saying that the value of the business should equal the RAB. With this outcome being the objective then assessing the reasonableness of adjusting the set margin prior to sale can be assessed by examining the potential sale price relative to the RAB. If the likely sale price is above the RAB then the implication is that the set WACC is too high and vice versa and a change is reasonable.

2. If the expected cash flow is insufficient to earn the set WACC, e.g. due to insufficient demand to charge a competitive price, then the sale price will be below the RAB. Changing the set WACC will not affect expected cash flows since market conditions are preventing the business from earning the set WACC.

In the circumstance that the sale of NBN Co is made at a fixed and previously set WACC, it is clear from the above that the risk is to the vendors in that the sale price will vary depending on whether the set WACC is different to the prevailing WACC – if the set WACC is less than the prevailing WACC then the sale price will be less than the RAB and



conversely. An alternative scenario would be to set the sale price at the RAB and then seek tenders on the return or WACC on those assets the purchaser would be prepared to accept. In these circumstances the risk is born by the consumers or customers assuming they are locked in to the NBN Co network i.e. there is no competitive alternative.

Assuming it is the asset that is sold at the set WACC then clearly in setting the WACC some margin should be allowed for the risk the vendor (NBN Co) bears. It is similar to the risk already discussed of changes in WACC when the duration (life) of the assets is not consistent with the time period under which the WACC was set. We cannot determine with any accuracy the compensation required without simulations but it is another reason why the set WACC should 'err on the generous' in line with the recommendations of the Productivity Commission and the Commerce Commission as summarised below.

We note commentary from a number of Authorities, primarily from the Productivity Commission, that recognises that the long term user of the service may be best served by being conservative in estimating the WACC rather than aggressive i.e. it is better to err on the side of it being 'too high' than being 'too low'. Unfortunately we have not seen any research that specifies the relative loss functions associated with an 'overstatement' or 'understatement' of the WACC that enable a formal analysis of this issue

In this regard, the Productivity Commission suggests that there is a trade-off between the social cost of under-investment resulting from a WACC being set that is 'too low' and the private benefit of it being set 'too high':

*"The possible disincentives for investment in essential infrastructure services are the main concern. In essence, third party access over the longer term is only possible if there is investment to make these services available on a continuing basis. Such investment may be threatened if inappropriate provision to access, or regulated terms and conditions of access, lead to insufficient returns for facility owners. While the denial of monopoly pricing of access also imposes costs on the community, they do not threaten the continued availability of the essential services concerned. Thus, over the longer term, the costs of inappropriate intervention in this area are likely to be greater than the cost of not intervening when action is warranted."<sup>3</sup>*

*"However given the asymmetry in the costs in under and over compensation of facility owners, together with the informational uncertainties facing regulators, there is a strong principle case to 'err' on the side of investors. The challenge is how to render this principle operational without creating new problems."<sup>4</sup>*

*"... given the cost of inappropriate intervention and the practical difficulties of intervening efficaciously, it is important that access regulators are not overly ambitious. The costs potentially associated with efforts to fully remove monopoly rents might suggest that the focus of regulators should be a more modest one of reducing demonstrably large rents. Similarly, the extensive information required to base access prices on precise assessments of firms' costs, and the attendant risk of mistakes, might provide a case for less intrusive approaches, involving some rules of thumb."<sup>5</sup>*

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<sup>3</sup> Productivity Commission, "Review of the National Access Regime," Position Paper March 2001 p xv111-xix

<sup>4</sup> Ibid p 71

<sup>5</sup> Ibid p71



A similar view is expressed by the New Zealand Commerce Commission <sup>6</sup> which provides the following explanation for estimating a standard error around an estimate of the WACC and selecting the 75th percentile WACC to use in price determinations:

*"The reason for the Commission adopting a cost of capital estimate that is above the mid-point is that it considers the social costs associated with underestimation of the cost of capital in a regulatory setting, are likely to outweigh the short-term costs of overestimation. That is, the Commission is acknowledging that where there is potentially a trade-off between dynamic efficiency (i.e. incentives to invest) and static allocative efficiency (i.e. higher short-term pricing), the Commission will always favour outcomes that promote dynamic efficiency. The reason being that dynamic efficiency promotes investment over time and ensures the longer term supply of the service, which thereby promotes the long-term interests of consumers.*

*On this basis the Commission considers it appropriate to apply a point estimate for the cost of capital for the DPP and CPP that is based on the 75th percentile."*

On these grounds we recommend erring on the high rather than low side of estimates and are of the view that this would still be 'reasonable' under the guidelines of Attachment 4 to the brief.

In summary, a mandatory review prior to sale will lead to a WACC that is reflective of conditions at the time and therefore lead to a greater likelihood that the sale price will be closer to the RAB rather than higher or lower depending on the relativity of the set WACC to the prevailing WACC. However there is also the issue noted on page 6 that there is a risk that the WACC is set such that the duration of the assets doesn't match the duration of the liabilities.

### **Comparability with other Regulatory Rates**

"Please advise the effective WACC, using a comparable methodology based on the 10 year Commonwealth Government bond rate plus a mark-up that is applied for regulatory purposes to other utilities (e.g. electricity and gas) and telecommunications companies in Australia."

The Table and Figures below summarise data collected on the WACC risk premium for:

- a) Telstra regulated pricing determinations; and
- b) Other utility regulated pricing determinations (the data table is in Appendix 1).

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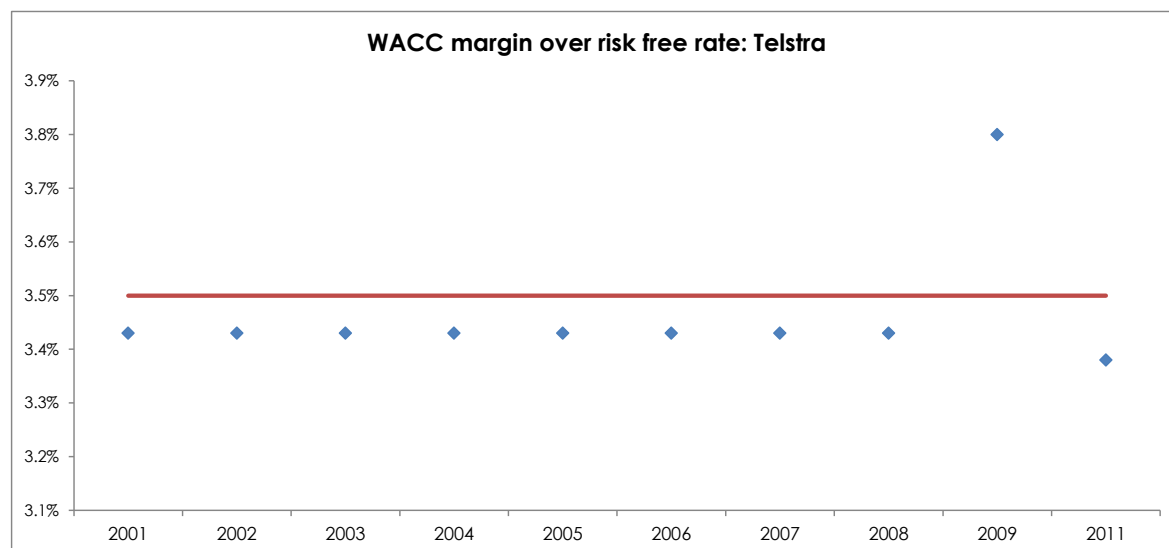
<sup>6</sup> Commence Commission, "Input Methodologies (Electricity Distribution Services) Draft Reasons Paper" June 2010 p 315



## Telstra regulated pricing determinations

The plain vanilla WACC risk premiums above the nominal risk free rate as assessed for Telstra since 2000 are presented in Figure 1 with the underlying data in Table 1. Also shown is the 350 basis point proposal for NBN Co as the straight line.

**FIGURE 1 REGULATORY MARGIN OF WACC ABOVE RISK FREE RATE FOR TELSTRA**



Source: ACCC determinations

**TABLE 1 REGULATORY MARGINS OF WACC ABOVE RISK FREE RATE FOR TELSTRA**

Year	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2011-14
D/V ratio	40%	40%	40%	40%	40%	40%	40%	40%	40%	40%
Risk-free (rf)	6.23%	5.87%	5.90%	4.83%	5.82%	5.15%	5.82%	5.82%	6.35%	5.16%
Risk premium	6%	6%	6%	6%	6%	6%	6%	6%	6%	6%
Asset beta	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
Equity beta	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7
Tax rate (e)	30%	30%	30%	30%	30%	30%	30%	30%	30%	
Debt premium	1.02%	1.02%	1.02%	1.02%	1.02%	1.02%	1.02%	1.02%	1.95%	2.06%
Issuance cost	0.08%	0.08%	0.08%	0.08%	0.08%	0.08%	0.08%	0.08%	0.08%	
Gamma	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.45
WACC (post-tax vanilla)	9.66%	9.30%	9.33%	8.26%	9.25%	8.58%	9.25%	9.25%	10.15%	8.54%
WACC (post-tax vanilla) less risk	3.43%	3.43%	3.43%	3.43%	3.43%	3.43%	3.43%	3.43%	3.80%	3.38%

Source: ACCC determinations

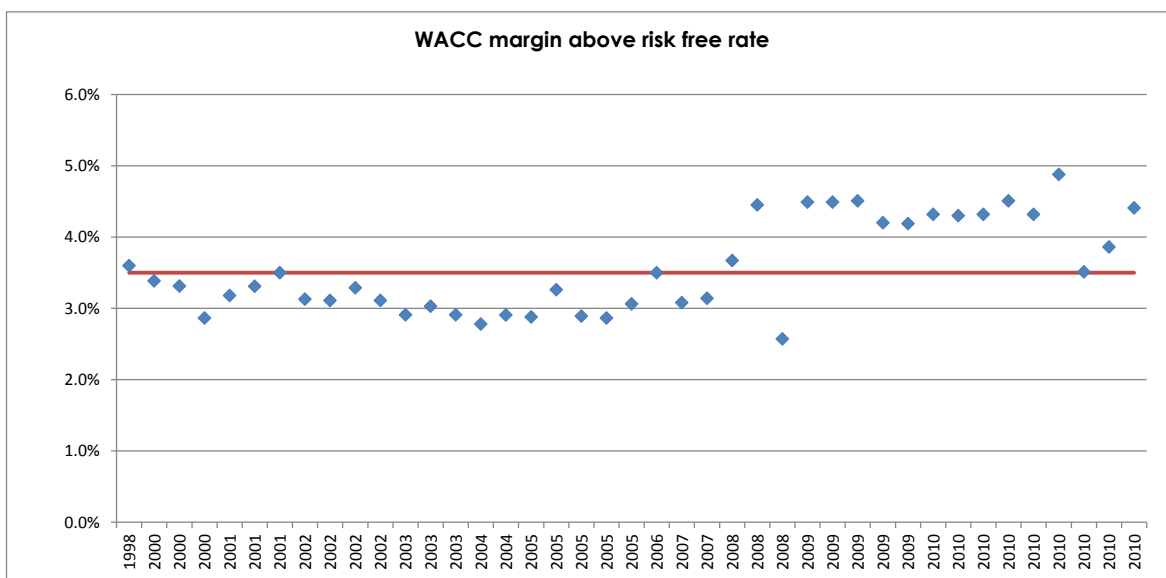
It is apparent from this data that the primary variable leading to a change in WACC has been the risk free rate. The WACC margin above this rate has been a steady 343 basis points until the decisions relating to the 2008-09 and 2011-14 periods.

This stability has in turn come about because the beta and MRP have been stable thereby providing a stable ERP and the DRP has been stable. In the most recent two decisions the beta of equity has fallen from 0.8 to 0.7 compared with a rise in the DRP.

This pattern of WACC margins above the risk free rate is in sharp contrast with that in electricity, gas and water determinations. A number of these are captured in Figure 2 and in the Table in the Appendix.



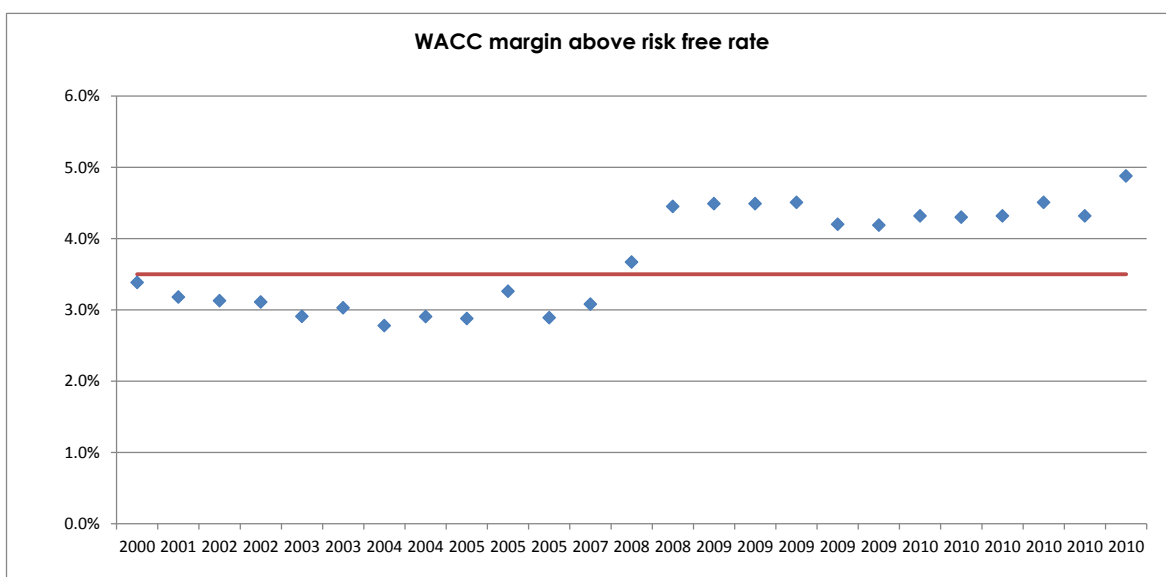
**FIGURE 2 WACC MARGIN ABOVE RISK FREE RATE: ELECTRICITY, GAS AND WATER**



It is evident that the margins have varied much more than for Telstra. The horizontal line is the proposed 350 basis points for NBN Co. The average is 355 and the median is 331. The impact of the GFC is evident with the WACC margin rising commensurate with the increase in the debt risk premiums.

Electricity dominates the group in terms of the number of determination for which we have data. Figure 3 shows this subset again with the proposed 350 basis points for NBN Co shown as the horizontal line. The average for the data is 371 basis points and the median 353 basis points. The equivalent summary statistics for the gas and water sectors are 330 basis points for both the mean and the median. It can be seen from the data table in the appendix that the beta is generally higher than 0.7 used for Telstra and the gearing is higher at 60% rather than 40%. Nevertheless the graph highlights the variability in the WACC risk premium over time.

**FIGURE 3 WACC MARGIN ABOVE RISK FREE RATE: ELECTRICITY**





The influence of the AER taking over the regulatory process is evident by the similar margins within a particular year post 2008.

The conclusions from this **historical review** are:

- The Telstra WACC risk margin has been quite stable at 343 basis points until recently when it has changed due to due revision of the debt risk premium and the beta of equity;
- Other regulatory determinations show volatility in the WACC risk margin with recent levels generally above both the Telstra WACC risk margin and the proposed 350 basis points for NBN Co. However the equity beta is higher, gearing is at 60 and the assumed debt rating is circa BBB;
- The WACC risk premium can be expected to be variable rather than fixed over time.

The important question is whether the 350 basis points reflects the margin that investors require at the time the capital is raised to finance the long term assets i.e. to ensure a zero NPV investment. Whether this is the case is a matter of fact at the time.



## Assessment of risk margin for NBN Co

"If you consider that NBN Co's proposed WACC methodology is reasonable, please advise your best estimate of the current WACC mark up for NBN Co? How does this relate to the 350 basis points proposed by NBN Co and with parameters used in other regulatory decisions?"

We have assessed a WACC and resultant risk margin of the WACC as at 22 November 2011. We have accessed market data to estimate the WACC for NBN Co.

We estimate the current premium to be circa 400 basis points.

This assessment will change with time as a result of changes in the inputs. The inputs used and the risk margin are captured below.

Input	Value	Comment
Risk free rate	5.11%	Average of 20 days yields to 22 Nov 2011 on 10 year Commonwealth Treasury Bonds with 90 bp added to reflect 30 year view. The 90 basis points was estimated from US data (no 30 year maturing CTBs are available)
Beta of equity	0.7	As used by ACCC for Telstra
Market Risk Premium	6.7%	Uses current one year MRP of 10.3% transitioning to a long term average of 6.5% over 10 years. Current MRP derived by applying a constant premium per unit risk to implied volatility of 22.2% for 1 year options on ASX 200 index. Constant premium per unit risk is 6.5%/14% where 14% reflects long term market volatility. Also adjusted for an average 30 year risk free rate compared with 10 year (30 basis points higher for 30 year risk free rate)
Debt Risk premium	2.87%	Spread on A rated, 7 year bonds (from Bloomberg) plus 25 basis points to extend to 10 years less 8 basis points to extend to 30 years (the latter derived from US 10 vs 30 year premiums)
Gearing	40%	As used by ACCC for Telstra
<b>Outputs</b>		
Cost of Equity	9.8%	Uses CAPM
Cost of Debt	8.0%	
Plain Vanilla WACC	9.1%	
WACC risk margin	4.0%	

By way of further comment on some of the inputs:

- We have estimated a spot 30 year **risk free rate** by adding a term premium of 90 basis points to the 10 year CTB rate (4.22%). The 90 basis points was assessed by examining the difference between 10 year and 30 year rates in the US since no 30 year CTBs exist in Australia' to enable a direct assessment. The 30 year rate was chosen to match the expected life of the assets to increase the chance of the duration of assets matching that of liabilities. However, the choice of this rate as the risk free rate does not affect our estimate of the risk margin (except for the discussion under the market risk premium below).
- We have selected a **beta of equity** as used for Telstra. We note Telstra is a mature network whereas NBN Co will go through a construction phase and growth phase before it can be viewed as a mature network like Telstra.





Ideally the comparable companies for assessing a beta during the construction phase would be those providing construction services to the Telco industry. Finding such pure-play companies is clearly a challenge so we do not have a view as to how the comparable betas might fall. However, ultimately the value of the constructed services / activities will be determined by demand for the services they provide, in turn a function of the systematic risk of Telco demand. Put another way, the ultimate funding for the construction phase is from the revenue generated by NBN Co and the non-diversifiable risk arises from how this changes with the economy. This will be, in turn, affected by the operating leverage of the construction business which may differ from the Telco business leading to a different asset beta however we do not have any fact base to test whether this will be significantly different.

As a consequence of lack of data, we have opted for using the Telstra beta.

However it is likely that the downside risks will be different in the construction phase to the operational phase. These risks will be insured either explicitly or implicitly by self-insurance. Such costs should be included in the cost component of the building block approach.

- We have selected a **Market Risk Premium** of 6.7%.<sup>7</sup> We have presented argument for a 7% risk premium in a number of expert papers.<sup>8</sup> The 6.7% reflects the 7% adjusted to reflect a 30 year risk free rate rather than a 10 year rate as discussed below. In essence the arguments for this are:
  - The long term average should include an allowance for the value of franking tax credits and the upper end of the range 6 – 7% best captures the historical record in this regard (see the Bishop paper referenced in footnote 7 for a graph depicting the historical record as it has evolved since 1990 using data from 1883 and 1958 respectively;
  - The current forward rate is well above the historical average as is informed by examining higher than average debt risk premiums looking out at least 7 years, by noting the decline in share prices and by examining the forward view on implied market risk derived from the price of options on the ASX 200;
  - The analysis above provided a MRP of 7%. This is derived using a 10 year CTB as the risk free rate. To be comparable for a 30 year period it is necessary to deduct the difference between the average risk free rates for 30 year compared with 10 year bonds. Since no Australian data is available for this purpose we assessed the difference using US data. This was 24 basis points for the period since 1977 for which we have data. This was rounded up to 30 basis points.
- The **debt risk premium** is based on the view that ideally there should be a matching of duration of cash flows from the assets and of funding i.e. 30 year assets, for example, should be funded by 30 year assets. Under this ideal situation the debt risk premium should reflect the current cost of funding for this period. Use of funding for a shorter period is analogous to banks 'borrowing short and lending

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<sup>7</sup> The risk margin is 354 basis points if a MRP of 6% is used and adjusted to a 30 year view by deducting 30 basis points for the longer term risk free rate and 375 basis points if a MRP of 6.5% similarly adjusted is used

<sup>8</sup> See for example:

Officer and Bishop, "Market Risk Premium: A Review Paper", prepared for Energy Networks Association, Australian Pipeline Industry Association & Grid Australia, August 2008

Bishop S, M Fitzsimmons & R Officer, "Adjusting the market risk premium to reflect the global financial crisis", JASSA Issue 1 2011

S Bishop "Commentary on MRP" paper prepared for DBNGP (WA) Nominees Pty Ltd as trustee of the DBNGP WA Pipeline Trust and DBNGP (WA) Transmission Pty Limited, November 2011



long' leading to exposure to additional risk. Investors would require compensation for bearing this risk thus the debt risk premium would need to be higher if a shorter maturity was used.

The plain vanilla WACC is estimated as 9.1% with a risk margin above the risk free rate of 4.0%. A risk margin as discussed on page 6 should be added to this.

Our view is that the appropriate MRP, using a 10 year risk free rate, is 7% under current circumstances. This view is appropriately above the more commonly adopted estimate of 6% in regulatory decisions as is apparent from Appendix 1. If this lower rate was used in place of our estimate of 7% (and adjusted to 5.7% for the longer term risk free rate) the risk margin would be 354 basis points. Given the standard error associated with estimates of WACC the mark-up of 350 basis points would be within a reasonable confidence interval around the point estimate of 354 basis points.

### **Reasonableness of Assumptions for Tax Allowance**

"Please confirm whether you consider that the following assumptions that have been used by NBN Co for the purpose of calculating the net tax allowance within the Long Term Revenue Constraint Methodology are reasonable.

- return on debt (inclusive of debt raising costs) = the actual interest expense recorded in NBN Co's statutory accounts for the relevant financial year
- $\gamma = 25\%$ "

### **Interest Cost of Debt**

The SAU outlines that the tax calculation in the building block approach will estimate the tax savings arising from interest being tax deductible using the actual interest rate on outstanding debt.

Typically the tax savings used for this purpose will be estimated using the opportunity cost of debt that is used in the estimate of the WACC to ensure a consistent forward view of cash flow estimates and the required rate of return.

The proposed approach will lead to a mismatch however it is challenging to estimate the magnitude and materiality of any error in advance. The error will be the difference between the opportunity cost of debt and the actual cost multiplied by the effective tax rate ( $\gamma$  adjusted). It can be positive or negative. This will be immaterial until all tax losses are used.

Without careful modelling we are unable to inform our hypothesis that the error will be small and relatively immaterial.

### **Gamma**

The proposal is to use a  $\gamma$  of 0.25 which would be reset each year to reflect the most recent final regulatory decisions made in relation to  $\gamma$  by a regulator or the Australian Competition Tribunal ["ACT"].

We are aware that the 0.25 is consistent with a recent decision made by the Australian Competition Tribunal based on the most recent research available to it. We have reviewed this research and have no grounds for disagreeing with the decision, despite it being lower than our expectation.

Given that the ACT provides an opportunity for AER decisions to be appealed we are comfortable with  $\gamma$  being set in this way.



## Appendix 1: Details of WACC's in Regulatory Decisions: Electricity, Gas and Water

Industry	Business	Authority	Report date	Risk free rate (Nominal)	Market Risk Premium	Gearing	Equity beta	Debt margin	Cost of Debt	Cost of Equity	Nominal Vanilla WACC	Reported WACC less Risk Free
Gas	Transmission Vic	ACCC	1998	6.00%	6.00%	60%	1.20	1.20%	7.20%	13.20%	9.60%	3.60%
Electricity	Distribution Victoria	ORG	2000	6.19%	6.00%	60%	1.0	1.50%	7.69%	12.19%	9.58%	3.39%
Gas	Distribution WA	OFFGAR	2000	6.27%	6.00%	60%	1.08	1.20%	7.47%	12.75%	9.58%	3.31%
Gas	Distribution NSW	IPART	2000	6.44%	5 - 6%	60%	0.9 - 1.1	.09 - 1.1	7.44%	12.10%	9.30%	2.86%
Electricity	Transmission Qld	ACCC	2001	5.65%	6.00%	60%	1.00	1.20%	6.85%	11.80%	8.83%	3.18%
Gas	Distribution SA	QCA	2001	5.96%	6.00%	60%	0.99	1.55%	7.51%	11.90%	9.27%	3.31%
Gas	Transmission SA	ACCC	2001	5.61%	6.00%	60%	1.16	1.20%	6.81%	12.57%	9.11%	3.50%
Electricity	Transmission SA	ACCC	2002	5.17%	6.00%	60%	1.00	1.22%	6.39%	11.17%	8.30%	3.13%
Electricity	Transmission Vic	ACCC	2002	5.12%	6.00%	60%	1.00	1.20%	6.32%	11.09%	8.23%	3.11%
Gas	Transmission Vic Main	ACCC	2002	5.31%	6.00%	60%	1.00	1.59%	6.90%	11.15%	8.60%	3.29%
Gas	Transmission Vic	ACCC	2002	5.12%	6.00%	60%	1.00	1.20%	6.32%	11.09%	8.23%	3.11%
Electricity	Transmission Murraylink	ACCC	2003	5.46%	6.00%	60%	1.00	0.86%	6.32%	11.44%	8.37%	2.91%
Electricity	Mainland Tasmania	OTER	2003	5.05%	6.00%	60%	0.95	1.25%	6.30%	10.75%	8.08%	3.03%
Gas	Transmission NSW Main	ACCC	2003	5.29%	6.00%	60%	1.00	0.92%	6.20%	11.30%	8.20%	2.91%
Electricity	Distribution NSW	IPART	2004	5.90%	5.50%	60%	0.95	0.9%-1.1%	7.00%	11.20%	8.68%	2.78%
Electricity	Distribution ACT	ICRC	2004	5.62%	6.00%	60%	0.90	1.25%	6.87%	11.02%	8.53%	2.91%
Electricity	Distribution SA	ESCOSA	2005	5.80%	6.00%	60%	0.80	1.64%	7.40%	10.60%	8.68%	2.88%
Electricity	Distribution Victoria	ESC	2005	5.27%	6.00%	60%	1.00	1.425%	6.69%	11.27%	8.61%	3.26%
Electricity	Distribution Qld	QCA	2005	5.61%	6.00%	60%	0.90	1.22%	6.83%	11.01%	8.50%	2.89%
Gas	Distribution NSW	IPART	2005	5.70%	5.5%-6.5%	60%	0.8 - 1.0	1.13 - 1.22	6.88%	11.10%	8.57%	2.87%
Gas	Transmission WA Main	ERA	2005	5.45%	5%-6%	60%	0.8-1.33	0.98-1.225	6.55%	11.45%	8.51%	3.06%
Gas	Distribution Qld	QCA	2006	5.25%	6.00%	60%	1.10	1.43%	6.68%	11.85%	8.75%	3.50%
Electricity	Transmission Queensland	AER	2007	5.68%	6.00%	60%	1.00	1.14%	6.82%	11.68%	8.76%	3.08%
Gas	Transmission Qld Main	ACCC	2007	5.70%	6.00%	60%	1.00	1.14%	6.840%	11.70%	8.84%	3.14%
Electricity	Transmission Vic	AER	2008	6.09%	6.00%	60%	1.00	2.11%	8.20%	12.09%	9.76%	3.67%
Electricity	Transmission SA	AER	2008	6.20%	6.00%	60%	1.00	3.42%	9.61%	12.20%	10.65%	4.45%
Water	Water Pricing Review Vic	ESC	2008	6.23%	6.00%	60%	0.65	1.75%	7.98%	10.13%	8.84%	2.57%
Electricity	Distribution NSW	AER	2009	4.29%	6.00%	60%	1.00	3.48%	7.78%	10.29%	8.78%	4.49%
Electricity	Distribution NSW	AER	2009	4.29%	6.00%	60%	1.00	3.48%	7.78%	10.29%	8.78%	4.49%
Electricity	Distribution NSW	AER	2009	4.32%	6.00%	60%	1.00	3.52%	7.84%	10.32%	8.83%	4.51%
Electricity	Transmission Tas	AER	2009	5.80%	6.00%	60%	1.00	3.01%	8.81%	11.80%	10.00%	4.20%
Electricity	Transmission NSW	AER	2009	5.86%	6.00%	60%	1.00	2.99%	8.85%	11.86%	10.05%	4.19%
Electricity	Distribution Vic	AER	2010	5.08%	6.50%	60%	0.80	3.74%	8.81%	10.28%	9.40%	4.32%
Electricity	Distribution Vic	AER	2010	5.65%	6.50%	60%	0.80	3.70%	9.35%	10.85%	9.95%	4.30%
Electricity	Distribution Vic	AER	2010	5.08%	6.50%	60%	0.80	3.74%	8.81%	10.28%	9.40%	4.32%
Electricity	Distribution Vic	AER	2010	5.14%	6.50%	60%	0.80	4.05%	9.19%	10.34%	9.65%	4.51%
Electricity	Distribution Vic	AER	2010	5.08%	6.50%	60%	0.80	3.74%	8.81%	10.28%	9.40%	4.32%
Electricity	Metering Vic	AER	2010	4.63%	6.00%	60%	1.00	4.00%	8.76%	10.63%	9.51%	4.88%
Water	Water and sewerage SA	Govt of SA	2010	6.17%	6.00%	55%	0.80	1.10%	7.27%	10.97%	8.94%	3.51%
Water	Bulk water NSW	IPART	2010	5.80%	5.5%-6.5%	60%	0.8 - 1.0	2.80%	8.60%	11.25%	9.66%	3.86%
Water	Water Qld	QCA	2010	4.91%	6.00%	60%	0.66	4.78%	9.69%	8.85%	9.35%	4.41%

Source: Various regulatory documents retrieved from relevant websites. Numbers in red were calculated from the data captured from the documents



## Biographical Notes

### Professor Bob Officer

B AgSc (Melbourne), M AgEc (New England), MBA (Chicago), PhD (Chicago), SF Fin

Bob has primarily focused on academic and consulting work. His expertise and research includes corporate and international finance, capital markets, industrial organisation, takeovers and antitrust.

He has played a substantive role in advising both regulatory bodies and regulated bodies on a whole range of issues associated with regulatory price setting for infrastructure assets. He has an international reputation for his pioneering work on the impact of dividend imputation on valuation

Bob was Chair of Victorian Funds Management Corporation until May 2006 with about \$37 billion under management and he has been integrally involved in the Australian Pension Fund industry for many years. He has held several other appointments including Chairman of both the Victorian and National Commissions of Audit, and has consulted to a large number of public, private and government organisations.

He sits on the Board and Investment committee on a number of Fund Managers Acorn Capital, CP2, JCP Investment Partners in addition to seats on the Boards of TAC and Transurban.

Bob has held Professorial positions in Finance at Monash University, University of Queensland and Melbourne Business School. He has held visiting Professor roles at Stanford Graduates School of Management and the Wharton School. He is Professor Emeritus at University of Melbourne.

### Dr Steven Bishop

B Ec (Monash), MCom (Hons) (UNSW), PhD (AGSM), FCPA, F Fin

Steve is a valuation and corporate finance consultant. He a founding director of Value Adviser Associates, a business valuation and corporate advisory practise with offices in Melbourne, Brisbane and Adelaide and now operating in Tasmania.

Steve's primary consulting interest is around the application of valuation insights to business decisions. In particular, he has guided the implementation of value-based management in a number of large and medium sized corporations.

Assignments have included business valuations for compliance, cost of capital estimation, merger and acquisition advice, the development of strategic and business plans, strategy advice, transfer pricing analysis and aspects of price determination in utility regulation.

Steve has worked in a number of industries including Aquaculture, Chemicals, Electricity, Financial Services, Forestry, Gas, Infrastructure, Minerals and Mining, Property, Rail, Retailing, Shipping & Transportation, Telecommunications, Water and Waste-water.

Prior to Value Adviser Associates Steven worked with L.E.K. Consulting, as a partner in the world-wide management consultancy business; with Marakon Associates, as a senior manager in the firm that was a foundation consulting business in value based management principles and application; with Andersen Consulting as a Senior Manager in the Strategic Services section.

Prior to joining the consulting sector, Steve worked as an academic for over 15 years. He held academic positions at AGSM, University of NSW, Monash, Melbourne Business School and the Bendigo Institute of Technology. Steven co-authored "*Corporate Finance*" by Bishop, Faff Oliver and Twite (now in the 5<sup>th</sup> edition). He continues to teach in the Masters of Applied Finance offered by Macquarie University.