2016 Energy Price Limits Decision

21 June 2015

Economic Regulation Authority

WESTERN AUSTRALIA

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Economic Regulation Authority
Perth, Western Australia
Phone: (08) 6557 7900

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DECISION

1. Pursuant to clause 2.26 of the *Wholesale Electricity Market Rules* (**Market Rules**), the Economic Regulation Authority (**Authority**) approves the revised value for the Maximum Short Term Energy Market (**STEM**) Price of $240/MWh for the 2016/17 financial year.

2. Pursuant to clause 2.26 of the Market Rules, the Authority approves the non-fuel and fuel coefficients for the Alternative Maximum STEM Price for the 2016/17 financial year:

   $84.07/MWh + 19.311 multiplied by the Net Ex Terminal distillate fuel cost in $/GJ[1]

3. In accordance with clause 6.20.11 of the Market Rules, the approved revised values for the Maximum STEM Price and the Alternative Maximum STEM Price will apply with effect from the time specified in a notice to be published on the Australian Energy Market Operator's (**AEMO**) website.

REASONS

Background

4. The Energy Price Limits are a set of price limits comprising the Maximum STEM price, the Alternative Maximum STEM price and the Minimum STEM price. The Energy Price Limits are the price caps within which participants in the Wholesale Electricity Market are allowed to bid for or offer energy in the STEM and Balancing Market, as provided for under the Market Rules.[2] These price caps are part of the market power mitigation mechanisms in the market.

5. The maximum price depends on whether gas or liquid fuelled generation is required to meet the electricity demand. The Maximum STEM Price is applied when gas-fuelled generation is required, and the Alternative Maximum STEM Price is applied when liquid-fuelled generation is required.

6. The Market Rules require AEMO to annually review the appropriateness of the value of the Maximum STEM Price and Alternative Maximum STEM Price.[3] In conducting the review, AEMO may propose revised values for the Maximum STEM Price and the Alternative Maximum STEM Price.[4] If it does propose such revised values, AEMO must use the applicable methodology set out in clause 6.20.7(b) of the Market Rules.

7. Clause 6.20.7(b) of the Market Rules stipulates that in conducting the review required by clause 6.20.6 AEMO must calculate the Maximum STEM Price or Alternative Maximum STEM Price using the following formula:

   (1 + Risk Margin) x (Variable O&M + (Heat Rate x Fuel Cost)) / Loss Factor

[1] Currently based on the Perth Terminal Gate Price (less excise and GST).

[2] Clause 7A.2.4

[3] Clause 6.20.6 of the Market Rules.

[4] Clause 6.20.7 of the Market Rules.

Where

i. Risk Margin is a measure of uncertainty in the assessment of the mean short run average cost for a 40 MW open cycle gas turbine generating station, expressed as a fraction;

ii. Variable O&M is the mean variable operating and maintenance cost for a 40 MW open cycle gas turbine generating station, expressed in $/MWh, and includes, but is not limited to, start-up related costs;

iii. Heat Rate is the mean heat rate at minimum capacity for a 40 MW open cycle gas turbine generating station, expressed in GJ/MWh;

iv. Fuel Cost is the mean unit fixed and variable fuel cost for a 40 MW open cycle gas turbine generating station, expressed in $/GJ; and

v. Loss Factor is the marginal loss factor for a 40 MW open cycle gas turbine generating station relative to the Reference Node.

8. AEMO must determine appropriate values for the factors described in (i) to (v) above as applicable to the Maximum STEM Price and Alternative Maximum STEM Price.

9. Where AEMO has proposed a revised value for the Maximum STEM Price and/or the Alternative Maximum STEM Price, AEMO is required to prepare a Draft Report describing how it arrived at the proposed revised values. AEMO must publish the report on the Market Website and advertise the report in newspapers widely published in Western Australia, and request submissions from all sectors of the Western Australian energy industry, including end-users, within six weeks of the date of publication.[5]

10. After considering the submissions on the Draft Report, AEMO must propose a final revised value for any proposed change to an Energy Price Limit and submit those values in its Final Report, including submissions received on the Draft Report, to the Authority for approval.[6]

11. The Market Rules require the Authority to review the Final Report provided by AEMO, including all submissions received by AEMO in the preparation of the report, and to make a decision as to whether or not to approve the revised value for any value comprising the Energy Price Limits.[7]

12. In making its decision as to whether or not to approve any proposed change to an Energy Price Limit, the Authority must only consider:[8]

- whether the revised value for the Energy Price Limit proposed by AEMO reasonably reflects the application of the method and guiding principles for calculating the Energy Price Limits described in clause 6.20 of the Market Rules; and

- whether AEMO has carried out an adequate public consultation process.

[5] Clause 6.20.9 of the Market Rules.

[6] Clause 6.20.10 of the Market Rules.

[7] Clause 2.26.1 of the Market Rules.

[8] Clause 2.26.1(c) of the Market Rules.

AEMO's process

13. Consistent with the approach in previous years, AEMO engaged Jacobs Group (Australia) (**Jacobs**) to assist it in undertaking the 2016 Energy Price Limits review. Jacobs prepared a draft report which was released for public consultation by AEMO on 18 April 2016.[9]

14. The consultation period on Jacobs' draft report closed on 30 May 2016. AEMO did not receive any submissions from stakeholders.

15. On 10 June 2016, AEMO provided the Authority with its final report, together with Jacobs' final report on the review of the Energy Price Limits for the 2016/17 financial year.

16. AEMO subsequently updated the revised Loss Factors determined by Western Power for the 2016/17 financial year and the final values of the Energy Price Limits were provided to the Authority on 16 June 2016. The revised Loss Factor for Pinjar is 1.0322 for the 2016/17 financial year.

17. The Maximum STEM Price approved by the Authority for the 2015/16 financial year, and proposed by AEMO for the 2016/17 financial year are as follows:

Financial year	Maximum STEM Price
2015/16 (Approved)	$253/MWh[10]
2016/17 (Proposed)[11]	$240/MWh

18. Jacobs' report notes that the decrease in the Maximum STEM Price since last year's review has been primarily driven by a reduction in the spot gas price distribution. The decrease in the costs associated with the updated dispatch profile have also had an impact on the decrease in the Maximum STEM Price. A summary of the movement in costs is shown in Figure 1 of Jacobs' final report.

19. The Alternative Maximum STEM Price is recalculated monthly based on changes in the monthly distillate price. The following equation is used to derive the Alternative Maximum STEM Price each month:

> Alternative Maximum STEM Price = Non-fuel coefficient + (Fuel coefficient multiplied by the Net Ex Terminal distillate fuel cost)

20. The Fuel coefficient for the Alternative Maximum STEM price only relates to the distillate fuel price. The non-fuel coefficient for the Alternative Maximum STEM Price relate to the rest of the cost components including variable O&M and fuel transport cost.

[9] See AEMO website, 2016 Energy Price Limits Review, http://wa.aemo.com.au/home/electricity/consultations/2016-energy-price-limits-review

[10] The Maximum STEM Price was not reached in the Balancing Market from 1 July 2015 to the date of this decision. The highest Balancing price reached during this period was $228.23 on 9 January 2016.

[11] Based on Loss Factor for the 2016/17 financial year.

21. The non-fuel and fuel coefficients for the Alternative Maximum STEM Price approved by the Authority for the 2015/16 financial year, and proposed by AEMO for the 2016/17 financial year are as follows:

Financial year	Non-fuel coefficient of the Alternative Maximum STEM Price	Fuel coefficient of the Alternative Maximum STEM Price
2015/16 (Approved)	$74.90/MWh	19.500
2016/17 (Proposed)[12]	$84.07/MWh	19.311

22. The Alternative Maximum STEM Price will vary depending on the distillate fuel price. The June 2016 Alternative Maximum STEM Price of $336/MWh is based on a distillate fuel price of $13.56/GJ. If the distillate fuel price were to remain unchanged, and the proposed parameters for 2016/17 were applied, the Alternative Maximum STEM Price would be $346/MWh.

23. Jacobs' report notes that the most significant influences on the Alternative Maximum STEM Price is the decrease in the distillate price driven by the continuing decrease in the world oil price, and the increase in the variable O&M costs due to a reduction in the Australian Dollar / US Dollar exchange rate and the applied CPI escalation. A summary of the movement in costs is shown in Figure 2 of Jacobs' final report.

The Authority's assessment

24. In January 2014, the Authority published the *Review of the methodology for setting the Maximum Reserve Capacity Price and the Energy Price Limits in the Wholesale Electricity Market* final report, as required under clause 2.26.3 of the Market Rules.[13] The Authority made a number of findings and recommendations it considered would improve the arrangements for determining the Energy Price Limits. The Authority considers any modifications to the arrangements for determining the Energy Price Limits should be considered as part of the Electricity Market Review which is currently in progress.

25. For the purposes of this decision, as required under clause 2.26.1 of the Market Rules, the Authority is required to only consider whether AEMO's proposed values reflect the application of the method and guiding principles for calculating the Energy Price Limits described in clause 6.20 of the Market Rules. Consequently the issues raised in the Authority's review on the methodology are not considered in this decision.

Key parameters

26. The Authority has reviewed Jacobs' Draft and Final Report and AEMO's Final Report on the review of the Energy Price Limits for the 2016/17 financial year. Jacobs' review generally continued with the basis for setting the Energy Price Limits approved by the Authority last year.

[12] Based on a Loss Factor for the 2016/17 financial year.

[13] ERA website, *Review of methodology for setting the Maximum Reserve Capacity Price and the Energy Price Limits in the Wholesale Electricity Market* Report, http://www.erawa.com.au/cproot/12036/2/Review%20of%20methodology%20for%20setting%20the%20MRCP%20and%20the%20EPLs%20in%20the%20WEM.pdf

27. As outlined above, the Market Rules define both the formula for calculating the Maximum STEM Price and Alternative Maximum STEM Price and the key parameters which must be used. The table below sets out the proposed values for the key parameters in relation to the Maximum STEM Price.

Key parameters of the Maximum STEM Price	Units	2016/17 Proposed	2015/16 Approved
Mean Variable O&M	$/MWh	$57.18	$57.33
Mean Heat Rate	GJ/MWh	19.047	19.019
Mean Fuel Cost	$/GJ	$7.57	$8.39
Loss Factor		1.0322	1.0298
Before Risk Margin 6.20.7(b)	$/MWh	$195.54	$210.62
Risk Margin added	$/MWh	$44.46	$42.38
Risk Margin Value	%	22.7%	20.1%
Assessed Maximum Price	$/MWh	$240	$253

28. The parameters required to calculate the Alternative Maximum STEM Price are the same, although the heat rate and fuel cost values differ reflecting the use of distillate rather than gas. The table below sets out the proposed values for the key parameters in relation to the Alternative Maximum STEM Price.

Key parameters of the Alternative Maximum STEM Price	Units	2016/17 Proposed	2015/16 Approved
Mean Variable O&M	$/MWh	$57.18	$57.33
Mean Heat Rate	GJ/MWh	19.098	19.070
Mean Fuel Cost	$/GJ	$13.89	$18.57
Loss Factor		1.0322	1.0298
Before Risk Margin 6.20.7(b)	$/MWh	$313.12	$399.55
Risk Margin added	$/MWh	$33.88	$29.45
Risk Margin Value	%	10.8%	7.4%
Assessed Maximum Price	$/MWh	$346[14]	$429[15]

Selection of generating unit

29. As identified in previous years, whilst clauses 6.20.7(a)(i) and 6.20.7(a)(ii) require the Maximum STEM Price and Alternative Maximum STEM Price to be based on the "highest cost generating works" in the SWIS fuelled by natural gas and distillate, respectively, clause 6.20.7(b) which defines the parameters to be used, refer to a "40 MW open cycle gas turbine generating station". Furthermore, clause 6.20.7(b)

[14] Based on distillate price of $13.56/GJ.

[15] Based on distillate price of $18.17/GJ.

does not specify the type of gas turbine technology, for example aero-derivative or industrial gas turbine.

30. As noted in the Jacobs' final report, previous years' analysis has shown that the Pinjar 40 MW gas turbines (GTs) have the highest cost for short dispatch periods and the Parkeston aero-derivative gas turbines are the next most costly to run for peaking purposes. It also notes the Kwinana twin sets were included in the 2011 review and shown to be very unlikely to have higher dispatch costs than the Pinjar gas turbines. Jacobs notes there is no reason to suggest this would change in the foreseeable future and has only considered the Pinjar GTs and Parkeston aero-derivative gas turbines for analysis in the 2016 review.

31. Jacobs has updated its modelled costs for the candidate machines (i.e. Pinjar GTs and Parkeston) and confirmed that the Pinjar GTs continue to be the highest cost machines.

Mean Variable O&M

32. The Market Rules stipulate that Mean Variable O&M is the mean variable operating and maintenance cost for a 40 MW open cycle gas turbine generating station, and includes, but is not limited to, start-up related costs.

33. As outlined above, consistent with the methodology approved in prior years, costs have been based on the most expensive unit fuelled by natural gas i.e. Pinjar GT. Jacobs has determined the variable O&M costs for Pinjar GT based on engineering data available to Jacobs.

34. In this year's review, Jacobs assessed the maintenance cost in the context of last year's review, and found that there was no material change in the maintenance regime of the relevant gas turbines and general trends in the industry remain unchanged. Jacobs has updated the O&M costs using the same assumptions as in last year's review with a correction for foreign exchange movements since then, and applying a standard CPI cost escalation which is appropriate for the industry.

35. Jacobs notes that a review of the current market was conducted for this year's study and it concluded that it is appropriate to adjust last year's costs for movements in foreign exchange and also escalate costs by CPI.

36. Consistent with previous years, Jacobs continued the same treatment of cost uncertainty and included start-up costs in Variable O&M. Costs were modelled to cover run times of between 0.5 and six hours.

Mean Heat Rate

37. The Market Rules stipulate that the Mean Heat Rate used is the rate at minimum capacity for a 40 MW open cycle gas turbine generating station.

38. As outlined above, consistent with the methodology approved in prior years, the parameters have been based on the most expensive unit fuelled by natural gas i.e. Pinjar GT. Jacobs has retained assumptions used in previous reviews on average heat rates at maximum and minimum capacity provided by the manufacturer.

39. Consistent with the approach approved in previous years, to estimate the heat rate based on the minimum capacity for the Pinjar GTs, Jacobs reviewed historic machine operation to determine an appropriate minimum load. A heat rate was then extracted

from the manufacturer's data for that loading level, as well as the sensitivity of the average heat rate to the variation in output, for modelling the uncertainty in the minimum capacity level.

Mean Fuel Cost

40. The Market Rules stipulate that the Mean Fuel Cost is the mean unit fixed and variable fuel cost for a 40 MW open cycle gas turbine generating station.

41. As outlined above, consistent with prior years, costs have been based on the most expensive unit fuelled by natural gas i.e. Pinjar GT.

Gas Price

42. Jacobs based this year's modelling of the spot gas price forecast on the 'alternative gas price forecast' developed in last year's review, which predicts the gas price distribution as a function of the historical maximum monthly spot gas prices. These prices were obtained from the gasTrading market website which is a short term gas trading platform. In this year's review, Jacobs has modified the methodology to account for expected movements in the contract market that are also expected to flow through to the spot market. Jacobs also made adjustments for unusually low maximum spot gas prices in Western Australia to reflect the recent upwards trend in the gas contract price which also has an influence on the gas spot price.

43. Jacobs's report states that it found a reasonably strong correlation between the Brent crude oil price and the historical maximum monthly spot gas prices in Western Australia. Jacobs expected that the recent upwards trend in the Brent crude oil price will continue in the short to medium term, and considered it reasonable to add an uptrend to the maximum monthly spot gas price forecast to represent the expected movement in the oil price.

44. Consistent with the methodology approved in previous years, the gas price includes both the price at the gas producer's plant gate and the cost of transmission from the plant gate to the delivery point at the power station. Gas transmission costs have been calculated in a manner consistent with the methodology approved in previous years. Also, gas price has been capped at the price which would give the same dispatch cycle cost as the prevailing price of distillate. The Authority considers that this continued approach to be appropriate for this review.

45. The Authority considers Jacobs' approach in estimating spot gas prices for use in setting the Maximum STEM Price to be reasonable for 2016/17. The Authority is of the view that it is appropriate to consider the recent spot market data available and also how likely further developments may influence the market.

46. The Authority notes, as set out in Jacobs report, that it has only used spot price data from the gasTrading platform. As set out in Jacobs' report, there are currently three short term gas trading platforms in WA. These include the gasTrading platform, the Inlet Trading market operated by DBNGP and the gas trading platform operated by Energy Access Services. Of these three platforms, only the spot gas prices in the gasTrading platform are published, which is why Jacobs has only considered these prices.

47. Jacobs recognises that, ideally, prices from all three platforms should be considered, but states it was not achievable within the review time frame as a survey of market

participants will be required for the non-published prices. The Authority notes this issue has recurred in the past few reviews.

48. Given the gas price is a significant parameter in determining the Maximum STEM Price, the issue on the lack of transparency of gas prices as part of the review of the Energy Price Limits should be reviewed as part of the Electricity Market Review which is currently in progress.

Distillate Price

49. As approved in previous reviews by the Authority, Jacobs has used the Singapore gasoil price to estimate the distillate price in deriving the Alternative Maximum STEM Price.

Loss Factor

50. The Market Rules stipulate that the Loss Factor is the marginal loss factor for a 40 MW open cycle gas turbine generating station relative to the Reference Node.

51. As in approved in previous reviews by the Authority, Jacobs obtained the Loss Factors for the 2015/16 financial year from AEMO's website. Consistent with previous years, AEMO subsequently updated the Loss Factors to reflect the latest values determined by Western Power.

Risk Margin

52. The Market Rules stipulate that the Risk Margin is a measure of uncertainty in the assessment of the mean short run average cost for a 40 MW open cycle gas turbine generating station.

53. Consistent with previous years, Jacobs identified the likely variability in key inputs to the calculation of Energy Price Limits and modelled the impact that the variability in the key inputs would have on the dispatch cycle cost. Jacobs chose the Energy Price Limits as the 80th percentile of the output price distribution. The Risk Margin is chosen to be the difference between the mean and the 80th percentile of the output price distribution.[16]

54. Jacobs acknowledges that through this approach, the Risk Margin is an output of the calculation rather than an input in determining the Energy Price Limits. The current Market Rules provide that the Risk Margin is to be determined first as an input, which feeds into the equation in clause 6.20.7(b) in order to calculate the Energy Price Limits. Jacobs considers the approach it has taken to be industry best practice.

55. The Authority considers Jacob's approach in calculating the Risk Margin as an output of the Energy Price Limits calculation to be appropriate, and recommends that a rule change be made to reflect this.

[16] Jacobs states in its final report that the Market Rules allow for the uncertainty of the short run average cost of peaking power to be assessed and a value to be determined that results in a price cap that exceeds the majority of potential circumstances with an acceptable probability, say 80% to 90%. This range is typical of risk margins observed in electricity markets where traders cannot accurately predict future market conditions and yet must strike a fixed price for trading purposes to manage uncertainty.

Coefficients for the Alternative Maximum STEM Price

56. The Alternative Maximum STEM Price is revised every month according to changes in the Singapore Gas Oil (0.5% sulphur) price, as provided in clause 6.20.3(b) of the Market Rules.

57. The Authority notes it has determined in previous reviews that it is more appropriate to approve the coefficients for the Alternative Maximum STEM Price, rather than a single revised value.

58. The Authority notes that Jacobs has calculated the coefficients in line with the methodology approved in previous reviews.

Public Consultation

59. The Authority is satisfied that AEMO has carried out an adequate public consultation process. AEMO published the Draft Report prepared by Jacobs, describing how it arrived at the proposed revised values of the Maximum STEM Price and the Alternative Maximum STEM Price on the Market Website, accompanied by an invitation for submissions. AEMO also published a notice in the West Australian newspaper on 20 April 2016, requesting submissions from all sectors of the Western Australian energy industry, including end-users. AEMO did not receive any submissions.

Conclusion

60. On the basis of the above assessment, the Authority is satisfied that:

- the proposed values for the Energy Price Limits by AEMO reasonably reflect the application of the method and guiding principles for calculating the Energy Price Limits described in clause 6.20 of the Market Rules; and
- AEMO has carried out an adequate public consultation process.