

DECLARED WHOLESALE GAS MARKET EVENT REPORT – SCHEDULING – 4 JUNE 2015

PREPARED BY: Market Monitoring and Change

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FINAL

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1 Summary

On 4 June 2015, AEMO published a declared wholesale gas market (DWGM) operating schedule for the 2.00PM scheduling horizon, in which equally beneficial injection bids for Longford meter (30000001PC) were not scheduled to the same extent.

The cause was due to interactions between accredited participant bid constraints, the supply point constraint applied and the MCE's internal constraint to schedule injections with a flat hourly profile.

AEMO investigated the event pursuant to a request under rule 218(2) of the National Gas Rules (NGR). Following that investigation AEMO has decided that the event was not an unintended scheduling result because the estimated financial effect on Market Participants is below the prescribed financial thresholds¹ in the NGR.

This report informs DWGM Market Participants about AEMO's investigation and the reasons for its decision.

2 Event Details

On 4th June 2015 at the 10.00AM schedule, a supply point constraint was applied to the Longford injection meter (30000001PC) to reflect facility limitations due to maintenance. AEMO's market clearing engine (MCE) produced a pricing schedule and an operating schedule with equal tie-breaking between participants at Longford (the scheduled injections for the day were proportionally reduced as a result of constraint application).

However, the constraint application caused market participant (MP) injections to be 'sculpted' unnecessarily. 'Sculpted' injections means that the scheduled hourly injection rate is not flat throughout the day. Injections may be sculpted where MPs have ramp rate constraints in their bid accreditation, however the MCE incorporates logic that attempts to minimise the extent of sculpting that is unrelated to known constraints. In this case, the unnecessary sculpting arose due to interactions between this logic, hourly supply point constraints and response time constraints.

At the 2.00PM schedule, the supply point constraint continued to apply, however there were small changes for individual MPs:

- The MCE did not produce the same tie-breaking in the paired pricing schedule and operating schedule. This should not occur unless caused by congestion within the declared transmission system, which was not the case here.
- Additionally, the interactions that caused unnecessary sculpting in the 10.00AM schedule now caused the tie-breaking in both 2.00PM schedules to be unequal between MPs at Longford.

It was not possible to determine the cause of the unequal tie-breaking and resolve it within the time limits set by section 215 of the NGR, and accordingly an operating schedule was approved with unequal tie-breaking for injection bids at Longford for the 2.00PM scheduling horizon. At the 6.00PM schedule, the tie-breaking issue was resolved and the operating schedule was able to compensate for the 2.00PM to 6.00PM scheduling interval by offsetting MPs' injection quantities during the remainder of the gas day.

¹ Refer rule 217(4) of the NGR.

3 Event Chronology

Time	Event/Action
10:00AM schedule	<ul style="list-style-type: none"> A constraint was applied to profile injections at Longford (with total daily equivalent: 683,461 GJ/d) <ul style="list-style-type: none"> Maximum Hourly Quantity (MHQ) = 24,900 GJ/hr from 1000 hrs to 1300 hrs MHQ = 29,094 GJ/hr from 1400 hrs for the remaining hours of the gas day AEMO produced a pricing schedule and an operating schedule with equal tie-breaking between participants at Longford, however there was some unusual sculpting for participant's injections at Longford.
2:00PM schedule	<ul style="list-style-type: none"> The constraint on Longford injections applied at 10.00AM continued to apply with no changes from the previous schedule. The MCE did not produce the same tie-breaking in the paired pricing schedule and operating schedule, nor did it produce equal tie-breaking between participants on a daily basis. AEMO was unable to diagnose this problem within the scheduling window. AEMO determined that the pricing schedule gave the best outcome of the two schedules (most equitable between participants) and accordingly approved the pricing schedule to be used as the operating schedule.
6:00PM schedule	<ul style="list-style-type: none"> The constraint applied to Longford was raised and changed to a maximum daily quantity constraint –(MDQ) = 700,000 GJ/d (revised from MHQ application in 2.00PM schedule) AEMO was able to produce correct schedules with equal tie-breaking between participants at Longford

4 Cause

The MCE failed to schedule equally priced bids to the same extent at the 2:00PM schedule due to interactions between accredited² participant bid constraints, the supply point constraint (SDPC) and the MCE's internal constraint to schedule injections with a flat hourly profile (minimise sculpting). The internal constraint attempts to schedule bids with a net zero difference between future hours after the initial hour plus any response time³.

Some injection bids at Longford have accreditation that restricts their ability to be rescheduled to certain hours, while others are free to be rescheduled at any time.

For all current day schedules on 4 June, the SDPCs applied limited the total quantity to \$0.0000/GJ bids with Authorised MDQ⁴ from which the MCE scheduled according to daily tie-breaking rules.

At the 10:00AM schedule, all injection bids with Authorised MDQ were scheduled to the same extent on a daily basis (i.e. tie-breaking was as expected) but were sculpted to allow for the SDPC MHQ change at 2:00PM and also to account for those bids that had ramp rate constraints. The MCE's internal constraint prevented any change to hourly flows until an accredited bid constraint and the SDPC changed. This resulted in the more flexible bids being scheduled with a lower share

² The aim of accredited bid constraints is to ensure that each Market Participant can reflect operational or contractual restrictions on their ability to supply or consume gas, so that their resultant scheduling instructions are more reflective of the quantities that they are able to inject or withdraw at the hourly level. Accredited bid constraints are not public information.

³ For example, if a bid has a one hour response time and no ramp rate limit, it would be scheduled flat from 11:00AM onwards for a 10:00AM schedule.

⁴ Total \$0 bids were 710,475GJ – of these only 705,475GJ had AMDQ. At the 2:00PM schedule an SDPC of 683,461GJ (daily equivalent) was applied.

of the hourly scheduled flow until 2:00PM and a higher share of the hourly scheduled flow thereafter (thereby balancing the daily quantities).

At the 2:00PM schedule, flexible bids were again scheduled with a lower share of hourly scheduled flow hourly compared to the bids with time-restricted accreditation. However, while the bids that were subject to ramp rate constraints had an opportunity to respond after 6:00PM, there were no changes to the SDPC MHQ and there was no subsequent window for the MCE to change scheduled flows to rebalance shares as had happened for the 10:00AM schedule.

While the flexible bids increased their share of the scheduled hourly flows, the bids with time-restricted accreditation maintained a larger relative share of the scheduled flows up due to the sculpting at the 10:00AM schedule, which was only partially offset by the increase of the SDPC MHQ at 2:00PM.

As for the different tie-breaking outcomes between the pricing and the operating schedules, the MCE achieves tie-breaking by minimising a tie-breaking penalty. On occasions there may be more than one solution that minimise the penalty equally – either is valid. The MCE then may select one randomly subject to other interactions with other constraints. Since the pricing and the operating schedules have different constraints (one models the network), they may not solve with the same tie-breaking solution.

5 Market Impact

For the purpose of the analysis, AEMO simulated scheduling results were obtained by applying a daily (rather than hourly) SDPC to the 2:00 PM schedule which allows even tie-breaking between participants (and represents the current operational solution to the issue that caused this event). No other changes to AEMO scheduling inputs were made. There was no impact to gas prices.

It is assumed that no changes to participant allocations at Longford would have been made if an alternative operating schedule with equal tie-breaking had been published for the 2.00PM scheduling interval.

Financial impacts

Some registered participants have chosen to trade in the DWGM market using different Market Participant (MP) IDs. MPs registered under the same ABN were grouped and a net financial impact was determined for each of these groups.

The estimated individual financial impact (underpayments or overcharges to MP) is calculated by summing changes to imbalance payments, deviation payments and linepack account allocations for individual entities registered as MPs (i.e. grouped by a common ABN). The net impacts for those entities who are worse off is then aggregated to calculate the total financial impact for all MPs.

The estimated financial impact for this event is summarised as follows:

- no MP was better off (undercharged or overpaid) by more than \$1,806;
- no MP was worse off (overcharged or underpaid) by more than \$4,489; and
- the total financial impact for (total underpayments or overcharges to) all MPs was \$7,851.

6 Assessment of the Event

In its assessment of the event AEMO has considered whether the outcome is an unintended scheduling result. As indicated in Table 1, AEMO has determined that the scheduling outcome does not meet the financial thresholds criteria for unintended scheduling results.

AEMO does not have reasonable grounds to suspect a breach of the Wholesale Market Procedures and has therefore only assessed this event with respect to the requirements of the NGR.

Table 1 Assessment of the event

ASSESSMENT CRITERIA	ASSESSMENT
<p>NGR 217 Unintended scheduling results</p> <p>(1) If scheduling instructions issued as part of an operating schedule produce one or more of the following results:</p> <p style="padding-left: 20px;">(a) equally beneficial bids are not scheduled to the same extent;</p> <p>then that result will be an unintended scheduling result unless...</p> <p>(4) ... its estimated financial impact⁵ for an individual Market Participant is less than \$23,471 or for all Market Participants is less than \$58,679.</p>	<p>While the scheduling outcome meets the criteria for unintended scheduling results when assessed against rule 217(1)(a), it does not meet the criteria for unintended scheduling results when assessed against rule 217(4).</p> <p>Consequently, AEMO does not consider this to be an unintended scheduling result.</p>

7 Further Actions

Following this incident AEMO investigated whether there were options to minimise a re-occurrence and found that the MCE could be modified to improve tie-breaking outcomes under the same scenario and to prioritise tie-breaking over scheduling with a flat hourly profile. However, such a change may increase deviation charges if the injector does not follow the variable hourly profile. A cost benefit analysis would need to be undertaken in conjunction with market participants if feedback is received that this option should be pursued.

AEMO also found that this outcome would not occur if all injection bids for the facility have the same accredited constraints or if a maximum daily constraint had been applied at the 2:00PM schedule (rather than an hourly constraint). Aligning participants' accredited constraints was identified as a possible solution, however it requires the cooperation of market participants and consultation would be required. Currently, AEMO is able to avoid the outcome reoccurring by using a mixture of daily and hourly constraints in such circumstances, however this increases complexity in the scheduling process and therefore risk of scheduling errors.

⁵ The financial thresholds specific here have been adjusted to reflect the change in the Consumer Price Index in accordance with rule 217(5).

Appendix – Further Analysis

Gas prices

The event had no discernible impact on gas prices

Market prices					
Schedule	6:00 AM	10:00 AM	2:00 PM	6:00 PM	10:00 PM
Published (\$/GJ)	\$6.2011	\$10.1000	\$7.5000	\$7.8500	\$8.8600

Deviation quantities and payments

The primary impact to MPs from this event was from changes to their deviations at the Longford injection point, due to unequal sculpting during the 2.00PM to 6.00PM scheduling interval. The overall impact to deviations in the market was **\$3,554**.

Imbalance quantities and payments

There were some impacts to MP imbalance payments due to the unequal tie-breaking that occurred for the 2.00PM schedule. However the magnitude of these impacts was very small due to the fact that daily quantities for participants were balanced in the 6.00PM schedule for the duration of the gas day. The net overall impact to imbalance quantities in the market was **\$0**, as aggregate injection quantities for each scheduling horizon were not impacted.

Linepack account

The daily amount added to the linepack account is the negative of the sum of total daily imbalance and deviation payments and is apportioned to each MP in accordance with their share of the total quantity of gas withdrawn on the relevant gas day. The overall impact to linepack account in the market was **\$3,554** (based on the change in deviation payments).