MINUTES OF THE RULES CHANGE PANEL
37TH MEETING
HELD ON TUESDAY, 13 MAY 2008 AT 10.10AM
AT ENERGY MARKET CO. PTE LTD
238A THOMSON ROAD #11-01
NOVENA SQUARE, SINGAPORE 307684

Present: Dave Carlson                Henry Gan
     Robin Langdale                  Tay Swee Lee
     Dr. Kang Cheng Guan             Philip Tan Pei Lip
     Dr. Daniel Cheng                Dr. Goh Bee Hua
     Low Boon Tong                   Michael Lim
     Ng Meng Poh                     Annie Tan

Absent with Lawrence Lee
Apologies: Dallon Kay

In Attendance: Paul Poh              Poa Tiong Siaw
               Tan Liang Ching            Nerine Teo
               Wang Jing                  Henry Wee

1.0 Notice of Meeting
The Chairman called the meeting to order at 10.10am. The Notice and Agenda of the meeting were taken as read.

2.0 Confirmation of Minutes of the 36th Rules Change Panel Meeting
The Minutes of the 36th Rules Change Panel meeting held on Tuesday, 11 March 2008 was tabled and taken as read.

There being no amendments to the Minutes, the Rules Change Panel unanimously accepted and approved the Minutes.
3.0 **Matters Arising**

The Panel noted that the follow-up actions were completed on the matters arising as outlined, except for the following:

3.1 **Adequacy of the MP Suspension Provisions**

The Panel was informed that the EMA replied on 23 April 2008 on the status of customers’ deposits when a retailer is under default. The EMA stated that “the requirement for customers to place security deposit with their retailer is a commercial one, set out in the contractual agreements between the customer and the retailer”. Thus, it would not be appropriate for EMA to impose regulatory requirements on commercial arrangements.

The Panel noted that currently the contestable consumers served by retailers are generally large customers who would typically use bankers’ guarantees instead of cash as their deposits with a retailer. Thus the impact on consumers in the event of a retailer winding up would have less impact given that deposits placed as bankers guarantee are only for the benefit of the customers that places them and can only be realised by the retailer if the customer fails to meet their obligations to the retailer.

The Panel was also informed that the EMA is currently doing a pilot program on electricity vending machines with selected households to roll out retail contestability. With full retail contestability in future, the Panel would like to highlight the concern that a large number of small consumers may be exposed to the risk of retailers’ defaults. Small consumers may not be aware of this risk unless there are explicit mechanisms in place to draw their attention to such potential risk. Such a risk may act as a barrier to customers switching away from SP Services.

In the event of a retailer defaulting, a large number of small consumers may lose their deposits and they may seek recourse through political or other channels.

EMC was requested to draft a letter to the EMA to highlight the potential risk for small consumers to move away from SP Services to other retailers and the deposits involved.

3.2 **Publishing Generation Offers and Dispatch Quantities**

(Paper No. EMC/RCP/35/2007/CP16)

The Panel was informed that EMC would report to the Panel at the July 2008 meeting.
3.3 **Changes Arising from the Review of Price Revision**  
(Paper No. EMC/RCP/36/2008/272)

The Panel was informed that the EMA had not finalized its decision to proceed with the price separation rule change, as they are still reviewing the minimum generation requirements for certain gencos.

EMC will revert to the Panel when advised of EMA’s decision at a later stage.

Mr. Low Boon Tong opined that setting minimum generation requirements may distort the market. The Chairman explained that the EMA was aware of such a potential effect and would have to take that into account when deciding on how best to deal with the price separation issue.

4.0 **Summary of Outstanding Rule Changes**

The Panel noted the contents of the paper.

5.0 **Monitoring List**

The Panel noted the contents of the paper.

6.0 **Changes Arising from the Review of Price Revision in the SWEM – Optimal Bidding under a Uniform Pricing Regime**  
(Paper No. EMC/RCP/36/2008/272)

EMC presented the following:
- the optimal bidding strategy under a uniform pricing regime;
- the effects of deviating from this optimal bidding strategy;
- the rationale behind negative generator bids


The report found that under a uniform pricing regime, generators should logically “bid approximately their marginal opportunity costs for energy in each of the blocks of power that they offer”. Negative energy offers do not contradict this principle when generator start-up costs or take-or-pay contracts are taken into account.
In formulating the compensation amount arising from price revisions, EMC proposed to:
- compensate based on cost-recovery, not forgone profits
- use generator offers to proxy their marginal costs

It is possible for generators to choose to deviate from the optimal strategy (e.g. to increase market share). However, in the absence of any other superior alternatives, EMC proposed to use generator offers to proxy marginal costs.

Concomitantly, EMC reiterated its proposal to compensate only Loss1 as shown in the figure above, in the event of a downward price revision.

Mr. Philip Tan noted that the Blue Ribbon Panel Report supported the practice of uniform pricing as opposed to as-bid pricing in the energy market. He highlighted that in Singapore’s context, generators bid with the expectation that they will be paid for the last cleared price for the whole energy quantity, and thus consider total overall cost in their bids. Uniform pricing should therefore apply even when price revision occurs, and generators should therefore be entitled to both Surplus1 and Surplus2 as compensation.

Mr. Philip Tan added that compensating a different amount based on each of the offer stacks gives the impression that as-bid pricing is applied during price revision. For uniform pricing to apply, we should apply a higher uniform price across all stacks by compensating both Surplus2 and Surplus3.
Mr. Carlson clarified that the uniform price is the marginal clearing price, which in the case of price revision is RMEP. This uniform pricing (RMEP) applies to generators that have been asked to generate outside of merit order. While these generators should be compensated, they should not be allowed to reset the uniform clearing price upwards.

Mr. Robin Langdale commented that he accepted the Blue Ribbon Panel Report’s finding that generators should offer based on their marginal costs. However, he disagreed with how marginal costs should be represented in the diagram.

He outlined the above diagram, and suggested that:

1) When a generator offers Stack 1 at P1, the marginal cost of producing that quantity is A. When the clearing price is P1, the generator’s cost (A) will exactly be equal to its revenue.
2) When a generator offers Stack 2 at P2, the marginal cost of producing that additional quantity is B+C. If the clearing price is P2, then again the generator’s cost (A+B+C) will exactly be equal to its revenue
3) If the generator had offered its bid for Stack 2 without offering Stack 1, it would have offered at P3 in order to recover its marginal costs of B+D (which are equal to B+C).

Mr. Langdale opined that with this strategy of offer bidding, generators should be entitled to Surplus1 and Surplus2 as compensation, since the marginal cost of individual offer stacks is represented by the L-shape area in the figure; Component B for the price of the offer, plus Component C for the expected surplus of the previous offer.
Minutes of 37th RCP Meeting – 13 May 2008

However, if only part of quantity B, say B(d) is dispatched it is necessary to compute the Genco’s marginal unit cost and apply that to the quantity dispatched. The marginal unit cost of offer B is

$\frac{P_2 (B+C)}{B} = \text{MCOST}$

Thus if only part of quantity B is dispatched, the compensation to the Genco should be:

$(\text{MARCOST} - \text{RMEP}) \times B(d)$, where RMEP is the revised clearing price.

Mr. Carson noted that there was general consensus that generators should be compensated for marginal costs, although there is a diversity of views on what constitutes marginal cost in the market. The Panel requested EMC to study Mr. Langdale’s argument and revert with a response at the next RCP.

**Rule Amendments to Remove Type 4**

On the issue raised by the Panel to reconsider removing Type 4 reruns in view of the price separation incident on 19 January 2008, Mr. Philip Tan indicated that the Panel should wait for the urgent rule change on price separation by the EMA.

Mr. Carlson stated that, in the interest of the market, it would be better for the EMA to revert with a broader tool to use to prevent localized market power; keeping Type 4 reruns is not an appropriate tool to prevent price separation.

{Mr. Kenneth Lim was invited to the meeting}

7.0 **Report for Trial of Prudential Methodology**
(Paper No. EMC/RCP/37/CP13)

In September 2006, EMC was tasked to proceed with a trial of prudential methodology over the adequacy of the credit support held by EMC.

EMC then engaged a consultant, Dr Ng Kah Hwa of NUS Centre for Financial Engineering, to conduct a review and propose a new prudential methodology. The RCP agreed to EMC’s recommendations to test this new methodology in parallel with the existing prudential methodology for 6 months. The trial was conducted from 10th September 2007 to 6th March 2008.
Minutes of 37th RCP Meeting – 13 May 2008

The Panel was informed that currently, a retailer/MSSL must provide EMC with credit support enough to cover at least 30-day trading exposure. Therefore, the value of the credit support required is:

\[ 30 \times ADE \]

(‘ADE’ is the average of past 90 days’ trade)

EMC also issues a margin call to a MP/MSSL when its estimated net exposure (ENE) ≥ 70% of the value of its credit support (CS) on a given day where:

\[
ENE = \text{Current Exposure} + (20-X) \times ADE - \text{Prepayment} \\
\text{Actual known exposure not yet due for payment} + \text{Estimated unknown exposure}
\]

The market participant/MSSL is then required to reduce its (ENE/CS) ratio to 50% in the event of a margin call.

It was determined that the current methodology uses past trade amounts to determine ADE. This may result in inadequate credit support to safeguard against default payment in the instance of:

1. Unexpected large price spikes
2. Increased electricity price volatility

The non-defaulting MPs will have to bear this potentially large default risk.

Dr Ng proposed the use of credit risk exposure (CRE) of a MP/MSSL, comprising of components A and B:

\[
CRE = CE + (30-X) \times ADE - \text{Prepayment} + [(18) \xi \times \psi \times \text{NVE}] \]

Component A Component B
Minutes of 37th RCP Meeting – 13 May 2008

Component A: covers for 30-day trading exposure assuming stable electricity prices.

\[ CE + (30-X) \times ADE - \text{Prepayment} \]

- Similar to ENE under the current methodology, except for the days of unknown exposure
- Current methodology uses a (20-X) days of unknown exposure, while the proposed methodology includes the 10-day suspension period of unknown exposure, (30-X).

Component B: covers additional exposure due to extreme price volatility

\[ [(18)ξ \times ψ \times (NVE)] \]

Price Volatility Factor (PVF)

- Captures additional exposure arising from potential price volatility using a Generalised Extreme Value (GEV) distribution.
- Better reflects electricity price movements as compared to normal distribution.
- GEV model produces the PVF which measures the impact of price volatility on the MP/MSSL’s unknown exposure.
- Only applies to the non-vested portion (NVE) as vested portion is settled at hedge price and not subject to price volatility.

The proposed prudential methodology showed that:

Margin Call:
- MP/MSSL must provide EMC with enough credit support (CS) such that \( CS > CRE \).
- EMC will notify the MP/MSSL when \( CRE = 90\% \) of CS.
- EMC will issue the MP/MSSL with a margin call when its CRE ≤ CS.
- An MP/MSSL who is issued with a margin call must, within 2 business days following the date of margin call, increase its:
  - prepayment or
  - credit support
  such that its CRE ≤ 80\% of CS

Rationale for 80\% margin call top-up requirement

- To maintain the same level of margin call top-up requirement for the proposed methodology as compared to the current methodology on a proportionate basis.
  - 70\% ± 50\% (Based on current methodology)
Minutes of 37th RCP Meeting – 13 May 2008

100% ÷ (100/70) x 50%
= 71.43% (Based on proposed methodology)

- Proposed methodology already provide for a more accurate and robust safeguard of prudential required by accounting for extreme price volatility
- Therefore, we do not require MP/MSSL to reduce its ratio (CRE/CS) to 71.43%.

Instead, EMC recommended a ratio of 80%, reducing the margin call top-up requirement.

Results of the trial of the proposed methodology

EMC conducted a trial of the proposed methodology from 10 September 2007 to 6 March 2008, which ran parallel to the current methodology. Market participants were issued a daily report of their prudential requirements based on the proposed methodology during this period.

Comparison of CRE for \( \alpha = 0.01 \) and \( \alpha = 0.005 \)

The minimum, maximum and average CRE that a MP/MSSL would required to place under the current and proposed methodology were compared using confidence level of 99% i.e. \( \alpha = 0.01 \) and 99.5% i.e. \( \alpha = 0.005 \) over the period of the trial.

The table below summarized the % increase in CRE under the proposed methodology compared to the current methodology.

<table>
<thead>
<tr>
<th>For Retailers 1-5</th>
<th>( \alpha = 0.01 )</th>
<th>( \alpha = 0.005 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range of % for all retailers under “Minimum CRE”</td>
<td>4.37% - 5.24%</td>
<td>6.05% - 7.23%</td>
</tr>
<tr>
<td>Range of % for all retailers under “Maximum CRE”</td>
<td>3.70% - 4.06%</td>
<td>4.99% - 5.68%</td>
</tr>
<tr>
<td>Range of % for all retailers under “Average CRE”</td>
<td>4.05% - 5.10%</td>
<td>5.59% - 7.02%</td>
</tr>
</tbody>
</table>

1 Retailer 6 was not included because it currently does not have a non-vested exposure (NVE), the only component affected by PVF. Therefore, it is currently not impacted by the change from the current methodology to proposed methodology.
The Panel was informed that three general observations can be made from the above table.

1. CRE and collaterals required under the proposed methodology are generally higher for both scenarios due to the addition of PVF.
2. Average % increase for the "Average CRE" across retailers is close to that of PVF ie at about 4.38% against 4.1% for PVF.
3. Range of % change for $\alpha = 0.005$ is generally higher than that of $\alpha = 0.01$ due to a stricter test of statistical significance for $\alpha = 0.005$

**Comparison of Price Volatility Factors for $\alpha = 0.01$ and $\alpha = 0.005$**

The Panel was informed that over the period of the trial the PVF averaged about 1.23 (meaning an additional 1.23 days of trade worth of collaterals was required) and averaged about 1.7 at a confidence level of 99% ($\alpha = 0.01$) and 99.5% ($\alpha = 0.005$) respectively.

The difference in PVFs can be attributed to different tests of statistical significance. Essentially, $\alpha = 0.005$ imposes a stricter criteria on the proposed methodology.

EMC recommends using a 99% confidence level, i.e. $\alpha = 0.01$, in line with Dr Ng’s proposal.

**Simulation Tests on CRE**

Simulation tests were conducted to examine the impact of electricity price spikes on the PVF and hence the CRE. These results are obtained through the replacement of the latest average daily WEP available ($155.01) on 6 March 2008 with wholesale electricity prices (WEP) ranging from $600 to $2400.

The values $600, $1200, $1800 and $2400 were chosen because the highest daily WEP that has occurred since the market started was on 29th June 2004 at $366. This was about 4.5 times the typical average daily WEP of $85 then. Based on this observation, a "worst case scenario" of the same magnitude was assume for the first simulation test, which is $130\times 4.5 = 600$ for a typical daily WEP of about $130 in the 6-month trial period. The remaining 3 simulation tests are based on a situation which is two, three and four times that of the "worst case scenario.

The Panel was informed that the simulation showed that, with increases in average daily WEP for 6 March 2008 from $600 to $2400, the PVF increased from 1.18 to 1.72.
## Minutes of 37th RCP Meeting – 13 May 2008

### Other concerns

Retailers had voiced their concerns over the complex methodology in calculating the variables such as $\xi$, $\psi$, $\sigma$, and $\mu$, which are essential in determining the PVF. The current methodology enables MPs to do an independent and simple estimation of the collaterals required prior to the actual receipt of EMC’s preliminary settlement statements. This gives the MP/MSSL more time to prepare enough collateral or undertake prepayment such that they do not hit a margin call.

To address this concern, the Panel was informed that MP/MSSL have the option of building a prudential calculator. However, the MP/MSSL would have to bear the cost of the building and maintenance of this calculator. MPs can use their own vendors or choose from a list of vendors that EMC will provide. EMC will provide the MPs/MSSL’s appointed vendors with the necessary specifications and historical data.

### Conclusion:

- The proposed prudential methodology is able to track the credit risk exposure more accurately
- Higher collaterals are required under this proposed methodology owed to the added element of accounting for price volatility, providing a greater safety net in the event of a default risk.
- EMC recommends that the proposed prudential methodology be implemented.

### Costs Involved:

The Panel was informed of the following estimated costs to implement the proposed prudential system.

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost</th>
<th>Bearer</th>
</tr>
</thead>
<tbody>
<tr>
<td>EMC’s Systems</td>
<td>$165,000</td>
<td>borne by EMC</td>
</tr>
<tr>
<td>Prudential calculator for MPs (Optional)</td>
<td>$48,000</td>
<td>borne by MPs</td>
</tr>
<tr>
<td>Application Program Interface (Optional)</td>
<td>$16,000</td>
<td>borne by EMC</td>
</tr>
</tbody>
</table>

EMC recommended that the RCP agree that the proposed prudential methodology be implemented and to task EMC to draft the relevant rule modifications.
Minutes of 37th RCP Meeting – 13 May 2008

The following Panel members VOTED for the implementation:

Mr. Robin Langdale
Mr. Ng Meng Poh
Mr. Michael Lim
Mr. Henry Gan
Dr. Goh Bee Hua

The following Panel members DID NOT SUPPORT:

Mr. Philip Tan
Mr. Tay Swee Lee
Ms. Annie Tan

The following Panel members ABSTAINED:

Dr. Daniel Cheng
Dr. Kang Cheng Guan
Mr. Low Boon Tong

Based on the votes cast, EMC will

a. draft the relevant rule modifications under the proposed prudential methodology,
b. publish the relevant rule modifications for the industry’s comments, and
c. present the rule modifications to the RCP

There being no other matters, the meeting ended at 12.25pm with a vote of thanks to the Chair.

Dave E Carlson
Chairman

Minutes taken by:
Eunice Koh
Senior Executive - Corporate Secretariat