INTERVENTION PRICING METHODOLOGY

FINAL REPORT AND DETERMINATION

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EXECUTIVE SUMMARY

The publication of this Final Report and Determination (Final Report) concludes the Rules consultation process conducted by AEMO to improve the Intervention Pricing Methodology.

The modifications to the Intervention Pricing Methodology arising from this consultation will:

- change the calculation of the RHS of feedback constraints in the intervention pricing run; and
- identify generators that have:
    - tripped or partially tripped;
    - been trapped in an FCAS trapezium; or
    - offered zero ramp rates

  and adjust their initial operating points accordingly in the intervention pricing run.

These modifications were identified in collaboration with the Intervention Pricing Working Group (IPWG). The IPWG was formed to provide industry input to AEMO's intervention pricing processes.

In the first stage of consultation AEMO received two submissions that were wholly supportive of the proposed changes, and no dissenting submissions.

In the draft stage of consultation AEMO received no further submissions.

AEMO's final determination is to adopt the Intervention Pricing Methodology in the form published with this Final Report.

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1. STAKEHOLDER CONSULTATION PROCESS

As required by clause 3.9.3(e) of the NER, AEMO has consulted on changes to the Intervention Pricing Methodology in accordance with the Rules consultation process specified 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
Notice of Second Stage Consultation and Draft Report published	3 September 2018
Second stage submissions closed	18 September 2018
Final Report published	28 September 2018

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

There is a glossary of acronyms used in this Final Report at Appendix A.

2. BACKGROUND

2.1. NER requirements

The following NER clauses are relevant to this consultation.

3.9.3 Pricing in the event of intervention by AEMO

(b) Subject to paragraphs (c) and (d), *AEMO* must in accordance with the methodology or assumptions *published* pursuant to paragraph (e) set the *dispatch price* and *ancillary service prices* for an *intervention price dispatch interval* at the value which *AEMO*, in its reasonable opinion, considers would have applied as the *dispatch price* and *ancillary service price* for that *dispatch interval* in the relevant *region* had the *AEMO intervention event* not occurred.

(e) Subject to paragraph (g), *AEMO* must develop in accordance with the *Rules consultation procedures* and *publish* details of the methodology it will use, and any assumptions it may be required to make, to determine *dispatch prices* and *ancillary service prices* for the purposes of paragraph (b).

2.2. Context for this consultation

AEMO directions for system strength in South Australia led to anomalous prices in NSW and Queensland in February 2017. AEMO subsequently engaged consultants (SW Advisory and Endgame Economics) to undertake a comprehensive review of intervention pricing in June 2017. The consultant's final report[1], produced in October 2017, outlined recommended changes to the directions process as well as alternative methodologies for intervention pricing.

AEMO established the Intervention Pricing Working Group (IPWG) to seek industry feedback on the recommended alternative approaches for the Intervention Pricing Methodology. The IPWG was open to all interested parties in the energy industry and consisted of representatives from 14 organisations, including thermal and renewable generators, settlement residue unit holders and the AEMC.

[1] The consultant's report ('Intervention Pricing Final report') is included in the IPWG Meeting 1 – Meeting Pack available at: https://www.aemo.com.au/Stakeholder-Consultation/Industry-forums-and-working-groups/Other-meetings/Intervention-Pricing-Working-Group

AEMO held five meetings with the IPWG between November 2017 and May 2018. The issues and proposed changes to the methodology were discussed extensively at the IPWG meetings, leading to different and preferred changes to the Intervention Pricing Methodology from those recommended by the consultants. There was strong support from the IPWG at the final 30 May 2018 meeting for AEMO to proceed with consultation on the modifications to the Intervention Pricing Methodology that were identified by the IPWG.

2.3. First stage consultation

AEMO issued a Notice of First Stage Consultation on 29 June 2018[2]. The accompanying Issues Paper[3] explained the proposed changes to the Intervention Pricing Methodology arising from the work of the IPWG.

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

Copies of both written submissions are published on AEMO's website at: http://www.aemo.com.au/Stakeholder-Consultation/Consultations/Intervention-Pricing-Methodology-Consultation?Convenor=AEMO%20NEM.

2.4. Second stage consultation

AEMO issued a Notice of Second Stage Consultation on 3 September 2018 as part of the Draft Report[4]. The Draft Report addressed the issues raised in the submissions received in the first stage of consultation. There were no modifications to the proposed changes to the Intervention Pricing Methodology.

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

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.	Feedback constraint RHSs in the intervention pricing run	AEMO
2.	Identification of tripped generators in the intervention pricing run	AEMO
3.	Untrapping generators in the intervention pricing run	AEMO
4.	Generators with zero ramp rates in the intervention pricing run	AEMO

4. DISCUSSION OF MATERIAL ISSUES

4.1. Feedback constraint RHS in the intervention pricing run

4.1.1. Issue summary and submissions

The current calculation of the RHS of feedback constraints in the pricing run can lead to anomalous pricing results.

When AEMO intervenes in the market NEMDE performs two runs:

[2] http://www.aemo.com.au/-/media/Files/Stakeholder_Consultation/Consultations/Electricity_Consultations/2018/Intervention-Pricing/Notice-of-First-Stage-Consultation---Intervention-Pricing-Methodology.pdf

[3] http://www.aemo.com.au/-/media/Files/Stakeholder_Consultation/Consultations/Electricity_Consultations/2018/Intervention-Pricing/Intervention-Pricing-Methodology_Issues-Paper.pdf

[4] http://www.aemo.com.au/-/media/Files/Stakeholder_Consultation/Consultations/Electricity_Consultations/2018/Intervention-Pricing/Intervention-Pricing-Methodology---Draft-Report-and-Determination.docx

- An outturn run, which includes the effects of the intervention, and which is used to dispatch the market; and
- A pricing run, which attempts to exclude the effects of the intervention, and which is used to price the market.

AEMO proposes to use the same RHS for feedback constraint equations in the outturn and pricing runs.

The purpose of a network constraint equation is to manage the flow across a network element within its limits (rating or stability limits). The RHS of the constraint equation reflects the limit across the network element. The technical envelope for a network element in the outturn and pricing runs should be the same, and therefore the RHS of constraint equations reflecting network limits in both runs should also be the same.

The proposed solution involves using the same RHS in the outturn and pricing runs for feedback constraint equations. The RHS calculation would use measured values of generator and interconnector operating points to best represent the prevailing state of the power system in both runs. Further information and analysis is available in the Issues Paper.

The RHS of other generic constraints which are market-related (e.g. negative residue management, non-physical losses, non-conformance, MNSP rate-of-change constraints and FCAS constraints) would continue to be calculated using generator or interconnector targets from the pricing run rather than measured values from the outturn run.

Both submissions supported this approach in the first stage of consultation. There were no further submissions in the second stage of consultation.

4.1.2. AEMO's assessment

The use of generator and interconnector targets in the RHS of feedback network constraints in the pricing run is known to produce anomalous outcomes. AEMO considers that using measured values of generator and interconnector operating points, as is the case in the outturn run, would better enable AEMO to set prices at the values that would have applied if AEMO had not intervened in the market, as required by NER 3.9.3(b). Preservation of the appropriate price signals during intervention pricing will in turn promote allocative and dynamic efficiency.

4.1.3. AEMO's conclusion

AEMO concludes that during an AEMO intervention, the RHS of thermal and stability feedback constraint equations in the pricing run should be calculated using measured values of generator and interconnector operating points, as is currently the case for the outturn run. Details of how this would work are contained in the Intervention Pricing Methodology published with this Final Report.

4.2. Identification of tripped generators in the intervention pricing run

4.2.1. Issue summary and submissions

The current intervention pricing methodology is unable to identify tripped generators in the pricing run.

During conventional dispatch, AEMO issues dispatch targets for generators and interconnectors for the next five minutes, and measures the actual generator and interconnector operating points five minutes later for use as a basis for the next set of dispatch instructions. Continual measurement of the actual state of the power system is essential for managing power system security.

During intervention pricing, the dispatch targets for generators and interconnectors are assumed to be met exactly, and are used as the starting point for the next set of dispatch instructions on which the intervention prices are based. There is no measurement of actual generator operating points, and

therefore no accounting in the pricing run for any generator trips (or partial trips) other than an eventual rebid. Once the rebid enters the market systems with a zero (or much reduced) availability, the pricing run can reduce the target of the tripped generator no faster than the generator's ramp down rate. This means that a tripped generator can continue to influence intervention prices long after it has stopped generating.

The proposed solution compares the bid availability and measured output of a generating unit to its previous dispatch target in the pricing run. If both the bid availability and the measured output of a generating unit are less than its previous pricing run dispatch target minus twice the ramp down rate, the unit is deemed to have tripped, and its measured output will be used in the pricing run. Further information and analysis is available in the Issues Paper.

Both submissions supported this approach in the first stage of consultation. There were no further submissions in the second stage of consultation.

4.2.2. AEMO's assessment

The use of generator targets in the pricing run when those generators have already tripped is known to produce anomalous outcomes. AEMO considers that using the measured generator output in the pricing run, when a generator is known to have tripped, would better enable AEMO to set prices at the values that would have applied if AEMO had not intervened in the market, as required by NER 3.9.3(b). Preservation of the appropriate price signals during intervention pricing will in turn promote allocative and dynamic efficiency.

4.2.3. AEMO's conclusion

AEMO concludes that when a generator can be identified as having tripped during an AEMO intervention, the previous dispatch target should be replaced with the measured generator output during the pricing run. Details of how this would work are contained in the Intervention Pricing Methodology published with this Final Report.

4.3. Untrapping generators in the intervention pricing run

4.3.1. Issue summary and submissions

The current intervention pricing methodology allows generators to remain trapped indefinitely in the pricing run while being untrapped in the outturn run.

Generating units may become trapped at the minimum (or maximum) enablement limits of their FCAS trapezium when enabled for FCAS. This is a consequence of the way in which FCAS offers are represented in NEMDE.

Because generators are assumed to meet their dispatch targets exactly in the pricing run, a generator trapped in the pricing run will remain trapped unless they rebid their FCAS trapezium. In the outturn run that same generator may become untrapped through natural variability in its energy output. The issue is exacerbated because generator trapping is a physical manifestation of market operation, and tends to have less visibility when it occurs in the pricing run – where the focus is on prices – than when it occurs in the outturn run.

The proposed solution identifies trapped generators in the pricing run and applies a small change to the assumed operating point of the generator to untrap them. Further information and analysis is available in the Issues Paper.

Both submissions supported this approach in the first stage of consultation. There were no further submissions in the second stage of consultation.

4.3.2. AEMO's assessment

The current intervention pricing methodology allows a generator to be trapped indefinitely in the pricing run while being untrapped in the outturn run. AEMO considers that untrapping generators in the pricing run would better enable AEMO to set prices at the values that would have applied if AEMO had not intervened in the market, as required by NER 3.9.3(b). Preservation of the appropriate price signals during intervention pricing will in turn promote allocative and dynamic efficiency.

4.3.3. AEMO's conclusion

AEMO concludes that when a generator is trapped in the pricing run it should be untrapped by applying a small change to the generator's assumed operating point. Details of how this would work are contained in the Intervention Pricing Methodology published with this Final Report.

4.4. Generators with zero ramp rates in the intervention pricing run

4.4.1. Issue summary and submissions

The current intervention pricing methodology does not accurately reflect the operation of generators with zero ramp rates.

Generators may offer zero ramp rates. The current intervention pricing methodology assumes that these generators maintain a constant energy output. In practice the output from these generators varies over time, but this variation is not currently reflected in the intervention pricing run.

The proposed solution identifies generators with zero ramp rates, and if a generator has offered a zero ramp rate then its measured output will be used in the pricing run. Further information and analysis is available in the Issues Paper.

Both submissions supported this approach in the first stage of consultation. There were no further submissions in the second stage of consultation.

4.4.2. AEMO's assessment

The current intervention pricing methodology does not accurately reflect the operation of generators that have offered zero ramp rates. AEMO considers that using the measured output in the pricing run for generators that have offered zero ramp rates would better enable AEMO to set prices at the values that would have applied if AEMO had not intervened in the market, as required by NER 3.9.3(b). Preservation of the appropriate price signals during intervention pricing will in turn promote allocative and dynamic efficiency.

4.4.3. AEMO's conclusion

AEMO concludes that if a generator offers a zero ramp rate then its measured output should be used in the pricing run. Details of how this would work are contained in the Intervention Pricing Methodology published with this Final Report.

5. OTHER MATTERS

There will be a delay between modifying the Intervention Pricing Methodology and changing AEMO's market systems. The market systems are expected to be changed in two stages. The first stage will harmonise the calculation of feedback constraint RHSs in the pricing and outturn runs. This is the most important change and is expected to be completed in January 2019. The second stage will implement the remaining improvements to the Intervention Pricing Methodology and be completed as resources allow.

Clause 3.9.3(g) of the NER allows AEMO to make minor and administrative amendments to the Intervention Pricing Methodology without conducting a Rules consultation. AEMO proposes to publish the Intervention Pricing Methodology with the consulted changes in future tense, and amend the changes to the present tense as they are progressively implemented in AEMO's market systems.

6. FINAL DETERMINATION

Having considered the matters raised in submissions, AEMO's final determination is to amend the Intervention Pricing Methodology in the form published with this Final Report, in accordance with clause 3.9.3(e) of the NER.

APPENDIX A. GLOSSARY

Term or acronym	Meaning
FCAS	Frequency Control Ancillary Service
IPWG	Intervention Pricing Working Group
MNSP	Market Network Service Provider
NEMDE	National Electricity Market Dispatch Engine
NER	National Electricity Rules
RHS	Right-Hand Side