Notice of Market Rules Modification

Paper No.: EMC/RCP/76/2014/325
Rule Reference: Market Rules Version 1 Jan 2014 Chap 6, Sec 5.1 & 10.4
Proposer: EMC, Market Admin
Date Received by EMC: 02 September 2014
Category Allocated: 1
Status: Not Approved by EMA
Effective Date: NA

This paper reviews the existing compensation guidelines used to assess compensation requests submitted under section 3.11 of Chapter 3 of the market rules. It also addresses three issues that were raised in a proposal received during the 2014/15 Rules Change Work Plan prioritisation exercise, together with a fourth that arose in the midst of our analysis.

This paper first revisits the principles underpinning SWEM’s design, which in turn guides the compensation framework adopted and provides the context within which the issues should be evaluated.

The SWEM was built on the fundamental principle of economic efficiency. The dispatch schedule generated by the MCE, which is premised on this principle, is the most economically efficient outcome and should generally be adhered to for dispatch purposes.

However, in real-time, the PSO may need to intervene and direct certain generators to deviate from the MCE’s schedule. Such generators should then be compensated if PSO’s directions lead to them to incur costs not recoverable from market revenue.

The first proposal suggests that generators could offer the instructed quantities of energy at low offer prices to secure dispatch (so as not to affect other generators) but should not be compensated based on those artificially low offer prices. However, given that such offer changes by directed generators can negatively impact market efficiency through artificially suppressed prices, we do not support this proposal.

Instead, generators should not be allowed to vary their offers for dispatch periods that are under the PSO’s direction. To ameliorate the potential that their offers were not reflective of their costs, for the instructed quantity up to the total energy offer quantity, generators will be given the ex-post choice of the methodology to be applied in calculating the compensable quantum (i.e. either offer-based or cost-based). The chosen methodology will apply to all dispatch periods of a given PSO direction.

The second proposal highlighted that the current offer-based methodology cannot be applied when a generator’s total energy offer quantity is less than its instructed level. A cost-based approach based on generators’ long-run marginal cost (LRMC) is proposed to supplement the existing offer-based compensation guidelines. Specifically, the fixed cost and variable non-fuel cost components of the LRMC are proposed to take reference from the prevailing Vesting Contract parameters, while variable fuel costs will be based on either the Vesting Contract fuel cost (for PNG or LNG) or the generator’s actual fuel costs (for other fuel types). Other costs (specifically, start-up or shut-down costs, incremental gas-related charges, and reserve and regulation costs if applicable under Table 5 of this paper) that are incurred in the course of following the PSO’s direction will also be compensable.
For the third proposal, which suggests examining whether it is timely to formally implement the guidelines in the market rules, EMC recommends that the proposed revised compensation guidelines remain non-binding. To assess the efficacy of the revised guidelines, it is proposed that the PSO and EMC inform the RCP whenever any experience has been gathered in applying them. A sample feedback template is provided in Annex 4.

Lastly, this paper also seeks the PSO’s views on whether the current suite of information provided by EMC to the PSO is sufficient for the issuance of directions during periods of system stress under section 9.1.3 of Chapter 5. PSO has indicated that they do not require additional information to be provided.

At its 75th meeting, the RCP unanimously supported the recommendations summarised in the third column of Table 7 and tasked EMC to revise the existing compensation guidelines and draft the relevant rule modifications.

The proposed rule modifications and revised compensation guidelines to implement the RCP’s decisions, as set out in Annexes 6 and 7 respectively, were presented at the 76th RCP meeting. The RCP unanimously supported the proposed rule modifications and recommends that the EMC Board adopt the rule modifications set out in Annex 6. The RCP also unanimously supported the revised compensation guidelines, set out in Annex 7, which will take effect immediately.

Date considered by Rules Change Panel: 04 November 2014
Date considered by EMC Board: 11 December 2014
Date considered by Energy Market Authority: 07 March 2016

Proposed rule modification:
See attached paper.

Reasons for EMA’s Decision Not to Approve the Rule Change:
EMA assessed that it is inappropriate to modify the market rules based on a set of non-binding compensation guidelines which are neither part of nor intended to prevail over the market rules.

More fundamentally, restricting each GRF which is under a direction by the PSO relating to energy (“Directed GRF”) from revising its energy offers as intended by the proposed modifications can potentially lead to inefficient market outcomes. Under such restriction, the energy offers of the Directed GRF will not reflect the PSO’s direction. This can potentially result in unintended consequences such as scheduling the remaining GRFs to generate excess output which they may not be able to deliver due to the Directed GRF complying with the PSO’s direction.

As the proposed modifications to the market rules are inconsistent with the EMA’s statutory duty to ensure fair and efficient market conduct under the Electricity Act, EMA has decided to reject the proposed modifications.
Executive Summary

This paper reviews the existing compensation guidelines used to assess compensation requests submitted under section 3.11 of Chapter 3 of the market rules. It also addresses three issues that were raised in a proposal received during the 2014/15 Rules Change Work Plan prioritisation exercise, together with a fourth that arose in the midst of our analysis.

This paper first revisits the principles underpinning SWEM’s design, which in turn guides the compensation framework adopted and provides the context within which the issues should be evaluated.

The SWEM was built on the fundamental principle of economic efficiency. The dispatch schedule generated by the MCE, which is premised on this principle, is the most economically efficient outcome and should generally be adhered to for dispatch purposes.

However, in real-time, the PSO may need to intervene and direct certain generators to deviate from the MCE’s schedule. Such generators should then be compensated if PSO’s directions lead to them to incur costs not recoverable from market revenue.

The first proposal suggests that generators could offer the instructed quantities of energy at low offer prices to secure dispatch (so as not to affect other generators) but should not be compensated based on those artificially low offer prices. However, given that such offer changes by directed generators can negatively impact market efficiency through artificially suppressed prices, we do not support this proposal.
Instead, generators should not be allowed to vary their offers for dispatch periods that are under the PSO’s direction. To ameliorate the potential that their offers were not reflective of their costs, for the instructed quantity up to the total energy offer quantity, generators will be given the ex-post choice of the methodology to be applied in calculating the compensable quantum (i.e. either offer-based or cost-based). The chosen methodology will apply to all dispatch periods of a given PSO direction.

The second proposal highlighted that the current offer-based methodology cannot be applied when a generator’s total energy offer quantity is less than its instructed level. A cost-based approach based on generators’ long-run marginal cost (LRMC) is proposed to supplement the existing offer-based compensation guidelines. Specifically, the fixed cost and variable non-fuel cost components of the LRMC are proposed to take reference from the prevailing Vesting Contract parameters, while variable fuel costs will be based on either the Vesting Contract fuel cost (for PNG or LNG) or the generator’s actual fuel costs (for other fuel types). Other costs (specifically, start-up or shut-down costs, incremental gas-related charges, and reserve and regulation costs if applicable under Table 5 of this paper) that are incurred in the course of following the PSO’s direction will also be compensable.

For the third proposal, which suggests examining whether it is timely to formally implement the guidelines in the market rules, EMC recommends that the proposed revised compensation guidelines remain non-binding. To assess the efficacy of the revised guidelines, it is proposed that the PSO and EMC inform the RCP whenever any experience has been gathered in applying them. A sample feedback template is provided in Annex 4.

Lastly, this paper also seeks the PSO’s views on whether the current suite of information provided by EMC to the PSO is sufficient for the issuance of directions during periods of system stress under section 9.1.3 of Chapter 5. PSO has indicated that they do not require additional information to be provided.

At its 75th meeting, the RCP unanimously supported the recommendations summarised in the third column of Table 7 and tasked EMC to revise the existing compensation guidelines and draft the relevant rule modifications.

The proposed rule modifications and revised compensation guidelines to implement the RCP’s decisions, as set out in Annexes 6 and 7 respectively, were presented at the 76th RCP meeting. The RCP unanimously supported the proposed rule modifications and recommends that the EMC Board adopt the rule modifications set out in Annex 6. The RCP also unanimously supported the revised compensation guidelines, set out in Annex 7, which will take effect immediately.
1 Introduction

This paper reviews the existing compensation guidelines, and addresses three related issues raised in a proposal received during the 2014/15 Rules Change Work Plan prioritisation exercise, together with a fourth that arose in the midst of our analysis.

This paper then proposes to supplement the existing compensation guidelines by including a methodology to assess compensation requests in the absence of energy offers.

2 Background

The need for compensation

The security-constrained economic dispatch produced by the market clearing engine (MCE) generally ensures that units are paid at least their offer prices. However, there are situations where participants are instructed by the PSO to deviate from this dispatch schedule for system security reasons. In such situations, the level of payment to these participants may not adequately compensate them at the levels indicated in their offers. There are thus provisions to compensate these participants so that they do not incur losses (with costs proxied by their offers) and have the confidence to both maintain their existing plants and invest in new ones so that they can respond to future incidents.

Section 3.11 of Chapter 3 of the market rules currently allows market participants (MPs) to request compensation from the EMC or the PSO in respect of various events (usually directions) described in section 3.3.1.5 of Chapter 3. These provisions for compensation are summarised in Annex 1.

There are two additional compensation provisions in (i) section 10.2.9 of Chapter 6 and Appendix 6L and (ii) in section 10.5 of Chapter 6 and Appendix 6K (for Rule Change Paper 320, which will take effect in August 2015) that require EMC to calculate the compensation based on a given formula, if the required conditions are met. However, as these two provisions have established procedures, they would not be discussed in this paper.

Current compensation guidelines

In 2006, the Rules Change Panel (RCP) endorsed a set of decision-making guidelines to provide decision-makers (namely, the EMC or the PSO) with guidance on assessing compensation requests submitted under section 3.11 of Chapter 3 of the market rules, and give applicants greater certainty about the criteria used to assess their request.

Under these guidelines, if the compensation relates to energy, reserve or regulation, a formula was provided to calculate the compensation quantum based on MPs' offers (i.e. offer-based compensation methodology).

Please refer to Annex 2 for the existing guidelines.

3 Analysis

This section sets out the principles underpinning the design of the SWEM, which then guides the compensation framework adopted.

---

1 EMC/RCP/24/2006/CP11: Concept paper- Guidelines for Compensation, as presented at the 24th RCP meeting on 12 January 2006.
While the provisions for compensation under section 3.11 of Chapter 3 of the market rules cover a broad spectrum of events and services, the PSO’s directions relate largely to the provision of energy. This paper will hence centre on PSO’s directions pertaining to energy.

3.1 SWEM’s Market Design Principles

The Singapore Wholesale Electricity Market (SWEM) was designed around the fundamental principle of economic efficiency\(^2\). Other principles such as robustness, transparency, equity and fairness are considered subordinate to that of economic efficiency.

Within the scope of economic efficiency, there are three broad elements:
- **Allocative efficiency** (each resource allocated to those who value it most in the short run)
- **Productive efficiency** (attainment of least-cost production in the short run)
- **Dynamic efficiency** (optimal rate of investment in the long run)

These elements in turn guide the adoption of several market design features, as summarised in Table 1 below.

<table>
<thead>
<tr>
<th>Types of Economic Efficiency</th>
<th>Market Design Feature</th>
<th>Reasons</th>
</tr>
</thead>
</table>
| Productive & Dynamic Efficiency | Marginal pricing (all scheduled units are paid based on the highest scheduled offer, regardless of their actual offers) | • Encourage generators to bid close to their true marginal cost, since they will be paid at their marginal cost or more  
• Allow the recovery of short run costs (during normal times) and long run costs (during periods of high prices)  
• Provide right price signals |
| Productive Efficiency | Merit order least-cost dispatch | • Minimise total costs, thereby enhance productive efficiency |
| Dynamic Efficiency | High energy price cap | • In an energy-only market, contributions towards fixed costs possible only during periods of high prices. Hence, by design, prices are allowed to spike to signal scarcity  
• Provide right investment signals |
| Productive Efficiency | Allow offer changes right up to gate closure | • Encourage more responsive offering voluntarily by MPs or in response to changing system conditions |

The dispatch schedule generated by the MCE, which is premised on the above design principles, is the most economically efficient outcome, and should generally be adhered to for dispatch purposes.

3.2 Compensation under PSO intervention

While the MCE’s dispatch schedule should be used for dispatch, there may be situations in real-time where the PSO needs to intervene and direct certain generators to deviate from the MCE’s

dispatch schedule. Under such situations, generators which are instructed to either generate higher or lower than that in the MCE’s dispatch schedule should be compensated, since it represents deviations from an economically efficient outcome.

The market was designed to encourage generators to offer close to their true marginal costs. As such, generators which were instructed to deviate from their schedules should receive compensation based on their offers as it is the best reflection of their costs. These are represented by the red shaded areas in Table 2 below.3

<table>
<thead>
<tr>
<th>Table 2: Compensation based on offers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Case A: Instructed to provide <strong>more</strong> than scheduled (IQ&gt;SQ)</td>
</tr>
</tbody>
</table>

| Rationale for compensation: To compensate for out-of-pocket costs incurred | Rationale for compensation: To compensate for lost profit |
| Payment for injection at MEP x IEQ | Compensation payable* |

* Note that section 4.5 of this paper proposes to use IEQ instead of Instructed Quantity (IQ) when calculating the actual compensation amount. The red shaded area depicted above would hence depend on IEQ rather than IQ.

Even though PSO’s instructions could span several dispatch periods, **compensation for each dispatch period should be assessed individually and independently**. This is because MCE’s scheduling is conducted on a period-to-period basis, and units are ensured to receive surpluses or at least offer recovery for each individual dispatch period. Compensation should therefore **not** be assessed as a block across multiple periods whereby the surpluses or profits earned in some are netted off losses in others.

The offer-based compensation methodology should work in all instances of Case B (unit instructed to provide less energy than scheduled) and enable the calculation of lost profit based on a unit’s offer, since the unit must have offers at least up to its scheduled quantity in order to be scheduled by the MCE.

The following discussions therefore focus on variants of Case A, where a unit was **instructed to provide more energy than scheduled by the MCE**, with compensation paid only when the **spot market revenue received by the directed generator is insufficient to cover its cost**.

The offer-based compensation methodology in the context of Case A, however, raises the following issues:

---

3 This is also the formulaic, offer-based compensation methodology in the existing guidelines.
i) **Absence of offers**

The compensation methodology prescribed in Table 2 requires the existence of offer quantities up to the instructed level. This requirement may not always be satisfied when a unit is instructed to provide more than scheduled.

In the absence of offers, generators should receive compensation **at least** for their **long run marginal costs (LRMC)**. This aligns with SWEM’s energy-only design whereby generators are able to recover their fixed costs solely through energy payments. Table 3 below illustrates the compensable quantum in the absence of offers, specifically when the total energy offer quantity was zero (Case A2) or the total energy offer quantity was less than the instructed level (Case A3).

### Table 3: Compensation in absence of offers

<table>
<thead>
<tr>
<th>Instructed to provide more than scheduled (IQ&gt;SQ)</th>
<th>Case A2: Total Energy Offer Quantity = 0</th>
<th>Case A3: Total Energy Offer Quantity &lt; Instructed Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Price</strong></td>
<td>Compensation based on cost</td>
<td>Scheduled (Energy and Contingency reserve if applicable)</td>
</tr>
<tr>
<td><strong>MEP</strong></td>
<td>Instructed</td>
<td>Instructed</td>
</tr>
<tr>
<td><strong>Compensated Cost</strong></td>
<td></td>
<td>Offers Absent: Compensation based on cost</td>
</tr>
<tr>
<td><strong>MW Energy</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Price</strong></td>
<td></td>
<td>Offers Exist: Compensation based on offers</td>
</tr>
<tr>
<td><strong>MEP</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Compensated Cost</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>MW Energy</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Note:** Payment for injection at MEP x IEQ

**Compensation payable**

*Note that section 4.5 of this paper proposes to use IEQ instead of Instructed Quantity (IQ) when calculating the actual compensation amount. The red shaded area depicted above would hence depend on IEQ rather than IQ.*

Together, Cases A, A2 and A3 represent a more comprehensive compensation arrangement for a generator that is instructed to generate more than scheduled. The proposed approach to compute the costs referred to in Table 3 will be detailed in section 4.2 below.

ii) **Allowance for offer changes**

As pointed out in Table 1, part of the market design entails allowing generators to change their offers up to gate closure so as to encourage offer responsiveness, which would then enhance short term economic efficiency.

However, there are concerns with continuing to allow offer changes by directed generators in the event of a PSO direction.

For instance, generators instructed to produce more than scheduled may disrupt the MCE’s schedule for the rest of the market if they attempt to lower their offer prices to secure dispatch for

---

4 Absence of offers refers to the case where, for a dispatch period, either the directed generator’s (i) total energy offer quantity was zero, or (ii) total energy offer quantity was positive but less than the instructed level.
the instructed quantities. This will disallow generators that would have been instructed to provide less than scheduled (i.e. generators in Case B) from being able to seek compensation.

Conversely, knowing that they will be entitled to compensation based on their offers, directed generators may raise their offer prices to maximise the compensation revenue attainable.

In view of the above scenarios, both of which have the potential to adversely impact market efficiency, it is proposed that directed generators be disallowed from changing their offers for all dispatch periods under direction. However, it is unfair to impose additional constraints on these units, especially when they are assisting in the maintenance of system security. Thus, in exchange for the inability to change their offers (and hence the possibility that their offers were unreflective of costs), directed generators will have the ex-post choice of the compensation calculation methodology to be used in its compensation request (i.e. cost-based or offer-based).

This ex-post choice is proposed to be:

- applicable only for the instructed quantity (IQ)\(^5\) up to the total energy offer quantity (TEQ).
  - If IQ exceeds TEQ, compensation for the remaining IQ in excess of TEQ can only be assessed based on the cost-based approach (given absence of offers to take reference from).

- a one-off decision that will apply to all dispatch periods for a given direction.
  - Whether offers for directed dispatch periods were reflective of costs (and thus the choice of the compensation calculation methodology) should be applicable for all dispatch periods of a given direction.

Table 4 below summarises the applicable compensation calculation methodology for a given dispatch period.

Table 4: Summary of Compensation Calculation Methodology to be applied

<table>
<thead>
<tr>
<th>Were offers for the dispatch period changed after PSO’s direction?</th>
<th>Quantity</th>
<th>Compensation Calculation Methodology (i.e. Price)</th>
</tr>
</thead>
</table>
| No                                                            | For IQ\(^*\) up to TEQ: Minimum (IQ, TEQ) | • Based on MP’s choice of either Offer-based or Cost-Based  
  • Chosen methodology will apply to all dispatch periods under a given direction |
|                                                              | For IQ\(^*\) in excess of TEQ: Maximum (IQ - TEQ, 0) | • Cost-based |
| Yes                                                           | -        | • No compensation  
  • Considered a rule breach\(^6\) and subject to penalties imposed by the MSCP |

* Note that section 4.5 of this paper proposes to use IEQ instead of Instructed Quantity (IQ) when calculating the actual compensation amount. The reference quantity (vis-à-vis TEQ) would hence depend on IEQ rather than IQ.

5 Note that section 4.5 of this paper proposes to use IEQ instead of IQ when calculating the actual compensation amount. The reference quantity (vis-à-vis TEQ) would hence depend on IEQ rather than IQ.

6 If the RCP supports this proposal, a rule change would be required.
4 Proposal Received

A proposer suggested reviewing the existing compensation guidelines, in relation to three specific areas. These three proposals will be examined separately in this section, together with a fourth proposal which arose in the midst of our analysis.

4.1 Proposal A: Generators to offer instructed level of energy at low offer prices, with compensation on a different basis

The proposer pointed out that if a generator is directed to deviate from its schedule, it would correspondingly cause other generators to deviate from their respective schedules. One possible solution would be for directed generators to offer their directed energy quantities at low prices to ensure dispatch, so as to avoid the spill-over effect on other generators. However, as these offer prices are artificially set low, they should not be used as the basis for compensation.

EMC's evaluation

As explained in section 3.2 (ii) of this paper, offer changes by generators under PSO's direction could adversely impact market efficiency and send out artificially low price signals, and should thus be disallowed. We therefore do not support Proposal A.

4.2 Proposal B: Provide guidelines for compensation in the absence of offers

The current guidelines, with compensation based on offers, do not cover situations where directed generators do not have offers.

EMC's evaluation

Indeed, in the absence of sufficient energy offer quantities up to the instructed level, a fall-back approach to calculate compensation is required. As mentioned in section 3.2 (i) of this paper, this approach should be based on the provider’s LRMC. Payment based on LRMC is also the basis adopted in pricing Vesting Contracts. Please refer to Annex 3 for a summary of the various components in the vesting contract hedge price.

The LRMC comprises both fixed and variable costs, together with any other associated costs incurred in the course of following such directions (for example, start-up and shut-down costs, and market charges). As the costs should ideally be specific to the generating technology and fuel of the directed generator, the subsequent analysis will address each of the three broad generator types in SWEM, which are combined-cycle gas turbines (CCGTs), gas turbines (GTs) and steam turbines (ST).

i) Fixed Cost

Fixed cost\(^7\) reflects the costs of building a new generation plant over its expected utilisation and life span.

At present, CCGTs are considered the most efficient technology for operation in the SWEM and thus are likely to be the type of plants for new investments. The EMA calculates, and reviews biennially, the LRMC of a CCGT unit for the vesting contract regime. To estimate a CCGT’s fixed cost for compensation, we can use the Annualised capital cost and Fixed running cost components of the vesting contract hedge price.

---

\(^7\) Examples of fixed costs include the purchase cost of the generating plant and associated equipment, land and site preparation costs, and gas connection costs.
For STs and GTs, however, capital and investment cost information is sparse and not readily available as new generation investments are mostly CCGTs. Given the lack of information on STs and GTs, we propose that for compensation purposes, the fixed cost compensation for STs and GTs be based on the CCGT’s fixed cost too.

ii) **Variable Cost**

Variable costs vary with generating output and comprise both fuel and non-fuel components. The latter for CCGTs is also calculated as part of the vesting contract regime and could similarly be used for CCGTs, STs and GTs.

On the other hand, variable fuel costs relates to the cost of fuel that is used to generate the instructed level of energy.

For CCGTs, the forward fuel prices using piped or liquefied natural gas could also adopt the figures used in the vesting contract regime. For other generators, the relevant fuel costs could generally be accounted based on either:

- its purchase cost (i.e. genco’s purchase price for the stock of fuel that was consumed); or
- the replacement cost (i.e. current cost of obtaining replacement fuel from the market).

In principle, fuel costs should be compensated based on its replacement costs, as it is a better reflection of the present cost of generation. However, in practice, the cost of obtaining replacement fuel may be affected by a multitude of factors such as the volume of each order, delivery lead time, and fuel quality/specifications. These factors may resultantly affect the mark-up over the relevant fuel benchmark, which cannot be determined with certainty.

In view of these factors, we proposed that fuel costs for STs/GTs be accounted based on gencos’ purchase cost (i.e. the inventory cost of fuel based on gencos’ prevailing accounting method).

iii) **Other costs**

Other costs directly attributable to compliance with PSO’s instruction should also be eligible for compensation. In our opinion, two types of other costs could be incurred by a directed generator in following PSO’s instruction, namely, start-up/shut-down costs and market charges.

If start-up and shut-down costs are incurred, then such costs should similarly be compensated akin to fixed costs. An example of start-up cost is the cost of fuel consumed to bring the generator to its no-load level in order to satisfy the PSO’s direction, and any other costs that could be shown to be directly attributable to the direction. Since such costs cannot be attributed to individual dispatch periods, they should be allocated equally among all dispatch periods under a given PSO instruction.

Market charges, specifically reserve and regulation costs should be compensable too. If gencos had offers, these costs would have been incorporated into their offers prices. As such, when the proposed cost-based approach is used in conjunction with the offer-based compensation methodology (i.e. Case A3, when a genco chooses offer-based compensation but has insufficient total energy offer quantity), these charges should be compensated only for the incremental quantity that is not covered by offers (i.e. IQ – TEQ). Table 5 below clarifies this arrangement. However, EMC/PSO fees are not compensable, as they have been included in the variable non-fuel cost component of the vesting contract hedge price.

---

8 Examples of variable non-fuel cost components are the costs of long-term servicing agreements for the maintenance of gas and steam turbines, EMC fees, PSO fees and EMA variable license fees.
### Table 5: Allowance for inclusion of reserve and regulation charges as costs

<table>
<thead>
<tr>
<th>MP's Chosen Methodology</th>
<th>Offer-based</th>
<th>Cost-based</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methodology applied in given dispatch period</td>
<td>Only Offer-based (IQ≤TEQ) (e.g. Case A)</td>
<td>Offer-based (up to TEQ) + Cost-based (for IQ&gt;TEQ) (e.g. Case A3)</td>
</tr>
<tr>
<td>Directed generator scheduled for energy</td>
<td>Reserve costs</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>No, since such costs should be included in offer</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Regulation costs</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Up to TEQ: No, since such costs should be included in offer</td>
<td></td>
</tr>
<tr>
<td></td>
<td>For IQ-TEQ: If IQ≤10MW, regulation charges for (5MWh – ½ x TEQ) compensable</td>
<td></td>
</tr>
<tr>
<td>Directed generator not scheduled for energy</td>
<td>Reserve costs</td>
<td></td>
</tr>
<tr>
<td></td>
<td>N.A. (No reserve costs since not scheduled)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Regulation costs</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Up to TEQ: No, since such costs should be included in offer</td>
<td></td>
</tr>
<tr>
<td></td>
<td>For IQ-TEQ: If IQ≤10MW, regulation charges for (5MWh – ½ x TEQ) compensable</td>
<td></td>
</tr>
</tbody>
</table>

*Note that section 4.5 of this paper proposes to use IEQ instead of IQ when calculating the actual compensation amount. References to IQ here would hence be read to mean IEQ instead.

To sum up, cost-based compensation for each dispatch period is proposed to be calculated based on the following formula:

**Compensation payable when Computed Cost exceeds Spot Market Revenue**

\[
= \text{Computed Cost} - \text{Spot Market Revenue} \\
= [(\text{Annual capital cost} + \text{Fixed annual running cost} + \text{Variable non-fuel cost} + \text{Variable fuel cost}) \times \text{Quantity} + \text{Other Costs}] - (\text{MEP} \times \text{Quantity})
\]

where:

- MEP is the market energy price of the generator (in $/MWh);
- Quantity is either IQ\(^9\) (if the generator chose cost-based compensation) or the IQ that is in excess of TEQ (if the generator chose offer-based compensation\(^{10}\)) (in MWh); and
- Components of Computed Cost for each generator type are as tabulated in Table 6.

---

\(^9\) Note that section 4.5 of this paper proposes to use IEQ instead of IQ when calculating the actual compensation amount. References to IQ here would hence be read to mean IEQ instead.

\(^{10}\) This refers to the case where the generator chooses the offer-based compensation methodology, but its total energy offer quantity is less than the instructed level (i.e. Case A3 of Table 3).
Table 6: Summary of cost-based components

<table>
<thead>
<tr>
<th>Type of Cost</th>
<th>Components</th>
<th>Calculation of Component</th>
</tr>
</thead>
<tbody>
<tr>
<td>i) Fixed Costs</td>
<td>Annual capital cost ($/MWh)</td>
<td>Prevailing Vesting contract (VC)'s Annual capital cost</td>
</tr>
<tr>
<td></td>
<td>Fixed annual running cost ($/MWh)</td>
<td>Prevailing VC's Fixed annual running cost * Overhead Index</td>
</tr>
<tr>
<td>ii) Variable Costs</td>
<td>Variable non-fuel cost ($/MWh)</td>
<td>Prevailing VC's Variable non-fuel cost * Overhead Index</td>
</tr>
<tr>
<td></td>
<td>Variable fuel cost ($/MWh)</td>
<td>For PNG or LNG: Prevailing VC's Fuel cost (Gas Price or LNG Price) For other fuel: Gencos' cost of fuel, based on their existing accounting method</td>
</tr>
<tr>
<td>iii) Other Costs ($)</td>
<td>Start-up and shut-down costs incurred in following direction, divided by all periods under PSO's direction</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Reserve and regulation charges, as applicable in Table 5 Incremental gas-related charges (e.g. Nomination Divergence charges), which can be verified and directly attributable to PSO's direction</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Excludes EMC/PSO fees</td>
<td></td>
</tr>
</tbody>
</table>

EMC recommends that the existing compensation guidelines be revised to include the above cost-based methodology.

4.3 Proposal C: Examine whether it is timely to formally implement the compensation guidelines in the market rules.

When the RCP last examined the compensation framework in 2006, no claims for compensation had been lodged. EMC at that time then recommended that the guidelines and formulae be introduced on a non-binding basis until sufficient experience has been gathered to judge whether they should be included in binding form in the market rules. The Panel had also requested that the EMC and the PSO inform the Panel of any experience gained in applying the decision-making guidelines and formulae to compensation requests.

The proposer thus suggests examining whether it is now timely to introduce the guidelines in the market rules.

EMC’s evaluation

Since the RCP’s last review, the PSO has handled three compensation requests11 (as of 01 June 2014).

---

11 The compensation amount for the three requests was agreed upon with the respective MPs on January 2012, February 2014 and March 2014. The PSO’s compensation notices can be found on EMC’s website at: https://www.emcsg.com/n1051.37.html
We are not aware of the compensation guidelines having been applied in assessing any compensation requests. However, as the PSO will issue directions only in rare and infrequent instances, there is limited benefit in formalising the guidelines. Moreover, retaining the guidelines in a non-binding form will allow flexibility to cover unanticipated situations.

EMC thus recommends that the compensation guidelines remain non-binding. However, given its more comprehensive coverage (by including the proposed methodology to calculate compensation in the absence of offers), the PSO and EMC should find it more useful for future requests. As such, we propose that the PSO and EMC inform the RCP whenever any experience has been gathered, so that the efficacy of the proposed revised guidelines could be assessed. A Sample Guidelines Feedback Template is provided in Annex 4.

4.4 Proposal D: To facilitate PSO’s directions issued under section 9.1.3 of Chapter 5

An issue regarding how one of the clauses which allow the PSO to issue directions could be achieved in practice surfaced in the midst of our analysis.

Under section 9.1.3 of Chapter 5 of the market rules, the PSO may override dispatch instructions for any registered facility with valid energy, reserve or regulation offers to provide or limit the provision of that service. The intent of this clause is to allow the PSO to be able to carry out tasks to prevent the power system from entering a high-risk or emergency operating state.

However, the PSO in practice may be unable to ascertain which registered facilities qualify under the above clause, given they do not have full information on the set of registered facilities with valid offers. EMC currently only communicates to the PSO the scheduled quantities for energy, reserve and regulation from each registered facility for a dispatch period, but not the remaining or unscheduled offer quantities available nor any information on offer prices.

For instance, a registered facility with registered capacity of 400MW may only wish to offer 300MW in its energy offer in a dispatch period. If this registered facility’s energy offer is scheduled fully (i.e. energy scheduled by MCE =300MW), the PSO would not know that this facility do not have remaining valid offer quantities to increase the provision of energy when directed to do so under section 9.1.3 of Chapter 5.

EMC’s evaluation

The PSO’s views on the usefulness of additional information (specifically remaining unscheduled offer quantities and/or prices from registered facilities for each dispatch period) were sought during the Industry Consultation process (see section 5 below).

Given that the PSO does not find such information useful, we recommend that this proposal not be implemented.

4.5 Use of instructed (IQ) or actual injection quantities (IEQ) for compensation

The foregoing discussions (in sections 3 and 4) contemplate the use of PSO’s Instructed Quantity (IQ) as the basis for calculating the compensation amount, assuming the ideal scenario whereby generators actual injection quantities (IEQ) adhere closely to the IQ.

During the industry consultation (see section 5 below), the PSO has suggested that IEQ should be used instead. We accept this suggestion, which would align the quantity for compensation with that used for energy payments in SWEM’s wholesale market settlement process.
Hence, IQ will be used to first determine gencos’ eligibility for compensation (vis-a-vis the sum of their scheduled energy and contingency reserve quantity), while the actual compensation payment for eligible gencos will be calculated based on IEQ.

5. Industry Consultation (Concept Paper)

We published the concept paper for consultation on 19 June 2014, and received the following feedback from Tuas Power, PacificLight Power, PSO and EMC Market Operations:

Comments from Tuas Power

We agree to the proposal that:

- Gencos should not be allowed to vary their offers for dispatch periods that are under PSO’s direction; and
- Ex-post choice should be given to the relevant generators for the compensation.

The ex-post choice of the compensation methodology should, however, cover three options:

1. An offer-based methodology where the compensation is based on the offers made by the respective generators;
2. A cost-based methodology where LRMC of the relevant generator type should be applied, for instance if PSO instructs to run a steam plant, then LRMC of a steam plant should be used for the calculation of compensation;
3. A market-based methodology where the MCE-settled price for the period can be chosen by the generators as compensation – this is possible in the case where the market price exceeds LRMC cost of the respective plant.

Also, the paper does not cover the compensation for generators when PSO instructs to put a generating unit in a standby-mode. We suggest that for such scenario the same principles apply and the generators should be given ex-post choice of the compensation according to options (2) and (3) above and using the relevant minimum stable load for the generating unit as a reference for the compensation calculations.

(Tuas Power’s subsequent explanation on what standby-mode entails)

Standby mode means the scenario where PSO directs a Genco to warm up a steam plant for instance and make it available to run anytime upon further instruction from PSO. There are both direct costs (fuel, manpower, etc) and indirect costs (plant depreciation, maintenance, shortening of plant life, etc) incurred to make a plant standby.

EMC’s response

We note Tuas Power’s agreement.

We agree in principle that the LRMC (both fixed costs and variable costs) for cost-based compensation should be specific to the relevant generator type. In our proposed cost-based methodology, variable fuel costs should correspond to the actual fuel used. However, as figures for fixed and variable non-fuel cost components (for existing STs and GTs) are not readily available without going through an extensive computation exercise, we suggest using the calculated vesting contract parameters as proxies.

Gencos do not need to choose the proposed third option of a “market-based methodology”, as it is already included in our proposed framework, where generators will receive the MEP for their injection quantities through the usual market settlement process. If gencos receive a MEP that is sufficient to cover their LRMC, then there is no need to submit a compensation request.
When generating units are instructed to be on standby mode, any costs that have been incurred to bring the unit to that mode and which can be shown to be directly attributable to PSO’s direction should be compensable, akin to start-up costs.

Comments from PacificLight Power

In order to ensure that the market operates in a transparent manner and provides a level playing field to all participants, PSO should provide information to all market participants in the event that an instructed schedule is issued.

In order to fully compensate a genco, any compensation for an instructed scheduled should be based on the actual cost of the physical fuel used to fulfil the generation output in the instructed schedule from PSO.

A genco should be compensated for all costs directly attributable as a result of the PSO instructed generation. This should include any GNC and/or SLNG charges.

(PacificLight Power’s subsequent clarification: PLP would like to clarify that compensation should include actual cost of physical fuel used and all costs directly attributed. This would include fixed costs and variable non-fuel costs and any other 3rd party charges such as GNC and/or SLNG charges.)

We would request EMC to verify how a genco’s compensation claim could be accurately verified based on purchase costs when liquid fuel is used to meet the instructed schedule and the fuel comes from a large reserve.

EMC’s response

It is not apparent how providing further information on PSO’s directions to particular participants would level the playing field, since the PSO currently already issues system status advisory notices to notify market participants when the power system is facing an abnormal condition.

We note PacificLight Power’s views regarding cost-based compensation. Incremental gas-related charges\(^\text{12}\), if shown and verified to have been incurred directly due to PSO’s instruction, should be compensable too. We have updated Table 6 above to include this under “Other Costs”.

For fuel costs, in our proposed cost-based methodology, we do not suggest that gencos identify the exact shipment or cargo of fuel used. Instead, for ease of calculation, the fuel purchase cost could simply adopt what gencos are currently using for their own accounting purposes (e.g. to attribute production/ inventory costs).

Comments from PSO (i)

MPs should not be given a choice to choose between ‘offer price + cost’ or ‘cost’ for each their compensation claims. A fair method will be using only the ‘cost’ methodology which is essentially the basis used by PSO (& accepted by relevant MPs) for the past compensation claims.

The LRMC based on Vesting contract is not a ‘perfect’ representative of fixed costs incurred as these are different for STs, OCGTs, CCGTs, etc. In the first place, fixed cost should not be included in compensation claim amount as these are not incremental cost resulting from PSO.

\(^{12}\) Only additional charges incurred directly arising from PSO’s instruction should be included as cost, similar to the principle adopted in determining the quantum of reserve and regulation charges that can be included as costs (in Table 5).
despatch instruction being different from that of MCE despatch schedule. Again, the same basis
had been used by PSO (& accepted by the relevant MPs) for the past compensation claims.

EMC’s response

We do not agree that compensation should not be based on offers. In SWEM’s uniform pricing
regime, generators are incentivised to offer close to their true marginal costs of production. Offer
prices are thus the best reflection of generators’ costs.

Furthermore, as explained in section 3, SWEM’s energy-only design implies that generators are
to recover both fixed and variable costs through market payments. Compensation is thus
meant to ensure directed generators receive remuneration at economically efficient levels. We
therefore do not agree with excluding fixed costs from the compensation claim amount.

While we recognise that the vesting contract parameters (for fixed and variable non-fuel costs)
do not represent the exact LRMC of each generator, short of doing an extensive exercise to
derive the LRMC of each directed generator, we consider the vesting contract parameters to be
the best proxies available.

The fact that this issue has been raised for inclusion in the RCP’s work plan indicates that it is
timely to re-examine the compensation calculation methodology, without being bounded by past
compensation claims.

Comments from PSO (ii)

The compensation payable should (be) base(d) on metered quantity and up to the Instructed
Quantity. In the worst case that unit trips and unable to deliver the Instructed Quantity,
compensation should not be payable.

EMC’s response

We accept the suggestion to use metered quantities (i.e. GRF’s IEQ) to calculate the
compensation payable, given it aligns the quantity for compensation with that used for energy
payments in SWEM’s wholesale market settlement process.

However, there will be no need to cap the quantities to the instructed level as deviations
within ±10MW are considered acceptable, and variances could also result from generators being
on automatic generation control (in which case they are deemed to have adhered to their
dispatch instructions).

The compensation clauses listed in Annex 1 provides that compensation may be requested from
the PSO only when the MP had complied with the direction. As such, if the PSO considers a
generator (which has submitted a compensation request) to not have complied with its directions,
the PSO should refer it to the market surveillance and compliance panel (MSCP) for their
assessment. If the MSCP consequently determines that a directed generator was non-compliant,
then the genco should not be compensated.

Comments from PSO (iii)

Summary of all compensation claims processed by PSO has already been published on EMC
website. It would not be appropriate for PSO to inform the RCP whenever any experience has
been gathered’ given that confidential info/data pertaining to specific MPs’ commercially sensitive
data would be required to determine the compensation amount claimable.
The valid offer information suggested by EMC in Option D is not practical. In emergency condition e.g. where load shed is imminent, PSO’s priority is to dispatch the GRFs that could come online the soonest instead of the cheapest but requires a long lead time (of say 10 hrs) to come online. PSO already have plant availability daily and is updated as-and-when there is a change, which enable PSO to use when issuing despatch instruction.

EMC’s response

The intent for PSO or EMC to inform the RCP when the guidelines have been applied is so that the efficacy of the guidelines could be assessed, and improvements/ refinements could be made to portions of the guidelines that were not workable. Commercially sensitive and confidential data do not have to be revealed. We suggest that the PSO/EMC inform the RCP using the Sample Guidelines Feedback Template in Annex 4.

We also note PSO’s views that they do not need EMC to provide GRFs’ offer information (in relation to Proposal D).

Comments from PSO (iv)

For cases where Instructed Quantity < Schedule Quantity, MPs should not be paid for the lost profit. This is stipulated in the Market Rules Chapter 1, S13.2.4.2 and is well aligned with the cost base(d) compensation regime suggested.

EMC’s response

Our external legal advisor from Rajah & Tann LLP has advised that the prohibitions in sections 13.2.4.1 – 13.2.4.3 of Chapter 1 of the market rules do not apply to compensation paid by the PSO under section 3.11 of Chapter 3.

While section 13.2.4 of Chapter 1 prohibits certain damages from being sought from the PSO, it allows exceptions to the rule if other sections of the market rules state a contrary position. Compensation that is paid by the PSO under section 3.11 of Chapter 3 is therefore considered to fall within those exceptions. Please refer to Annex 5 for the full text of their opinion.

As such, the compensation framework proposed in this paper, including compensation when instructed to provide less than scheduled, does not contradict section 13.2.4 of Chapter 1 of the market rules, and could thus be applied.

Comments from EMC Market Operations

The frequency of such case(s) is likely to be very low, e.g. only a few instances since market start. The system implementation cost of Proposal D is likely to be significant (i.e. new data and module) as it needs to deliver the real time offer information to PSO.

EMC’s response

We note EMC Market Operations’ assessment of the potential system implementation costs. Since the PSO (in Comments from PSO (iii) above) does not think that such information is required, we will not implement Proposal D.

6. Conclusion

The compensation guidelines are meant to provide clarity and guidance for both decision-makers and applicants in assessing a compensation claim/request.
This paper has revisited SWEM’s design principles to provide the context within which the current compensation framework is evaluated. Arising from the four proposals, refinements to provide greater clarity on the offering behaviour expected of directed generators and an update to the existing guidelines to include a cost-based approach to calculate the compensable quantum are proposed.

The proposals examined in this paper and EMC’s recommendations are summarised in Table 7 below.

Table 7: Summary of proposals examined and EMC’s recommendations

<table>
<thead>
<tr>
<th>Proposal</th>
<th>Description of proposal</th>
<th>EMC’s views and recommendations</th>
</tr>
</thead>
</table>
| A | Generator to offer instructed level of energy at low offer prices, with compensation on a different basis | Recommend that:  
- Offer changes by GRFs under direction be disallowed since they could potentially have an adverse impact on market efficiency  
- Directed GRFs be given the ex-post choice of compensation calculation methodology, if offers were available  
- Offer changes made by directed GRFs for dispatch periods under direction be considered a rule breach and subject to penalties by MSCP, with no compensation payable (rule change required) |
| B | Provide guidelines for compensation in the absence of offers | Recommend that:  
- Cost-based compensation be based on LRMC, using the components outlined in section 4.2  
- The existing compensation guidelines be revised to include the cost-based methodology |
| C | Examine whether it is timely to formally implement the guidelines in the market rules | Recommend that:  
- Guidelines remain non-binding  
- PSO/EMC provide feedback to the RCP on the efficacy of the guidelines using the sample Guidelines Feedback Template in Annex 4 |
| D | Provide information on remaining unscheduled offer quantities from registered facilities to assist the PSO in issuing directions under section 9.1.3 of Chapter 5 | Recommend that the proposal not be implemented, since the PSO has indicated that they do not require additional information to be provided |

7. **Decision by the Rules Change Panel (RCP) at the 75th RCP Meeting**

The concept paper was presented at the 75th RCP meeting, where the Panel unanimously supported the recommendations summarised in the third column of Table 7 and tasked EMC to revise the existing compensation guidelines and draft the relevant rule modifications.

8. **Proposed Rule Modifications and Revised Compensation Guidelines**

Arising from the RCP’s decision at its 75th meeting, EMC has:

- drafted the proposed rule modifications, as set out in Annex 6, to disallow offer changes by GRFs which are under a PSO direction relating to energy, and
- revised the compensation guidelines, as set out in Annex 7, to incorporate the cost-based formula.

Table 8 below summarises the proposed rule modifications.

In the proposed rule modifications, an exception to the restriction on offer changes is allowed if it is intended for the GRF to reflect its revised capability during forced outages. In such situations, offer quantities must be reduced from the highest to the lowest price at which they were offered so that an indirect price change does not occur.\textsuperscript{13}

<table>
<thead>
<tr>
<th>Chapter 6, Section</th>
<th>Proposed change</th>
<th>Reason for change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sections 5.1.5, 5.1.6 and 5.1.7</td>
<td>Replaced “section 10.4.1” with “section 10.4”.</td>
<td>To subject these sections to section 10.4 of Chapter 6.</td>
</tr>
<tr>
<td>Section 10.4.1</td>
<td>Added “but subject always to section 10.4.3”.</td>
<td>To subject section 10.4.1 to the proposed new section 10.4.3 of Chapter 6.</td>
</tr>
<tr>
<td>Section 10.4.3</td>
<td>Added new restriction on offer variations or revised standing offers for a GRF when: (i) the PSO has issued a direction or instruction in respect of the GRF, (ii) such instructions or direction were issued under 5.4.3, 5.6.1, 9.1.3 or 10.4.1 of Chapter 5, and (iii) such direction or instruction relates to energy. Added an exception to the new prohibition, if offer changes are intended to reflect the GRF’s revised capability during forced outages.</td>
<td>To implement the proposed restriction on offer changes, as described in section 3.2(ii) of this paper.</td>
</tr>
</tbody>
</table>

9. **Impact on market systems**

There is no impact on market systems.

10. **Legal sign-off**

The text of the proposed rule modifications has been vetted by EMC’s external legal counsel, whose opinion is that the modifications reflect the intent of the rule modification proposal as expressed in the third column of the table in Annex 6.

\textsuperscript{13} In accordance with the MSCP’s statement on Offer Variations and Revised Standing Offers after Gate Closure, 6 April 2005. \url{https://www.emcsg.com/f285_8002/MSCP_Statement_on_Gateclosures_Addendum_6_April_05.pdf}
11. Consultation (Proposed rule modifications and revised compensation guidelines)

The proposed rule modifications and revised compensation guidelines as set out in Annexes 6 and 7, were published for comments on 26 September 2014. Feedback was received from YTL PowerSeraya and Pacificlight Power.

Comments from YTL PowerSeraya (YTLPS)

1. We request that PSO’s directions be issued in a format indicating the start and end time as well as the section of the Market Rules that the direction is based on to avoid disputes when determining compensation. In the interests of time, PSO's directions can first be issued verbally but they should later be followed up with written directions in a given format affirming the verbal directions given earlier.

2. Off-peak periods currently face a situation of over-supply, resulting in gencos offering at or below cost to ensure continuity of running of their machines. Given the restriction on changing offers for periods subject to PSO directions, offer-based compensation may not be appropriate for the compensation during those periods. Cost-based compensation should therefore be provided as an option. We support the proposal to allow a choice of either offer-based compensation or cost-based compensation.

3. We note the proposal to use Vesting Contract Hedge Price parameters for determining compensation under the cost-based approach. When the Vesting Regime ends in the future, the Vesting Contract Hedge Price parameters would no longer be available. How would the Vesting Contract Hedge Price parameters then be replaced for determining cost-based compensation?

EMC’s response

1. When directions are issued to a GRF to alleviate system emergencies, the PSO may not always have a clear indication of when the conditions may cease. When this happens, for the directed GRF, all future dispatch periods should be considered as being under instruction (and thus the directed GRF will be restricted from changing its offers) until the PSO have sight of the cessation of the event.

2. YTLPS’s support for the proposal to provide a choice of calculation methodology is noted.

3. The use of vesting contract parameters recommended in the revised guidelines is meant to approximate the LRMC of generators. When the vesting contract regime ceases, gencos seeking cost-based compensation would then have to justify the LRMC of their generators to the PSO. Regardless, the overarching principle of compensating based on LRMC should be maintained.

Comments from PacificLight Power

We refer to Section 5, Table 4 of the Compensation Guidelines proposal. It is noted that the proposed variable fuel cost computation is recommended to be based on a Market Participant’s existing accounting method. Since different companies adopt different accounting methodology, PLP is of the opinion that a common accounting method should be implemented by the EMC for calculation of the variable fuel cost to ensure that Market Participants are treated consistently.

EMC’s response

We note PLP’s suggestion for a common accounting method. However, given that gencos’ accounts are already subject to audit and directions are expected to be issued infrequently, we do not feel that there is a need to prescribe a particular method to calculate the relevant fuel
costs. Moreover, if the prescribed method differs from what is used by the claimant, unnecessary administrative costs may be placed on the claimant to re-calculate their fuel cost.

12. Decision at the 76th RCP meeting

At the 76th RCP meeting, the RCP unanimously supported the proposed rule modifications and revised compensation guidelines as set out in Annexes 6 and 7 respectively.

The revised compensation guidelines set out in Annex 7 will take effect immediately, and the RCP will write to the EMC and PSO to (i) inform them to use the revised compensation guidelines and (ii) request that they provide feedback to the RCP on the efficacy of the guidelines when the guidelines have been applied in assessing a compensation request.

13. Recommendation

The RCP unanimously recommends that the EMC Board:

- adopt the proposed rule modifications as set out in Annex 6;
- seek EMA’s approval of the proposed rule modifications as set out in Annex 6; and
- recommend that the proposed rule modifications come into force one business day after the date of which the approval of the Authority is published by the EMC.
<table>
<thead>
<tr>
<th>Market Rules Chapter 5</th>
<th>Provision for Compensation</th>
<th>Instruction applies to</th>
</tr>
</thead>
<tbody>
<tr>
<td>Section 4.7.3</td>
<td>Providers of reactive support or voltage support that are not providing services pursuant to an ancillary services contract that are directed by the PSO to take action, but only if outside the limits of the Transmission Code requirements.</td>
<td>Reactive support and voltage control</td>
</tr>
<tr>
<td>Section 5.4.3</td>
<td>MPs directed by the PSO to take action in accordance with the Market Rules when market mechanisms fail to provide adequate security</td>
<td>Not specific</td>
</tr>
<tr>
<td>Section 5.6.2</td>
<td>MPs who respond, during an emergency operating state, to: i) A direction by the PSO to cancel maintenance. ii) A decision by the PSO to cancel, defer or deny requests for planned outages. iii) A direction by the PSO that PSO controlled grid or generation facilities be returned to service.</td>
<td>Maintenance, work affecting security of PSO controlled system, outages, directions to return to service, operating to security limits appropriate for an emergency operating state</td>
</tr>
<tr>
<td>Sections 7.7.2 and 7.7.3</td>
<td>MPs for a generation facility whose outage is cancelled, deferred or recalled by the PSO, if: i) The outage had originally received planning or final approval by the PSO. ii) The outage was cancelled, deferred or recalled by reason of a material error in the PSO's demand forecast, a failure of generation facilities within the PSO controlled system, a failure of facilities forming part of the PSO controlled grid, or a failure of intertie facilities. iii) The direct expenses were identified to the PSO in accordance with Section C.2 of Appendix 5C. iv) The direct expenses exceed $10,000.</td>
<td>Outages that have received planning approval or final approval by the PSO</td>
</tr>
<tr>
<td>Section 8.4.3</td>
<td>MPs directed by the PSO to provide any level of any ancillary service above the levels required by the electricity licence or any registration requirements referred to in the Market Rules, the transmission code or any applicable connection agreement, and if the facility is not otherwise subject to an ancillary service contract.</td>
<td>Primary reserve, secondary reserve, contingency reserve, regulation, reactive power and voltage support service, black start service, fast start service, reliability must-run service</td>
</tr>
<tr>
<td>Section 8.6.2</td>
<td>MPs directed by the PSO under an emergency operating state to provide any class of contracted ancillary service, even if the EMC does not have an ancillary service contract in respect of that registered facility.</td>
<td>Reactive support and voltage control service, black start capability, fast start service, reliability must-run service</td>
</tr>
<tr>
<td>Section 9.1.7</td>
<td>MPs, with a valid energy, reserve or regulation offer, who comply with a dispatch instruction issued pursuant to Section 9.1.3 of Chapter 5, where the PSO considers that any dispatch instructions issued in accordance with Section 9.1.2 of Chapter 5 could result in the PSO controlled system entering into a</td>
<td>Energy, primary reserve, secondary reserve, contingency reserve, regulation</td>
</tr>
<tr>
<td>Market Rules Chapter 5</td>
<td>Provision for Compensation</td>
<td>Instruction applies to</td>
</tr>
<tr>
<td>------------------------</td>
<td>-----------------------------</td>
<td>------------------------</td>
</tr>
<tr>
<td></td>
<td>high-risk or emergency operating state. The dispatch instruction may be to provide or to limit the provision of the relevant physical service. Under Section 9.1.8, compensation is not available for dispatch instructions for reactive support and voltage control.</td>
<td></td>
</tr>
<tr>
<td>Section 9.7.3</td>
<td>MPs who have sustained a loss or damage as result of a dispatch error.</td>
<td>Not specific</td>
</tr>
<tr>
<td>Section 10.4.1</td>
<td>MPs who have taken actions in response to an abnormal frequency excursion. Abnormal frequency conditions and actions to be taken identified in Section 9.5 of the System Operation Manual.</td>
<td>Not specific</td>
</tr>
</tbody>
</table>
Annex 2: Existing Compensation Guidelines  
(Paper No.: EMC/RCP/24/2006/CP11, 12 January 2006)

Guidelines and Formula for Compensation

Purpose

The purpose of these guidelines is to assist the EMC and the PSO in assessing requests for compensation submitted under Section 3.11 of Chapter 3 of the Market Rules.

These guidelines have no formal standing under the Market Rules and are intended to assist the EMC or the PSO, as the case may be, in determining whether compensation is payable in respect of a particular event, and if so, to calculate an amount of compensation that is fair and economically efficient.

It is intended that the EMC and PSO would use these guidelines as much as possible, and where appropriate, when considering requests for compensation.

Guidelines

Any claim for compensation that involves physical damage to plant, or any similar complicating factors should be based upon the Market Participant’s submission in support of the request for compensation.

Only one claim for compensation may be made in respect of a particular instruction from the PSO. For example, where a Market Participant has received an instruction to increase its output by 10MW, it is only permissible to make a claim for compensation for the energy delivered. Assuming the generator provided an additional 5MWh in response to the PSO’s instruction, then compensation would be paid for 5MWh of energy produced. It is not permissible to lodge a claim for additional compensation in respect of the same instruction, for example for the provision of reserve.

If a generator is scheduled for reserve, this is treated as a contract to sell the cleared quantity at the market clearing price, if called upon. Therefore, a generator that is scheduled to provide 150MW of energy and 10MW of reserve cannot lodge a claim for compensation if it is instructed by the PSO to ramp up to 160MW. However, if the same generator is instructed to ramp up to 170MW, and it complies with the instruction, then it could submit a claim for compensation for the output above 160MW.

A request for compensation should first be assessed against the criteria in Table 1 to assess whether compensation is prima-facie payable.

Table 2 then provides guidance on the basis on which compensation should be determined in respect of instructions to increase or decrease the provision of particular products. Table 3 provides eligibility criteria where the claimant has been scheduled to provide both energy and reserve.

The formula then assists the EMC and PSO to calculate the amount of compensation payable where the instruction relates to energy, reserve or regulation. Where there is no applicable offer, compensation will be assessed on the basis of the Market Participant's submission in support of the request for compensation. The price caps for energy, reserve and regulation will apply to any such request to limit the amount of compensation that may be sought as long as no physical damage to plant, or any similar complicating factors.

Basis for Compensation
The general principle applied to compensation for energy, reserve and regulation is that the amount of compensation is based on the offer price submitted by the Market Participant. Within this general principle, the following applies:

Where a claim relates to an instruction to provide more than the scheduled quantity of energy (IQ > SQ), then the compensation is paid as the difference between the offer price and the market clearing price over the additional quantity of energy provided. This is because the Market Participant is automatically paid the market clearing price for the injected quantity of energy. This is illustrated in Figure 1.

A similar principle applies where a Market Participant is instructed to provide less than the scheduled quantity of energy. In that situation, the compensation is also based on the difference between the market clearing price and the offer price submitted by the Market Participant over the additional quantity provided. This is illustrated in Figure 3.

Where a claim relates to an instruction to provide more than the scheduled quantity of reserve (IQ > SQ) or regulation, then the compensation is paid as the offer price multiplied by the quantity over and above the scheduled quantity that the Market Participant was instructed to provide. This is because the Market Participant will be automatically paid only for the scheduled quantity of reserve or regulation.

Table 1: Criteria to Determine Whether Compensation is Payable

<table>
<thead>
<tr>
<th>Section</th>
<th>Provision for Compensation</th>
<th>Instruction applies to</th>
<th>Assessment criteria</th>
</tr>
</thead>
</table>
| 4.7.3 of Chapter 5 | Providers of reactive support or voltage control that are not providing services pursuant to an ancillary services contract that are directed by the PSO to take action. This is subject to Section 8.4.2 which states that there is no entitlement for compensation for any ancillary service that must be provided pursuant to any electricity licence or connection requirement or any registration requirement referred to in the Market Rules, the Transmission Code or any applicable connection agreement. Compensation therefore only applies to instructions outside the limits of Transmission Code requirements. See also Section 8.4.3 relating specifically to registered facilities/generation settlement facilities. | Reactive support and voltage control     | In principle, a Market Participant may make a request for compensation if:  
  - The market participant is not providing services pursuant to an ancillary services contract; and  
  - the PSO gives an instruction to provide reactive support and voltage control; and  
  - the instruction is to provide above levels required by electricity licence, connection requirement, the Transmission Code, or any registration requirement referred to in the Market Rules; and  
  - the Market Participant complies with the instruction. |
| 5.4.3 of Chapter 5 | Market Participants directed by the PSO to take action in accordance with the Market Rules when market mechanisms fail to provide adequate security | Not specific                           | In principle, a Market Participant may make a request for compensation if:  
  - market mechanisms fail to provide adequate security, and  
  - The PSO gives direction to take action, and  
  - the Market Participant complies with the instruction. |
<table>
<thead>
<tr>
<th>Section</th>
<th>Provision for Compensation</th>
<th>Instruction applies to</th>
<th>Assessment criteria</th>
</tr>
</thead>
</table>
| 5.6.2 of Chapter 5 | Once an emergency operating state has been declared by the PSO - Market Participants who comply with a direction issued to it pursuant to Section 5.6.1. This may include cancelling all maintenance or other planned work affecting the security of the PSO controlled system, cancelling, denying requests for or deferring approved planned outages, directing that PSO controlled grid or generation facilities be returned to service and operating to security limits appropriate for any emergency operating state. | Maintenance, work affecting security of PSO controlled system, outages, directions to return to service, operating to security limits appropriate for an emergency operating state.                                                                 | In principle, a Market Participant may make a request for compensation if:  
* The PSO declares an emergency operating state, and  
* The PSO gives direction pursuant to Section 5.6.1 of Chapter 5; and  
* the Market Participant complies with the direction. |
| 7.7.2 and 7.7.3 of Chapter 5 | A Market Participant for a generation facility in respect of which an outage is cancelled, deferred or recalled by the PSO may apply for compensation for direct expenses incurred as a result if the conditions specified in Sections 7.7.2.1 to 7.7.2.4 of Chapter 5 are met. | Outages that have received planning approval or final approval by the PSO.                                                                                                                                               | In principle, a Market Participant for a generation facility may make a request for compensation only if:  
* The PSO cancels, defers or recalls outage; and  
* if the conditions specified in Sections 7.7.2.1 to 7.7.2.4 of Chapter 5 are met. |
| 8.4.3 of Chapter 5 | Market Participants directed by the PSO to provide any level of any ancillary service above the levels required by the electricity licence or any registration requirements referred to in the Market Rules, the transmission code or any applicable connection agreement, and if the facility is not otherwise subject to an ancillary service contract. | Primary reserve, secondary reserve, contingency reserve, regulation, reactive power and voltage support service, black start service, fast start service, reliability must-run service.                      | In principle, a Market Participant may make a request for compensation if:  
* The PSO has issued a direction for ancillary service, and  
* the quantity instructed is above that required otherwise, and  
* the Market Participant has complied with the direction. |
| 8.6.2 of Chapter 5 | Market Participants directed by the PSO under an emergency operating state to provide any class of contracted ancillary service, even if the EMC does not have an ancillary service contract in respect of that registered facility. | Reactive support and voltage control service, black start capability, fast start service, reliability must-run service.                                                                                             | In principle, a Market Participant may make a request for compensation if:  
* The PSO has declared emergency operating state, and  
* The PSO issued a direction for contracted ancillary service, and  
* the Market Participant has complied with the direction. |
<table>
<thead>
<tr>
<th>Section</th>
<th>Provision for Compensation</th>
<th>Instruction applies to</th>
<th>Assessment criteria</th>
</tr>
</thead>
</table>
| 9.1.7, 9.1.8 and 9.1.3 of Chapter 5 | Market Participants, with a valid energy, reserve or regulation offer, who comply with a dispatch instruction issued pursuant to Section 9.1.3 of Chapter 5 - where the PSO considers that any dispatch instructions issued in accordance with Section 9.1.2 of Chapter 5 could result in the PSO controlled system entering into a high-risk or emergency operating state. Under Section 9.1.8, compensation is not available for dispatch instructions for reactive support and voltage control. | Energy, primary reserve, secondary reserve, contingency reserve, regulation | In principle, a Market Participant may make a request for compensation if:  
• The PSO has issued a dispatch instruction pursuant to Section 9.1.3 of Chapter 5; and  
• the Market Participant has complied with the instruction.                                                     |
| 9.7.3 of Chapter 5 | When a dispatch error has occurred, a market participant who has sustained a loss or damage as a result may make a request for compensation to the PSO.                                                                                     | Not specific                                    | In principle, a Market Participant may make a request for compensation if:  
• A dispatch error has occurred, and  
• the Market Participant has sustained a loss or damage as a result.                                                                                     |
| 10.4.1 of Chapter 5 | When a Market Participant for a generation facility has taken action in response to an abnormal frequency condition. Abnormal frequency conditions and actions to be taken identified in Section 9.5 of the System Operation Manual.                                      | Not specific                                    | In principle a Market Participant can claim compensation if:  
It has taken action in response to abnormal frequency condition in accordance with the System Operation Manual.                                                                                     |
## Table 2: Basis for Compensation

<table>
<thead>
<tr>
<th>PSO direction relating to</th>
<th>Compensation paid where instruction is to produce/ deliver more than scheduled or required quantity</th>
<th>Compensation paid where instruction is to produce or deliver less than scheduled or required quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy</td>
<td>As per formula. If scheduled for both energy and reserve, consult Table 3 below.</td>
<td>As per formula and table below. If scheduled for both energy and reserve, consult Table 3 below.</td>
</tr>
<tr>
<td>Primary Reserve</td>
<td>As per formula</td>
<td>None</td>
</tr>
<tr>
<td>Secondary Reserve</td>
<td>As per formula</td>
<td>None</td>
</tr>
<tr>
<td>Contingency Reserve</td>
<td>As per formula</td>
<td>None</td>
</tr>
<tr>
<td>Regulation</td>
<td>As per formula</td>
<td>None</td>
</tr>
<tr>
<td>Reactive support and voltage control</td>
<td>To be determined on the basis of the applicant's submission</td>
<td>None</td>
</tr>
<tr>
<td>Black start capability</td>
<td>To be determined on the basis of the applicant's submission</td>
<td>None</td>
</tr>
<tr>
<td>Fast start service</td>
<td>To be determined on the basis of the applicant's submission</td>
<td>None</td>
</tr>
<tr>
<td>Reliability must-run service</td>
<td>To be determined on the basis of the applicant's submission</td>
<td>None</td>
</tr>
<tr>
<td>Others</td>
<td>Eligibility for compensation and amount of compensation payable to be determined on the basis of the applicant's submission.</td>
<td></td>
</tr>
</tbody>
</table>

## Table 3: Criteria for Eligibility for Compensation Where Generator Scheduled for Both Energy and Reserve

<table>
<thead>
<tr>
<th>Assessment Criterion</th>
<th>Compensation Payable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quantity instructed by the PSO is less than the scheduled quantity of energy</td>
<td>Compensation payable in accordance with formula 3 below (if IQ&lt;sub&gt;m&lt;/sub&gt; &lt; SQ&lt;sub&gt;m&lt;/sub&gt;)</td>
</tr>
<tr>
<td>Quantity instructed by the PSO is greater than or equal to the scheduled quantity of energy, but less than or equal to the sum of the scheduled quantity of energy and the scheduled quantity of reserve</td>
<td>No compensation payable</td>
</tr>
<tr>
<td>Quantity instructed by the PSO is greater than the sum of the scheduled quantity of energy and the scheduled quantity of reserve</td>
<td>Compensation payable in accordance with formula 2 below (if IQ&lt;sub&gt;m&lt;/sub&gt; &gt; SQ&lt;sub&gt;m&lt;/sub&gt;)</td>
</tr>
</tbody>
</table>
Formula to Calculate Compensation in Respect of Energy, Reserve and Regulation

COMP\(_{m,pq}\) is calculated as follows:

1. If IQ\(_m\) = SQ\(_m\), then COMP\(_m\) = 0

2. If IQ\(_m\) > SQ\(_m\), then

\[
\text{COMP}_m = \sum_{pq=1}^{n} \text{COMP}_{m,pq}
\]

where

COMP\(_{m,pq}\) is the compensation paid in relation to the price-quantity pair pq of the energy, reserve or regulation offer from the generator m for the relevant dispatch period.

The compensation due under each price-quantity pair spq (COMP\(_{m,spq}\)) is then calculated as follows:

If \(\sum_{pq=1}^{spq} Q_{m,pq} \leq SQ_{m}\), then COMP\(_{m,spq}\) = 0

or

If \(\sum_{pq=1}^{spq-1} Q_{m,pq} \geq IQ_{m}\), then COMP\(_{m,spq}\) = 0

Otherwise,

\[
\text{COMP}_{m,spq} = \max[0, (P_{m,pq} - MCP_{m})] \times 0.5 \times [\min(\sum_{pq=1}^{spq} Q_{m,pq}, IQ_{m}) - \max(\sum_{pq=1}^{spq-1} Q_{m,pq}, SQ_{m})]
\]

3. If IQ\(_m\) < SQ\(_m\), then

\[
\text{COMP}_m = \sum_{pq=1}^{n} \text{COMP}_{m,pq}
\]

where

COMP\(_{m,pq}\) is the compensation paid in relation to the price-quantity pair pq of the energy, reserve or regulation offer from the generator m for the relevant dispatch period.
The compensation due under each price-quantity pair \( spq \) (\( COMP^{m,spq} \)) is then calculated as follows:

If \( \sum_{p=1}^{spq} Q^{m,pq} \leq IQ^m \), then \( COMP^{m,spq} = 0 \)

or

If \( \sum_{p=1}^{spq-1} Q^{m,pq} \geq SQ^m \), then \( COMP^{m,spq} = 0 \)

Otherwise,

\[
COMP^{m,spq} = \max(0, (MCP^m - P^{m,spq})) \times 0.5 \times [\min(\sum_{p=1}^{spq} Q^{m,pq}, SQ^m) - \max(\sum_{p=1}^{spq-1} Q^{m,pq}, IQ^m)]
\]

where

- \( MCP^m \) for energy - is the market energy price (MEP) in $/MWh at MNN \( m \), as defined in Section 2.2.2 of Chapter 7 of the Market Rules for reserve and regulation – $0/MWh in all cases

- \( SQ^m \) is the quantity (MW) of energy, reserve or regulation scheduled for GRF \( m \) in the original dispatch schedule. Where a claim relates to energy, and a unit is scheduled for both energy and contingency reserve, and the instruction is to provide more than the scheduled quantity of energy, then \( SQ^m \) is the sum of the quantities in MW scheduled for energy and contingency reserve for GRF \( m \).

- \( IQ^m \) is the quantity of energy, reserve or regulation in MW that the PSO has instructed GRF \( m \) to provide in dispatch period \( m \). This quantity may be amended to reflect any partial compliance with the PSO’s instruction.

- \( spq \) is an index of a specific price-quantity pair in an energy, reserve or regulation offer

- \( pq \) is the index of the price-quantity pairs in an energy, reserve or regulation offer, ordered by increasing price

- \( Q^{m,pq} \) is the quantity of the price-quantity pair \( pq \) for the energy, reserve or regulation offer from GRF \( m \) for the relevant dispatch period

- \( P^{m,pq} \) is the price of the price-quantity pair \( pq \) for the energy reserve or regulation offer from GRF \( m \) for the relevant dispatch period. Where the offer is for reserve, the reserve price is adjusted by the applicable effectiveness multiplier (as defined in Section D.24.7 of Appendix 6D of Chapter 6 of the Market Rules)

- \( n \) is the maximum number of price-quantity pairs contained in the offer submitted by the market participant.

Where a claim for compensation relates to reserve provided by a Interruptible Load facility, the term GRF is deemed to refer to such an Interruptible Load facility.

The following figures illustrate the calculation of compensation using the formulae outlined above:
Figure 1: Calculation of Compensation for Energy Where IQ>SQ

\[
\sum_{pq=1}^{spq} Q_{m,pq}^{\text{m}} \leq SQ^{\text{m}} \\
\sum_{pq=1}^{spq-1} Q_{m,pq}^{\text{m}} \geq IQ^{\text{m}}
\]

Payment at MEP x IEQ

Scheduled quantity (SQ)  Instructed quantity (IQ)

Figure 2: Calculation of Compensation for Energy Where SQ>IQ

\[
\sum_{pq=1}^{spq} Q_{m,pq}^{\text{m}} \leq IQ^{\text{m}} \\
\sum_{pq=1}^{spq-1} Q_{m,pq}^{\text{m}} \geq SQ^{\text{m}}
\]

Payment at MEP x IEQ
Figure 3: Calculation of Compensation for Energy Where GRF Scheduled for Both Energy and Reserve and where IQ>SQ

\[
\sum_{pq=1}^{spq} Q^{m,pq} \leq SQ^m
\]

Payment at MEP x IEQ
### Annex 3: Components of the Vesting Contract Hedge Price

<table>
<thead>
<tr>
<th>Cost Components</th>
<th>Parameters</th>
<th>Sample Values (Based on 2Q 2014 prices)</th>
</tr>
</thead>
</table>
| **Annual capital cost** | • Cost of purchasing the plant and all associated equipment, including cost of delivery of the plant in a state suitable for installation in Singapore  
                                 • Land and site preparation cost  
                                 • Gas and electrical connection costs  
                                 • Miscellaneous costs (e.g. permits, licences, fees, legal and financial advice, initial spares, start-up costs, construction-related insurance) | $27.65/MWh                              |
| **Fixed annual running cost * Overhead Index** | • Manpower and allowance for head office services  
                                 • Emergency fuel usage  
                                 • Fixed maintenance and other fixed operations  
                                 • Working capital  
                                 • Insurance property tax, EMA licence fee | ($10.44 + $6.42) * 1.04094 = $17.55/MWh |
| **Variable non-fuel cost * Overhead Index** | • Long term servicing agreement for maintenance of gas turbine and steam turbine  
                                 • EMC fees, PSO fees and EMA variable license fees  
                                 • Consumables such as chemicals and town water |                                        |
| **Variable fuel cost** | • Gas price (for Balance Vesting) – Singapore price for gas delivered to electricity generating companies, calculated using existing Singapore pipeline gas contracts based on the HSFO price, or as determined by the Authority  
                                 • LNG price (for LNG Vesting) – Singapore regasified LNG price as determined by the Authority | Gas Price—$147.35/MWh  
                                 LNG price—$152.70/MWh |
### Annex 4: Sample of Guidelines Feedback Template

**Purpose:** For PSO/EMC to provide feedback to RCP on efficacy of Compensation Guidelines

**Guidelines Feedback Template**

<table>
<thead>
<tr>
<th>No.</th>
<th>Section of Guidelines</th>
<th>Used in Assessing Compensation Claim (Y/N)</th>
<th>Workable? (Y/N)</th>
<th>Reasons (if not workable) and/or Other Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Criteria to determine whether compensation is payable <em>(Existing Guidelines Table 1)</em></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Assessment of whether offer changes were made <em>(Concept paper Table 4)</em></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Ex-post choice of Compensation Calculation Methodology <em>(Concept paper Table 4)</em></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Offer-based formula <em>(Concept paper Table 2)</em></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Cost-based formula <em>(Concept paper Table 6)</em></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fixed cost and Variable non-fuel cost (using vesting contract parameters)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fuel cost (using gencos’ purchase cost / vesting contract parameters)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Other costs - Reserve and Regulation costs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Other costs - Start up and shut down costs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Other costs - Incremental gas-related charges</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>[Any other comments]</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Submitted by: ____________________ (PSO/EMC)

Date: ____________________

---

Corresponding to Notice of Compensation published here: [https://www.emcsg.com/n1051,37.html](https://www.emcsg.com/n1051,37.html)

---

*Corresponding to Notice of Compensation published here: [https://www.emcsg.com/n1051,37.html](https://www.emcsg.com/n1051,37.html)*
Annex 5: Rajah & Tann LLP’s Memo

Private and Confidential

ENERGY MARKET COMPANY PTE LTD
228A Thomson Road
#11-01 Novena Square Tower A
Singapore 307684

Attn: Mr. Paul Poh / Mr. Tan Liang Ching / Ms Lucia Loh

MEMORANDUM ON APPLICATION OF SECTION 13.2.4 OF CHAPTER 1 IN RESPECT OF APPLICATION OF COMPENSATION UNDER SECTION 3.11 (READ WITH SECTION 3.3.1.5) OF CHAPTER 3

Dear Sirs,

This memorandum is issued to the Energy Market Company Pte Ltd ("EMC").

Introduction and instructions

1. We are instructed by EMC to advise on whether section 13.2.4 of Chapter 1 of the market rules ("section 13.2.4") should apply to a request by a market participant to seek compensation from the PSO or EMC under section 3.11 of the market rules (read with section 3.3.1.5 of Chapter 3 of the market rules ("section 3.3.1.5").

2. This memorandum is based on the market rules and the laws of Singapore as at the date hereof. The italicised expressions appearing in this memorandum have the respective meanings ascribed to them in the market rules.

Background

3. Section 13.2.4 provides as follows:

"13.2.4 Except as otherwise provided in these market rules, in no event shall the PSO be liable to indemnify and hold harmless a market participant or the market participant’s directors, officers or employees from or in respect of:

13.2.4.1 any indirect or consequential loss or incidental or special damages including, but not limited to, punitive damages;"

RAJAH & TANN LLP
9 Battery Road #23-01 Straits Trading Building Singapore 049910 T +65 6535 3000 F +65 6535 9030 emc@rajatann.com
We are registered in Singapore with limited liability (T10LL0005E). We do not accept service of court documents by fax.
13.2.4.2 any loss of profit, loss of contract, loss of opportunity or loss of goodwill; or,

13.2.4.3 any damages where the amount claimed, exclusive of amounts claimed for costs, in respect of a given event or circumstance and a given person, is in the aggregate less than $5,000;

and no market participant shall assert or attempt to assert against the PSO any claim in respect of any of the losses or damages referred to in sections 13.2.4.1 to 13.2.4.3."

4. It will be observed that there are three key component parts to section 13.2.4:

   a. the exclusion of liability for indemnification in respect of certain losses/damages described in sub-sections 13.2.4.1 to 13.2.4.3 (the “Liability Exclusions”);

   b. the prohibition against a market participant asserting any claims for certain losses or damages described in sub-sections 13.2.4.1 to 13.2.4.3 (the “Prohibition”); and

   c. the opening words of section 13.2.4, i.e. “[e]xcept as otherwise provided in these market rules”, which sets out a general exception to both the Liability Exclusions and the Prohibition (the “Exception”).

5. Section 3.11 of Chapter 3 (“section 3.11”) of the market rules permits a market participant to request compensation from the EMC or PSO in respect of various events (usually for actions taken in compliance with the PSO’s directions) described in section 3.3.1.5.

6. The EMC has published a consultation paper (RCP Paper No. EMC/RCP/XX/2014/CP53) on the review of compensation guidelines used to assess and quantify the amount of compensation to be paid by the PSO pursuant to compensation requests submitted under section 3.11 of Chapter 3 of the market rules (“CP53 Consultation Process”). As part of the CP53 Consultation Process, the EMC has instructed us to advise whether section 13.2.4 should be read as applicable to the compensation request by a market participant under section 3.3.1.5, such that the losses or damages referred to in sections 13.2.4.1 to 13.2.4.3 should be excluded from the assessment and quantification of compensation to be paid to the market participant.

Our analysis

7. As a starting point, and as already alluded to above, the Exception when read literally can be read broadly as an exception for both the Liability Exclusions and the Prohibition. On plain reading, the Exception would disapply section 13.2.4 in its entirety as long as any other provision in the market rules sets out a contrary position to either the Liability Exclusions or the Prohibition. This would mean, for example, that in the event that the market rules specifically provide that the PSO is liable to indemnify and hold harmless a market participant for any of the matters provided in sections 13.2.4.1 to 13.2.4.3, the Liability Exclusions will accordingly cease to apply. Read broadly, this could also mean that, to the extent that one is permitted by the market rules to seek compensation
from the PSO and even if such compensation may include any sum which would otherwise fall within the Liability Exclusions, the Liability Exclusions and the Prohibition in section 13.2.4 would not apply to such request for compensation by reason of the Exception.

8. It may also be noted that the subject matter to which section 13.2.4 and section 3.3.1.5/section 3.11 relate are not identical. The Liability Exclusions as drafted generally relates to indemnification obligations and the Prohibition against certain claims for losses or damages. In contrast, section 3.3.1.5, read with section 3.11, generally relates to "compensation" requests of market participants in respect of actions carried out by the market participants as a result of directions (or actions) of the PSO. The deliberate use of a distinct expression, "compensation", suggests that it was never intended to have an exactly identical meaning to the indemnification of losses or damages to which section 13.2.4 relate. On closer examination of the various events which allow for a market participant to request compensation from the EMC or PSO under section 3.3.1.5, such compensation appears generally to be intended to remunerate the market participant for some form of physical service provided and not to indemnify or make good any loss or damage suffered by the market participant -- the sole exception being section 9.7.3 of Chapter 5, which relates to loss or damage suffered by the market participant as a result of dispatch errors by the PSO.

9. Section 3.3.1.5, read with section 3.11, provides that a market participant may request for compensation to be paid by the PSO under certain circumstances. It also appears that the PSO's obligation to pay compensation does not arise from the request for compensation per se, but only where, for example, the PSO and the market participant agree on the quantum of compensation and the PSO has received that amount from the EMC pursuant to sections 3.11.5 and 3.12 of Chapter 3. The market rules thus appear to suggest that once the PSO agrees to a quantum of compensation, that agreed quantum then becomes an amount which the PSO will become obliged to pay, so that such payment obligation can then fall within the meaning of the Exception, with the end-result that the Liability Exclusions do not apply to that agreed quantum. But the converse corollary of the foregoing would mean that, if the PSO disagrees with the requested quantum, that quantum would not fall within the Exception and would then be subject to the full rigour of the Prohibition. Such a reading will lead to a curious result of a market participant only becoming in breach of the Prohibition retrospectively after the PSO has made its decision to disagree or reject a requested quantum. This may mean that only adventurous market participants will seek compensation, since if the PSO subsequently disagrees with the quantum sought and the compensation quantum is then found to include the losses/damages covered by the Liability Exclusions, the market participant will have run the risk of having breached the Prohibition by making the request for compensation of that quantum. This is unsatisfactory since the market participant cannot know, at the point of making a request, what quantum of compensation the PSO will accord to. To read section 13.2.4 as limiting the right of a market participant to seek compensation may render the compensation regime under section 3.3.1.5, read with section 3.11, of Chapter 3 unworkable. It cannot have been the intention of the parties to limit the compensation regime in this fashion.

10. The market rules have the effect of a contract between each market participant and the PSO by virtue of the execution by the PSO and each market participant of the PSO/MPC agreement. This is also stated in Section 3.2.2 of Chapter I of the market rules. It may also be recalled that the original version of
the market rules was initially prepared by the Authority (which for all intents and purposes appears to be the same legal person as the PSO). (See also section 46(1) of the Electricity Act in this regard.) Section 13.2.4 originated from that original version prepared by the Authority and (as far as we are aware), section 13.2.4 has not been amended ever since.

11. In interpreting a contract, one must consider the intention of the parties, and in the present context, the intention of the PSO (or the Authority as the case may be) behind section 13.2.4 would be relevant.

The Government Proceedings Act ("GPA") provides the Singapore Government with statutory immunity against certain proceedings brought against it in respect of various acts carried out by any public officer. However, the Singapore Government itself appears to be capable of being sued in respect of its contracts under the GPA and does not have immunity against legal suits arising from any contractual obligations which it undertook.

In respect of the PSO, it is an alter ego of the Authority which is a statutory body established under the Energy Market Authority Act ("EMA Act"). However, the EMA Act also does not appear to provide for statutory immunity for the Authority (or PSO) itself against contractual liability.

Instead of exercising its powers under the market rules to require compliance by the market participants under the provisions listed in section 3.3.1.5, it may be possible for the Authority, in exercise of its broad powers under the Electricity Act, to require certain actions to be undertaken by its licensees for which no compensation request could have been made.

Yet, despite the above possible alternative route which could have avoided compensation liability, and despite the absence of statutory immunity for the PSO as aforesaid, the PSO appears to have voluntarily and contractually undertaken to accept requests for compensation (and to be bound to pay compensation) under the market rules and further expressly qualified its Liability Exclusions and Prohibition by a broad Exception. In these circumstances, we would have thought it reasonable to infer that it must have been the PSO’s intention (or the Authority’s intention when it originally drafted section 13.2.4) to accept contractual liability for compensation under the market rules which would not be qualified by section 13.2.4.

12. Under Singapore contract law, exclusion/limitation of liability clauses in a contract are also to be construed strictly and if a party seeks to exclude or limit his liability, he must do so in clear words. The application of the exclusion/limitation of liability clause must be restricted to the particular circumstances the parties had in mind at the time they entered into the contract. Additionally, the contra proferentum rule of contractual interpretation, also applies to exclusion/limitation of liability clauses. The contra proferentum rule provides that “contractual provisions should prima facie be construed against the party who was responsible for the preparation of the contract and/or who is to benefit from the provision”.

---

1. Singapore Telecommunications Ltd v Starhub Cable Vision Ltd [2000] 2 SLR(R) 165, at 62
2. Kay Lim Construction & Trading Pte Ltd v Soon Douglas (Pte Ltd and another) [2012] SGHC 196, ("Kay Lim Construction"), at 40,
3. EE California Ltd v Ohtm Valve Co Europe [1994] 1 WLR 221 at 227, as applied in Kay Lim Construction at 40.
13. Applying these principles, the application of section 13.2.4 will have to be construed strictly; and if in the event the PSO is seeking to rely on it to exclude any amounts representing any losses or damages (as provided therein) included in a request for compensation by a market participant under section 3.11, read with section 3.3.1.5, section 13.2.4 must be clear and unambiguous in providing that it is intended to apply to exclude such losses or damages. We do not think that the applicability or inapplicability of section 13.2.4 in respect of a compensation request is necessarily clear and unambiguous, given the Exception and the absence of definition of what “compensation” entails and the absence of clear and unambiguous statements in the market rules as to how the quantum of such compensation should generically be determined. Given that reliance on section 13.2.4 will be by PSO and further given that the Authority is the drafter of section 13.2.4, the strict construction of section 13.2.4 against PSO will likely lead to a more generous reading in favour of the market participant so that its compensation request may be seen as unqualified by the restrictions of section 13.2.4.

Conclusion

14. Based on our foregoing analysis, we would construe the broad words of the Exception as excluding compensation claims under section 3.11, read with section 3.3.1.5, from the scope of section 13.2.4 in its entirety.

15. This memorandum is addressed to EMC solely for the benefit of EMC. We consent to the publication of this memorandum by EMC solely for the purposes of its CPS3 Consultation Process that it may be noted that legal advice has been sought by EMC and it shall be understood that we do not advise, and our memorandum shall not be relied upon, re-published or re-transmitted by any person (other than the EMC for the aforesaid purposes).

16. We trust the foregoing is of assistance. Please do not hesitate to contact us if you have any further queries or require any clarification.

Yours faithfully,

Larry Lim / Benjamin Liew

T (65) 6232 0482 / (65) 6232 0686
F (65) 6428 2213 / (65) 6428 2239
E larry.lim@rajahtann.com / benjamin.liew@rajahtann.com
Annex 6: Proposed Rule Modifications

<table>
<thead>
<tr>
<th>Existing Market Rules (1 January 2014)</th>
<th>Proposed Rule Changes (Deletions represented by strikethrough text and additions represented by double-underlined text)</th>
<th>Reasons for Rule Change</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>5.1</strong> OBLIGATION TO HAVE OFFERS</td>
<td><strong>5.1</strong> OBLIGATION TO HAVE OFFERS <strong>5.1.5</strong> Subject to section 10.4.1, for any dispatch period in the current market outlook horizon, if the quantity currently offered in a valid offer for a registered facility exceeds the relevant quantity that its dispatch coordinator reasonably expects to be available from the registered facility by more than: …</td>
<td>To subject section 5.1.5 to section 10.4 of Chapter 6.</td>
</tr>
<tr>
<td>5.1.6 Subject to section 10.4.1, for each dispatch period that a registered facility is not synchronised and until the earliest dispatch period in which it would be possible for that registered facility to be synchronised, its dispatch coordinator shall: …</td>
<td>5.1.6 Subject to section 10.4.1, for each dispatch period that a registered facility is not synchronised and until the earliest dispatch period in which it would be possible for that registered facility to be synchronised, its dispatch coordinator shall: …</td>
<td>To subject section 5.1.6 to section 10.4 of Chapter 6.</td>
</tr>
<tr>
<td>5.1.7 Subject to section 10.4.1, the dispatch coordinator of a registered facility shall, to the extent necessary for consistency with any standing capability data that is</td>
<td>5.1.7 Subject to section 10.4.1, the dispatch coordinator of a registered facility shall, to the extent necessary for consistency with any standing capability data that is revised and</td>
<td>To subject section 5.1.7 to section 10.4 of Chapter 6.</td>
</tr>
</tbody>
</table>
| **Existing Market Rules**  
(1 January 2014) | **Proposed Rule Changes**  
(Deletions represented by strikethrough text and additions represented by double-underlined text) | **Reasons for Rule Change** |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>revised and approved under section 4, submit revised <em>standing offers</em> and <em>offer variations</em> that apply from the time that revised <em>standing capability data</em> takes effect.</td>
<td>approved under section 4, submit revised <em>standing offers</em> and <em>offer variations</em> that apply from the time that revised <em>standing capability data</em> takes effect.</td>
<td></td>
</tr>
</tbody>
</table>

10.4 **GATE CLOSURE**

10.4.1 Notwithstanding sections 5.1.5, 5.1.6 and 5.1.7, no *offer variation* or revised *standing offer* shall be submitted by or for a *market participant* within 65 minutes immediately prior to the *dispatch period* to which the *offer variation* or revised *standing offer* applies, except:

... |

10.4.3 Notwithstanding sections 5.1.5, 5.1.6, 5.1.7 and 10.4.1, but except where an *offer variation* or revised *standing offer* is intended for a *generation registered facility* to reflect its revised capability during a *forced outage*, no *offer variation* or revised *standing offer* shall be submitted by or for a *market participant* for a *generation registered facility* in respect of a given *dispatch period* in the event that:

10.4.3.1 an instruction or a direction (as

To subject the current gate closure requirements in section 10.4.1 of Chapter 6 to the proposed new section 10.4.3 of Chapter 6 below.

To make clear that the proposed new section 10.4.3 applies, notwithstanding sections 5.1.5, 5.1.6, 5.1.7 and 10.4.1 of Chapter 6.

To introduce a general prohibition on offer variations or revised standing offers for a generation registered facility for a dispatch period for which a PSO instruction or direction
<table>
<thead>
<tr>
<th>Existing Market Rules (1 January 2014)</th>
<th>Proposed Rule Changes (Deletions represented by strikethrough text and additions represented by double-underlined text)</th>
<th>Reasons for Rule Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>the case may be) has been issued by the PSO in respect of such generation registered facility under section 5.4.3, 5.6.1 or 9.1.3 of Chapter 5, or an instruction has been issued by the PSO in respect of such generation registered facility under the system operation manual in connection with the abnormal frequency conditions referred to in section 10.4.1 of Chapter 5; and</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.4.3.2 such instruction or direction (as the case may be) requires the generation registered facility to provide or limit the provision of energy in one or more dispatch periods which includes that given dispatch period.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>under section 5.4.3, 5.6.1 or 9.1.3 of Chapter 5 or under the system operation manual in respect of certain abnormal frequency conditions referred to in section 10.4.1 of Chapter 5 has been issued, and such instruction or direction relates to the provision/limitation of provision of energy for that dispatch period (and other dispatch period(s) if applicable).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>To provide an exception to the general prohibition in the proposed new section 10.4.3, being an offer variation or revised standing offer which is intended to reflect a generation registered facility’s revised capability during a forced outage, shall be permitted.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Annex 7: Proposed Revised Compensation Guidelines

Guidelines for Compensation
(Version: 04 Nov 2014)

1. Introduction and Purpose

The purpose of these guidelines is to assist the EMC and the PSO in assessing requests for compensation submitted under section 3.11 of Chapter 3 of the Market Rules.

These guidelines have no formal standing under the Market Rules and are intended to assist the EMC or the PSO, as the case may be, in determining whether compensation is payable in respect of a particular event, and if so, to calculate an amount of compensation that is fair and economically efficient.

It is intended that the EMC and the PSO would use these guidelines as much as possible, and where appropriate, when considering requests for compensation.

When the EMC or the PSO has applied these guidelines in assessing a compensation request, they shall provide feedback to the Rules Change Panel on whether these guidelines can be applied in practice, using the template in Annex 1.

2. General Guidelines

a) Any claim for compensation that involves physical damage to plant, or any similar complicating factors should be based upon the Market Participant’s (MP) submission in support of the request for compensation.

b) Only one claim for compensation may be made in respect of a particular instruction from the PSO.

For example, where a MP has received an instruction to increase its output by 10MW, it is only permissible to make a claim for compensation for the energy delivered. Assuming the generator provided an additional 5MWh in response to the PSO’s instruction, then compensation would be paid for 5MWh of energy produced. It is not permissible to lodge a claim for additional compensation in respect of the same instruction, for example for the provision of reserve.

If a generator is scheduled for reserve, it is treated as a contract to sell the cleared quantity at the market clearing price, if called upon. Therefore, a generator that is scheduled to provide 150MW of energy and 10MW of reserve cannot lodge a claim for compensation if it is instructed by the PSO to ramp up to 160MW. However, if the same generator is instructed to ramp up to 170MW, and it complies with the instruction, then it could submit a claim for compensation for the output above 160MW.

c) Only one calculation methodology is to be applied for all affected dispatch periods of a particular instruction issued by the PSO.

d) Whether compensation is eligible for a dispatch period is to be determined independent of other dispatch periods. This means that, where a particular instruction from the PSO spans across several dispatch periods, surpluses in one dispatch period should not be netted off losses in other dispatch periods. The total amount of compensation for all dispatch periods under each instruction from the PSO shall be the sum of the compensation in those periods where compensation applies.
e) The price caps for energy, reserve or regulation will apply to any such request to limit the amount of compensation that may be sought as long as there is no physical damage to plant, or any similar complicating factors.

3. Criteria to determine whether compensation is payable

A request for compensation should first be assessed against the criteria in Table 1 to assess whether compensation is prima-facie payable.

Any disagreement between the EMC/PSO and the claimant on whether the MP has complied with the instruction (and therefore eligible for compensation) should be referred to the Market Surveillance and Compliance Panel (MSCP) for their assessment and decision.

Table 1: Criteria to Determine Whether Compensation is Payable

<table>
<thead>
<tr>
<th>Section</th>
<th>Provision for Compensation</th>
<th>Instruction applies to</th>
<th>Assessment criteria</th>
</tr>
</thead>
</table>
| 4.7.3 of Chapter 5 | Providers of reactive support or voltage control that are not providing services pursuant to an ancillary services contract that are directed by the PSO to take action. This is subject to Section 8.4.2 which states that there is no entitlement for compensation for any ancillary service that must be provided pursuant to any electricity licence or connection requirement or any registration requirement referred to in the Market Rules, the Transmission Code or any applicable connection agreement. Compensation therefore only applies to instructions outside the limits of Transmission Code requirements. See also Section 8.4.3 relating specifically to registered facilities/ generation settlement facilities. | Reactive support and voltage control | In principle, a MP may make a request for compensation, if:  
• the MP is not providing services pursuant to an ancillary services contract; and  
• the PSO gives an instruction to provide reactive support and voltage control; and  
• the instruction is to provide above levels required by electricity licence, connection requirement, the Transmission Code, or any registration requirement referred to in the Market Rules; and  
• the MP complies with the instruction. |
| 5.4.3 of Chapter 5 | MPs directed by the PSO to take action in accordance with the Market Rules when market mechanisms fail to provide adequate security | Not specific | In principle, a MP may make a request for compensation if:  
• market mechanisms fail to provide adequate security; and  
• the PSO gives direction to take action;  
• the MP complies with the instruction; and  
• where the PSO’s direction relates to energy, no offer changes were submitted for the GRF for all dispatch periods covered by the |
<table>
<thead>
<tr>
<th>Section</th>
<th>Provision for Compensation</th>
<th>Instruction applies to</th>
<th>Assessment criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.6.2 of Chapter 5</td>
<td>Once an emergency operating state has been declared by the PSO - MPs who comply with a direction issued to it pursuant to Section 5.6.1. This may include cancelling all maintenance or other planned work affecting the security of the PSO controlled system, cancelling, denying requests for or deferring approved planned outages, directing that PSO controlled grid or generation facilities be returned to service and operating to security limits appropriate for any emergency operating state.</td>
<td>Maintenance, work affecting security of PSO controlled system, outages, directions to return to service, operating to security limits appropriate for an emergency operating state</td>
<td>In principle, a MP may make a request for compensation if: • the PSO declares an emergency operating state; and • the PSO gives direction pursuant to Section 5.6.1 of Chapter 5; • the MP complies with the direction; and • where the PSO’s direction relates to energy, no offer changes were submitted for the GRF for all dispatch periods covered by the direction from the time of issuance of the direction.</td>
</tr>
<tr>
<td>7.7.2 and 7.7.3 of Chapter 5</td>
<td>A MP for a generation facility in respect of which an outage is cancelled, deferred or recalled by the PSO may apply for compensation for direct expenses incurred as a result if the conditions specified in Sections 7.7.2.1 to 7.7.2.4 of Chapter 5 are met.</td>
<td>Outages that have received planning approval or final approval by the PSO</td>
<td>In principle, a MP for a generation facility may make a request for compensation if: • the PSO cancels, defers or recalls outage; and • the conditions specified in Sections 7.7.2.1 to 7.7.2.4 of Chapter 5 are met.</td>
</tr>
<tr>
<td>8.4.3 of Chapter 5</td>
<td>MPs directed by the PSO to provide any level of any ancillary service above the levels required by the electricity licence or any registration requirements referred to in the Market Rules, the transmission code or any applicable connection agreement, and if the facility is not otherwise subject to an ancillary service contract.</td>
<td>Primary reserve, secondary reserve, contingency reserve, regulation, reactive power and voltage support service, black start service, fast start service, reliability must-run service</td>
<td>In principle, a MP may make a request for compensation if: • the PSO has issued a direction for ancillary services; and • the quantity instructed is above that required otherwise; and • the MP has complied with the direction.</td>
</tr>
<tr>
<td>8.6.2 of Chapter 5</td>
<td>MPs directed by the PSO under an emergency operating state to provide any class of contracted ancillary service, even if the EMC does not have an ancillary service contract in respect of that</td>
<td>Reactive support and voltage control service, black start capability, fast start</td>
<td>In principle, a MP may make a request for compensation if: • the PSO has declared emergency operating state; and</td>
</tr>
<tr>
<td>Section</td>
<td>Provision for Compensation</td>
<td>Instruction applies to</td>
<td>Assessment criteria</td>
</tr>
<tr>
<td>---------</td>
<td>----------------------------</td>
<td>------------------------</td>
<td>--------------------</td>
</tr>
<tr>
<td></td>
<td>registered facility.</td>
<td>service, reliability must-run service</td>
<td>• the PSO issued a direction for contracted ancillary services; and • the MP has complied with the direction.</td>
</tr>
<tr>
<td>9.1.7, 9.1.8 and 9.1.3 of Chapter 5</td>
<td>MPs, with a valid energy, reserve or regulation offer, who comply with a dispatch instruction issued pursuant to Section 9.1.3 of Chapter 5 - where the PSO considers that any dispatch instructions issued in accordance with Section 9.1.2 of Chapter 5 could result in the PSO controlled system entering into a high-risk or emergency operating state. Under Section 9.1.8, compensation is not available for dispatch instructions for reactive support and voltage control.</td>
<td>Energy, primary reserve, secondary reserve, contingency reserve, regulation</td>
<td>In principle, a MP may make a request for compensation if: • the PSO has issued a dispatch instruction pursuant to Section 9.1.3 of Chapter 5; • the MP has complied with the instruction; and • where the PSO’s direction relates to energy, no offer changes were submitted for the GRF for all dispatch periods covered by the direction from the time of issuance of the direction.</td>
</tr>
<tr>
<td>9.7.3 of Chapter 5</td>
<td>When a dispatch error has occurred, a MP who has sustained a loss or damage as a result may make a request for compensation to the PSO.</td>
<td>Not specific</td>
<td>In principle, a MP can claim compensation if: • a dispatch error has occurred; and • the MP has sustained a loss or damage as a result.</td>
</tr>
<tr>
<td>10.4.1 of Chapter 5</td>
<td>When a MP for a generation facility has taken action in response to an abnormal frequency condition. Abnormal frequency conditions and actions to be taken identified in Section 9.5 of the System Operation Manual.</td>
<td>Not specific</td>
<td>In principle, a MP can claim compensation if: • it has taken action in response to an abnormal frequency condition in accordance with the System Operation Manual; and • where the PSO’s direction relates to energy, no offer changes were submitted for the GRF for all dispatch periods covered by the direction from the time of issuance of the direction.</td>
</tr>
</tbody>
</table>
4. **Basis for Compensation**

If the criteria in Table 1 are met, the compensable amount shall be calculated using the basis prescribed in the following table.

**Table 2: Basis for Compensation**

<table>
<thead>
<tr>
<th>PSO direction relating to:</th>
<th>Instructed to provide more than scheduled or required quantity (IQ &gt; SQ)</th>
<th>Instructed to provide less than scheduled or required quantity (IQ &lt; SQ)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Energy</strong></td>
<td>For each instruction from the PSO, the claimant’s choice of either:</td>
<td>Offer-based formula (Scenario B of Table 3)</td>
</tr>
<tr>
<td></td>
<td>- Offer-based formula(^1) <em>(Scenarios C and D of Table 3)</em>, or</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Cost-based formula <em>(Scenario E of Table 3)</em>.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SQ(^m) = Scheduled Energy for GRF m + Scheduled Contingency Reserve for GRF m (if applicable)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Note: Chosen basis will apply to all dispatch periods covered by a given PSO instruction.</td>
<td></td>
</tr>
<tr>
<td><strong>Reserve</strong> (any class)</td>
<td>Offer-based formula <em>(Scenario C of Table 3)</em></td>
<td>None</td>
</tr>
<tr>
<td><strong>Regulation</strong></td>
<td>Offer-based formula <em>(Scenario C of Table 3)</em></td>
<td>None</td>
</tr>
<tr>
<td><strong>Reactive support and voltage control, Black start capability, Fast start service, Reliability must-run service</strong></td>
<td>To be determined on the basis of the applicant’s submission</td>
<td>None</td>
</tr>
<tr>
<td><strong>Others</strong></td>
<td>Eligibility for compensation and amount of compensation payable to be determined on the basis of the applicant's submission.</td>
<td></td>
</tr>
</tbody>
</table>

\(^1\) If the offer-based formula is chosen as the basis of compensation, it will be applied for the compensable quantity (CQ, where CQ = IEQ x 2), up to the total offer quantity for energy (TOQ, which is the sum of quantities in all price-quantity pairs of the energy offer) of the GRF for the dispatch period. Compensation for the remaining quantity of (CQ – TOQ) will be calculated using the cost-based formula. See Scenario D of Table 3.
### 5. Compensation Calculation Methodology

Where a formula is to be adopted in the calculation of the compensable amount (according to Table 2), the formulae are as set out in Table 3 below. Figures 1 to 5 then illustrate the calculation of compensation based on the formulae for the respective scenarios.

**Table 3: Compensation Calculation Formulae**

<table>
<thead>
<tr>
<th>Chosen Calculation Methodology</th>
<th>Scenario/Condition(s)</th>
<th>Compensation Calculation Formulae</th>
<th>Illustration</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Offer-based</strong> (for energy, reserve and regulation)</td>
<td>(A) IQ&lt;sub&gt;m&lt;/sub&gt; = SQ&lt;sub&gt;m&lt;/sub&gt;</td>
<td>0</td>
<td>-</td>
</tr>
</tbody>
</table>
| | (B) IQ<sub>m</sub> < SQ<sub>m</sub> **Instructed to provide less energy, reserve or regulation than scheduled** | COMP<sub>m</sub> = \( \sum \text{COMP}_{m,pq} \)  
The compensation due under each price-quantity pair spq (COMP<sub>m,spq</sub>) is then calculated as follows:  
If \( \sum_{pq=1}^{spq} Q_{m,pq} \leq Q_{m} \), then COMP<sub>m,spq</sub> = 0  
or  
If \( \sum_{pq=1}^{spq-1} Q_{m,pq} \geq Q_{m} \), then COMP<sub>m,spq</sub> = 0  
Otherwise,  
COMP<sub>m,spq</sub> = max \( \left[ 0, \left( \text{MCP}<sub>m</sub> - P_{m,pq} \right) \right] \times 0.5 \times \left[ \min \left( \sum_{pq=1}^{spq} Q_{m,pq}, SQ_{m} \right) - \max \left( \sum_{pq=1}^{spq-1} Q_{m,pq}, CQ_{m} \right) \right] \) | Figure 1 |
| | (C) IQ<sub>m</sub> > SQ<sub>m</sub> and TOQ<sub>m</sub> ≥ CQ<sub>m</sub> **Instructed to provide more energy, reserve or regulation than scheduled, and total offer quantity is at** | COMP<sub>m</sub> = \( \sum \text{COMP}_{m,pq} \)  
The compensation due under each price-quantity pair spq (COMP<sub>m,spq</sub>) is then calculated as follows:  
If \( \sum_{pq=1}^{spq} Q_{m,pq} \leq SQ_{m} \), then COMP<sub>m,spq</sub> = 0  
or  
COMP<sub>m,spq</sub> = max \( \left[ 0, \left( \text{MCP}<sub>m</sub> - P_{m,pq} \right) \right] \times 0.5 \times \left[ \min \left( \sum_{pq=1}^{spq} Q_{m,pq}, CQ_{m} \right) - \max \left( \sum_{pq=1}^{spq-1} Q_{m,pq}, SQ_{m} \right) \right] \) | Figure 2 or Figure 3 (if a claim relates to energy and the GRF is scheduled for both energy and contingency) |
<table>
<thead>
<tr>
<th>Chosen Calculation Methodology</th>
<th>Scenario/Condition(s)</th>
<th>Compensation Calculation Formulae</th>
<th>Illustration</th>
</tr>
</thead>
<tbody>
<tr>
<td>least the compensable quantity</td>
<td>If ( \sum_{pq} Q^{m,pq} \geq CQ^m ), then ( \text{COMP}^{m,spq} = 0 )</td>
<td>reserve)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Otherwise,</td>
<td>( \text{COMP}^{m,spq} = \max \left[ 0, \left( P^{m,pq} - \text{MCP}^m \right) \times 0.5 \times \min \left( \sum_{pq} Q^{m,pq}, CQ^m \right) - \max \left( \sum_{pq} Q^{m,pq}, SQ^m \right) \right] )</td>
<td>Figure 4</td>
</tr>
<tr>
<td></td>
<td>(D) IQ(^m) &gt; SQ(^m) and TOQ(^m) &lt; CQ(^m) (for energy only)</td>
<td>The compensation due under each price-quantity pair ( spq ) (( \text{COMP}^{m,spq} )) is calculated as follows:</td>
<td>Figure 4</td>
</tr>
<tr>
<td></td>
<td>Instructed to provide more energy than scheduled, and total energy offer quantity is less than compensable quantity</td>
<td>If ( \sum_{pq} Q^{m,pq} \leq SQ^m ), then ( \text{COMP}^{m,spq} = 0 )</td>
<td>Figure 4</td>
</tr>
<tr>
<td></td>
<td>or</td>
<td>or ( \sum_{pq} Q^{m,pq} \leq CQ^m , then ( \text{COMP}^{m,spq} = 0 )</td>
<td>Figure 4</td>
</tr>
<tr>
<td></td>
<td>Otherwise,</td>
<td>( \text{COMP}^{m,spq} = \max \left[ 0, \left( P^{m,pq} - \text{MCP}^m \right) \times 0.5 \times \min \left( \sum_{pq} Q^{m,pq}, CQ^m \right) - \max \left( \sum_{pq} Q^{m,pq}, SQ^m \right) \right] )</td>
<td>Figure 4</td>
</tr>
<tr>
<td></td>
<td>The compensation due for the remaining quantity of ( (CQ^m - TOQ^m) ) is calculated as follows:</td>
<td>Figure 4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>( \text{COMP}^{m,cost} = \max \left[ 0, \left( FC^m + VC^m + \frac{OC^m}{IEQ^m} - \text{MCP}^m \right) \right] \times 0.5 \times \left( CQ^m - \sum_{pq} Q^{m,pq} \right) )</td>
<td>Figure 5</td>
<td></td>
</tr>
<tr>
<td>Cost-based only (E) IQ(^m) &gt; SQ(^m) (for energy only)</td>
<td>( \text{COMP}^m = \max \left[ 0, \left( FC^m + VC^m + \frac{OC^m}{IEQ^m} - \text{MCP}^m \right) \right] \times 0.5 \times CQ^m )</td>
<td>Figure 5</td>
<td></td>
</tr>
</tbody>
</table>
where

\( \text{COMP}^m \) is the total compensation amount for the GRF at MNN m (referred hereafter as ‘GRF m’) for a given dispatch period.

\( \text{COMP}^{m,pq} \) is the compensation paid in relation to the price-quantity pair \( pq \) of the energy, reserve or regulation offer from the GRF \( m \) for the relevant dispatch period.

\( \text{MCP}^m \) for energy - is the market energy price (MEP) in $/MWh at MNN m, as defined in Section 2.2.2 of Chapter 7 of the Market Rules.

for reserve and regulation - $0/MWh in all cases.

\( \text{SQ}^m \) is the quantity in MW of energy, reserve or regulation scheduled for GRF \( m \) in the original dispatch schedule.

Where a claim relates to energy, and a GRF is scheduled for both energy and contingency reserve, and the instruction is to provide more than the scheduled quantity of energy, then \( \text{SQ}^m \) is the sum of the quantities in MW scheduled for energy and contingency reserve for GRF \( m \).

\( \text{IQ}^m \) is the quantity of energy, reserve or regulation in MW that the PSO has instructed GRF \( m \) to provide in the relevant dispatch period.

\( \text{CQ}^m \) is the compensable quantity in MW, which:

for a claim relating to energy - is two times the injection energy quantity (\( \text{IEQ}^m \) in MWh) of GRF \( m \) in the relevant dispatch period (i.e. \( 2 \times \text{IEQ}^m \)).

for a claim relating to reserve or regulation - is the same as \( \text{IQ}^m \).

\( \text{TOQ}^m \) is the sum of the quantities in all price-quantity pairs contained in an energy, reserve or regulation offer submitted by the MP for GRF \( m \).

\( \text{spq} \) is an index of a specific price-quantity pair in an energy, reserve or regulation offer.

\( \text{pq} \) is the index of the price-quantity pairs in an energy, reserve or regulation offer, ordered by increasing price.

\( n \) is the maximum number of price-quantity pairs contained in the offer for GRF \( m \).

\( \text{Q}^{m,pq} \) is the quantity of the price-quantity pair \( pq \) for the energy, reserve or regulation offer from GRF \( m \) for the relevant dispatch period.

\( \text{P}^{m,pq} \) is the price of the price-quantity pair \( pq \) for the energy, reserve or regulation offer from GRF \( m \) for the relevant dispatch period.

Where the offer is for reserve, the reserve price is adjusted by the applicable effectiveness multiplier (as defined in Section D.24.7 of Appendix 6D of Chapter 6 of the Market Rules).

\( \text{FC}^m \) is the fixed cost for GRF \( m \) in $/MWh in accordance with Table 4.

\( \text{VC}^m \) is the variable cost for GRF \( m \) in $/MWh in accordance with Table 4.

\( \text{OC}^m \) is other costs incurred by GRF \( m \) in $ in accordance with Table 4.
Where a claim for compensation relates to reserve provided by a load registered facility, the term GRF is deemed to refer to such a load registered facility.

### Table 4: Components of Computed Cost for Cost-based Formula

<table>
<thead>
<tr>
<th>Type of Cost</th>
<th>Components</th>
<th>Calculation of Component</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td><strong>Combined Cycle Gas Turbines (CCGT)</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Steam Turbine (ST)</strong> / Gas Turbine (GT) *</td>
</tr>
<tr>
<td>Fixed Costs</td>
<td>Annual capital cost</td>
<td>Vesting contract (VC)’s Annual capital cost</td>
</tr>
<tr>
<td>(FC&lt;sub&gt;m&lt;/sub&gt;)</td>
<td>Fixed annual running cost</td>
<td>VC’s Fixed annual running cost x Overhead Index</td>
</tr>
<tr>
<td>in $/MWh</td>
<td></td>
<td><strong>Combined Cycle Gas Turbines (CCGT)</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Steam Turbine (ST)</strong> / Gas Turbine (GT) *</td>
</tr>
<tr>
<td>Variable Costs</td>
<td>Variable non-fuel cost</td>
<td>VC’s Variable non-fuel cost x Overhead Index</td>
</tr>
<tr>
<td>(VC&lt;sub&gt;m&lt;/sub&gt;)</td>
<td></td>
<td><strong>Combined Cycle Gas Turbines (CCGT)</strong></td>
</tr>
<tr>
<td>in $/MWh</td>
<td>Variable fuel cost</td>
<td>For PNG or LNG:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>VC’s Fuel cost (Gas Price or LNG Price)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>For other fuel:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cost of fuel based on MP’s existing accounting method</td>
</tr>
<tr>
<td>Other Costs</td>
<td>Start-up and shut-down costs</td>
<td></td>
</tr>
<tr>
<td>(OC&lt;sub&gt;m&lt;/sub&gt;)</td>
<td>incurred in following direction,</td>
<td></td>
</tr>
<tr>
<td>in $</td>
<td>divided by all periods under the</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PSO’s direction</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Per-period Reserve and regulation</td>
<td></td>
</tr>
<tr>
<td></td>
<td>charges:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Under Scenario E (cost-based formula chosen)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Reserve and Regulation charges</td>
<td></td>
</tr>
<tr>
<td></td>
<td>can be included</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Under Scenario D (offer-based formula chosen, but TOQ&lt;CQ)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Reserve charges to be excluded</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Regulation charges can be</td>
<td></td>
</tr>
<tr>
<td></td>
<td>included if CQ&lt;sub&gt;m&lt;/sub&gt; ≤ 10MW,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>but only for the portion of CQ&lt;sub&gt;m&lt;/sub&gt;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>that is not covered by TOQ&lt;sub&gt;m&lt;/sub&gt;, which is calculated as:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Regulation Charges ($) for GRF m</td>
<td>CQ&lt;sub&gt;m&lt;/sub&gt; x [ \sum_{pq}^{m} Q^{m,pq} ]</td>
</tr>
<tr>
<td></td>
<td>CQ&lt;sub&gt;m&lt;/sub&gt;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Per-period incremental gas-related</td>
<td></td>
</tr>
<tr>
<td></td>
<td>charges which can be verified and</td>
<td></td>
</tr>
<tr>
<td></td>
<td>directly attributable to PSO’s</td>
<td></td>
</tr>
<tr>
<td></td>
<td>direction</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Excludes EMC/PSO fees</td>
<td></td>
</tr>
</tbody>
</table>

Note: VC parameters correspond with that of the respective quarter

* For STs and GTs, deviations from the VC parameters for (i) Annual capital cost, (ii) Fixed annual running cost and (iii) Variable non-fuel cost components are allowed if justifiable
Figure 1: Calculation of Compensation for Energy Where IQ<SQ (Offer-based)

\[
\sum_{pq=1}^{spq} Q^{m,pq} \leq CQ^m
\]

\[
\sum_{pq=1}^{spq-1} Q^{m,pq} \geq SQ^m
\]

Figure 2: Calculation of Compensation for Energy Where IQ>SQ (Offer-based)

\[
\sum_{pq=1}^{spq} Q^{m,pq} \leq SQ^m
\]

\[
\sum_{pq=1}^{spq-1} Q^{m,pq} \geq CQ^m
\]
Figure 3: Calculation of Compensation for Energy where IQ>SQ (Offer-based), for a GRF which is scheduled for both Energy and Reserve

\[ \sum_{pq=1}^{spq} Q^{pq,m} \leq SQ^m \]

Figure 4: Calculation of Compensation for Energy where IQ>SQ (Offer-based) and CQ exceeds TOQ (Offer-based up to TOQ, Cost-based for CQ-TOQ)

\[ \sum_{pq=1}^{spq} Q^{pq,m} \leq SQ^m \]

where Computed Cost ($/MWh) = FC^m + VC^m + (OC^m / IEQ^m)
Figure 5: Calculation of Compensation for Energy Where IQ>SQ (Cost-based)

where Computed Cost ($/MWh) = FC^m + VC^m + (OC^m / IEQ^m)
Annex 1 – Compensation Guidelines Feedback Template for PSO/EMC to provide feedback to the Rules Change Panel

(Email to EMC at: emcmarketadministration@emcsg.com)

We refer to the Guidelines for Compensation (version 04 Nov 2014), and are pleased to provide our feedback to the RCP in relation to the request referred to in the following Compensation Notice.

Compensation Notice Date/ Month¹: ________________________

<table>
<thead>
<tr>
<th>No.</th>
<th>Section of Guidelines</th>
<th>Used in Assessing Compensation Request (Y/N)</th>
<th>Workable? (Y/N)</th>
<th>Reasons (if not workable) and/or Other Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Criteria to determine whether compensation is payable (section 3)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Assessment of whether offer changes were made (section 4)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Basis for compensation (section 4)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Offer-based formula (section 5)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Cost-based formula (section 5)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fixed cost and Variable non-fuel cost (using vesting contract parameters)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Variable fuel cost (using gencos’ purchase cost/ vesting contract parameters)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Other costs - Reserve and Regulation costs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Other costs - Start up and shut down costs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Other costs - Incremental gas-related charges</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Any other comments</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Submitted by : ________________________ (PSO/EMC)

(Name and Designation)

Signature : ________________________

Date : ________________________

¹ Corresponding to Compensation Notice served pursuant to Chapter 3 section 3.14 of the Market Rules, which is published on: https://www.emcsg.com/n1051,37.html