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AUSTRALIAN ENERGY MARKET OPERATOR

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Mr John Pierce
Chairman
Australian Energy Market Commission
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By email

Dear Mr Pierce

NEM 5 Minute Dispatch and 30 Minute Settlement: Price Impacts from Late Rebids

As you may be aware, AEMO has established a NEM Wholesale Consultative Forum (NEMW-CF) to facilitate and improve stakeholder engagement on key issues affecting the wholesale electricity market. Earlier this year AEMO presented some analysis to the Forum to assist in its consideration of the impacts from late rebids that are associated with 5 minute dispatch and 30 minute settlement. AEMO was requested to provide this information to the AEMC in the context of the AEMC's consultation on a proposed bidding in good faith rule proposal.

AEMO's report to the NEMW-CF is attached for your consideration in the context of the bidding in good faith rule. The report does not address issues raised in the consultation or options papers prepared by the AEMC as part of this consultation, but provides quantitative analysis of market outcomes that the NEMW-CF considered to be relevant.

Should you have any questions or wish to discuss this further, please contact Scott Maves on (03) 9609 8013 or scott.maves@aemo.com.au.

Yours sincerely

Terry Grimwade
Group Manager, Wholesale

CC. Sebastien Henry

NEMW CONSULTATIVE FORUM

FOR DISCUSSION	
SUBJECT:	NEM 5 MINUTE DISPATCH AND 30 MINUTE SETTLEMENT: PRICE IMPACTS FROM LATE REBIDS
AGENDA ITEM:	3.3
PAPER#:	1
CONTACT:	SCOTT MAVES
DATE:	WEDNESDAY, 30 JULY 2014

1. PURPOSE

To present the findings of a study of the spot market impacts of late rebidding in the National Electricity Market (NEM), as requested by the the National Electricity Market Wholesale Consultative Forum (NEMCF).

2. BACKGROUND

At the NEMCF meeting of 26 March 2014, forum members asked AEMO to investigate and report on the spot market impacts of participant rebids that occur late in the 30-minute settlement interval. At the 28 May 2014 NEMCF meeting, AEMO discussed the analysis to date and agreed to extend it to include spot market impacts for calendar years 2010 and 2013. This paper outlines the results of that study.

The NEM central dispatch process runs every 5 minutes to determine dispatch targets for scheduled generators, loads and network services, and to determine a 5 minute dispatch price for each NEM region. Wholesale energy settlement, however, occurs on a 30 minute trading interval basis using a regional spot price calculated as the average of the six 5-minute dispatch prices.

This design can result in an inconsistency between the pricing signals that influence dispatch activities and the prices that are used for financial settlement.

In analysing the issue for 2010 and 2013, AEMO was guided by the Australian Energy Regulator (AER) market performance report of February 16-22 2014[1] that identified price variations that related to a similar pattern of rebidding in the NEM. It drew attention to rebids made late in the 30-minute settlement interval that reduced capacity in some price bands, and occurred at the same time as a significant price variation.

AEMO reviewed the incidence and impact of this type of rebidding activity. Analysis focussed on those pricing intervals that feature a large variation between the 30 minute settlement price and the 5 minute dispatch price.

[1] http://www.aer.gov.au/sites/default/files/20140216%20-%2020140222%20Weekly%20report.pdf

3. DISCUSSION

3.1. The analysis

The analysis considers all 5-minute dispatch intervals in 2010 and 2013.

AEMO's approach was as follows.

- Classifying each dispatch interval by its rank in a 30-minute settlement period (DI1 to DI6), limiting attention to DI6.
- For each 5-minute dispatch interval, calculating a counterfactual 30-minute settlement price that is the average of all other 5-minute dispatch prices in the same 30-minute settlement interval (excluding the dispatch interval of interest).
- Selecting dispatch intervals with a 5-minute price that had a greater than 30% variation from the corresponding counterfactual (settlement) price.
- Selecting dispatch intervals with the price determined by a bid having a submission time-stamp from the same 30-minute settlement interval.

AEMO analysed the resultant dispatch intervals to measure incidence by region, to identify typical price-setting generation units and measure an approximate price impact.

AEMO also selected a sample of flagged trading intervals to measure the proportion of rebids that featured movement of a dispatched offer-quantity from a low to a higher price band.

The following summarises the results.

3.2. Incidence by region

Using the described approach the following shows incidence by region.

Key findings:

- The percentage of affected settlement intervals in the NEM for 2013 were 0.5% compared to 0.4% in 2010.
- For 2010,
    - Measured incidence was greatest in Tasmania where almost 1.3% of 30-minute settlement intervals (SI) had at least one dispatch interval that was flagged by our approach.
    - South Australia ranked next in terms of measured incidence, with almost 0.9% of settlement intervals affected.
- For 2013,
    - Queensland ranked first in terms of incidence (2.3%) followed by South Australia (1.2%).

Figure 1: Incidence by NEM region: 2010 & 2013

	2010		2013	
Region	Total count of flagged DI6	% 30min SI with vol index>30%, bids within same SI	Total count of flagged DI6	% 30min SI with vol index>30%, bids within same SI
NSW	78	0.4%	35	0.2%
QLD	143	0.8%	410	2.3%
SA	155	0.9%	206	1.2%
TAS	220	1.3%	120	0.7%
VIC	126	0.7%	80	0.5%
Total NEM	722	0.4%	851	0.5%

When compared by price level:

- A large proportion of events happened when the settlement price was at or above the 95th percentile (high prices)

Figure 2: Incidence by 30-minute price percentile

	NSW		QLD		SA		TAS		VIC	
Price range	2010	2013	2010	2013	2010	2013	2010	2013	2010	2013
<90%	14%	8%	56%	13%	55%	13%	60%	38%	43%	18%
90%-95%	2%	0%	3%	23%	3%	14%	4%	16%	10%	5%
95%-100%	84%	92%	41%	64%	42%	73%	36%	46%	47%	77%

- Compared with 2010, in 2013 incidence in this top 5% of settlement prices has generally increased.

3.3. Price impact

The counterfactual price approximates what the published price might have been in the absence of the flagged dispatch interval.

The impact on price was measured by taking the difference between the published settlement price and the estimated counterfactual price. This difference was load-weighted to determine an annual impact.

Negative price differences mean that the published price is higher than the calculated alternative/counterfactual price.

For 2010,

- Annual price impacts were greatest for Tasmania and Queensland. The results suggest that actual published prices for 2010, on average, may have been

Figure 3: Price impacts by year and region

Year	DI	NSW	QLD	SA	TAS	VIC
2010	6	$0.08	-$0.06	-$0.04	-$0.17	-$0.02
2013	6	$0.03	-$0.22	-$0.40	-$0.03	$0.08

    - $0.17/MWh higher in Tasmania than might have otherwise been the case in the absence of the dispatch interval flagged by our relative volatility measure.
    - $0.06/MWh higher in Queensland than might have otherwise been the case in the absence of the dispatch interval flagged by our relative volatility measure.

For 2013,

- Annual price impacts were greatest for South Australia and Queensland. The results suggest that actual published prices for 2013, on average, may have been:
    - $0.40/MWh higher in South Australia than might have otherwise been the case in the absence of the dispatch interval flagged by our relative volatility measure.
    - $0.22/MWh higher in Queensland than might have otherwise been the case in the absence of the dispatch interval flagged by our relative volatility measure.

3.4. Marginal units

Figure 4 lists the top 5 scheduled power stations that were most frequently represented as marginal energy price-setters during those 5-minute dispatch intervals that have been flagged using the described approach.

Also calculated was the percentage of times when these marginal price setters were flagged.

The results focus on the sixth (final) dispatch interval in each 30 minute pricing interval, as the incidence in other dispatch intervals is relatively small.

Figure 4: Top 5 Price-setting power stations: Total NEM 2010 & 2013

Year	Station	Count of 5min DI	Count of flagged 5	% flagged 5 min DI	Count of flagged 5 min DI				
					NSW	QLD	SA	TAS	VIC
2010	Murray	53,657	78	0.15%	9	8	23	17	21
2010	Poatina	50,136	64	0.13%	3	5	6	44	6
2010	Gordon	25,775	51	0.20%	7	4	4	33	3
2010	Liddell	142,160	39	0.03%	12	5	8	3	11
2010	Bayswater	217,494	36	0.02%	10	2	12	5	7
2013	Stanwell	41,428	133	0.32%	6	120	0	4	3
2013	Gladstone	86,806	100	0.12%	2	92	3	2	1
2013	Torrens Island B	59,417	70	0.12%	0	0	69	1	0
2013	Murray	40,478	51	0.13%	6	10	14	10	11
2013	Upper Tumut	22,043	42	0.19%	6	10	12	5	9

Many of these intervals occur in unconstrained system conditions, meaning that units in different regions may be the marginal price-setting unit.

- In 2010, Murray power station tops the list and was involved in 78 events (or 0.15% of the time this station was marginally dispatched) with most of these affecting prices in South Australia, Victoria and Tasmania.
- In 2013, Stanwell power station tops the list and was involved in 133 occasions with most of them affecting the Queensland price.

Figure 5: Top 5 Price-setting power stations by region

Year	NSW	QLD	SA	TAS	VIC
2010	Liddell	Gladstone	Murray	Poatina	Murray
	Bayswater	Callide B	Lake Bonney 2 Wind Farm	Gordon	Liddell
	Murray	Swanbank	Bayswater	John Butters	Loy Yang B
	Gordon	Kogan Creek	Torrens Island B	Murray	Hazelwood
	Vales Point B	Murray	Dry Creek	Loy Yang A	Jeeralang A
	Tumut 3		Liddell		
2013	Stanwell	Stanwell	Torrens Island B	Poatina	Murray
	Murray	Gladstone	Torrens Island A	Murray	Upper Tumut
	Upper Tumut	Braemar	Murray	Reece	Torrens Island A
	Tumut 3	Callide B	Upper Tumut	Gordon	Loy Yang A
	Uranquinty	Braemar 2	Hallett	Loy Yang B	Tumut 3
					Loy Yang B
					Yallourn
					Mortlake

Figure 5 lists the top 5 scheduled power stations for each region that were most frequently represented as marginal price setters during those 5-minute dispatch intervals that have been flagged using the described approach. Power stations identified in both 2010 and 2013 for each region are:

- New South Wales: Tumut 3 Power Station and Murray Power Station
- Queensland: Gladstone Power Station and Callide B Power Station
- South Australia: Murray Power Station, and Torrens Island Power Station “B”

- Tasmania: Poatina Power Station, Murray Power Station and Gordon Power Station
- Victoria: Murray Power Station

3.5. Analysis of rebids

A random sample of the flagged DI6 trading intervals was selected to measure the percentage of rebids that featured the movement of a dispatched offer-quantity from a low to a higher price band. This sample was limited to those scheduled bids with an offer price of greater than $5000/MWh or less than -$800/MWh.

- Of the 85 selected marginal units with scheduled offer prices greater than $5,000/MWh, 68.5% in 2010, and 91.5% in 2013, had shifted the dispatched offer quantity to a higher price band.
- Of the 61 selected marginal units with submitted bid prices less than -$800, about 93.5% in 2010 and almost 100% in 2013, had shifted the dispatched offer quantity to a lower price band.
- The observed rebids tended to occur in clusters within the same day or over consecutive days as shown in the table below.

4. RISKS / FINANCIALS

This report provides the results from the analysis of a market issue for discussion purposes. Limiting assumptions mean that the results and conclusions are indicative, and therefore not reliable as a statement of fact.

5. NEXT STEPS

That the results from this analysis are discussed by the National Electricity Market Wholesale Consultative Forum.

That this paper is submitted to the Australian Energy Market Commission for consideration in its Rule Change Review: Bidding in Good Faith.