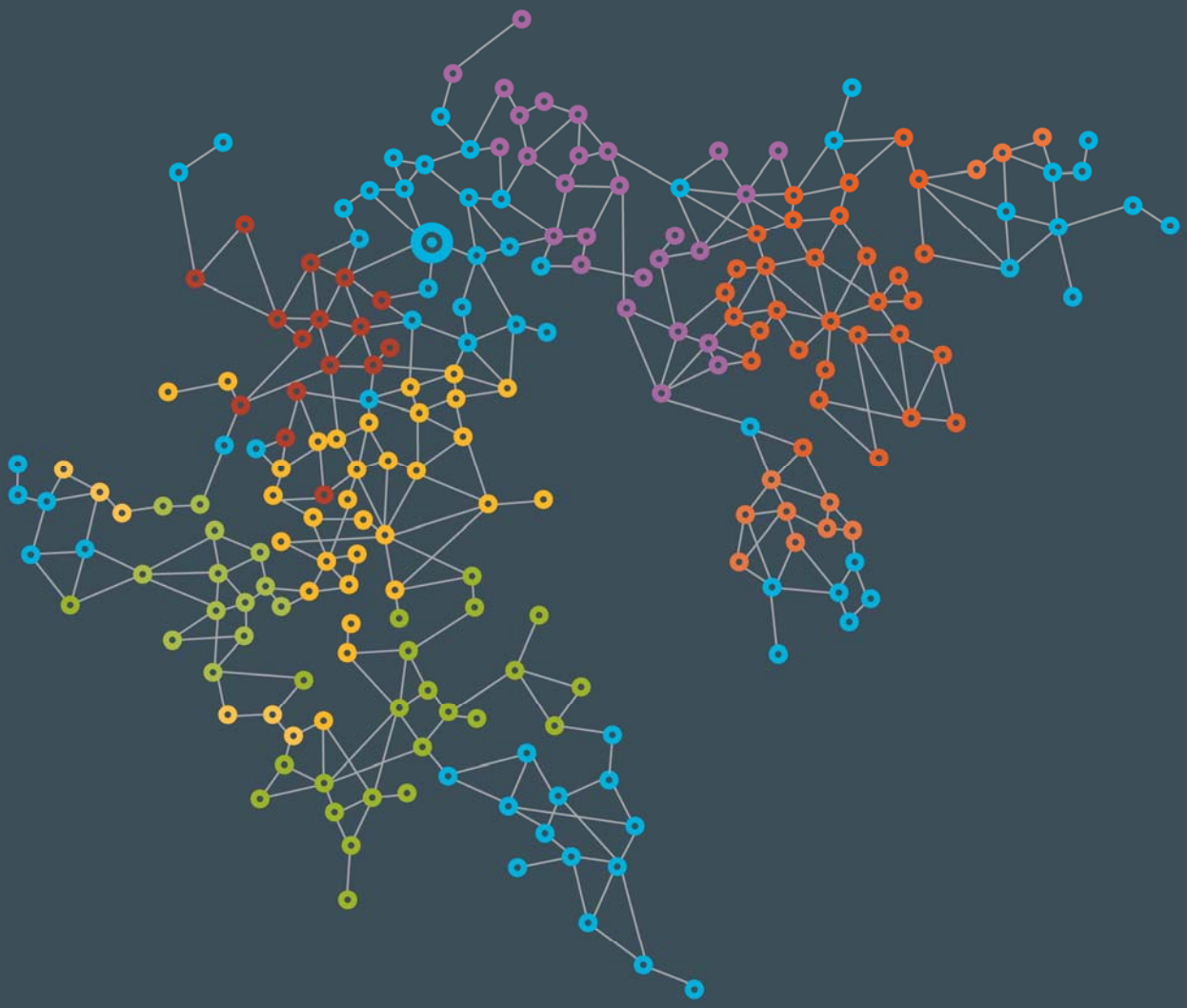
INDEPENDENT MARKET OPERATOR

# Draft Report: Maximum Reserve Capacity Price for the 2015/16 Capacity Year

November 2012



## DISCLAIMER

The Independent Market Operator (IMO) has prepared this report under section 4.16 of the Wholesale Electricity Market Rules (Market Rules) to describe the process it followed in arriving at a proposed revised value for the Maximum Reserve Capacity Price.

Although all due care has been taken in preparing this report, the IMO makes no guarantee that it is completely accurate and accepts no liability for any errors.

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# EXECUTIVE SUMMARY

Each year, the Independent Market Operator (IMO) is required to determine the Maximum Reserve Capacity Price in accordance with the *Market Procedure: Maximum Reserve Capacity Price*[1] ("Market Procedure").

The Maximum Reserve Capacity Price (MRCP) sets the maximum bid price that can be made in a Reserve Capacity Auction and is also used as the basis to determine an administered Reserve Capacity Price if no auction is required.

The MRCP aims to establish the marginal cost entry of providing additional Reserve Capacity in each Capacity Year. The MRCP is established by undertaking a technical bottom-up cost evaluation of the entry of a 160 MW Open Cycle Gas Turbine (OCGT) generation facility entering the Wholesale Electricity Market (WEM) in the relevant Capacity Year.

This Draft Report details the outcome of the draft determination of the MRCP for the 2013 Reserve Capacity Cycle. The value used for the 2013 Reserve Capacity Cycle will be effective from 1 October 2015 through to 1 October 2016.

The methodology for determining the MRCP is specified in the Market Procedure and includes a technical costing of the following components:

- the capital cost of a 160 MW OCGT power station with inlet cooling, located within the South West interconnected system (SWIS);
- the land cost associated with developing and constructing the power station;
- the cost associated with connection of the power station to the transmission system;
- the cost associated with building liquid fuel storage and handling facilities for the power station to accommodate 24 hours of operation;
- the fixed Operational and Maintenance (O&M) costs associated with the power station and the transmission facilities listed above;
- a margin for legal, approval, financing and insurance costs and contingencies; and
- the Weighted Average Cost of Capital (WACC).

The methodology (valuing the cost of entry of a 160 MW OCGT power station) employed this year for determining the MRCP is identical to that used last year.

## MRCP outcome

The 2013 Maximum Reserve Capacity Price proposed by the IMO in its Draft Report is $152,800 per MW per year, approximately 6.8% lower than the MRCP of $163,900 determined for the 2012 Reserve Capacity Cycle.

[1] The Market Procedure is available at http://www.imowa.com.au/market-procedures

However, as noted in this report, the IMO has submitted Procedure Change Proposal PC_2012_08[2] to amend the Market Procedure. PC_2012_08 proposes to amend the franking credit value, gamma, within the Weighted Average Cost of Capital (WACC) from 0.5 to 0.25 to align it with the practice of Australian regulators over the last 18 months. If this proposal is accepted, the IMO will determine the MRCP for its Final Report in accordance with the amended Market Procedure.

The IMO has also calculated the MRCP that would result from this lower gamma value, which is $157,500 per MW per year. This would represent a reduction of only 3.9% from the 2014/15 MRCP.

### Changes since 2014/15 MRCP

Table A shows the impact of changes in the input parameters since the 2014/15 MRCP, where the value of gamma remains unchanged at 0.5.

**Table A: Impact of changes in input parameters (current Market Procedure, gamma = 0.5)**

| | Impact ($) | Impact (%) | MRCP ($) |
|---|---|---|---|
| **2014/15 MRCP** | | | **163,900** |
| Escalation factors | + 400 | + 0.2% | 164,300 |
| Power Station costs | - 4,200 | - 2.6% | 160,100 |
| Margin M | + 500 | + 0.3% | 160,600 |
| Fixed Fuel Cost | + 2,800 | + 1.7% | 163,400 |
| Land Cost | - 100 | - 0.1% | 163,300 |
| Transmission Cost | + 600 | + 0.4% | 163,900 |
| WACC | - 11,600 | - 7.1% | 152,300 |
| Fixed O&M | + 500 | + 0.3% | 152,800 |
| **Combined impact** | **- 11,100** | **- 6.8%** | **152,800** |

The most significant changes since the 2014/15 MRCP are explained below.

- The Power Station Cost is 3.7% lower than for 2014/15, with the reduction driven by falling steel and copper prices coupled with the appreciation of the Australian dollar versus the Euro.
- The Fixed Fuel Cost is 122% higher than last year. Sinclair Knight Merz (SKM) has reviewed this estimate for the first time, based on the same scope as previous estimates provided by GHD. SKM has developed its estimate with the benefit of recent project

[2] See http://www.imowa.com.au/PC_2012_08

experience in Western Australia.

- The WACC has reduced from 6.83% to 5.49%. This has been driven by a further deterioration in bond yields in the past year and the use, for the first time, of the bond-yield approach developed by the Economic Regulation Authority (ERA) for determining the debt risk premium. If a gamma value of 0.25 was used, as is proposed in PC_2012_08, the WACC would be 6.03%.

Table B shows the impact of changes in the input parameters since the 2014/15 MRCP, where the value of gamma is 0.25.

**Table B: Impact of changes in input parameters (gamma = 0.25)**

| | Impact ($) | Impact (%) | MRCP ($) |
|---|---|---|---|
| **2014/15 MRCP** | | | **163,900** |
| Escalation factors | + 400 | + 0.2% | 164,300 |
| Power Station costs | - 4,200 | - 2.6% | 160,100 |
| Margin M | + 500 | + 0.3% | 160,600 |
| Fixed Fuel Cost | + 2,800 | + 1.7% | 163,400 |
| Land Cost | - 100 | - 0.1% | 163,300 |
| Transmission Cost | + 600 | + 0.4% | 163,900 |
| WACC/Gamma | - 7,000 | - 4.3% | 156,900 |
| Fixed O&M | + 600 | + 0.4% | 157,500 |
| **Combined impact** | **- 6,400** | **- 3.9%** | **157,500** |

### Stakeholder workshop held on 1 November 2012

In submissions on the 2014/15 MRCP, a number of stakeholders suggested that the capital structure assumptions that underpin the WACC calculation may not be appropriate for the current composition of the WEM. In particular, these stakeholders suggested that it was likely that a generator in the WEM would raise debt finance from a bank rather than through the corporate bond market. The IMO committed to review these assumptions in 2012.

The IMO commissioned PricewaterhouseCoopers (PwC) to review recent regulatory practice with regards to the cost of debt. PwC advised that:

- it remains current regulatory practice to determine the risk free rate from a 20-day average of recent observed yields of Commonwealth Government bonds;
- no challenges to this method for determining the risk free rate have been brought to the ACT recently;

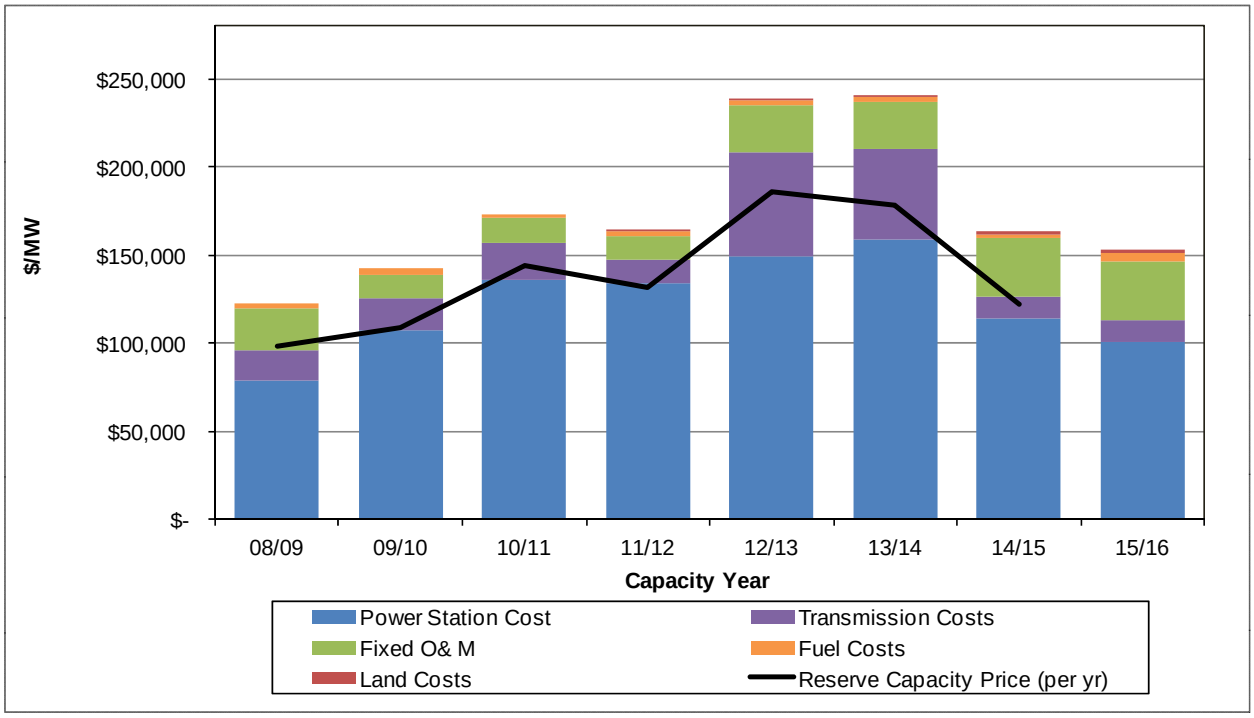
- no Australian regulator has applied a cost of debt estimate that is based on the cost of bank debt; and
- there has been a sustained shift in the practice of both the Australian Energy Regulator (AER) and ERA to apply a value of gamma of 0.25.

The IMO confirmed to attendees that it would progress with a Procedure Change Proposal to amend the value of gamma, and would retain the determination of the risk free rate and debt risk premium from observed yields of Commonwealth Government and corporate bonds respectively.

### Historical variation of MRCP

Figure B indicates that the MRCP has been relatively stable aside from the MRCPs for 2012/13 and 2013/14, which are outliers. This graph shows the MRCPs for the period from 2008/09 to 2015/16, including the contribution of the various component costs. Please note the individual cost components include the impact of the WACC.

**Figure B: MRCPs for 2008/09 to 2015/16 Capacity Years**




As shown in the graph, the higher MRCPs for 2012/13 and 2013/14 were largely driven by higher estimates of Transmission Costs, which are provided by Western Power. The IMO notes that the method used by Western Power changed for the 2012/13 MRCP following discussions between the IMO and Western Power. The IMO considered that estimates provided by Western Power for previous years lacked detail and transparency. However, the IMO notes that the 2012/13 estimate provided by Western Power for the shared connection cost at the cheapest location was more than 350% higher than the indicative value provided for the 2011/12 MRCP.

As part of the five-yearly review of the MRCP, assisted by the Maximum Reserve Capacity Price

Working Group (MRCPWG), SKM reviewed the methodology employed by Western Power. In its analysis, SKM highlighted that the method used for the 2012/13 and 2013/14 MRCPs required a broad range of assumptions that can lead to significant inaccuracies and year-to-year volatility.

An amended methodology for estimating the Transmission Costs was implemented following this review[3], based on a weighted average of actual contribution costs charged by Western Power. Western Power applied the new methodology for the first time for the 2014/15 MRCP. The outcomes of this methodology have been significantly lower than the estimates provided by Western Power for 2012/13 and 2013/14, suggesting that the higher cost estimates provided for those years were not reflective of the capital contributions actually being charged to project developers that have either secured connection or been provided with an Access Offer.

Outside of the 2012/13 and 2013/14 MRCPs, the Transmission Cost component of the MRCP has been relatively stable with estimates falling within 20% of the mean for the remaining years[4].

The IMO notes that the current methodology for estimating the Transmission Costs uses several years of data in a weighted average calculation. This method is expected to result in lower volatility than occurred under the previous methodology employed by Western Power for 2012/13 and 2013/14.

The IMO also notes that the Power Station Cost increased by 101% from the 2008/09 MRCP to the 2013/14 MRCP, driven by significant increases in commodity prices and WA labour costs. The introduction of inlet cooling into the design of the theoretical power station, following the 5-yearly MRCP methodology review, has moderated this increase and was the predominant reason for the reduction in the Power Station Cost from 2013/14 to 2014/15. This change was implemented as it reflects current market practice. All Open Cycle Gas Turbine generation facilities constructed in the SWIS since the commencement of the WEM have incorporated inlet cooling.

### Procedure Change Proposal

As noted above, the IMO has submitted Procedure Change Proposal PC_2012_08[5] to amend the Market Procedure. The IMO is currently consulting in relation to this proposal, with submissions closing on 10 December 2012.

If the Procedure Change Proposal is approved, the revised Market Procedure will commence prior to the publication of the Final Report for the 2015/16 MRCP. The IMO will then determine the MRCP for its Final Report in accordance with the amended Market Procedure.

[3] See Procedure Change PC_2011_06.
[4] This analysis excludes the effect of the WACC.
[5] See http://www.imowa.com.au/PC_2012_08

## Invitation for submissions

The IMO seeks submissions on this Draft Report. Information on the public submission process is included within this report and can also be found in the Reserve Capacity section of the IMO website (www.imowa.com.au/mrcp).

The value of gamma is prescribed in the Market Procedure and can only be amended by a Procedure Change Proposal. As such, submissions related to the proposed change in gamma from 0.5 to 0.25 should be made in response to the Procedure Change Proposal PC_2012_08[6].

[6] Submissions for PC_2012_08 close on 10 December 2012.

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# 1. INTRODUCTION

The Maximum Reserve Capacity Price (MRCP) sets the maximum bid that can be made in a Reserve Capacity Auction and is used as the basis to determine an administered Reserve Capacity Price if no auction is required. Each year the Independent Market Operator (IMO) is required to determine the MRCP in accordance with the *Market Procedure: Maximum Reserve Capacity Price*[7] (Market Procedure). The proposed revised value for the MRCP is published in the form of a Draft Report, which is published on the IMO website (www.imowa.com.au/mrcp) for public consultation.

Following the public consultation process, the IMO must consider submissions and propose a final revised MRCP value and submit that value, along with a final report (produced in accordance with clause 4.16.7 of the Market Rules) to the Economic Regulation Authority (ERA) for approval.

This Draft Report presents the updated component costs as determined for the 2013 Reserve Capacity Cycle. The IMO uses publicly available information, together with advice from independent engineering and economics consultants and Western Power, to update the various input parameters that are used in calculating the MRCP.

This Draft Report is produced in accordance with clause 4.16.6 of the Wholesale Electricity Market Rules (Market Rules).

## 1.1 Reserve Capacity Cycle timing

This Draft Report has been prepared for the 2013 Reserve Capacity Cycle and the MRCP will be effective from 1 October 2015 through to 1 October 2016.

## 1.2 General costing methodology and structure of this Draft Report

The yearly determination of the MRCP requires the IMO to develop estimates of the following constituent costs:

- the capital cost of a 160 MW Open Cycle Gas Turbine (OCGT) power station with inlet cooling, located within the South West interconnected system (SWIS);
- the land cost associated with developing and constructing the power station;
- the cost associated with connection of the power station to the transmission system;
- the cost associated with building liquid fuel storage and handling facilities for the power station;
- the fixed Operational and Maintenance (O&M) costs associated with the power station and the transmission facilities listed above;
- a margin for legal, approval, financing and insurance costs and contingencies; and

[7] The Market Procedure is available at http://www.imowa.com.au/market-procedures

- the Weighted Average Cost of Capital (WACC).

In determining the proposed MRCP, the IMO has sought advice from various consultants and agencies. Table 1 lists these organisations and the input parameters for which they have provided advice.

**Table 1: Consultants and agencies**

| Organisation | Cost estimate(s) provided |
|---|---|
| Sinclair Knight Merz (SKM) | Power station capital cost<br>Margin for indirect costs and contingencies<br>Fixed Fuel Cost<br>O&M costs |
| Landgate | Land cost |
| Western Power | Transmission connection cost |
| Pricewaterhouse Coopers (PwC) | Debt Risk Premium |

As shown in Table 1, SKM has been engaged to determine the Fixed Fuel Cost that was provided by GHD last year. PwC has been appointed to determine the Debt Risk Premium (DRP). The remaining annual WACC parameters have been determined by the IMO for the first time using available market data.

### 1.3 MRCP outcome for the 2013 Reserve Capacity Cycle

The IMO proposes a value of the MRCP of $152,800 per MW per year for the 2013 Reserve Capacity Cycle.

This is a reduction of 6.8% from the 2012 MRCP of $163,900 per MW per year.

However, as explained in Section 1.4 below, the IMO has submitted Procedure Change Proposal PC_2012_08[8] to amend the Market Procedure. If this proposal is accepted, the IMO will determine the MRCP for its Final Report in accordance with the amended Market Procedure.

The IMO has also calculated the MRCP that would result if PC_2012_08 is accepted. This value is $157,500 per MW per year, which would represent a reduction of only 3.9% from the 2014/15 MRCP.

A detailed analysis of the changes since the 2014/15 MRCP is included in Section 4.4 of this report. This analysis is presented for both scenarios described above.

[8] See http://www.imowa.com.au/PC_2012_08

## 1.4 Stakeholder workshop held on 1 November 2012

In submissions on the 2014/15 MRCP, a number of stakeholders suggested that the capital structure assumptions that underpin the WACC calculation may not be appropriate for the current composition of the WEM. In particular, these stakeholders suggested that it was likely that a generator in the WEM would raise debt finance from a bank rather than through the corporate bond market. The IMO committed to review these assumptions in 2012.

The IMO commissioned PricewaterhouseCoopers (PwC) to review recent regulatory practice with regards to the cost of debt. PwC was requested to only consider Australian regulators whose decisions are reviewable by the ACT. The IMO also requested advice with regard to regulatory practice in determining:

- the risk free rate, given that Commonwealth Government bond yields have further declined to historic lows; and
- the value of imputation credits (gamma), given the observed shift in regulatory decisions by the Australian Energy Regulator (AER) and the ERA.

PwC advised that:

- it remains current regulatory practice to determine the risk free rate from a 20-day average of recent observed yields of Commonwealth Government bonds;
- no challenges to this method for determining the risk free rate have been brought to the ACT recently;
- no Australian regulator has applied a cost of debt estimate that is based on the cost of bank debt; and
- there has been a sustained shift in the practice of both the AER and ERA to apply a value of gamma of 0.25.

In addition to the review by PwC, the IMO separately consulted with banks to determine whether banks maintained a robust benchmark or index of the cost of debt that was publicly available. The banks contacted confirmed that the cost of bank debt was determined on a project-by-project basis and that no such benchmark was publicly available.

The IMO confirmed to attendees that it would progress with a Procedure Change Proposal to amend the value of gamma, and would retain the determination of the risk free rate and DRP from observed yields of Commonwealth Government and corporate bonds respectively.

## 1.5 Procedure Change Proposal

The IMO has submitted Procedure Change Proposal PC_2012_08[9] to amend the Market Procedure. This proposal includes two changes that have the potential to impact the calculation of the MRCP:

[9] See http://www.imowa.com.au/PC_2012_08

- The franking credit value, gamma, would be amended from 0.5 to 0.25 to align with recent Australian regulatory practice. Following a decision by the Australian Competition Tribunal in May 2011[10], both the AER and ERA have regularly applied a value of 0.25 in regulatory decisions. This proposed change will have a material impact on the MRCP as noted in Section 1.3 above.
- With the commencement of the Balancing Market in 2012, the power station would be required to comply with the Balancing Facility Requirements. However, the IMO notes that the Balancing Facility Requirements currently consist of communication systems that have a negligible impact on the capital cost for the power station.

If PC_2012_08 is accepted, the IMO will determine the MRCP for its Final Report in accordance with the amended Market Procedure.

This report has been prepared in accordance with the current Market Procedure. However, alternative outcomes using a gamma value of 0.25 are also provided in this report for information.

The IMO is currently seeking submissions regarding PC_2012_08. Submissions close on Monday, 10 December 2012.

The IMO notes that the value of gamma is prescribed in the Market Procedure and can only be amended by a Procedure Change Proposal. As such, submissions related to the proposed change in gamma from 0.5 to 0.25 should be made in response to the Procedure Change Proposal PC_2012_08.

## 1.6 Supporting Documents

The following related documents are available on the IMO website (http://www.imowa.com.au/mrcp):

- MRCP Calculation Spreadsheet, Draft Report versions:
    - Version 1 is prepared in accordance with the current Market Procedure, using a gamma of 0.5;
    - Version 2 is prepared with a gamma of 0.25 as would be adopted if PC_2012_08 is accepted;
- SKM report, dated 30 October 2012, *Review of the Maximum Reserve Capacity Price 2013* (Draft Report version);
- PwC letter, dated 11 October 2012, *Debt risk premium using the ERA's debt yield methodology*;
- WACC parameter calculation spreadsheet (risk free rate and inflation);
- Letter from Landgate, dated 11 September 2012, *Land Values for Reserve Capacity*

[10] Application by Energex Limited (Gamma) (No 5) [2011] A CompT 9 (12 May 2011)

*Price*;

- Western Power report, dated 8 October 2012, *Total Transmission Cost Estimate for the Maximum Reserve Capacity Price for 2015/16*;
- PwC letter, dated 15 October 2012, *Review of debt and equity related issues within the WACC used in the Maximum Reserve Capacity price*; and
- Minutes of the WACC Workshop held 1 November 2012.

# 2. ESCALATION OF COSTS

The Market Procedure describes a number of escalation factors that are applied to various costs within the MRCP. These escalation factors are used to estimate the changes in costs from the time at which price estimates are derived to the time at which, for the purpose of the MRCP, the capital is assumed to be outlaid.

The calculation for the 2013 MRCP is based on a theoretical power station that would commence operation on 1 October 2015. In line with the Market Procedure, capital costs are escalated to 1 April 2015 and O&M costs have been escalated to 1 October 2015. The various input costs have been provided to the IMO at different dates, which are provided in Chapter 3 of this report.

The IMO proposes to use the escalation factors summarised in Table 2.

**Table 2: Escalation Factors**

| Escalation Factor | Financial Year | | | | |
|---|---|---|---|---|---|
| | 2012/13 | 2013/14 | 2014/15 | 2015/16 | 2016/17 |
| CPI | 3.25% | 2.50% | 2.50% | 2.50% | |
| Power Station Capital Cost | 1.62% | 4.39% | 3.33% | 2.85% | 2.85% |
| Connection Asset O&M Cost | 4.32% | | | | |
| Power Station O&M Cost | 3.79% | 3.60% | 3.61% | 3.62% | |
| Transmission Connection Cost | -2.91% | | | | |

Where possible cost escalation factors are based on forecast price movements. Labour costs are projected based on long-run historical cost escalation, observed in labour price indices published by the Australian Bureau of Statistics.

The following escalation factors have been determined for use in the MRCP:

- The CPI (Consumer Price Index) escalation rates are determined from the forecasts of the Reserve Bank of Australia (RBA)[11] as described in the Market Procedure. The mid-point of the RBA's target range of inflation is used beyond the period of the forecasts, resulting in a constant escalation rate from the 2015/16 financial year onwards.
- The power station capital cost escalation factors have been determined by SKM and are published in its report. SKM has calculated these escalation factors by weighting historical and forecast movements of specific input cost drivers such as steel, copper and labour costs. The weighting of each input cost driver relates to its contribution to the total capital cost of the power station.
- Escalation factors for connection asset O&M costs have also been calculated by SKM. SKM has noted in previous years that fixed O&M costs for these assets are dominated

[11] Published in the Statement on Monetary Policy , November 2012.

by labour costs, so the labour cost escalation rates are used to escalate these O&M costs. The labour cost escalation factors are determined from the 10-year average movement in Labour Price Indices, so a single escalation rate has been applied in the MRCP calculation.

- Escalation factors for power station O&M costs have also been determined by SKM. These escalation factors are derived by weighting labour escalation rates and CPI.
- The transmission connection cost escalation factor is determined from the average annual change in Western Power cost estimates for a fixed transmission connection scope, as described in Section 2.4 of the Market Procedure. This has been provided in Western Power's report.

Further detail on the development of these escalation factors can be found in the applicable supporting documents on the IMO website at http://www.imowa.com.au/mrcp.

# 3. INPUT PARAMETERS TO THE MAXIMUM RESERVE CAPACITY PRICE CALCULATION

## 3.1 Power Station Capital Costs (PC)

As with the 2012 MRCP determination, the IMO commissioned SKM to provide generation plant capital costs for a 160 MW OCGT power station located within the SWIS. This is the sixth year in which SKM has provided this estimate to the IMO. The scope provided to SKM was identical to last year in all respects, except that the facility now needs to meet the Balancing Facility Requirements as implemented from 1 July 2012.

SKM developed the capital cost estimate for a generic 160 MW OCGT power station (including procurement, installation and commissioning) using Thermoflow GT Pro®/PEACE® and benchmarked the costs of equipment and labour against actual projects.

For the purposes of the 2013 MRCP:

**PC = A$829,446.75 per MW**

This price represents a decrease of 3.4% from the corresponding value for the 2012 MRCP. The key drivers of this change have been weakening steel and copper prices as well as a strengthening of the Australian dollar versus the Euro. SKM notes in its report that the *"weakening Euro or conversely the relative strength of the Australian dollar results in a reference price decrease of approximately 10% for the SGT5-200E gas turbine plant".*

## 3.2 Legal, financing, insurance, approvals, other costs and contingencies (M)

The parameter M is defined as a margin to cover legal, financing, insurance, approvals, other costs and contingencies. SKM was commissioned to provide an estimate of these costs for 2013. This is the fifth year in which SKM has provided this parameter for the IMO.

The margin M is estimated from the costs associated with recent comparable developments, excluding any abnormal costs that may be particular to individual projects. Costs are scaled for a 160 MW power station where relevant. M is added as a fixed percentage of the capital cost of developing the power station.

For the purposes of the 2013 MRCP:

**M = 18.77%**

This value has risen from the corresponding value of 18.2% for the 2012 MRCP.

The margin M is added as a fixed percentage of the capital cost of developing the power station. However, SKM has advised that many costs included under M, such as engineering design, project management and legal costs are fixed in nature. As the Power Station Capital Costs (PC) have reduced, these fixed costs represent a higher percentage of PC.

### 3.3 Transmission Connection Costs (TC)

For the 2013 MRCP, Western Power has calculated the transmission connection cost estimate as part of its obligations under the Market Procedure.

The Transmission Connection Cost estimate provided for this MRCP determination is based on actual connection costs and Access Offers that have been determined by Western Power. As the connection costs for individual projects are confidential to Western Power and the project developer, Western Power has provided an audit report verifying the connection cost data used in the calculation.

The Transmission Connection Cost is calculated using actual connection costs for projects within a 5-year window, and weights each connection cost according to the year that the facility commenced, or is expected to commence, operation.

This methodology for estimating the Transmission Connection Cost was implemented following the five-yearly review of the MRCP, assisted by the Maximum Reserve Capacity Price Working Group (MRCPWG), and was applied by Western Power for the first time for the 2014/15 MRCP. In analysis for the MRCPWG, SKM highlighted that the method employed by Western Power for the 2012/13 and 2013/14 MRCPs required a broad range of assumptions that can lead to significant inaccuracies and year-to-year volatility.

The outcomes of this methodology are significantly lower than the estimates provided by Western Power for 2012/13 and 2013/14, suggesting that the higher cost estimates for those years were not reflective of the capital contributions actually being charged to project developers that have either secured connection or been provided with an Access Offer.

For the purposes of the 2013 MRCP:

**TC = A$115,124 per MW**

This value is approximately 4.8% higher than the corresponding value in 2012. The IMO notes that, outside of the 2012/13 and 2013/14 MRCPs, the Transmission Connection Cost component of the MRCP has been relatively stable with estimates falling within 20% of the mean for the remaining years[12].

For further information regarding the costing provided by Western Power, please refer to the Western Power report[13] published on the IMO website (http://www.imowa.com.au/mrcp).

#### 3.3.1 Easement Costs

To assist Western Power in its determination of the transmission connection cost estimate, the IMO provides an estimate of easement costs for the direct connection scope described in step

[12] This analysis excludes the effect of the WACC.
[13] See Western Power report *Total Transmission Cost Estimate for the Maximum Reserve Capacity Price for 2015/16*.

2.4.2 of the Market Procedure.

The IMO has estimated the easement cost on the same basis as last year.

- The easement is assumed to be 2km long and 60m wide (an area of 12 hectares).
- The IMO has assumed that a project developer may not be required to purchase the full portion of land and could instead secure easement rights for some or all of the easement. As such, the IMO has estimated the easement costs to be 50% of the purchase value of the land, consistent with the 2012 MRCP.
- The purchase price per hectare has been estimated by dividing the average cost of the land parcels (as valued by Landgate) by three hectares. Note that this cost estimate is as at 30 June 2012.

To meet the requirements for the transmission connection cost estimate (Section 2.4 of the Market Procedure), the IMO has escalated the resulting value forward to 30 June 2013 using the CPI escalation factor for the 2012/13 financial year of 3.0%. Further escalation of this cost to 1 April 2015 occurs within the transmission connection cost estimate methodology where required.

The IMO has estimated that the easement cost as at 30 June 2013 is A$5.147M, down 3.6% from the 2012 value of A$5.339, predominantly due to a small reduction in the cost of land at Pinjar and Kwinana.

## 3.4 Fixed Fuel Costs (FFC)

Fixed Fuel Costs for the determination of the 2013 MRCP have been estimated by SKM. The Fixed Fuel Costs were previously calculated by GHD, which provided these estimates for the last five years.

SKM has provided its cost estimate as at 30 June 2012, which has been escalated to 1 April 2015, using the CPI escalation rates from Table 1.

For the purposes of the 2013 MRCP:

**FFC = A$7.069 M**

This price represents an increase of 122% from the corresponding value for the 2012 MRCP.

SKM has estimated the Fixed Fuel Costs based on the same scope as the previous estimates provided by GHD. SKM has developed its estimate with the benefit of recent project experience in Western Australia.

## 3.5 Land Costs (LC)

The IMO commissioned Landgate to update the land cost estimates to be used in the MRCP determination. This is the fifth year in which Landgate has provided these estimates to the IMO.

These estimated land valuations are based on guidelines outlined in the Market Procedure.

Valuations were conducted for seven locations in regions where development of a power station within the SWIS would be reasonably likely. The regions included were:

- Collie Region;
- Kemerton Industrial Park Region;
- Pinjar Region;
- Kwinana Region;
- North Country Region (both Geraldton and Eneabba); and
- Kalgoorlie Region.

Land sizes and costs were determined in accordance with the Market Procedure. Three hectare sites were used for all locations except Kemerton, for which the smallest available lot is five hectares. This approach is identical to that used in the 2012 MRCP.

Landgate has provided its estimate of the cost of each land parcel as at 30 June 2012, excluding stamp duty. The IMO has added the applicable stamp duty to each land parcel cost, determined by the online calculator provided by the Office of State Revenue[14]. In accordance with the Market Procedure, the IMO has calculated the mean of the seven valuations. This average land cost has been escalated to 1 April 2015, using the CPI escalation rates from Table 1.

For the purposes of the 2013 MRCP:

**LC = A$2.694 M**

This price represents a decline of 3.9% from the corresponding value for the 2012 Maximum Reserve Capacity Price. This reduction in a relatively small component of the MRCP is predominantly due to a reduction in the estimated land costs at Pinjar and Kwinana. The estimated cost per hectare at all other locations has remained unchanged.

## 3.6 Weighted Average Cost of Capital (WACC)

For the 2013 MRCP determination the IMO commissioned PwC to calculate the DRP and has calculated the remaining WACC components itself from publicly available information.

The calculations of the risk free rate and inflation are provided in a spreadsheet that is published on the IMO website at http://www.imowa.com.au/mrcp. The corporate tax rate is determined to be 30%, consistent with last year.

The WACC is determined according to the Capital Asset Pricing Model (CAPM), with bond yields considered in both the costs of equity and debt. The nominal risk free rate is determined from observed yields of Commonwealth Government bonds, while the DRP is derived from

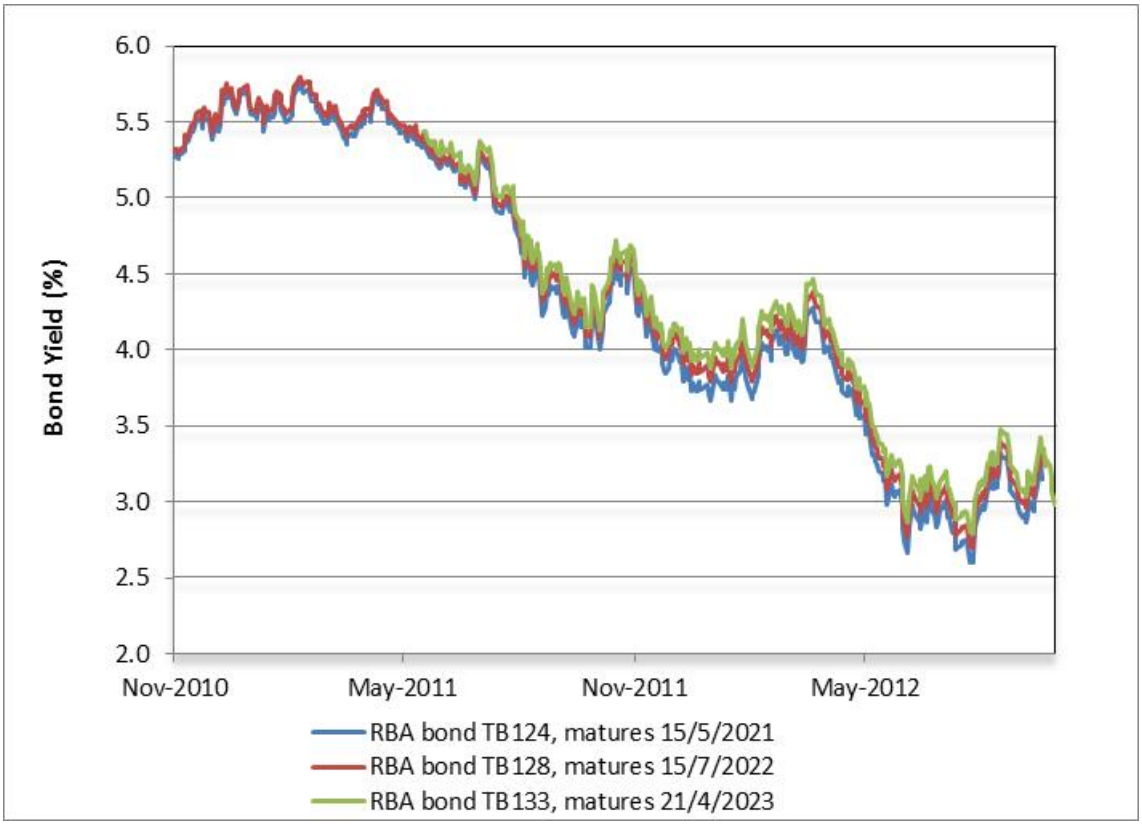
[14] http://rol.osr.wa.gov.au/taxcal/

observed yields of corporate bonds.

The IMO notes that the WACC used for the determination of the 2013 MRCP reflects continuing turbulence in global financial markets, largely as a result of continuing concerns over sovereign debt levels in Europe and the slow rate of economic recovery in the US.

As market volatility has remained, investors continue to prefer lower risk investments such as government and high quality corporate bonds. Yields on RBA bonds have continued to decline since the determination of the 2012 MRCP. This is illustrated in Figure 1, which shows indicative daily yields of Commonwealth Government securities with maturity dates approximately ten years from now.

**Figure 1: Stock market results and bond yields, Nov 2010 to Sep 2012[15]**




A detailed calculation of the WACC is provided in Appendix A.

For the purposes of the 2013 MRCP:

- **WACC = 5.49%** under the current Market Procedure (with a value of gamma of 0.5); and
- **WACC = 6.03%** if Procedure Change Proposal PC_2012_08 is approved (amended value of gamma of 0.25).

These WACC values are significantly lower than the WACC of 6.83% determined for the 2012

[15] Bond yield data sourced from RBA Statistical Table F16, available from http://www.rba.gov.au/statistics/tables/

MRCP. This reduction is driven by lower values for two input parameters.

- The nominal risk free rate has reduced from 3.92% to 3.13%. This parameter has been calculated from Commonwealth Government security yields using the same method as last year.
- The DRP has reduced from 4.13% to 2.94%. For 2013 the DRP has been calculated using the ERA's "Bond-Yield Approach". For the 2012 MRCP this parameter was calculated from Bloomberg fair value data. This methodology change is explained in Section 3.6.1.

If Procedure Change Proposal PC_2012_08 is approved, the Gamma used in the determination of the WACC will reduce from 0.5 to 0.25, resulting in an increase in the WACC to 6.03%.

The IMO notes that the risk free rate and the DRP for this Draft Report were calculated from market observations in September 2012. These parameters will be recalculated for the Final Report from market observations in November 2012.

### 3.6.1 Debt Risk Premium

The Market Procedure requires that "*The IMO must determine the methodology to estimate the DRP, which in the opinion of the IMO is consistent with current Australian accepted regulatory practice.*"

For the 2014/15 MRCP the DRP was determined from the 7-year Bloomberg BBB fair value curve, extrapolated to 10 years using the difference between the AAA 7-year and 10-year fair value curves.

At that time, the IMO noted that the ERA had developed the "Bond-Yield Approach" for determination of the DRP, and had applied this in its *Final decision on WA Gas Networks Pty Ltd proposed revised access arrangement for the Mid-West and South-West Gas Distribution System*. However, the IMO also noted that this methodology had been appealed to the Australian Competition Tribunal (ACT) and that it could not be considered "*accepted regulatory practice*" until such time as it was upheld by the ACT.

In June 2012 the ACT broadly upheld the "Bond-Yield Approach" methodology. Consequently, the IMO considers that the ERA's 'Bond-Yield Approach' now represents current accepted regulatory practice in Australia.

Further, the AER recently noted in its *Final Decision, Roma to Brisbane Pipeline 2012-13 to 2016-17* that it considered that the Bloomberg methodology overstated the cost of debt, that the "Bond-Yield Approach" had been upheld, and that it would be initiating its own review of methodologies for determining the DRP.

The IMO notes that PwC has provided three distinct estimates in its note to the IMO based on different subsets of bonds. The IMO has applied the value that represents a strict application of the ERA's approach in the WA Gas Networks final revised decision, utilising bonds with credit ratings of BBB and BBB+, with a term to maturity of at least two years.

## 3.7 Capital Costs (CAPCOST)

The term CAPCOST refers to the total capital cost expressed in millions of Australian Dollars for the 160 MW OCGT power station. This is calculated by using the following formula:

$$CAPCOST = ((PC \times (1+M) + TC) \times CC + FFC + LC) \times (1+WACC)^{1/2}$$

For the purposes of the 2013 MRCP:

**CAPCOST = A$190.386 M**

The alternative CAPCOST under a Gamma of 0.25 would be A$190.873 M.

## 3.8 Fixed Operation & Maintenance Costs (ANNUALISED_FIXED_O&M)

### 3.8.1 Generation

For the 2013 determination, SKM has determined the fixed O&M costs for the generator assets using the same methodology as last year. This is the seventh MRCP for which SKM has provided the estimate of these costs.

An annuity is calculated taking the first 15 years of O&M costs provided by SKM. The SKM report[16] details the total fixed O&M costs of the OCGT to year 15 as A$31.390 M in June 2012 terms. This cost is annualised and then escalated forward by 3-1/4 years, to 1 October 2015 (the point at which these costs are assumed to commence), using the power station O&M escalation factors.

For the purposes of the 2013 MRCP:

**Generation Fixed O&M Costs = A$14,750.56 per MW per year**

This cost represents an increase of 3.4% from the corresponding value for the 2012 MRCP.

### 3.8.2 Transmission

For the 2013 determination, SKM provided the fixed O&M costs of the switchyard and transmission line assets using the same methodology as last year. This is the seventh MRCP for which SKM has provided the estimate of these costs.

An annuity is calculated taking the first 15 years of O&M costs provided by SKM. The SKM report[17] details the total fixed O&M costs for the switchyard and transmission line assets. This cost is annualised and then escalated forward by 3-1/4 years, to 1 October 2015 (the point at which these costs are assumed to commence), using the connection asset O&M escalation factor.

For the purposes of the 2013 MRCP:

[16] See Table 3-2 of the SKM report *Review of the Maximum Reserve Capacity Price 2013*.
[17] See Tables 4-1 and 4-2 of the SKM report *Review of the Maximum Reserve Capacity Price 2013*.

**Transmission Fixed O&M Costs = A$425.15 per MW per year**

This cost represents an increase of 1.6% from the corresponding value for the 2012 MRCP.

### 3.8.3 Network access charges

Western Power's Price List provides the various charges for network access and related services that apply for generation facilities. It is assumed that the power station is connected to the transmission system, so reference Tariff TRT2 is used for the purpose of the MRCP.

The IMO notes that no 2012/13 Price List has yet been approved for Western Power's network access charges. However, Western Power submitted its *Amended proposed revisions to the Access Arrangement for the Western Power* Network to the ERA on 31 October 2012[18].

The network access charges calculated for this Draft Report are taken from this proposed price list. The IMO notes that a Price List is likely to be approved by the ERA prior to the development of the Final Report for the 2015/16 MRCP. If this occurs, the IMO proposes to determine the network access charges for the Final Report based on the approved Price List.

As the use of system charge varies by location, the IMO has considered the list of locations nominated in step 2.7.1 of the Market Procedure, and has used the unit price for the most expensive of these locations. In the proposed 2012/13 Price List, Bluewaters has the highest price among power stations located in the regions listed in the Market Procedure.

For the purpose of the MRCP, the costs are assumed as at 1 July 2012 and have been escalated forward to 1 October 2015. The CPI escalation factor has been used as required by step 2.5.6(c) of the Market Procedure.

For the purposes of the 2013 MRCP:

**Fixed Network Access Costs = A$13,687.07 per MW per year**

This cost represents a decrease of 4.6% from the corresponding value for the 2012 MRCP due to the proposed reductions in the Western Power tariffs in the proposed 2012/13 Price List.

### 3.8.4 Insurance costs

The Market Procedure requires that the Fixed O&M component of the MRCP include annual insurance costs in respect of power station asset replacement, business interruption and public and products liability insurance as required under network access arrangements with Western Power. This is the second year that these costs have been included in the MRCP.

[18] Available at http://www.erawa.com.au/cproot/10933/2/20121031%20-%20D98163%20-%20Softcopy%20-%20Amended%20Proposed%20Revisions%20to%20the%20Access%20Arrangement%20-%2029%20October%202012%20-%20Western%20Power.pdf

For the 2012 MRCP, the IMO estimated the relevant insurance premiums through consultation with two well-known insurance brokers and consideration of insurance renewal documentation provided by two Market Participants. The insurance brokers requested that they not be named. For the 2013 MRCP the IMO sought updated advice from three insurance brokers, including the same brokers that had previously provided quotations.

At the time of preparing this report advice has been received from one broker that premiums in respect of asset replacement and business interruption insurance had increased by a median of approximately 22.5%, driven by recent adverse domestic claims experience in the area of electricity generation and an increase in re-insurance costs worldwide. Given that the IMO had calculated the premium in 2011 as 0.23% of the limit of liability, this would increase the premium to 0.28%. This broker also suggested that public and products liability insurance premiums were at similar levels to last year.

Another broker contacted by the IMO has suggested a premium for asset replacement and business interruption insurance of 0.30% of the limit of liability.

Based on previous and updated advice, the insurance premiums have been estimated as follows:

- Asset replacement and business interruption insurance is estimated as A$690,679 per year as at 1 April 2015, calculated as 0.29% of the limit of liability at that date. The limit of liability has been determined as the sum of the capital construction cost and the potential refund liability during the period of re-construction.

  For the purpose of asset replacement insurance, the capital construction cost has been calculated as

  $$PC \times (1 + M) \times CAP + FFC_{non-fuel}$$

  where

  PC is the Power Station Capital Cost (see Section 3.1 of this report);

  M is margin M (see Section 3.2 of this report);

  CAP is the expected Capacity Credit allocation (see Section 4.3 of this report); and

  $FFC_{non\text{-}fuel}$ is the non-fuel component of the Fixed Fuel Cost (see Section 3.4 of this report).

  For business interruption insurance, the IMO has included the potential refund liability for the facility for two years. While a construction period of one year is assumed in the application of the WACC in the MRCP calculation, a period of time would be required prior to the commencement of any reconstruction works following a loss event (for example, for procurement of services, building approvals and any demolition or clearing works). The weighting of capacity refunds to peak demand periods means that a Market Participant may be required to refund two years worth of capacity payments in a period of less than 15 months.

- Public and products liability insurance is estimated as A$120,000 per year as at 30 June 2012, based on a limit of $50M for any one occurrence.

Based on the information considered by the IMO, the premium rates are consistent with the following assumptions:

- A newly constructed generation facility with on-site diesel storage;
- Location in a rural region of the SWIS, outside of any cyclone risk;
- Inclusion of coverage for machinery breakdown; and
- Deductibles of $500,000 for property damage, $100,000 for liability and 60 days for business interruption insurance.

The premiums above have been estimated to include the 2% terrorism levy and 10% stamp duty.

The insurance costs have been escalated forward to 1 October 2015 (the point at which these costs are assumed to commence), using the CPI escalation factor.

For the purposes of the 2013 MRCP:

**Insurance Costs = A$5,202.15 per MW per year**

This value is 19.1% higher than the corresponding value in 2012. It should be highlighted that insurance costs related to the development phase of the power station are included within margin M.

### 3.8.5 Total Fixed Operation & Maintenance Costs

For the purposes of the 2013 MRCP:

**ANNUALISED_FIXED_O&M = A$34,055 per MW per year**

Total fixed operation and maintenance costs have increased by 2.0% compared to last year.

# 4. MAXIMUM RESERVE CAPACITY PRICE CALCULATION

## 4.1 Annualised Capital Costs (ANNUALISED_CAPCOST)

The annualised capital cost is determined using:

- the capital cost of A$190.386 M, as determined in Section 3.7;
- the WACC of 5.49%, as determined in Section 3.6; and
- a term of 15 years, as required by the Market Procedure.

For the purposes of the 2013 MRCP:

**ANNUALISED_CAPCOST = A$18.957 M per year**

The value of the ANNUALISED_CAPCOST under a Gamma of 0.25 will be A$19.694 M per year.

## 4.2 Annualised Fixed Operation & Maintenance Costs (ANNUALISED_FIXED_O&M)

The total annualised fixed O&M costs are outlined in Section 3.8.5. For the purposes of the 2013 MRCP:

**ANNUALISED_FIXED_O&M = A$34,055 per MW per year**

## 4.3 Expected Capacity Credit Allocation (CC)

SKM has provided its estimate of the output of the reference facility at 41°C, which represents the expected Capacity Credit allocation for the facility. For the purposes of the 2013 MRCP:

**CAP = 159.6 MW**

## 4.4 Calculation

The Maximum Reserve Capacity Price is calculated using the following equation as required by the Market Procedure:

MRCP = (ANNUALISED_FIXED_O&M + ANNUALISED_CAP_COST / CC)

Using the values determined by the IMO and presented in previous sections, the MRCP for the 2013 Reserve Capacity Cycle is determined to be A$152,831.19 which is rounded to:

**MRCP = A$152,800 per MW per year**

A MRCP of A$152,800 per MW per year is proposed by the IMO. This represents a 6.8% decrease from the 2012 MRCP of $163,900.

The impact of changes in the input parameters since the 2014/15 MRCP is shown in Table 3 below, where the value of gamma remains unchanged at 0.5.

**Table 3: Impact of year-on-year changes in input parameters (Gamma = 0.5)**

| | Impact ($) | Impact (%) | MRCP ($) |
|---|---|---|---|
| **2014/15 MRCP** | | | **163,900** |
| Escalation factors | + 400 | + 0.2% | 164,300 |
| Power Station costs | - 4,200 | - 2.6% | 160,100 |
| Margin M | + 500 | + 0.3% | 160,600 |
| Fixed Fuel Cost | + 2,800 | + 1.7% | 163,400 |
| Land Cost | - 100 | - 0.1% | 163,300 |
| Transmission Cost | + 600 | + 0.4% | 163,900 |
| WACC | - 11,600 | - 7.1% | 152,300 |
| Fixed O&M | + 500 | + 0.3% | 152,800 |
| **Combined impact** | **- 11,100** | **- 6.8%** | **152,800** |

Similarly, Table 4 shows the impact of changes in the input parameters if the value of gamma is amended to 0.25 as a result of Procedure Change Proposal PC_2012_08.

**Table 4: Impact of year-on-year changes in input parameters (Gamma = 0.25)**

| | Impact ($) | Impact (%) | MRCP ($) |
|---|---|---|---|
| **2014/15 MRCP** | | | **163,900** |
| Escalation factors | + 400 | + 0.2% | 164,300 |
| Power Station costs | - 4,200 | - 2.6% | 160,100 |
| Margin M | + 500 | + 0.3% | 160,600 |
| Fixed Fuel Cost | + 2,800 | + 1.7% | 163,400 |
| Land Cost | - 100 | - 0.1% | 163,300 |
| Transmission Cost | + 600 | + 0.4% | 163,900 |
| WACC/Gamma | - 7,000 | - 4.3% | 156,900 |
| Fixed O&M | + 600 | + 0.4% | 157,500 |
| **Combined impact** | **- 6,400** | **- 3.9%** | **157,500** |

# 5. STAKEHOLDER INPUT

The IMO invites submissions from all sectors of the Western Australian energy industry, including end users, on the proposed new MRCP to apply for the 2015/16 Capacity Year. Following receipt of public submissions, the IMO will propose a final revised value of the Maximum Reserve Capacity Price to the ERA for approval.

## 5.1 Submission Guidelines

Submissions must be made in writing and be no longer than five pages in length (12 point font). Claims regarding the appropriateness of the values used by the IMO to determine the MRCP for the 2013 Reserve Capacity Cycle must be accompanied by supporting evidence.

In keeping with the principle of open and transparent processes, all submissions will be published on the IMO website.

## 5.2 Maximum Reserve Capacity Price Consultation Workshop

Following the close of submissions, the IMO may hold a workshop on the proposed new MRCP to apply for the 2015/16 Capacity Year. Attendance at the workshop may be offered to those who have made a submission. The IMO would then discuss any issues that have arisen and will take into consideration the submissions and the outcome of the workshop when producing the Final Report to be submitted to the ERA.

## 5.3 Details for Making a Submission

Submissions should be addressed to:

Greg Ruthven
Manager, System Capacity
Independent Market Operator

By post:
PO Box 7096, Cloisters Square
Perth, WA, 6850

By email:
imo@imowa.com.au

By facsimile:
+61 8 9254 4399

The deadline for submissions is:

**4.00PM Western Standard Time on Wednesday, 19 December 2012**.

The IMO notes that the value of gamma is prescribed in the Market Procedure and can only be

amended by a Procedure Change Proposal. As such, submissions related to the proposed change in gamma from 0.5 to 0.25 should be made in response to the Procedure Change Proposal PC_2012_08.

General enquiries may be directed to Johan Van Niekerk or Greg Ruthven on (08) 9254 4300.

# 6. CONCLUSION

The IMO has conducted a review of the main factors used to determine the MRCP, in accordance with the Market Procedure.

For the 2013 Reserve Capacity Cycle, the IMO proposes that the MRCP be set at $152,800 per MW per year.

The MRCP of $152,800 per MW per year represents a decrease of 6.8% from the 2012 price. The main drivers of the lower MRCP have been the reduction in WACC as well as a net decrease in capital costs related to the Power Station and Fixed Fuel Costs.

If the value of gamma is amended to 0.25 by Procedure Change Proposal PC_2012_08, this will be applied in the Final Report for the 2015/16 MRCP. The MRCP that would result from this lower value of gamma is $157,500 per MW per year.

The 2013 MRCP computation has been included in Appendix B and a comparison between the 2012 and 2013 MRCPs can be found in Appendix C.

# APPENDIX A: WEIGHTED AVERAGE COST OF CAPITAL (WACC)

The pre-tax real Officer WACC is used for the determination of the Maximum Reserve Capacity Price. The formulae are shown below:

$$WACC_{real} = \left( \frac{\left(1 + WACC_{nominal}\right)}{\left(1 + i\right)} \right) - 1$$

and

$$WACC_{nominal} = \frac{1}{\left(1 - t\left(1 - \gamma\right)\right)} R_e \frac{E}{V} + R_d \frac{D}{V}$$

where the nominal Return on Equity is calculated as:

$$R_e = R_f + \beta_e \times MRP$$

and the nominal Return on Debt is calculated as:

$$R_d = R_f + \left(DRP + d\right)$$

Pricewaterhouse Coopers (PwC) calculated the debt risk premium and the IMO reviewed the remaining Annual parameters. A table of the parameters and values are shown in Table A1 below. The volatile Minor parameters, highlighted in yellow, have been recalculated since the publication of the draft report so that the most recent numbers are used.

**Table A1: WACC parameters for 2012 and 2013**

| Parameter | Notation | 2013 Value | 2012 Value |
|---|---|---|---|
| | | | |
| Nominal Risk Free Rate of Return (%) | $R_f$ | 3.13 | 3.92 |
| Expected Inflation (%) | $i$ | 2.57 | 2.55 |
| Real risk free rate of return (%) | $R_{fr}$ | 0.55 | 1.34 |
| Market Risk Premium (%) | *MRP* | 6 | 6 |
| Asset beta | $\beta_a$ | 0.5 | 0.5 |
| Equity beta | $\beta_e$ | 0.83 | 0.83 |
| Debt Margin / Debt Risk Premium (%) | *DRP* | 2.94 | 4.13 |
| Debt issuance costs (%) | *d* | 0.125 | 0.125 |
| Corporate tax rate (%) | *t* | 30 | 30 |
| Franking credit value | $\gamma$ | 0.5 | 0.5 |
| Debt to total assets ratio (%) | *D/V* | 40 | 40 |
| Equity to total assets ratio (%) | *E/V* | 60 | 60 |

For the purposes of the 2013 MRCP:

**WACC = 5.49%**

However, if PC_2012_08 is approved, gamma will be amended to 0.25 and the WACC would be 6.03%.

# APPENDIX B: CALCULATION OF THE MAXIMUM RESERVE CAPACITY PRICE

The Maximum Reserve Capacity Price is calculated as described by the *Market Procedure: Maximum Reserve Capacity Price*. This is shown below:

**MRCP = ANNUALISED_FIXED_O&M + (ANNUALISED_CAP_COST / CC)**

where:

MRCP is the Maximum Reserve Capacity Price to apply in a Reserve Capacity Auction.

ANNUALISED_FIXED_O&M is the annualised fixed operating and maintenance costs for the power station and any associated electricity transmission facilities, expressed in Australian dollars, per MW per year.

ANNUALISED_CAP_COST is the CAPCOST, expressed in Australian dollars, annualised over a 15 year period using the Weighted Average Cost of Capital (WACC).

CC is the expected Capacity Credit allocation determined in conjunction with the power station capital cost, expressed in MW.

**Table B1: 2013 MRCP and associated parameters**

| Parameter | Value | Unit |
|---|---|---|
| | | |
| **2012 MRCP** | **$152,800.00** | **A$/MW/Year** |
| Where | | |
| ANNUALISED_FIXED_O&M | $34,054.92 | A$/MW/Year |
| ANNUALISED_CAPCOST | $18,956,692.61 | A$/Year |
| CC | 159.6 | MW |

**Table B2: 2013 MRCP and associated parameters (Gamma = 0.25)**

| Parameter | Value | Unit |
|---|---|---|
| | | |
| **2012 MRCP** | **$157,500.00** | **A$/MW/Year** |
| Where | | |
| ANNUALISED_FIXED_O&M | $34,085.89 | A$/MW/Year |
| ANNUALISED_CAPCOST | $19,693,502.99 | A$/Year |
| CC | 159.6 | MW |

**Table B3: ANNUALISED_CAPCOST and associated parameters**

| Parameter | Value | Unit |
|---|---|---|
| | | |
| **CAPCOST** | **$190,385,950.86** | **A$** |
| Where | | |
| PC | $829,446.75 | A$/MW |
| M | 18.77% | % |
| TC | $115,124.00 | A$ |
| CC | 159.6 | MW |
| FFC | $7,069,232.08 | A$ |
| LC | $2,693,872.28 | A$ |
| WACC | 5.49% | % |
| **Annualisation** | | |
| | | |
| **ANNUALISED_CAPCOST** | **$18,956,692.61** | **A$/Year** |
| Where | | |
| CAPCOST | $190,385,950.86 | A$ |
| WACC | 5.49% | % |
| Term of Finance (Years) | 15 | Years |

**Table B4: ANNUALISED_CAPCOST and associated parameters (Gamma = 0.25)**

| Parameter | Value | Unit |
|---|---|---|
| | | |
| **CAPCOST** | **$190,872,721.84** | **A$** |
| Where | | |
| PC | $829,446.75 | A$/MW |
| M | 18.77% | % |
| TC | $115,124.00 | A$ |
| CC | 159.6 | MW |
| FFC | $7,069,232.08 | A$ |
| LC | $2,693,872.28 | A$ |
| WACC | 6.03% | % |
| **Annualisation** | | |
| | | |
| **ANNUALISED_CAPCOST** | **$19,693,502.99** | **A$/Year** |
| Where | | |
| CAPCOST | $190,872,721.84 | A$ |
| WACC | 6.03% | % |
| Term of Finance (Years) | 15 | Years |

# APPENDIX C: COMPARISON BETWEEN THE 2012 AND 2013 MAXIMUM RESERVE CAPACITY PRICES

**Table C1: Comparison between 2012 and 2013 MRCPs**

| Parameter | Reserve Capacity Year 2013 | 2012 | Units |
|---|---|---|---|
| PC | $829,446.75 | $858,987.37 | A$/MW |
| M | 18.77% | 18.2% | % |
| TC | $115,124.00 | $109,821.00 | A$/MW |
| FFC | $7,069,232.08 | $3,183,074.82 | A$ |
| LC | $2,693,872.28 | $2,804,181.83 | A$ |
| CAPCOST | $190,385,950.86 | $191,790,889.30 | A$ |
| Term of Finance | 15 | 15 | Years |
| WACC | 5.49% | 6.83% | % |
| **ANNUALISED_CAPCOST** | **$18,956,692.61** | **$20,829,728.91** | **A$/Year** |
| CC | 159.6 | 159.6 | MW |
| ANNUALISED_CAPCOST | $18,956,692.61 | $20,829,728.91 | A$/Year |
| ANNUALISED_FIXED_O&M | $34,054.92 | $33,391.76 | A$/MW/Year |
| **MRCP** | **$152,800.00** | **$163,900.00** | **A$/MW/Year** |

**Table C2: Comparison between 2012 and 2013 MRCPs (Gamma = 0.25)**

| Parameter | Reserve Capacity Year 2013 | 2012 | Units |
|---|---|---|---|
| PC | $829,446.75 | $858,987.37 | A$/MW |
| M | 18.77% | 18.2% | % |
| TC | $115,124.00 | $109,821.00 | A$/MW |
| FFC | $7,069,232.08 | $3,183,074.82 | A$ |
| LC | $2,693,872.28 | $2,804,181.83 | A$ |
| CAPCOST | $190,872,721.84 | $191,790,889.30 | A$ |
| Term of Finance | 15 | 15 | Years |
| WACC | 6.03% | 6.83% | % |
| **ANNUALISED_CAPCOST** | **$18,956,692.61** | **$20,829,728.91** | **A$/Year** |
| CC | 159.6 | 159.6 | MW |
| ANNUALISED_CAPCOST | $18,956,692.61 | $20,829,728.91 | A$/Year |
| ANNUALISED_FIXED_O&M | $34,085.89 | $33,391.76 | A$/MW/Year |
| **MRCP** | **$157,500.00** | **$163,900.00** | **A$/MW/Year** |

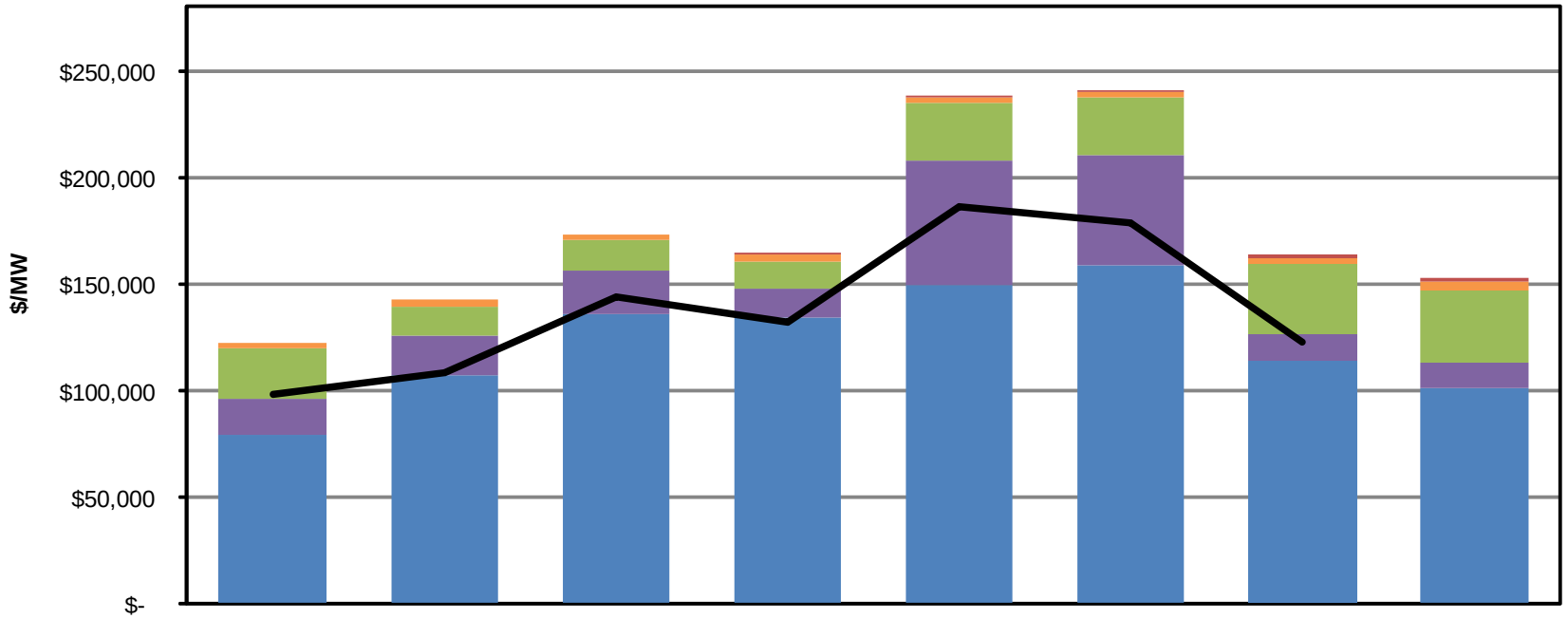
**Table C3: Impact of year-on-year changes in input parameters**

| | Impact ($) | Impact (%) | MRCP ($) |
|---|---|---|---|
| **2014/15 MRCP** | | | **163,900** |
| Escalation factors | + 400 | + 0.2% | 164,300 |
| Power Station costs | - 4,200 | - 2.6% | 160,100 |
| Margin M | + 500 | + 0.3% | 160,600 |
| Fixed Fuel Cost | + 2,800 | + 1.7% | 163,400 |
| Land Cost | - 100 | - 0.1% | 163,300 |
| Transmission Cost | + 600 | + 0.4% | 163,900 |
| WACC | - 11,600 | - 7.1% | 152,300 |
| Fixed O&M | + 500 | + 0.3% | 152,800 |
| **Combined impact** | **- 11,100** | **- 6.8%** | **152,800** |

**Table C4: Impact of year-on-year changes in input parameters (Gamma = 0.25)**

| | Impact ($) | Impact (%) | MRCP ($) |
|---|---|---|---|
| **2014/15 MRCP** | | | **163,900** |
| Escalation factors | + 400 | + 0.2% | 164,300 |
| Power Station costs | - 4,200 | - 2.6% | 160,100 |
| Margin M | + 500 | + 0.3% | 160,600 |
| Fixed Fuel Cost | + 2,800 | + 1.7% | 163,400 |
| Land Cost | - 100 | - 0.1% | 163,300 |
| Transmission Cost | + 600 | + 0.4% | 163,900 |
| WACC/Gamma | - 7,000 | - 4.3% | 156,900 |
| Fixed O&M | + 600 | + 0.4% | 157,500 |
| **Combined impact** | **- 6,400** | **- 3.9%** | **157,500** |

# APPENDIX D: VARIATION IN THE MAXIMUM RESERVE CAPACITY PRICE AND CONSTITUENT COSTS




| Capacity Year | 08/09 | 09/10 | 10/11 | 11/12 | 12/13 | 13/14 | 14/15 | 15/16 |
|---|---|---|---|---|---|---|---|---|
| Power Station Cost | $ 79,110 | $ 107,404 | $ 135,701 | $ 134,091 | $ 149,306 | $ 158,710 | $ 113,956 | $ 100,747 |
| Transmission Costs | $ 16,558 | $ 18,017 | $ 20,672 | $ 13,151 | $ 58,493 | $ 51,621 | $ 12,328 | $ 11,773 |
| Fixed O& M | $ 23,900 | $ 13,363 | $ 14,392 | $ 13,431 | $ 27,335 | $ 26,649 | $ 33,384 | $ 34,055 |
| Fuel Costs | $ 2,907 | $ 3,456 | $ 2,631 | $ 3,151 | $ 2,615 | $ 2,825 | $ 2,239 | $ 4,530 |
| Land Costs | $ - | $ - | $ - | $ 293 | $ 769 | $ 818 | $ 1,972 | $ 1,726 |
| MRCP (nearest $100) | $ 122,500 | $ 142,200 | $ 173,400 | $ 164,100 | $ 238,500 | $ 240,600 | $ 163,900 | $ 152,800 |
| Excess Capacity | 6.43% | 11.44% | 2.19% | 5.83% | 8.99% | 14.59% | 13.79% | - |
| Reserve Capacity Price (per yr) | $ 97,837 | $ 108,459 | $ 144,235 | $ 131,805 | $ 186,001 | $ 178,477 | $ 122,427 | - |

# APPENDIX E: ABBREVIATIONS

ACT – Australian Competition Tribunal

AER – Australian Energy Regulator

CAPM – Capital Asset Pricing Model

CPI – Consumer Price Index

DRP – Debt Risk Premium

ERA – Economic Regulation Authority

GST – Goods and Services Tax

IMO – Independent Market Operator

MRCP – Maximum Reserve Capacity Price

MRCPWG – Maximum Reserve Capacity Price Working Group

MW – Megawatt

OCGT – Open Cycle Gas Turbine

O&M – Operation and Maintenance

PwC – Pricewaterhouse Coopers

RBA – Reserve Bank of Australia

SKM – Sinclair Knight Merz

SWIS – South West interconnected system

WACC – Weighted Average Cost of Capital

WEM – Wholesale Electricity Market