

professional transparent cost-effective people ideas integrity commitment teamwork

CEO's Message

I hope that everyone had a great start to 2007 and a good Chinese New Year. We all look forward to a successful and fruitful year.

The measure of a robust and maturing market can be indicated by how well it responds to unexpected circumstances. We saw two positive examples recently, when the National Electricity Market of Singapore (NEMS) responded to spikes in the wholesale energy price in December and January. The NEMS swiftly reacted and the energy price normalised after a few periods of high prices. Please see the article on page 3 for more details.

Over the past few weeks, our Market

Administration team has consulted the stakeholders of the NEMS on their priorities for the RCP's work plan for the next two years. The updated work plan will be presented to the RCP during its March meeting for approval. This is an important annual exercise to assess ongoing and urgent issues as well as those that will contribute to the long-term evolution of the market.

On the IT side, I am pleased to report that both our Server Re-platform final phase and our Data Delivery Phase 1 are targeted to go live in March. Both of these initiatives will ensure the continued reliability of our market IT systems and will enhance our services to market participants. For more details on the recent IT workshop and Market System User Group meeting, please go to page 4.

We are finalising the 2006 Market Report to be published on the EMC website in April. Now in its fourth year, the report provides a comprehensive overview of the market activities and shares insights into the performance of the market over the year. Printed copies will be mailed to market participants and interested parties who are on our mailing list.

We at EMC look forward to further interacting with you over the course of the year to exchange ideas and address the issues of our evolving marketplace.

Dave Carlson Chief Executive Officer

Rule Change Update: Urgent Rule Modification

In November 2006, EMC observed many instances where prices at certain nodes deviated significantly from the prices at all other nodes. While these prices were in accordance with the Market Rules, they were not reflective of the system marginal price. EMC therefore used its discretion within the Market Rules to conduct price re-runs. Through our daily price validation process, EMC has verified that these price deviations did not occur prior to November 2006.

It was observed that in a single day, more than 30 dispatch periods could experience such outcomes, with nodal prices ranging from several hundred dollars to \$4,500. These outcomes did not reflect the locational pricing regime because extreme price

separation should not occur when there is no transmission constraint in the system. Under the locational marginal pricing model, all nodal prices should always reflect the system marginal price when there is no transmission constraint.

The abnormal prices were discovered at nodes associated with generation units that were not running and hence 'disconnected' from the transmission system (grid). Despite not generating, these units may still draw energy from the grid for station load, which would then be settled at the nodal energy price. If an abnormal price were used in settlement, the financial impact on affected market participants would be considered material.

While EMC conducted the re-runs, it also investigated and traced the cause of the abnormal pricing outcomes to inadequate modelling of disconnected generation units in the market clearing engine (MCE). A disconnected unit (or node in the MCE) is modelled in the MCE as 'connected' to the grid via an artificial line (type 2 artificial line). Before the proposed change, the modelling of type 2 artificial lines could prevent prices reflecting the system marginal price from being discovered by the MCE at a disconnected unit's node because incremental demand at that node could not be met from the grid. When this happened, the energy price discovered at that node should have been the offer price from the disconnected

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EMC's Exercise Thunderbolt 2007 Successfully Completed



The HR team handling inquires with the auditor observing

On 6 and 7 February, EMC conducted its fourth annual business continuity exercise, named *Exercise Thunderbolt 2007*. This year, Ernst & Young was engaged to audit the exercise and the business continuity plan (BCP).

Exercise Thunderbolt tests the response of EMC personnel during a disaster at Republic Plaza. This exercise covers:

- *Emergency response plan* tests EMC personnel's understanding of the emergency response procedures and protocol during a disaster.
- *Desktop scenarios* test the responses of various teams – such as the BCP steering committee, human resources department and the damage assessment team – to the emergency and their management of the crisis.

- *Modular BCP site test* examines the recovery of EMC's internal LAN system, located at our BCP site, when the BCP is activated. It also tests the recovery and continuity of critical business operations.
- *BCP activation* tests the effectiveness of the BCP call list and the responses of all EMC personnel to the BCP activation.
- *BCP communications* tests the communications processes and ensures effective management of client expectations.
- *Moving back plans* test the back up and restoration of e-mails and market operations data performed at the BCP site to EMC's main office.

Several changes that we made throughout 2006 have resulted in a further tightening of and improvements to our already robust

and often tested BCP. Most notable was the implementation of a new system recovery process that meant that EMC was able to recover and resume its critical operations within three hours of the time the disaster occurred. The exercise also served as a training ground for new staff, who have joined EMC in the past twelve months, ensuring that they understand their roles and responsibilities.

Our business continuity plan has been successfully tested, but as there is always room for improvement, we will evaluate and where possible implement the auditor's recommendations to further enhance our procedures and plans.

Exercise Thunderbolt is one of the comprehensive and ongoing exercises that we use to test various models of our BCP to ensure our preparedness for any crisis situation.



BCP steering committee members responding to the scenarios with the auditor observing

(continued from page 1)

generation unit (which is usually high) or, in the absence of an offer, the upper energy price limit of \$4,500.

With the cause identified, EMC's proposed solution was to model type 2 artificial lines with the characteristics of real lines to allow reverse flow from the grid to the disconnected unit's node, and thus demand at the node would be met at a nodal price that reflects the system marginal price. A default line, representing the most likely connection of the generation unit,

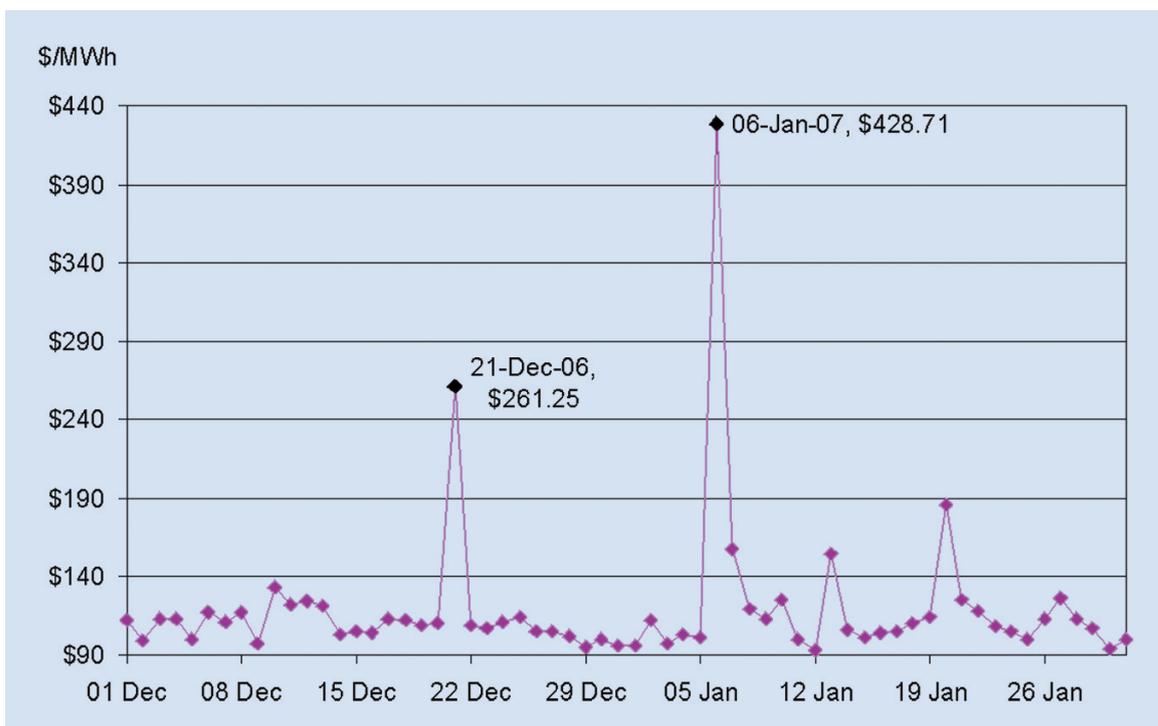
is designated for each generation unit. When a type 2 artificial line is needed to connect the unit to the grid, it would have exactly the same electrical characteristics as this default line. This change in modelling requires a modification to the MCE formulation. Given the high frequency of abnormal pricing outcomes in a short period and the potentially significant financial impact, EMC referred this rule modification proposal to the Urgent Rule Modification Committee (URMC).

The URMC (comprising one representative

of the Power System Operator, one representative of the EMC Board and the Chairman of the Rules Change Panel) agreed to make this urgent rule modification at its meeting on 24 January. Following confirmation by the EMC Board and the approval of the EMA, this modification took effect on 9 February, and EMC continues to monitor the result. The urgent rule modification will apply for a period of one year. During this period, the normal rule change process will be applied for this modification in order for it to be permanently written into the Market Rules.

Spikes in the Average Energy Price (USEP) in December and January

In the final month of 2006 and the first month of 2007, the average electricity price of the wholesale market (USEP) recorded two days of notable prices, when the daily average closed above \$240/MWh, as shown in the chart below.



On Thursday, 21 December 2006, the power system experienced an unplanned gas supply disruption, which resulted in the simultaneous tripping of two combined-cycle gas turbine (CCGT) units. Several areas in Singapore experienced electricity cuts for about 45 minutes in the afternoon and the USEP rose to its capped value of \$4,500/MWh for one period. The market responded well to this power system emergency with all operating generating units powering up to their maximum generation capacity. Both available open-cycle gas turbine (GT) units were immediately deployed and interruptible loads were called upon. With the swift restoration efforts by market players and all steam turbine units ramped up to ease the demand, the power availability was subsequently normalised, allowing the USEP to return to typical levels following three periods of high prices. Overall, the daily average USEP closed at \$261.25/MWh.

On the morning of Saturday, 6 January 2007, the forced outage of a CCGT unit and the commissioning activity of another unit resulted in temporary tight supply conditions

in the energy market. The situation was further compounded by higher daily average demand than on the previous two Saturdays. On the supply front, all units stepped up their generation, and both available GT units ran. As demand began to decline in the afternoon and the tripped generating unit returned to service, the USEP normalised after six periods of high prices. Overall, the daily average USEP closed at its second all-time market high at: \$428.71/MWh.

High regulation price

It is also notable that the regulation price rose substantially during these two months, especially in early January, with the daily average regulation price hitting a historical high of \$1,263/MWh on 7 January. A summary of the monthly average regulation price over

Month	Average Regulation Price
August 2006	\$66.23
September 2006	\$18.08
October 2006	\$85.86
November 2006	\$85.93
December 2006	\$187.40
January 2007	\$719.49

the last six months is shown in the table below.

The Market Surveillance and Compliance Panel (MSCP) has indicated that it is monitoring the regulation prices. For more details, please refer to the latest *MSCP Market Watch*, a quarterly publication of the MSCP, which is available on the EMC website at www.emcsg.com.

Air Products Begins Trading as an Interruptible Load Provider

Air Products, registered under a wholesale trader license (trading for reserves only), commenced trading as an interruptible load (IL) provider on 31 January. Its participation in the reserve markets has boosted the total IL capacity to 26MW. Though it remains a small portion of the overall reserve provision, it is important to note that the NEMS is taking incremental steps to provide demand participation from load facilities.



User Forums

Market Information Sharing Forum (MISF)

As usual, the MISF forum held on 17 January drew strong participation from the invited industry players. The forum covered the market performance, market shares and pricing incidents for the last two months of 2006. Part of the roundup included a summary of price performance and a comparison with past years.

Participants were briefed on a market clearing enhancement that is being supported by an urgent rule change proposal (see article on page 1) to re-model the type 2 artificial line to resolve the issue of high market network node prices, which have been observed at disconnected units. This part of the forum was quite lively, as it drew much discussion and many points of view from industry players.

The next MISF is scheduled for Tuesday, 20 March, 2.30 pm.

Combined IT Workshop and MSUG

EMC held another combined IT workshop and Market System User Group meeting on 15 February, which was attended by close to 30 market participants. The meeting included an update on the progress of our current IT projects and a presentation of the web services, which were developed as part of the Data Delivery Phase 1 project. We informed market participants that both the Server Re-platform final phase and Data Delivery Phase 1 projects are targeted to go live in March.

The workshop gave the attendees the opportunity to familiarise themselves with the web services provided by EMC and suggested ideas about how they could develop their own web services. We described all of EMC's web services and demonstrated some of them, including offer submission and offer retrieval. This was followed by a demonstration of other functionality enhancements made to the trading website, such as web offering and view offers.

As part of the final phase of the Server Re-platform project, we have upgraded SonicMQ to version 7.0, as its clustered capabilities should provide better availability of the EMC broker to the market participants. Market participants have been asked to perform testing of the connectivity between their SonicMQ 6.1 brokers and EMC's SonicMQ 7.0 broker.

We also provided details of EMC's test environment, which is available to market participants for the testing of web services, and asked market participants to perform user acceptance testing (UAT) for the enhancements to the trading website.

For those market participants who were unable to attend the meeting, we sent an e-mail on 21 February, summarising the key points and highlighting the items that they have been asked to test.

The next MSUG is scheduled for Thursday, 19 April and will feature an update of the progress of our current and upcoming projects.

EMC Training Programme – Next Course on 17 and 18 May

EMC will be holding its regular two-day training course *Understanding Electricity Markets* on 17 and 18 May. Our staff will be conducting six sessions covering the following topics:

- Understanding Electricity
- Overview of the Electricity Sector
- The NEMS and its Unique Features
- Pricing in Detail
- Settlement
- The Demand Side

The next course is scheduled for:

- 16–17 August 2007

We advise you to book early to secure your place in the course of your choice and benefit from our early-bird discount.

Further details on the programme and on how to register are on our website, www.emcsg.com. For enquiries please e-mail trainingprogramme@emcsg.com or contact Ong Pui Size at +65 6779 3000.

Send us Comments, Feedback or Questions

The *EMC Bulletin* is written by EMC for you and we are always striving to improve our service. Therefore we are interested in any feedback you might have about specific articles and topics covered or comments and suggestions about other areas you would like to see included.

Please send your comments, feedback or any questions either via e-mail to info@emcsg.com or via fax to +65 6779 3030.

Thank you in advance for your time and effort.