



NEM Event – Direction 29 August to 8 September 2018

July 2019

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 03 July 2019.

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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ABBREVIATIONS

Abbreviation	Expanded name
AEMO	Australian Energy Market Operator
AEST	Australian Eastern Standard Time
DI	Dispatch Interval
MN	Market Notice
NEM	National Electricity Market
NER	National Electricity Rules
PS	Power Station
SA	South Australia

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1. Summary

To ensure adequate system strength for secure operation of the South Australian (SA) 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 29 August and 8 September 2018, AEMO issued five directions to South Australian Market Participants to maintain power system security. These five directions are classified under four direction events, as summarised in Table 1.

Table 1 Summary of the five South Australia directions between 29 August and 8 September 2018

Direction	Directed Participant	Event No.	Issue time	Cancellation time	Direction instruction
Torrens Island A unit 1	AGL SA Generation Pty Ltd	1	1500 hrs, 29 August 2018	0600 hrs, 30 August 2018	Synchronise and follow dispatch targets from 2330 hrs on 29 August 2018.
Torrens Island B unit 1	AGL SA Generation Pty Ltd	1	1630 hrs, 29 August 2018	1000 hrs, 30 August 2018	Remain synchronised and follow dispatch targets from 0030 hrs on 30 August 2018.
Torrens Island B unit 1	AGL SA Generation Pty Ltd	2	1800 hrs, 30 August 2018	0400 hrs, 31 August 2018	Synchronise and follow dispatch targets from 0030 hrs on 31 August 2018.
Osborne Power Station (PS)	Origin Energy Electricity Ltd	3	0800 hrs, 6 September 2018	1500 hrs, 6 September 2018	Remain synchronised and follow dispatch targets from 1030 hrs on 6 September 2018.
Torrens Island B unit 2	AGL SA Generation Pty Ltd	4	0000 hrs, 8 September 2018	1630 hrs, 8 September 2018	Remain synchronised and follow dispatch targets from 0100 hrs on 8 September 2018.

2. Intervention assessment

2.1 The need for intervention

To ensure adequate system strength for secure operation of the South Australian power system, suitable combinations of synchronous generating units must be in service at all times. 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 from 28 August 2018 for each of the direction events.

¹ See <http://www.aemo.com.au/Media-Centre/South-Australia-System-Strength-Assessment>.

For each of the directions, the need for intervention because:

1. ENGIE submitted a bid at 1248 hrs on 28 August 2018 to de-commit Pelican Point GT from 0000 hrs on 30 August 2018².
2. AGL submitted a bid at 1021 hrs on 28 August 2018 to de-commit Torrens Island B unit 1 from 0030 hrs on 30 August 2018³.
3. ENGIE submitted a rebid at 1718 hrs on 30 August 2018 for a Pelican Point GT to remain out of service⁴.
4. Origin submitted a rebid at 1441 hrs on 5 September 2018 to de-commit Osborne PS from 1030 hrs on 6 September 2018⁵.
5. ENGINE submitted a rebid at 1258 hrs on 7 August 2018 to de-commit Pelican Point GT from 0900 hrs on 8 September 2018⁶.

AEMO determined that there would be insufficient online synchronous units available to meet system strength requirements following these bids and assessed all available options before directing.

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. For each of the direction events, AEMO issued market notices as listed in Table 2.

AEMO contacted all participants who operate suitable synchronous generating units in South Australia to confirm their availability and the latest time to intervene. Those participants indicated they did not intend to adjust their market offers, but identified units that would be available if directed.

For each of the four direction events, AEMO assessed the latest time to intervene taking account of the advised lead times. The latest times to intervene are listed in Table 2.

2.3 Decision to intervene

As all participants contacted had indicated that no market response would be provided, AEMO evaluated the estimated costs, and issued directions as listed in Table 1. AEMO cancelled the directions when relevant synchronous generating units rebid into the market.

3. Intervention process

AEMO considers that it followed all applicable processes under NER Clause 4.8 for the management of the directions between 29 August 2018 and 8 September 2018⁷. Table 2 provides a high-level timeline of the intervention event.

² Rebid reason: 1245~A~RESPOND TO PREDISPATCH D+1~

³ Re-bid reason: 1015~F~00 INITIAL BID~

⁴ Rebid reason: 1715~F~REVISED TOLLING NOMINATION: #723~

⁵ Rebid reason: 1440A CONSTRAINT MANAGEM- S:V_500_HY_TEST SL

⁶ Rebid reason: 1250~A~RESPOND TO PREDISPATCH D+1~

⁷ AEMO. Power system operating procedure SO_OP 3707, "Intervention, direction and clause 4.8.9 instructions", 11 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.

Table 2 Timeline of key events between 28 August and 8 September 2018

Time	Events / comments
28 August 2018	
1021 hrs	AGL submitted a bid to de-commit Torrens Island B unit 1 from 0030 hrs on 30 August 2018
1248 hrs	ENGIE submitted a bid at to de-commit Pelican Point GT from 0000 hrs on 30 August 2018
29 August 2018	
1114 hrs	AEMO published a market notice seeking a market response and noting that the latest time to intervene was pending the 1230 hrs pre-dispatch run on 29 August 2018 (MN 64029). The latest time to intervene was determined to be 1600 hrs on 29 August 2018 (MN 64030).
1500 hrs	<ul style="list-style-type: none"> • Direction issued to AGL to synchronise Torrens Island A unit 1 and follow dispatch targets from 2330 hrs on 29 August 2018. • AEMO published MN 64034 declaring a direction was issued to a SA participant. • AEMO published MN 64036 declaring that an AEMO intervention event had commenced from dispatch interval (DI) ending 1505 hrs and that all dispatch intervals during the AEMO intervention event would be intervention price DIs. • Intervention constraints applied to Torrens Island A unit 1 in central dispatch from dispatch interval (DI) ending 2335 hrs on 29 August 2018.
1630 hrs	<ul style="list-style-type: none"> • Direction issued to AGL for Torrens Island B unit 1 to remain synchronised and follow dispatch targets from 0030 hrs on 30 August 2018 (TORRB1 direction event no. 1). • Intervention constraints applied to Torrens Island B unit 1 in central dispatch from DI ending 0035 hrs on 30 August 2018.
30 August 2018	
0600 hrs	The direction to Torrens Island A unit 1 was cancelled and intervention constraints were revoked.
1000 hrs	<ul style="list-style-type: none"> • The direction to Torrens Island B unit 1 (TORRB1 direction event no. 1) was cancelled and intervention constraints were revoked. • AEMO published MN 64043 declaring the cancellation of the direction.
1718 hrs	ENGIE submitted a rebid for a Pelican Point GT to remain out of service.
1728 hrs	AEMO published a market notice seeking a market response and noting the latest time to intervene was at 1800 hrs on 30 August 2018 (MN 64050).
1800 hrs	<ul style="list-style-type: none"> • Direction issued to AGL for Torrens Island B unit 1 to synchronise and follow dispatch targets from 0030 hrs on 31 August 2018 (TORRB1 direction event no. 2). • AEMO published MN 64052 declaring a direction was issued to a SA participant. • AEMO published MN 64053 declaring that an AEMO intervention event had commenced from DI ending 1800 hrs and that all dispatch intervals during the AEMO intervention event would be intervention price DIs. • Intervention constraints applied to Torrens Island B unit 1 in central dispatch from DI ending 2325 hrs on 30 August 2018 when the unit synchronised.
31 August 2018	
0400 hrs	<ul style="list-style-type: none"> • The direction to Torrens Island B unit 1 (TORRB1 direction event no. 2) was cancelled and intervention constraints were revoked. • AEMO published MN 64056 declaring the cancellation of the direction.
5 September 2018	
1441 hrs	Origin submitted a rebid to decommit Osborne PS.

Time	Events / comments
6 September 2018	
0935 hrs	AEMO published a market notice seeking a market response and noting that the latest time to intervene was 0800 hrs on 6 September 2018 (MN 64093).
0800 hrs	<ul style="list-style-type: none"> • Direction issued to Origin for Osborne PS to synchronise and follow dispatch targets from 1030 hrs on 6 September 2018. • AEMO published MN 64097 declaring a direction was issued to a SA participant. • AEMO published MN 64098 declaring that an AEMO intervention event had commenced from DI ending 0800 hrs and that all dispatch intervals during the AEMO intervention event would be intervention price DIs. • Intervention constraints applied to Osborne PS in central dispatch from DI ending 1035 hrs on 6 September 2018.
1500 hrs	<ul style="list-style-type: none"> • The direction to Osborne PS was cancelled and intervention constraints were revoked. • AEMO published MN 64105 declaring the cancellation of the direction.
7 September 2018	
1814 hrs	AEMO published a market notice seeking a market response (MN 64134). The latest time to intervene was 0000 hrs on 8 September 2018.
1258 hrs	ENGIE submitted a rebid to decommit Pelican Point PS.
8 September 2018	
0000 hrs	<ul style="list-style-type: none"> • Direction issued to Torrens Island B unit 2 to synchronise and follow dispatch targets from 0100 hrs on 8 September 2018. • AEMO published MN 64136 declaring a direction was issued to a SA participant. • AEMO published MN 64137 declaring that an AEMO intervention event had commenced from DI ending 0000 hrs and that all dispatch intervals during the AEMO intervention event would be intervention price DIs. • Intervention constraints applied to Torrens Island B unit 2 in central dispatch from DI ending 0105 hrs on 8 September 2018.
1630 hrs	<ul style="list-style-type: none"> • The direction to Torrens Island B unit 2 was cancelled and intervention constraints were revoked. • AEMO published MN 64154 declaring the cancellation of the direction.

3.1 Adequacy of responses to AEMO inquiries

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 of all responses to its requests from AGL and Origin for information prior to issuing the directions between 29 August and 8 September 2018.

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 direction. AEMO is satisfied with the relevant participants complying with the directions listed in Table 1.

4. Dispatch and pricing outcomes

4.1 Changes to dispatch outcomes due to the direction

The directions to Torrens Island A, Torrens Island B and Osborne PS resulted in approximately 1,879 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 minimised⁸. AEMO considered the application of counter-action constraints to achieve this objective, but concluded this was not practical during this intervention.

Tables 3 and 4 summarise the estimated change to dispatch outcomes resulting from all four direction events. These are estimated by comparing against a simulated dispatch with the direction removed.

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.

Of note is that while these directions displaced market-based generation in South Australia, they also decreased imports into South Australia. The decreased imports, coupled with an impact on network constraints, resulted in displacement of generation in other NEM regions.

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

	QLD	NSW	VIC	SA	TAS
Without direction	227,020	245,789	162,594	44,837	57,458
Actual	229,402	244,895	160,435	44,425 + 1,879 ^A	56,934
Change	+2,382	-894	-2,159	+1,467	-525

A. 1,879 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	-2,822	-81,673	18,832	-6,039	-2,772	14,862
Actual ^A	-2,883	-20,899	17,588	-7,364	-2,842	14,369
Change ^B	60 MWh more into NSW	2,226 MWh more into NSW	1,245 MWh less into NSW	1,325 MWh more into VIC	70 MWh more into VIC	492 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|.

⁸ 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.

4.2 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 Methodology⁹.

Intervention pricing applies whenever the direction meets the region reference node test, that is a direction at the region reference node would have avoided the need for the direction.

AEMO's transfer limit advice on South Australia System Strength provides a number of feasible combinations of generating units that provide the needed level of system strength. All combinations of plant in the limit advice can be fully substituted by directing at the region reference node (Torrens Island) in the current system strength scenarios. Accordingly, system strength directions in South Australia pass the region reference node test and intervention pricing is appropriate.

Intervention pricing was applied for this event in accordance with NER 3.9.3(b), and for the full intervention period from:

- DI ending 1505 hrs on 29 August 2018 until DI ending 1000 hrs on 30 August 2018.
- DI ending 1805 hrs on 30 August 2018 until DI ending 0400 hrs on 31 August 2018.
- DI ending 0805 hrs on 6 September 2018 until DI ending 1500 hrs on 6 September 2018.
- DI ending 0005 hrs on 8 September 2018 until DI ending 1630 hrs on 8 September 2018.

For the duration of the first direction event (intervention period from DI ending 2335 hrs on 29 August 2018 until DI ending 1000 hrs on 30 August 2018), significant generation output differences were observed between the dispatch and intervention pricing run. These differences are largely attributed to network constraint equations that use the "What-if" dispatch targets as inputs. The impact of this divergence is typically small, however in this case resulted in a Queensland generator being more heavily constrained in the intervention pricing run.

While such divergences are consistent with the Intervention Pricing Methodology at that time, they represent suboptimal outcomes – particularly in cases where direction events cover extended periods of time. On 9 January 2019, upon consultation with the Intervention Pricing Working Group, AEMO implemented a change to the central dispatch engine where the Right-Hand Side of feedback constraint equations in the intervention pricing run uses metered Supervisory Control and Data Acquisition (SCADA) values rather than the "What-if" dispatch targets or "What-if" flow targets calculated in the previous interval of the intervention pricing run (if one was performed)⁹.

5. Conclusions and further actions

Between 29 August and 8 September 2018, AEMO issued four direction events to South Australian Market Participants to maintain power system security, in response to a forecast lack of system strength in the region.

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

⁹ Intervention Pricing Methodology, available at http://www.aemo.com.au/-/media/Files/Electricity/NEM/Security_and_Reliability/Dispatch/Policy_and_Process/2018/Intervention-Pricing-Methodology.pdf.

appropriate intervention pricing and seeking market response from all generators capable of meeting the system strength requirements. The market was informed after each direction was issued.

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