AEMO
AUSTRALIAN ENERGY MARKET OPERATOR

Report on Manifestly Incorrect Input that affected dispatch

July 2021

Incorrect SCADA values at Dederang Terminal Station – 17 June 2021

Important notice

PURPOSE

AEMO has prepared this report on a Manifestly Incorrect Input that has affected dispatch in accordance with clause 3.9.2B(g) of the National Electricity Rules.

AEMO has prepared this report using information available as at 18 June 2021.

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VERSION CONTROL

Version	Release date	Changes
1	05/07/2021	First release

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1. Summary

On 17 June 2021 dispatch intervals (DIs) ending 1215 hrs to 1300 hrs were identified as subject to review under the automated procedures for determining a manifestly incorrect input (MII) in clause 3.9.2.B of the National Electricity Rules (NER).

AEMO determined that DIs ending 1215 hrs to 1230 hrs contained a MII due to incorrect Supervisory Control and Data Acquisition (SCADA) values, which were used in central dispatch. In accordance with standard procedures, AEMO subsequently replaced all dispatch prices and market ancillary services prices with the corresponding prices for the last correct dispatch interval (DI ending 1210 hrs). These updated dispatch prices were used to determine the spot prices for trading interval (TI) ending 1230 hrs.

This report describes the circumstances of the event and provides the information to be published in accordance with NER 3.9.2B(g) and outlines:

1. The reasons for the determination that the interval contained a MII
2. Whether the determination was correct
3. What actions will be taken to minimise the risk of a similar event in the future.

2. Description of the MII

2.1 Planned work

At 11:00 hrs on 17 June 2021, AEMO provided permission to AusNet Services to undertake work to replace metering equipment on transformers at Dederang Terminal Station (DDTS). The work was permitted on the basis that the work would affect one piece of apparatus at a time. From around 12:10 hrs, suspect SCADA was observed for some values relating to the DDTS H1 and H2 transformers and was hand-dressed by AEMO staff. Subsequently, further readings on the H1, H2 and H3 transformers intermittently indicated suspect and were used in constraint equations.

2.2 Dispatch intervals subject to review

The MII trigger thresholds for identifying DIs as "subject to review" relate to changes in regional energy prices and cleared interconnector flows, and are described in appendix B of AEMO's Dispatch power system operating procedure (SO_OP_3705), located here.

There were two separate automated MII triggers during this event:

- For DI ending 12:15 hrs there was a change in the Queensland price and the flow across Directlink that exceeded the MII thresholds and hence triggered the automated process.[1]
- For DI ending 12:20 hrs DDTS suspect SCADA data caused constraints to violate, resulting in changes in the South Australian and Victorian prices and the flow across Heywood that exceeded the MII trigger thresholds.

Table 1 lists the energy regional original price (ROP) for all regions, FCAS ROP for all regions, as well as the target flows on all interconnectors for DIs ending 1210 hrs to 1230 hrs on 17 June 2021.

All times referenced in this report are market time (AEST).

Table 1 Regional original prices and interconnector target flows for DIs ending 1210 hrs to 1230 hrs on 17 June 2021.

		DI 1210		DI 1215		DI 1220		DI 1225		DI 1230	
Energy ROP ($/MWh)	NSW	57.37		37.84		38.06		-84.98		-1,000.00	
	QLD	-72.03		0.00		-27.66		-88.32		19.14	
	SA	163.06		180.69		1,018.94		49.45		49.45	
	TAS	166.15		184.38		13,481.06		1,238,275.72		-69.47	
	VIC	184.88		204.13		15,000.01		1,398,663.37		15,515.03	
		Raise	Lower	Raise	Lower	Raise	Lower	Raise	Lower	Raise	Lower
6 sec ROP ($/MWh)	NSW	1.75	0.03	1.40	0.03	1.75	0.03	1.75	0.18	2.00	0.14
	QLD	1.75	49.25	1.40	16.68	1.75	16.68	1.75	0.18	2.00	0.14
	SA	1.75	0.03	1.40	0.03	1.75	0.03	1.75	0.18	2.00	0.14

[1] While DDTS suspect SCADA affected DI ending 12:15 hrs, it is not clear whether this directly contributed to the variations in price and interconnector flow that exceeded the MII trigger thresholds for DI ending 12:15 hrs.

		DI 1210		DI 1215		DI 1220		DI 1225		DI 1230	
	TAS	1.75	0.03	1.40	0.03	1.75	0.03	1.75	0.18	0.49	0.14
	VIC	1.75	0.03	1.40	0.03	1.75	0.03	1.75	0.18	2.00	0.14
60 sec ROP ($/MWh)	NSW	2.29	0.18	2.01	0.15	2.01	0.18	2.00	0.80	2.29	0.50
	QLD	2.29	76.72	2.01	21.12	2.01	49.25	2.00	0.80	2.29	0.50
	SA	2.29	0.18	2.01	0.15	2.01	0.18	2.00	0.80	2.29	0.50
	TAS	2.29	0.18	2.01	0.15	2.01	0.18	2.00	0.80	2.29	0.50
	VIC	2.29	0.18	2.01	0.15	2.01	0.18	2.00	0.80	2.29	0.50
5 min ROP ($/MWh)	NSW	0.75	0.15	0.75	0.07	0.75	0.18	0.80	0.41	0.80	0.41
	QLD	0.75	4.26	0.75	0.07	0.75	0.18	0.80	0.41	0.80	0.41
	SA	0.75	0.15	0.75	0.07	0.75	0.18	0.80	0.41	0.80	0.41
	TAS	0.75	0.15	0.75	0.07	0.75	0.18	0.80	0.41	0.80	0.41
	VIC	0.75	0.15	0.75	0.07	0.75	0.18	0.80	0.41	0.80	0.41
Regulation ROP ($/MWh)	NSW	7.99	10.89	7.99	10.70	11.68	10.60	14.73	14.00	7.99	10.60
	QLD	7.99	15.00	7.99	10.70	11.68	10.60	14.73	14.00	7.99	10.60
	SA	7.99	10.89	7.99	10.70	11.68	10.60	14.73	14.00	7.99	10.60
	TAS	7.99	10.89	7.99	10.70	11.68	10.60	14.73	14.00	7.99	10.60
	VIC	7.99	10.89	7.99	10.70	11.68	10.60	14.73	14.00	7.99	10.60
Interconnectors (MW)	N-Q-MNSP1	54.40		-26.10		-25.00		-104.30		-172.08	
	NSW1-QLD1	-185.64		-122.93		-85.52		111.36		216.24	
	T-V-MNSP1	362.58		334.57		358.50		438.65		468.14	
	V-S-MNSP1	12.67		18.00		-63.00		-127.00		-144.17	
	V-SA	-340.00		-325.45		-478.71		-443.00		-420.00	
	VIC1-NSW1	-11.26		28.86		112.68		307.47		548.41	

In terms of process, initially AEMO publishes that a dispatch interval is subject to review. This is overwritten and prices are indicated as firm when AEMO either replaces or accepts the original prices.[2]

Clause 3.9.2B(e) of the NER states that where AEMO determines that a DI has been affected by a MII, AEMO must replace all the dispatch prices for energy and market ancillary services for all regions in the affected DI with the corresponding prices from the last correct DI. Clause 3.9.2B(f) states that AEMO may only replace prices if no more than 30 minutes have elapsed since publication of dispatch prices for the DI subject to review.

AEMO replaced the dispatch prices for energy and market ancillary services for all regions for the four DIs between DI ending 1215 hrs and DI ending 1230 hrs with the prices from the last correct DI (DI ending 1210 hrs). The replacement of prices was consistent with clause 3.9.2B(e) and clause 3.9.2B(f) of the NER.

[2] By default, original prices are made firm after 30 minutes

Table 2 lists the DIs affected by the MII and the time at which prices were replaced.

Table 2 DIs affected by the MII and the time at which original prices were replaced.

Affected DI	Time at which prices were replaced
DI ending 1215	12:34
DI ending 1220	12:35
DI ending 1225	12:41
DI ending 1230	12:46

2.3 Determination of MII

From around 1100 hrs on 17 June 2021 Ausnet commenced a planned upgrade of metering circuits at DDTS.

At approximately 12:10 hrs alarms were triggered for suspect SCADA data at DDTS. These suspect values were used by the National Electricity Market Dispatch Engine (NEMDE) for DIs ending 1215 hrs, 1220 hrs, 1225 hrs and 1230 hrs. The large variations in dispatch prices and interconnectors flows triggered the price revision process.

The AEMO control room determined that the SCADA values associated with the DDTS H transformers were incorrect. Consequently, the control room deemed these incorrect values to be MIIs. To address the issue, at 12:29 hrs AEMO hand dressed the suspect MVAR values for the DDTS H1, H2 and H3 transformers.[3] While the price revision process was triggered for an extra six DIs, no further MIIs were detected.

The suspect SCADA values caused the constraint V>>V_NIL_4C to bind in dispatch for three DIs from DI ending 1220 hrs. This thermal constraint aims to prevent the overload of the Dederang H3 330/220kV transformer.

3. Scheduling error

A scheduling error occurs when AEMO determines that a DI contained a MII (refer to clause 3.8.24(a)(3) of the NER). As DIs ending 1215 hrs to 1230 hrs were affected by the MII described above, a scheduling error occurred for these four dispatch intervals.

Under clause 3.16.2(a) of the NER, Market Participants affected by a scheduling error may apply to a dispute resolution panel (established under clause 8.2.6A of the NER) for a determination on whether they are entitled to compensation.

[3] MW values had been hand dressed earlier.

4. Assessment

Reasons for the determination

AEMO's automated procedures identified DIs ending 1215 hrs to 1300 hrs on 17 June 2021 as being subject to review, and AEMO determined that DIs ending 1215 hrs to 1230 hrs contained a MII due to incorrect SCADA values resulting from planned work on metering circuits at DDTS. All dispatch and ancillary services prices for DIs ending 1215 hrs to 1230 hrs were replaced with the most recent correct prices, being those determined for DI ending 1210 hrs.

AEMO addressed the incorrect inputs by hand-dressing suspect values from DI ending 12:35, from which time all prices were accepted.

Was the determination correct

AEMO concludes the determination was correct.

Corrective action

AEMO hand dressed the incorrect SCADA values and was in regular contact with Ausnet as it addressed the issue.

AEMO is considering whether the outage assessment process could be improved so that more detailed information (such as, the SCADA and constraints affected by an outage) is included in the Network Outage Schedule (NOS).[4]

Scheduling error

Accordingly, a scheduling error under clause 3.8.24(a)(3) of the NER has occurred for the four DIs between DIs ending 1215 hrs and 1230 hrs.

[4] The NOS lists the planned network outages for work on the transmission system. Refer to: https://aemo.com.au/en/energy-systems/electricity/national-electricity-market-nem/data-nem/network-data/network-outage-schedule

Acronyms

Acronym	Expanded name
AEMO	Australian Energy Market Operator
DDTS	Dederang Terminal Station
DI	Dispatch interval
MII	Manifestly incorrect input
MW	Megawatt
MWh	Megawatt Hour
NEMDE	National Electricity Market Dispatch Engine
NER	National Electricity Rules
NOS	Network Outage Scheduler
PTP	Permission to proceed
ROP	Regional original price
SCADA	Supervisory Control and Data Acquisition
TI	Trading interval
TNSP	Transmission network service provider

Glossary

Term	Definition
Supervisory Control and Data Acquisition	Supervisory Control and Data Acquisition is a system that gathers real-time data from remote terminal units and other communication sources in the field and enables operators to control field devices from their consoles.