

Determination of the Ancillary Service Margin Peak and Margin Off-Peak parameters

Issues Paper

4 March 2015

Economic Regulation Authority

WESTERN AUSTRALIA

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

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Introduction

Synergy is currently the default provider of the Spinning Reserve Ancillary Service¹ under the *Wholesale Electricity Market Rules* (**Market Rules**). However, the Market Rules also allow other generators to provide such services through an Ancillary Service Contract provided it is a less expensive alternative.²

The Ancillary Service Margin Peak and Margin Off-Peak parameters (**Margin Values**) are required under the Market Rules.³ These parameters reflect the margins applied to the Balancing Price in the settlement calculations of the availability costs to be paid to Synergy for the provision of Spinning Reserve Ancillary Service.

The Market Rules⁴ require the Independent Market Operator (**IMO**) to submit a proposal for the Margin Values to the Economic Regulation Authority (**Authority**) by 30 November of the year prior to the start of the financial year.

The IMO submitted its proposal on the Margin Values for the period from 1 July 2015 to 30 June 2016 on 28 November 2014.⁵ The IMO engaged Jacobs Group (Australia) Pty Ltd (**Jacobs**) to assist in deriving the Margin Values and provided the Authority with a confidential report prepared by Jacobs on the key modelling assumptions used in deriving the Margin Values.

As a result of queries made by the Authority on the IMO's proposal and Jacobs' report on the Margin Values, the IMO became aware of an error in its proposal and Jacobs' report and submitted a revised proposal on 11 February 2015. Subsequently, further queries were made by the Authority on the revised proposal and Jacobs' revised report. The IMO advised a further error was identified and it submitted a second revised proposal to the Authority on 25 February 2015.

The IMO's original and two revised proposals, and Jacobs' original and two revised public reports are available on the Authority's website.⁶

The Market Rules⁷ require that the Authority determine the Margin Values by 31 March 2015. The time period to which the determination applies is from 1 July 2015 to 30 June 2016.

¹ Spinning reserve is reserve that is synchronised to the system that can respond almost immediately and provide frequency or voltage support for a short duration.

² Clause 3.11.8(b) of the Market Rules.

³ Clause 9.9.2.

⁴ Clause 3.13.3A(a).

⁵ Jacobs' 2015/16 Margin Peak and Margin Off-Peak Review confidential final report (24 November 2014) is included as an attachment to the IMO's proposal of the Margin Values.

⁶ See ERA website, Spinning Reserve (Margin_Peak and Margin_Off-Peak), http://www.erawa.com.au/electricity/wholesale-electricity-market/determinations/ancillary-services-parameters/spinning-reserve-margin_peak-and-margin_off-peak

⁷ Clause 3.13.3A.

In determining the Margin Values, the Authority must undertake a public consultation process, which must include publishing an issues paper and issuing an invitation for public submissions.⁸ The Authority has prepared this issues paper to assist interested parties in making submissions on the proposed Margin Values for the 2015/16 financial year as submitted by the IMO.

Given the Authority's independent role, it is not the Authority's practice to engage in consultation with the IMO during the review process. For this reason, the Authority notes that it did not provide any comment to the IMO on Jacobs' key modelling assumptions.

⁸ Required by clause 3.13.3A(b) of the Market Rules.

Invitation to make submissions

Interested parties are invited to make submissions on the Authority's issues paper by **4:00 pm (WST) Wednesday, 18 March 2015** via:

Email address: publicsubmissions@erawa.com.au

Postal address: PO Box 8469, PERTH BC WA 6849

Office address: Level 4, Albert Facey House, 469 Wellington Street, Perth WA 6000

Fax: 61 8 6557 7999

CONFIDENTIALITY

In general, all submissions from interested parties will be treated as being in the public domain and placed on the Authority's website. Where an interested party wishes to make a submission in confidence, it should clearly indicate the parts of the submission for which confidentiality is claimed, and specify in reasonable detail the basis for the claim. Any claim of confidentiality will be considered in accordance with the provisions of section 55 of the *Economic Regulation Authority Act 2003*.

The publication of a submission on the Authority's website shall not be taken as indicating that the Authority has knowledge either actual or constructive of the contents of a particular submission and, in particular, whether the submission in whole or part contains information of a confidential nature and no duty of confidence will arise for the Authority.

General Enquiries

Elizabeth Walters
Economic Regulation Authority
Ph: 08 6557 7900
records@erawa.com.au

Media Enquiries

Richard Taylor
Riley Mathewson Public Relations
Ph: 61 8 9381 2144
Fax: 61 8 9381 3877

Proposed Margin Values

Under the Market Rules, Synergy is the default provider of Spinning Reserve Ancillary Services. The Margin Values determined by the Authority are used to determine the amount Synergy receives for providing this service. The Margin Values⁹ are applied to the Balancing Price in calculating the payment to Synergy.

Table 1 below shows the IMO's proposed Margin Values for 2015/16 on 28 November 2014 (original proposal), 11 February 2015 (revised proposal) and 25 February 2015 (second revised proposal), compared with the approved Margin Values for 2014/15.¹⁰ The table also shows other parameters used in deriving the Margin Values.

Table 1 Margin Values and other parameters used in deriving the Margin Values

Margin Values	Original proposal on 28/11/2014 2015/16	Revised proposal on 11/02/2015 2015/16	Second revised proposal on 25/02/2015 2015/16	Current 2014/15
Margin Off-Peak (%)	26	45	51	14
Margin Peak (%)	26	31	36	15
Average Annual Spinning Reserve Capacity_Off-Peak (MW) ¹¹	178.44	178.44	178.44	201.29
Average Annual Spinning Reserve Capacity_Peak (MW) ¹²	208.84	208.84	208.84	220.48
Estimated Annual Availability Cost (\$M)	7.21	7.25	8.32	5.11
System Marginal Price_Off-Peak (\$/MWh)	32.98	32.98	32.98	31.10
System Marginal Price_Peak (\$/MWh)	47.23	47.23	47.23	45.83

In Jacobs' final report on 2015/16 Margin Peak and Margin Off-Peak Review,¹³ it states the Margin Values are higher than the estimates recommended for the 2014/15 financial year, and this is primarily driven by the higher availability cost.¹⁴ The factors contributing to the higher availability cost in this review are as follows:

⁹ Expressed as a percentage.

¹⁰ These values have no carbon price components as carbon price was repealed in July 2014.

¹¹ The Authority understands from the IMO that the Average Annual Spinning Reserve Capacity depends on which generator is running and on the output of the largest generator running. This information is dynamic and changes in each interval. For this reason, the averages vary between simulation runs which has contributed to slightly different numbers for the Average Annual Spinning Reserve Capacity in 2014/15 with and without carbon price.

¹² See footnote 11.

¹³ See ERA website, Jacobs' 2015/16 Margin Peak and Margin Off-Peak Review public final report (24 February 2015), http://www.erawa.com.au/electricity/wholesale-electricity-market/determinations/ancillary-services-parameters/spinning-reserve-margin_peak-and-margin_off-peak

¹⁴ Availability cost is Synergy's cost of providing Spinning Reserve.

- Cockburn combined cycle gas turbine (**CCGT**) no longer provides Spinning Reserve either directly or through the Load Following raise.¹⁵ Also, NewGen Kwinana CCGT Load Following raise no longer contributes to Spinning Reserve, whereas previously it was providing about 10 per cent of this through Load Following reserve. The Authority understands from the IMO that this is due to the units not meeting System Management's minimum ramp rate for Spinning Reserve services. The change in criterion on minimum ramp rate required for Spinning Reserve services occurred subsequent to the last Margin Values review. The disqualification of Cockburn CCGT and NewGen Kwinana CCGT for Spinning Reserve provision puts upward pressure on the availability cost because the reserve otherwise provided by these units would need to be provided by other higher cost facilities.
- Muja C and Muja D units have reduced maximum Spinning Reserve provision from 20MW to 15MW, leading to an increase in Margin Values. The Authority understands that the IMO requested feedback from Synergy on full extracts of the key assumptions for their facilities. This change resulted from a refinement of assumptions on Muja C and Muja D by Synergy and that there have not been any unit configuration changes.
- Kwinana 5 and 6 have been retired, removing 80MW of possible contribution to Spinning Reserve, which has led to an increase in Margin Values.
- Jacobs' report states that demand growth has added to cost pressures in the system and contributed to an increase in Synergy's cost of providing Spinning Reserve. Jacobs' report states that there is roughly 3% of demand growth since the last Margin Values review.
- The requirement for Synergy to provide Load Rejection Reserve further constrains the operation of Synergy's plant and therefore increases the availability cost. As discussed below, this is the first time the impact of providing Load Rejection Reserve is modelled as part of the review.

The Average Annual Spinning Reserve Capacity refers to the Spinning Reserve capacity requirement, which is dynamic in each interval and set by the dispatch profile in Jacobs' model.

The IMO advised the Average Annual Spinning Reserve Capacity Peak and Off-Peak has decreased in this review, because Jacob's optimised dispatch model projects Collie Power Station will have to run less often or at lower levels than was assumed in prior years' modelling. This is due to the optimised dispatch model requiring Muja C and Muja D to run more often to replace Spinning Reserves Services previously assumed to be provided by NewGen Kwinana's Load Following Ancillary Services. When Collie (which has the highest generator output in the system) turns down, the Spinning Reserve requirement reduces in that interval.¹⁶

The Authority notes that the changes in the assumptions outlined above have led to an increase in the Margin Values in this review. Margin Peak has increased from 15 percent

¹⁵ Spinning Reserve can be provided indirectly through Load Following raise / up.

¹⁶ Clause 3.10.2 of the Market Rules specify the standard for Spinning Reserve Service must be at a level sufficient to cover the greater of 70% of the total output, including Parasitic Load, of the generation unit synchronised to the SWIS with the highest total output at that time; and the maximum load ramp expected over a period of 15 minutes.

to 36 per cent, and Margin Off-Peak has increased from 14 per cent to 51 per cent. These values have no carbon price incorporated.

The Authority invites public submissions on the IMO's proposed Margin Values for the 2015/16 financial year.

Submissions are invited from interested parties on the proposed Margin Values for the 2015/16 financial year.

Modelling of the Margin Values

The Market Rules require the Margin Values to take account of:

- the margin Synergy could reasonably have been expected to earn on energy sales forgone due to the supply of spinning reserve service; and
- the loss in efficiency of Synergy's scheduled generators that System Management has scheduled to provide spinning reserve service that could reasonably be expected due to the scheduling of those reserves.

To determine the appropriate Margin Values, the IMO commissioned Jacobs to calculate the availability cost that could reasonably be expected to be incurred by Synergy for providing Spinning Reserve.¹⁷ In order to estimate the availability cost, Jacobs undertook market simulations that compare the revenue and generation cost outcomes with and without the provision of Spinning Reserve by Synergy.

In this year's review, Jacobs also took into account the impact of Load Rejection Reserve¹⁸ in its calculation to ensure that only the cost of Spinning Reserve was being included in calculating the Margin Values. Jacobs considers that there is an interaction between the cost of providing Spinning Reserve and the cost of providing Load Rejection Reserve with the cost of providing both forms of reserve being higher (or lower) than the sum of providing each reserve separately. Jacobs labelled the difference between these two quantities as the Interaction Cost.

Jacobs consulted with the IMO and determined that the availability cost of providing Spinning Reserve should be the base availability cost¹⁹ plus the Interaction Cost of providing both Spinning Reserve and Load Rejection Reserve, allocated proportionally to the average level of Spinning Reserve²⁰ required relative to the sum of the Spinning Reserve and Load

¹⁷ Compared to the 2014/15 review of the Margin Values, inputs assumptions related to demand and the removal of the carbon price have been updated to reflect the expected values for the 2015/16 financial year.

¹⁸ Load Rejection Reserve is the service of holding capacity associated with a Scheduled Generator or Dispatchable Load in reserve so that the Scheduled Generator can reduce output rapidly or the Dispatchable Load can increase consumption rapidly in response to a sudden decrease in SWIS load. The cost for Load Reject is determined by the Authority every three years and the determined cost has been nil since market commencement.

¹⁹ Base availability cost is the availability cost of providing Spinning Reserve only, with no provision of Load Rejection Reserve.

²⁰ Jacobs' model determines a Spinning Reserve requirement for every interval. As Jacobs is apportioning a 'total cost' it is apportioned using the average of the Spinning Reserve requirement over all relevant intervals.

Rejection Reserve requirements. Jacobs calculated the availability cost for providing Spinning Reserve using the following equation.

Availability cost for providing SR =

Base availability cost for providing SR²¹ + (Interaction Cost²² * SR Proportion²³)

Jacobs used the following equation in their modelling for the base availability cost in peak and off-peak periods for providing Spinning Reserve. The same equation was used in last year's review.

Base availability cost for providing SR =

Synergy's total generation costs with spinning reserve provision

– Synergy's total generation costs without spinning reserve provision

+ (Synergy's total generation volume without spinning reserve provision
– Synergy's total generation volume with spinning reserve provision)
* System marginal price with spinning reserve provision

Having determined the availability cost for providing Spinning Reserve, average annual spinning reserve capacity amount for peak and off-peak periods, and the system marginal price for peak and off-peak periods through market simulations, Jacobs re-arranged the equation in clause 9.9.2(f)²⁴ of the Market Rules to derive the Margin Values.²⁵

This method is described in Jacob's 2015/16 Margin Peak and Margin Off-Peak Review – public final report, which is published on the Authority's website.²⁶

The Authority notes that the modelled Spinning Reserve availability cost using the revised methodology in this year's review is \$8.32 million, and that the modelled Spinning Reserve availability cost based on last year's methodology (without taking into account of an

²¹ Base availability cost is the availability cost of providing Spinning Reserve only, with no provision of Load Rejection Reserve.

²² Interaction Cost = Availability cost (Spinning Reserve and Load Rejection Reserve) – Availability cost (Spinning Reserve only) - Availability cost (Load Rejection Reserve only)

²³ SR Proportion = Average Spinning Reserve provision / (Average Spinning Reserve provision + Average Load Rejection Reserve provision)

²⁴ Clause 9.9.2(f) provides the settlement equation to be used in calculating spinning reserve payment to be paid to Synergy.

²⁵ $Margin(t) = (SR_Availability_Payment(t) - \sum(c \in CAS_SR, ASP_SRPayment(c,m) / TITM)) / (0.5 \times Bal_Price(t) \times \max(0, SR_Capacity(t) - LF_Up_Capacity(t) - \sum(c \in CAS_SR, ASP_SRQ(c,t))))$

²⁶ See ERA website, Jacobs' 2015/16 Margin Peak and Margin Off-Peak Review public final report (24 February 2015), http://www.erawa.com.au/electricity/wholesale-electricity-market/determinations/ancillary-services-parameters/spinning-reserve-margin_peak-and-margin_off-peak

Interaction Cost) would be \$7.36 million.²⁷ The Authority understands that the Interaction Cost can be positive or negative in different modelled samples. In this review, the overall average of the modelled Interaction Cost is positive.

The IMO's first revised proposal

As a result of queries made by the Authority on the IMO's proposal and Jacobs' report on the Margin Values, the IMO became aware of an error in its proposal and Jacobs' report and submitted a revised proposal. The IMO's first revised proposal showed that as a result of correcting the error:

- Margin Peak has increased from the originally proposed value of 26 per cent to the revised proposed value of 31 per cent.
- Margin Off-Peak has increased from the originally proposed value of 26 per cent to the revised proposed value of 45 per cent.

The increase in Margin Values resulted from three factors:

- 1) Reversion of an incorrect assumption relating to the "Load Following Up Capacity" parameter which is part of the equation in calculating Margin Values. This was the key error in Jacob's calculations.

In its original report, Jacobs adopted an incorrect assumption on "Load Following Up Capacity" and included only the subset which qualified as Spinning Reserve. The correct assumption which had been adopted in previous years by Jacobs is that System Management and the IMO settlement system make no distinction between qualifying and non-qualifying Load Following Up.

The Authority understands that the reason for Jacobs changing this assumption in its original report stemmed from System Management disqualifying the Cockburn and NewGen Kwinana CCGT from providing Spinning Reserve through Load Following Up for the first time in this review. The reversion of the incorrect assumption would lead to an increase in "Load Following Up Capacity" which would result in an increase in Margin Values.²⁸

- 2) Update of Spinning Reserve provision assumptions with respect to the Bluewaters units to better reflect Bluewaters' Ancillary Service contract and how System Management manage Spinning Reserve.
- 3) Correction of a minor error relating to leap-year calculation.

The IMO notes the errors would have resulted in an underpayment to Synergy for Spinning Reserve provision, as the Margin Values are applied to the Balancing Price in the settlement calculation of the availability cost to be paid to Synergy for Spinning Reserve provision.

²⁷ This amount refers to "Cost of SR Only", page 31 of Jacobs' *2015/16 Margin Peak and Margin Off-Peak Review* public final report (24 February 2015), http://www.erawa.com.au/electricity/wholesale-electricity-market/determinations/ancillary-services-parameters/spinning-reserve-margin_peak-and-margin_off-peak

²⁸ $\text{Margin}(t) = (\text{SR_Availability_Payment}(t) - \text{Sum}(c \text{ e } \text{CAS_SR,ASP_SRPayment}(c,m) / \text{TITM})) / (0.5 \times \text{Bal_Price}(t) \times \max(0, \text{SR_Capacity}(t) - \text{LF_Up_Capacity}(t) - \text{Sum}(c \text{ e } \text{CAS_SR,ASP_SRQ}(c,t))))$

The IMO's second revised proposal

Further queries were made by the Authority on the revised proposal and Jacobs' revised report. As a result, the IMO identified a further error and it submitted a second revised proposal to the Authority. This error relates to the methodology for calculating the Interaction Cost.

Referring to the table 10-2 and table 10-3 in Jacob's report,²⁹ the Authority understands from the IMO that the Interaction Cost should be calculated as follows.

$$\text{Interaction Cost} = \text{Cost of SR given provision of LRR} - \text{Cost of SR only}$$

The Authority understands from the IMO that Jacobs has erroneously calculated the Interaction Cost as follows.

$$\text{Interaction Cost} = \text{Cost of SR given provision of LRR} - \text{Cost of SR only} - \text{Cost of LRR only}$$

This error has resulted in the calculation of a lower availability cost, and hence lower Margin Values. The IMO's second revised proposal shows that as a result of correcting the error:

- Margin Peak has increased from the revised proposed value of 31 per cent to the second revised proposed value of 36 per cent.
- Margin Off-Peak has increased from the revised proposed value of 45 per cent to the second revised proposed value of 51 per cent.

As part of the Margin Values determination for the 2015/16 financial year, the Authority intends to examine Jacobs' modelling approach in deriving the Margin Values to ensure Jacobs' approach is appropriate and the modelled Margin Values reflect the requirements under the Market Rules.

Submissions are invited from interested parties on the methodology used by Jacobs in its modelling to derive the Margin Values for the 2015/16 financial year.

²⁹ See ERA website, Jacobs' *2015/16 Margin Peak and Margin Off-Peak Review* public final report (24 February 2015), http://www.erawa.com.au/electricity/wholesale-electricity-market/determinations/ancillary-services-parameters/spinning-reserve-margin_peak-and-margin_off-peak