Review of the Weighted Average Cost of Capital for the Purposes of Determining the Maximum Reserve Capacity Price

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Report to the Independent Market Operator
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Maximum Reserve Capacity Price: Review of WACC

Executive summary

Introduction

Western Australia’s Independent Market Operator (IMO) commissioned the Allen Consulting Group to undertake a review of the weighted average cost of capital used to determine the Maximum Reserve Capacity Price. The required scope of this review was to:

- advise on the calculation of the WACC used in setting the Maximum Reserve Capacity Price, including available methods, parameters, and value to be used by the IMO in determining the maximum reserve capacity price (including the parameter ‘D’ in the Market Rules);
- advise on the methodology and model used to calculate “k”, a factor defined by the Market Rules to equate the net present value of 10 years worth of payments escalated on a CPI-1 per cent with the payment stream from 10 years worth of an unescalated payments; and
- advice on the use of the term “Nominal” in the definition of the term ‘ANNUALISED_CAPCOST[t]’ in Appendix 4 of the Market Rules.

The Maximum Reserve Capacity Price (and hence the WACC used to derive it) is used in two places in the Market Rules, namely:

- to establish a cap for the price that is payable where the IMO holds an auction to procure additional generation capacity; and
- as an input in setting the price that is paid to capacity that enters the market other than through an auction (for example, commercial entry).

The IMO has indicated that the WACC should reflect the efficient cost of capital that would be required to support investment in an open cycle gas turbine (OCGT) peaking plant, where such plant is constructed following it being successfully bid into a Reserve Capacity Auction. Under this scenario, payments for capacity would be underwritten by a 10-year contract with the IMO with payments escalated by CPI-1 percent (known as a Long Term Special Price Arrangement).

We note at the outset that the WACC for the two situations set out above need not be the same. We also note that, in undertaking the tasks described above, we have found a number of other potential defects in the regime surrounding the Maximum Reserve Capacity Price, which are summarised below. We recommend further analysis of these matters.

Conclusions and recommendations

General Methodology

It is recommended that the IMO calculate WACC values by use of the capital asset pricing model (CAPM) to estimate the cost of equity.

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1 The administered price for this non-auctioned capacity cannot be higher than 85 per cent of the Maximum Reserve Capacity Price, and it will be lower if there is deemed to be surplus generation capacity and/or if an auction is held and the capacity is offered at a lower price (the auction price determining the new administered price).
It is recommended that the context for the application of the WACC implies that it should be expressed in real terms, consistency with which implies that all forecasts of cash flows should be presented in real terms.

The Allen Consulting Group is of the view that it is appropriate and preferable to use a post-tax WACC when determining regulated revenues and prices. This approach would determine regulated revenues and prices with a cost of taxation that is closer to the cost of taxation which would actually be incurred by an efficient provider of an open cycle gas turbine (OCGT) peaking plant.

However, Western Australia’s Economic Regulator Authority (the ERA) must approve the Maximum Reserve Capacity Price. Consequently, the IMO may consider that maintaining consistency with the regulatory precedent, established by the ERA’s determinations with respect to energy (electricity and gas) transmission and distribution, and rail access, warrants adopting a pre-tax WACC.

The Allen Consulting Group considers that the treatment of taxation is ultimately a matter for the IMO to determine taking into account these factors. Accordingly, both post-tax and pre-tax WACC values are presented in this report.

**CAPM and WACC parameters**

Recommended values of CAPM and WACC parameters are set out in Table 1.1 together with calculated returns on equity and WACC values. Of these parameters, the market variables of the nominal risk free rate of return and debt margins should be updated at the time that the IMO finally calculates the Maximum Reserve Capacity Price for a prospective capacity year.
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Table 1.1

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<th>CAPM Parameter</th>
<th>Notation/Determination</th>
<th>Recommended Value</th>
</tr>
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<tbody>
<tr>
<td>Nominal risk free rate of return (%)</td>
<td>$R_{fn}$</td>
<td>6.21</td>
</tr>
<tr>
<td>Expected inflation (%)</td>
<td>$\pi_e$</td>
<td>3.00</td>
</tr>
<tr>
<td>Real risk free rate of return (%)</td>
<td>$R_{fr}$</td>
<td>3.12</td>
</tr>
<tr>
<td>Market risk premium (%)</td>
<td>$MRP$</td>
<td>6.00</td>
</tr>
<tr>
<td>Asset beta</td>
<td>$\beta_a$</td>
<td>0.5</td>
</tr>
<tr>
<td>Equity beta</td>
<td>$\beta_e$</td>
<td>0.83</td>
</tr>
<tr>
<td>Debt margin (%)</td>
<td>$DM$</td>
<td>1.60</td>
</tr>
<tr>
<td>Debt issuance costs (%)</td>
<td>$t$</td>
<td>0.125</td>
</tr>
<tr>
<td>Corporate tax rate (%)</td>
<td>$\gamma$</td>
<td>0.5</td>
</tr>
<tr>
<td>Debt to total assets ratio (%)</td>
<td>$D/V$</td>
<td>60</td>
</tr>
<tr>
<td>Equity to total assets ratio (%)</td>
<td>$E/V$</td>
<td>40</td>
</tr>
<tr>
<td>Nominal pre-tax cost of debt (%)</td>
<td>$R_{fn} + DM$</td>
<td>7.81</td>
</tr>
<tr>
<td>Nominal post-tax cost of equity (%)</td>
<td>$R_{fn} + \beta_e \times MRP$</td>
<td>11.19</td>
</tr>
<tr>
<td>Nominal post-tax WACC (%)</td>
<td>Vanilla WACC</td>
<td>9.84</td>
</tr>
<tr>
<td>Real post-tax WACC (%)</td>
<td>Vanilla WACC</td>
<td>6.64</td>
</tr>
<tr>
<td>Nominal post-tax WACC (%)</td>
<td>Officer WACC</td>
<td>7.72</td>
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<tr>
<td>Nominal pre-tax WACC (%)</td>
<td>Officer WACC</td>
<td>11.02</td>
</tr>
<tr>
<td>Real pre-tax WACC (%)</td>
<td>Officer WACC</td>
<td>7.79</td>
</tr>
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Note: a. Debt issuance costs are excluded from the calculated WACC as these costs are already included in a margin, represented by "M" in Appendix 4 of the Market Rules.

The WACC values that result are:

- a **real post-tax WACC of 6.64 per cent**, which assumes that taxation is explicitly provided for in cash flows; or

- a **real pre-tax WACC of 7.79 per cent**, which accounts for taxation through an adjustment to the WACC itself. (This approach is comparable to the current methodology implied in Appendix 4 of the Market Rules.)

Note that in calculating the WACC, the Allen Consulting Group has excluded the recommended debt issuance cost allowance of 12.5 basis points. This is because the calculation of the Maximum Reserve Capacity Price includes a margin to cover, amongst other things, financing costs. While regulatory precedent in Australia is to include these costs in the WACC, to do so here would double count these costs.
In terms of the annual calculation of the Maximum Reserve Capacity Price, the Allen Consulting Group recommends that:

- the nominal risk free rate of return, debt margin and forecast of inflation be updated each year – note that we recommend against using inflation-linked bonds as a means of providing a direct estimate of the real risk free rate or to establish a market-based forecast of inflation; and

- the remaining variables (market risk premium, equity beta, corporate tax rate, franking credit value, and the gearing level) be fixed for a period of time, say five years.

The second group of variables are likely to remain stable over longer periods of time, and fixing the values of these parameters would minimise the administrative complexity, burden and cost of the recommended approach. This approach is also consistent with that taken in establishing the WACC for electricity transmission networks covered by the National Electricity Rules.

**The parameter “D”**

The parameter “D”, which is the real interest rate on debt, is used in the formula for \( \text{CAPCOST}[t] \) in Appendix 4 of the Market Rules to allow for the financing costs incurred during construction. It is erroneous to include an allowance for debt costs – the financing costs incurred include the opportunity cost incurred by equity providers and so the WACC is the appropriate rate to use.

The Allen Consulting Group recommends that the parameter “D” be replaced by the WACC (calculated on the basis outlined above).

**Accounting for inflation between the calculation of the price and its application**

While outside the current scope of the works, the Allen Consulting Group notes that there is no allowance in the costs included in \( \text{CAPCOST}[t] \) and \( \text{PRICECAP}[t] \) for the effects of inflation between the time the Maximum Reserve Capacity Price is established, and the Capacity Year in which it will apply.

The Allen Consulting Group considers that the Maximum Reserve Capacity Price should reflect the nominal cost that would be incurred by an OCGT peaking plant in a Capacity Year; this requires that costs are adjusted to reflect the impact of actual or forecast inflation.

**The parameter “k”**

The Allen Consulting Group recommends that the parameter “k” in the formula for \( \text{PRICECAP}[t] \) in Appendix 4 of the Market Rules be calculated using the model in the separate spreadsheet provided to the IMO.

Based on its preceding analysis, the Allen Consulting Group makes the following observations on the IMO’s existing methodology and model:

- There are a number of inconsistencies in the current model:
  - the payment stream resulting from the annuity formula is a fixed constant dollar payment stream (real WACC applied to the asset base) — and the
The payment stream under the Long Term Special Price Arrangement is a nominal payment stream — the NPV should be calculated using the nominal WACC (not the real WACC as occurs in the current model); and

the inflation rate implied in the real WACC, while not explicitly specified, likely differs from the inflation rate used to escalate the stream of payments under the Long Term Special Price Arrangement.

• The payment stream under a Long Term Special Price Arrangement would be escalated annually after the first year (that is, the first year of the two payment streams should originally be the same under the model before being adjusted by “k”) — the current model escalates payments monthly (including the first payment).

• The real WACC (and nominal WACC) should be converted to monthly rates so that the compounded monthly rate is equivalent to the calculated WACC.

Other potential issues with the regime

As noted previously, while addressing the matters discussed above, we discovered a number of broader issues with the regime surrounding the Maximum Reserve Capacity Price which we recommend to be analysed further. These are set out below, separated into the issues that arise when the Maximum Reserve Capacity Price is being used as an input into setting the administered price for non-auctioned capacity and when it is being used as the price cap for an auction.

Maximum Reserve Capacity Price – non-auctioned capacity

• \textit{WACC} – as alluded to above, the cost of capital associated with capacity that enters commercially may be higher than that procured through an auction because the former is not underwritten by a long-term contract. This could lead to the administered price not being sufficiently high to attract commercial entry (and hence place greater reliance on the use of a Reserve Capacity Auction).

• \textit{Limit on the price} – the fact that the maximum administered price for non-auctioned capacity is 85 per cent of the Maximum Reserve Capacity Price may lead to the administered price not being sufficiently high to attract commercial entry (and hence place greater reliance on the use of a Reserve Capacity Auction).

– We note that the fact that the Maximum Reserve Capacity Price is calculated on the assumption that the life of the OCGT peaking plant is only 15 years may offset this (that is, if the true economic life exceeds 15 years) – in this context, we understand that an operational life of 30 years is assumed in calculating fixed operating and maintenance costs.
Implicit indexation – a new entrant will only recover its costs if the Maximum Reserve Capacity Price is escalated for inflation in each year. This is because the Maximum Reserve Capacity Price is calculated on the basis that it is an indexed annuity. However, the escalation that is applied implicitly to the Maximum Reserve Capacity Price is the change in the input prices. This is because the Maximum Reserve Capacity Price is recalculated each year on the basis of new input prices. Hence, and ignoring the 85 per cent rule above, a new entrant will fail to recover costs if input prices do not keep pace with output price inflation, and make a windfall if input prices rise at a faster rate than inflation.

**Maximum Reserve Capacity Price – auctioned capacity**

Term – the fact that the Long Term Price Arrangement is only for 10 years – after which time the generator would get paid the administered price (which in turn is set at a maximum of 85 per cent of the Maximum Reserve Capacity Price) leaves open the possibility that a generator may not be able to recover its total cost.

– Again, we note that the fact that the Maximum Reserve Capacity Price is calculated on the assumption that the life of the OCGT peaking plant is only 15 years may offset this (that is, if the true economic life exceeds 15 years) – again, we understand that an operational life of 30 years is assumed in calculating fixed operating and maintenance costs.

**Other issues**

Calculation of annual fixed operating and maintenance costs ($FIXED\_O&M[t]$) — there appear to be similarities between these costs and capital costs as in both cases a present value is established in the current year. However, rather than an annuity, the Allen Consulting Group understands that the present value of FIXED_O&M costs (based on the first 15 years of these costs) is divided by the number of years (that is, 15) and the size of the OCGT peaking plant (160 MW) to derive an annual cost.

Economic life — as noted above, the technical report underpinning the estimate of fixed annual OCGT peaking plant operating and maintenance costs indicates the assumed operating life of an OCGT peaking plant is 30-years. If the economic life of the plant were equal to the operating life (or at least greater than 15 years), this would be expected to result in a price (revenue) that unambiguously over recovers costs.