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# Icon Water Limited

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## Response to Draft Report

23 January 2015

**Submission to the Industry Panel review of the Price Direction for regulated water and sewerage services determined by the Independent Competition and Regulatory Commission in June 2013**



Icon Water Limited (formerly ACTEW Corporation Limited) is an unlisted public company that owns and operates the water and sewerage assets and business in the ACT. The company is owned by the ACT Government and has two voting shareholders: the Chief Minister and Deputy Chief Minister of the ACT.

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## Executive Summary

The Independent Competition and Regulatory Commission (**ICRC**) released its Final Report and Price Direction for water and sewerage services in the Australian Capital Territory (**ACT**) on 26 June 2013. On 26 September 2013, Icon Water Limited (**Icon Water**), formerly ACTEW Corporation Limited, submitted an application for review of the Price Direction by an Industry Panel under Part 4C of the *Independent Competition and Regulatory Commission Act 1997* (the **Act**). An Industry Panel (**Panel**) was appointed in April 2014. The Panel released its draft decision in December 2014.

Icon Water is generally supportive of the Panel's draft decision. The well-accepted regulatory techniques applied in the draft decision, if implemented, would provide significant benefits to the ACT community by:

- providing a more certain basis for operating a water and sewerage business and thereby promoting efficient maintenance and investment;
- providing greater incentives to drive costs down over time; and
- reducing the administrative costs of regulation over the coming years.

However, Icon Water is concerned with some elements of the draft decision. Icon Water's two main concerns are as follows.

- Under the draft decision, Icon Water and its customers are exposed to significant risk that revenue will fall short of efficient costs by up to \$58 million due to water sales varying from forecasts. Icon Water has calculated that the average revenue outcome over the distribution of potential weather outcomes for the next four years is a shortfall of \$34 million. To address this risk, Icon Water contends that:
  - the deadband on the demand volatility adjustment mechanism should be reduced from 7 per cent to 3 per cent of forecast sales revenue over the period 2014-15 to 2017-18;
  - the water sales forecast for 2014-15 should take account of actual volumes observed in the year to date and be set at the level of sales observed in 2013-14; and
  - the water sales forecasts for 2015-16 to 2017-18 should be set at 42.5 GL per annum rather than at 44.6 GL in 2015-16 increasing to 45.8 GL in 2017-18.
- Icon Water considers that some of the inputs used to calculate the weighted average cost of capital (WACC) are underestimated and that, as a result, the WACC does not provide an appropriate rate of return on investment. In particular, Icon Water submits that further consideration should be given to:
  - Increasing the equity beta parameter from 0.7 to 0.9 to account for asymmetric exposure to market conditions, the imprecision of the beta estimates and limitations of the Sharpe-Lintner capital asset pricing model (**CAPM**); and
  - Reducing the gamma parameter from 0.50 to 0.25 to reflect information that was available at the time the ICRC made its decision in 2013.

# 1 Introduction

## 1.1 Background

The Independent Competition and Regulatory Commission (**ICRC**) released its Final Report and Price Direction for water and sewerage services in the Australian Capital Territory (**ACT**) on 26 June 2013. On 26 September 2013, Icon Water Limited (**Icon Water**), formerly ACTEW Corporation Limited, submitted an application for review of the Price Direction by an Industry Panel under Part 4C of the *Independent Competition and Regulatory Commission Act 1997* (the **Act**). An Industry Panel (**Panel**) was appointed in April 2014 and held a directions hearing on 25 July 2014 at which it directed Icon Water to submit a Statement of Facts and Contentions (**SOFC**). Icon Water submitted its SOFC on 31 July 2014. The main matters raised for review were:

- the ICRC's decision on the cost of capital, in particular:
  - the use of a firm-specific, rather than a 'typical firm', approach; and
  - the decision to set the rate of return on equity below the level determined as the lower bound for that parameter, as a transitional measure to achieve a particular price outcome;
- the ICRC's decision to apply a regulatory model under which all key elements of the building block revenue model are reset every two years (over a regulatory period of six years); and
- the ICRC's method for calculating the depreciation component of the building block revenue, which contains a number of errors.

The SOFC also identified that other matters that are connected with the matters outlined above that needed to be reviewed as part of its proposed alternative approach. In particular, Icon Water's proposed increase in the length of the period between resets of the revenue building block model (from two years to five years) would require:

- forecasts of expenditure, demand and miscellaneous income beyond the 2013-14 and 2014-15 forecasts determined as part of the original Price Direction;
- consideration of the form of control and pass-through provisions, since increasing the period of a fixed price path would increase risk of divergence between revenue and cost due to events beyond Icon Water's control; and
- determination of prices or revenue caps beyond the 2013-14 and 2014-15 prices determined as part of the original Price Direction.

In relation to each of these matters, the SOFC set out Icon Water's proposed alternative decision. These proposals were based on the regulatory proposals submitted by Icon Water to the ICRC in July 2012 and April 2013.

The Panel released its Draft Report in December 2014 and called for submissions by 23 January 2015.

The present document represents Icon Water's submission in response to the draft decision.

## 1.2 Icon Water response

The Panel's draft decision has been based on well-accepted regulatory techniques and, if implemented, would provide significant benefits to the ACT community by:

- providing a more certain basis for operating a water and sewerage business and thereby promoting efficient maintenance and investment;
- providing greater incentives to drive costs down over time; and
- reducing the administrative costs of regulation over the coming years.

Icon Water acknowledges the approach adopted by the Panel, which restores well accepted regulatory practice and should serve to renew the community's confidence in the independent regulatory review process.

Icon Water does however have two remaining concerns that relate to:

- the risk of water sales revenue not recovering efficient cost over the regulatory period; and
- the return on capital allowed in the draft decision.

These concerns are detailed in Section 2 and Section 3. Icon Water's responses to other elements of the draft decision are set out in Section 4.

## 2 Demand risk

### 2.1 High likelihood of a revenue shortfall under the draft decision

There is a considerable risk that water sales will be below the forecast adopted by the Panel and that, as a result, revenue will fall short of the level the Panel has identified is required to recover efficient costs. Icon Water's analysis indicates that there is an 84 per cent likelihood of a revenue shortfall under the draft decision,<sup>1</sup> with an expected cost over the regulatory period of \$34 million (in 2014-15 dollar terms). Icon Water notes that it has already absorbed a revenue shortfall of \$263 million in the 2008-13 regulatory period.

This risk arises due to the combination of the following factors.

- Efficient costs do not vary significantly with water sales, whereas revenue is heavily reliant on water sales at the Tier 2 price. The impact on revenue due to water sales is around 60 times larger than the impact on costs.<sup>2</sup>
- The water sales forecasts adopted by the Panel are above the expected level of demand, based on Icon Water's statistical analysis.
- Up to seven per cent of water sales revenue is at risk under the demand volatility adjustment mechanism (**DVAM**) adopted by the Panel as part of its hybrid price and revenue cap form of control.

Icon Water appreciates that the Panel is looking to introduce a risk sharing approach to the water volumes forecast, but this risk is not symmetric between Icon Water and its customers. Figure 1 shows the cumulative probability of average annual water sales over 2014-15 to 2017-18, based on Icon Water's demand forecasting model (the blue line). While the Panel's analysis indicates a similar variance in the distribution of consumption outcomes to those derived by Icon Water,<sup>3</sup> the average consumption adopted by the Panel (represented by the black vertical dotted line in the figure) is higher than the average derived by Icon Water. The black solid line in the figure shows the corresponding revenue impact for each water sales outcome over the regulatory period after taking account of the DVAM.

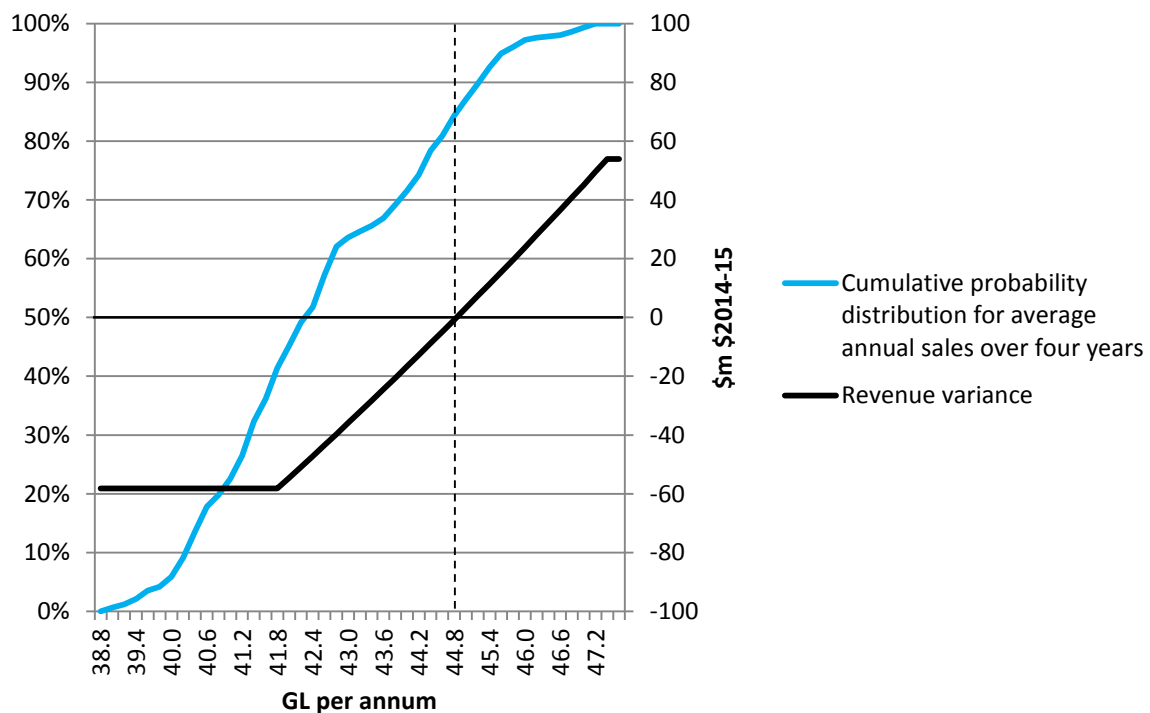
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<sup>1</sup> The analysis uses the Breusch-Ward sales forecasting model submitted to the Panel in August 2013 to predict sales under permanent water conservation measures (**PWCM**) in each of the 15,779 1451-day (four-year) sequences since 1967.

<sup>2</sup> Icon Water 2012, *ACTEW main submission to the ICRC, Regulated water and sewerage services from 1 July 2013*, July, p77

<sup>3</sup> Industry Panel 2014, *Review of the ICRC's 2013 price direction for regulated water and sewerage services in the ACT, Draft Report*, December, p54

**Figure 1: Demand risk under the draft decision**



Icon Water notes that tariff structure is not being considered as part of the Panel’s review, but that the Panel has made draft decisions in relation to water sales forecasts and specification of the DVAM. Icon Water seeks decisions from the Panel on these matters that have greater regard to Clause 20(2)(e) of the ICRC Act; namely, the cost of providing the regulated services. In order to provide reasonable opportunity to recover efficient costs the final decision would need to incorporate at least one of the following amendments:

- reducing the level of revenue at risk under the hybrid price/revenue cap to 3 per cent of water sales revenue over the full five year period (discussed further in Section 2.2); and/or
- reducing the level of water sales forecasts to those proposed by Icon Water in August 2014, modified to account for forecast changes over time in the proportion of sales charged at each price tier (discussed further in Section 2.3).

## 2.2 Demand volatility adjustment mechanism

### 2.2.1 Icon Water’s SOFC

In its SOFC, Icon Water proposed a revenue cap form of control, with annual ‘unders and overs’ adjustments for revenue variance. Icon Water also proposed that, as a means of minimising revenue variance, the demand forecasts on which prices are based should be updated annually based on a predetermined model.

### 2.2.2 Panel draft decision

The Panel’s draft decision is to apply a hybrid price and revenue cap, with individual price caps for water and sewerage charges set in real terms for the remaining three years of the regulatory period and a DVAM. This adjustment mechanism provides for the pass through at the next price review of any variance

in water sales revenue outside of a deadband defined as  $\pm 7$  per cent of forecast water sales revenue over the full five year regulatory period.

### 2.2.3 Icon Water response

The Panel's draft decision in relation to form of control focuses on providing stability and predictability in unit prices. However, it does so at the expense of creating:

- uncertainty with respect to the total amount of consumer bills over time;
- risk that revenue will fall short of costs to an extent that impacts on service levels; and
- risk that Icon Water will generate revenue significantly in excess of that required to cover efficient costs (though Icon Water's analysis suggests this risk is low due to the water sales forecasts adopted in the draft decision).

Icon Water submits that with relatively minor amendment a much better balance can be struck between these factors.

#### **There are no incentive benefits from exposing Icon Water to demand risk**

One of the reasons given by the Panel in relation to its preference for a larger deadband is that it would not undermine "*the incentive benefits associated with a price cap.*"<sup>4</sup> Icon Water contends that the price cap form of regulation provides no incentive benefits in this case. The price cap does not provide greater incentives for *cost* efficiency than a revenue cap, since neither results in within-period adjustments for reductions in controllable costs. The price cap *does* provide a greater incentive to increase sales quantities and Icon Water notes that the Panel's statement that Icon Water "*is well-placed to manage some [demand-related risks] (eg, by connecting customers or by encouraging conservation measures).*"<sup>5</sup> Icon Water contends that it is not well placed to manage demand risk and that there is little benefit in providing this incentive. The number of customers receiving regulated water services is effectively outside of Icon Water's control, since it is determined by government and private property development. Icon Water would not promote increased water usage as a means of avoiding a potential revenue shortfall, since a "*central focus*" of the ACT Government demand management strategy, *ACT Water Strategy 2014-44*, is "*maintaining efforts to reduce demand (consumptive use per capita) over the longer term.*"<sup>6</sup>

#### **The deadband in the draft decision is effectively nine per cent over the remaining four years**

There will be no demand volatility adjustment on account of the 2013-14 year under the draft decision, since the Panel has accounted for the actual water sales for that year. Therefore, the deadband defined by the Panel is equivalent to a deadband of 9 per cent on water sales revenue over the four years 2014-15 to 2017-18. To achieve a deadband of 7 per cent over the four years 2014-15 to 2017-18, the deadband applied to the full five years would need to be set at 5.5 per cent.

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<sup>4</sup> Industry Panel 2014, *Review of the ICRC's 2013 price direction for regulated water and sewerage services in the ACT, Draft Report*, December, p55

<sup>5</sup> Industry Panel 2014, *Review of the ICRC's 2013 price direction for regulated water and sewerage services in the ACT, Draft Report*, December, p52

<sup>6</sup> ACT Government 2014, *ACT Water Strategy 2014-44, Striking the balance*, August, p4

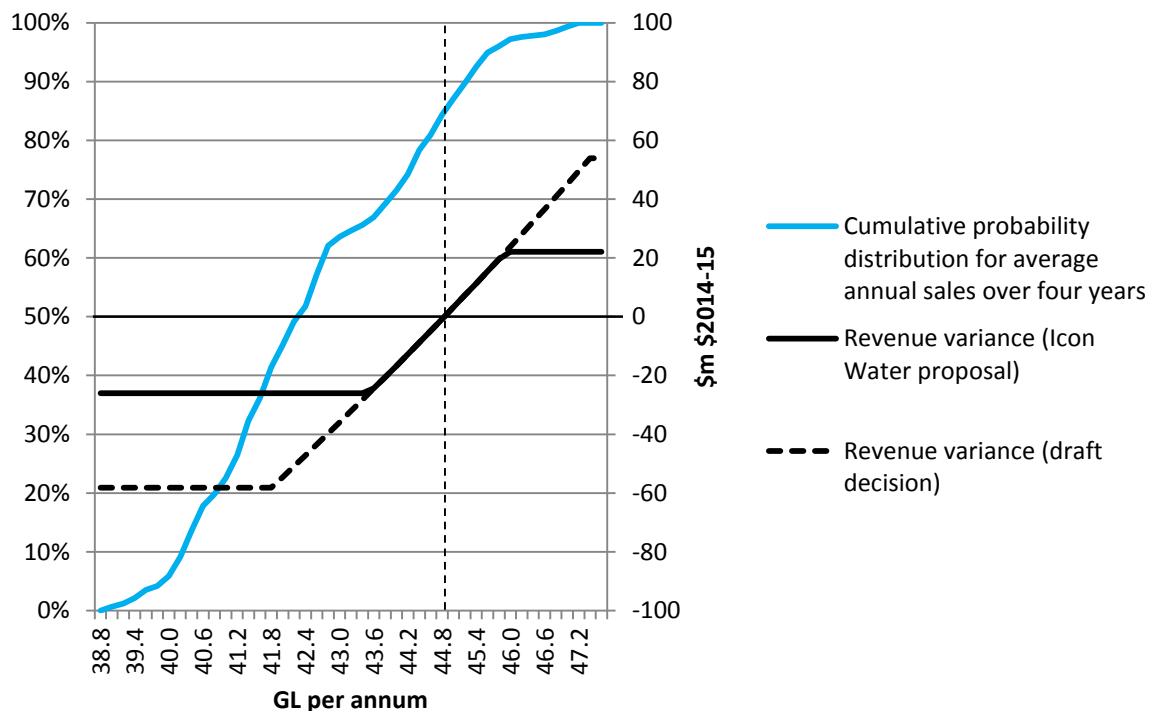
### Icon Water proposes a reduced deadband

The Panel has itself noted that “there is marked difference between the revenue that [Icon Water] would earn from water sales” under the lower and upper bounds of the deadband.<sup>7</sup> Icon Water proposes that this difference be reduced by setting the level of revenue at risk under the hybrid price/revenue cap at 3 per cent of water sales revenue over the full five year period (see Figure 2).

At the expense of a slight reduction in the stability and predictability in unit prices over the next two regulatory periods, this proposal would:

- increase predictability with respect to the total amount of consumer bills over time;
- mitigate the risk that revenue will fall short of costs to an extent that impacts on service levels; and
- mitigate the risk that Icon Water will generate revenue significantly in excess of that required to cover efficient costs.

**Figure 2: Icon Water proposed deadband**



## 2.3 Forecast water sales

### 2.3.1 Icon Water’s SOFC

In its SOFC, Icon Water proposed that the water volumes forecasting model developed by Professors Trevor Breusch and Michael Ward and submitted to the ICRC in its April 2013 submission be used for the purpose of annual updates of demand forecasts over the remainder of the five year period. In August

<sup>7</sup> Industry Panel 2014, *Review of the ICRC’s 2013 price direction for regulated water and sewerage services in the ACT, Draft Report*, December, p54

2014, Icon Water submitted to the Panel a version of this model incorporating up to date data and proposed a water sales forecast of 42.6 GL, with 24.9 GL charged at the Tier 1 price and 17.7 GL charged at the Tier 2 price. At the Panel's request, Icon Water also set out the forecasts derived from the model for 2014-15, 2016-17 and 2017-18, which were similar to the forecast for 2015-16.

### 2.3.2 Panel draft decision

The Panel engaged Cardno to review Icon Water's proposed forecasting model and to provide alternative forecasts if Icon Water's forecasts were found to be not reasonable. Cardno advised that Icon Water's forecast was not reasonable for the following reasons:

- The model does not take account of demographic changes, including population growth.
- The model relies on weather as its key predictive variable even though weather is difficult to predict.
- The sample of billing data used in the model requires scaling.
- The model appears only to have been tested using in-sample data and regression coefficients and predicted outcomes changed significantly when the model was updated.

Cardno developed its own sales forecasting model using annual average consumption per customer as the dependent variable and making adjustments for the difference between the average consumption of established and new residential customers. The independent variables in the model were evaporation, a single cardinal variable for water restrictions, and a 'water aware' variable defined (in the historical data) as the cumulative sum of the restrictions variable. Cardno's recommended sales forecasts increase from 44.0 GL in 2014-15 to 45.8 GL in 2017-18.

The Panel accepted Cardno's advice in its draft decision.

### 2.3.3 Icon Water response

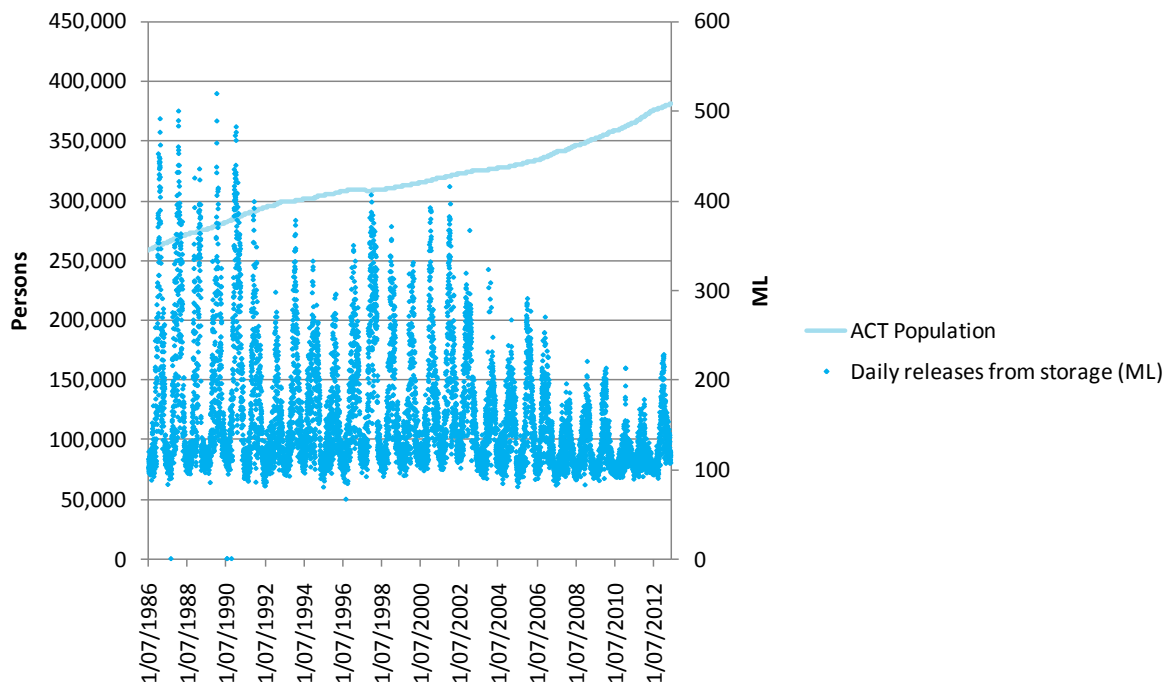
Icon Water submits that:

- the Panel's key concerns in relation to Icon Water's proposed forecasts warrant further testing and reconsideration; and
- the forecast developed by Cardno and adopted by the Panel in the draft decision overestimates the expected level of demand.

#### **Icon Water's forecasting model is reasonable**

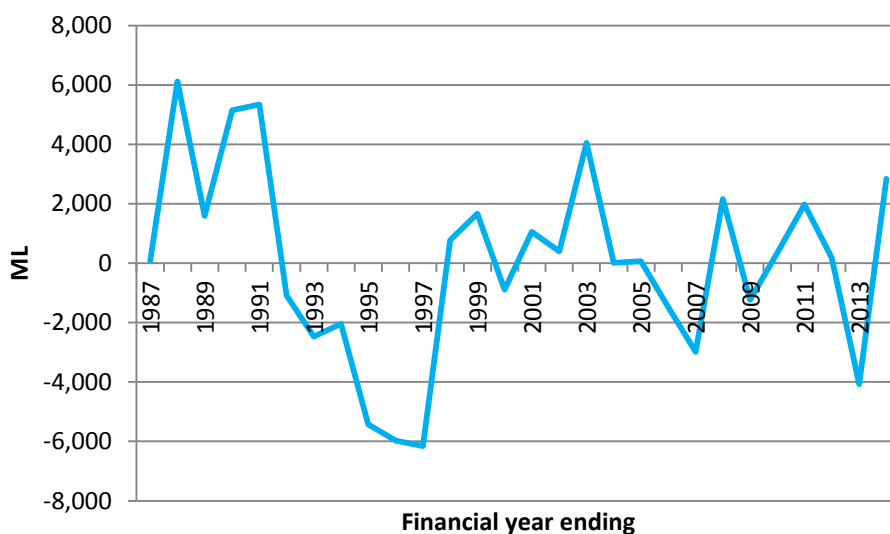
The key concern in relation to Icon Water's forecasting model appears to be the absence of *explicit* assumptions in relation to population or customer growth. The difficulty that arises when attempting to make such assumptions is that, despite significant population increase in the ACT over the past 30 years, total water consumption has decreased. Even winter consumption, which is primarily so called non-discretionary use, has not changed significantly over the past three decades (see Figure 3). Clearly population increase has not *caused* consumption to decrease, but its effects have been offset by those of other factors, such as price increases and efficiency savings due to the infiltration of more efficient appliances, moves to more drought-resistant gardens and behavioural change. If the effects of population growth are to be explicitly modelled, then the effects of efficiency savings must also be explicitly modelled. However, there is little useful data available to create variables that would reliably capture these effects.

**Figure 3: Total daily releases and ACT population**



Weather and water restrictions are the most significant drivers of water sales. Icon Water’s demand forecasting model makes the assumption that the net effects of other factors, including population and efficiency savings, are zero in the medium term (and if these effects are not zero in recent observations, then forecasts over the first few years will be adjusted accordingly via the autoregressive error process). These net effects of ‘other factors’ can be estimated as the residuals from a model that regresses weather and restrictions variables on total consumption. Residuals from a basic model in which evaporation, rainfall and dummy variables for three levels of restrictions are regressed against total annual consumption are shown in Figure 4. It shows that the net effect of these ‘other factors’ has not been increasing over time. In fact, they have evidenced a static trend around zero over the past 16 years. This evidence supports the assumption made by Professor Breusch and Professor Ward and Icon Water that the net effects of factors other than weather and restrictions will be zero over the forecast period.

**Figure 4: The net effects of ‘other factors’ on total consumption over time**



If Icon Water’s assumption was unreasonable, one would expect to observe an upward trend in residuals, with primarily positive residuals over recent observations. However, as noted in Icon Water’s submission of demand forecasts to the Panel in August 2014, the residual for the most recent 12 months is very close to zero.<sup>8</sup>

In relation to Cardno’s criticism of the need to scale the billing sample data used in Icon Water’s model, Icon Water notes that this scaling affects only the proportion of consumption assigned to each consumption price tier (and not total consumption) and that the resulting proportion for 2015-16 is consistent with historical observations.<sup>9</sup>

In relation to Cardno’s criticism that Icon Water has not tested its model against out-of-sample data, Icon Water notes that a comparison of the forecast for 2013-14 proposed in Icon Water’s April 2013 submission to the ICRC with the actuals for that year represents such a test. The forecast for 2013-14 of 40.9 GL was reasonably close to the outturn sales of 41.9 GL, especially when considering that this forecast was greater than any annual consumption observed over the preceding six years. Icon Water also notes that Cardno’s report does not indicate that it undertook out-of-sample testing of its own model.

In relation to Cardno’s criticism that updating the model caused significant changes in coefficients and predictions, Icon Water notes that the significant changes in coefficients and ‘alpha’ factors described by Cardno on page 59 of its report were primarily the result of Icon Water introducing a scaling factor on the sample of billing data to improve the allocation of consumption to price tiers and not due to the update of the data in the model.

In summary, Icon Water contends that the Panel’s key concerns in relation to Icon Water’s proposed forecasts require reconsideration. Icon Water does however note that the way in which the model allocates consumption to price tiers would ideally be adjusted where the forecast horizon exceeds 1-2

<sup>8</sup> ACTEW Corporation 2014, *Information return: demand forecasts*, August, p11

<sup>9</sup> ACTEW Corporation 2014, *Information return: demand forecasts*, August, p13

years. Given that the Panel has adopted a form of control requiring a forecast over the next 3.5 years, Icon Water has developed revised forecasts that take account of this issue (see Section 2.3.4).

### **The forecasts adopted in the draft decision overestimate the expected level of demand**

In the absence of Cardno's demand forecast modelling, Icon Water has been able to determine, on the basis of Cardno's report, that the water sales forecast adopted by the Panel in its draft report is not robust and overestimates the expected level of demand. In summary:

- the forecast is inconsistent with the ACT Government's water strategy;
- the forecast does not pass a reasonableness test based on 2013-14 actual sales;
- the forecast is based on arbitrary assumptions about the effects of water restrictions and future trends that are not supported by historical observations or evidence; and
- there is no evidence of any objective model selection process or statistical assessment of alternative variable specifications (including for the highly arbitrary, yet critically important 'water aware' variable).

#### *The forecast is inconsistent with the ACT Government's water strategy*

The water sales forecasts adopted by the Panel represent increases on actual sales in 2013-14 of 5 per cent in 2014-15 and 9 per cent in 2017-18. These significant increases in overall consumption appear to be inconsistent with the ACT Government demand management strategy, *ACT Water Strategy 2014-44*, which states that, "*Innovative ways of using water more efficiently, and demand reduction initiatives that reduce per capita use and overall consumption, will continue to be pursued*" (emphasis added).<sup>10</sup>

#### *The forecast does not pass a reasonableness test based on 2013-14 actual sales*

The Panel's forecast for 2014-15 represents an increase of 5 per cent on the 2013-14 actual. It does not appear that this increase can be justified on the basis of 2013-14 being a wetter-than-average or cooler-than-average weather year. Rainfall in 2013-14 was almost identical to the long term average and mean daily maximum temperature in 2013-14 was above the long-term average.<sup>11</sup> After accounting for the billing cycle, rainfall in billing periods ending in 2013-14 was below the long term average by 2.1 per cent.<sup>12</sup> Based on the growth rate in the forecasts adopted by the Panel for the remaining years of the regulatory period, population growth can explain only 1.3 per cent of the 5 per cent discrepancy. Based on this reasonableness test, it appears the level of the forecasts in all years is relatively high.

#### *The specification of the restrictions variable may lead to underestimation of the impact of PWCM*

Icon Water is concerned by Cardno's specification of the restrictions variable in the model. Icon Water's model applies dummy variables for the various levels of restrictions, thereby allowing the effect of each to be estimated. Cardno's model, in contrast, by specifying a single cardinal variable for restrictions, imposes the constraint that the incremental effect on consumption of moving from one level of

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<sup>10</sup> ACT Government 2014, *ACT Water Strategy 2014-44, Striking the balance*, August, p4

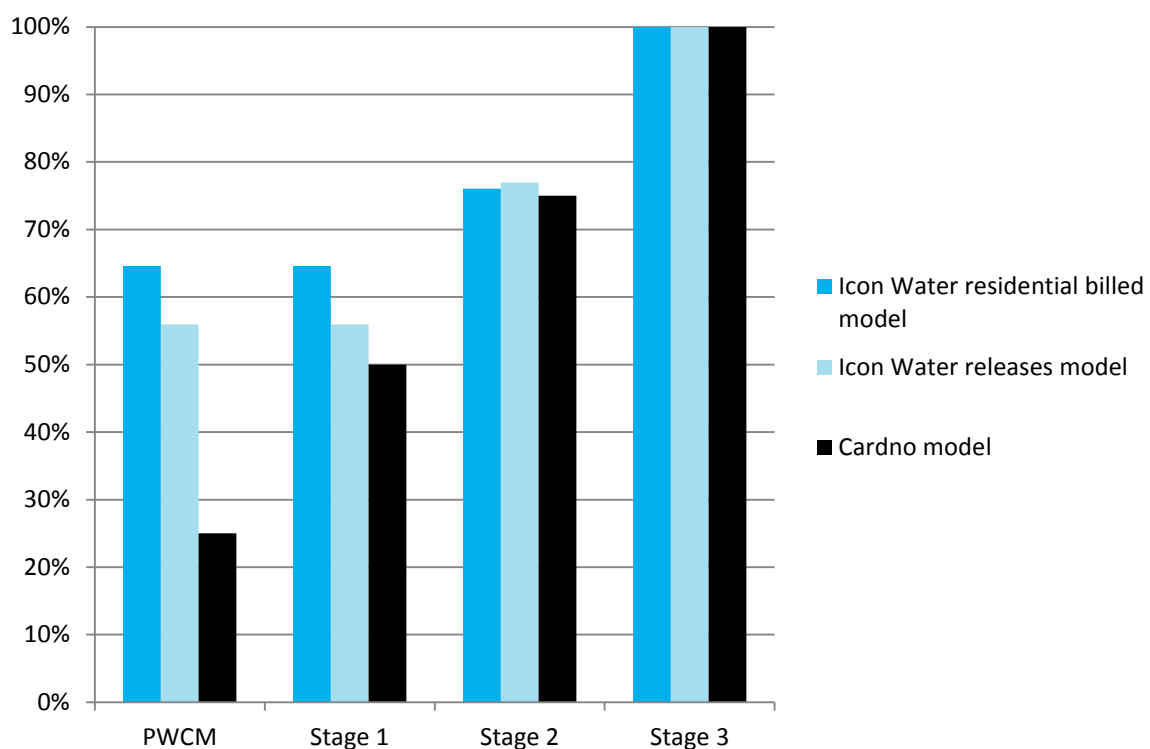
<sup>11</sup> The average annual rainfall at Canberra Airport between 1939-2013 is 619mm, while the 2013-14 rainfall was 620mm. The average daily maximum temperature at Canberra Airport between 1939-2013 is 19.7°C, while the 2013-14 average daily maximum temperature was 21.5°C (Bureau of Meteorology climate data for stations 070014 and 070351).

<sup>12</sup> The 2013-14 figure is adjusted to include 1/6 of April 2013, ½ of May 2013, 5/6 of June 2013, 5/6 of April 2014, ½ of May 2014, 1/6 of June 2014. The outcome of the adjustment is rainfall of 606mm and average daily maximum temperature of 21.4°C.

restrictions to the next must be equal. There is no evidence in Cardno’s report that it tested whether this assumption was reasonable.

The estimated effect of PWCM is particularly important, since this is the level of restrictions assumed for the forecast period. Cardno’s assumption is that PWCM will have an effect that is 25 per cent of the effect of Stage 3 water restrictions. The estimated coefficients from the more flexible variable specification in Icon Water’s Breusch-Ward model indicate that the effect of PWCM is at least half that of Stage 3 water restrictions during summer (and more than 70 per cent during winter).<sup>13</sup> Figure 5 shows that by fixing the incremental effects of the various levels of water restrictions Cardno is likely to be significantly underestimating the effects of PWCM.

**Figure 5: The modelled effects of various stages of water restrictions in summer relative to the effect of Stage 3 water restrictions**



Examination of the chart on page 84 of Cardno’s report provides further evidence that Cardno is underestimating the depressive effect of PWCM on consumption. The Cardno model has over-predicted consumption for all years that were subject to PWCM, except 2013-14, which is less reliable due to the unavailability of evaporation data for that year. This indicates that the model may also over-predict consumption in the forecast period over which PWCM is assumed to apply.

*The model assumes that the effects that have offset population growth in the past will cease in the forecast period*

As discussed earlier in this section, a key issue in relation to forecasting water sales is how to account for historical observations of changes in water consumption that are not explained by water restrictions or

<sup>13</sup> The finding of a similar effect for PWCM and Stage 1 water restrictions was also found by Letcher, R. and Breusch, T., 2007, Development of a Revenue Forecasting Model for Pricing, p. 33.

weather. Over a period of more than 25 years, these changes due to ‘other factors’ have tended to be negative in net terms, such that total consumption, let alone average customer consumption, has decreased over time (see Figure 3 on page 12).

Icon Water’s approach, based on advice from econometric experts, has been to make what it sees as a neutral assumption that the future effects of ‘other factors’ would be zero, such that total consumption would no longer decrease, but would stabilise. Cardno makes the assumption that after falling for more than 25 years, total consumption will now begin to increase. This assumption requires reconsideration.

Cardno do this by electing to explicitly model the effects of one of these ‘other factors’ that drives increases in consumption all else being equal – population growth.<sup>14</sup> Cardno assumes that the remainder of the ‘other factors’ will cease to have any offsetting effect. In particular, Cardno assumes there will be no further efficiency savings for established dwellings. This assumption is inconsistent with the evidence presented in Figure 4 on page 13. Cardno assumes that the net effects shown in the figure will begin to trend upward over the forecast period, despite the fact that they have not done so in the past. It needs to be recognised that household infrastructure will continue to become more efficient due to technological improvement, continued retrofits of toilets and showerheads, further rainwater tank installations, and reductions in garden size.

#### *Forecast levels of the ‘water aware’ variable are unreasonable and inconsistent with its definition*

Cardno includes a ‘water aware’ variable in its model, which accounts for the ‘other factors’ aside from population. As described in Cardno’s report, a variable that increased over the historical data was needed in the model to explain reductions in consumption that could not be explained by weather or water restrictions. Cardno defines the variable as the cumulative value of the restrictions variable. As Cardno notes, any increasing variable would capture these effects to some extent.<sup>15</sup> Icon Water therefore questions why there is no evidence of Cardno testing alternative specifications of this variable.

Having required the inclusion of a variable that increases over the historical data to explain the historical data, Cardno then make the arbitrary assumption that the variable will cease to increase from 2014 onwards. Cardno notes in its report that this assumption is subjective. Icon Water contends that this assumption is also unreasonable.

Further, Cardno’s assumption about forecast levels of the ‘water aware’ variable is inconsistent with its own definition. The model correctly assumes a restrictions value of 1 going forward. To be consistent, the ‘water aware’ variable, which is defined as cumulative restrictions, should increase by 1 per year. By holding it constant, the definition of the variable has been changed between the historical and forecast periods.

#### *There is no evidence of an objective model selection process*

Cardno’s model appears to have been specified based on its *a priori* preferences without statistical analysis to support choosing that specification over alternative specifications. Icon Water’s forecasting model, on the other hand, used robust statistical model selection criteria, in particular the Bayesian Information Criterion.

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<sup>14</sup> The consumption growth due to population growth is based on consumption by newer dwellings, which use less water than established dwellings.

<sup>15</sup> Cardno 2014, *Independent review of ICRC price direction, Technical Report*, November, p69

## Other concerns

Icon Water is also concerned that:

- evaporation is the only variable used to account for the effects of weather;
- the weather and restrictions variables used in the regression do not appear to have been adjusted to take into account that water sales at a given point in time relate to water use that took place over the preceding three months;
- the use of a polynomial function for the relationship between average consumption and the proportion of sales at the Tier 1 price can result in implausible outcomes outside the range of observations used to define the function. For example, over some ranges of consumption a polynomial function predicts that the proportion charged at Tier 1 price *increases* with average consumption. For this reason, Icon Water has specified the function as an exponential function:<sup>16</sup>

### Equation 1: Price tier allocation as a function of average consumption

$$\text{Propn tier 1} = 0.75264 - 0.00811 e^{0.012254 \times \text{total consumption (ML)} / \text{number of supply charges}}$$

#### 2.3.4 Proposed alternative

The Panel has made a draft decision to set demand forecasts for the remainder of the regulatory period. In August 2014, Icon Water provided an updated version of the forecasting model that it proposed would apply under the annual forecasting approach proposed in its SOFC and, accordingly, proposed a consumption forecast for 2015-16. In the context of the Panel's requirement for a four-year forecast 2014-15 to 2017-18, Icon Water proposes the forecasts in Table 1.

Icon Water proposes that 2014-15 estimated water sales be set at 40.6 GL (for the reasons discussed in Section 4.2). The total annual consumption forecasts for the remaining three years are as per Icon Water's submission to the Panel in August 2014. However, as a four-year forecast is now required, Icon Water has adjusted the allocation of consumption to price tiers for forecast customer growth by applying Equation 1 on page 17.

**Table 1: Icon Water's proposed water sales forecasts (ML)**

	2014-15	2015-16	2016-17	2018-19
Tier 1 price	24,077	24,762	25,277	25,745
Tier 2 price	16,502	17,790	17,268	16,797
Total water sales	40,579	42,552	42,545	42,542

<sup>16</sup> Icon Water 2014, *Statement of changes, Information return to the ICRC*, December, p39

### 3 Return on capital

The Panel's draft decision in relation to the weighted average cost of capital (**WACC**) is summarised in Table 2.

**Table 2: Proposed cost of capital**

<i>Parameter</i>	<i>Panel's draft decision</i>	<i>Basis</i>
Nominal risk free rate (RfR)	3.22%	40-day average of the yields on the 10-year CGS using data from Bloomberg.
Equity beta	0.7	Point estimate for the equity beta.
Market risk premium (MRP)	7.23%	40 day average of Bloomberg's daily implied MRPs.
Debt risk premium (DRP)	3.13%	40 day average (approximated by 2-month average) of the credit spreads for the 10-year BBB Australian corporate bonds using data from the RBA.
Debt raising costs	0.125%	Debt raising costs for the 10-year term to maturity assumption.
Gearing	60%	
Gamma (imputation)	50%	
Inflation	2.5%	
Return on equity (RoE)	8.28%	Based on the CAPM method.
Return on debt (RoD)	6.48%	Risk free rate + DRP + debt raising costs
Nominal vanilla WACC	7.20%	$RoE \times 0.4 + RoD \times 0.6 = \text{Nominal vanilla WACC}$

Icon Water considers that the Panel's draft decision in relation to the overall WACC is an improvement on the ICRC price direction. However, Icon Water continues to consider that parts of the inputs used to calculate the WACC are underestimated. As a result, the overall WACC does not provide an appropriate rate of return on investments.

In particular, Icon Water submits that particular consideration should be given to:

- Equity beta; and
- Gamma.

Before discussing the equity beta and gamma in more detail Icon Water would like to comment on the Panel's decision relating to the choice of a short sampling period instead of a long-term sampling period. In its July 2012 submission to the ICRC, Icon Water proposed that the WACC should be established using long term estimates of the cost of debt and equity. However, Icon Water also noted that it could accept a short term sampling period, but only if an unbiased and reasonable estimate of the cost of equity can be calculated using a conditional MRP combined with the risk free rate average over a short period close to the date of the final decision.

Icon Water considers that the Panel's estimate of the MRP is low for the market conditions it reflects (40 days before 31 May 2013). However, Icon Water acknowledges that the Panel has used 'an unbiased'

estimate to calculate a conditional MRP. Although Icon Water considers that a long-term sample would be in the interest of customers, regulators and shareholders as it would generate a more predictable and above all more stable WACC over time, Icon Water accepts the Panel's draft decision to use a short term sample period as it has used an unbiased (albeit low) prevailing estimate of the MRP. Icon Water also agrees that this provides a more internally consistent WACC than if a long-term historical estimate of the MRP had been combined with a short-term estimate of the risk free rate.

Icon Water also questions whether the Panel's estimate of the risk free rate of 3.22 per cent has been annualised. When estimating the risk free rate, consistent with the ICRC historical approach, Icon Water's preference is to rely on the CGS estimate from the RBA. Relying on RBA's annualised CGS data for the 40 business days period to 31 May 2013, Icon Water derives an annualised estimate of the risk free rate of 3.25 per cent. Icon Water would encourage the Panel to consider this approach in light of the fact that Icon Water and the ICRC have been in agreement on the sourcing of this parameter in the past.

### **Equity beta**

In relation to the equity beta, Icon Water's July 2012 submission to the ICRC provided an expert report from SFG Consulting. The Panel has considered the report and noted:

*An equity beta of 0.7 is lower than ACTEW's proposal of 0.9, which the Panel understands was based on advice from SFG Consulting (SFG), which can be summarised as follows:*

- *SFG estimated that the beta of a typical water business ranges from 0.58 to 0.71 with 90% confidence.*
- *SFG considered that sensitivities of stock returns to market returns would vary depending on market conditions and so developed separate beta range estimates for 'up' and 'down' markets, with the 'up' market estimates ranging from 0.39 to 0.62 and the 'down' market estimates ranging from 0.67 to 0.88.*
- *SFG argued that investors would factor in greater sensitivities of stock returns to falling markets and lower sensitivities to rising market in forming expectations. It therefore recommended an equity beta of 0.90, which is at the upper bound of the 'down' market beta range.*

*The two observations that the Panel would make about this advice are as follows:*

- *The equity beta range estimated by the Panel (0.53 to 0.77) is broadly consistent with the equity beta range SFG estimated for the whole sample (ie, 0.58 to 0.71).*
- *SFG has accounted for asymmetric exposure to market conditions in recommending the beta of 0.90, especially the sensitivities of stock returns to falling markets. The Panel has taken into account the impact of overall market conditions on investors' expectations on the required cost of equity by adopting implied MRPs, which are influenced by changing investors' expectations (risk aversion) in all market conditions. The Panel does not therefore think it is appropriate to make another compensatory adjustment to the equity beta.<sup>17</sup>*

In light of the Panel's comment that it does not consider it appropriate to make 'another compensatory adjustment to the equity beta', Icon Water engaged SFG Consulting to provide an opinion on the Industry Panel's equity beta of 0.7. In particular, SFG Consulting was asked to consider the Panel's view that by

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<sup>17</sup> Industry Panel 2014, *Review of the ICRC's 2013 price direction for regulated water and sewerage services in the ACT, Draft Report*, December, p177

adopting an implied MRP estimate it has already taken account of market conditions in its overall estimate of the cost of equity.

SFG Consulting has advised that the implied equity beta estimate would be approximately 0.8 if only the implications of asymmetrical exposure to market conditions were to be considered (and not the two further reasons that lead SFG Consulting to recommend an overall equity beta of 0.9 in its previous report to Icon Water; namely, the imprecision of the beta estimates and limitations of the Sharpe-Lintner CAPM)<sup>18</sup> regardless of what the expected return on the overall market is at a point in time, which is what the Panel expressed concern about.

SFG Consulting's reasoning is as follows:

*According to the theory of the Sharpe-Lintner CAPM, an asset has the same market exposure regardless of market conditions. So according to the theory of this model, the cost of equity increases in direct proportion to the beta estimate...*

*However, we need to consider the impact on the stock price if the beta differs depending on market conditions. In the context of this note, market conditions means whether the market exhibits a return above or below the risk-free rate.<sup>19</sup>*

SFG Consulting provides context regarding this notion:

*Investment products are offered that provide a degree of downside protection in the event of market downturns, but still offer upside when the market performs well. These investment products appeal to self-managed superannuation funds if the trustees are concerned about preservation of capital. The trade-off is that the average return offered by these products is less than comparable products which are more exposed to market downturns. The reason the average return is relatively lower is because the person offering the product must purchase insurance against the market downturn. But when the situation is reversed, so there is increased exposure to market downturns and less exposure to upturns, then expected returns are higher.<sup>20</sup>*

SFG Consulting notes listed water utilities appear to have the opposite type of market exposure: equity beta estimates are higher during periods when the market offers low returns, and the beta estimates are lower during periods when the market offers high returns. As investors do not want this kind of exposure this is reflected in the prices investors pay for stocks.<sup>21</sup>

In relation to the Panel's view that by adopting an implied MRP estimate it has already taken account of market conditions in its overall estimate of the cost of equity, SFG Consulting notes:

*... accounting for the expected return on the market at a point in time is a different concept to accounting for an investment's asymmetric exposure to different market conditions. If investors*

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<sup>18</sup> SFG Consulting, 2015, *Impact on the cost of equity from asymmetry in beta estimates according to market conditions*, January, pp3-4

<sup>19</sup> SFG Consulting, 2015, *Impact on the cost of equity from asymmetry in beta estimates according to market conditions*, January, p2

<sup>20</sup> SFG Consulting, 2015, *Impact on the cost of equity from asymmetry in beta estimates according to market conditions*, January, p2

<sup>21</sup> SFG Consulting, 2015, *Impact on the cost of equity from asymmetry in beta estimates according to market conditions*, January, p3

were to price two assets in May 2013, and one asset had an asymmetric risk exposure, and the other asset had the same risk exposure regardless of market conditions, investors would still offer a lower price to the former asset (or in other words require a higher return). The asymmetric exposure discussed above does not mean that we should change the beta estimate depending upon whether the expected market return or market risk premium right now is high or low. The implication of the asymmetric exposure is that assets with asymmetric exposure to market conditions will trade on lower prices and therefore have a higher cost of capital than otherwise comparable assets.<sup>22</sup>

### **Gamma**

Under the Australian taxation system, tax credits (imputation credit) created by an Australian company may be redeemed by domestic shareholders. An imputation credit is created for each dollar of eligible tax paid by companies. Imputation credits are distributed to shareholders through the payment of franked dividends. Imputation credits therefore represent a benefit for domestic shareholders for their investment in the company in addition to dividends (and capital gains).

Gamma can theoretically take a value between 0 and 1. A low value indicates that investors do not place much value on the imputation credits and therefore require a higher pre-tax income to justify their investments.

In the draft decision, the Panel has reviewed past regulators decision on the value of imputation credits (gamma). It notes that in the past Australian regulators have generally adopted a gamma value of 0.5. However many regulators have lowered their estimates of gamma to 0.25 following the Australian Competition Tribunal decision in 2011.<sup>23</sup> Consistent with that decision, Icon Water also proposed a gamma of 0.25.

Icon Water notes that the AER on 27 November 2014 in its draft decision for a large number of energy businesses changed its position on the gamma from 0.5 to 0.4.<sup>24</sup> This value has since then been firmly rejected by the participating businesses under review and it is uncertain what value finally will be determined.

Icon Water continues to believe that a gamma value of 0.25 is appropriate based on the Australian Competition Tribunal's decision. Icon Water also considers that other regulatory decisions on gamma before 31 May 2013 support a gamma of 0.25.

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<sup>22</sup> SFG Consulting, 2015, *Impact on the cost of equity from asymmetry in beta estimates according to market conditions*, January, p3

<sup>23</sup> Australian Competition Tribunal 9, 2011, *Application by Energex Limited (Gamma) (No 5)*; Independent Pricing and Regulatory Tribunal, 2012, *Review of imputation credits (gamma)*

<sup>24</sup> See for example AER, 2014, *Draft decision Essential Energy distribution determination 2015-16 to 2018-19 Overview*, November, p45, AER, 2014, *Draft decision Endeavour Energy distribution determination 2015-16 to 2018-19 Overview*, November, p45 and AER, 2014, *Draft decision Ausgrid distribution determination 2015-16 to 2018-19 Overview*, November, p46.

## 4 Other matters

Icon Water's responses in relation to the other elements of the Panel's draft decision are set out in this section.

### 4.1 Regulatory period, form of control and risk allocation measures

#### 4.1.1 Length of regulatory period

For the reasons outlined in Sections 2.2 and 4.2 of its SOFC, Icon Water supports and endorses the Panel's draft decision to apply a five-year regulatory period.

#### 4.1.2 Form of control and demand risk measures

Icon Water discusses this matter in detail in Section 2.2.3.

#### 4.1.3 Measures for expenditure risks

Icon Water generally supports the Panel's draft decision on pass-through arrangements, with the exception of the following comments.

The pass-through provision for the Water Abstraction Charge (**WAC**) allows for a cost pass-through if the total WAC payable differs from the amount included in the Price Direction. This approach would almost certainly result in a pass-through every year, since the total WAC payable is based on actual water volumes. Icon Water questions whether the benefits of adopting this extent of precision in relation to within-period updates of the revenue requirement outweigh the associated administrative costs.

Icon Water notes the Panel adopted its approach "*so that [Icon Water] does not receive a windfall gain or loss as a result of changes in these uncontrollable costs.*"<sup>25</sup> Icon Water notes that in cases where water volumes are lower than forecast, the 'windfall gain' received by Icon Water in relation to the lower than forecast WAC payable would be only around one tenth the 'windfall loss' that would be incurred in that case due to lower than forecast water sales revenue.<sup>26</sup> Under the approach adopted in the draft decision, any revenue shortfall will be exacerbated by a WAC pass-through.

Consideration should be given to whether the pass-through event should be based on changes in the WAC rate, as per the ICRC Price Direction, with a further 'true up' based on total WAC payable taking place at the end of the period if the DVAM is triggered.

#### 4.1.4 Measures for unforeseen events

Icon Water supports the Panel's draft decision on reopening arrangements.

### 4.2 Method used to determine prices

Icon Water supports the approach taken by the Panel in its draft decision on the method used to determine prices, subject to the following comments.

#### 4.2.1 Estimated water sales for 2014-15

In order to calculate the 'true up' adjustment necessary to account for over or under recovery of revenue in the first two years (2013-14 and 2014-15), the Panel has calculated the difference between the net

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<sup>25</sup> Industry Panel 2014, *Review of the ICRC's 2013 price direction for regulated water and sewerage services in the ACT, Draft Report*, December, p58

<sup>26</sup> The tier 2 water price is more than nine times greater than the WAC rate in the draft decision.

revenue requirement for 2013-14 and 2014-15 and the net revenue Icon Water is expected to earn in these first two years. In calculating the net revenue Icon Water is expected to earn, the Panel has used actual revenue for 2013-14 and estimated revenue for 2014-15. In calculating estimated revenue for 2014-15, the Panel has assumed water sales will be 44.0 GL in line with the forecast developed by Cardno.

As discussed in Section 2.3.3, Icon Water contends that the forecasting method adopted by the Panel leads to overstated forecasts. Notwithstanding Icon Water’s concerns over the forecasting method, water volumes observed over 2014-15 to date do not support a forecast of 44 GL. Both water sales and the total releases from storage are lower for the period July-December 2014 than they were for the same period in 2013-14, suggesting that total water sales for 2014-15 are unlikely to exceed the 41.9 GL level observed in 2013-14. In fact, releases from storage are 6.5 per cent lower in 2014-15 to date than for the corresponding period in 2013-14. Sales over the coming months are unlikely to increase dramatically, since:

- the relatively low releases from storage observed in recent months will continue to feed through into sales as meters are read over the next three months; and
- the summer months, which have a disproportionately large impact on annual sales, have to date been relatively wet in Canberra, with 102 mm of rain falling in December and 94 mm of rain falling in the first 22 days of January (compared to long-term averages of 53.8 mm and 58.5 mm for December and January).<sup>27</sup> In fact, in terms of rainfall over the period 1 December to 22 January, 2014-15 is the fourth wettest year in the last 48 years.

**Table 3: Water volumes observed over the first six months of 2013-14 and 2014-15**

	2013-14	2014-15
Water sales, July – December (ML)	17,659	17,613
Releases, 1 July – 22 January (ML)	28,040	26,211

Icon Water proposes that the estimated sales for 2014-15 for the purpose of calculating the ‘true up’ adjustment be set at 40.6 GL. This estimate is based on forecasting releases for the remainder of the year and multiplying by the historical ratio between sales and releases (see Table 3). Icon Water has used releases to develop this estimate because it provides an indication of the sales that will be observed in the coming months and therefore provides a more up-to-date assessment.

<sup>27</sup> Bureau of Meteorology observations from Canberra Airport (station 070351). Long term averages accessed at [http://www.bom.gov.au/climate/averages/tables/cw\\_070014.shtml](http://www.bom.gov.au/climate/averages/tables/cw_070014.shtml)

**Table 4: Estimated water sales 2014-15**

Actual releases 01/07/2014 – 22/01/2015 (ML)	26,211
Forecast releases 23/01/2015 – 31/07/2015 (ML)	21,688 <sup>28</sup>
Estimated releases 2014-15 (ML)	47,899
x Ratio of ACT sales to releases (June 2011 – Dec 2014)	84.7 per cent
<b>Estimated ACT sales 2014-15 (ML)</b>	<b>40,579</b>
Estimated proportion charged at Tier 1 price	59.3 per cent <sup>29</sup>
- Tier 1 price (ML)	24,077
- Tier 2 price (ML)	16,502

#### 4.2.2 Pro rata consumption pricing

The method used to determine prices in the draft decision does not take into account the effect on revenue from a portion of the water sales in a given financial year being charged at the prices of the previous financial year. Prices determined by the ICRC in the current and previous regulatory periods have taken this effect into account<sup>30</sup> and by changing this element of the method used to determine prices, the draft decision imposes a windfall loss on Icon Water of around \$400,000. This loss could increase in magnitude if prices change in the Panel's final decision. Icon Water seeks a revision of the Panel's pricing model to account for this effect and would be willing to work with the Panel to forecast the required inputs.

#### 4.2.3 Profile of the water price path

Icon Water also submits that the profile of the price paths should be such that increases in 2016-17 and 2017-18 are at least in line with increases in the consumer price index, with the P<sub>0</sub> change adjusted accordingly, in line with the approach commonly employed by economic regulators. In the draft decision, the water price path is decreasing in real terms over those out years.

### 4.3 Treatment of water security projects

Icon Water supports the Panel's approach of applying the orthodox building block method to capital expenditure on water security projects.

As noted in its letter to the Panel of 21 November 2014, Icon Water is very concerned with some of the statements made and conclusions drawn by Cardno in Section 6 of its report regarding the regulatory treatment of the water security projects. Although the Panel has not adopted the approach recommended by Cardno in its report, Icon Water notes the Panel's statement that *"if, for some reason, there is a change between the Panel's draft and final decisions that results in [Icon Water's] financial viability improving, then the Panel may revisit the decision not to defer a portion of these capital costs."*<sup>31</sup> If the Panel does revisit this decision, Icon Water contends that considerably more analysis would be required to support the position adopted by Cardno.

<sup>28</sup> Based on the releases forecast submitted to the Panel in August 2014.

<sup>29</sup> Based on Equation 1 on page 19 using a supply charge quantity of 166,992.

<sup>30</sup> See, for example, Attachment 2 to the ICRC Price Direction of June 2013.

<sup>31</sup> Industry Panel 2014, *Review of the ICRC's 2013 price direction for regulated water and sewerage services in the ACT, Draft Report*, December, p75

Icon Water notes that Cardno's terms of reference for its review sought advice on two potential alternative approaches to recover water security project costs:

- an estimate of the reasonable capacity expansion that was required to meet ACTEW's security of supply standard at the time and over the term of the next regulatory period, compared to the actual capacity installed; and
- an estimate of the benefits that customers will derive from the water security assets over the economic life of those assets.<sup>32</sup>

In its report, Cardno recommends against using benefit estimates to apportion costs.<sup>33</sup> Although Icon Water agrees with this conclusion, Icon Water disagrees with the supporting reasons outlined by Cardno. Cardno indicates that its confidence in the timing of benefits is undermined by it not having access to the benefit calculation model and by its concern that benefits have been overstated.<sup>34</sup> Icon Water notes that "*Cardno were unable in the time available to use Icon's extensive hydrological modelling information within the scope of its work.*"<sup>35</sup> Icon Water also notes that concerns over the overall level of benefits are only relevant to the question of apportioning costs over time to the extent that those concerns also relate to the timing of benefits.

Having recommended against using benefit estimates to apportion costs, Cardno goes on to develop an option for estimating the short-term cost of achieving the same level of water security as the water security projects with a different combination of projects – namely the Tantangara Transfer project and the Murrumbidgee to Googong Transfer projects (but not the Enlarged Cotter Dam).<sup>36</sup> Cardno provides no evidence that this option would provide a similar level of water security to the projects that were undertaken. Icon Water further notes that, in order to implement Tantangara water transfers to the ACT, it needed:

- to purchase water from NSW Murrumbidgee irrigators;
- an Intergovernmental Agreement that water from the regulated Murrumbidgee could be transferred to Tantangara Dam and ultimately to the ACT; and
- a commercial agreement with Snowy-Hydro that would allow Icon Water to request the water and compensate Snowy-Hydro for lost power generation.

At the time of the decision on the water security projects in 2007, there was significant risk that the second and/or third points above could not be implemented. For this reason, amongst others, it would not have been prudent to rely solely on this option. It would therefore be unreasonable to use this option as a basis for reducing the cost recovery associated with the water security projects in this regulatory period. Icon Water has further concerns regarding the assumptions Cardno has adopted in modelling this option and would be willing to discuss these concerns in more detail if the Panel deemed that to be helpful.

Noting the detailed and sophisticated nature of the hydrological and economic analysis of water security options undertaken over several years and supported by subsequent expert review and research, Icon

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<sup>32</sup> Industry Panel 2014, *Terms of reference (for Cardno)*, p3

<sup>33</sup> Cardno 2014, *Independent review of ICRC price direction, Technical Report*, November, pp94-95

<sup>34</sup> Cardno 2014, *Independent review of ICRC price direction, Technical Report*, November, p94

<sup>35</sup> Industry Panel 2014, Letter to Icon Water, 1 December.

<sup>36</sup> Cardno 2014, *Independent review of ICRC price direction, Technical Report*, November, pp96-98

Water suggests that Cardno may wish to reconsider its comments and conclusions in relation to the following matters.

- In relation to the economic benefits of avoiding water restrictions, Cardno states that *“It is unwise to rely purely on theoretical economic benefits, particularly for poorer customers, if customers cannot turn the benefits into the real money that they need to find to pay the increased water bills. Taken to the extreme, \$20,000 per year of theoretical economic benefits for a customer would not necessarily allow her to pay a \$10,000 water bill, even if it can be used to justify the project.”*<sup>37</sup> The benefit estimates used in Icon Water’s cost benefit analysis were not theoretical, but empirical, since they were based on results from a rigorous non-market valuation study.<sup>38</sup> Consumer budget constraints were taken into account by respondents when participating in the choice experiments that were used in the study to estimate the benefits. The suggestion that benefit cost analysis should not rely on non-financial benefits is counter to standard practice and the guidance provided by the Water Services Association of Australia, the Productivity Commission and the Office of Best Practice Regulation.<sup>39</sup>
- Cardno states, *“One of the ‘conservative’ decisions was to assume that the climate change forecast for 2030 by the CSIRO had already occurred, based on the reduced inflows during the 2001-2006 drought. However, a standard statistical test comparing the recent average flow with the time series available would not have convincingly supported the view that 2001-2006 was strong evidence of climate change.”*<sup>40</sup> Icon Water contends that it would have been irresponsible not to incorporate climate change into future planning given its significant potential impact on water security. A standard statistical test performed on autumn rainfall in 2001-2006 shows a statistically significant difference to the long-term average at the 0.1 per cent level.<sup>41</sup> This reduction in autumn rainfall was due to expansion of the tropics and higher pressures in the sub-tropical ridge, which can only really be explained by anthropogenic climate change.<sup>42</sup> This change has a significant impact on runoff into Icon Water’s storage because autumn rainfall strongly influences runoff in the high yielding winter-spring periods.
- In relation to the estimated benefits of avoiding Stage 4 restrictions, Cardno states *“It is unclear why the results expressed by customers in the willingness-to-pay survey needed to be scaled up in this way. Presumably customers were considered to be too willing to accept risk.”*<sup>43</sup> Scaling was required because Stage 4 restrictions as they were defined at the time were not included in the customer willingness-to-pay survey. Icon Water notes that the estimates of willingness to pay adopted by Icon Water were demonstrated to be reasonable by two rounds of substantial additional work:

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<sup>37</sup> Cardno 2014, *Independent review of ICRC price direction, Technical Report*, November, p93 (footnote 52)

<sup>38</sup> Hensher, D., Shore, N. and Train, K. (2006) *Water Supply Security and Willingness to Pay to Avoid Drought Restrictions*, Economic Record 82(256) 56-66

<sup>39</sup> Office of Best Practice Regulation, 2007, *Best Practice Regulation Handbook*, August; Water Services Association of Australia, 2014, *Urban water planning framework and guidelines*, March; and Productivity Commission, 2014, *Environmental Policy Analysis: A Guide to Non-Market Valuation*, January.

<sup>40</sup> Cardno 2014, *Independent review of ICRC price direction, Technical Report*, November, p93 (footnote 52)

<sup>41</sup> An unpaired two-sample t-test with unequal variances (the Welch t-test; see Dalgaard, 2008, *Introductory Statistics with R (Second Edition)*, Springer, p.100-101) was performed on autumn rainfall, using the two years groups 1967-2000 and 2001-2006. The hypothesis equal means was rejected at the 0.1% level, as it had a p-value of 0.00011.

<sup>42</sup> CSIRO 2012, *Climate and water availability in south-eastern Australia: A synthesis of findings from Phase 2 of the South Eastern Australian Climate Initiative (SEACI)*, September, p5

<sup>43</sup> Cardno 2014, *Independent review of ICRC price direction, Technical Report*, November, p93 (footnote 52)

- a study undertaken by Colmar Brunton in 2008;<sup>44</sup> and
- a choice modelling study undertaken by researchers at the Australian National University in 2012 following the relaxation of temporary water restrictions.<sup>45</sup>

Notwithstanding the issues outlined above, Icon Water continues to support the application of the orthodox building block approach to recovery of water security project costs, which the Panel has adopted in its draft decision.

## 4.4 Value of the regulated asset base

### 4.4.1 Opening value

Icon Water supports the Panel’s draft decision on the opening value of the regulated asset based (**RAB**).

### 4.4.2 Forecast capital expenditure

Icon Water supports the Panel’s proposed approach of adopting the capital expenditure forecasts prepared by Icon Water.

However, Icon Water notes that the actual capital expenditure for 2013-14 used by the Panel in the draft decision includes only Icon Water’s general capital expenditure program and excludes expenditure on the water security projects of \$14.7 million in 2013-14. Icon Water notes that the figures used by the Panel were provided by Icon Water on 24 September 2014. The project listing provided in that file excluded the water security projects. These projects are recorded separately as a legacy of the arrangements prior to 2012 in which the water security projects were delivered by a bulk water alliance and the general capital program was delivered by what was then ActewAGL Water Division under a Utilities Management Agreement. Icon Water acknowledges that it did not bring this point to the attention of the Panel’s advisors at that time. The actual capital expenditure for 2013-14 is provided in Table 5.<sup>46</sup>

**Table 5: Actual net capital expenditure for 2013-14 (\$ nominal)**

General program (water)	25,955,930
Water security projects	14,680,624
Water	40,636,555
Sewerage	18,116,043
Total	58,752,597

The Panel notes Cardno’s statement that “*the new [capital expenditure governance] processes had been applied to only a small proportion of the expenditure in the first two years of the regulatory period.*”<sup>47</sup> As

<sup>44</sup> Colmar Brunton Social Research 2008, ACT Water Users Research: Final Report prepared for Infrastructure Development Branch, Water Division, (a division of) ActewAGL, 6 June.

<sup>45</sup> McNair B.J. and Ward M.B. 2012, *Willingness to pay research project, Final Report, Prepared for ACTEW Corporation*, March, available at [http://users.monash.edu.au/~mward/WTP\\_final\\_report\\_for\\_ACTEW\\_Personal\\_Academic\\_Webpage\\_Version.pdf](http://users.monash.edu.au/~mward/WTP_final_report_for_ACTEW_Personal_Academic_Webpage_Version.pdf)

<sup>46</sup> These figures were also submitted to the ICRC in Icon Water’s information return of 1 December 2014.

<sup>47</sup> Industry Panel 2014, *Review of the ICRC’s 2013 price direction for regulated water and sewerage services in the ACT, Draft Report*, December, p87

explained in its letter to the Panel of 21 November 2014, these statements were based on a spreadsheet provided by Icon Water during Cardno's review that was only able to be partially completed due to the time constraints given in the data request. Icon Water notes that on 25 November 2014 it provided further information to the Panel to demonstrate that this statement is incorrect. Some 95 per cent of the 2013-14 program had an approved technical report and 98 per cent has an approved business case. At the time the information was provided, 81 per cent of the 2014-15 program had an approved technical report and 77 per cent had an approved business case.<sup>48</sup> Icon Water also notes that the Panel in its letter to Icon Water on 1 December 2014 acknowledged the provision of this information and noted that the information arrived too late to be incorporated in the draft report and would be taken into account in the final decision.

#### 4.4.3 Depreciation

For the reasons set out in Section 2.3 of its SOFC, Icon Water supports the Panel's draft decision to revise the approach to calculating depreciation.

Icon Water notes that the Panel's preferred approach requires estimates of the standard life for each capital project. Icon Water is currently preparing a response to an information request from the Panel's advisors in relation to the "60 new projects in the revised program for which asset life is not available."<sup>49</sup>

#### 4.4.4 Indexation

For the reasons set out on page 27 of its SOFC, Icon Water supports the Panel's draft decision to index the RAB.

### 4.5 Rate of return and net tax liabilities

For the reasons set out in Section 2.1 of its SOFC, Icon Water supports and endorses the Panel's draft decision to apply a benchmark firm WACC, with the rate of return on equity set using the capital asset pricing model (CAPM).

However, Icon Water has concerns over some of the parameter values adopted by the Panel in calculating the WACC. These concerns are discussed in detail in Section 3.

Icon Water also notes that the Panel has not taken gamma into account when calculating tax payable as part of its revenue modelling. This approach is inconsistent with the approach adopted by the Australian Energy Regulator in its post-tax revenue model (PTRM), which divides tax payable by  $(1-(1-\text{gamma}) \times \text{tax rate})$ , prior to adjusting for imputation credits.

Icon Water also notes that the draft decision (including Table 10.1 and Table 10.4) refers to the Panel adopting a *post-tax nominal* WACC of 7.20 per cent. Icon Water understands that the WACC adopted by the Panel is actually a *nominal vanilla* WACC of 7.20 per cent.

### 4.6 Forecast operating expenditure

Icon Water supports the Panel's draft decision to adopt the operating expenditure forecasts prepared by Icon Water.

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<sup>48</sup> Email from Ben McNair (Principal Economist, ActewAGL Distribution) to Steve Martin (Project Manager, Industry Panel) on 25 November 2014.

<sup>49</sup> Industry Panel 2014, *Review of the ICRC's 2013 price direction for regulated water and sewerage services in the ACT, Draft Report*, December, p94

## 4.7 Forecast demand

### 4.7.1 Forecast water sales

This matter is discussed in detail in Section 2.3.

### 4.7.2 Forecast supply and fixtures charge quantities

Icon Water supports the Panel's draft decision in relation to forecast supply and fixtures charge quantities.

## 4.8 The Price Direction

Icon Water would make the following specific comments in relation to the draft substituted price direction at Appendix 12 to the Panel's draft decision.

In Section 6, it would be helpful if the price direction clarified how prices should be rounded; for example, prices for water consumption should be rounded to the nearest cent per kilolitre.

Section 11(b) provides for the ICRC to *"recommend that amendments [to the tariff structures in place] be made during the regulatory period..."* Consideration needs to be given to whether this provision should be removed given that substantive changes to tariff structures would appear to be prohibited by the maximum prices determined in Section 6.

Section 11(e) needs to be amended to clarify that the WACC-based discount rate would be used not only to assess actual revenue against the deadband, but also to carry forward the revenue pass-through amount to the unsmoothed revenue requirement in 2018-19 (consistent with the simplified examples provided on page 56 of the draft decision).

The water sales revenue set out in Section 11(e) of the Price Direction is labelled '\$2012-13'; however, the revenue figures appear to be in nominal dollars terms. Further, consideration should be given to whether provision should be made to adjust these figures for cost pass-through adjustments made during the regulatory period. In the absence of such adjustments, any cost pass-through will lead to the DVAM being asymmetric.

## **Attachment A: Letter from SFG Consulting**

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**Re: Impact on the cost of equity from asymmetry in beta estimates according to market conditions**

Dear Bjorn,

We have been asked to comment on a draft report by the Industry Panel (the Panel) that relates to Icon Water. The report, released on the 3<sup>rd</sup> of December 2014, is entitled *Review of the Independent Competition and Regulatory Commission's 2013 Price Direction for Regulated Water and Sewerage Services in the ACT*.

In its report, the Panel has made an estimate of the cost of equity using the Sharpe-Lintner Capital Asset Pricing Model (CAPM), populated with the following three parameter estimates – a risk-free rate of 3.22%, a market risk premium of 7.23%, and an equity beta estimate of 0.7.<sup>1</sup> This results in an estimate of the cost of equity of 8.28%.<sup>2</sup>

We have been asked to comment on the Panel's beta estimate of 0.7. The Panel arrived at its estimate of beta in the following manner. It compiled beta estimates with reference to historical stock returns for 16 firms listed in the United Kingdom (U.K.) and the United States (U.S.) and concluded that a typical water utility with benchmark gearing of 60% would have a beta estimate within the range of 0.53 to 0.77.<sup>3</sup> The Panel then made reference to beta estimates adopted by other water regulators which fell within a range of 0.55 to 0.80.<sup>4</sup> Finally, the Panel selected the figure of 0.7 – above the mid-point of the two ranges referred to above – on the basis of evidence from the finance literature that the expected return on stocks with low beta estimates is likely to be above the cost of equity implied by the implementation of the beta estimate in the Sharpe-Lintner CAPM.<sup>5</sup>

The issue we have been asked to comment upon is the relevance, for cost of equity estimation, of beta estimates that differ depending upon market conditions. The specific issue is described below.

Icon Water submitted that an appropriate beta estimate is 0.9, in part on the basis that the beta estimates for listed water utilities are different depending upon whether market returns are high or low. In making this submission Icon Water relied upon analysis we previously conducted, in which we compiled beta estimates

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<sup>1</sup> Industry Panel (2014), Sub-section 10.3.2, p. 106.

<sup>2</sup> The computation is cost of equity = risk-free rate + beta × market risk premium = 0.0322 + 0.7 × 0.0723 = 0.0322 + 0.0506 = 8.28%.

<sup>3</sup> Industry Panel (2014), Sub-section A8.2.2, p. 175, and Sub-section A9.1, p. 281. The figure of 0.53 is the median Vasicek-adjusted beta estimate and the figure of 0.77 is the median Blume-adjusted beta estimate. Beta estimates are compiled from five years of monthly returns.

<sup>4</sup> Industry Panel (2014), Sub-section A8.2.2, p. 175.

<sup>5</sup> Industry Panel (2014), Sub-section A8.2.2, p. 176.

that are allowed to vary with market conditions.<sup>6</sup> As noted by the Panel, the “‘up’ market estimates [range] from 0.39 to 0.62 and the ‘down’ market estimates [range] from 0.67 to 0.88.”<sup>7</sup> The term in the finance literature for systematic risk that varies according to market conditions is *asymmetric beta estimates* which simply means that there is different estimates of systematic risk depending upon market conditions at different points in time. There is an asymmetry.<sup>8</sup>

The Panel does not consider the asymmetry in beta estimates to be something that should be taken into account in reaching its conclusion on equity beta. So we have been asked by Icon Water to explain the impact of asymmetric beta estimates on the cost of equity, and consider whether this issue is worthy of further consideration by the Panel.

First, we need to consider why asymmetric exposure to market returns is related to the cost of equity. The cost of equity is the flipside of the price of the stock. A risk that leads to investors being prepared to pay a higher price for the stock also means it is a risk that leads to an increase in the cost of equity.

In considering the price investors are prepared to pay for the stock, investors will consider what payoffs the stock will have in different market outcomes. According to the theory of the Sharpe-Lintner CAPM, an asset has the same market exposure regardless of market conditions. So according to the theory of this model, the cost of equity increases in direct proportion to the beta estimate. For example, if beta is 0.7 and the market return in a given year is 10% above the risk-free rate, we expect the stock to have a return that is 7% above the risk-free rate. And if the market return is 10% below the risk-free rate, we expect the stock to have a return that is 7% below the risk-free rate. Investors do not know in advance whether the market will have high or low returns next year, but the stock price will reflect this symmetric risk exposure.

However, we need to consider the impact on the stock price if the beta differs depending on market conditions. In the context of this note, *market conditions* means whether the market exhibits a return above or below the risk-free rate.<sup>9</sup> Investors still do not know in advance whether market returns will be high or low in a future period. However, because investors are risk averse, investors will pay a higher price for stocks that have higher association with market movements when the market is rising and lower association with market movements when the market is falling. The reason investors pay a higher price for stocks with this type of market exposure is that the stock has more upside potential, and less downside risk. The lower exposure to market returns in a market downturn provides a degree of portfolio protection or insurance, at the very point when portfolio protection or insurance is needed. The higher exposure to market returns in an upturn means that investors benefit from improved market conditions. As mentioned above, the flipside of investors paying higher prices is lower required returns. So for stocks that offer portfolio protection or insurance during market downturns, and increased market exposure during upturns, the cost of equity will be lower.

To provide some additional context for this notion, consider investment products that are tailored to investors’ particular appetite for market risk. Investment products are offered that provide a degree of downside protection in the event of market downturns, but still offer upside when the market performs well. These investment products appeal to self-managed superannuation funds if the trustees are concerned about preservation of capital. The trade-off is that the average return offered by these products is less than comparable products which are more exposed to market downturns. The reason the average return is relatively lower is because the person offering the product must purchase insurance against the market downturn. But when the situation is reversed, so there is increased exposure to market downturns and less exposure to upturns, then expected returns are higher.

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<sup>6</sup> SFG Consulting (2012), *Systematic risk of Actew’s water and sewerage business*, May.

<sup>7</sup> Industry Panel (2014), Sub-section A8.2.2, p.175.

<sup>8</sup> As explained in more detail below, this does not mean using different betas in a cost of capital equation, depending upon whether the estimate of the market risk premium today is high or low. It means different market exposure to either market returns in the future or different market exposure in periods of high or low volatility. The implication is not that a cost of equity computation would have a high beta input when the market risk premium estimate is high, and a low beta input when the market risk premium estimate is low.

<sup>9</sup> In other contexts the term *market conditions* can refer to a market in which market volatility is expected to be high or low. When we think about good or bad market conditions we can think about both concepts. The first concept relates to the realised market returns, and whether they are high or low. The second concept relates to how much risk is embedded in expected market returns. When the market is volatile, lower beta is desirable because the lower beta reduces the volatility of the investor’s portfolio at a time when the investor is most concerned about potential market returns.

In the situation of listed water utilities, it appears they have the opposite type of market exposure. The beta estimates are higher during periods when the market offers low returns, and the beta estimates are lower during periods when the market offers high returns. This is the sort of exposure investors do not want, and will be reflected in the prices investors pay for stocks. When the market does poorly, the stocks are expected to have an increased association with returns in the falling market. When the market does well, investors benefit less from the market upturn because the beta estimates are lower when market conditions are good. So for stocks with an asymmetric exposure to market conditions – with higher beta estimates when the market does poorly, and lower beta estimates when the market does well – prices will be lower and the cost of capital will be higher, compared to a comparable case in which the systematic risk exposure is constant.

The advice we have previously given to Icon Water is that if there is evidence of an asymmetric exposure to market conditions, then the beta estimate incorporated into the Sharpe-Lintner CAPM should be at least as high as the down market beta estimate. The reason we write *at least as high as the down market beta estimate* is that investors will factor into prices (and therefore the cost of capital) both the increased exposure to poor market conditions, and the reduced exposure to good market conditions. In that previous advice we have not done a formal computation of the appropriate expected return that accounts for both the increased down market beta and the reduced up market beta. The reason for this is that regulators, in our experience, are reluctant to step outside the Sharpe-Lintner CAPM to estimate the cost of equity. So to perform a formal computation of the expected return that incorporates both the down market and up market equity betas is an increased hurdle for the regulator to overcome. For this reason we have simply referred to the down market beta estimate as a lower bound for the beta estimate that would be incorporated into the Sharpe-Lintner CAPM.

The Panel states that it “has taken into account the impact of overall market conditions on investors’ expectations on the required cost of equity by adopting implied MRPs, which are influenced by changing investors’ expectations (risk aversion) in all market conditions. The Panel does not therefore think it is appropriate to make another compensatory adjustment to the equity beta.”<sup>10</sup> It is true that the Panel has adopted a contemporaneous estimate of the market risk premium (7.23%), using a 40 day average of the Bloomberg market risk premium estimate.<sup>11</sup> This means that, based upon equity prices and expected dividends in May 2013, the Australian equity market was expected to earn an annual return 7.23% above 10-year government bond yields.

However, accounting for the expected return on the market at a point in time is a different concept to accounting for an investment’s asymmetric exposure to different market conditions. If investors were to price two assets in May 2013, and one asset had an asymmetric risk exposure, and the other asset had the same risk exposure regardless of market conditions, investors would still offer a lower price to the former asset (or in other words require a higher return). The asymmetric exposure discussed above does not mean that we should change the beta estimate depending upon whether the expected market return or market risk premium right now is high or low. The implication of the asymmetric exposure is that assets with asymmetric exposure to market conditions will trade on lower prices and therefore have a higher cost of capital than otherwise comparable assets.

In terms of arriving at a final estimate of beta, what the discussion above implies is that the beta estimate of 0.7 is not really a conservative estimate in the sense that it is above the mid-point of the beta range of 0.53 to 0.77 considered by the Panel. It is likely to be the case that the cost of equity capital for the listed stocks considered is higher than implied by beta of 0.7 and the Sharpe-Lintner CAPM. In our previous advice on this issue we recommended an equity beta of 0.9, which accounts for a number of issues considered by the Panel including imprecision in beta estimates from regression analysis and the possibility that the Sharpe-Lintner CAPM leads to an under-estimate of expected returns for low beta stocks. So the difference between our beta estimate of 0.9, and the Panel’s beta estimate of 0.7, comes from two sources: (1) How much relative weight should be given to imprecision in the beta estimates from regression and the poor empirical performance of the Sharpe-Lintner CAPM; and (2) whether asymmetric exposure to market conditions is relevant for estimating the cost of equity.

If the Panel were only to re-consider the implications of asymmetric exposure to market conditions, the implied beta estimate would be approximately 0.8 (based on our previous report to Icon Water), because we placed relatively more emphasis on the imprecision in beta estimates and the limitations of the Sharpe-

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<sup>10</sup> Industry Panel (2014), Sub-section A8.2.2, p. 267.

<sup>11</sup> Industry Panel (2014), Sub-section A8.2.1, p. 175.

Lintner CAPM. We have not been asked to explore the merits of how much weight should be given to issues other than asymmetric exposure to market conditions.

Regards,



Jason Hall