

RCP PAPER NO. : **EMC/RCP/66/2013/CP44**

SUBJECT : **PROPOSED PROVISION FOR PRICE REVISION WHEN GENERATING UNITS FAIL TO REVISE THEIR OFFERS IN GOOD FAITH**

FOR : **DECISION**

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Executive Summary

This paper assesses the proposal to include an additional provision to conduct price revision when Market Participants (MPs) are determined to have failed to revise their offers in good faith to correctly reflect the physical capabilities of their generating units after forced outages.

This proposal surfaced in response to an episode on 13 December 2011, where offers were not revised correctly following a sequence of forced outages. As a result, the Market Clearing Engine (MCE) scheduled units that were physically unable to run up, compromising system security and artificially suppressing prices; the prices for energy, reserves and regulation did not rise to accurately reflect the physical scarcity. Even though YTL PowerSeraya was subsequently fined, the fine collected was paid to the MEUC (consumers and retailers), rather than to producers (generators and interruptible load providers), who would have received the higher prices if the offers were revised correctly.

The proposal to conduct a price revision in such cases addresses this financial dimension by preserving the price signal integrity for decision making, and by making it more financially equitable to the producers by ensuring that they receive settlement payments equivalent to what they should have received in the first place. Price revision is also incentive-compatible as it removes the financial incentive for MPs to not revise their offers if they are unable to generate enough to cover their retail/vesting contracts. While price revision gives no price certainty to producers and consumers ex-ante, and also has no effect on system security during the affected periods, thresholds are proposed to be set to ensure that they are conducted only where the financial impact to the market is significant.

If the decision is made to proceed with price revision, a three-step process in determining whether to conduct a price revision is proposed whereby prices are first declared provisional

for periods in which an Emergency Operating State (EOS) declared by the PSO is in effect. The PSO will next send EMC SCADA data on the gencos' actual output and tripping data of individual units (including cases of failure to synchronise) by D+3 business day. Finally, price revision will be conducted for a given period only if the sum of all assessable generating units' gross generation output falls short of the corresponding scheduled quantities by more than 500 MW for the period. In this case, the MCE will be rerun using an additional constraint setting the scheduled output of the tripped generating units to be equal to their actual generating output, while keeping all ex-ante offers unchanged, to produce the revised clearing prices.

At the 64th RCP meeting, the RCP tasked EMC to consult the Market Surveillance and Compliance Panel (MSCP) and the Dispute Resolution Counsellor (DRC) on the alternative options explored in the paper, in particular:

- (a) For the MSCP to recover the relevant compensation amounts from the offending party, and direct the distribution of these amounts to the affected parties (those who suffered out-of-pocket losses or foregone profits); and
- (b) For the DRC to facilitate compensation claims by the affected parties directly against the offending party.

At the 65th RCP meeting, the RCP discussed the responses from the MSCP and the DRC. The RCP requested that EMC further explore the legal implications of the MSCP and DRC options with EMC's legal advisor, and then draw up a comparison of the pros and cons of these two options with those for price revision. In addition, the RCP requested data on the impact of the price reruns (listed in the 65th RCP Monitoring list) on USEP.

In the assessment process, two additional options have been proposed:

- a) Automatic Settlement Adjustment, and
- b) Hybrid Model.

At the 66th RCP meeting, a comparison of the pros and cons of the five options (price revision, MSCP, DRC, Automatic Settlement Adjustment, and Hybrid Model) was presented and discussed. After much debate and deliberation, the issue of whether to conduct a price revision for cases like the 13 December 2011 incident was put to a vote. The Panel by majority vote decided **not to support** the proposal to conduct a price revision for such cases.

By a second majority vote, the Panel decided to monitor the occurrence of future similar incidents through the RCP monitoring list until such time that the Panel decides it no longer requires monitoring, or that a revisit of this issue may be required. Therefore, cases of non-compliance of dispatch referred by the PSO to the MSCP for investigation will be captured in future RCP monitoring lists.

1. INTRODUCTION

This paper assesses the proposal to conduct price revision when Market Participants (MPs) are determined to have failed to revise their offers in good faith to correctly reflect the physical capabilities of their generating units following forced outages. This proposal surfaced in response to an episode on 13 December 2011¹, where offers were not revised correctly following a sequence of forced outages. As a result, the Market Clearing Engine (MCE) scheduled units that were physically unable to run up, compromising system security and artificially suppressing prices.

2. BACKGROUND

2.1 Description of the 13 December 2011 Episode

At 10.36pm (Period 46) on 13 December 2011, the forced outages of four Combined-Cycle Plants (CCPs) at YTL PowerSeraya ("PowerSeraya")'s power station (SERCCP1-4) rendered about 1,100 MW of energy unavailable to the wholesale electricity market. However, the energy offers from these four units were not revised for the subsequent three periods, resulting in the MCE continuing to schedule them. Even though some units managed to re-synchronise with the system after the trip, their output was still substantially lower than their scheduled quantities.

The scheduling of these tripped units led to a physical shortfall of supply. The PSO thus had to declare an emergency operating state and instruct other generation facilities to run up. As the MCE's schedules for these periods were computed assuming these 1,100 MW of energy offers were available, the actual physical scarcity was not reflected in the schedule prices, which remained relatively low at between \$174.60 to \$200.12.

For P2 on 14 December, offer variations were submitted to reflect that 3 of the 4 CCP units were generating again. At 1am on 14 December, PSO issued an advisory to inform that the system was back to a normal operating state. The EOS was thus in effect in P46-48 of 13 December and P1-2 of 14 December, and the prices for these periods were subsequently provisionalised to allow for a detailed investigation.²

As the PSO verified that no physical load shedding occurred, the incident did not fall into any of the current provisions for price revision, namely:

Type 1: Cases where 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

Type 2: Cases where the MCE has used input data³ 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

Type 3: Cases where the MCE has used the adjusted nodal load forecasts which take into account the energy shortfall specified by the PSO for a dispatch period

Type 4: Cases where the MCE has applied constraint violation penalty for line constraint for a dispatch period and the PSO has subsequently confirmed that there was no load shed in that period

Type 5: Cases where the MCE has produced prices which do not reflect their respective locational system marginal price(s) (LSMP)

¹ We have referred to this episode as the "13 December 2011 episode" in this paper.

² For further details, please refer to the Determination of the Market Surveillance and Compliance Panel, MSCP/2012/D3, 17 July 2012.

³ Inputs to the MCE that can trigger price revision include all inputs used by the MCE in determining the RTS, but exclude bids and offers from market participants that have been validated and accepted by the MCE.

Consequently, the prices for the affected periods were finalised at the lower level, which did not reflect the physical scarcity experienced.

2.2 Implications of the 13 December 2011 Episode

The failure to revise offers to correctly reflect the units' physical capability following a forced outage had both system security and financial implications.

The PSO managed to take corrective actions to guide the system through without any load shed, units instructed to run up were compensated for their more expensive generation, and PowerSeraya was fined for compromising system security.

However, the financial dimension appears to be less comprehensively dealt with. Due to the failure to withdraw offers from units that could not perform, prices for energy/reserve/regulation did not rise to accurately reflect the physical scarcity, and the Market Surveillance and Compliance Panel (MSCP) estimated the total financial impact of this incident to be around \$1.68 million. Although PowerSeraya was fined a total of \$800,000, this did not ameliorate the financial impact to the producers (generators and interruptible load providers), as the fine collected was paid to the Monthly Energy Uplift Charge ("MEUC") (consumers and retailers), rather than to the producers.

2.3 Proposal Received

In response to this incident, a proposal was submitted suggesting the following:

- In situations where MPs are determined to have failed to revise their offers in good faith, or failed to revise correctly in good faith, to reflect the physical capability of their generating units, hence leading to artificial/suppressed price signals, there should be a provision for price revision of the affected generating units for the affected periods, using the revised offer that is reflective of the physical capability of the generating units. This will ensure that the correct price signals are provided to the market appropriately.

3. ANALYSIS OF PROPOSAL

3.1 Historical Offer Revision Trends

The extent to which gencos revise their offers following a trip is summarised in the table below, using data from 2009 to June 2012.

Table 1: Summary of Total Tripped Events and Offer Variations⁴

Event	Total Number	Total Percentage
Tripped events from 2009 – Jun 2012	356	100.0%
Failed to revise offers	104	29.2%
Revised offers	252	70.8%

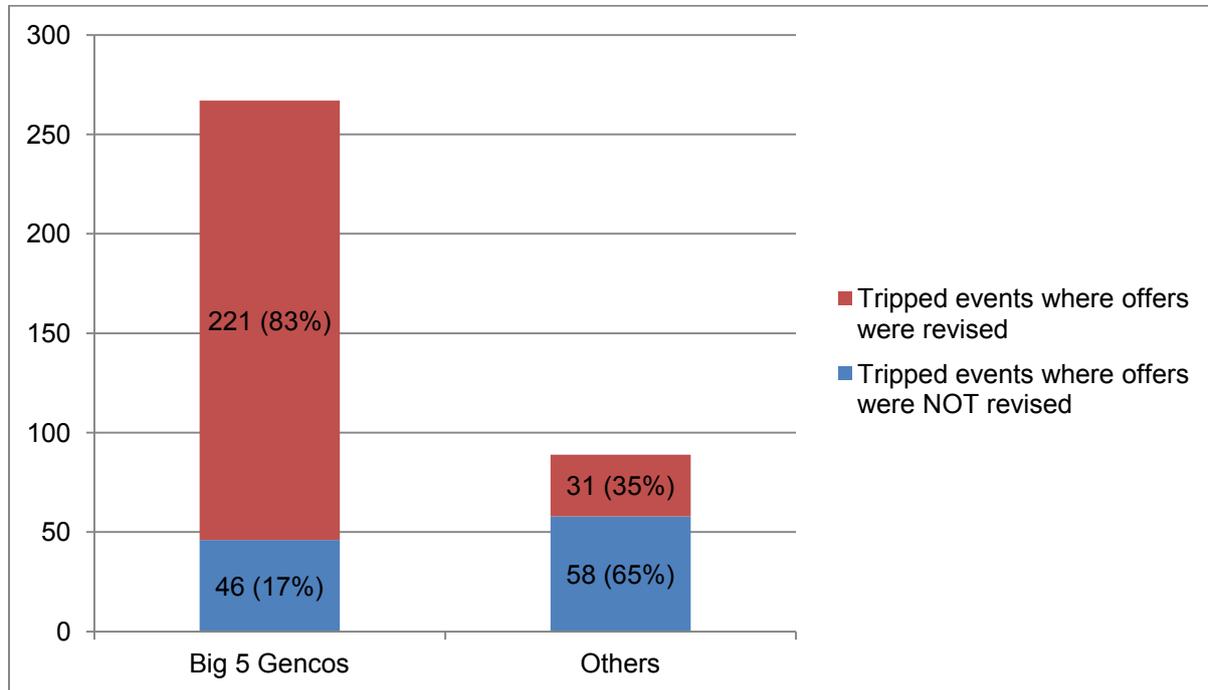
As shown in Table 1, gencos failed to revise their offers 29.2% of the time when their generating units tripped. Strictly speaking, what matters most is whether gencos are physically able to comply with their dispatch schedule, regardless of whether they revise their offers (e.g. it is fine if they do not revise their offers, but are able to comply with their dispatch schedules for periods

⁴ Summarised data is based on offer variations submitted by MPs following a forced outage of their generating units. Revised offers received within four periods after the tripped period were matched to the tripped events. A tripped event is classified under "Revised offers" if there is a matching revised offer. Where no offer variations pertaining to a tripped event were received, that tripped event is classified under "Failed to revise offers".

subsequent to their trips). However, this information requires SCADA⁵ data on the gencos' output, which is not available. As such, we proxy this by analysing whether gencos revise their offers following trips.

To get a better picture of the gencos' behaviours, data for two broad groups were analysed and the results are graphically illustrated below.

Graph 1: Tripped Events and Offer Variations for Genco Groups



Note: The Big 5 Gencos include PowerSeraya, Senoko Energy, Tuas Power Generation, Keppel Merlimau Cogen, and Sembcorp Cogen. Others include National Environment Agency (NEA), Shell Eastern Petroleum, and Keppel's and Senoko's incineration plants.

Graph 1 shows that the Big 5 Gencos make up a large proportion of trips (267 out of total 356 tripped incidents or 75%) and in the majority of the cases, do revise their offers (221 out of total 267 incidents, or 83%).

3.2 Arguments for and against Price Revision

As a rule of thumb, ex-post price revision should be avoided where possible in an ex-ante market like Singapore. Specifically relating to this episode, the considerations **against** price revision are:

- **No Price Certainty** - Producers and consumers make their production/consumption decisions for the period based on the lower ex-ante prices/price forecasts. If prices are revised ex-post (based on MSCP's report, the Uniform Singapore Energy Price (USEP) would have risen to \$3409/MWh for P47 of 13 December 2011), consumers would have to pay the higher ex-post prices for their consumption which was originally premised on the lower ex-ante prices, which is unfair to them⁶.
- **No Effect on System Security** – Price revision essentially adjusts prices after the period is over, and does not have an impact on the period's actual system security. Rather, the

⁵ Supervisory Control and Data Acquisition

⁶ This problem is mitigated for consumers who are on contracts (eg. vesting, fixed-rate, fuel-indexed) as they will have little or no exposure to spot prices. Further, those exposed to spot prices might not regularly monitor published spot prices, or might have price inelastic demand and not alter consumption in response to the high prices.

period's system security depends on PSO's corrective actions, and the physical response of standby/online units.

On the other hand, the considerations **for** price revision in this particular episode are:

- **Incentive Compatible Rules** – The Market Rules should be structured to align the interests of MPs with that of the overall market. This ensures that MPs will voluntarily obey the rules, when acting in their own interests.

While not specifically pertaining to this episode, there is a financial incentive for MPs not to revise offers if they are unable to generate to cover their retail/vesting contracts (i.e. essentially taking a net short position in the spot market) and have to buy back from the spot market; if they were to remove or revise their offers downwards, the spot prices will spike and they will incur significant losses.

If, however, the MPs know that prices will be revised upwards ex-post even if they do not revise their offers ex-ante, then it removes this financial incentive and increases the likelihood that they will revise their offers accurately.

- **Financial Equity** – Price revision is more financially equitable to other producers, by ensuring that they receive settlement payments equivalent to what they should have received in the first place. Essentially, if the genco with forced outage units had revised its offers, the prices for energy/reserve/regulation would spike up to accurately reflect their relative scarcity in the market, and producers would have been correspondingly paid a scarcity premium. Any fine imposed by the MSCP is directed through the MEUC to the consumers/retailers, rather than to the producers for that specific period who received less than what they ought to have.
- **Price Signal Integrity** – Spot prices play an integral role in guiding long-term decision making (e.g. investing in new generation plants, decommissioning old plants). In the 13 December 2011 episode, the market prices were obviously erroneous by suggesting that no scarcity exists. All else equals, such artificial suppression of prices will lead to a lower-than-optimal level of investments in new capacity in the long term.

3.3 Assessment of Alternative Options

Alternative channels to achieve the benefits of price revision (e.g. financial equity, incentive compatible rules) without incurring its costs (e.g. lack of price certainty), were also examined.

One such option explores whether current market rules provide legal latitude for the MSCP to direct the MP that committed the breach (referred to herein as the “offending MP”) to pay restitution to other affected MPs, which suffered losses/reduced profits resulting from the former's failure to revise its offers). This would bypass the MEUC channel and allow fines to be paid to targeted parties (i.e. producers).

Currently, the market rules allow the MSCP to direct the offending MP to pay a financial penalty⁷. However, there are no explicit rules to direct the offending MP to pay the other affected MPs. Based on the opinion of our legal adviser, it is unclear that such direct restitution is possible, unless there are rule changes to specifically empower the MSCP to do so.

In addition, the role of the MSCP is to ensure compliance with the market rules, taking enforcement actions when a breach of the market rules is determined. It is not generally for the MSCP to adjudicate private claims between the MPs for the purpose of compensating losses suffered by one or more MPs as a result of the breach of others. Further, the award of “costs” described in Section 7.2.8.6 of Chapter 3 of the market rules refers to “costs associated with the investigation or consideration of the matter” and that such costs are those incurred specifically in respect of a given matter.

⁷ Please refer to Market Rules Chapter 3 Section 7.2.8.5.

It therefore appears that the MSCP may not be the appropriate body to direct the offending MP to compensate other MPs.

Another option explored was whether the affected MPs could seek compensation from the offending MP directly through the Dispute Resolution Mechanism, either via the Mediation Route⁸ or the Arbitration Route⁹. Our legal advisor advised that for an affected MP to seek compensation from the offending MP through one of these routes, the affected MP must first show that it has a basis for the claim. In this regard, there are difficulties for an affected MP to establish a claim against the offending MP in a case similar to the 13 December 2011 episode, including:

- a) The market rules do not expressly provide for an offending MP who breaches the market rules to pay compensation to an affected MP for losses arising from the breach.
- b) The affected MP may try to establish a claim for damages on ground of breach of contract. However, the market rules do not expressly provide that the MPs have direct contractual relations with one another.¹⁰
- c) It may be difficult to imply the existence of a collateral contract between each MP and every other MP incorporating the market rules. The market rules do not expressly state that an MP is to pay damages for failure to submit offer variations in time. There is therefore no necessity to construe or imply a collateral contract between each MP and every other MP in the present circumstances for the market rules to operate sensibly.
- d) Even assuming that there is a bilateral contract between each MP and every other MP, there is a further issue of whether there is sufficient causal connection between the offending MP's breach of contract and the affected MP's loss. In addition, the loss of the affected MP cannot be too remote.
- e) Alternatively, the affected MP may try to establish a claim under the tort of negligence. However, the affected MP would need show that the offending MP owed a duty of care to the affected MP to submit offer variations in compliance with the relevant market rule. It may be difficult in cases similar to the 13 December 2011 episode for the affected MP to show that the offending MP owed a duty of care to the affected MP, given that they are competitors in the energy market, and not, for example, manufacturer and consumer or professional and client.

In view of the above-mentioned difficulties, this alternative option has not been explored further.

4. IMPLEMENTATION CONSIDERATIONS FOR PRICE REVISION

Since there are no viable options currently to achieve the effects of price revision, this section examines the feasibility of conducting price revision and proposes an implementation framework.

4.1 Current Timelines

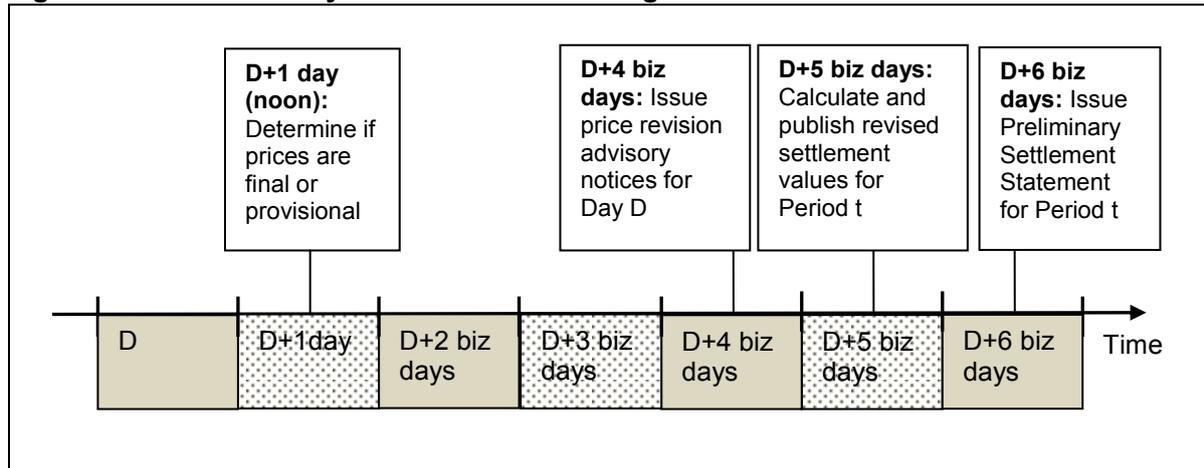
The key timelines of the current price revision regime are summarised in Figure 1 below.

("D" refers to a trading day; "T" refers to the beginning of a dispatch period"; "Period t" refers to a dispatch period)

⁸ Please refer to Market Rules Chapter 3 Section 3.8.13.

⁹ Please refer to Market Rules Chapter 3 Section 3.9.29.

¹⁰ As outlined in Chapter 1, Section 3.2, the Market Rules do not explicitly serve as a bilateral contract between Market Participants.

Figure 1: Timeline of Key Events for Determining Prices

As shown in Figure 1, the key milestones for the price determination process are:

- By D+1 day (noon): EMC to provide confirmation as to whether prices determined are final or provisional. Provisional prices may be subject to revision.¹¹
- By D+4 biz days: For provisional prices which are confirmed to be subject to revision, EMC to issue price revision advisory notices¹² for the relevant dispatch day D. Provisional prices in respect of which no such price revision advisory notices are issued by the deadline stipulated shall be deemed final.¹³
- By D+5 biz days: EMC to calculate and publish revised values of the settlement data to be used for settlement purposes for Period t.¹⁴
- By D+6 biz days: Preliminary settlement statement for the relevant trading day to be issued.¹⁵

The proposed price revision implementation will have to take into account the operational framework/timeline of the current price determination process.

4.2 Proposed Approach for Price Revision

a) EOS as Trigger

The proposed price revision should take place when units' deviations have a significant financial impact to justify the effort and price uncertainty associated with price revision. Instead of requiring PSO/EMC to constantly monitor deviations for all periods, EMC proposes declaring prices provisional for periods when the EOS is in effect. The EOS serves as a natural trigger that shortlists incidents of significant impact without the need for additional processes.

An assessment will then be made on whether prices should be revised for all periods covered by the EOS. If an EOS is declared or lifted midway through a period, that period will still be subjected to the price revision assessment

b) Units Assessed for Deviation from their Scheduled Energy

To ensure that the assessment is holistic and inclusive, it is proposed to be extended to:

¹¹ Please refer to Market Rules Chapter 6 Section 9.3.2A.

¹² A price revision advisory notice shall indicate the dispatch periods to which the advisory notice relates, the nature of the pricing problem, and the methodology to be used to determine settlement prices and/or quantities. Please refer to Market Rules Appendix 6H Section H.1.10.

¹³ Please refer to Market Rules Chapter 6 Section 9.3.2B.

¹⁴ Please refer to Market Rules Chapter 6 Section 10.2.4.

¹⁵ Please refer to Market Rules Chapter 7 Section 5.2.1.

- (i) **Cases of failure to synchronise** - Although the original proposal for price revision was suggested for forced outage incidents, EMC proposes extending this price revision assessment to cases of generators failing to synchronise after being scheduled, as such cases have the same potentially significant financial impact on the market.
- (ii) **Include 2 periods before EOS** - Some trips or failure to synchronise could occur before the EOS is in effect. In order to capture these affected units in the threshold equation (see point c below), it is proposed that the assessment of trips be extended to 2 periods before the EOS takes effect¹⁶.

A unit that trips or fails to synchronise up to 2 periods before the EOS till the end of EOS may have its output vary from its scheduled energy level for many periods. The periods to which its deviation will count towards the price revision assessment is discussed below:

Figure 2: Timeline of Data Input and Computation of RTDS

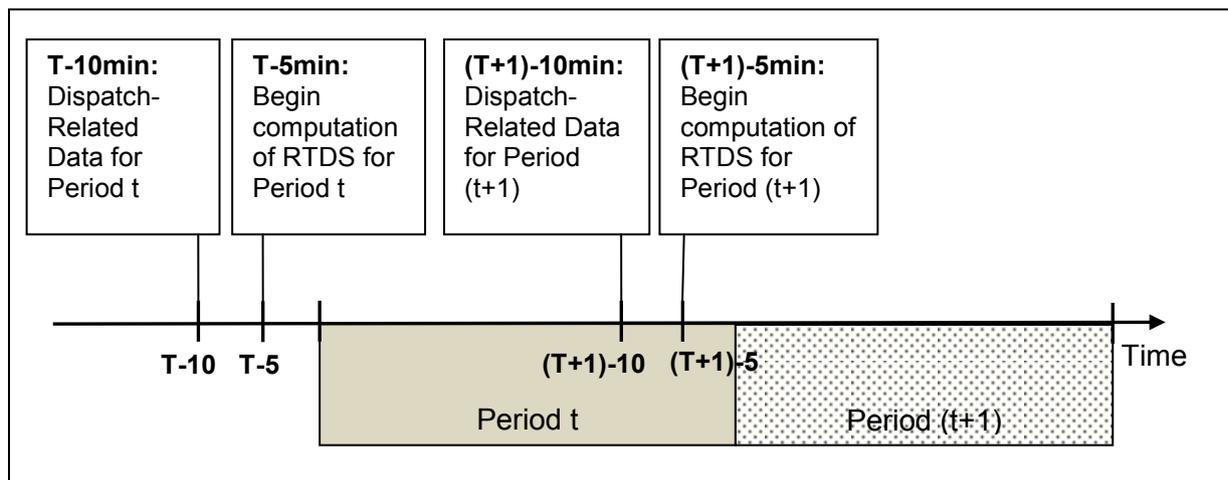


Figure 2 above outlines the RTDS timeline, with PSO sending EMC the dispatch-related data (e.g. unit start generation, network status file) 10 minutes¹⁷ before the period, and the RTDS computation commencing 5 minutes before. Based on this timeline, the threshold equation assessment is proposed as follows:

- (i) **Trip(s) occurs between T-30mins and T-10mins:** Any deviation between the scheduled energy and actual output for the tripped unit should be taken into account only from Period t onwards. This is based on the principle that any shortfall for the Period (t-1) should already be covered by reserve procured for the same period.
- (ii) **Trip(s) occurs between T-10mins and T:** Any deviation between the scheduled energy and actual output for the tripped unit should be taken into account only from Period (t+1) onwards. Since other dispatch-related data for Period t comes in at (and is correct as of) T-10mins, this T-10mins time reference should similarly apply to energy offers for consistency. This implies that if the trip happens after T-10mins, the energy offer should nevertheless be taken as correct up to T-10mins when coming up with the schedule for Period t.
- (iii) **Failure to synchronise in Period t-1:** Any deviation between the scheduled energy and actual output for the unsynchronised unit should be taken into account only from Period t onwards.

¹⁶ As an example, a unit trips 5 minutes into Period t and EOS is in effect from Periods t+2 to t+6. Its deviation would count towards the threshold equation for Periods t+2 to t+6. For t+1, its deviation is moot since there is no EOS in effect.

¹⁷ Under the Market Operations Timetable in Appendix 6A of the Market Rules, PSO is required to send the dispatch-related data by 5 minutes before the period. However, operationally, PSO sends in this data earlier at 10 minutes before the period.

Units in (i), (ii) and (iii) above that would be accessed in a particular period for price revision within the EOS are termed “assessable generating units” in the rest of this paper.

For units that experience multiple trips or failure to synchronise within the same EOS window (inclusive two periods before the start of EOS), the first trip or failure to synchronise is set as the period from which it’s deviation would be taken into account for the price revision assessment.

c) Large Financial Impact – Threshold Equation

As a further refinement, EMC proposes a threshold equation that determines whether price revision should be made for a particular dispatch period within the EOS:

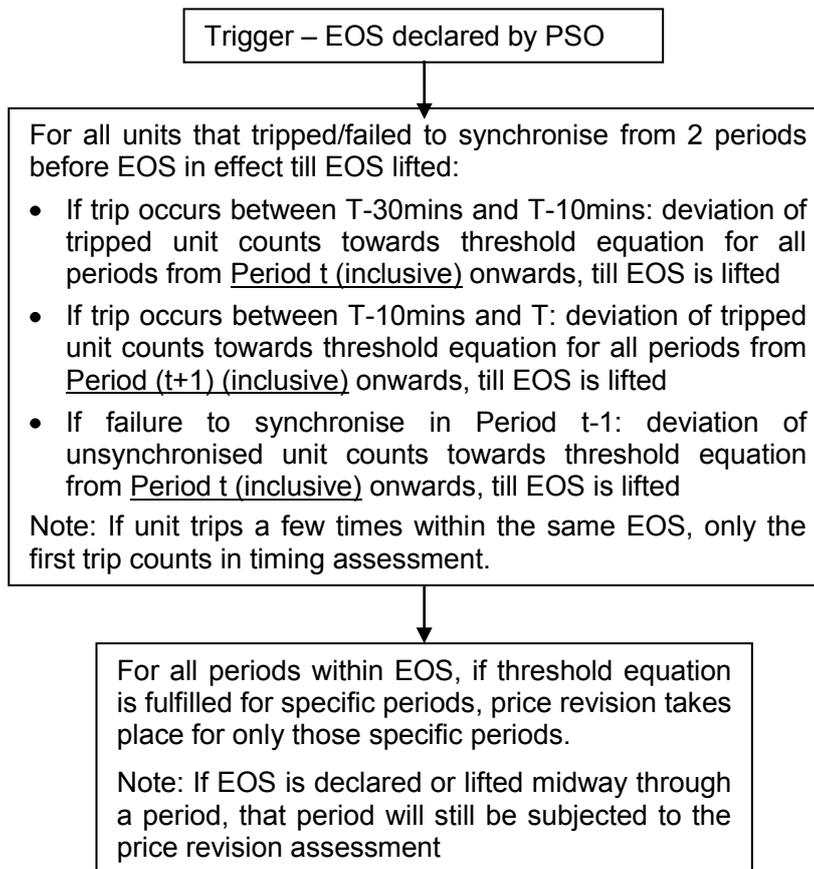
Threshold Equation: **for Period t,**
where i refers to all assessable generating units in a given time period¹⁸

Price revision takes place for a period within the EOS only if the sum of all assessable generating units’ actual generation falls short of their corresponding energy schedules by more than 500 MWs for the period. The threshold of 500MW is proposed to proxy cases when the financial impact could be significant, and the assessable generating units could be owned by the same or different gencos.

Summary of Approach

The proposed methodology is summarised in Figure 3 below:

Figure 3: Proposed Methodology to Conduct Price Revision



¹⁸ As defined in Section 4.2b above.

As a further illustration, a worked example is shown in Table 2, where there are multiple trips occurring in different periods within the same EOS window (including two periods before the start of EOS).

Table 2: Determination of Periods to Conduct Price Revision

Generating Unit	Actual Output Deviation from Scheduled Quantities (MW)					
	Period 1 (Normal Operating State)	Period 2 (Normal Operating State)	Period 3 (EOS)	Period 4 (EOS)	Period 5 (EOS)	Period 6 (Normal Operating State)
A	Trip occurs at 00:15hrs	(Unit A should be assessed from this period but irrelevant as EOS starts from Period 3)	200	20 (Returned online)	100 (Brief trip again)	-
B	-	Trip occurs at 00:47hrs	200	100	25 (Returned online)	-
C	-	Trip occurs at 00:52hrs	(not assessed since the trip happened after T-10mins)	400	200	-
D			Trip occurs at 01:02hrs	200	200	
Total Actual Output Deviation from Scheduled Quantities (MW) =		-	400	720	525	-

 = Deviation contributing to threshold equation

As shown in Table 2, the start of the periods subjected to price revision assessment for each generating unit depends on whether the trip occurs between T-30mins and T-10mins, or between T-10mins and T. As Generators A and B tripped within 2 periods before the start of EOS, their deviations from scheduled quantities will contribute to the threshold equation for the all following periods within the EOS window. Even though Generator A briefly tripped again in Period 5, this repeated trip will not be considered as a new trip and hence, its deviation still counts towards the threshold equation for Period 5. In addition, the deviations for Generators A and B are counted for Periods 4 and 5 respectively even though they have returned online, because they still fall within the EOS window.

In the above example, price revision will be conducted for Periods 4 and 5 because the threshold equation¹⁹ is met for these periods.

4.3 Values to be used for Price Revision

One issue when conducting price revision relates to what revised inputs should be used for the rerun. In the event that there is significant deviation between actual and scheduled output (regardless of whether the unit revised its offers), there are three different options:

- A) **Revise generator's offer to zero** - However, the generator's actual generating output for the affected periods may be greater than 0MW, even if it is less than scheduled. This would over-state the price impact.
- B) **Revise generator's offer to actual output** – Even when the generator's offer is set to its actual output for the respective periods, its revised scheduled output may still defer from its actual output (e.g. arising from co-optimization effects).
- C) **Revise generator's scheduled output to actual output** – This is the most direct method, which ensures that for the specific generator, its schedule will adhere exactly to the actual physical outcome. Since the generator's output is set as a constraint rather than a variable, it will not contribute to the price discovery process (i.e. it will be treated as a price-taker)

Of the above options, option C) is likely most appropriate by ensuring that the MCE schedule matches the actual outcome of the period, in relation to this specific unit. The MCE will then be run with this additional constraint and all other ex-ante offers unchanged, to produce the revised clearing prices. This will better reflect the resource scarcity for the period and drive up USEP, Reserve and Regulation prices.

If even at the higher revised prices, other generators that were instructed by PSO to run up expensive generating units during the EOS are unable to cover their costs, they can still seek compensation from PSO as per the current arrangements as set out in the market rules.

4.4 Application of the Proposed Price Revision to the 13 December 2011 Episode

In the 13 December 2011 episode, four generating units tripped in Period 46. EOS was declared in that same period, with normal operating state resuming only in Period 3 of 14 December 2011. Applying the proposed implementation of price revision onto this episode, the assessment of which periods to conduct price revision is summarised in Table 3 below.

Table 3: Determination of Periods to Conduct Price Revision (13 December 2011 Episode)

Generating Unit	Actual Output Deviation from Scheduled Quantities (MW)				
	Period 46 13 Dec 2011	Period 47 13 Dec 2011	Period 48 13 Dec 2011	Period 1 14 Dec 2011	Period 2 14 Dec 2011
	EOS in Effect				
CCP1	270 (Trip occurred at 22:36 hrs)	169	19	25	-
CCP2	270 (Trip occurred at 22:36 hrs)	286	109	28.73	-
CCP3	290 (Trip occurred at 22:36 hrs)	290	290	285	-
CCP4	270 (Trip occurred at 22:36 hrs)	275.83	195	130	-

Total Actual Output Deviation from Scheduled Quantities for Four Tripped Generating Units (MW) =	1020.83	613	468.73	20
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= Deviation contributing to threshold equation

Since the four CCPs tripped between T-30mins and T-10mins (where T=Period 47), their deviation from scheduled output from Period 47 of 13 December 2011 to Period 2 of 14 December 2011 (end of EOS) contributed to the threshold equation assessment. As explained earlier, even though some units managed to re-synchronise in Periods 47 and 48 only to encounter brief forced outages again, these subsequent forced outages within the same EOS window will not be treated as new trips.

In this case, price revision will be conducted for Periods 47 and 48 under the proposed price revision framework, as the total actual output deviation from scheduled quantities for the four CCPs exceeded the threshold amount of 500MW.

According to the MSCP's determination, the simulated MCE outcomes for this episode led to a revised USEP of \$3409/MWh for Period 47, \$540/MWh for Period 48 of 13 December 2011, and \$234/MWh for Period 1 of 14 December 2011.

As can be seen, the implementation of this price revision proposal will correct prices for the periods with significant financial impact; in this case, the USEP will rise to above \$500/MWh for Periods 47 and 48.

4.5 Historical Cases of EOS

During the period from January 2009 to June 2012, PSO declared an EOS for a total of six incidents. Among these incidents, four of them lasted for only one period, while the other two lasted for 5 and 7 periods respectively.

This low number of historical cases of EOS being declared over the past three years provides a sense of the infrequency at which such price revision cases might be triggered in the first instance. In addition, the short length of time for which EOS incidents last also limits the number of periods for which price revision of this new type might occur (for EOS covering only one period, there will not be any price revision).

5 CONTRAST WITH THE AUTOMATIC PENALTY SCHEME

The Automatic Penalty Scheme (APS), which is currently under study, applies when a generation registered facility (GRF) deviates from its real-time dispatch schedule or its short-term schedule as advised by PSO by more than 10 MW.²¹ A contrast between the proposed APS and our proposed price revision arrangement is summarised below:

Table 4: Contrast between Proposed Price Revision and the APS

	Proposed Price Revision	APS
Principle	Serves to correct large financial impact on the system, due to units deviating from schedules following forced outages and failure to revise offers.	Serves as an automatic punishment to gencos who deviate from their schedules.

²⁰ MSCP's determination report did not publish the actual output for Period 2 of 14 December 2011.

²¹ Subject to exceptions under the APS.

Trigger	EOS declaration by PSO; Sum of deviations by tripped generating units 500 MW.	Deviation by a GRF from its scheduled quantity by more than 10MW. Can be bi-directional (i.e. generate more or less than schedule).
Effect	Price revision is conducted ex-post to determine revised (higher) clearing price, which will be used for settlement.	Penalty imposed on deviating GRF for that dispatch period as follows: <i>Penalty</i> = Max {2 x (USEP + HEUC) x [(½ x (BeginGeneration + EndScheduledQty) x ½ hour - ½ x (BeginGeneration + EndGeneration) x ½ hour - 5 MWh], \$5000} No price revision.
Exceptions	Nil	Some exceptions to the application of the APS include: - GRFs under AGC; - Forced outage incidents which cause the GRF to automatically disconnect from the transmission system in the preceding and current dispatch periods; - GRFs being started-up or shut-down in accordance with its RTDS or short-term schedule; - GRFs performing a fuel changeover as required under the Transmission Code.
Data Requirements	PSO to send EMC SCADA data on the gencos' actual output and tripping data of individual units by D+3 Business Day .	PSO to submit the following data to EMC by D+5 Business Day : (a) deviating GRFs for each dispatch period for day D; and (b) BeginGeneration, EndScheduledQty and EndGeneration for each deviating GRF identified in (a) for the relevant dispatch periods for day D.

Although both proposals examine the gencos' deviation from their schedule, Table 4 above highlights some distinct differences between the two. APS serves mainly as a punishment to gencos who deviate from their schedules beyond the threshold, whereas this proposal primarily aims to correct the financial impact on the system by revising prices to the "what ought to have been" level, rather than being punitive in nature.

In addition, this proposal has a much higher threshold of deviation (500 MW) than that for the APS, and the deviation is the sum of all tripped generating units' deviation from schedule, rather than an individual GRF's deviation from schedule. While the price revision will result in a higher clearing price used for settlement, the APS will have no effect on prices. Further, the APS deviation could be due to various other reasons, whereas in this proposal, it is solely intended for incidents of forced outages.

6 INDUSTRY CONSULTATION

We published the concept paper for industry consultation on 28 September 2012, and sought the PSO's views on whether it would be feasible for the PSO to send EMC the SCADA data on the generators' gross actual output for each period under an EOS, and the tripping data of individual units (including cases of failure to synchronise), by D+3 business day.

Comments were received from PSO, EMC Market Operations, Tuas Power Supply and Sembcorp Cogen.

Comments from the PSO

This rule change is not necessary. Firstly, all market participants are expected to revise offer if it is no longer available. Otherwise, these non-compliance cases would be referred to MSCP for action. Secondly, the rerun threshold can be subjective, as price impact depends very much on system condition and market participants' offers prior to any forced outage of GRFs. However, if there is need for price rerun it should be on case-by-case basis, PSO agreed with EMC that rerun for every case of GRF forced outage should be avoided for the NEMS ex-ante market.

EMC's Response

EMC agrees with PSO's view that in Singapore's ex-ante market, price revision should be avoided where possible. However, as discussed in the paper, the December incident led to a significant financial impact on affected participants, which was not addressed even with MSCP's fine. The purpose of the proposed price revision is thus to correct cases of significant financial impact on the market. With the proposed price revision, cases of non-compliance would still be referred to the MSCP, and fines could still be imposed.

EMC notes PSO's view that the threshold for price revision can be subjective, and one possibility is to remove the threshold equation. EMC agrees that there should not be reruns for every case of GRF forced outage, hence the suggestion to use EOS as the trigger, which should limit the incidences of price revision to only those with significant financial impact.

Comments from EMC Market Operations

We propose that similar to the current CVP rerun, PSO need to confirm with EMC on the data request by D+1. The reason for CVP rerun is that the potential transmission capacity change in the standing data for the price revision has to be done in the off-line rerun environment, which takes much longer time for the data preparation, data update and data portback to the Production system besides the normal rerun procedures. As a result, we used to manage to revise and finalize prices for CVP rerun cases on D+4BD and D+5BD respectively. Similarly to this new rerun type however with PSO Data available by D+3BD only, EMC will then very likely end up with potential rule breaches by failing to revise and finalize prices by D+4BD and D+5BD respectively.

PSO need to provide the scheduled quantity besides the actual output similar to APS data provision from PSO. The reason is that PSO may override the dispatch schedule, and the PSO may fall back to STS if the RTS fails.

Propose to make it more straightforward for the applicable periods: maybe stick to the principle that whether it is theoretically possible for the affected MPs to revise offers based on the cutoff time for offer submissions. That is to count trips between T-5min and (T+1)-5min for Period t+1 onwards. Furthermore, such price revision would not occur frequently. It will be very challenging for operation to resolve rare incidents within tight timeline if the approach is however complex.

We propose to raise the threshold slightly higher – 600MW to avoid single generator forced outage scenario such as TUA G1.

EMC's Response

EMC will discuss with PSO on whether a D+1BD timeline for data request is operationally feasible and whether the PSO can provide the scheduled quantity data. The proposed timeline of T-10min to assess the periods to which deviations from schedule would apply to stems from the principle that all data fed into the MCE is correct up to T-10min. Given that these reruns should happen infrequently, we believe that the level of complexity is acceptable.

The setting of threshold level is a matter of tolerance with regard to the extent of financial impact on the market, rather than being pegged to the capacity of any particular unit.

Comments from Tuas Power Supply

(a) *We support the proposed price revision so that the final settlement can better reflect the real supply situations.*

However, we suggest EMC to:

- i. Remove the 500MW threshold since the proposed price revision is triggered by EOS and the occurrence of such is already quite infrequent. There is no need to apply a secondary check on the threshold.*
- ii. Revisit to see if EOS is the most relevant trigger for such price revision. EOS is regarding system security and supply shortfall is the main concern; whilst such price revision as proposed in this paper is driven by financial impact from a commercial perspective. There may be cases where EOS is not necessary but the financial impact of such price revision is huge. Maybe EMC can review historical data and share with the market on the likelihood of such cases.*

(b) *The proposed timeline for price revision is very stringent, as it implies that pool traders are expected to make offer variations within a period of as short as 5 minutes after the unit's forced outage. Otherwise (during EOS activation), EMC would intervene and carry out the necessary price revision.*

EMC's Response

- (a)
 - i. We are agreeable to removing the 500MW threshold since the EOS has already been used to shortlist periods where the financial impact may be significant.
 - ii. While EOS indeed focuses on system security rather than financial impact on the market, these two considerations are positively correlated - EOS is likely to be declared when there is a significant shortfall in energy, which is when the financial impact would be large. Conducting a price revision as and when ex-post outcomes differ significantly from ex-ante inputs (e.g. actual generator output more/less than scheduled output regardless of trips, or extrapolating on this idea, load forecast differing from actual demand) would shift NEMS to an ex-post market, which contravenes our existing market design and has its own set of challenges.
- (b) The proposed timeline for price revision is designed to be consistent with the timeline for dispatch-related data from PSO, and implies that energy offers should be taken as correct as of T-10mins when coming up with the schedule for Period t. It is not set with the expectation that offer variations should be made by traders within a certain timeline, which would be up to MSCP to assess if these offer variations were made expediently.

Comments from Sembcorp Cogen

Issue	Comments
EOS declaration as a trigger	<p><i>We understand that the limitations of EMC to have data on the actual output of gencos. As such, EMC proposed that declaring prices provisional for periods when the EOS is in effect as a proxy to situation where actual generation output deviates significantly from scheduled quantities.</i></p> <p><i>Chapter 5 Section 2.3.4 state that: "During an emergency operating state, the PSO shall have the authority to modify security limits as necessary to manage conditions on the PSO controlled system,"</i></p> <p><i>We would like to argue that since PSO can set the security limits of the system, using EOS as a trigger for price revision may not be transparent for the gencos.</i></p> <p><i>There shall have a criteria and guideline are properly defined for triggering of price revision.</i></p>
Scheduled Quantity – Actual Output >= 500MW	<p><i>There is no sufficient basis using the incident on 13 December 2011 to set 500MW as a cut off for price revision. System condition at those periods is not reflective of the supply and demand for other situations.</i></p>

Suggestions:

The objective of this paper is to include an additional provision to conduct price revision when Market Participants (MPs) are determined to have failed to revise their offers in good faith to correctly reflect the physical capabilities of their generating units after forced outages.

Firstly, we believe that all traders will adhere to Market rule/SOP to reflect actual plant availability after MSCP determination. Under this presumption, if MP did not submit bids after an outage, it meant that offer was not submitted on time.

We would like to cite a recent example from TUAS CCP4 outage on 11 Oct 2012. The machine tripped at 1240hr, the offer was change immediately and reflected on 12:55 DPR. We can observe the lost of 343MW and the USEP move up from \$230 to \$527. If Tuas did not revise their offer, the conditions based on the proposal would not trigger a price revision.

As such, we propose the following:

When a force outage occurs and if EMC did not receive the revise offer for the affected genset (as per EMC the T-10 condition) AND

The variance between the schedule load and the actual output from the SCADA system at end of period is greater than 100MW,

EMC will conduct the DPR price rerun for each period until revise offer is submitted.

The number 100MW was chosen because EMC is using +/-100MW as high/low scenario for DAR run.

EMC's Response

The Market Rules (Chapter 5 Section 2.3.1) states that "[t]he PSO controlled system shall be considered as being in an emergency operating state when observance of security limits applicable under a normal operating state will require or be reasonably likely to require curtailment of non-dispatchable load". As in EMC's reply to Tuas Power Supply earlier, the EOS is likely to be declared when there is a significant shortfall in energy, rather than when the size of

the forced outage is small. As such, the EOS serves as a good proxy for cases with significant financial impact.

In relation to the suggestion of +/- 100MW for the threshold variance, EMC is open to removing the 500MW threshold, and using the EOS as the trigger for price revision.

7 DELIBERATION AT THE 64TH RCP MEETING

The above proposal was presented at the 64th RCP Meeting. At that meeting, the RCP discussed the impact of price revision in Singapore's ex-ante market. Some members were concerned that higher revised prices would be unfair to consumers who had consumed assuming lower prices. There was also general consensus that affected parties (those who suffered out-of-pocket losses or foregone profits) should be entitled to some form of compensation from the offending party if reruns were not performed.

The RCP requested for EMC to consult the MSCP and the Dispute Resolution Counsellor (DRC) on the alternative options considered in the paper, in particular:

1. For the MSCP to recover the relevant compensation amounts from the offending party, and direct the distribution of these amounts to the affected parties (those who suffered out-of-pocket losses or foregone profits); and
2. For the DRC to facilitate compensation claims by the affected parties directly against the offending party

With that, the discussion of this proposal was deferred to the next meeting.

7.1 Response from the MSCP

EMC consulted the MSCP on whether the scope of the MSCP could be expanded to include looking into compensation issues as well. Specifically, EMC asked if the MSCP would be agreeable to:

- a) recovering the relevant compensation amounts from the offending party (in full or in part, in addition to any punitive fine component); and
- b) directing the distribution of these compensation amounts collected from the offending party to the affected parties (those who suffered either out-of-pocket losses or foregone profits stemming from actions of the offending party)

Further, EMC shared with the MSCP on our legal counsel's opinion that the role of the MSCP is to ensure compliance with the market rules, taking enforcement actions when a breach of the market rules is determined. It is not generally for the MSCP to adjudicate private claims between the Market Participants (MPs) for the purpose of compensating losses suffered by one or more MPs as a result of the breach of others. As such, it was advised that the MSCP may not be the appropriate body to direct the offending party to compensate other MPs. EMC sought the MSCP's views on this issue, and suggested that if need be, necessary changes to the Market Rules could be made to empower the MSCP to direct compensation. The full legal response was also provided to the MSCP.

The MSCP's response is as follows:

The MSCP considers that, under the current market rules, it is not within its scope to adjudicate compensation claims between market participants. Moreover, the market rules do not provide for compensation claims between market participants arising from rule breaches. The MSCP further considers that it is important to first discuss

the issues around establishing a basis for such compensation claims, and then have the market agree on the principles around the calculation and payment of such compensation. Without these discussions, the MSCP is unable to give a considered view of whether it is appropriate for it to have a role in compensation. The question of directing the distribution of compensation amounts collected appears to be a technical one, which should not be an issue if the rules are clear on the basis of claims and compensation principles.

7.2 Response from the DRC

EMC consulted the DRC on whether the Dispute Resolution Mechanism could be used by affected parties seeking compensation against the offending party directly, in cases such as the 13 Dec 2011 episode. EMC also shared with the DRC on our legal advisor's full response regarding the difficulties for an affected MP to establish a claim against the offending MP in such cases. One of the difficulties is that the market rules do not expressly provide for an offending MP who breaches the market rules to pay compensation to an affected MP for losses arising from the breach. Another difficulty is that the market rules do not expressly provide that the MPs have direct contractual relations with one another (Chapter 1, Section 3.2).

The DRC's response is as follows:

The types of disputes between market participants which are covered under our dispute management regime are set out in Section 3.3.1.4 of the Singapore Electricity Market Rules.

This is not a dispute which falls under Section 3.3.1.4.

However, if the parties wish to mediate, we could encourage and help facilitate this by arranging for ad-hoc mediation, or referring it to the Singapore Mediation Centre. All costs will be borne by the parties themselves.

If you wish to widen the scope of Section 3.3.1.4, we will need to amend the section to include:

“ any dispute between market participants arising out of or in connection with their operations or dealings in the National Electricity Market of Singapore where the parties agree to apply the dispute resolution process in section 3.”

EMC sent some follow-up questions to the DRC, to which the DRC clarified below.

EMC's follow-up query (a)

Assuming we change the rules to bring both parties to the mediation platform, do you think the affected MP would have difficulty establishing a case against the offending MP (as per the legal opinion of our legal counsel, Rajah and Tann)? If that's really the case, then in addition to the proposed change in Section 3.3.1.4, we would have to look into making rule changes to bolster the affected MP's case for claims.

DRC's response (a)

That is a call for you all to make. My role is simply to provide a process for disputes to be resolved or determined; not to favour any particular party.

EMC's follow-up query (b)

Can the mediation/arbitration take place if the case is raised only unilaterally (by the affected MP) and not mutually (by both MPs)?

- If not, how can we get around the scenario when the offending MP doesn't want to cooperate?
- If yes, if the MP is uncooperative still, mediation doesn't seem to be constructive. In which case, possible to put the case straight up to arbitration?

DRC's response (b)

- *If the dispute falls within our Rules, both parties have to follow the process.*
- *Parties are bound to try mediation. You never know. A skilful mediator can help turn things around. In most jurisdictions, the success rate for mediations is 70 %. However, if there is no will to resolve the matter, it will take its natural course and the matter will proceed to arbitration for determination.*

7.3 Summary of the MSCP's and DRC's Responses

The MSCP confirmed our legal advisor's opinion that it is not currently within the MSCP's scope to adjudicate compensation claims between market participants. As suggested by the MSCP, before discussing about whether the MSCP should play a role in recovering compensation or in directing the distribution of compensation amounts collected (from the offending party to the affected parties), the RCP should first **discuss the issues around establishing a basis for compensation claims** in cases like the 13 December 2011 episode, and then have the market agree on the **principles around the calculation and payment of such compensation**.

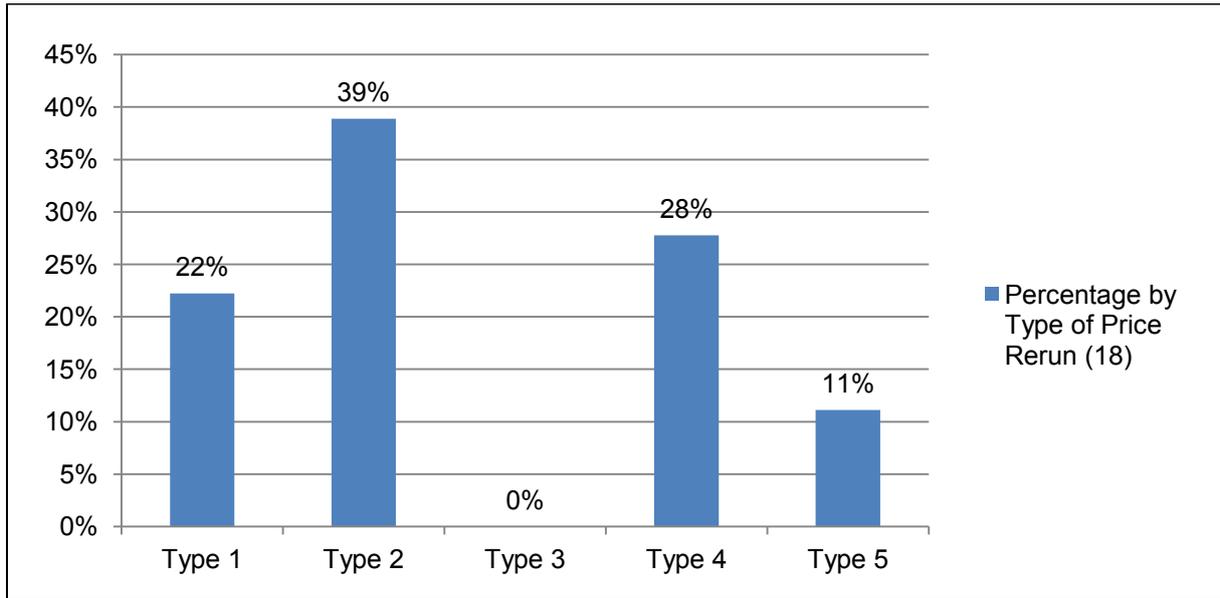
The DRC also confirmed the legal advice that cases like the 13 December 2011 episode is not a dispute which falls under Chapter 3 Section 3.3.1.4 of the Market Rules, which sets out the types of disputes between MPs. Nevertheless, the scope of Section 3.3.1.4 can be amended to incorporate such disputes. The DRC **did not provide views on whether the affected MP would have difficulty establishing a case against the offending MP through the mediation/arbitration route**, or comment on the legal opinion regarding this. However, the DRC said that they could help to arrange for mediation if the parties so wished, though all costs would have to be borne by the parties themselves.

8 DELIBERATION AT THE 65TH RCP MEETING

At the 65th RCP meeting, the RCP discussed the responses from the MSCP and the DRC, with both channels appearing as possible options. There was also discussion on the preservation of price signal integrity, consistency with the current regime allowing for other types of price revision, and the implications of revising prices upwards after consumers have already consumed for the period. The RCP requested that EMC further explore the legal implications of the MSCP and DRC options with EMC's legal advisor, and compare the pros and cons of these two options with those for price revision. In addition, the RCP requested data on the impact of the price reruns (as listed in the 65th RCP Monitoring list) on USEP.

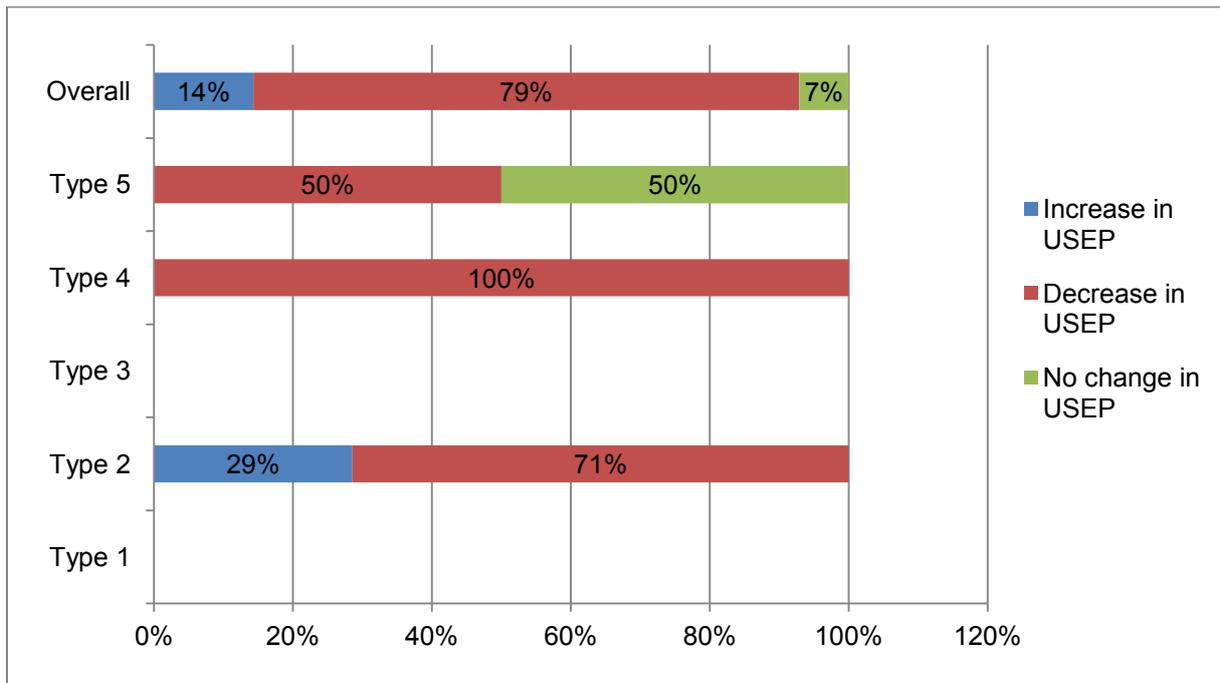
8.1 Impact on USEP following Price Reruns

In the 65th RCP Monitoring list, there were a total of **18** separate price rerun incidents from Dec 2010 to Nov 2012. A list of these incidents, together with the reason for the rerun and its impact on USEP, is attached as Annex 1. The key points are highlighted in Graphs 2-3 below.

Graph 2: Percentage of Price Reruns by Type²² from Dec 2010 to Nov 2012

Graph 2 shows the percentage by type of price rerun that occurred from December 2010 to November 2012, based on the rerun classification introduced in Page 3 of this paper. The two most common types of price rerun were Type 2 (39%) and Type 4 (28%) reruns. There were no cases of Type 3 price rerun.

The impact of rerun incidents on USEP is illustrated in Graph 3 below.

Graph 3: Percentage of Rerun Incidents Leading to Increase/Decrease/No Change in USEP

Note: There are no figures for Type 1 price reruns because no USEP was generated before the rerun for USEP change comparison. There were no cases of Type 3 price reruns between December 2010 and November 2012.

²² Please refer to Section 2.1 for a description of the 5 types of price rerun.

According to Graph 3, 79% of the total rerun incidents²³ that occurred between December 2010 and November 2012 led to a decrease in USEP.

There is no definite impact on USEP under Type 2 and Type 5 price reruns; USEP can increase, decrease or remain the same. However, under Type 4 price reruns, USEP decreased 100% of the time between December 2010 and November 2012. Furthermore, based on the data in Annex 1, the maximum increase and decrease in USEP is as follows:

Maximum increase in USEP =	\$4.67
Maximum decrease in USEP =	\$315.76

8.2 Consultation with EMC's Legal Advisor

EMC consulted our legal advisor again on the MSCP and DRC options as described in Section 3.3 of this paper, in relation to the following areas:

- The expected changes (and their magnitude) required in the Market Rules to bolster the case of the claimant
- The type of data/evidence required by the claimant
- The likelihood of success for each option
- Foreseeable problems and difficulties

The legal inputs are incorporated in the comparison of the pros and cons of the different options in Section 8.4.

8.3 Two Additional Proposed Options – Automatic Settlement Adjustment and Hybrid Model

In the assessment process, two additional options have been proposed.

1) Automatic Settlement Adjustment

- **Automatic Calculation** – When the MSCP assesses that an MP is guilty of failing to revise its offers, EMC's settlement system will automatically debit a compensatory payment based on a pre-determined framework from the offending MP, for payment to the affected MPs.
- **Basis for Settlement Adjustment** – The RCP will have to decide on the basis to calculate the compensatory payments, which will likely take reference from ex-post price reruns. The settlement methodology could be adjusted to ensure that electricity consumers are not subjected to the higher prices, either by increasing the amount collected from the offending MP, or reducing the compensation to the affected MPs.

By specifying the methodology in the market rules, these compensatory payments can be automatically and consistently determined (analogous to the APS), without involving any potentially lengthy and costly processes.

2) Hybrid Model

- **Enforcement and Financial Penalty** - In the event of a breach of the market rules, the MSCP shall determine the appropriate enforcement action (including the imposition of

²³ Note that there were four Type 1 rerun cases which had no USEP generated before the rerun, so these were excluded from the analysis.

financial penalties), and any sum that is paid by the offending MP is to be put into a “compensation fund” to be administered by the DRC.

- **Compensation Fund and Framework for Claims** - Affected MPs who wish to claim from the compensation fund will have to submit their requests for claims with supporting information (the types of supporting information required may be set out in the market rules). The framework for submitting requests for claims, including without limitation the timelines (including the cut-off time for submitting a request for a claim) and format required, may be set out in the market rules.
- **Distribution of Compensation** - The DRC will determine whether each of the claimants to the compensation fund meets a stated list of criteria to qualify for a claim. The DRC will also determine the quantum of compensation to be paid to each successful claimant, based on certain agreed principles for calculation of quantum. If the aggregate quantum of sums claimed by the affected MPs is more than the amount available in the compensation fund, the sums in the compensation fund will be distributed to each claimant on a pro rata basis. If, on the other hand, the aggregate quantum of sums claimed by the affected MPs is less than the amount available in the compensation fund, the remaining amount may be returned to MPs through the MEUC.

The pros and cons of these two options are also assessed in Section 8.4.

8.4 Pros and Cons of Five Options

Table 5 below highlights the key advantages and disadvantages of resolving cases like the 13 December 2011 episode via the five proposed options, namely, price revision, direction by the MSCP, direction by the DRC, Automatic Settlement Adjustment, and the Hybrid model.

To recap, the starting point of this proposal is to provide for price revision when gencos fail to revise their offers in good faith to correctly reflect the physical capabilities of their generating units following forced outages. Since this inadvertently involves some level of subjective assessment (e.g. whether the offers were revised based on reasonable grounds, based on available information at that point in time), the MSCP is the ideal party to make this assessment. Indeed, this is the case for Options 1-4, whereby the MSCP's determination is proposed to be the trigger of the compensation process. However for option 5, given the timeline constraints (i.e. EMC having to publish revised prices by D+5 business days as described in Section 4.1 of this paper), the trigger is proposed to be using the EOS as described in Section 4.2 rather than the MSCP's determination.

Following the trigger by either the MSCP or the EOS, a comparison of all 5 options is summarised in the table below:

Table 5: Comparison of Pros and Cons of Five Options

	Option 1: MSCP to direct restitution to affected parties	Option 2: Compensation through the DRC	Option 3: Automatic Settlement Adjustment	Option 4: Hybrid Model	Option 5: Price Revision
Effect/outcome	<p>Pros:</p> <ul style="list-style-type: none"> Can calibrate such that consumers are not exposed to higher ex-post prices <p>Cons:</p> <ul style="list-style-type: none"> Creates a duty of care between MPs, which may be too onerous a burden for MPs and/or may risk causing their business to be non-viable Not entirely 	<p>Pros:</p> <ul style="list-style-type: none"> Can calibrate such that consumers are not exposed to higher ex-post prices MSCP has flexibility to decide the quantum of financial penalty, depending on severity of case and culpability of offending MP <p>Cons:</p> <ul style="list-style-type: none"> Creates a duty of 	<p>Pros:</p> <ul style="list-style-type: none"> Can calibrate such that consumers are not exposed to higher ex-post prices Fast and consistent treatment of such cases, with lesser scope for dispute if framework is clearly set out (similar to APS) MSCP has flexibility to decide the quantum of financial penalty, depending on 	<p>Pros:</p> <ul style="list-style-type: none"> Consumers are not exposed to higher ex-post prices MSCP has flexibility to decide the quantum of financial penalty, depending on severity of case and culpability of offending MP Mitigates issue of payment by offending MP being disproportionate to severity of breach (Capped at penalty) 	<p>Pros:</p> <ul style="list-style-type: none"> Preserves price signal integrity Financially equitable – ensures parties pay/receive the right amounts Avoid issue of “creating” a duty of care/ relationship directly between MPs Fast and consistent treatment of such cases <p>Cons:</p>

	<p>financially equitable if no clawback from parties that benefited from suppressed prices</p> <ul style="list-style-type: none"> • May involve lengthy process before affected MPs receive compensation • Offending MP may potentially be liable to pay large compensations disproportionate to breach committed 	<p>care between MPs, which may be too onerous a burden for MPs and/or may risk causing their business to be non-viable.</p> <ul style="list-style-type: none"> • Not entirely financially equitable if no clawback from parties that benefited from suppressed prices • May involve lengthy and potentially expensive (e.g. mediation costs) process before affected MPs receive compensation • May create precedent in future for MPs to claim against each other using the DRC route for other breaches of market rules • Offending MP may potentially be liable to pay large compensations disproportionate to breach committed 	<p>severity of case and culpability of offending MP</p> <p>Cons:</p> <ul style="list-style-type: none"> • Creates a duty of care between MPs, which may be too onerous a burden for MPs and/or may risk causing their business to be non-viable. • Not entirely financially equitable if no clawback from parties that benefited from suppressed prices • Offending MP may potentially be liable to pay large compensations disproportionate to breach committed 	<p>amount, which forms compensation fund)</p> <ul style="list-style-type: none"> • Avoid issue of “creating” a duty of care/ relationship directly between MPs <p>Cons:</p> <ul style="list-style-type: none"> • Not entirely financially equitable. Affected MPs may not be fully compensated (if fund is insufficient) 	<ul style="list-style-type: none"> • Consumers on retail contracts with spot price exposure are exposed to higher ex-post prices
Implementation	<p>Cons:</p> <ul style="list-style-type: none"> • Substantial Market Rules changes to 	<p>Pros:</p> <ul style="list-style-type: none"> • Fewer rule changes required than 	<p>Cons:</p> <ul style="list-style-type: none"> • Need to establish a basis and 	<p>Pros:</p> <ul style="list-style-type: none"> • Role of MSCP and DRC need not be 	<p>Pros:</p> <ul style="list-style-type: none"> • No significant changes to

	<p>empower the MSCP to assess validity and/or quantum of losses, and to adjudicate claims and award/direct payment of compensation to affected MPs.</p> <ul style="list-style-type: none"> • Need to establish a basis and calculation framework for such compensation claims which may overestimate or underestimate loss. • Electricity Act only authorise the MSCP to impose financial penalties on MPs. Imposing compensation and distributing them to MPs are not sanctioned by the Electricity Act, thus ruling out this option. 	<p>option 1, as the procedural steps of Dispute Resolution Process are already set out in Market Rules and power of arbitration tribunal already provided for (no need to re-write entire process for resolving claim between MPs).</p> <p>Cons:</p> <ul style="list-style-type: none"> • Need to establish a basis and calculation framework for such compensation claims which may overestimate or underestimate loss. 	<p>calculation framework for such compensation claims, which may overestimate or underestimate loss.</p>	<p>changed; procedures by MSCP and DRC in Market Rules may not need substantive changes</p> <p>Cons:</p> <ul style="list-style-type: none"> • Need to establish a basis and calculation framework for such compensation claims, which may overestimate or underestimate loss. 	<p>procedures in market rules (procedure for rerun is already in place for other types of rerun)</p> <ul style="list-style-type: none"> • Avoids the issue of determining basis for compensation. Reruns will ensure affected MPs receive correct restitution.
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8.5 Proposed Basis for Compensation

Options 1-4 require a framework to determine the basis for compensation. In principle, affected MPs (as a group, i.e. genco-retailer pair) should only be compensated based on their actual net exposure to spot prices, which can be derived from its injection net of any vested quantities including vesting contracts and fixed retail contracts. This is illustrated in the figure below:

Figure 3: Computing a Genco's Net Exposure to Spot Price (Uncontracted IEQ)

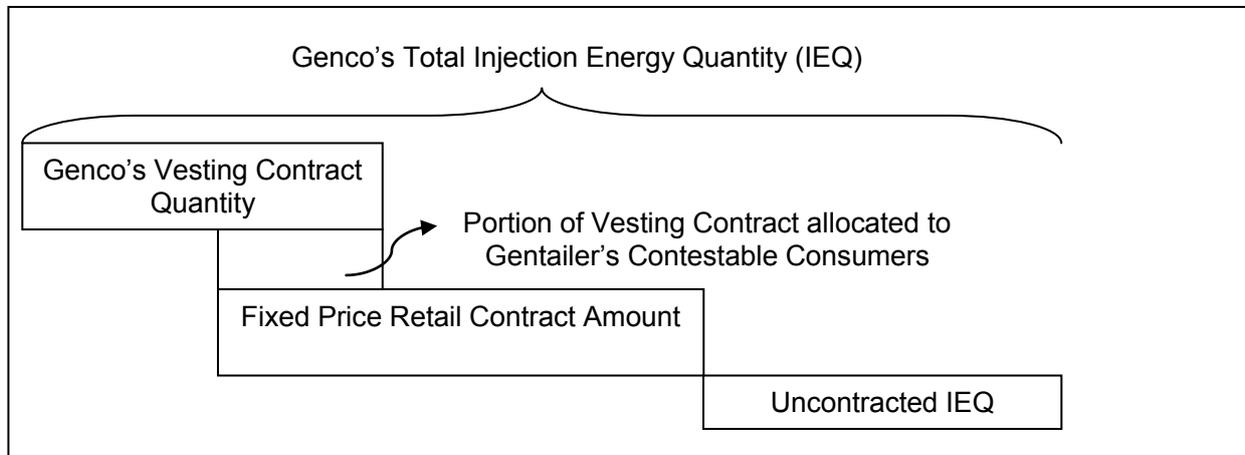


Figure 3 shows the computation of a genco's net exposure to spot prices, which is equivalent to its IEQ that is not vested (i.e. contracted out at fixed price). Essentially, its IEQ should be net of its vesting obligations (Genco's Vesting Contract Quantity less the portion allocated back to its Retailer arm by MSSL for distribution to Contestable Consumers). This amount should then be further reduced by its retail contracts at fixed prices (i.e. not exposed to spot prices), since such contracts have the same effect as vesting contracts. The remaining IEQ component will then be its "Uncontracted IEQ", which includes retail contracts referenced to spot prices (since the Genco indeed experiences forgone profits from the suppressed spot prices).

The above approach requires a distinction between its retail contracts on spot and fixed prices. However, it is not practical for the MSCP or the DRC to review all bilateral and retail contracts (which the MPs would also have to submit) in order to assess the MPs' effective exposure to the spot market. As a proxy, it is proposed that all retail contracts are assumed to be on fixed price, such that we can proxy the "Fixed Price Retail Contract Amount" using the Genco's retailer's WEQ. This "Uncontracted IEQ" will then be the quantity used to be multiplied with the change in energy price (difference between revised price and ex-ante price) to determine compensation claim amount.

For consistency, the same principle will be extended to Ancillary Services, whereby as a gentailer group, the MP will be assessed for its net exposure to reserve/regulation prices. This exposure is then multiplied by the change in reserve/regulation prices to derive the compensation claim amount.

The proposed formulae to calculate the compensation amount for Energy and Ancillary Services are as follows:

For Energy

- $(IEQ - VC_{net})_{MP} * \Delta VCRP - WEQ_{MP} * \Delta(USEP + HEUC)$
 where IEQ=Injection energy quantity, VC_{net} =Vesting Contract Quantity allocated to non-contestable consumers, WEQ=Withdrawal energy quantity (assumed fixed price retail contract amount as in Figure 3), VCRP=Vesting Contract Reference Price, HEUC=Hourly Energy Uplift Charge

For Ancillary Services (AS)

- $\Delta(\text{ASrevenue} - \text{AScost})_{\text{MPgroup}}$
where MPgroup refers to the combined genco-retailer arms.

Essentially, the above formulae are proposed to be applied according to these principles:

- **Principle for Compensation (for energy)** – Based on a genco group's²⁴ net exposure²⁵ to the spot market. For example, assuming a genco would have received \$x more if prices were revised upwards to reflect the shortfall of energy for the affected periods, but its retail arm had paid \$y less based on the artificially suppressed ex-ante prices, then its net exposure is \$(x-y). The genco can claim up to \$(x-y) for compensation, provided (x-y) is greater than zero.
- **Principle for Compensation (for ancillary services)** – Again based on a genco group's net exposure²⁶ to the spot market. For example, assuming a genco would have received \$a more for providing reserve/regulation if their prices were revised upwards ex-post, but it is charged \$b more for the increase in cost of ancillary services, then its net exposure is \$(a-b). The genco can only claim compensation for ancillary services if (a-b) is greater than zero.
- **Overall Compensation Claim Across All Products²⁷** – Recognising that a genco may have benefited from energy and made a loss from ancillary services based on revised prices (or vice versa), the overall compensation claim amount available to a genco group should be the sum of (x-y) and (a-b), of which the genco can seek compensation only if (x-y+a-b)>0.

In the above cases, compensation can only be claimed against the offending MP. Only affected MPs who are made worse off (across the sum of Energy and Ancillary Services) due to the lower ex-ante prices can claim compensation. This is equivalent to satisfying (x-y+a-b)>0, as in the above examples.

9 DELIBERATION AND DECISION AT THE 66TH RCP MEETING

At the 66th RCP meeting, the Panel was updated on the impact of past rerun incidents on USEP, and presented with a comparison of the pros and cons of the five options (price revision, MSCP, DRC, Automatic Settlement Adjustment, and Hybrid Model), followed by a proposed framework to determine the basis for compensation. The simulation result of the proposed formulas for compensation applied on the 13 December 2011 incident was also shared, showing:

- if 100% of retail contracts were assumed to be on fixed rates, then the total compensation amount that could be claimed against PowerSeraya would be \$1.6 million, approximately the same as the financial impact estimated in MSCP's determination paper;
- if only 90% of retail contracts were assumed to be on fixed rates, then the total compensation amount would increase to \$2.0 million.

The Panel agreed that Option 1 (*'MSCP to direct restitution to affected parties'*) should be taken out of the consideration, following the legal advice that requiring the MSCP to adjudicate claims from affected parties would fall outside the ambit of Section 47 of the Electricity Act.

²⁴ I.e. Inclusive of the generation and retail arms of the affected MP seeking compensation.

²⁵ Here, net exposure refers to the net benefit/cost to the genco group due to its production/consumption at ex-ante versus ex-post spot prices.

²⁶ Here, net exposure refers to the net benefit/cost to the genco group after accounting for any benefit of providing ancillary services (if their prices increase after rerun), and any corresponding additional cost of ancillary services allocated to them.

²⁷ I.e. Energy and Ancillary Services

Among the remaining options, there was discussion about the issue of creating a duty of care between MPs, as well as the offending MP potentially being liable to pay large compensations disproportionate to the breach committed. To get around the disadvantages of some options while enjoying the advantages of other options, the Panel also explored having a hybrid of the current options, for example, a hybrid of Options 3 (*'Automatic Settlement Adjustment'*) and 4 (*'Hybrid Model'*). The complexity of implementing the different options was also considered.

There were mixed opinions about whether to conduct a price revision (Option 5). The main considerations for price revision include being consistent with the other types of price reruns in our market, financial equity and price signal integrity, as well as simplicity in implementation (procedures are already in place for the other types of reruns, and a compensatory framework for the other options would likely be based on a price rerun too). On the other hand, the main argument against price revision was that it is unfair to charge consumers a higher ex-post price for quantities consumed based on ex-ante prices, as they would not have a chance to respond during the affected period(s) by reducing their consumption.

After much debate and deliberation, the issue of whether to conduct a price revision (Option 5) for cases like the 13 December 2011 incident was put to a vote. The Panel by majority vote decided **not to support** the proposal to conduct a price revision for such cases.

The following members supported conducting a price revision:

1. Mr Luke Peacocke (Representative of Generation Licensee)
2. Mr Dallon Kay (Representative of the Wholesale Electricity Market Trader)
3. Mr Michael Wong (Representative of Retail Electricity Licensee)

The following members did not support conducting a price revision:

1. Mr Kng Meng Hwee (Representative of the PSO)
2. Mr Phillip Tan (Person experienced in Financial Matters in Singapore)
3. Dr Toh Mun Heng (Representative for the interests of consumers of electricity)
4. Mr Koe Pak-Juan (Representative of Generation Licensee)
5. Mr Toh Seong Wah (Representative of the EMC)

The following members abstained from voting:

1. Mr Sean Chan (Representative of Retail Electricity Licensee)
2. Mr Lawrence Lee (Representative of Market Support Services Licensee)

By a second majority vote, the Panel decided to monitor the frequency of occurrence of future similar incidents through the RCP monitoring list until such time that the Panel decides it no longer requires monitoring, or that a revisit of this issue may be required. Therefore, cases of non-compliance of dispatch instruction that are referred by the PSO to the MSCP for investigation will be captured in future RCP monitoring lists.

Details of the second voting are as follows:

Those who voted for monitoring:

1. Mr Kng Meng Hwee (Representative of the PSO)
2. Mr Phillip Tan (Person experienced in Financial Matters in Singapore)
3. Dr Toh Mun Heng (Representative for the interests of consumers of electricity)
4. Mr Koe Pak-Juan (Representative of Generation Licensee)
5. Mr Lawrence Lee (Representative of Market Support Services Licensee)

Those who voted against monitoring:

1. Mr Luke Peacocke (Representative of Generation Licensee)
2. Mr Dallon Kay (Representative of the Wholesale Electricity Market Trader)
3. Mr Michael Wong (Representative of Retail Electricity Licensee)

4. Mr Sean Chan (Representative of Retail Electricity Licensee)

Those who abstained from voting:

1. Mr Toh Seong Wah (Representative of the EMC)