

MARKET SUSPENSION PRICING SCHEDULE

FINAL REPORT AND DETERMINATION

Published: November 2018





EXECUTIVE SUMMARY

The publication of this Final Report and Determination (Final Report) concludes the Rules consultation process conducted by AEMO to consider amendments to the Estimated Price Methodology under the National Electricity Rules (NER).

In the first stage of consultation, AEMO received four submissions with varied opinions. AEMO held a meeting on 22 August 2018 with participants of the Market Suspension Working Group and participants who submitted responses in the first stage of consultation to further discuss the key issues.

In the second stage of consultation, AEMO received no further submissions.

The improvement to the Estimated Price Methodology arising from this consultation is to impose a cap/floor on the output prices from the market suspension price schedules, aligned with the levels used during administered pricing (currently \$300/MWh and -\$300/MWh, respectively). This was supported at the 22 August 2018 meeting.

AEMO's final determination is to amend the Estimated Price Methodology in the form published with this Final Report following implementation in AEMO's market systems (implementation is expected to occur by summer 2019). Once implemented, the Estimated Price Methodology will be published in AEMO's standard template format for NER procedures, including introductory text, definitions and version history.



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1. STAKEHOLDER CONSULTATION PROCESS

As required by clause 3.14.5(e) of the NER, AEMO has consulted on the Estimated Price Methodology¹ in accordance with the Rules consultation process in rule 8.9.

The consultation steps undertaken by AEMO are outlined below.

Deliverable	Date
Notice of first stage consultation and Issues Paper published	29 June 2018
First stage submissions closed	6 August 2018
Draft Report & Notice of second stage consultation published	21 September 2018
Submissions due on Draft Report	8 October 2018
Final Report published	16 November 2018

The publication of this Final Report marks the end of the consultation.

Note that there is a glossary of terms used in this Draft Report at Appendix A.

2. BACKGROUND

2.1. NER requirements

The following NER clauses are relevant to this consultation.

3.14.5 Pricing during market suspension

...

(b) If, in *AEMO's* reasonable opinion, it is not practicable to operate *central dispatch* and determine *dispatch prices* and *ancillary service prices* in a *suspended region* in accordance with rules 3.8 and 3.9, *AEMO* must set *dispatch prices* and *ancillary service prices* for the *suspended region* at the prices applicable to the relevant *dispatch interval* in the current market suspension pricing schedule developed and published in accordance with paragraph (e).

...

(e) *AEMO* must:

- 1) develop in accordance with the *Rules consultation procedures* a methodology to be used by *AEMO* (estimated price methodology) to prepare and update schedules containing reasonable estimates of typical *market* prices during the periods to which the schedules relate (market suspension pricing schedules);
- 2) develop and update the market suspension pricing schedule in accordance with the estimated price methodology, to be used during any period in which the *spot market* is suspended; and
- 3) *publish* the estimated price methodology promptly after it has been developed and *publish* the market suspension pricing schedule at least 14 days prior to the first day to which the schedule relates.

...

¹ Available here: <https://www.aemo.com.au/-/media/Files/Electricity/NEM/Data/MMS/2017/Estimated-Price-Methodology-Suspension-NER-3-14-5.pdf>.



2.2. Context for this consultation

Following the 2016 South Australian (SA) black system event, AEMO convened a Market Suspension Working Group to seek industry input on potential changes to market suspension arrangements in the National Electricity Market (NEM).

The Working Group raised concerns regarding the existing estimated price methodology. In particular, the existing methodology applies an unfiltered four-week sample of prices for each region. As a result, calculations include any recent price spikes (and, in the case of the energy market, any negative prices). As a result, the schedules could produce atypical price outcomes.

2.3. First stage consultation

AEMO issued a Notice of First Stage Consultation on 29 June 2018². The accompanying Issues Paper³ outlined several possible changes to the estimated price methodology.

AEMO received four written submissions in the first stage of consultation.

AEMO also held one meeting on 22 August 2018. This meeting was with participants from the Market Suspension Working Group and participants who submitted responses in the first stage of consultation.

Copies of all written submissions have been published on AEMO's website at:

<https://aemo.com.au/Stakeholder-Consultation/Consultations/Market-Suspension-Pricing-Consultation?Convenor=AEMO%20NEM>.

2.4. Second stage consultation

AEMO issued a Notice of Second Stage Consultation on 21 September 2018 as part of the Draft Report⁴. The Draft Report addressed the issues raised in the submissions received in the first stage of consultation.

AEMO received no further submissions in the second stage of consultation.

2.5. Rule change – participant compensation following market suspension

Concurrent with AEMO's Market Suspension Pricing Schedule Consultation, the AEMC has been progressing a rule change for participant compensation following market suspension⁵. This rule change was requested by AEMO, with the intent of removing the incentive for generators to withdraw from the market when prices in the Market Suspension Pricing Schedule (MSPS) are low, await direction from AEMO and then be compensated under the directions compensation framework. The rule change aims to remove these incentives by creating a new compensation framework.

Under the new regime, during a MSPS period, scheduled generators will be eligible for compensation to recover their operational costs (based on the average estimated SRMC of the generator's fuel type and respective region, plus an additional premium). Compensation will also be payable to scheduled generators in neighbouring regions in the event that scaling under NER clause 3.14.5(f) results in prices that are too low to cover a generator's estimated costs. The estimated SRMC will be calculated by AEMO using data already obtained for planning purposes.

During commercial operation, if the MSPS price is too low, generators will automatically be paid compensation under the new regime (i.e. to cover their estimated operational costs). Similarly, when a

² Available at: http://www.aemo.com.au/-/media/Files/Stakeholder_Consultation/Consultations/Electricity_Consultations/2018/Market-Suspension-Pricing/Notice-of-First-Stage-Consultation.pdf.

³ Available at: http://www.aemo.com.au/-/media/Files/Stakeholder_Consultation/Consultations/Electricity_Consultations/2018/Market-Suspension-Pricing/Market-Suspension-Pricing-Schedule-Issues-Paper.pdf.

⁴ Available at: http://www.aemo.com.au/-/media/Files/Stakeholder_Consultation/Consultations/Electricity_Consultations/2018/Market-Suspension-Pricing/Market-Suspension-Pricing-Schedule-Draft-Report-and-Determination.pdf.

⁵ Available at: <https://www.aemc.gov.au/rule-changes/participant-compensation-following-market-suspensi>.



generator is under direction during a MSPS period, compensation payments will automatically be based on the new regime (i.e. estimated operational costs rather than 90th percentile price). In both cases, generators are entitled to apply for additional compensation if they are still out of pocket.

As a result of the new compensation regime applying to generators under commercial operation and under directions from AEMO, the rule change has largely mitigated the likelihood of AEMO directions due to insufficiently high prices in the MSPS (caused by capping the MSPS, averaging prices over 4 weeks, or potential price scaling in neighbouring regions).

3. SUMMARY OF MATERIAL ISSUES

The key material issues arising from the proposal and raised by Consulted Persons are summarised in the following table:

No.	Issue	Raised by
1.	Treatment of outliers	AEMO
2.	Averaging horizon	AEMO
3.	Averaging resolution	AEMO
4.	Treatment of days	AEMO
5.	Frequency of publication	AEMO
6.	Approach across energy/ FCAS markets	AEMO



4. DISCUSSION OF MATERIAL ISSUES

4.1. Treatment of outliers

4.1.1. Issue summary and submissions

A key impetus for this consultation was the impact that high Regulation FCAS prices had on the SA Regulation FCAS pricing schedules during the 2016 market suspension. The current methodology includes all prices, and has no explicit consideration of outliers. AEMO considered two alternatives in the Issues Paper. The submissions received varied on the ideal treatment of outliers.

Submissions received in the first stage of consultation

Both ERM Power and Ergon Energy favoured the current approach of including all prices. The proponents argued that these high/ low prices are part of the normal price signals during dispatch, with the high prices balancing out the low (or negative) prices.

AGL favoured the removal of all outliers if the averaging horizon was not sufficiently extended. The purpose would be to ensure that schedules are not skewed by particularly high/ low prices that occur.

Energy Australia favoured an approach of capping/ flooring the schedule prices. The proponent argued that this would preserve pricing signals, whilst limiting extreme outcomes.

AEMO's alternative of capping/ flooring the input prices to the schedules was not favoured by any proponent.

22 August 2018 meeting

The meeting group resolved that excluding or capping/ flooring any of the input prices to the schedules would be inappropriate, as these prices are a result of market outcomes. However, the meeting group was in favour of capping/ flooring the output prices from the schedules. This would maintain reasonable estimates of typical market prices, whilst managing price risk during a time of severe market disruption. Furthermore, the meeting group was in favour of aligning the cap and floor with the levels used during administered pricing (currently \$300/MWh and -\$300/MWh, respectively).

4.1.2. AEMO's assessment

The existence of extreme prices as inputs into the schedules is known to result in very high/ low schedule prices. This can be particularly problematic if a suspended region previously had a local FCAS requirement, causing high prices in the FCAS pricing schedules. Furthermore, generators within a suspended region may be prevented from being dispatched for FCAS. As a result, participants may be exposed to paying high FCAS prices (as per the pricing schedules), however unable to hedge their position by dispatching local generators for FCAS.

AEMO considers that the exclusion or capping/ flooring of these prices is inappropriate, as these prices are representative of actual market outcomes. AEMO believes that capping/ flooring the output prices in the schedules is sufficient to mitigate the concerns with extreme input prices, whilst ensuring that incentives for disorderly bidding are reduced⁶.

4.1.3. AEMO's conclusion

AEMO concludes that a cap and floor will apply to all schedule prices. The levels of the cap and floor will be aligned with the levels used during administered pricing (currently \$300/MWh and -\$300/MWh, respectively), as per NER clause 3.14.1(a) and 3.14.1(b), respectively. Note that the floor will only apply to energy prices, as FCAS prices cannot be negative.

⁶ See 'Principles for pricing during market suspension' in the Issues Paper.



4.2. Averaging horizon

4.2.1. Issue summary and submissions

The primary objective of the averaging horizon is to ensure data used in calculating the schedules are relevant. Currently, an averaging horizon of four weeks is used. AEMO considered four further alternatives in the Issues Paper. The submissions received varied widely on the optimal averaging horizon.

Submissions received in the first stage of consultation

ERM Power favoured the current horizon of 4 weeks. It was argued that a shorter averaging horizon could introduce abnormal price volatility into the schedules, whereas a longer averaging horizon will not be reflective of the market outcomes during the suspension event. Furthermore, although an averaging horizon based on the most recent two years may have an appropriate shape, the magnitude of the prices may not be appropriate.

None of the submissions favoured a horizon of less than 4 weeks. This is in accordance with AEMO's view that a very short averaging horizon would result in the schedules being too susceptible to short-term or event-based volatility in prices.

Energy Australia favoured a horizon of 13 weeks. The proponent argued that this option would provide a trade-off between smoothing out short-term price fluctuations, and preserving medium-term price outcomes.

AGL favoured a horizon of 52 weeks. The proponent argued that this would prevent anomalous market suspension pricing outcomes from occurring.

Ergon Energy favoured a horizon based on 3 representative weeks in the most recent 2 years. The proponent argued that an extended averaging horizon (i.e. 13 weeks or more) is too long and may not account for seasonal effect, whereas a short averaging horizon (i.e. less than four weeks) may be too susceptible to short-term demand/ supply conditions.

22 August 2018 meeting

The meeting group ruled out an averaging horizon of 52 weeks or an averaging horizon based on the most recent two years. This was due to the potential effect of changes in policy (e.g. carbon price) or the supply mix (e.g. generation retirements or increased renewable energy generation uptake).

The group believed that either an averaging horizon of 4 weeks or 13 weeks was appropriate. Some proponents believed that a 13-week horizon could inaccurately represent the pricing/ demand profile during the day, as the timing of the peak periods change across the seasons. However, other proponents suggested that wind generation is a stronger driver for price outcomes (compared to demand). Due to the variability in wind generation, a longer horizon will provide a smoothing effect to the schedules, thereby reducing volatility in the schedules.



4.2.2. AEMO's assessment

The meeting raised the question of what was the primary driver for prices in a region, demand or wind generation. Figures 1 and 2 below illustrate that both demand and wind generation are key contributors to price outcomes. As expected, higher demand is likely to result in higher prices, due to an increased requirement for more expensive generation (locally or inter-regionally). Similarly, higher wind generation is likely to result in low prices, due a decreased requirement for more expensive generation.

Figure 1 Average daily SA price as a result of SA demand (FY16-18)

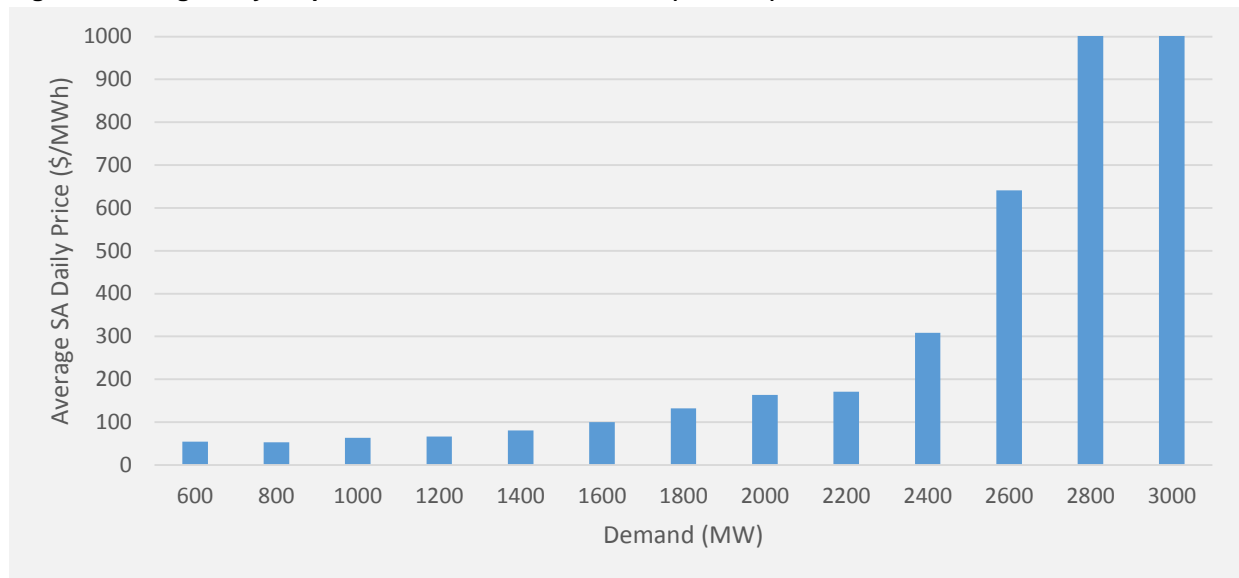
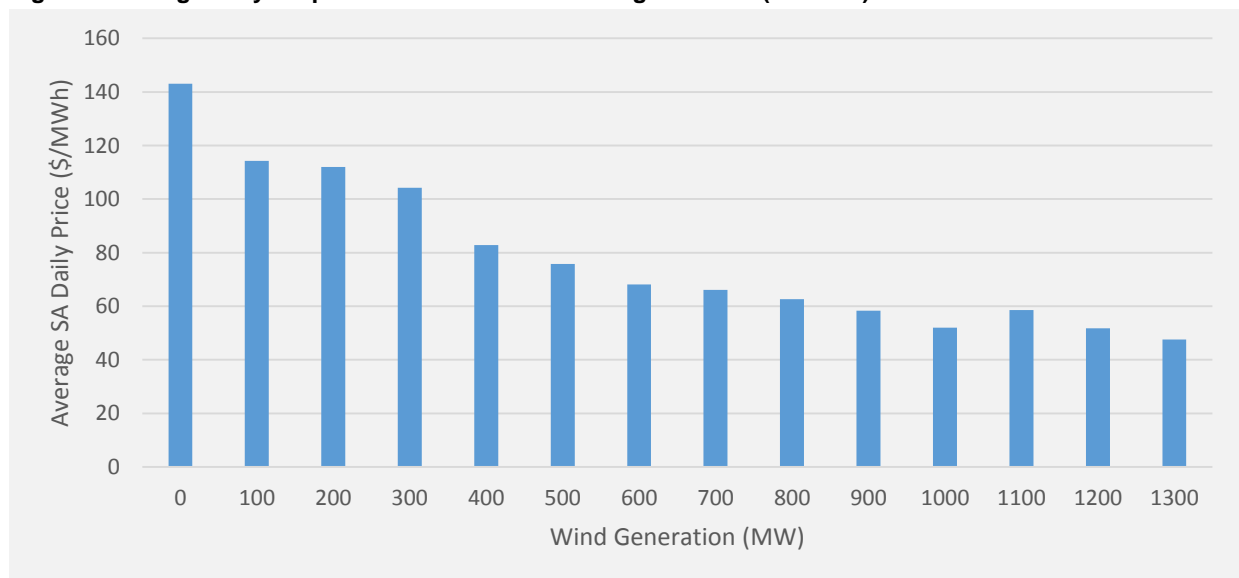


Figure 2 Average daily SA price as a result of SA wind generation (FY16-18)



However, further analysis indicates that the pricing profile for a given day is more closely aligned with demand, as opposed to wind generation. As per Figure 3 below:

- SA prices have a morning peak in winter, coinciding with the morning peak in demand during winter. This does not occur in summer, as rooftop PV ramps up whilst the morning load picks up.
- SA prices have a later evening peak in winter, coinciding with a later evening peak in demand during winter. Once again, rooftop PV is a factor, as the sun sets earlier in the winter period.



As per Figure 4, the correlation between wind generation and price over a day is far less evident.

Figure 3 Average 30-min SA price and average 30-min SA demand (FY16-18)

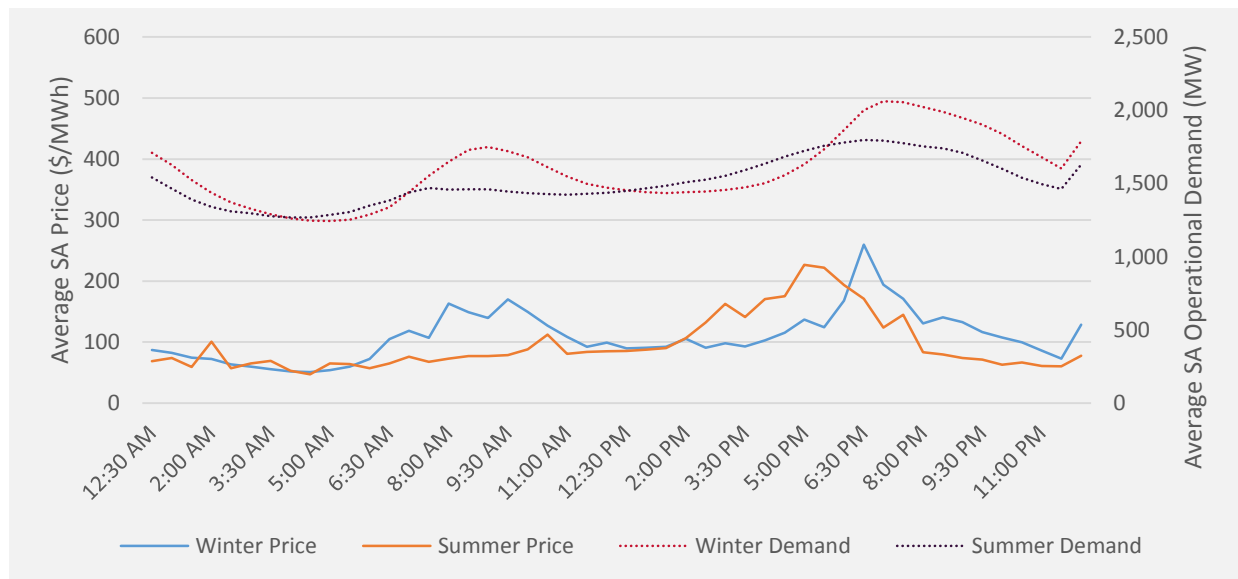
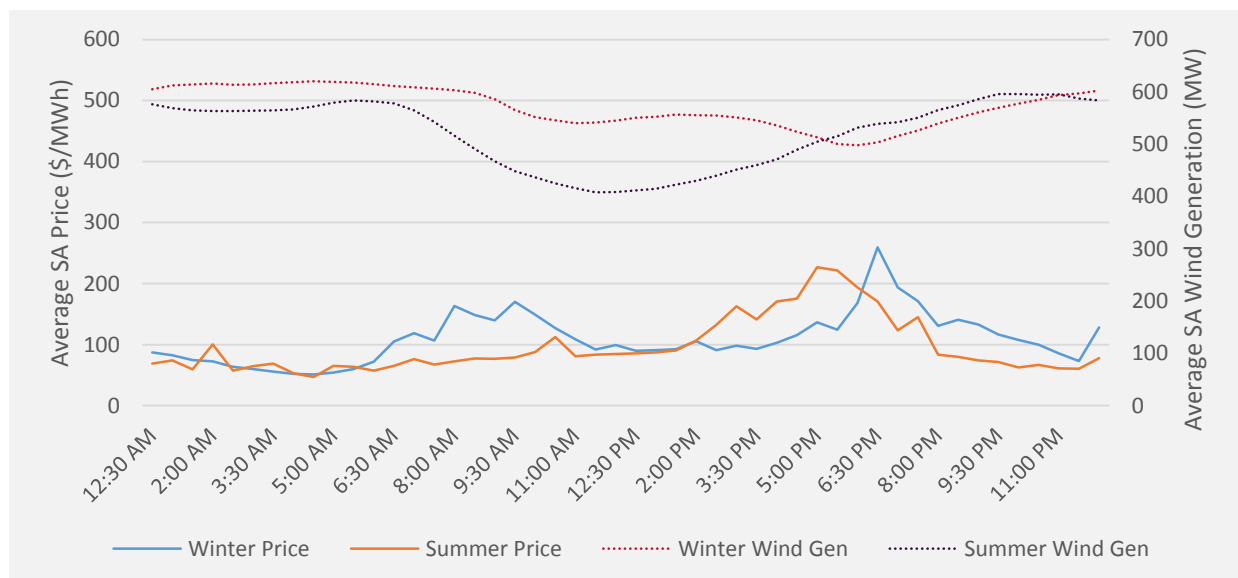


Figure 4 Average 30-min SA price and average 30-min SA wind generation (FY16-18)



In light of the seasonal variations in the price shape (as a result of demand), a shorter time horizon is required. If a longer averaging horizon was used, it is possible that the timing and magnitude of the price peaks used as inputs into the schedules would be incorrect. As a result, the schedules would not be able to reflect reasonable estimates of typical prices for the relevant period.

A final point worth noting is that wind generation will be a stronger driver for price in regions where wind generation is more pervasive. Although this may be the case for SA, it is not necessarily the case across other NEM regions.

4.2.3. AEMO’s conclusion

AEMO concludes that an averaging horizon of four weeks, as per the current estimated price methodology, is most appropriate. There have not been sufficient reasons raised to warrant a change to a different averaging horizon.



4.3. Averaging resolution

4.3.1. Issue summary and submissions

The primary objective of the averaging resolution is to ensure the appropriate time-of-day price signals are achieved. Currently, an averaging resolution of 30 minutes is used. AEMO considered four further alternatives in the Issues Paper. The submissions received were split between maintaining the current approach, and adopting a less granular resolution.

Submissions received in the first stage of consultation

AGL and Ergon Energy favoured the current resolution of 30 minutes. Both proponents believed this achieves appropriate time-of-day signals, but is worth reviewing when the market transitions to 5-minute settlement.

None of the submissions favoured a resolution of 5 minutes or a resolution of 1 day. This is in accordance with AEMO's view that a 5-minute resolution in a 30-minute market will not be reflective of relevant prices, whilst a daily resolution will not provide any price shape across the day. However, the submissions did note that a review of the averaging resolution would be beneficial once 5-minute settlement commences.

Energy Australia favoured a resolution of peak/ off-peak periods. It was argued that this would reduce price volatility, whilst still preserving price shape elements.

ERM Power suggested an alternative approach, a resolution of 3-hour blocks (commencing at 10pm). It was argued that a 30-minute resolution may introduce levels of volatility in the schedules, which could cause frequent rebids by generators. This could lead to difficulties for AEMO to manage power system security and reliability during a period of heightened system stress. Furthermore, ERM Power argued that a low granularity resolution would remove the required pricing signals for efficient dispatch. ERM Power's alternative approach were based on the following considerations:

- Price volatility would be averaged out, to remove the incentives for frequent rebidding.
- Price signals would still be maintained to promote efficient generator and demand management response.
- The blocks would align with daily market demand profiles, and increased penetration of large scale PV farms.
- The blocks align with commonly traded contract definitions in the financial markets.

For further details of ERM Power's alternative approach, please refer to ERM Power's submission in the first stage of consultation.

22 August 2018 meeting

The meeting group was split between the current averaging resolution of 30 minutes, and ERM Power's suggestion of 3-hour blocks. The key concern with the current approach is the potential for high levels of volatility in the schedules, with short-term fluctuations between high and low prices making unit commitment difficult for fast-start plants. Conversely, proponents for the current approach highlighted that a 30-minute resolution would provide very sharp time-of-day signals, whilst prices could be sufficiently smoothed out using the capping/ flooring approach.

Furthermore, the meeting group discussed the possibility of price scaling for neighbouring regions. This occurs when a neighbouring region is exporting to a suspended region (possibly during the evening peak), and the schedule price in the suspended region is lower than in the neighbouring region. In this instance, the price in the neighbouring region would be capped based on the schedule price in the suspended region. This issue can be mitigated by ensuring schedule prices are sufficiently high.

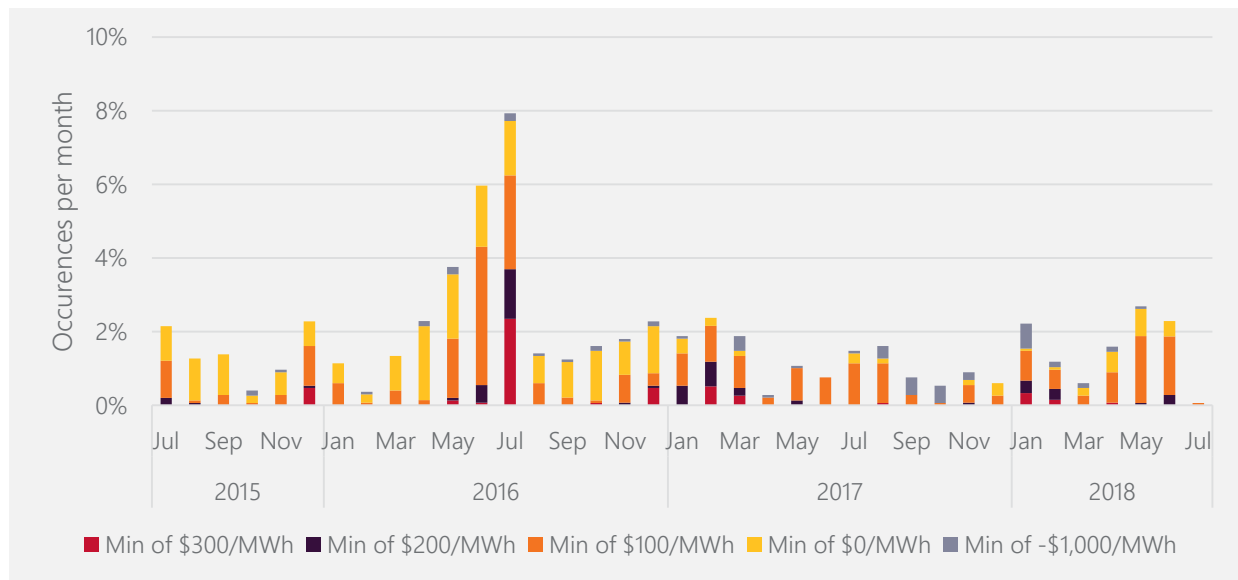


4.3.2. AEMO’s assessment

The meeting group raised the concern of the potential for excessive price volatility impacting the schedules. Figure 5 illustrates the frequency of volatile price outcomes in SA, as follows:

- For each month, the number of TIs of volatile prices has been counted.
 - This applies to instances where the price has first increased by at least \$50/MWh, and then decreased by at least \$50/MWh (or vice-versa).
 - Instances where the price has been constantly increasing (or decreasing) have not been included, as these are not examples of volatile prices.
- These instances have been grouped based on the minimum price in the relevant sequence of three consecutive TIs.

Figure 5 Instances of price volatility in SA (FY6-18)



It is clear that instances of price volatility in SA are very rare, accounting for 1-2% of the time. The notable exception is 2016, where the closure of Northern PS resulted in increased volatility for a few months.

Furthermore, instances of price volatility where the minimum price in the relevant sequence is \$300/MWh (or possibly \$200/MWh) are unlikely to be a concern. At these levels of high prices, the unit commitment for a fast-start unit is less complicated, as prices are sufficiently high to cover their short-run marginal cost.

Thus, maintaining the averaging resolution of 30-minutes does not result in the schedules having unnecessary price volatility⁷. Furthermore, a less-granular averaging resolution is likely to suppress price during the peak periods, increasing the likelihood for interventions by AEMO and increasing the likelihood of impacting neighbouring regions (an unfavourable outcome)⁸.

4.3.3. AEMO’s conclusion

AEMO concludes that an averaging resolution of 30-minutes, as per the current estimated price methodology, is most appropriate. There have not been sufficient reasons raised to warrant a change to a different averaging horizon.

⁷ See ‘Principles for pricing during market suspension’ in the Issues Paper.

⁸ See ‘Principles for pricing during market suspension’ in the Issues Paper.



AEMO notes that with 5-minute settlement commencing in 2021, a review of the averaging resolution may be warranted in light of changing market dynamics.

4.4. Treatment of days

4.4.1. Issue summary and submissions

Currently, separate schedules are produced for weekdays and weekends/ public holidays. In the Issues Paper, AEMO noted that a change in the averaging resolution might warrant a change in the treatment of days.

Submissions received in the first stage of consultation

ERM Power was the only submission to suggest an alternative approach, in line with the suggestion of 3-hour blocks for the averaging resolution. It was noted that the overnight blocks would apply across all days, whilst the daytime blocks would be different for weekdays and weekends/ public holidays.

22 August 2018 meeting

The meeting group did not raise any objections to the current approach, with the exception of ERM Power's suggestion.

4.4.2. AEMO's assessment

As per AEMO's conclusion of maintaining an averaging horizon of 30 minutes, separate schedules should continue to be produced for weekdays and weekends/ public holidays.

4.4.3. AEMO's conclusion

AEMO concludes that separate schedules for weekdays and weekends/ public holidays, as per the current estimated methodology, is most appropriate.

4.5. Frequency of publication

4.5.1. Issue summary and submissions

Currently, schedules are produced on a weekly basis. Furthermore, as per NER clause 3.14.5(e)(3), schedules must be published 14 days in advance of the period to which they relate.

Submissions received in the first stage of consultation

No submissions opposed the current frequency of publication.

ERM Power argued that the current 14-day notification period is no longer required, as participants no longer need to rely on manual processes of determining prices during a suspension event. ERM Power suggested that this notification period could be reduced to at least one day, thereby producing more reasonable estimates of typical market prices.

22 August 2018 meeting

The meeting group had strong support for reducing the notification period. Although rule changes are beyond the scope of this consultation, AEMO invites any interested party to submit a rule change to progress this issue.

4.5.2. AEMO's assessment

The schedules are produced for every week, with publication on a weekly basis the ideal approach.



4.5.3. AEMO's conclusion

AEMO concludes that schedules should continue to be published on a weekly basis, as per the current estimated price methodology.

4.6. Approach across energy/ FCAS markets

4.6.1. Issue summary and submissions

Currently, the same approach is used across all nine markets (i.e. energy and eight FCAS markets).

Submissions received in the first stage of consultation

ERM Power was the only submission that suggested a modified approach for the FCAS markets. The proponent argued that inputs into the schedules that are local FCAS prices should be replaced by global FCAS prices. As a result, non-normal FCAS pricing outcomes would not be considered in the calculation of the schedules.

22 August 2018 meeting

The idea of replacing local FCAS prices with global FCAS prices was discussed at the meeting, however AEMO opposed this idea. The primary issue is that global FCAS prices do not exist. Furthermore, designing a system to calculate the global FCAS price would be very difficult.

4.6.2. AEMO's assessment

Under normal market conditions, the NEM mainland is likely to have a singular FCAS price for a particular service, however Tasmania is likely to have a different price. Furthermore, it is possible that multiple mainland regions could have local FCAS requirements, resulting in several different FCAS prices across the NEM for a particular service. Determining a global FCAS price would be very difficult, with the benefit only realised during a suspension event which had a local FCAS requirement in recent weeks – an unlikely occurrence. Furthermore, by capping the output prices from the schedules, the possible impact of local FCAS prices as inputs to the schedules will largely be mitigated.

4.6.3. AEMO's conclusion

AEMO concludes that the same approach should be used across all nine markets, as per the current estimated price methodology.

5. FINAL DETERMINATION

Having considered the matters raised in submissions and at meetings, in addition to correcting a double negative in clause 1.2(b) by deleting the word "not" and specifying that the schedules are calculated for 30-minute periods (as opposed to trading intervals), AEMO's final determination is to amend the Estimated Price Methodology in the form of Attachment 1, in accordance with clause 3.14.5(e) of the NER, following implementation in AEMO's market systems (implementation is expected to occur by summer 2019). Once implemented, the Estimated Price Methodology will be published in AEMO's standard template format for NER procedures, including introductory text, definitions and version history.



APPENDIX A. GLOSSARY

Term or acronym	Meaning
FCAS	Frequency Control Ancillary Service
NEM	National Electricity Market
NER	National Electricity Rules
SA	South Australia
TI	Trading Interval



APPENDIX B. ATTACHMENT 1 –ESTIMATED PRICE METHODOLOGY

This appendix contains the text that will be included in AEMO’s Estimated Price Methodology following implementation in AEMO’s market systems (implementation is expected to occur by summer 2019). Once implemented the Estimated Price Methodology will be published in AEMO’s standard template format for NER procedures, including introductory text, definitions and version history.



1. ESTIMATED PRICE METHODOLOGY

1.1. General statement of methodology

- (a) Pricing schedules to be used under 3.14.5 of the NER will comprise two sets of 48 values for each *region*. One set represents the 30-minute prices to apply for all weekdays that are not public holidays in the majority of that *region*. The other set applies for all weekend days and public holidays in the majority of that *region*.
- (b) These schedules will be calculated and published each week and will be based on average values for each 30-minute period over the previous four completed weeks prior to the calculation. In calculating these values, allowance will be made for any changes to and from daylight saving time aligning values at local time.

1.2. Detailed requirements

- (a) Each Market Suspension Pricing Schedule report file consists of two sets of 48 30-minute prices for each *region*, for the *energy* and eight FCAS markets.
- (b) One set consists of *region* 30-minute prices that apply to all weekdays (excluding those that are public holidays for the majority of that *region*), and the other set applies to weekend days (including those that are public holidays for the majority of that *region*).
- (c) Day-types are managed through an internal MMS calendar.
- (d) Each *region* weekday price is calculated as the historical average of prices in the MMS database for that *region*, market and 30-minute period for all weekdays within the previous 28 days up to the end of the *billing period* (midnight Saturday) prior to the report's publication date.
- (e) Each *region* weekend price is calculated as the historical average of prices in the MMS database for that *region*, market and 30-minute period for all weekend days within the previous 28 days up to the end of the *billing period* (midnight Saturday) prior to the report's publication date.
- (f) If a 30-minute price produced for the Market Suspension Pricing Schedules exceeds the amount of the *administered price cap* as defined in 3.14.1(a) of the NER, the amount of the *administered price cap* will instead apply for that 30-minute period.
- (g) If a 30-minute price produced for the Market Suspension Pricing Schedules is less than the amount of the *administered floor price* defined in 3.14.1(b) of the NER, the amount of the *administered floor price* will instead apply for that 30-minute period.