

**MINUTES OF THE RULES CHANGE PANEL
29TH PANEL MEETING
HELD ON TUESDAY, 14 NOVEMBER 2006
AT 9.35AM
AT ENERGY MARKET COMPANY PTE LTD
9 RAFFLES PLACE #22-01
REPUBLIC PLAZA, SINGAPORE 048619**

Present	Dave Carlson Tay Swee Lee Dr. Daniel Cheng Low Boon Tong	Philip Tan Pei Lip Francis Gomez Koh Kah Aik
Absent with apologies	Dallon Kay Robin Langdale Kng Meng Hwee	Henry Gan Lim Ah Kuan
In Attendance	Paul Poh Poa Tiong Siaw Janice Leow	Teo Wee Guan Wang Jing

1.0 Notice of Meeting

The Chairman called the meeting to order at 9.35am. The Notice and Agenda of the meeting were taken as read.

2.0 Confirmation of Minutes of the 28th Rules Change Panel Meeting

The Minutes of the 28th Rules Change Panel meeting held on Tuesday, 5 September 2006 was tabled and taken as read.

There being no amendment to the Minutes, the Rules Change Panel unanimously accepted and approved the Minutes.

3.0 Summary of Outstanding Rule Changes

The Panel noted the contents of the paper.

4.0 Monitoring List

The Panel noted the contents of the paper.

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5.0 Matters Arising - Imposition of Default Levy

(Paper No. EMC/RCP/28/2006/254 – 14 March 2006)

At the 28th RCP Meeting on 5 September 2006, the RCP tasked EMC to study and report on the feasibility and impact of the following 3 issues:

1. Remove MSSL's liability for a default levy when it is a net creditor (due solely to vesting contract credits held on behalf of retailers);
2. Allocate default levies based on the determination of net invoice amount including vesting contract credits of MSSL and retailers only when there is a default; and
3. Withhold vesting contract credits due to the defaulting retailers via MSSL when a default levy is imposed. These vesting credits shall then flow back to the wholesale market to derive a net default amount to be imposed to the respective parties.

Issue 1: Remove MSSL's liability for a default levy when it is a net creditor due solely to vesting contract credits held on behalf of retailers).

1.1 Feasibility:

- Ad-hoc and technically easy to implement.

1.2 Impact:

- On Gencos: Because of Vesting Contracts, even when there is a high spot price, Gencos would only be paid at the high prices for 35% of their total volume. The other 65% would be paid at the lower vesting hedge price. However since retailers' share of vesting contracts credits are not included in the retailers' wholesale invoice, gencos would have to bear defaults based on a retailer's invoice with high spot price on 100% of the volume. Thus, it is unfair that Gencos have to bear a higher portion of a default levy while MSSL is excluded from it.
- On retailers: Despite defaulting on its wholesale invoice, a retailer retains entitlement to vesting credits from MSSL.
- On MSSL: MSSL does not bear default levy
- On Wholesale Market Clearing: Market clears.

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1.3 Conclusion

In principle, this approach imposes an added unjust burden to Gencos as described above. EMC does not recommend this approach.

Issue 2: Allocate default levies based on the determination of net invoice amount including vesting contract credits of MSSL and retailers only when there is a default.

This approach is such that for normal settlement in the wholesale market, vesting contracts credits (VCC) that MSSL holds on behalf of retailers are not allocated to retailers. However, when a default levy is imposed, the net invoice amounts of markets participants are then adjusted taking into account the distribution of VCC from MSSL to retailers. These adjusted invoices will then be used to determine if a MP is a Net Debtor or Net Creditor. Net Creditors will be allocated default levies.

2.1 Feasibility

- MSSL to send vesting contract credit (VCC) data to EMC when default identified (feasible)
- Adjust net invoice amount taking into account VCC (feasible)
- Allocated default levy to resulting net creditors (feasible)
- Ensuring that MPs allocated default levies can pay (**not feasible**) – creates potential secondary defaults that increases systemic risk to the market. The purpose of default levy is to minimize systematic risk. See discussion below on impact on retailers and the wholesale market.

2.2 Impact:

- On Gencos: Neutral.
- On Retailers: When a retailer defaults, other retailers would likely also be large debtors because of high prices. They are also likely to be required to pledge large collaterals. Redefining them as net creditors (if their vesting contract credits are large enough) would mean they then have to also pay for default levy i.e. a debtor pays more.

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- On MSSL: MSSL's share of any default levy would be reflective of its "true" creditor status.
- On wholesale market clearing: Not right in principle to mix two financially separate markets (wholesale and retail) up. Default levy is a wholesale market debt and should not be apportioned based on retail market invoices. Also, it works against mitigation of clearing risk because we cannot ensure that a debtor liable to pay for default levy has the cash flow to pay. To illustrate, take the scenario that MSSL has pointed out: MSSL being the sole net creditor due to VC credits held on behalf of retailers. In this scenario, it was argued that after passing through VC credits to retailers, some retailers may be receiving VC credits from MSSL that are in excess of the amounts they owe the wholesale market (hence they should be net creditors). Suppose this was the case and that a retailer is treated as a net creditor for default levy purposes. The question here then is: How can the wholesale market maximize the probability that the retailer has the cash flow to pay for the levy? The wholesale market cannot because the retailer's net cash flow from VC is not settled in the wholesale market. They are settled outside the wholesale market.

Also, the added burden on retailers (when spot prices are high) mentioned above would increase the probability of a secondary default, i.e. a default on the amount of default levy imposed.

2.3 Conclusion on Issue 2

If part of the wholesale vesting contract credits from gencos to MSSL can be withheld when there is a default (**See Issue 3**), then the negative impacts of whether a default levy bearer can meet its obligations can be addressed and the approach becomes feasible.

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Issue 3: Withhold vesting contract credits due to the defaulting retailers via MSSL when a default levy is imposed. These vesting credits shall then flow back to the wholesale market to derive a net default amount to be imposed to the respective parties.

3.1 Feasibility

- Note that any default levy is calculated on D+20cd+3bd. It is, hence, not possible to withhold VC credit (for Trading D) due to retailers that is held by MSSL. This is because settlement between MSSL and EMC based on its net invoice amount (VC included) has already taken place on D+20cd.

3.2 Conclusion on Issue 3

Since VC credits for a trading day would have been settled before a default on that trading day can be established, it is impossible to withhold the VC credits.

The alternative would be to settle VC credits separately from other real-time market settlement for a given trading day. This implies settling VC credits at least 3 business days after D+20cd, when a payment default can firmly be established.

Overall Conclusion

Issues 1 to 3 have been studied in detail. The approach described in Issue 1 is not desirable because it is unjust to Gencos. The approach in Issue 2 was dependent on the workability of withholding wholesale vesting contract credits in Issue 3. Finally, withholding vesting contract credits for the purpose described above is not advisable because:

1. It is not technically compatible with the current wholesale settlement regime; and
2. For it to work, VC settlement would have to be separated (and delayed) from other transactions for a given trading day. Creating a separate VC settlement procedure would be a fundamental change to the wholesale settlement regime. The associated costs of systems and changes are likely to be much higher than the two options discussed in the 28th RCP Meeting.

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Recommendation

Given the above analysis, EMC recommended to the Panel to consider the following two options:

1. MSSL calculates and submits VCD to EMC for inclusion in Wholesale Market Settlement Statements (Option 1 discussed at the 28th RCP Meeting)

This option brings Vesting Contract Settlement Amounts between MSSL and Retail MPs into wholesale market settlement. MSSL will calculate these amounts and provide them to EMC for inclusion in wholesale settlement statement.

It would delay the issue of preliminary settlement statement by 1 business day and comes at an estimated cost of \$860,000. However, if the Panel considers it vital to uphold the robustness of the default levy regime against even very remote events, then this option would be less costly than separating VC settlement and other wholesale market transactions as discussed in Issue 3 above.

2. Impose default levy only on net creditors (based on the existing wholesale market invoice amounts)

If the Panel considers cost of system changes cannot be justified given the remoteness of distortionary events, this original proposal should be supported.

The Panel noted that Option 1 would cost S\$860,000 in systems changes and delay the issue of preliminary settlement statement by 1 business day. Such costs would be borne by the market.

The Panel unanimously voted to support the adoption of Option 2.

The Panel requested EMC to present the text of rule changes required to implement Option 2 to the Panel at the 30th RCP Meeting.

EMC

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6.0 Market Manual: GST Registration Number (Paper No. EMC/RCP/29/2006/261)

This paper assessed EMC's proposal to require a market participant to provide its GST registration number in its application form (Market Manual) to participate in the Singapore Wholesale Electricity Market (SWEM).

The Panel noted the contents of the paper and agreed with the proposal.

The Panel **supported** EMC's recommendation and would make the necessary recommendation to the EMC Board for adoption.

7.0 Composition of Rules Change Panel (Paper No. EMC/RCP/29/2006/262)

Currently, the Market Rules make exemptions for the Market participants/MSSLs who are affiliates of Temasek Holdings Pte Ltd to be concurrently represented on the RCP. It is intended in the Market Rules that the composition of the RCP should result in fair representation. This is feasible only in a privatized electricity industry where ownership is not concentrated. Since the sale of gencos has not been announced, it has become necessary to extend the exemptions for such market participants/MSSL so that they can be concurrently represented on the RCP.

The current exemption period ends on 31 December 2006. This proposal seeks to extend the exemption period for one more year, i.e. until end of 31 December 2007.

The Panel noted the contents of the paper.

The Panel **supported** EMC's recommendation to amend Section 2.3.3 of Chapter 3 of the Market Rules and would make the necessary recommendation to the EMC Board for adoption.

8.0 Mixed Integer Program Based Modelling of Regulation Constraints (Paper No. EMC/RCP/29/2006/263)

EMC proposed to modify the regulation constraints in the market clearing engine. The new constraints would eliminate the occurrence of "trapped" generators, where some generators qualified as regulation providers are unnecessarily constrained for energy dispatch at their "regulation minimum" or "regulation maximum" level because of regulation constraints. The proposed approach would allow for more optimal dispatch schedules.

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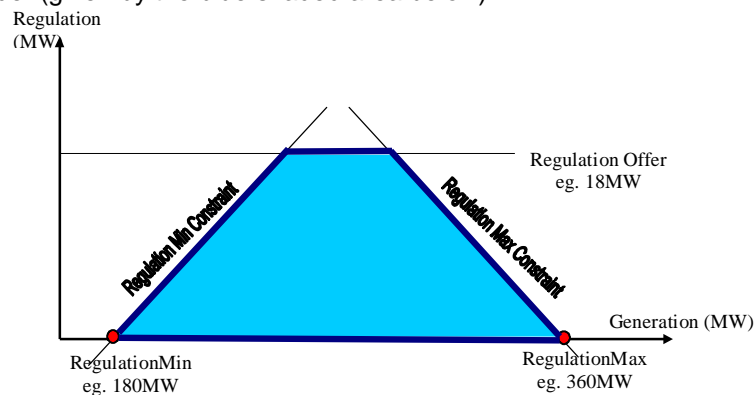
Action

Background

The Panel was informed that Regulation is the frequent adjustment to a generating unit's output so that any power system frequency variation due to imbalance between load and generation can be corrected. Currently, regulation can only be provided by generation registered facilities (GRFs).

The PSO prompts GRFs to provide regulation through the Automatic Generation Control (AGC) subsystem. For the AGC to be able to control a GRF, the GRF's output must be within a certain range. This range is between the RegulationMin and RegulationMax of the GRF, i.e. the GRF's output should not be less than the RegulationMin or greater than RegulationMax.

The Regulation Min/Max constraints, together with the regulation offer constraints, define the feasible solution space for any qualified regulation provider (given by the blue shaded area below):



The existing regulation constraints may result in a situation where a qualified regulation provider, despite not being scheduled for regulation, is "trapped" at its 'RegulationMin' and 'RegulationMax', depicted by the two red dots in the figure above.

This is undesirable because:

- a qualified regulation provider trapped at 'RegulationMin' would be forced to generate at 'RegulationMin' level, despite other cheaper energy offers may be available; and
- a qualified regulation provider trapped at 'RegulationMax' would not be scheduled above 'RegulationMax' even if it is offering cheaper (below market clearing price) energy into the market.

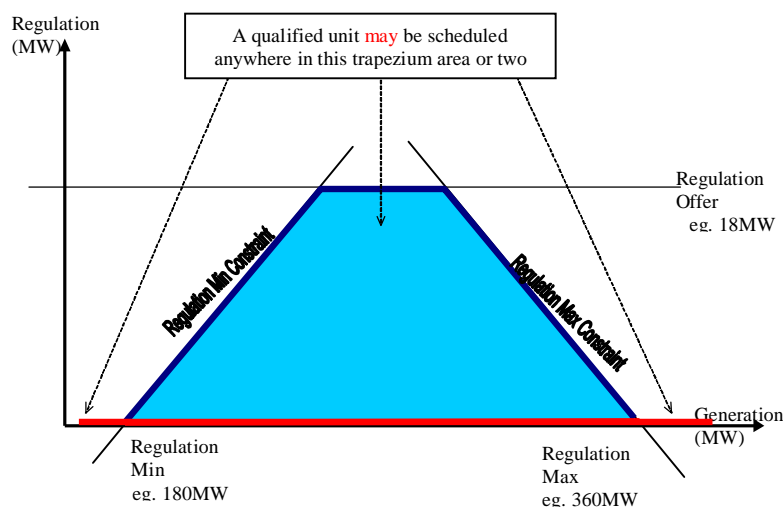
The above two situations resulted in 'cheaper' available generation not being dispatched to meet demand. Hence, due to qualified regulation providers being trapped, the resultant dispatch schedules are uneconomical (i.e. more costly) and economic efficiency is undermined.

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MIP-based Regulation Constraints

The Panel was informed the problem of a “trapped” GRF lies with the existing definition of the solution space for a qualified regulation provider. To overcome this problem, EMC proposed to define a new solution space for qualified regulation provider so that if it is not scheduled for regulation, then it should be allowed to provide energy at any output level and not subject to the RegulationMin/Max Constraints. The modified solution space is given by the diagram below (it is given by the blue shaded area, plus the red line segment):



The modified solution space is non-convex, thus Mixed Integer Program (MIP) is introduced in defining the new regulation constraints.

MIP-based Approach

Because MIP-based solution increases the time needed to solve the optimization problem, MIP-based regulation constraints will be applied only in cases where “trapped” generators are discovered.

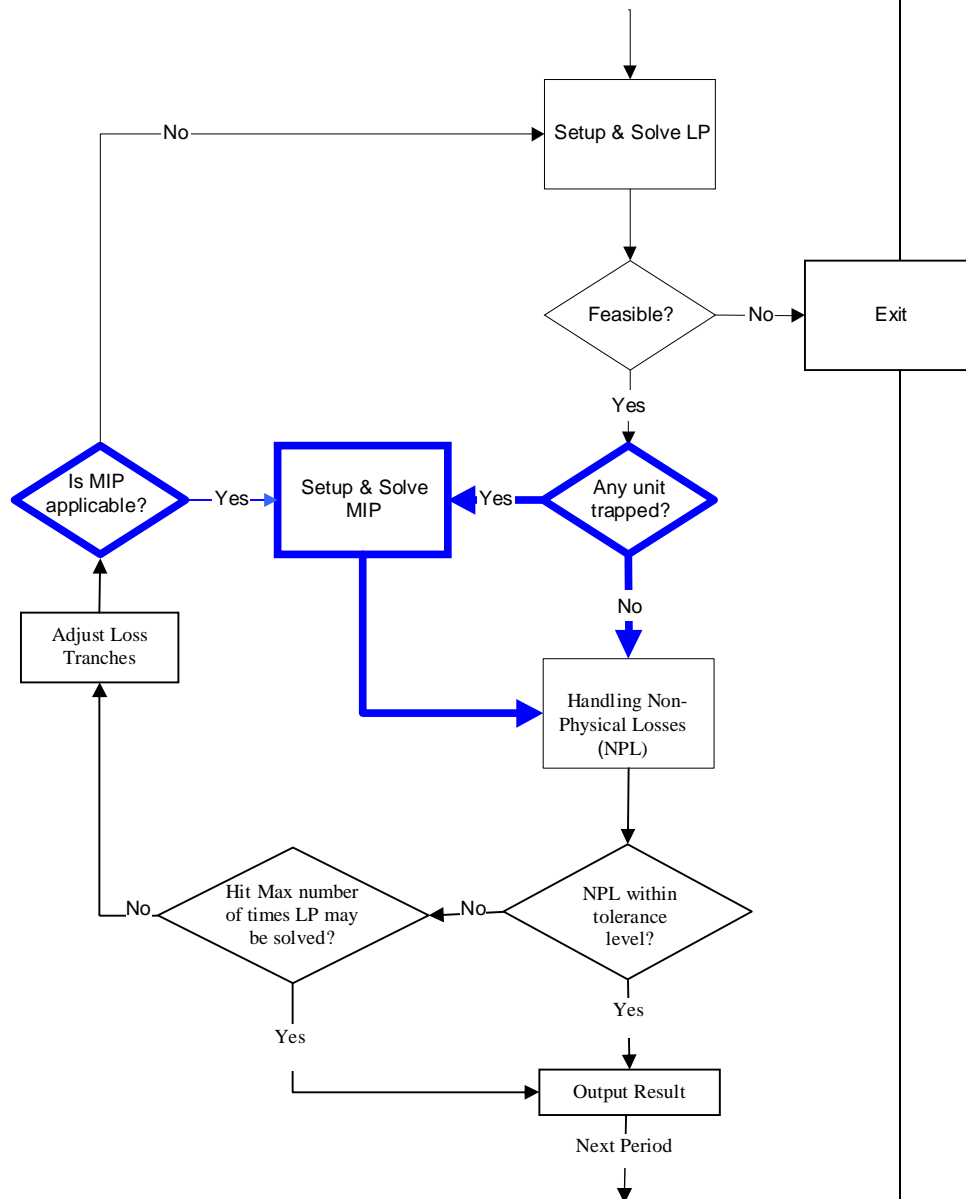
The following steps are used to determine if MIP-based regulation constraints should be applied to solve the optimization function:

- a) Apply normal regulation qualification checks before the initial solve and identify the generators that qualify to provide regulation.
- b) After the first solve, check if any generator is cleared for a quantity of energy equal to their RegulationMin or RegulationMax.
- c) If at least one generator is cleared at either of these levels, then formulate and apply the MIP-based regulation constraints on all qualified regulation providers and re-solve.

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This process can be described by the following flowchart. An additional check and re-solve step is added to the existing flowchart. This process ensures that there would be no non-physical losses or trapped generators in the solution.



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The Panel was also informed that EMC proposed two other changes to the present pre-check conditions for regulation providers:

1. The current rules require a GRF's total energy offer to be greater than or equal to its RegulationMin in order for its regulation offer to be considered. However, if the total energy offer of a GRF is only equal to its RegulationMin, then because of the Generation Block Constraint, this GRF would be scheduled for energy to at most its RegulationMin level. With its energy scheduled below or equal to its RegulationMin, this GRF would in fact not be scheduled to provide any regulation. Thus, such a GRF's regulation offer should not be considered in the first place.
2. Currently, GRFs with StartGeneration equal to its RegulationMin would be disqualified from providing regulation. This is to allow GRFs that are trapped in one period to be scheduled below its RegulationMin in the next period.

With the implementation of MIP-based regulation constraints, the occurrence of regulation anomaly would have been eliminated. There is then no reason to keep this arrangement because a GRF with StartGeneration equal to its RegulationMin is able to provide regulation and should not be disqualified as a regulation provider.

For the above reasons, EMC proposed the following changes to be made to the pre-check conditions:

Section	Current Pre-check Conditions imposed on a GRF's regulation offer	Proposed Pre-check Conditions imposed on a GRF's regulation offer
6D.13A.1.1	Sum of energy offered \geq RegulationMin	Sum of energy offered $>$ RegulationMin
6D.13A.1.2	StartGeneration $>$ RegulationMin	StartGeneration \geq RegulationMin

Conclusion

The Panel noted that introducing MIP-solve to address the problem of 'trapped' generators for regulation anomaly would enable the MCE to produce more optimal market outcomes, Test also showed that MCE's performance would not be adversely affected.

Technical Working Group Deliberation

The TWG met to deliberate on this proposal on 10 October 2006. TWG members unanimously agreed with the conclusion of this paper and endorsed the rule modification proposal.

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Mr. Tay Swee Lee suggested to EMC to study if the application of MIP-based regulation constraints for a dispatch period would result in insufficient regulation providers in the next period and the impact of the GRF that was scheduled below the RegMin i.e. whether it would be “stuck” below RegMin permanently.

EMC

Mr Tay also asked if PSO had raised any system security concern with the rule change. Mr Paul Poh informed the Panel that the PSO’s TWG representative did not raise any such concern. .

Referring to the process flow chart, Mr. Philip Tan requested EMC to check whether the use of LP in decision symbol “ Hit Max Number of times LP may be solved “ could result in endless looping since MIP is now introduced and MIP solve may not be considered a LP solve.

EMC

(Post meeting Note: In the market rule, the reference to LP include the MIP component. Thus there is no issue of endless looping)

EMC will re-submit the proposal to the Panel at the next Panel meeting.

9.0 Review of Price Revision in the Singapore Wholesale Electricity Market

The Panel was informed that the Singapore Wholesale Electricity Market (SWEM), in principle, adopts ex-ante pricing where spot prices for energy, regulation and reserve are determined by the market clearing engine (MCE) just prior to the start of each half-hour dispatch period.

In its market design paper (‘Wholesale Market Design’, dated 2 August 2002), PHB had recommended that ex-ante prices should remain firm unless (a) if there is a re-dispatch, as a result of a significant contingency, or (b) the market operator errs in calculating the original ex-ante prices.

Accordingly, the Market Rules requires EMC to confirm by 12 pm each day whether the previous day’s prices are final or provisional. Prices that are provisional are subject to revision. Prices are revised by re-running the MCE. If it is not possible to perform a re-run, the revised prices are determined by taking an average of last 30 days’ prices.¹

Some RCP members had questioned the rationale of the existing price revision arrangement. According to them, the arrangement seems to run afoul with an ex-ante market. In an ex-ante market, prices determined prior to the start of a dispatch period should be firm and bind both sellers and buyers. Strictly, ex-ante prices should not be revised.

¹ Except where: (1) there was a load shed, then the MEP and USEP shall be equal to the energy price ceiling; or (2) the average price of the past 30 days exceeds the applicable upper price limit specified in Appendix 6J, then that price shall be set to that upper limit.

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However, other RCP members contend that price revision is necessary to ensure that the prices determined by the MCE for settlement purposes are correct and reflect the prevailing underlying market.

The RCP tasked EMC to undertake a review on price revision in SWEM in May 2006.

EMC highlighted the various types of Price Revision Re-run as follows

Type of Price Revision / Re-run	What EMC did	Intention
<p>Type 1 The MCE has failed to produce a real-time schedule (RTS) for a dispatch period for any reason other than a real-time market suspension. (Section 9.2.6, Chapter 6)</p>	<p>Re-run the MCE to produce the real-time pricing schedule.</p>	<p>To determine prices for settlement.</p>
<p>Type 2 The MCE has used input data that are not entirely what should have been supplied to it at the time the RTS for a dispatch period would normally have been produced. (Section 10.2.5, Chapter 6)</p>	<p>Re-run the MCE by using all correct input data that should have been used by the MCE at the time when the MCE runs</p>	<p>To ensure that prices for settlement are based on correct and timely input data to the MCE.</p>
<p>Type 3 The MCE has used the adjusted nodal load forecasts which take into account the energy shortfall specified by the PSO for a dispatch period. (Section 10.2.8, Chapter 6)</p>	<p>Re-run the MCE by using the 'unadjusted' nodal load forecasts to (i) determine the prices for settlement, and (ii) to determine compensation for affected generators under Appendix 6I of Chapter 6.</p>	<p>To ensure that prices for settlement reflect the energy shortfall in the dispatch period.</p>
<p>Type 4 The MCE has applied constraint violation penalty (CVP) for line constraint for a dispatch period and the PSO has subsequently confirmed that there was no load shed in that period. (Section 10.2.3A, Chapter 6)</p>	<p>Re-run the MCE by using the maximum actual line flow values supplied by the PSO; if no such values is received from the PSO, EMC will re-run the MCE by relaxing the line constraints in accordance with D.16.4, Appendix 6D of Chapter 6</p>	<p>To ensure that prices for settlement reflect the prevailing line conditions for the dispatch period.</p>

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EMC provided the statistics on re-run in terms of frequency and price impact as follows

Frequency

Type of Price Revision / Re-run	2003	2004	2005	2006 (until 30 June)
Type 1: Failed/Missing/Late RTS	23 (9%)	18 (26%)	23 (43%)	15 (68%)
Type 2: Erroneous inputs to MCE	224 (91%)	48 (68%)	24 (45%)	4 (18%)
Type 3: Scheduling by MCE taking into account anticipated energy shortfall by PSO	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Type 4: Application of CVP in the MCE due to violation of line constraints when there is no load shedding in real-time	0 (0%)	4 (6%)	6 (11%)	3 (14%)
Total	247	70	53	22

Price Impact

Year	Largest increase in USEP, i.e. consumers pay higher price with price revision	Largest decrease in USEP, i.e. consumers pay lower price with price revision	Largest increase in MEP, i.e. generator receives higher price with price revision	Largest decrease in MEP, i.e. generator receives lower price with price revision
2003	\$7.48	-\$288.58	\$46.64	-\$4,397.75
2004	\$6.12	-\$116.66	\$9,000.00	-\$4,426.22
2005	\$49.08	-\$2,220.30	\$4,601.05	-\$2,940.28
2006 (until 30 June)	\$0.01	-\$169.27	\$15.25	-\$30.89

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The statistics showed that while frequency of re-runs has declined, they remain. The price impact however can be very significant. With the relative small number of re-runs the impact on economic efficiency is minimal. Given the very significant impact on prices the impact on equity on fairness is great (price can change by +/- \$9000/MWh if they are no price revision. This can have adverse impact on both generators and loads (consumers).

EMC's assessment on whether to have price revisions or not.

EMC assessed that having no price revision yields a straightforward arrangement and gives full certainty to MPs. However, it can result in settlement based on wrong prices which will adversely impact consumers and generators. It is inequitable/unfair to these parties (noting that the extent will depend on the magnitude of price difference which can be very big, and this had already happened). If there is no price revision, one way is to allow affected parties to seek compensation from error-causer(s) but this works only if: (a) error causer(s) can be clearly identified, or (b) error causer(s) can be made to pay for its mistakes through 'its-own-pocket'.

In view of maintaining equity & fairness, EMC recommend that SWEM, in principle, should allow price revision. This will create some uncertainty but the extent is not great because price revision occurs very infrequently. Also, this can have adverse financial impact on certain generators who had delivered based on original ex-ante price. EMC recommended that these generators be compensated for the affected quantity of energy they had produced.

Practices in Other Relevant Jurisdictions

EMC provided the Panel with price revision practices in two jurisdictions that uses ex-ante pricing ie NEM (Australia) and WEM (Argentina). In particular the NEM market had seen incidents of pricing error. The initial remedy was to improve quality of inputs to the dispatch engine. However some incidents of pricing error still occur. Although infrequent, the impact can still be significant for the parties concerned. NEM also noted that wrong prices (if uncorrected) filter down to settlement and persist as wrong and misleading price signals. To solve the problem, NEMMCO introduced price revision.

Comments from market participants.

EMC also received several comments from various market participants. EMC has provided responses to every comment in the paper. EMC highlighted to the Panel the following key comments.

a) Main objection for price revision is that prices agreed beforehand should not be changed after goods has been delivered and consumed

EMC's response: Our market is not one where sellers and buyers directly agreed on the price (e.g. stock market). The MCE determines the price, taking into account demand, supply, network conditions and system requirements.

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If the input(s) to the MCE is wrong or untimely, then prices will be wrong. Hence, it is unfair for parties to pay/receive the wrong price; the impact can be significant if the price difference is very large.

b) Consumers (and not just generators) should also be entitled to compensation if they end up paying more after price revision.

EMC's response: This is wrong. Price revision is to correct prices wrongly determined by the MCE. The revised price is the correct price that parties should pay (or receive). Hence, if revised price turns out higher, consumers should rightly pay that price since that is the correct price. This should not be confused with compensation for generators. Compensation is given to generators who are adversely affected because they had already delivered based on the original (wrong) price. Hence, we propose to compensate them for the affected quantity of energy they had produced.

Price revision creates uncertainty. In addition, it does not improve economic efficiency. Hence, we should not have price revision.

EMC's response: The extent of uncertainty depends on the frequency of price revision which is currently very low. Uncertainty affects both generators and consumers. We also note price revision has minimal effect on economic efficiency in the short- and long-run currently. But effect in the long-run can be significant if pricing error occurs frequently. Our argument for price revision rests on maintaining equity and fairness. Although the extent of it depends on frequency of pricing error, a more important factor is the magnitude of price difference involved, which can be very large.

First Decision Sought From Panel: To Allow Price Revision or Not?

EMC recommend that in principle, price revision should be allowed in SWEM. EMC main argument for doing so is to maintain equity and fairness. The panel was asked to first indicate whether it supports this recommendation

Mr. Tay Swee Lee requested that EMC publish the full text of the MPs' comments. The Panel agreed with this.

EMC

Mr Tay Swee Lee commented that market participants did not know the reasons for the re-runs. EMC responded that in the review, EMC recommended that EMC report to the Panel on the number of price revision/re-run and explain the circumstances giving rise to such revision/re-run (this is to form part of monitoring list of the RCP).

Mr. Philip Tan requested that EMC explain in detail the price checks carried out by EMC Market Operations before the Panel make the decision on whether to have re-runs or not.

EMC agreed to do this at the next Panel meeting.

EMC

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{Mr. Koh Kah Aik left the meeting at 11.10am}.

10. Appointment of Technical Working Group

As there was a lack of quorum, the Chairman informed the remaining members of the Panel that this paper will be circulated to the RCP or deferred to the next Meeting.

Action

EMC

The being no other matters, the meeting ended at 12.40pm with a vote of thanks to the Chair.

Dave E Carlson
Chairman

Minutes taken by:
Eunice Koh
Market Panel Administrator