

# DECLARED WHOLESALE GAS MARKET EVENT REPORT – GAS DAY 4 FEBRUARY 2013

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## Glossary

<b>Terms or Abbreviations</b>	<b>Explanation</b>
AEMO	Australian Energy Market Operator
AEST	Australian Eastern Standard Time
DR	Disaster recovery
DWGM	Declared wholesale gas market
MIBB	Market Information Bulletin Board
MP (MPs)	Market participant(s)
SCADA	Supervisory Control And Data Acquisition system
SWN	System wide notices
SMS	Short message service
UPS	Uninterrupted power supply

## Summary

The loss of external power supply to AEMO's data centre in Queensland led AEMO to perform a transfer of the DWGM systems to the backup site in Victoria at 0615 on 4 February 2013.

Scheduling systems could not run after the transfer resulting in AEMO administering the 10 AM market price at \$4.80/GJ (set equal to the 6 AM market price).

Other immediate consequences were:

- Market notices did not provide sufficient information for Market Participants (MPs) to assess potential risks.
- Market notices were not sent to all participant contacts.
- The WebExchanger was interrupted for approximately 55 minutes. MPs could and did submit market information to AEMO before the cutoff time for the next scheduling horizon.
- The Market Information Bulletin Board (MIBB) was interrupted for approximately 2-3 minutes.
- AEMO settlement systems failed to calculate and publish the 10 AM imbalance quantities and payments.
- The administered market price was \$0.45/GJ higher than what it would have been if the 10 AM pricing schedule had been run.
- The change in market settlement outcomes resulting from the administration of price was not material. The differences on an individual basis were less than \$1,200.

The event was caused by inconsistencies between production site and backup site databases which were not detected prior to the transfer.

AEMO will review and improve its systems, processes and procedures to ensure that:

- Transfer of the systems between primary and backup sites is seamless.
- Communication with participants is effective during market events, with clear and concise messages to all intended internal and external stakeholders.

## 1 Purpose

This report:

- Reviews the events leading up to and consequent from AEMO administering the market price in DWGM;
- Identifies the points of failure and their causes, and reports on impacts; and
- Identifies learnings from the event and the resultant actions being undertaken.

## 2 Description of the event

Note—all times in this report refer to AEST unless specified otherwise.

The DWGM market systems were housed at AEMO's data centre in Queensland, with the backup site at AEMO's Victorian data centre.

Power supply to the Queensland data centre is backed up with on-site diesel generation and uninterruptible power supplies. External power supply was interrupted at 0053 on Monday 4 February 2013. UPS and on-site backup diesel generation maintained power supply to essential services and the data centre. AEMO scheduled an emergency transfer to the backup site in Victoria when it became clear that mains supply would not be restored in the near future. The transfer was scheduled to take place immediately after publication of the schedule for the 6 AM scheduling horizon to minimise potential for impacts on participants.

AEMO advised market participants of the transfer between 0604 and 0613. The notifications advised that the WebExchanger (WEX) and Market Information Bulletin Board (MIBB) may be interrupted, and possibly other systems, for up to approximately 90 minutes.

The transfer commenced at 0615. The scheduling systems were transferred to the backup site by 0700. At 0716, AEMO detected problems with the systems for scheduling and system wide notices (SWN), and commenced resolution of these issues.

When AEMO determined that system issues would not be resolved in time for publication of the 10 AM schedules, it issued notification (sent at 0959) to market participants that it was commencing an administered pricing period for the DWGM at 1000.

The issues impacting scheduling were resolved at 1005. At 1102, AEMO issued notification of conclusion of the administered pricing period at 1300.

Other market systems (NEM and STTM) and operational systems (SCADA) were not affected during the event. The DWGM market systems are currently operating normally from the Victorian data centre. Normal power supply to the Queensland site has been restored.

### 3 Cause of the event

The root cause has been identified as an inconsistency between the scheduling databases at the production and backup sites. AEMO was not aware of this inconsistency prior to the event. The inconsistency resulted in the failure of some database compiled code objects (SQL stored procedures, views and triggers). The identification and resolution of these failures resulted in a delay to availability of the systems in the backup site.

## 4 Market impacts

### 4.1 Market Processes

#### 4.1.1 Scheduling and pricing processes

AEMO scheduled gas using processes defined by the Gas Scheduling Procedures and Administered Pricing Procedure when it reasonably considered that it would be unable to produce both the pricing and operating schedules by the required 10 AM schedule time.

The impacts on scheduling and pricing processes were as follows:

- AEMO administered the price for the 10 AM scheduling horizon. Market price was set at \$4.80/GJ (equal to the 6 AM market price), or \$0.45/GJ higher than otherwise might have been. Participants were advised of this administered price by SWN issued by SMS at 1014.<sup>1</sup>
- D+1 schedules for gas day 5 February 2013 were published approximately 3 hours later than the times specified in the Gas Scheduling Procedures and National Gas Rules.
- During the outage of the primary scheduling system, System Wide Notices (SWN) were issued by SMS via the backup Whispir system, and many individuals were not sent the SWN (refer section 4.2.4).

A manual back-end process, required to enable a transfer of scheduling data to settlement systems during the administered pricing period, was not completed during the event:

- This impacted reporting, and delayed publication of the administered market price and imbalance data for the 10 AM scheduling horizon. This was corrected on 6 February 2013.

#### 4.1.2 Settlement processes

The impacts on settlements and prudential monitoring processes were as follows:

- As a result of the 10 AM schedule data not being transferred from the scheduling database to the settlement database:
  - The 4 Feb 2013 10 AM schedule imbalance data (GJ and \$) was not calculated. This was resolved on 6 February 2013.
  - The 4 Feb 2013 2 PM imbalance data (GJ and \$) was incorrectly calculated. This was resolved on 6 February 2013.
- Prudential monitoring was unaffected, as the process normally runs three business days in arrears (i.e. on business day 7 February), by which time the issues had been resolved.

<sup>1</sup> In the report GWCF 13-098-01 presented to GWCF on 12 February 2012, AEMO initially estimated that market price would have been \$4.70/GJ. After subsequent modeling the price has been recalculated to be \$4.35/GJ).

## 4.2 Market Interfaces and Communications

### 4.2.1 Advice

AEMO advised the market by SWN issued at 0604 that “the MIBB report may be interrupted for a short duration after 06:30 am (EST). Other market systems may be unavailable for up to 90 minutes”, and at 0613 issued a SWN that “Due to market system cut over some market systems including WEX will be interrupted for up to 90 minutes”.

### 4.2.2 WebExchanger

The WebExchanger “WEX” (participant input interface) was restored to functionality within approximately 55 minutes, and MPs could and did successfully submit market data to AEMO after the outage period in time for the 10 AM scheduling horizon. To AEMO’s knowledge, no MP’s were impacted by the outage of the WEX.

### 4.2.3 MIBB

The Market Information Bulletin Board (MIBB) was restored in approximately 2-3 minutes, and impacted issuance of reports

- The 10 AM administered price was not published on time.<sup>2</sup>
- Imbalance data (GJ and \$) for 10 AM schedule were not published on time.<sup>3</sup>
- The MIBB reports were published correctly on 6 February 2013.

### 4.2.4 Market notices

System Wide Notices (SWN) were the primary form of communication with the market during the event. Refer to Appendix 1 for a listing of the SWN that were issued.

Approximately half the contact list of about 150 individuals across various trading and non trading organisations, were not sent SWN via Whispir SMS, the backup SMS system for issuing SWN applied during the MIBB outage. Approximately four trading and seven non trading organisations were not sent any Whispir SMS SWN. These omissions were caused by non alignment of the Whispir contact lists with the contact list used for SWN issued by the scheduling system.

As per current normal practice, participants in other markets were not notified of the event.

Some trading and non-trading participants have complained that they were not sufficiently informed of the potential risks and ramifications during the event.

The information provided to participants by SWN was limited:

- The initial notices communicated the intention to transfer to the backup site, but did not communicate to participants the reason for the transfer, and did not advise that this was an unplanned transfer of a critical nature.
- The information in each SWN is restricted by system which limits the number of characters in each notice. SWN issued by SMS from the scheduling system is limited to 160 characters per message. SMS from the Whispir system over 160 characters are automatically broken into 160 character lengths and sent as an separate SMS’s. For example, a 400 character message will be broken into three separate SMS’s.
- It is possible for AEMO to attach a file to the SWN to provide more details, but this did not occur in this event.

<sup>2</sup>INT41 (a public report of market and reference prices)

<sup>3</sup> INT282 (Imbalance allocation report)

## 4.3 Financial impacts

### 4.3.1 Consequences

The consequences of administering the price for the 10 AM scheduling horizon were:

- AEMO re-approved the 6 AM approved operating and pricing schedule as the 10 AM approved operating and pricing schedule.
- AEMO set market price for the 10 AM scheduling horizon equal to that for the 6 AM scheduling horizon at \$4.80/GJ.
- Imbalance payments for the 10 AM scheduling horizon were \$0 for all MPs because scheduled injection and withdrawal quantities (including demand forecasts) did not change between 6 AM and 10 AM schedules.
- MPs deviating from the 6 AM schedule (by injecting or withdrawing more or less gas than scheduled) paid \$4.80/GJ for each GJ of deviation (same price as the ex-ante market price). As such, MPs were not exposed to market risks due to differences between the 6 AM ex-ante market price and deviation price.

### 4.3.2 Estimated direct (in the market) impacts

The direct (in the market) impacts of AEMO's administration of market price are estimated as:

- AEMO ran, approved and published the 10 AM pricing and operating schedules using:
  - MPs' updated controllable injection and controllable withdrawal bids, and updated demand forecasts submitted for the 10 AM schedule; and
  - AEMO input data applicable for that schedule.
- The market price for the 10 AM scheduling horizon would have been \$4.35/GJ or \$0.45/GJ lower than the administered price.
- AEMO estimates the higher administered price had an immaterial financial impact on MP settlement outcomes. Compared to the provisional settlement outcomes based on D+3 allocation data, AEMO estimates that:
  - MPs were -charged net overall \$245 less through imbalance and deviation payments for the gas day.
  - Eight MPs were charged less, but the change was not more than \$1,139 for any individual MP on the gas day.
  - Fifteen MPs were paid less, but the change was not more than \$638 for any individual MP on the gas day.

See Appendix 2 for details on these calculations.

## 5 Key learnings and actions

The key learnings and actions arising from this event are summarised below.

### 5.1 System transfer processes

The decision to defer the transfer to shortly after 6 AM was taken to minimise impacts on participants. Impacts could have been far more serious if this transfer had commenced earlier and similar issues had impacted on the schedule for the 0600 scheduling horizon.

This was the first live transfer from the Queensland production site to the Victorian backup site. AEMO had not previously tested the transfer to the backup site when migrating systems to the



Queensland data centre, on the basis that previous transfers between production and backup sites had not raised significant issues. This resulted in AEMO being unaware of the serious nature of inherent issues that existed in the databases and led to this event.

As the underlying issues have not yet been fully addressed, if there is a need to transfer the DWGM systems between the sites, there will be heightened risks of system issues arising from system and database transfers.

AEMO is urgently addressing the issues raised by this event to reduce the risk of reoccurrence during a future transfer of the gas market systems between the primary and backup sites.

In addition, AEMO will incorporate the following learnings from this event into its processes:

- Migration of production sites should in future incorporate greater testing of the ability to transfer to the backup site.
- Problems encountered during transfers should be investigated more rigorously and root causes identified in addition to fixing the immediate problems, so that potential inherent issues are uncovered earlier and remedial actions taken.
- The system architecture and the site transfer procedures currently allow for the completion of a transfer within the pre-determined time window. This leaves minimal contingency for additional time and resources, and limits options for reverting to the primary site to restore the service if issues arise during the transfer.
- Coordinating and running an unplanned transfer with all support team members working from home significantly slowed down the process in this event. The standard collaboration tools used in the office did not work effectively from the home environment. There was no contingency for this potential risk on the day. The planning in future events should consider this potential risk, and AEMO will review and enhance the arrangements to resolve issues experienced.

In conjunction with addressing the immediate issue(s), investigation into root causes has identified potential for further risks within the DWGM systems. This investigation is ongoing with high priority. The areas of focus include:

- Continued investigation into the root cause of the problem and applying Sybase vendor supplied remediation steps as appropriate (target completion March 2013).
- Investigation of methods for re-compiling stored procedure code in the DWGM systems to cater for issues during transfers between sites (target completion March 2013).
- Investigation of a move to a supported version of Sybase such that we can use the current toolsets and improvements in the product (target completion July 2013).
- Investigation of the costs and benefits of introducing a different regime of database replication to reduce the required times to transfer between sites (target completion July 2013).

## 5.2 Communication processes

There were problems with communication with participants:

- AEMO's systems failed to issue SWN to individuals and organisations during the event. The failure to send SWN to individuals and organisations was caused by non alignment of contact lists between the production and Whispir systems. AEMO has rectified this, and will adjust its procedures to ensure that alignment is periodically verified.
- Some trading and non trading participants complained that they were not sufficiently informed of the potential risks and ramifications during the event. The information provided by SWN is limited, and did not advise that this was an unplanned transfer of a critical nature.

AEMO is currently reviewing existing SWN SMS notices and ability to attach documents, to ensure that notices provide sufficiently clear and concise information for MPs to be able to understand the events and assess the impacts of the event on their trading strategy and position.

AEMO will consult with MP's on whether the current approach to issuing market notices via SMS (with its inherent character limitation) is an effective method of communicating information during market events in the event of a system failure, and if not, what alternatives might be justifiable, and what other information would be valuable.

- Potentially, participants in other markets could also have been impacted by the consequences of the event, but were not advised.

It is currently not normal practice in any of the gas and electricity markets to notify participants in other markets of an event in another market, and the AEMO systems are not designed to provide notices across markets.

While no direct impact was identified on the NEM or on STTM hubs from this event, in some areas the markets are strongly related and in some cases events such as this could impact on other markets and their participants.

AEMO will review the merits for and issues with providing information to a wider audience during events.

### 5.3 Scheduling processes

Following the failure to complete a manual back-end process for transfer scheduling data to settlement systems during the administered pricing period, AEMO will review and amend its procedures and training so that they are more effective in preventing similar issues during future market administration events.

AEMO will also review and update the Gas Scheduling Procedures, the Administered Pricing Procedures and the Electronic Communication Procedures to incorporate the recommended improvements arising from the review of this event.

## APPENDIX 1—System wide notices (SWN)

Notice_Id	System_Message	Publish (AEST)
8702	AEMO will proceed with a cut over of market systems from the <Queensland>* site to the <Victorian>* backup site today 04/02/13 at 06:00 am (EST).	04/02/2013 05:55:13
8703	Due to the market system cut over from the primary site to the backup site, the MIBB report may be interrupted for a short duration after 06:30 am (EST). Other market systems may be unavailable for up to 90 minutes.	04/02/2013 06:04:18
8704	Due to market system cut over some market systems including WEX will be interrupted for up to 90 minutes.	04/02/2013 06:13:55
Whispir4	Late Publication of Day+1 8am Schedule Due to delays in market system cut over process 8am Day+1 schedule publication will be delayed.	04/02/2013 07:53
Whispir	Administered Price period Administered Price period is declared commencing at 10:00 AM due to inability to produce schedules	04/02/2013 09:59
Whispir	Market Price Administered for 10AM schedule Market price for 10AM schedule for gas day 04/02/13 has been administered (not capped) at \$4.8000. Operational schedule has been re-published based on 6AM schedule.	04/02/2013 10:14
Whispir	Delayed publication of day+1 schedule Delayed 8AM day+1 schedule has been published.	04/02/2013 10:58
Whispir	Administered Price period conclusion Administered Price period will conclude at 01:00 PM.	04/02/2013 12:02

\* Text marked “<text>” has been edited from actual SWN text.

<sup>4</sup>Backup market notice communication system was used if and when MIBB failed.

## APPENDIX 2—Simulated market outcomes if AEMO did not administer the 10 AM market price

If AEMO did not administer the 10 AM market price, AEMO would have run, approved and published the 10 AM operating schedule and pricing schedule using:

- MPs’ updated controllable injection bids, controllable withdrawal bids and demand forecasts submitted for the 10 AM schedule; and
- AEMO input data applicable for that schedule.

### Changes to controllable injection and withdrawal bids, and demand forecasts (received by 0900)

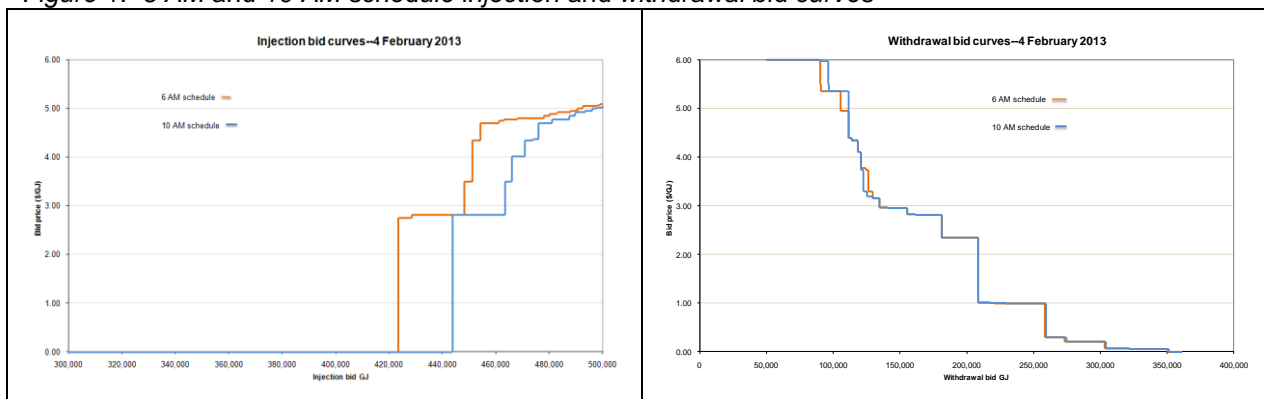
Four MPs have moved their injection bids to lower price bands.

Two MPs have made small changes to their controllable withdrawal bids.

Three MPs have reduced their demand forecasts.

See details in Figure 1.

Figure 1: 6 AM and 10 AM schedule injection and withdrawal bid curves



### Changes to 10 AM scheduling outcomes

Market price would have been \$4.35/GJ and \$0.45/GJ lower than the administered price.

Compared to the administered scheduling outcomes,

- Scheduled controllable injections would have increased by 985 GJ;
- Scheduled controllable withdrawals would have increased by 2,663 GJ; and
- Demand forecasts would have decreased by 1,219 GJ.

See details in Table 1.

Table 1: Changes to scheduled injections, controllable withdrawals and demand forecasts

	Market price (\$/GJ)	Scheduled injections (GJ)	Scheduled withdrawals (GJ)	Demand forecasts (GJ)
Administered schedule (1)	\$4.80	473,430	111,420	354,346
Simulated schedule (2)	\$4.35	474,416	114,083	353,127
Changes ((2) minus (1))	-\$0.45	985	2,663	-1,219

### Changes to imbalance quantities and payments

Changes to the 10 AM scheduling outcomes would impact on the 10 AM and 2 PM imbalance quantities and payments. AEMO would have:

- under-charged MPs by \$1,998 of imbalance payments for the 10 AM schedule because of increased imbalance quantities albeit at a lower price;
- under-paid MPs by \$3,615 of imbalance payments for the 2 PM schedule; and
- under-paid MPs by \$1,616 of imbalance payments for the gas day.

See details in Table 2.

Table 2: Changes to imbalance quantities and payments

		10:00 AM	2:00 PM
Administered schedule (1)	Market price	\$4.8000	\$5.3505
	Imbalance GJ	0	-273
	Imbalance \$	\$0	-\$1,459
Simulated schedule (2)	Market price	<b>\$4.3500</b>	\$5.3505
	Imbalance GJ	<b>459</b>	<b>-948</b>
	Imbalance \$	\$1,998	-\$5,074
Changes ((2) minus (1))		\$1,998	-\$3,615
Total changes for gas day		<b>-\$1,616</b>	

Note: Positive payments imply MPs pay AEMO. Negative payments imply AEMO pay MPs.

### Changes to deviation quantities and payments

Changes to the 10 AM scheduling outcomes would impact the 6 AM and 10 PM deviation quantities and payments.

- The 10 AM reduced market price would have resulted in AEMO under-charging MPs by \$10 of deviation payments for the 6 AM scheduling interval.
- The 10 AM deviation quantities would have increased resulting in AEMO under-charging MPs by \$1,851 in deviation payments for the 10 AM scheduling interval.<sup>5</sup>
- AEMO would have under-charged MPs by a total of \$1,861 deviation payments for the gas day.

See details in Table 3.

Table 3: Changes to deviation quantities and payments

		6:00 AM	10:00 AM
Administered schedule (1)	Market price	<b>\$4.8000</b>	\$5.3505
	Deviation GJ	-22	<b>7,567</b>
	Deviation \$	-\$106	\$40,488
Revised schedule (2)	Market price	<b>\$4.3500</b>	\$5.3505
	Deviation GJ	-22	<b>7,913</b>
	Deviation \$	-\$97	\$42,339
Revised (2) minus Administered (1)		\$10	\$1,851
Total change in deviation payments		<b>\$1,861</b>	

Note: Positive payments imply MPs pay AEMO. Negative payments imply AEMO pay MPs.

### Changes to settlement payments

Compared to the provisional D+3 settlement outcomes,

- AEMO would have under-charged MPs by \$245 for the gas day.

<sup>5</sup> The increase in deviation quantities was due to changes in updated demand forecasts.

- Eight MP would have been undercharged, but no MP would have been under-charged by more than \$1,139 for the gas day.
- Fifteen MPs would have been under-paid, but no MP would have been under-paid by more than \$638 for the gas day.