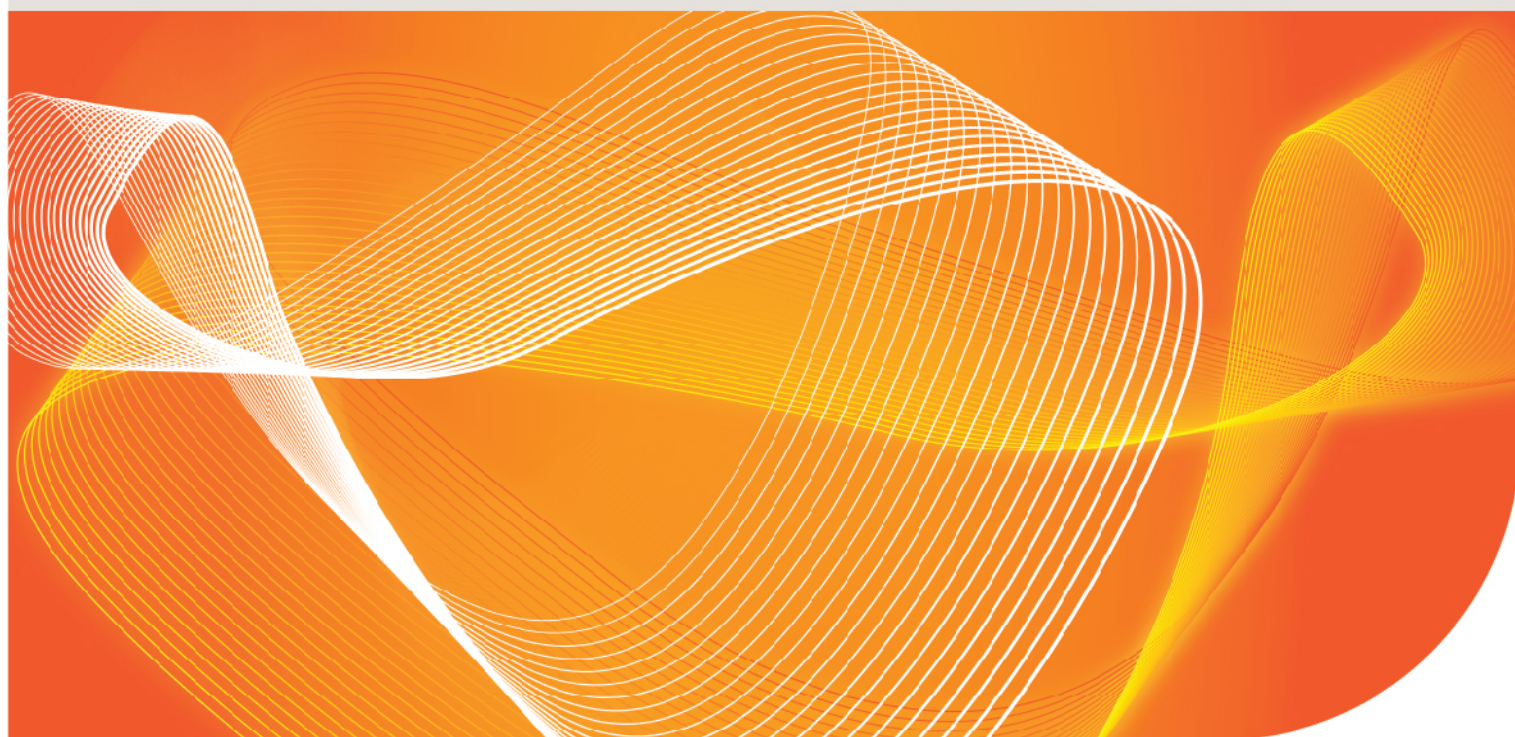# FINAL REPORT: 2016 MAXIMUM RESERVE CAPACITY PRICE FOR THE 2018-19 CAPACITY YEAR

FOR THE WHOLESALE ELECTRICITY MARKET

23 December 2015

AEMO
AUSTRALIAN ENERGY MARKET OPERATOR

IMPORTANT NOTICE

Purpose

AEMO has prepared this document under section 4.16 of the Wholesale Electricity Market Rules to provide information about the proposed final revised value of the 2016 Maximum Reserve Capacity Price for the 2018-19 Capacity Year, as at the date of publication.

Disclaimer

This document or the information in it may be subsequently updated or amended. This document does not constitute legal or business advice, and should not be relied on as a substitute for obtaining detailed advice about the Wholesale Electricity Market Rules, or any other applicable laws, procedures or policies. AEMO has made every effort to ensure the quality of the information in this document but cannot guarantee its accuracy or completeness.

Accordingly, to the maximum extent permitted by law, AEMO and its officers, employees and consultants involved in the preparation of this document:

- make no representation or warranty, express or implied, as to the currency, accuracy, reliability or completeness of the information in this document; and

- are not liable (whether by reason of negligence or otherwise) for any statements or representations in this document, or any omissions from it, or for any use or reliance on the information in it.

EXECUTIVE SUMMARY

Each year, the Australian Energy Market Operator (AEMO) is required to determine the Maximum Reserve Capacity Price (MRCP) in accordance with the Market Procedure: Maximum Reserve Capacity Price (Market Procedure)[1] for the Western Australian Wholesale Electricity Market (WEM).

The MRCP sets the maximum bid price that can be offered 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 of providing additional Reserve Capacity in each Capacity Year.

This report presents the outcome of the final determination of the MRCP for the 2016 Reserve Capacity Cycle. The 2016 MRCP applies for the 2018-19 Capacity Year, covering the period from 8:00 AM on 1 October 2018 to 8:00 AM on 1 October 2019.

The methodology used to determine the MRCP is outlined in the Market Procedure. The MRCP is calculated by undertaking a technical, bottom-up cost evaluation of the entry of a new 160 MW open cycle gas turbine (OCGT) generation facility in the South West interconnected system in the relevant Capacity Year. The broad methodology applied to determine the MRCP has not changed in the last four years and includes the following costs:

- the capital cost of building a 160 MW OCGT power station with inlet cooling;
- the land cost associated with developing and constructing the power station;
- the costs associated with connecting the power station to the transmission system;
- the costs associated with building liquid fuel storage and handling facilities sufficient for the power station to operate for 14 hours at full capacity;
- the fixed operating and maintenance (O&M) costs associated with the power station and transmission facilities;
- a margin (Margin M) for legal, approval, financing and insurance costs and contingencies; and
- the weighted average cost of capital (WACC).

Proposed final value of the 2016 MRCP for the 2018-19 Capacity Year

AEMO has calculated a proposed final value of $159,800 per MW per year for the 2016 MRCP, 3.0 per cent lower than the 2015 MRCP of $164,800 per MW per year.

---

[1] Available at: http://wa.aemo.com.au/home/imo/imo-procedures.

Changes from the 2015 MRCP

Table 1 shows the year-on-year variation in the input parameters between the 2015 MRCP (for the 2017-18 Capacity Year) and the 2016 MRCP.

Table 1   Breakdown of variance between 2015 and 2016 MRCP

	Impact (AU$)	Impact (%)	MRCP (AU$)
2015 MRCP			**164,800**
Escalation factors	-2,600	-1.6	162,200
Power station cost	-1,600	-1.0	160,600
Margin M	0	0.0	160,600
Fixed fuel cost	-100	-0.1	160,500
Land cost	-100	-0.1	160,400
Transmission cost	-100	-0.1	160,300
WACC	-1,000	-0.6	159,300
Fixed O&M	500	0.3	159,800
2016 MRCP	**-5,000**	**-3.0**	**159,800**

The key changes from the 2015 MRCP are:

- lower escalation factors have reduced the 2016 MRCP by 1.6 per cent, largely due to lower forecasts of commodity prices, inflation and labour costs;
- power station costs have reduced the 2016 MRCP by 1.0 per cent as a result of lower commodity prices, particularly for copper, steel and cement; and
- the WACC has reduced the 2016 MRCP by 0.6 per cent, largely due to a reduction in the risk free rate.

Changes since the draft report

The proposed final value of the 2016 MRCP is 2.2 per cent higher than the proposed value of $156,400 in the draft report. This is due to:

- updated WACC parameters (risk free rate, inflation and the debt risk premium) which have increased the WACC from 5.30 per cent to 5.69 per cent; and
- revised Consumer Price Index escalation factors reflecting the November 2015 forecasts from the Reserve Bank of Australia.

Historical variation of the MRCP

Figure 1 shows the MRCP for the 2008-09 to 2018-19 Capacity Years. The MRCP has been fairly stable over this period, except for the 2012-13 and 2013-14 Capacity Years, when high transmission and power station cost estimates increased the MRCP. Individual cost components also include the effect of WACC.

As part of the five-yearly MRCP methodology review completed in 2011, the design of the theoretical power station was revised to reflect current market practice. Inlet cooling was incorporated into the design as it was observed that all OCGT generators built since market start included inlet cooling. This reduced power station costs calculated in the 2012 MRCP for the 2014-15 Capacity Year compared to the 2013 MRCP.

Figure 1   MRCP comparisons, 2008-09 to 2018-19 Capacity Year
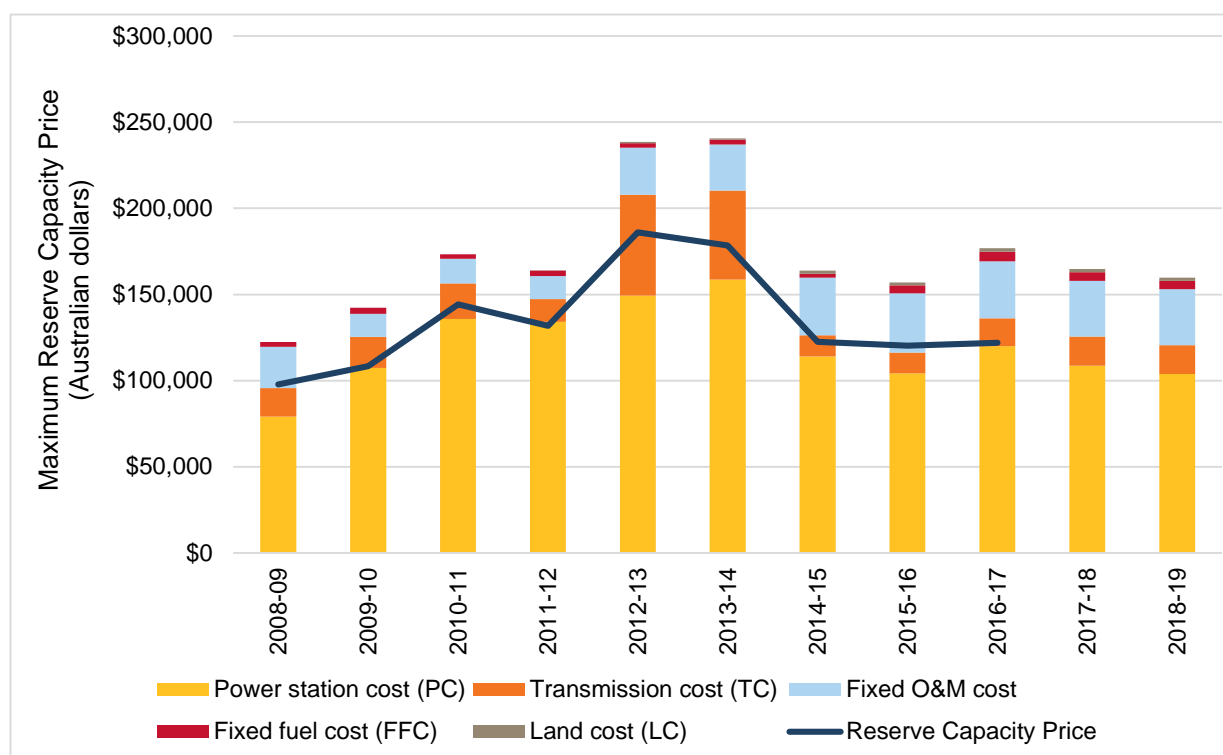
Note: Individual cost components in this figure include WACC. The Reserve Capacity Price for the 2017-18 Capacity Year has not yet been calculated because of the deferral of the 2015 Reserve Capacity Cycle[2].

Changes to transmission use of system network access charges

As part of the Western Australian Government's Electricity Market Review (EMR)[3], the regulation of Western Power's distribution and transmission networks are expected to be transferred to the framework established under the National Electricity Rules on 1 July 2018. AEMO has been notified that this will result in the cessation of the transmission use of system (TUOS) charge for generation connections.

The EMR team has requested that AEMO indicates in its draft and final MRCP reports:

- the impact of the removal of the TUOS charge on the 2016 MRCP; and

[2] Further information is available at: http://wa.aemo.com.au/home/electricity/reserve-capacity/reserve-capacity-timetable-overview.
[3] Further information is available at:
    https://www.finance.wa.gov.au/cms/Public_Utilities_Office/Electricity_Market_Review/Network_Regulation.aspx.

- that transition provisions to allow the recalculation of the 2016 MRCP are likely to be introduced prior to 1 July 2018.

AEMO has determined that the removal of the TUOS charge will reduce the proposed final 2016 MRCP value of $159,800 by $10,300 to $149,500 per MW per year.

As the decision to remove the TUOS charge has not been made, AEMO has not made this adjustment in its proposed final 2016 MRCP.

Public consultation

On 6 November 2015, the draft MRCP report was published for consultation. The four week consultation period closed on 4 December 2015. AEMO received submissions[4] from Tesla Corporation and Synergy.

Both submissions questioned the continued applicability of the reference technology and the calculation of the WACC. AEMO notes that it does not have discretion regarding the calculation of these components as they are specified in the Market Procedure. However, AEMO recommends that the issues raised are considered in the next five yearly-review of the Market Procedure.

---

[4] See http://wa.aemo.com.au/home/electricity/reserve-capacity/maximum-reserve-capacity-price.

CONTENTS

TABLES

FIGURES

CHAPTER 1.   INTRODUCTION

Each year, the Australian Energy Market Operator (AEMO) is required to determine the Maximum Reserve Capacity Price (MRCP) in accordance with section 4.16 of the Wholesale Electricity Market (WEM) Rules and the Market Procedure: Maximum Reserve Capacity Price (Market Procedure)[5].

The MRCP sets the maximum bid price that can be offered 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 of providing additional Reserve Capacity for each Capacity Year.

This report presents the outcome of the final determination of the MRCP for the 2016 Reserve Capacity Cycle[6]. The 2016 MRCP applies for the 2018-19 Capacity Year, covering the period from 1 October 2018 to 1 October 2019.

The proposed draft value for the 2016 MRCP was published on AEMO's website[7] on 6 November 2015 for public consultation. AEMO must consider all submissions received as part of the public consultation period before submitting a proposed final 2016 MRCP to the Economic Regulation Authority (ERA) for approval, in accordance with clause 4.16.7 of the WEM Rules.

1.1   Overview of input parameters

This report discusses the input parameters used to determine the 2016 MRCP. The methodology used to determine the MRCP is outlined in the Market Procedure. The MRCP is calculated by undertaking a technical, bottom-up cost evaluation of the entry of a new 160 MW open cycle gas turbine (OCGT) generation facility in the South West interconnected system (SWIS) in the relevant Capacity Year. The broad methodology applied to determine the MRCP has not changed in the last four years and includes the following costs:

- the capital cost of a 160 MW OCGT power station with inlet cooling;
- the land cost associated with developing and constructing the power station;
- the costs associated with connecting the power station to the transmission system;
- the costs associated with building liquid fuel storage and handling facilities sufficient for the power station to operate for 14 hours at full capacity;
- the fixed operating and maintenance (O&M) costs associated with the power station and transmission facilities;
- a margin (Margin M) for legal, approval, financing and insurance costs, other costs and contingencies; and
- the weighted average cost of capital (WACC).

Component costs calculated for the draft report have been updated in this final report. In determining the 2016 MRCP, AEMO used publicly available information as well as advice from independent engineering and economics consultants, Western Power and the Western Australian Land Information Authority (Landgate).

---

[5]   See http://wa.aemo.com.au/home/imo/imo-procedures.
[6]   See http://wa.aemo.com.au/home/electricity/reserve-capacity/reserve-capacity-timetable-overview.
[7]   See http://wa.aemo.com.au/home/electricity/reserve-capacity/maximum-reserve-capacity-price.

Table 2 shows the organisations and the input parameters they provided.

Table 2   Consultants and agencies

Organisation	Cost estimates provided
Jacobs Group (Australia) (Jacobs)	Power station capital costs and relevant escalation factors Margin for legal, approval, financing, insurance, other costs and contingencies Fixed fuel costs Generation O&M costs and relevant escalation factors Switchyard O&M costs and relevant escalation factors Transmission line O&M costs and relevant escalation factors
Landgate	Land costs
PricewaterhouseCoopers (PwC)	Debt risk premium (DRP)
Western Power	Transmission connection costs and relevant escalation factors

Throughout this report, cost and price estimates are expressed in Australian dollars, unless otherwise specified.

1.2   Public consultation

On 6 November 2015, the draft MRCP report was published for consultation. The four week consultation period closed on 4 December 2015. AEMO received submissions[8] from Tesla Corporation and Synergy.

Both submissions questioned the continued applicability of the reference technology and the calculation of the WACC. AEMO notes that it does not have discretion regarding the calculation of these components as they are specified in the Market Procedure. However, AEMO recommends that the issues raised are considered in the next five yearly-review of the Market Procedure.

Further information on the issues raised and AEMO's responses can be found in Chapter 4.

1.3   Outcome of the 2016 MRCP for the 2018-19 Capacity Year

AEMO proposes a final value of $159,800 per MW per year for the 2016 MRCP. This is 2.2 per cent higher than the value proposed in the draft report and is 3.0 per cent lower than the 2015 MRCP of $164,800 per MW per year.

1.4   Supporting documentation

The following related documents are available on AEMO's website:[9]

• MRCP calculation spreadsheet, draft report version;

• MRCP calculation spreadsheet, final report version;

• Jacobs report dated 15 October 2015, *Review of the Maximum Reserve Capacity Price 2018-2019*;

• Jacobs response to public comment dated 10 December 2015;

---

8   See http://wa.aemo.com.au/home/electricity/reserve-capacity/maximum-reserve-capacity-price.
9   See http://wa.aemo.com.au/home/electricity/reserve-capacity/maximum-reserve-capacity-price.

- PwC letter dated 9 October 2015, *Estimated debt risk premium using the ERA's "bond yield" methodology*;

- PwC letter dated 16 November 2015, *Estimated debt risk premium using the ERA's "bond yield" methodology*;

- Landgate report dated 8 September 2015, *Land values for the Maximum Reserve Capacity Price for 2016*;

- WACC parameter calculation spreadsheet for draft report;

- WACC parameter calculation spreadsheet for final report; and

- Western Power report dated 19 October 2015, *Total Transmission Cost Estimate for the Maximum Reserve Capacity Price for 2018/19*.

CHAPTER 2.   2016 MRCP INPUT PARAMETERS

2.1   Escalation factors

The 2016 MRCP calculation is based on a theoretical power station that would commence operation on 1 October 2018. Costs have been determined as at 2015 and have been escalated to 2018. For example, capital costs are escalated to 1 April 2018 and fixed O&M costs are escalated to 1 October 2018.

Depending on the type of component costs being estimated, different escalation factors are used. This is summarised in Table 3.

Table 3   Cost escalation forecast

Escalation factor	Component costs applied to	Source and methodology
Power station capital cost	• Power station capital cost	Methodology is derived by Jacobs and estimates are published in their report to AEMO (chapter 6). This involves sourcing information from Australian Bureau of Statistics, London Metal Exchange, CME Group, Consensus Economics and Australian Construction Industry Forum (Construction Forecasting Council).
Generation O&M cost	• Generation O&M cost	
Connection asset O&M cost	• Switchyard O&M cost • Transmission line O&M cost	
Consumer Price Index (CPI)	• Asset insurance O&M cost • Fixed network access and on-going O&M charges • Fixed fuel cost • Land cost	A general measure of price inflation for all Australian households forecast by the Reserve Bank of Australia (RBA). Where a forecast range is provided, the mid-point is applied. For periods outside the RBA's forecast horizon, the mid-point of the RBA's target for inflation is used.
Transmission connection cost	• Transmission connection cost	Average change over 5 years in the estimates calculated in step 2.4.2 of the Market Procedure. Where 5 years of data is not available the escalation rate is averaged over the period for which equivalent data is available. Western Power provides these escalation factors.

Table 4 lists the escalation factors that were applied to prepare the proposed final value of the 2016 MRCP.

Table 4   Escalation factors

Financial year ending	30 June 2016	30 June 2017	30 June 2018	30 June 2019
Power station capital cost	0.38%	4.16%	3.48%	4.44%
Generation O&M cost	3.50%	3.50%	3.51%	3.51%
Connection asset O&M cost	4.10%	4.10%	4.10%	4.10%
CPI	2.00%	2.50%	2.50%	2.50%
Transmission connection cost	-2.20%	-2.20%	-2.20%	-2.20%

With the exception of the escalation factors for the power station costs, all other escalation factors have decreased from the 2015 MRCP. In particular, forecasts for copper, steel and cement have decreased, reflecting lower prices of these commodities observed between June 2014 and June 2015. Engineering construction cost forecasts in Western Australia (WA) have also fallen as a result of reduced infrastructure investment as resources projects move from the construction to production phase. Similarly, labour cost forecasts are lower as demand for labour continues to decline due to the slowdown in resource investment.

2.2   Capital costs

2.2.1   Power station capital cost (PC)

Jacobs selected a Siemens SGT5-2000E (33MAC) 178 MW OCGT generator as the reference equipment on the basis that it is currently the most appropriate machine available that meets the criteria for the MRCP calculation. Evaporative air cooling technology was included as it is a commonly adopted technology for SWIS generator installations. Plant equipment, engineering, procurement and construction capital costs were estimated based on recent quotes obtained by Jacobs.

Jacobs has identified the component costs that are likely to be scalable with generator size and those components that are likely to be fixed. It has adjusted only the scalable costs in estimating the capital cost for a 160 MW generator.

Fixed and scalable cost components were benchmarked against similar completed projects in Australia as at 30 June 2015. Scalable costs were first converted to a $ per kW basis and then into a nominal 160 MW generator. The total capital cost was then escalated to 1 April 2018 using the power station capital cost escalation factor.

The scope and methodology applied is consistent with previous years.

For the proposed final value of the 2016 MRCP, **PC = $834,782 per MW**.

The estimated capital cost of a power station has decreased by 3.6 per cent (a reduction of around $2.0 million in the total capital cost) from the 2015 MRCP, due to reductions in commodity prices, particularly steel, as well as copper and cement.

This estimate has not changed from the draft report.

2.2.2   Legal, approval, financing, insurance, other costs and contingencies (M)

'M' is a margin that covers legal, approval, financing, insurance, other costs and contingencies during the project construction phase. Margin M is estimated from the costs associated with recent, comparable developments, excluding any project specific abnormal costs. The costs are scaled to the reference equipment where relevant. Margin M is then added as a fixed percentage of the capital cost of developing the power station.

For the proposed final value of the 2016 MRCP, **M = 20.00 per cent**.

AEMO has been advised that the value for Margin M of 19.97 per cent originally quoted by Jacobs for the 2015 MRCP was incorrect. The correct value was 20.03 per cent. This is attributed to a manual entry error by Jacobs. Correcting this error would not have changed the 2015 MRCP.

The reduction in cost factor 'M' is due to a 1.7 per cent reduction in project management costs and costs that are determined as a percentage of the overall engineering, procurement and construction price. The reduction has been partly offset by an increase in legal costs.

This estimate has not changed from the draft report.

2.2.3 Capacity Credit (CC) allocation

The expected CC allocation for the nominal 160 MW generator output is estimated by adjusting the expected performance of the reference equipment to match the weather conditions of 41 degrees Celsius and 30 per cent relative humidity.

For the proposed final value of the 2016 MRCP, **CC = 150.5 MW**.

The expected CC allocation is consistent with the 2015 MRCP. This estimate has not changed from the draft report.

2.2.4 Transmission connection cost (TC)

TC is based on a weighted average of the capital contributions of generators connecting to the SWIS over 5 years. Estimates are based on actual connection costs and access offers identified by Western Power through its confidential database. Western Power has provided an independent audit report to verify the accuracy of the estimates on the basis that the underlying data is commercial in-confidence and therefore cannot be published. The weightings for each project are determined by the year the facility began, or is expected to begin, operation. If there is no project data available for a particular year in the five-year window, Western Power estimates the shallow connection cost in line with the Market Procedure. Shallow connection cost estimates include construction of a substation, 2 kilometres of overhead line to the power station and an overhead line easement.

AEMO provides easement costs to Western Power for use in estimating shallow connection costs. AEMO's easement cost calculation includes the following assumptions:

- the easement is assumed to be 12 hectares (2 kilometres long and 60 metres wide);
- it is assumed a new generator may not need to purchase the entire 12 hectares, instead securing easement rights for some or all of the land. AEMO estimates easement costs to be 50 per cent of the land value; and
- the land value includes transfer duty.

Easement costs have decreased by 2.8 per cent from the 2015 MRCP due to a fall in land values in the Collie, Eneabba, Kwinana and Pinjar regions.

For the proposed final value of the 2016 MRCP, **TC = $160,280 per MW**.

No escalation factors have been applied as Western Power has already escalated the TC estimate to 1 April 2018.

The transmission connection cost estimate decreased by 0.6 per cent from the 2015 MRCP. This decrease was due to a fall in the transmission connection cost escalation factor, offsetting an increase in total shallow connection costs as a result of higher substation costs.

This estimate has not changed from the draft report.

2.2.5 Fixed fuel cost (FFC)

FFC is the cost associated with developing and constructing onsite liquid fuel storage and supply facilities and supporting infrastructure, including the initial cost of filling the tank with diesel fuel to a level sufficient for 14 hours of operation. Jacobs provided an estimate of the FFC for 30 June 2015, which has been escalated to 1 April 2018 using the CPI escalation factor. The cost of diesel includes delivery but excludes excise and GST.

A detailed estimation of the cost of fuel is available in Jacobs' report entitled "Energy Price Limits for the Wholesale Electricity Market in Western Australia"[10] dated 13 May 2015.

For the proposed final revised value of the 2016 MRCP, **FFC = $7,089,948.**

---

[10] Available at http://wa.aemo.com.au/docs/default-source/rules/other-wem-consultation-docs/jacobs-2015-energy-price-limits-review-for-web.pdf?sfvrsn=0.

The estimated fixed fuel costs have decreased by 2.6 per cent from the 2015 MRCP. This is largely associated with a decrease in the price of diesel fuel, which has been estimated at $0.74 per litre, 18.7 per cent lower than the previous year. International oil prices have fallen by approximately 50 per cent since June 2014 which has affected the price of diesel. Therefore, the cost of the first fill of the storage tank has fallen to $600,300, compared to $742,400 included in the 2015 MRCP.

This estimate has decreased by 0.5 per cent from the draft report as a result of the revised CPI escalation factor.

2.2.6   Land costs (LC)

Land valuations were made for six regions where development of a SWIS connected power station is most likely, namely:

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

Landgate assessed hypothetical land sites for each region in or near existing industrial estates for land that would be suitable for the development of a power station. Valuations were completed as at 30 June 2015 and exclude transfer duty (previously known as stamp duty). AEMO has added the applicable transfer duty to the land parcel cost using the Office of State Revenue's online calculator[11].

AEMO has calculated the average of the six valuations and escalated this to 1 April 2018 using the CPI escalation factor. Three hectare sites were applied for all regions except for Kemerton, where the minimum land parcel is five hectares.

For the proposed final value of the 2016 MRCP, **LC = $2,656,499**.

The estimated land costs have decreased by 3.5 per cent from the 2015 MRCP. The slowdown in the WA economy, driven by a weakening resources sector, has reduced demand for industrial land, resulting in lower sales and land prices. This has specifically affected the land valuations of Collie, Eneabba, Kwinana and Pinjar regions.

This estimate has decreased by 0.5 per cent from the draft report as a result of the revised CPI escalation factor.

2.2.7   Weighted average cost of capital (WACC)

The WACC is determined by using the Capital Asset Pricing Model to estimate the costs of equity and debt. The DRP was estimated by PwC while the risk free rate and expected inflation components of the WACC were calculated using information available from the RBA website[12]. The nominal risk free rate is determined using observed yields of Commonwealth Government bonds, while the DRP is derived using observed yields of corporate bonds. Both the DRP and risk free rate were estimated from market observations ending in 13 November 2015 and 30 November 2015, respectively. A corporate tax rate of 30 per cent is also assumed.

Appendix A details the steps for estimating the WACC.

---

[11] Available at: https://rol.osr.wa.gov.au/Calculators/faces/Calculators?_afrLoop=247790592985840&_afrWindowMode=0&_adf.ctrl-state=re8l3w9ui_4.
[12] See http://www.rba.gov.au/statistics/tables/ and http://www.rba.gov.au/publications/smp/index.html.

Risk free rate of return methodology

Figure 2 shows the daily yield for a selection of RBA bonds with maturity dates roughly 10 years from now. RBA bond yields have decreased since the 2015 MRCP calculation. The nominal risk free rate is calculated as the annualised yield using a 20-day average. This is then adjusted for inflation to determine the real risk free rate of return.

Figure 2   RBA bond yields, March 2014 to November 2015
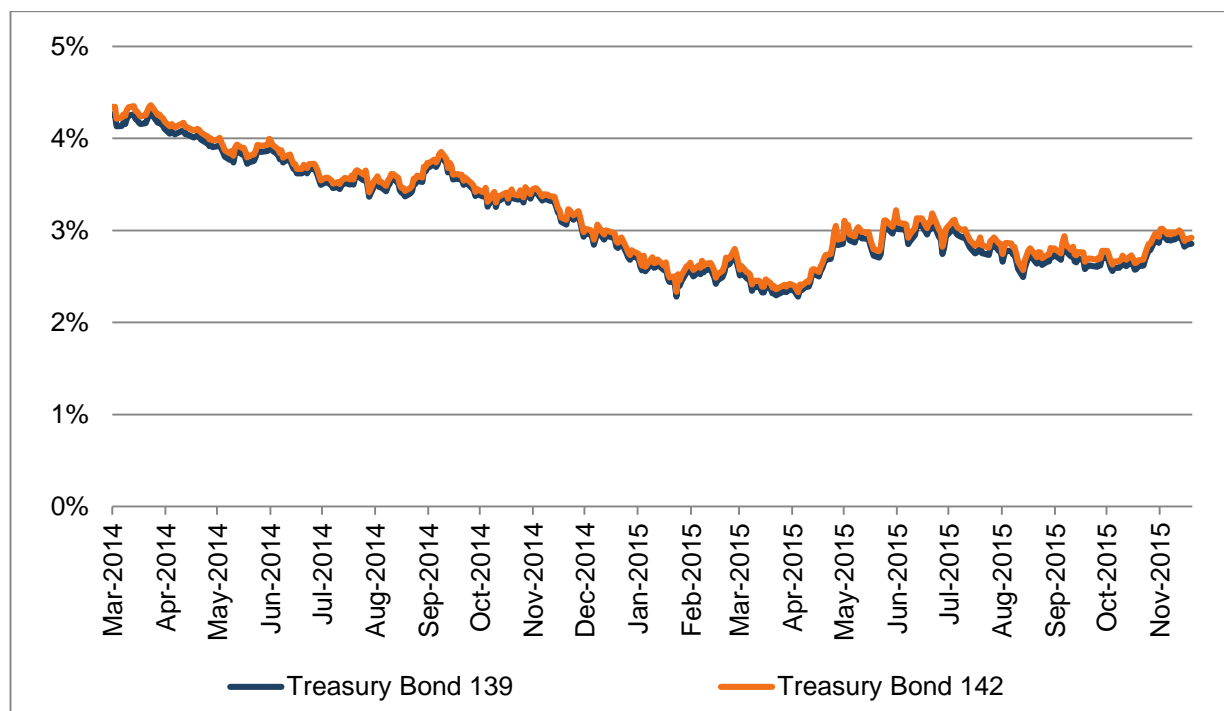
Debt risk premium methodology

The Market Procedure requires AEMO to determine the methodology to estimate the DRP, which in the opinion of AEMO is consistent with currently accepted Australian regulatory practice. Since the global financial crisis, AEMO notes that Australian regulators have applied multiple methodologies for estimating the DRP as bond market data has become increasingly difficult to obtain. Australian regulators have yet to implement a common methodology.

AEMO uses the ERA's current bond yield methodology, published in the "Rate of Return Guidelines"[13] with Standard and Poor's BBB rated bonds to estimate the DRP.

The ERA has recently adopted a modified bond yield approach to estimate the DRP for the "Final Decision on Proposed Revisions to the Access Arrangement for the Mid-West and South-West Gas Distribution Systems"[14] amended on 10 September 2015. The methodology used in that determination uses a larger sample of bonds issued by Australian utilities on Australian and international markets to estimate a bond yield curve to calculate a 10-year DRP.

AEMO notes that while the ERA has deviated from its Rate of Return Guidelines in this decision, the Rate of Return Guidelines have not been amended. The ATCO decision is currently the only decision in which this methodology has been applied. Further, ATCO appealed the ERA's use of this methodology to the Australian Competition Tribunal[15]. A decision is yet to be made on this appeal and as such,

---

[13] Available at https://www.erawa.com.au/gas/gas-access/guidelines/rate-of-return-guidelines.
[14] Available at https://www.erawa.com.au/cproot/13880/2/GDS%20-%20ATCO%20-%20AA4%20-%20Amended%20Final%20Decision%20-%20PUBLIC%20VERSION.PDF.
[15] See http://www.competitiontribunal.gov.au/current-matters/tribunal-documents/act-10-2015.

AEMO does not consider this modified bond yield methodology to be representative of current accepted Australian regulatory practice and has not adopted it for the 2016 MRCP determination.

AEMO further notes that the Australian Energy Regulator's (AER) methodology[16] differs from the ERA's. The AER uses a third party data service provider (such as Bloomberg) as the source of benchmark cost of debt estimates, and specifies the use of a trailing average portfolio approach to calculate the return on debt. AEMO understands that the AER has continued to use the Rate of Return Guidelines in its recent access arrangement decisions[17]. However, this method is considered inappropriate for financing a new asset, and therefore has not been considered in the determination of the 2016 MRCP.

For the 2016 MRCP, AEMO considers it appropriate to calculate the DRP using the bond yield approach on Australian bonds, consistent with the 2015 MRCP. The bond yield approach has been applied in numerous decisions by the ERA since 2011[18] and AEMO considers that this methodology is still representative of current accepted Australian regulatory practice.

AEMO will continue to monitor regulatory practice in relation to the DRP estimation for future MRCP determinations.

Capital Asset Pricing Model results

For the proposed final value of the 2016 MRCP, **WACC (real terms) = 5.69 per cent**.

This is lower than the WACC (real terms) of 5.81 per cent applied in the 2015 MRCP. This is largely due to a decrease in the risk free rate of return and inflation, partly offset by an increase in the DRP.

The estimated WACC has increased by 0.39 percentage points from the draft report due to an increase in the DRP and risk free rate as outlined in Appendix A.

AEMO observes that in recent years the WACC applied in the MRCP determination has been volatile. Growth in the Australian economy has weakened, predominantly driven by a substantial fall in mining investment. This is largely due to a weak global economy, falling commodity prices as China's growth falls and increased uncertainty in financial markets. Interest rates are expected to remain low due to slow economic recovery resulting in limited inflationary pressure.

2.3 Operating and maintenance costs

2.3.1 Generation O&M costs

Generation O&M costs assume that the OCGT plant is based on a single gas turbine capable of delivering a nominal 160 MW output using diesel fuel with a 30 year operating life and a 2 per cent capacity factor. Gas connection costs are therefore not considered. An allowance for balance of plant has also been included.

A 15 year annuity is calculated based on individual component costs (as at June 2015), which are derived from similar recent and current OCGT projects. These costs are then escalated to 1 October 2018 using the generation O&M escalation factor.

For the proposed final value of the 2016 MRCP, **Generation fixed O&M costs = $16,330 per MW per year**.

The estimated yearly O&M cost increased by 1.4 per cent from the 2015 MRCP.

This estimate has not changed from the draft report.

---

[16] Available at http://www.aer.gov.au/networks-pipelines/guidelines-schemes-models-reviews/rate-of-return-guideline.
[17] Available at https://www.aer.gov.au/networks-pipelines/determinations-access-arrangements?f%5b0%5d=type%3Aaccc_aer_access_arrangement.
[18] For example, see https://www.erawa.com.au/gas/gas-access/dampier-to-bunbury-natural-gas-pipeline/access-arrangements/access-arrangement-period-2011-2015/decisions-and-proposals and https://www.erawa.com.au/electricity/electricity-access/western-power-network/access-arrangement/access-arrangement-period-2012-2017/decisions-and-proposals.

2.3.2   Switchyard O&M costs

Switchyard O&M costs have been calculated from the isolator on the high voltage side of the generator transformer and does not include any generator transformer or switchgear associated costs. A bottom-up approach has been used to estimate the switchyard costs using data from several Australian transmission network service providers. This is based on the assumption that the assets represent an incremental addition to a large asset base. The cost estimate includes labour, machinery parts and general overheads that are incurred during routine maintenance.

The 330 kV switchyard is assumed to have an average asset life of 50 years. A 15 year annuity is calculated based on the cost estimates (as at June 2015) and is then escalated to 1 October 2018 using the connection O&M escalation factor.

For the proposed final value of the 2016 MRCP, **Switchyard O&M costs = $492 per MW per year**.

The switchyard O&M cost estimate has increased by 2.7 per cent from the 2015 MRCP.

This estimate has not changed from the draft report.

2.3.3   Transmission line O&M costs

The new transmission line is assumed to be a single circuit 330 kV construction with 2 conductors per phase and is assumed to have an average asset life of 60 years. The rating of the line has been selected to facilitate the transport of up to 200 MVA (power factor of 0.8). A bottom-up approach has been used to estimate the transmission costs using data from several Australian transmission network service providers and is based on the assumption that the assets represent an incremental addition to a large asset base.

The cost estimate includes labour, machinery parts and general overheads that are incurred during routine maintenance. A 15 year annuity is calculated based on the cost estimates (as at June 2015) and is then escalated to 1 October 2018 using the connection O&M escalation factor.

For the proposed final value of the 2016 MRCP, **Transmission line O&M costs = $9.47 per MW per year**.

The transmission line O&M estimate has increased by 2.0 per cent from the 2015 MRCP.

This estimate has not changed from the draft report.

2.3.4   Asset insurance costs

The fixed O&M component of the MRCP includes annual insurance costs to cover power station asset replacement, business interruption and public and products liability insurance. AEMO has obtained advice on insurance costs from an independent broker to calculate insurance premiums. The broker prefers to remain anonymous to protect its competitive position.

Premiums have been calculated as follows:

- Asset replacement insurance has been calculated as 0.24 per cent of the limit of liability, as advised by the broker. The limit of liability has been determined as the sum of the capital construction cost and value of fuel.
  - The capital cost and value of fuel are estimated as: PC x (1 + M) x CC + FFC.
  - AEMO has calculated asset replacement insurance as $425,063 per year.
- Business interruption insurance includes coverage for the potential refund liability for the facility for two years. While a construction period of one year is assumed in the application of WACC, a period of time would be required prior to commencement of construction work following a loss event (for example, for procurement of services, building approvals and any demolition or clearing

works). The refund mechanism in the WEM Rules means that a Market Participant may be required to refund two years' worth of capacity payments in less than 15 months.

- AEMO has calculated business interruption insurance as $129,524 per year.
- Public and products liability insurance is estimated as $108,900 per year. This liability includes 10 per cent transfer duty and 10 per cent GST, for a limit of $50 million for any one occurrence, as required by Western Power in an Electricity Transfer Access Contract.
- A cost of $20,000 per year for an annual insurance site survey has also been included.

The premium estimates are consistent with the following assumptions that the insurance covers:

- a newly constructed generation facility with on-site diesel storage;
- a facility located in a rural region of the SWIS with no cyclone risk;
- machinery breakdown; and
- deductibles of $25,000 to $50,000 for public and products liability insurance, $500,000 for property damage and 60 days for business interruption insurance.

Estimated insurance costs are escalated where necessary to 1 October 2018 using the CPI escalation factor.

For the proposed final value of the 2016 MRCP, **Asset insurance costs = $4,654 per MW per year**.

The insurance cost estimates have decreased by 1.7 per cent from the 2015 MRCP. This is due to lower business interruption and asset replacement insurance premiums. The fall in insurance premiums is the result of fewer natural disasters and manufacturing claims across most industry segments, including electricity generation.

This estimate has increased by 0.3 per cent from the draft report as a result of the revised CPI escalation factor.

2.3.5   Fixed network access and on-going charges

Network access charges are estimated using Western Power's network access tariffs (Price List) data from the 2015-16 Price List approved by the ERA[19]. The relevant tariff that applies to generation facilities is the Transmission Reference Tariff 2. As network access charges vary by location, AEMO has considered the list of six regions outlined in the Market Procedure and applied the unit price for the most expensive location.

For the 2016 MRCP, Muja Power Station substation "Use of System" has been selected as the base tariff input for the calculation of the fixed network access charges. The other two input component costs include control system and transmission metering service charges. Total yearly costs on a per MW basis are calculated as at July 2015 and have been escalated by CPI to 1 October 2018.

For the proposed final value of the 2016 MRCP, **Fixed network access costs = $11,096 per MW per year**.

The fixed network access cost estimates have increased by 1.1 per cent from the 2015 MRCP. This is due to increases in control system service charges and use of system charges.

This estimate has reduced by 0.5 per cent since the draft report as a result of the revised CPI escalation factor.

---

[19] Available at https://www.erawa.com.au/cproot/13484/2/2015%2016%20Price%20List.pdf.

Changes to transmission use of system network access charges

As part of the Western Australian Government's Electricity Market Review (EMR)[20], the regulation of Western Power's distribution and transmission networks are expected to be transferred to the framework established under the National Electricity Rules on 1 July 2018. AEMO has been notified that this will result in the cessation of the transmission use of system (TUOS) charge for generation connections.

The EMR team has requested that AEMO indicates in its draft and final MRCP reports:

- the impact of the removal of the TUOS charge on the 2016 MRCP; and

- that transition provisions to allow the recalculation of the 2016 MRCP are likely to be introduced prior to 1 July 2018.

AEMO has determined that the removal of the TUOS charge will reduce the proposed final 2016 MRCP value of $159,800 by $10,300 to $149,500 per MW per year.

As the decision to remove the TUOS charge has not been made, AEMO has not made this adjustment in its proposed final 2016 MRCP.

---

[20] Further information is available at:
https://www.finance.wa.gov.au/cms/Public_Utilities_Office/Electricity_Market_Review/Network_Regulation.aspx.

CHAPTER 3. PROPOSED FINAL REVISED VALUE OF THE 2016 MRCP

3.1 Annualised Capital Costs (ANNUALISED_CAP_COST)

The theoretical total capital cost (CAP_COST) of constructing a new power station in the SWIS and connecting it to the grid is estimated from the component costs determined in chapter 2.2. This is expressed as:

$$CAP\_COST = \left((PC \times (1+M) + TC) \times CC + FFC + LC \right) \times (1+WACC)^{\frac{1}{2}}$$

For the proposed final revised value of the 2016 MRCP, **CAP_COST = $189,810,126**.

CAP_COST is then annualised over a 15 year period using the WACC.

This produces an **ANNUALISED_CAP_COST = $19,149,362 per year**.

The annualised capital cost estimate has decreased by 4.0 per cent from the 2015 MRCP.

This estimate has increased 2.8 per cent from the draft report due to an increase in the WACC.

3.2 Annualised Operating and Maintenance Costs (ANNUALISED_FIXED_O&M)

The theoretical annualised fixed O&M cost is the sum of individual O&M components calculated in chapter 2.3. This is expressed as:

ANNUALISED_FIXED_O&M = generation O&M costs + switchyard O&M costs + transmission line O&M costs + asset insurance costs + fixed network access costs and on-going charges

Depreciation is omitted as it forms part of a regulated utility's annual revenue entitlement.

For the proposed final value of the 2016 MRCP, **ANNUALISED_FIXED_O&M = $32,582 per MW per year**.

The annualised fixed O&M cost estimate has increased by 0.9 per cent from the 2015 MRCP.

This estimate has decreased 0.1 per cent from the draft report.

3.3 Proposed final revised value of the 2016 MRCP

The MRCP is estimated by summing the annualised fixed O&M and annualised capital expenditure on a per MW basis. This is expressed as:

$$MRCP = ANNUALISED\_FIXED\_O\&M + \frac{ANNUALISED\_CAP\_COST}{CC}$$

The proposed final value of the 2016 MRCP is estimated to be $159,820 which is then rounded to the nearest $100.

For the proposed final value of the 2016 MRCP, **MRCP = $159,800 per MW per year**.

The proposed final revised value of the 2016 MRCP is 3.0 per cent lower than the 2015 MRCP.

This estimate is 2.2 per cent higher than the value proposed in the draft report as a result of updated WACC parameters and the revised CPI escalation factor.

An overview of the variation of the components of the 2015 and 2016 MRCP is provided in Table 5.

Table 5   MRCP components for 2015 and 2016

	2015 MRCP	2016 MRCP	Unit
MRCP	164,800	159,800	AU$/MW/year
ANNUALISED_FIXED_O&M	32,307	32,582	AU$/MW/year
Generation O&M costs	16,107	16,330	AU$/MW/year
Switchyard O&M costs	479	492	AU$/MW/year
Transmission line O&M costs	9.28	9.47	AU$/MW/year
Asset insurance cost	4,737	4,654	AU$/MW/year
Fixed network access and on-going charges	10,975	11,096	AU$/MW/year
ANNUALISED_CAPCOST	19,938,596	19,149,362	AU$/year
CAP_COST	196,083,112	189,810,126	AU$
WACC	5.81	5.69	%
Term of finance	15	15	Years
CC	150.5	150.5	MW

Table 6 outlines the changes between the 2015 and 2016 MRCP values by input parameter. It shows most of the changes relate to a decrease in the escalation factors, power station costs and WACC.

A detailed breakdown of the historical MRCP since market start is provided at Appendix B.

Table 6   Breakdown of variance between 2015 and 2016 MRCP

	Impact ($)	Impact (%)	MRCP (AU$)
2015 MRCP			**164,800**
Escalation factors	-2,600	-1.6	162,200
Power station cost	-1,600	-1.0	160,600
Margin M	0	0.0	160,600
Fixed fuel cost	-100	-0.1	160,500
Land cost	-100	-0.1	160,400
Transmission cost	-100	-0.1	160,300
WACC	-1,000	-0.6	159,300
Fixed O&M	500	0.3	159,800
2016 MRCP	**-5,000**	**-3.0**	**159,800**

CHAPTER 4. STAKEHOLDER SUBMISSIONS

The draft report and supporting documents were published for the 2016 MRCP on 6 November 2015. Rule Participants and other industry stakeholders were advised of the publication on the same day and announcements were published in the West Australian and Australian Financial Review on 9 November 2015.

AEMO received submissions from Tesla Corporation and Synergy. A summary of the issues raised in the submissions and AEMO's response is given in Table 7.

Table 7   AEMO's responses to issues raised in public consultation

Submitter	Component	Comment	AEMO's response
Tesla Corporation	PC – Reference equipment	Tesla Corporation notes that the benchmark generator (160 MW) should be reduced to reflect the size of the units that have recently been installed in the SWIS (30 to 40 MW). Tesla Corporation considers that the size of such units is more likely to reflect future growth of peak demand in the WEM.	The methodology prescribed in the Market Procedure currently requires the theoretical reference power generating station to be a 160 MW OCGT. AEMO has included this issue in the issues register that it maintains in preparation for the next five-yearly MRCP methodology review in accordance with clause 4.16.9 of the WEM Rules.
Tesla Corporation	PC – OCGT capital cost estimate	Tesla Corporation notes that the total engineering, procurement and construction costs of a 160 MW nominal generator are derived from scaling down costs for plant equipment, civil works, mechanical and electrical works for a 178 MW generator. Tesla Corporation agrees that some of these costs can be scaled down (e.g. size of turbine blades), but many of these costs are fixed and not scalable. Tesla Corporation requests that non scalable cost elements should be kept at the 178 MW cost levels.	Table 2.1 of Jacobs' report lists which costs are treated as fixed and which are treated as scalable. Jacobs have confirmed that they view this as an appropriate methodology, consistent with that used for previous years' MRCP calculation. Jacobs has confirmed that costs for the items identified as scalable in Table 2.1 of Jacobs' report are affected by the size of the generating unit. For example, a larger gas turbine will require a larger foundation, pipework, larger water treatment plants and higher rated electrical equipment. AEMO considers that the scaling approach applied by Jacobs represents the best application of the current Market Procedure, in the absence of live projects for comparative purposes.
Tesla Corporation	Margin M – exchange rate risk	Tesla Corporation notes that exchange rate movements pose a significant challenge to generation proponents in the importation and construction of gas turbines. The Euro to Australian dollar exchange rate has moved from 0.6886 (June 2015 average) to 0.65 (July to November 2015 average). As such, the capital cost of importing a gas turbine to Australia has increased. Tesla Corporation notes that Margin M does not include a margin for financing costs associated with equity raising and contingency costs and queries if foreign exchange hedging costs are included in Margin M.	AEMO notes that investors will apply different strategies to hedging currency risk and it is not necessarily true that all investors in peaking capacity would fully hedge against potential movements in exchange rates. Margin M (as described in Section 7 of Jacobs report) includes a cost for raising capital. It does not include potential hedging fees for foreign exchange exposure. The cost of hedging contracts will vary depending on the specific contract details and any figure included in Margin M would be arbitrary.
Tesla Corporation	WACC – equity beta	Tesla Corporation considers that the current value for the equity beta is too low, given the recent volatile operating market for electricity generation assets in WA. An equity beta of more than 1 should be considered, which is consistent with WACC determinations by the Independent Pricing and Regulation Tribunal (IPART) in New South Wales. Tesla Corporation suggests AEMO use an equity beta of 1.05 instead of 0.83, which is the mid-point range recommended by IPART (0.95 to 1.15 for electricity generators).	The equity beta value used in the derivation of the WACC is one of the five-yearly components described in the Market Procedure. The review of these estimates was last carried out in October 2011. The Market Procedure allows AEMO to review the five-yearly components if, in AEMO's opinion, a significant economic event has occurred since undertaking the last five-yearly review of the MRCP. AEMO has concluded that no significant economic event has occurred since the completion of the last review. The equity beta value is expected to be re-assessed during the five-yearly review of the WACC components.

Submitter	Component	Comment	AEMO's response
Tesla Corporation	WACC – risk free rate of return	Tesla Corporation notes that using a risk free bond rate with a duration of 10 years is different to that used by the ERA. The ERA commonly uses a five year rate which aligns with the regulatory period for electricity and gas distribution assets. A 10 year rate may be appropriate to new entrant generators but not to compensating existing generation. Existing generation is unlikely to have access to 10 year financing and will have locked in financing in prior years at a different rate. As such, the current methodology exposes existing generation to on-going exposure to debt markets.	The methodology prescribed in the Market Procedure currently requires AEMO to calculate a nominal risk free rate on a moving average basis from the annualised yield on Commonwealth Government bonds with a maturity of 10 years. AEMO considers that this element of the Market Procedure should be reviewed during the next five-yearly MRCP methodology review in accordance with clause 4.16.9 of the WEM Rules.
Synergy	WACC – DRP	Synergy recommends AEMO adopting the ERA's rate of return methodology published in its "Final Decision on Proposed Revisions to the Access Arrangement for the Mid-West and South-West Gas Distribution Systems" rather than relying on ERA's 2013 Rate of Return guidelines. This principle is based on adopting the latest regulatory thinking that has been applied by regulators in recent decisions.	AEMO notes that Synergy has referred to a single decision by the ERA in 2015 regarding the DRP methodology used in its "Final Decision on Proposed Revisions to the Access Arrangement for the Mid-West and South-West Gas Distribution Systems" which differs from the 2013 ERA's Rate of Return Guidelines. AEMO also notes that ATCO appealed the ERA's use of the new methodology to the Australian Competition Tribunal on 1 October 2015. This appeal was recently granted on 1 December 2015[21]. As such, AEMO views the ERA's proposed new methodology is yet to be an established current regulatory practice when compared to the ERA's official 2013 Rate of Return Guidelines.
Synergy	WACC	Synergy is concerned that the WACC used in determining the MRCP is based on regulated network businesses and does not sufficiently reflect an appropriate risk profile for developing generation assets in the WEM.	The WACC used in the MRCP is calculated using the pre-tax real Officer WACC, consistent with Australian regulatory practice. This model allows for consideration of different risk profiles, influenced by two parameters – the credit rating and beta of the benchmark entity. For example, the ERA assumed a credit rating of A- when determining the WACC for Western Power's 2013 to 2017 Access Arrangement. The ERA also determined the risk free rate from the five year Commonwealth Government securities yield (linked to the duration of the access arrangement period). By contrast, the MRCP is based on a credit rating of BBB, which results in higher estimates for beta and the DRP. In addition, the risk free rate is calculated for a 10 year term (linked to the maximum duration for a Special Price Arrangement), which results in a higher risk free rate. AEMO considers that the use of a BBB credit rating to determine these parameters adequately reflects the risks of constructing generation assets.
Synergy	WACC - DRP	Synergy notes that the average term to maturity of the BBB rated bonds used to calculate the DRP was approximately 4.89 years, which is lower than AEMO's target 10 year benchmark term to maturity. As such, the proposed weighted DRP is likely to be underestimated. Synergy commented that a 10 year term for debt is accepted regulatory practice, particularly with reference to the AER's recent decisions in 2015 for electricity and gas businesses in eastern Australia.	AEMO considers that extrapolating bond data would not be consistent with current accepted regulatory practice, which is reflective of the current state of debt markets. While developing the bond yield approach, the ERA stated that using an extrapolation to determine a 10 year estimate would be impractical and potentially unreliable, and considered that using a sample of real bonds with shorter maturity dates is preferable[22].

[21] See http://www.judgments.fedcourt.gov.au/judgments/Judgments/tribunals/acompt/2015/2015acompt0007.
[22] Available at https://www.erawa.com.au/gas/gas-access/regulatory-discussion-papers/estimating-the-debt-risk-premium.

Submitter	Component	Comment	AEMO's response
Synergy	PC – Reference equipment	Synergy considers that it is timely for the theoretical power station adopted as the basis for the MRCP calculation to be revisited to take into account any changes in technology or products available in the market.	The methodology prescribed in the Market Procedure currently requires the theoretical reference power generating station to be a 160 MW OCGT. Changes to the definition of a power station may be reviewed during the next five-yearly MRCP methodology review in accordance with clause 4.16.9 of the WEM Rules.

APPENDIX A. WACC

The pre-tax real WACC is applied in the determination of the MRCP. The formula is:

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

where

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

and the nominal return on equity is calculated as:

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

while the nominal return on debt is calculated as:

$$R_d = R_f + (DRP + d)$$

Table 8 outlines the WACC parameters applied in the 2015 MRCP and the proposed final 2016 MRCP.

Table 8   WACC parameters for the 2015 and 2016 MRCP

Parameter	Notation	2015 value	2016 value
Nominal risk free rate of return (%)	R_f	3.32	2.92
Expected inflation (%)	i	2.52	2.45
Real risk free rate of return (%)	R_{fr}	0.78	0.46
Market risk premium (%)	MRP	6	6
Asset beta	β_a	0.5	0.5
Equity beta	β_e	0.83	0.83
Debt risk premium (%)	DRP	1.68	2.363
Debt issuance cost (%)	d	0.125	0.125
Corporate tax rate (%)	t	30	30
Franking credit value	γ	0.25	0.25
Debt to asset ratio (%)	D/V	40	40
Equity to total asset ratio (%)	E/V	60	60

APPENDIX B. HISTORICAL MRCP COMPONENT COST BREAKDOWN

Figure 3   Historical MRCP component cost breakdown

	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19
Land cost (LC)	$-	$-	$-	$293	$769	$818	$1,973	$1,783	$2,064	$1,912	$1,831
Fixed fuel cost (FFC)	$2,907	$3,456	$2,631	$3,151	$2,615	$2,825	$2,239	$4,680	$5,442	$5,061	$4,886
Fixed O&M cost	$23,900	$13,363	$14,392	$13,431	$27,335	$26,649	$33,384	$34,239	$33,238	$32,307	$32,582
Transmission cost (TC)	$16,558	$18,017	$20,672	$13,151	$58,493	$51,621	$12,329	$12,164	$16,127	$16,860	$16,624
Power station cost (PC)	$79,110	$107,404	$135,701	$134,091	$149,306	$158,710	$113,971	$104,178	$119,942	$108,649	$103,898
Reserve Capacity Price	$97,835	$108,459	$144,235	$131,805	$186,001	$178,477	$122,428	$120,199	$121,889		

MEASURES AND ABBREVIATIONS

Units of measure

Abbreviation	Unit of measure
AU$	Australian dollar
kW	Kilowatt
MW	Megawatt

Abbreviations

Abbreviation	Expanded name
AEMO	Australian Energy Market Operator
AER	Australian Energy Regulator
ANNUALISED_CAP_COST	Annualised capital cost
ANNUALISED_FIXED_O&M	Annualised fixed operating and maintenance cost
CAP_COST	Capital cost
CC	Capacity Credit
CPI	Consumer price index. Used as a general price inflation index during escalations.
DRP	Debt risk premium
EMR	Electricity Market Review
ERA	Economic Regulation Authority
FFC	Fixed fuel costs
IPART	Independent Pricing and Regulation Tribunal
LC	Land cost
M	Margin to cover legal, approval, financing and other costs and contingencies
MRCP	Maximum Reserve Capacity Price
PC	Power station capital cost
PwC	PricewaterhouseCoopers Australia
RBA	Reserve Bank of Australia
OCGT	Open cycle gas turbine
O&M	Operating and maintenance
SWIS	South West interconnected system
TC	Transmission connection costs
TUOS	Transmission use of system
WA	Western Australia
WACC	Weighted average cost of capital
WEM	Wholesale Electricity Market

LIST OF COMPANY NAMES

The following table lists the full name and Australian Business Number (ABN) of companies that have been referred to in this document.

Company	Full company name	ABN
Jacobs	Jacobs Group (Australia)	37 001 024 095
Landgate	Western Australian Land Information Authority	86 574 793 858
PwC	PricewaterhouseCoopers Australia	52 780 433 757
RBA	Reserve Bank of Australia	50 008 559 486
Western Power	Electricity Networks Corporation	18 540 492 861