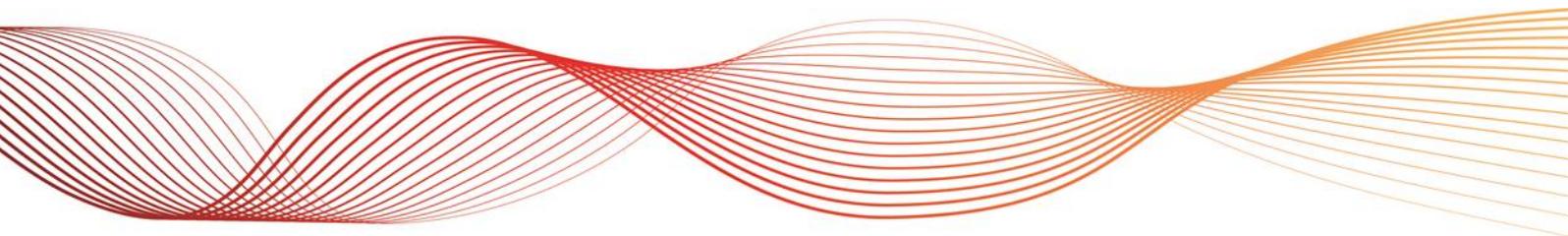




NEM EVENT – DIRECTION 9-11 OCTOBER 2017

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IMPORTANT NOTICE

Purpose

Where the Australian Energy Market Operator (AEMO) intervenes in the National Electricity Market (NEM) through the use of directions, AEMO must publish a report in accordance with National Electricity Rules (NER) clause 4.8.9(f) and 3.13.6A(a). This report satisfies those NER obligations, and is based on information available to AEMO at 22 May 2018.

Unless otherwise indicated, terms in this report have the same meanings as those defined in the NER.

All references to time in this report are based on Australian Eastern Standard Time (AEST).

Disclaimer

AEMO has made every reasonable effort to ensure the quality of the information in this report but cannot guarantee its accuracy or completeness. Any views expressed in this report are those of AEMO unless otherwise stated, and may be based on information given to AEMO by other persons.

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CONTENTS

Purpose	2
Disclaimer	2
1. SUMMARY	4
2. INTERVENTION ASSESSMENT	4
2.1 The need for intervention	4
2.2 Assessment of market response and latest time to intervene	5
2.3 Decision to intervene	5
3. INTERVENTION PROCESS	5
3.1 Adequacy of responses to AEMO inquiries	6
3.2 Participant ability to comply with the intervention	6
4. CHANGES TO DISPATCH OUTCOMES	6
4.1 Application of intervention pricing	8
5. CONCLUSIONS AND FURTHER ACTIONS	8
ABBREVIATIONS	9

TABLES

Table 1	Summary of the three South Australia directions between 9 October 2017 and 11 October 2017	4
Table 2	Timeline of key events on 9 to 11 October 2017	5
Table 3	Estimated changes to local generation in each region (MWh)	7
Table 4	Estimated changes to interconnector flow between regions (MWh)	7



1. SUMMARY

To ensure adequate system strength for secure operation of the South Australian power system, certain combinations of synchronous generating units must be in service at all times¹.

Clause 4.8.9 of the National Electricity Rules (NER) allows AEMO to intervene in the market by issuing directions or clause 4.8.9 instructions, if AEMO is satisfied that it is necessary to maintain or re-establish the power system to a secure, satisfactory, or reliable operating state. Section 116 of the National Electricity Law allows AEMO to issue directions to take certain action if AEMO considers that it is necessary to maintain power system security or for reasons of public safety.

Between 9 October 2017 and 11 October 2017, AEMO issued three directions to South Australian Market Participants to maintain power system security. The three directions are summarised in Table 1.

Table 1 Summary of the three South Australia directions between 9 October 2017 and 11 October 2017

Direction	Directed participant	Issue time	Cancellation time	Direction instruction
Torrens Island B unit 2	AGL SA Generation Pty Ltd	2000 hrs, 9 October 2017	0700 hrs, 11 October 2017	Torrens Island B unit 2 to remain synchronised and follow dispatch targets effective from 2100 hrs on 9 October 2017.
Torrens Island A unit 2 & 4	AGL SA Generation Pty Ltd	0600 hrs, 10 October 2017	0700 hrs, 11 October 2017	Synchronise Torrens Island A unit 2 & unit 4 by 0000 hrs on 11 October 2017 and follow dispatch targets.
Torrens Island A unit 1	AGL SA Generation Pty Ltd	2130 hrs, 10 October 2017	0700 hrs, 11 October 2017	Torrens Island A unit 1 to remain synchronised and follow dispatch targets effective from 2230 hrs on 10 October 2017.

2. INTERVENTION ASSESSMENT

2.1 The need for intervention

To ensure adequate system strength for secure operation of the South Australian power system, certain combinations of synchronous generating units must be in service at all times¹. AEMO continues to investigate system strength requirements in South Australia, and updates the set of viable combinations on a regular basis. The need for intervention, and options considered, were assessed against the set of viable combinations available at 9 October 2017.

At 1336 hrs on 9 October 2017, ENGIE submitted a rebid de-committing Pelican Point PS capacity with effect from 0000 hrs on 11 October 2017. As a result, the 1400 hrs Pre-Dispatch (PD) run on 9 October 2017 (produced at approximately 1330 hrs) indicated that there would be insufficient online synchronous generating units available to meet system strength requirements from 0000 hrs on 11 October 2017. AEMO sought a market response, assessed available options for intervention, and determined the latest time to intervene should a market response not be provided.

An evaluation of plant available for direction was performed and it was decided a combination of 1 x Torrens Island B unit and 3 x Torrens Island A units were required to meet South Australian system

¹ For more information about this requirement, see <http://www.aemo.com.au/Media-Centre/South-Australia-System-Strength-Assessment>.

strength requirements. Due to advised plant limitations, the aforementioned Torrens Island units were unable to be synchronised at once.

While the first two directions were in effect, at 1330 hrs on 10 October 2017, ENGIE advised they were rebidding Pelican Point station out of service from 2230 hrs on 10 October 2017 to 0600 hrs on 11 October 2017. At 1530 hrs on 10 October 2017, AGL submitted a rebid to de-commit Torrens Island A unit 1 capacity from 2230 hrs on 10 October 2017. As a result, AEMO determined that further intervention was required to ensure sufficient online synchronous generating units would be available to meet system strength requirements from 2230 hrs on 11 October 2017.

2.2 Assessment of market response and latest time to intervene

Under NER clause 4.8.5A(a) and (c), AEMO must notify the market of any anticipated power system security or reliability issue and the latest time for market response before AEMO would need to intervene. AEMO issued this market notice (MN 59395) at 1422 hrs on 9 October 2017², and updated the notice (MN 59396) at 1702 hrs on 9 October 2017.

AEMO contacted the Registered Participants who operate eligible synchronous generating units in South Australia to seek their availability for the relevant period, and to determine the latest time to intervene. Those Registered Participants indicated that they did not intend to adjust their market offers, but identified units that would be available if directed. Based on advised lead times and technical capabilities of the units, AEMO assessed that the latest time to intervene was 2000 hrs on 9 October 2017.

2.3 Decision to intervene

At 2000 hours on 9 October 2017, insufficient market response had been provided, and the circumstances giving rise to the need for intervention were still in effect.

AEMO evaluated the estimated costs provided for eligible synchronous generating units, and issued directions to AGL SA Generation Pty Ltd for Torrens Island unit B2 to remain synchronised and follow dispatched targets from 2100 hrs on 9 October 2017.

3. INTERVENTION PROCESS

AEMO considers that it followed all applicable processes under NER Clause 4.8 for the management of the directions between 9 and 11 October 2017³. Timeline of key events on 9 to 11 October 2017 Table 2 provides a high-level timeline of the intervention event.

Table 2 Timeline of key events on 9 to 11 October 2017

Time	Events / comments
9 October 2017	
1422 hrs	AEMO published market notice seeking a market response and latest time to intervene will be advised (MN 59395).
1702 hrs	AEMO published market notice seeking a market response and noting the latest time to intervene was at 2000 hrs on 9 October 2017 (MN 59396).
2000 hrs	Direction issued to AGL SA Generation Pty Ltd for Torrens Island unit B2 to remain synchronised and follow dispatch targets from 2100 hrs on 9 October 2017.

² AEMO Market Notices are at <http://www.aemo.com.au/Market-Notices>.

³ AEMO power system operating procedure SO_OP 3707 "Intervention, Direction and Clause 4.8.9 Instructions", September 2014, available at http://aemo.com.au/-/media/Files/Electricity/NEM/Security_and_Reliability/Power_System_Ops/Procedures/SO_OP_3707---Intervention-Direction-and-Clause-4-8-9-Instructions.pdf.



Time	Events / comments
2000 hrs	Intervention constraints applied to Torrens Island unit B2 units in central dispatch from dispatch interval (DI) ending 2105 hrs on 9 October 2017.
2003 hrs	AEMO published MN 59400 declaring a direction was issued to a SA participant at 2000 hrs.
2003 hrs	AEMO published MN 59402 declaring an AEMO intervention event commenced from DI ending 2000 hrs and that all DIs during the AEMO intervention event to be intervention price dispatch intervals.
10 October 2017	
0553 hrs	AEMO published MN 59406 declaring a direction to a SA participant at 0600 hrs.
0600 hrs	Direction issued to AGL SA Generation Pty Ltd for Torrens Island units A2 and A4 to synchronise and follow dispatch targets by 0000 hrs on 11 October 2017.
1330 hrs	Revised PD now indicates that there would be insufficient online synchronous generating units available to meet system strength requirements from 2230 hrs on 10 October 2017.
1603 hrs	Update to the direction issued to AGL SA Generation Pty Ltd for Torrens Island units A2 and A4 to synchronise and follow dispatch targets by 2230 hrs on 10 October 2017.
2130 hrs	Direction issued to AGL SA Generation Pty Ltd for Torrens Island unit A1 to remain synchronised and follow dispatch targets from 2230 hrs on 10 October 2017.
2130 hrs	Intervention constraints applied to Torrens Island units A2, A4 and A1 in central dispatch from dispatch interval (DI) ending 0000 hrs on 11 October 2017.
2137 hrs	AEMO published MN 59423 declaring a direction was issued to a SA participant at 2130 hrs.
11 October 2017	
0700 hrs	AGL SA Generation Pty Ltd Torrens Island unit B2, A1, A2 and A4 directions were cancelled at 0700 hrs on 11 October 2017 after Torrens Island B unit 3 was online and stable. All intervention constraints were revoked.
0705 hrs	AEMO published MN 59438, 59441, and 59444 declaring the cancellation of the directions.
0706 hrs	AEMO published MN 59445 declaring the cancellation of the intervention event and intervention price dispatch intervals.

3.1 Adequacy of responses to AEMO inquires

NER 4.8.5A(d) permits AEMO to request information from Scheduled Network Service Providers, Scheduled Generators, Semi-Scheduled Generators, and Market Customers.

AEMO is satisfied with the timeliness, adequacy, and effectiveness off all responses to its requests for information prior to issuing directions between 9 October 2017 and 11 October 2017.

3.2 Participant ability to comply with the intervention

NER 4.8.9(d) requires that a Registered Participant must immediately notify AEMO of its inability to comply, or intention not to comply, with a direction or clause 4.8.9 instruction.

AEMO did not receive any indication that a Registered Participant would be unable to comply with the directions.

4. CHANGES TO DISPATCH OUTCOMES

The directions to synchronise and dispatch to technical minimum loads resulted in approximately 3,701 megawatt hours (MWh) of generation being added to the market.

Under NER 3.8.1(b)(11), AEMO must ensure that, as far as reasonably practicable, the number of participants affected by the intervention, and the resulting changes to interconnector flows, are

minimised⁴. AEMO considered the application of counter-action constraints to achieve this objective, but concluded this was not practical during this direction because all South Australian scheduled units were running at technical minimum load or not generating.

Table 3 and 4 summarise the estimated change to dispatch outcomes resulting from this direction. These are estimated by comparing against a simulated dispatch with the direction removed.

From dispatch interval (DI) ending 2105 hrs to DI ending 2130 hrs on 9 October 2017, interaction between Frequency Control Ancillary Service (FCAS) bids and constraints restricted Torrens Island B unit 2 dispatch targets to the minimum enablement limit of its FCAS trapezium in the intervention pricing run. From DI ending 2235 hrs to DI ending 2245 hrs on 10 October 2017, Torrens Island A unit 1 dispatch targets were also restricted to the minimum enablement limit of its FCAS trapezium⁵ in the intervention pricing run. For the purposes of Participant compensation (and comparison in this section), AEMO has performed manual reruns of the intervention period to estimate the dispatch outcomes that would have applied had the direction event not occurred.

On 10 October 2017, ENGIE advised at 1330 hrs on the 10 October 2017 they were rebidding Pelican Point station out of service from 2230 hrs 10 October 2017 to 0600 hrs 11 October 2017.

Torrens Island A2 and A4 units were directed to synchronise at 2230 hrs and follow market targets. As a result, between DI ending 1405 hrs and 2235 hrs, AEMO has also performed manual reruns by invoking direction constraints that align with the synchronisation of these two units.

Directions in one region can cause dispatch changes to other regions. In particular, these changes are driven by economic co-optimisation within the market, and by the interplay between network constraint equations across multiple regions.

These directions displaced local generation in South Australia and increased exports from the region. The increased exports, coupled with an impact on network constraints, resulted in displacement of generation in all regions.

Table 3 Estimated changes to local generation in each region (MWh)

	QLD	NSW	VIC	SA	TAS
Without direction	207,154	230,179	167,830	40,600	51,521
Actual	206,477	229,673	165,977	40,247 +3,701 ^A	51,508
Change	-677	-506	-1,853	+3,348	-13

A. 3,701 MWh is the directed energy

Table 4 Estimated changes to interconnector flow between regions (MWh)

	Terranora	QNI	VIC-NSW	Heywood	Murraylink	Basslink
Without direction^A	-755	7,677	25,416	-2,413	-1,293	13,983
Actual^A	-693	8,286	26,657	-4,811	-2,157	13,964
Change^B	62 MWh less into NSW	609 MWh more into QLD	1241 MWh more into NSW	2399 MWh more into VIC	864 MWh more into VIC	19 MWh less into VIC

A. Positive numbers are for flows flowing north or west, negative for flows flowing south or east.

B. Change = |Actual - Without direction|.

⁴ AEMO's power system operating procedure SO_OP 3707 "Intervention, Direction and Clause 4.8.9 Instructions" describes this objective. In practice, AEMO meets the objective by selecting generating units located in the same region as the directed generation (and, if possible, belonging to the same participant) and then constraining the dispatch of the selected generating units by an equal and opposite amount to that of the directed generating units.

⁵ This affected only the intervention pricing run, which determines the spot prices that should apply during periods of intervention pricing. It did not affect the dispatch run, which determines the dispatch targets issued to Market Participants.



4.1 Application of intervention pricing

AEMO declares intervention pricing for periods subject to an AEMO intervention event. Under intervention pricing, NER 3.9.3(b) requires that AEMO set the dispatch price and ancillary service prices at the value which AEMO, in its reasonable opinion, considers would have applied had the intervention event not occurred. AEMO determines and publishes these prices in accordance with the Intervention Pricing Methodology⁶.

Intervention pricing was applied for this event in accordance with NER 3.9.3(b) for the full intervention period from DI ending 2005 hrs on 9 October 2017 until DI ending 0700 hrs on 11 October 2017.

For the intervention pricing run, Torrens Island B unit 2 dispatch targets were restricted to the minimum enablement limit of its FCAS trapezium between dispatch interval (DI) ending 2105 hrs to DI ending 2130 hrs on 9 October 2017. Torrens Island A unit 1 dispatch targets were also restricted to the minimum enablement limit of its FCAS trapezium between DI ending 2235 hrs and DI ending 2245 hrs on 10 October 2017. While this is consistent with the Intervention Pricing Methodology, it can result in pricing outcomes that do not reflect how the market would have operated had the direction not occurred. AEMO manually resolved this issue to improve the quality of the intervention pricing run once it was identified.

There is a known issue that directed units can become restricted to the minimum enablement of their FCAS trapeziums in the intervention pricing run. AEMO has addressed this issue by following a process to increase Constraint Violation Penalty (CVP) on the intervention constraint. With a higher CVP, units can ramp down to below their minimum enablement limit in the intervention pricing run.

Post-event analysis, AEMO identified that the timing of intervention constraints used for Torrens Island A unit 2 and 4 were incorrect between DI ending 1405 hrs and DI ending 2235 hrs on 10 October. This can result in pricing outcomes that do not reflect how the market would have operated had the directions not occurred.

5. CONCLUSIONS AND FURTHER ACTIONS

Between 9 October 2017 and 11 October 2017, AEMO issued three energy directions to South Australian Market Participants to maintain power system security in response to a forecast lack of system strength.

AEMO is satisfied that all applicable procedures and processes were followed in assessing the need for intervention, determining the latest time to intervene, enacting and managing the intervention, applying appropriate intervention pricing, and ensuring the market remained informed at all stages.

AEMO is also satisfied with the timeliness and adequacy of participant responses and communication throughout.

⁶ Intervention Pricing Methodology at <https://www.aemo.com.au/-/media/Files/PDF/Intervention-Pricing-Methodology-October-2014.pdf>.



ABBREVIATIONS

Abbreviation	Expanded name
AEMO	Australian Energy Market Operator Limited
AEST	Australian Eastern Standard Time
DI	Dispatch Interval
MN	Market Notice
NEM	National Electricity Market
NER	National Electricity Rules
PD	Pre-Dispatch