

RCP PAPER NO. : **EMC/RCP/104/2018/CP73**

SUBJECT : **COMPENSATION FOR LOAD REGISTERED FACILITIES
ADVERSELY AFFECTED BY PRICE REVISION**

FOR : **DECISION**

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DATE OF MEETING : **11 SEPTEMBER 2018**

Executive Summary

This paper assesses the proposal to compensate load registered facilities (LRFs) which are registered to provide load curtailment if they are adversely affected by price revision.

Revisions in Uniform Singapore Energy Price (USEP)

When circumstances warrant an ex-post revision of prices, LRFs which had submitted bids indicating their willingness to pay for energy may incur out-of-pocket costs or losses (relative to their bid prices) if the Revised USEP is higher than their bid price. From a fairness perspective, it can be argued for such LRFs to be compensated for the difference between the Revised USEP and the bid prices for quantities such LRFs consumed in adherence to dispatch instructions.

Hence, this paper sets out a compensation arrangement for LRFs that are adversely affected by upward revisions in USEP.

Revisions in the load curtailment price (LCP)

However, for revisions in the LCP, which serves as an incentive payment to LRFs for load curtailments delivered, EMC does not recommend any compensation as the LCP is not designed to be aligned with the bid prices submitted.

Notwithstanding the proposed compensation arrangement set out in this paper, **EMC recommends that the RCP hold this proposal in abeyance** as:

- a) Given the infrequency of upward price revision and limited participation of LRFs currently, the potential benefits of this proposal are not expected to outweigh the implementation costs; and

- b) Given the inherent design issues with the current scheme, it is preferred that the design of the current scheme be reviewed and revised, before re-considering the provisions for compensation during price revision periods under the revised scheme.

At the 104th RCP meeting, the RCP **unanimously supported** EMC's recommendation to hold the proposal in abeyance.

1. Introduction

This paper assesses the proposal to compensate load registered facilities (LRFs) which are registered to provide load curtailment if they are adversely affected by price revision.

2. Background

2.1 Proposal

At the 99th Rules Change Panel (RCP) meeting in November 2017, the RCP discussed and supported introducing compensation for generation registered facilities (GRFs) which received a revised market energy price that is lower than the offer price(s) of energy quantities that were generated in adherence with dispatch instructions, in Rule Change 346¹.

Arising from their discussion, the RCP tasked EMC to examine **extending the provisions for compensation arising from price revision to LRFs which also participate in the energy market.**

2.2 Principles and Considerations of Compensation

As previously established in Rule Change 346,

- compensation due to price revision should be **limited to costs or losses incurred**, since the costs of compensation are borne by loads who did not cause the need for price revision either;
- costs or losses incurred are **assessed relative to offers**, which are the best proxy of GRF's marginal costs;
- no clawing back of additional surpluses earned by generators nor compensation for (non-dispatchable) loads resulting from higher prices;
- no compensation for reserve and regulation while they should in principle be taken into account, given that they form a substantially smaller part of the market and the current settlement of reserve and regulation is based on revised quantities; and
- compensation arrangements should be administratively simple and cost-effective, as far as possible.

2.3 Participation of LRFs for Load Curtailment

Currently, LRFs which are registered for the purposes of load curtailment participate in the energy market via the submission of restricted energy bids (REB)² into the energy market. In this paper, unless otherwise noted, all references to LRFs would be to LRFs which are registered for the purposes of load curtailment.

The following sections provide an overview of the participation of LRFs in the energy market of the Singapore Wholesale Electricity Market (SWEM), which was introduced by an EMA directive in 2016³.

¹ In Paper No. EMC/RCP/99/2017/346: Compensation for Generators Adversely Affected by Price Revision

² Such energy bids are considered "restricted" as the bid prices are subjected to different price limits. Specifically, there is a bid price floor set at 1.5 times of the prevailing Balance Vesting Price.

³ In Rule Change 335: Rules Modification for EMA's "Implementing Demand Response in the National Electricity Market of Singapore"

2.3.1 Scheduling

LRFs can comprise loads from one or more premises and participate in aggregate if they are located within the same load zone defined by the PSO.

For each dispatch period, LRFs will submit REBs representing withdrawal quantities which are dispatchable, i.e. the portion of its load which can be controlled and varied based on dispatch instructions. The corresponding bid prices reflect the LRF's maximum willingness to pay for each given quantity of energy.

In the dispatch model of the Market Clearing Engine, EMC will allocate the bid quantities to the designated node(s) associated with the LRF⁴.

Depending on the demand, supply and network conditions, an LRF may be fully or partially scheduled (i.e. the LRF will have to consume) or not scheduled (i.e. the LRF will have to curtail) in respect of its bid. Scheduling outcomes are determined on a locational basis. In general, a bid will be scheduled (to consume) when the bid price is more than the price at that node.

2.3.2 Settlement

Incentive payment, known as the load curtailment price (LCP), is paid per MWh of scheduled curtailment if the scheduled curtailment lowers the Uniform Singapore Energy Price (USEP)⁵, which is the price charged to loads for energy withdrawals. Specifically, the LCP (in \$/MWh) is calculated based on the following formula:

$$LCP = \frac{\frac{1}{3} \times (CUSEP - USEP) \times \text{NonRegulatoryLoad}}{\sum_{LRFs} \text{LoadCurtailmentQuantity}}, \text{ capped at } \$4,500/\text{MWh}$$

Where:

- CUSEP (in \$/MWh) = counterfactual USEP, derived by re-running the MCE with the REBs re-priced to 10 × VoLL (i.e. assuming no energy bids were received from LRFs);
- Non-RegulatoryLoad (in MWh) = (0.5 × Load Forecast) – VestingQuantity; and
- LoadCurtailmentQuantity (in MWh) = amount of load curtailment deemed to have been delivered, calculated using each LRF's dispatch schedule and ramp rates.

For energy that is consumed by the constituent loads of the LRF (i.e. the LRF's Withdrawal Load Quantity (WLQ)), the respective retailers of such loads will be charged at the USEP.

2.3.3 Implications of current scheduling and settlement arrangements

The above arrangements have the following implications:

- An LRF could be scheduled to consume even though the price that it is charged for energy (i.e. USEP) is higher than its bid price. This is because scheduling is based on nodal prices, but energy withdrawals are charged at USEP (which is a weighted average of prices at offtake nodes').

⁴ For details, refer to the "Methodology for Determination of Load Participation Factors" published on EMC's secure website.

⁵ Note that an exception exists in the case where both the USEP and the CUSEP are at the price ceiling of \$4,500/MWh, and shortfalls in energy were scheduled in the counterfactual run, incentive payment would still be paid (based on a difference of \$500/MWh between CUSEP and USEP).

- Scheduling of load curtailment is independent of the LCP received. The LCP is primarily determined based on the impact that scheduled load curtailments have on the USEP, while scheduling is based on nodal prices. For instance, an LRF could be scheduled to curtail but not receive any incentive payment if USEP = CUSEP.

2.3.4 Settlement for periods subject to price revision

In the SWEM, if circumstances warrant the revision of prices for a given period, the **revised prices for all products are used for settlement**. The use of revised prices stems from the principle of using correct prices for settlement, instead of allowing erroneous prices to persist.

LRFs are therefore paid at the **revised LCP** for ex-ante scheduled load curtailment quantities (LCQ). The use of ex-ante scheduled LCQ essentially means that we pay an LRF for quantities of load curtailment that was instructed to be delivered in real time.

Table 1 below illustrates the settlement arrangements using a hypothetical example of four LRFs which are scheduled differently in the real-time schedule and in the rerun.

Table 1: Settlement for load curtailment for the period subject to price revision

LRF	LRF A	LRF B	LRF C	LRF D
Real-time Schedule (RTS)	Consume ($LCQ_A = 0$)	Curtail ($LCQ_B > 0$)	Consume ($LCQ_C = 0$)	Curtail ($LCQ_D > 0$)
After Price Revision	Curtail ($LCQ'_A > 0$)	Consume ($LCQ'_B = 0$)	Consume ($LCQ'_C = 0$)	Curtail ($LCQ'_D > 0$)
Settlement for Load Curtailment	0	$RLCP \times LCQ_B$	0	$RLCP \times LCQ_D$
Settlement for Energy	Revised USEP \times WLQ			

	Real-time Schedule (RTS)	After Price Revision
LCP	Original LCP (OLCP) = $\frac{1/3 \times (\text{Original CUSEP} - \text{Original USEP}) \times \text{NonRegulatoryLoad}}{LCQ_B + LCQ_D}$	Revised LCP (RLCP) = $\frac{1/3 \times (\text{Revised CUSEP} - \text{Revised USEP}) \times \text{NonRegulatoryLoad}}{LCQ'_A + LCQ'_D}$
USEP	Original USEP	Revised USEP

Note that for periods subject to price revision, the LCQs which determine the revised LCP (e.g. the revised LCQ of LRF A and LRF D in Table 1) could be different from those LCQs which are paid (e.g. the RTS LCQ of LRF B and LRF D in Table 1).

3. Analysis

As explained in section 2.3.4, revised prices are used for settlement so that erroneous real-time prices are not allowed to persist. When price revision is conducted, LRFs could be affected by revisions to the **LCP** and the **USEP**. The impact of changes to each of these two prices is examined in the following sections, taking alignment from the principles set out in section 2.2 above and within the context of the current design of the scheme set out in section 2.3.

3.1 Revisions in the Load Curtailment Price (LCP)

EMC's assessment

The LCP serves as an **incentive payment** for load curtailment. Since the LCP is not intended to cover or reflect costs, consistent with the principles mentioned in section 2.2, there is **no rationale for compensation** arising from changes in LCP.

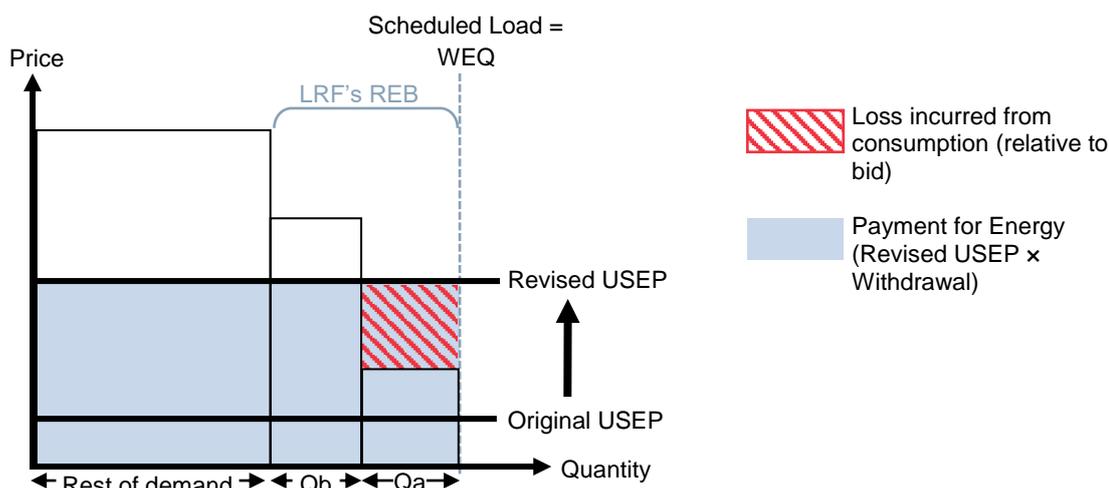
3.2 Revisions in USEP

To examine the impact of revisions in USEP on LRFs, in Figures 1 and 2 in the ensuing subsections, we assume that there is only one LRF which submitted a REB with two price-quantity pairs (of quantities Q_a and Q_b).

3.2.1 Upward USEP Revision

In Figure 1 below, the LRF is scheduled to consume ($Q_a + Q_b$) in real time. However, at Revised USEP, the LRF would have preferred consuming Q_b only.

Figure 1: Impact on LRF from upward price revision



In such a situation, the LRF incurs a loss from consuming Q_a (red shaded area in Figure 1), where the marginal cost of consumption (which is Revised USEP) is higher than the LRF's marginal benefit of consumption (which is its bid price for Q_a). The LRF also forgoes the load curtailment payment it would have received had the revised schedule applied in real time.

EMC's Assessment

On the basis that the revised prices are the correct prices that should be used to pay generators when market energy prices are revised upwards, EMC did not propose clawing back the economic profits from these generators, nor entitle loads to compensation⁶. Such a stand was premised on all loads being non-dispatchable.

LRFs, unlike non-dispatchable load, do indicate their maximum willingness to pay for energy. An LRF's bid price should reflect the marginal benefit of consuming that given quantity of energy. If, due to price revision, an LRF is charged at a price higher than its bid price, **EMC in principle agrees that the LRF should be compensated for the losses in respect of the LRF's REB, which is the difference between Revised USEP and its bid price** (as indicated by the red shaded area in Figure 1). It would be unfair for an LRF to be charged a higher price for energy ex-post even though it had already indicated its willingness to pay ex-ante⁷.

⁶ In previous papers where price revision was discussed. For example, see section 3.3.3 of <https://www.emcsq.com/f315.9531/EMC272-EMA-TLC.pdf>

⁷ Other than for the case where, due to the adoption of half-nodal pricing, an LRF is scheduled to consume even though its bid price is lower than the USEP (in absence of price revision).

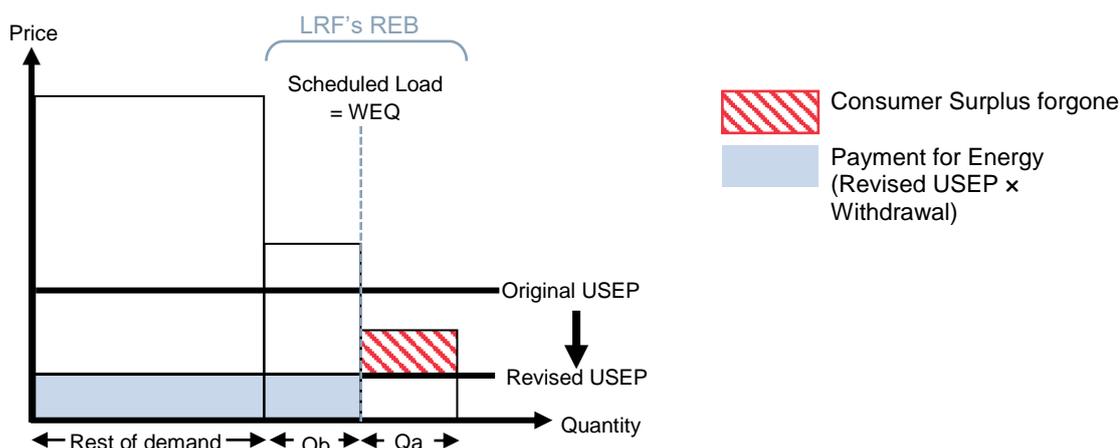
As for the forgone load curtailment payment, given that compensation examined in this paper is intended to cover out-of-pocket losses, there is no justification for compensation as no load curtailment was delivered in real time by the LRF (i.e. real-time LCQ were zero).

3.2.2 Downward USEP Revision

In Figure 2 below, the LRF is scheduled to consume Q_b and curtail Q_a (because bid price for $Q_a < \text{RTS nodal price}$) in real-time.

At Revised USEP, the LRF would have preferred consuming the quantity of Q_a as well (because bid price for $Q_a > \text{revised nodal price}$).

Figure 2: Impact on LRF from downward price revision



In the above situation, the impact of price revision on the LRF is the consumer surplus forgone (red shaded area) but which is negated by the load curtailment payment received⁸ from curtailing Q_a .

EMC's Assessment

Since the intent of compensation examined in this paper is to compensate for losses incurred resulting from price revision, EMC assesses that there are **no grounds for compensation** for forgone consumer surpluses that the LRF would have earned had the revised prices applied in real time.

3.3 Proposed Compensation Methodology

Our analysis in section 3.2.1 concludes that in principle, it would be fair and equitable to compensate LRFs in cases where the USEP was higher than the bid prices for quantities it was scheduled to consume arising from price revision. We detail the proposed compensation methodology in the following:

A) Use of Bids

The preceding analysis hinges on the use of bids submitted as a reflection of LRFs' marginal benefit from consumption. The need for compensation also stems from the losses or out-of-pocket costs that, with hindsight, would not have been consumed or scheduled. Hence, compensation is proposed to be based on bids submitted by LRFs.

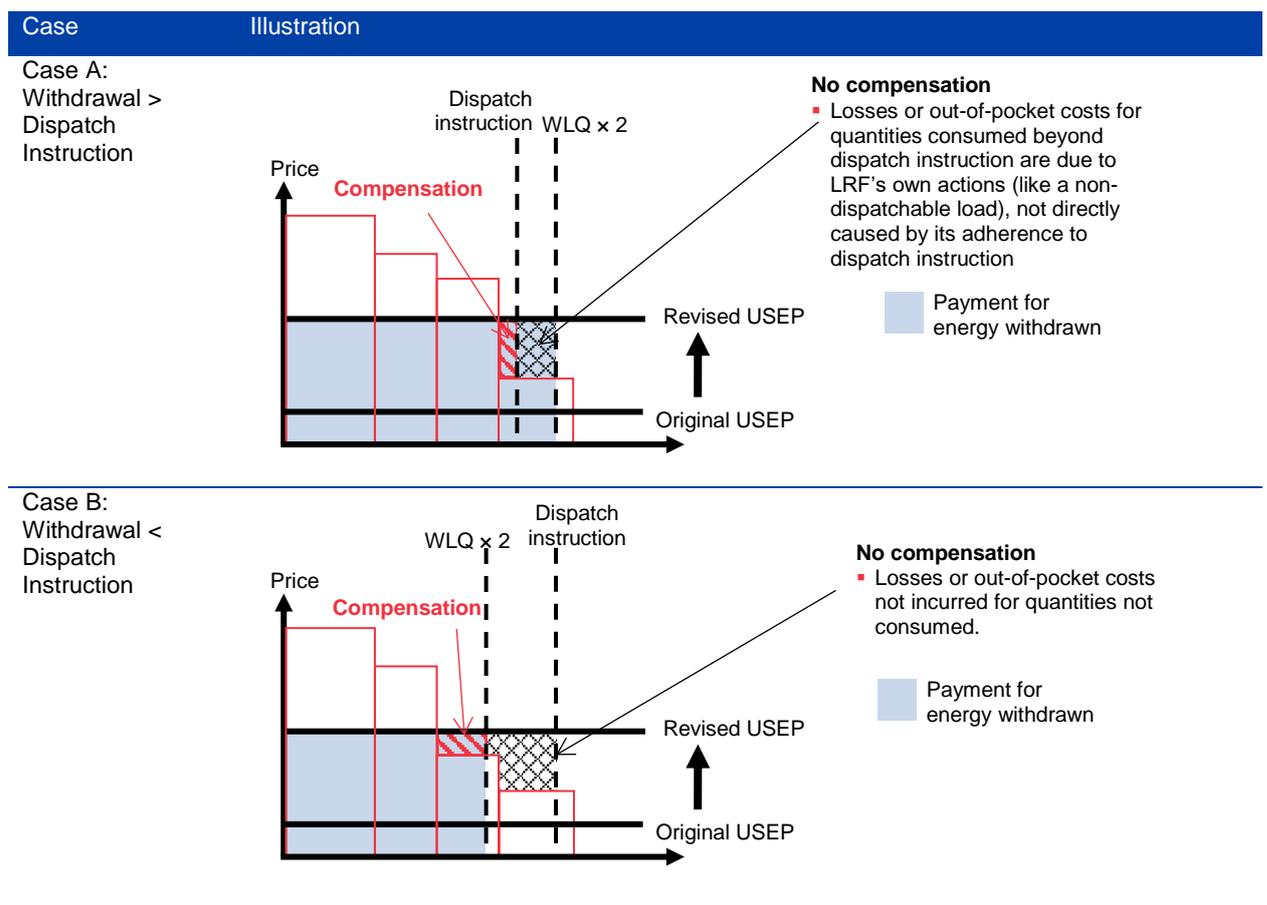
⁸ Note that as per Table 1, the load curtailment payment received would be based on the Revised LCP (which could be zero).

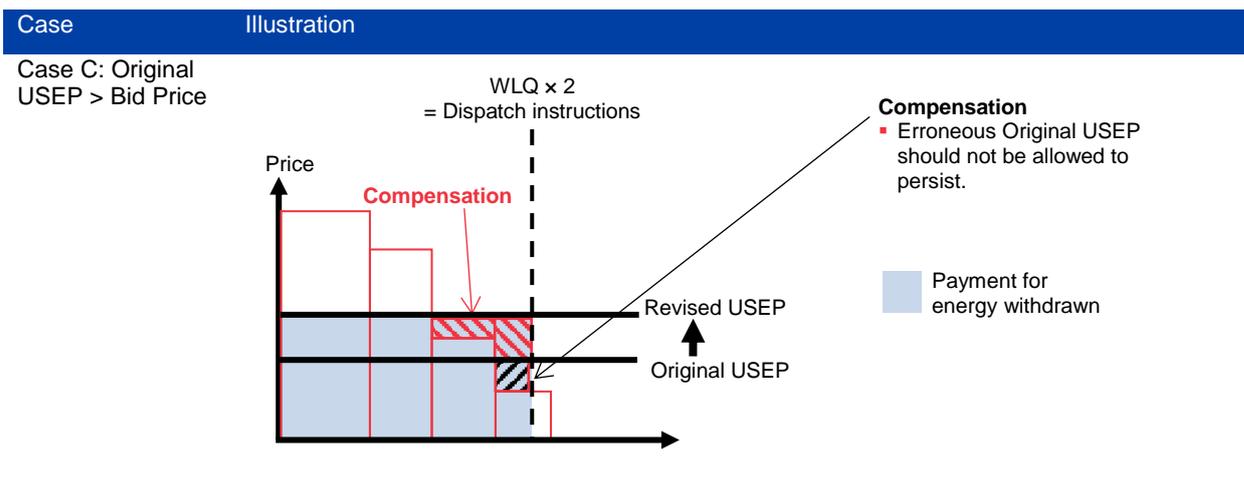
B) Price Used and Quantity Eligible for Compensation

Ideally, an LRF should only be compensated up to its revised nodal price (instead of Revised USEP). However, (i) the LRF is not charged for withdrawals at its nodal price; instead, its consumption is charged at USEP due to the half-nodal pricing regime in Singapore, and (ii) an LRF may be associated with multiple nodal prices if it comprises loads aggregated across different nodes within the same load zone. As such, we propose to use Revised USEP as a proxy, where it will be compared against bid prices.

The quantities eligible for compensation would be based on an LRF's withdrawals (i.e. the LRF's WLQ), capped at its dispatch instructions for the dispatch period. This is illustrated in Case A and Case B of Table 2 below, together with the accompanying reasons for the non-compensable areas.

Table 2: Illustration of Quantity Eligible for Compensation





As alluded to in section 2.3.3 of this paper, there may be instances where an LRF is scheduled to consume bid quantities even if the corresponding bid prices are lower than the Original USEP, for instance in Case C of Table 2 above. With reference to Case C, if the area between Original USEP and the bid price for the bid quantity corresponding to the dispatch instructions (black shaded area in Case C) is:

- **Compensated** - there will be different treatment for periods subject to price revision and periods not subject to price revision. For periods with price revision, an LRF would essentially be charged at its indicated bid price, whereas for periods without price revision, an LRF would be charged at the USEP even if the USEP is higher than its bid price for those quantities.
- **Not compensated** - it does not align with the intent of compensation examined in this paper, which is to compensate LRFs for out-of-pocket costs or losses (relative to bid prices submitted) arising from price revision. Moreover, given that Original USEP is erroneous, it should not be used.

On balance, in keeping with the principles of compensation and to avoid complicating the compensation calculations, if compensation arrangements are to be implemented, EMC proposes that LRFs be compensated as long as (i) USEP has been revised upwards, and (ii) the bid price, for bids corresponding up to the lower of an LRF's WLQ or dispatch instruction, is lower than the Revised USEP (i.e. as reflected in Case C of Table 2).

C) Types of Price Revision Applicable

Table 3 below assesses the applicability of compensation for LRFs under the different types of price revision.

Table 3: Assessment of applicability of compensation for LRFs

Type of Price Revision	Circumstance(s) under which an MCE rerun would be carried out	Should there be compensation for LRFs?
1	MCE failed to produce an RTS	Yes, if revised USEP is higher than LRF's energy bid price(s) for quantities it was instructed to consume in accordance with Table 2 above.
2	MCE used wrong input data in RTS	Yes, if revised USEP is higher.
3	MCE used adjusted nodal load forecasts which reflect the energy shortfall specified by the PSO	Yes, if revised USEP is higher.

Type of Price Revision	Circumstance(s) under which an MCE rerun would be carried out	Should there be compensation for LRFs?
4	MCE has incurred CVP for line constraint, and there is no load shed in real time	Yes, if revised USEP is higher.
5	MCE has produced prices not reflective of their respective locational system marginal prices	Yes, if revised USEP is higher.

3.4 Other Considerations

This section sets out the other considerations in deciding whether to implement the proposed compensation arrangements:

a) Number of LRFs registered to provide load curtailment

The scheme which allows the participation of LRFs for load curtailment was introduced in the SWEM on 28 April 2016. As at 30 June 2018, there is only one LRF registered to provide load curtailments, with a curtailment capacity of 7.2MW.

b) Frequency and Impact of Price Revision

Table 4 below tabulates the number of price revision periods since the start of the scheme, together with the number of such periods with an increase in USEP (“upward price revision”) and the magnitude of USEP increases in those periods.

Table 4: Frequency and Magnitude of Upward Price Revision (28 April 2016 to 30 June 2018)

Period	28 April 2016 – 31 Dec 2016	2017	1 Jan 2018 – 30 June 2018
Number of periods with price revision	11	41	8
Number of periods with upward price revision, excluding Type 1 ⁹ price revision	5	2	1
(Periods with upward price revision as a % of total number of price revision periods)	(45.5%)	(4.9%)	(12.5%)
For Periods with Upward Price Revision:			
Average Difference between Revised USEP and Original USEP	\$1.28	\$0.06	\$0.03
Maximum Difference between Revised USEP and Original USEP	\$1.47	\$0.10	\$0.03
Number of periods in which LRFs had submitted REBs	0	0	0

The infrequency of price revision in the SWEM (with price revision affecting 0.16% of the periods from 28 April 2016 to 30 June 2018) implies that the proposed compensation arrangement is expected to have limited impact. Furthermore, no LRFs had been adversely affected by price revision before.

⁹ Type 1 Price Revision periods are excluded as it entails cases where the RTS was not produced in time (and hence, no original USEP to assess upward or downward price revision).

c) Implementation time and cost estimates

EMC Market Operations provided two implementation approaches. Under both approaches, MPs will be initiating the compensation request.

The implementation time and costs are provided in Table 5 below, and the options differ in how EMC processes the compensation request received from MPs:

- **Option 1:** EMC will use internal excel tool to validate and facilitate the claim process (similar to option adopted in Rule Change 346)
- **Option 2:** EMC will develop an internal system platform to validate and semi-automate the claim process

Table 5: Estimated Implementation Time and Costs

Alternative	Option 1 (EMC uses Internal Excel Tool)		Option 2 (EMC uses Internal System Platform)	
	Effort Estimates (Man weeks)	Lapse Time (Calendar weeks)	Effort Estimates (Man weeks)	Lapse Time (Calendar weeks)
Time Estimates				
0. Vendor Selection/Preparation	N.A.	6	N.A.	8
1. Change Requirement Scoping and Analysis	4	2	9	4
2. System Development/ Testing/ Project Management	13.4	12	51.8	25
3. User Acceptance Testing (UAT)	4	6	6	7
4. Audit	4	5	4	5
Total Effort Required	25.4	31	70.8	49
Cost Estimates				
1. Internal EMC Manpower (within EMC's budget)		\$41,600		\$92,800
2. External Resource to Support (Vendor)		\$52,320		\$208,942
3. Audit		\$25,000		\$25,000
Total Additional Implementation Costs Required		\$77,320		\$233,942
4. Operational cost per claim		2 man-days		0.5 man-days
5. Operation cost per year for documentation housekeeping and audit support		3 man-days		3 man-days

Option 1 has lower one-off implementation cost but higher operational cost per claim, while the reverse is true for Option 2.

In view of the implementation costs, coupled with the expected infrequency of claims, EMC recommends adopting Option 1 if the compensation arrangements examined in this paper are to be introduced.

4. Consultation

The concept paper was published for consultation on 10 August 2018, with comments received from four stakeholders.

Comments from Diamond Energy Merchants & EMC's response

S/No.	Section No. of Concept Paper	Comments from Diamond Energy Merchants	EMC's response
1	2.1	<i>We welcome the EMC's decision to look at the compensation for LRFs when they are affected by price revision given that such compensation is offered to GRFs.</i>	
2	2.2	<i>We agree that the established principles should form the basis for any compensation. At the same time, we want to stress that LRFs are inherently different compared to GRFs, which is sometimes not appreciated in the context of Load Curtailment programs (i.e. Interruptible Load and Demand Response) in the NEMS. One important point that is too often ignored is that for GRFs, generation of electricity is the core business, while for LRFs, participation in the Demand Response program is never the core business. Therefore, the perspective of losses or costs incurred is completely different between GRFs and LRFs.</i>	EMC notes Diamond Energy's views. The analysis in this paper was based on LRFs providing load curtailment by submitting demand bids, and that these demand bids reflect their willingness to pay.
3	2.3.3	<p><i>We have our reservations with respect to both the points mentioned here, and particularly with the second point. In our view, this is an inherent weakness in the design and one of the main causes holding back the success of the Demand Response program. That the market can call upon LRFs to curtail for zero incentive payment is something extremely difficult to digest for the DR Aggregator as well as the owner of the LRF. Again, we feel that this problem exists because LRFs were not appreciated to be different from GRFs in the nature of their operation.</i></p> <p><i>An LRF, whose core business is dependent on a steady supply of electricity, does not consider the procurement of electricity as being optional. It is not going to be sensitive to pool price variation as it will be buying electricity at a fixed price from a retailer in almost all instances based on our experience in Singapore. In most cases the retailer supplying electricity to the LRF will be a different entity than the DR aggregator. The premise of the LRF "bidding to consume" therefore, does not apply and changes the perspective of how the DR program works in reality. The ONLY motivation for the LRF to curtail load is the incentive payment originating from participation in the DR program which flows from the DR aggregator. Given that the LCP is variable and is not part of the bid (i.e. the LRF cannot say that it should be curtailed only if the LCP is above \$X), it is not possible to develop a working opportunity cost model for participating in the program without leaving it completely to chance. Most LRFs will not even consider the idea of participating in a program with such uncertainties which may even result in losses from their core operations with no assured benefits.</i></p> <p><i>The LRF also feels hard done by the fact that there is a cap on the LCP (\$4,500/MWh), but there is no floor price guaranteed when scheduled to curtail. GRFs, in contrast, while having the same cap, are always guaranteed to be paid at or above their bid price if they are scheduled to generate. We believe there should be</i></p>	<p>EMC notes that Diamond Energy's views pertain to the design of the scheme for LRFs to provide load curtailments (loosely referred to as the "Demand Response (DR) scheme" hereafter) and does not directly relate to the proposal discussed in this paper.</p> <p>The suggestion for LRFs to be paid at least equal to the bid price if scheduled to curtail would necessitate a review of the design of the current DR scheme.</p>

S/No.	Section No. of Concept Paper	Comments from Diamond Energy Merchants	EMC's response
		<p><i>a similar provision for LRFs also (i.e. if curtailed the floor price could equal the bid price).</i></p> <p><i>Also consider the following scenario:</i></p> <ul style="list-style-type: none"> <i>• The MCE curtails an LRF (assume a curtailment quantity of 7 MW) while the LCP is zero (the MW reduction is not enough to move to a lower offer stack)</i> <i>• Had there been no DR bids, the extra 7 MW would have been scheduled to the GRF who would be paid for the additional 7 MW for the period</i> <i>• But when the equivalent outcome is obtained through the LRF, the market saves (7 x USEP x 0.5) but there is no payment to the LRF and essentially it becomes a free service</i> <p><i>In our view, this is a flaw in the design of the program and a weakness that results in LRFs being treated as free service providers.</i></p>	<p>The scenario described is consistent with the implications highlighted in section 2.3.3 of this paper, that the scheduling of load curtailment is independent of the LCP received.</p> <p>Further, it is inaccurate to say that “the market saves (7 x USEP x 0.5)”, as there is no resulting improvement in welfare.</p> <p>In the scenario described, the LRF’s bid would have been submitted at or below the USEP.</p> <p>If the LRF’s bid is at USEP, the marginal generator would be neutral as to whether the LRF consumes or not since the payment at USEP would only cover the generator’s marginal cost.</p> <p>If the LRF’s bid is below USEP, the LRF benefits by not consuming energy at prices above its marginal benefit.</p>
4	2.3.4	<p><i>We would like to point out with respect to Table 1 that in the present market (with 1 LRF registered in the DR program), if there is only 1 price-quantity pair in the bid, settlement for Load Curtailment will be zero for LRF B also (as the RLCP will always be zero in this case).</i></p>	<p>Regardless of the number of LRFs registered for load curtailment, there is always the possibility for the settlement for load curtailment to be zero.</p>
5	3.1	<p><i>EMC’s assessment is that there is no rationale for compensation arising from changes in LCP. Carrying on from our comments in S/No 3, this fails to appreciate the perspective of the LRF for whom the incentive payment is the primary benefit that makes them consider participating in the DR program. From EMC’s perspective, the incentive payment seems to be looked at as a “bonus” for the LRF, which we feel is an invalid consideration.</i></p>	<p>In our view, given the way LCP is structured in the current DR scheme, LCP is an incentive payment and delinked from bid prices submitted. Hence, even if LCP is revised, there is no basis for compensation in accordance with the principles set out in section 2.2.</p>
6	3.2.1	<p><i>We agree with the premise of compensation that is due here. However, it has not been appreciated that the LRF may not be on pool-price pass-through with the retailer in most instances, and that its retailer may be different from the DR aggregator. There might be cases of different parties laying claims to the compensation that is due.</i></p>	<p>Given that the compensation quantum is examined relative to bids submitted, compensation, if introduced, will be paid to the market participant for the LRF.</p>
7	3.2.2	<p><i>We strongly disagree with EMC’s assessment of there being no grounds for compensation here. Referring to our comment in S/No 4, this scenario will mostly result in a revised LCP of zero. This means that the LRF will have provided a curtailment for free.</i></p> <p><i>We suggest that not only compensation for this scenario, but the scheduling logic in the DR program should be reconsidered to ensure that LRFs are not asked to curtail for zero LCP even in real-time.</i></p>	<p>Section 3.2.2 is intended to examine the impact of a <u>downward revision in USEP</u>. With regard to the case where the LCP is zero resulting from a downward revision in USEP, as explained in section 3.1, there is no rationale for compensation given that LCP serves as an incentive payment and is delinked to bid prices submitted.</p> <p>The LCP is a derived outcome, i.e. it is not a direct output from the MCE’s solution. The scenario of LRFs being scheduled to curtail even though the LCP is zero results from the design of the</p>

S/No.	Section No. of Concept Paper	Comments from Diamond Energy Merchants	EMC's response
			current DR scheme and the way incentive payment is calculated.
		<i>Adding on to the comments in S/No 3 and 5, we feel LCP should be a "biddable" price if there is to be any chance of adding more LRFs to the DR program.</i>	We agree, in general, with a scheme which better links bid prices with the corresponding payment.
		<i>Another factor that is not considered is that the LRF may be participating in both Interruptible Load (IL) and DR programs. Being asked to curtail for DR means that it loses out on being scheduled for IL for multiple periods (after curtailment, it takes multiple periods for most LRFs to return to full load). Compensation should also be considered for the lost opportunity of IL revenue during this time and the impact of energy and reserve co-optimization by the MCE.</i>	The trade-off between providing reserve vis-à-vis load curtailment is a commercial decision MPs have to make. If the MP for an LRF submits both energy bids and reserve offers for a given dispatch period, the MCE will determine schedules based on the <u>net benefit to the market</u> . In accordance with the principles set out in section 2.2, EMC recommends that there be no compensation for reserve and regulation, in keeping with a compensation arrangement which is administratively simple and cost-efficient.
8	3.3	<i>The graphs in Table 2 show partial scheduling of load with respect to the bid. In most cases, this is not practical for LRFs as unlike GRFs, they are only able to provide curtailment in discrete blocks. Separately, we have submitted a Rule Change Request for incorporation of Minimum Stable Load for LRFs, similar to the provisions for GRFs to address the discriminatory treatment that currently exists.</i>	The illustrations in Table 2 are only intended to demonstrate the proposed compensation methodology under different scenarios and to provide the corresponding reasons. EMC notes that loads may face technical constraints which require curtailments to be scheduled in a block. The issue will be addressed in a separate work stream.
9	3.4a	<i>The point about there being only 1 LRF registered is very important and seems not to be given due consideration (refer to our comments in S/No 4 as an example).</i>	
10	3.4b	<i>Table 4 suggests that the majority of price revisions are in the downward direction, which happens to be the case that is not compensated according to the proposal in this paper. We feel this (along with other justifications in our earlier comments) warrants reconsideration for compensation in case of downward USEP revision.</i>	EMC's view to not recommend compensation in downward price revision cases is independent of the number of price revision periods.
11	General comment	<i>We understand that this paper has been presented as a compensation mechanism for LRFs within the limitations of the Electricity Market and existing DR program design. However, we have presented the perspective of the DR aggregator and LRF (with actual experience of registering and participating in the DR program) in the hope that it will trigger a comprehensive review of the entire DR program (not just the compensation mechanism), and attempt to resolve what we see as inherent weaknesses that prevent the program from functioning as desired.</i>	EMC notes Diamond Energy's comments.

Comments from Senoko Energy

Senoko is supportive of a fair compensation for LRFs adversely affected by price revision.

For the Price Used for Compensation, can EMC evaluate if HEUR should be added to consider the nodal price equalisation effects?

It would be useful to have an estimate of the costs to implement the proposed methodology, with an evaluation against its benefits.

EMC's response

EMC notes Senoko's views.

The hourly energy uplift rebate (HEUR) captures settlement differences between total amounts receivable from retailers and total amounts payable to energy, reserve and regulation providers in each settlement interval, and distributes it to loads based on withdrawal energy quantities.

It can be argued that assessing compensation based on (Revised USEP+HEUR) instead of Revised USEP would better align the compensation reference price with the price charged to consumers for energy withdrawals. However, while the HEUR is allocated to loads, it is intended to be a settlement balancing mechanism and does not reflect nodal prices. As such, EMC still recommends the reference price to be the Revised USEP, which best proxies nodal prices faced by LRFs.

Estimated implementation time and costs are included in Table 5 of section 3.4(c) above.

Comments from PSO

Given the current low volume of DR participation, if this compensation framework were to proceed, EMC may consider using the manual approach until such time when it becomes cost-effective to automate the compensation process.

EMC's response

EMC notes the PSO's views.

Comments from EMC Market Operations

- 1. Although the bid should in principle reflect a consumer's willingness to pay, the nature of the demand response scheme in the SWEM may distort this intent due to the presence of incentive payment. Hence, compensation due to the revision of USEP on the basis that a consumer incurs out-of-pocket costs does not seem justifiable.*
- 2. Furthermore, dispatch is based on the locational marginal price. The disparity between locational marginal price and USEP may result in many different scenarios that may not be covered in the paper.*
- 3. The concept paper does not discuss how the cost of compensation is proposed to be allocated. Since the net effect of the proposal is that LRFs will pay less for energy than the Revised USEP, we feel that the cost of compensation should be allocated to generators instead of being allocated to loads via MEUC.*

EMC's response

- 1. Our analysis was based on the design of the current scheme, where bids are assumed to reflect LRF's willingness to pay. Nevertheless, we recognise that the presence of incentive payment may affect LRFs' bidding behaviour.*

2. The intent of the cases in Table 2 is to explain, conceptually, the proposed compensation arrangements. If the RCP in-principle supports the proposed compensation arrangements, we will work with Market Operations to ensure that the draft rule changes cover all potential scenarios.
3. We propose that the costs of compensation examined in this proposal be recovered via the monthly energy uplift charge (MEUC).

In accordance with the causer-pays principle, if the causers of price revision can be identified, then the costs of compensation should be recovered from the causers. However, as recognised in a previous review of price revision in the SWEM¹⁰, in price revision situations, it is often difficult to pinpoint the error-causer or apportion culpability in cases involving multiple parties.

Moreover, since it is unlikely that gencos would cause the need for price revision, allocating such costs to them could instead affect efficient generation decisions.

In the absence of a clear causer, generally, the least distortionary way would be for costs to be allocated closest to end consumers. As such, we recommend that the cost of compensation be recovered via the same mechanism as for other compensation claims under section 3.11 of Chapter 3, i.e. from loads via MEUC.

5. Conclusion and Recommendations

When circumstances warrant an ex-post revision of prices, LRFs which had submitted bids indicating their willingness to pay for energy may incur out-of-pocket costs or losses (relative to their bid prices) if the Revised USEP is higher than their bid price. From a fairness perspective, it can be argued for such LRFs to be compensated for the difference between the Revised USEP and the bid prices for quantities such LRFs consumed in adherence to dispatch instructions.

This paper thus sets out a proposed compensation arrangement for LRFs that are adversely affected by upward revisions in USEP.

However, EMC **recommends that the RCP hold this proposal in abeyance** for the following reasons:

- a) Given the infrequency of upward price revision and limited participation of LRFs, the potential benefits of this proposal are not expected to outweigh the implementation costs set out in Table 5; and
- b) Comments received during consultation have highlighted some inherent design issues with the current scheme. While our assessment in this paper was premised on the current design of the scheme, a more preferable outcome would be to review and revise the design of the current scheme before re-considering the provisions for compensation during price revision periods under the revised scheme.

6. Decision at the 104th RCP Meeting

The concept paper was presented at the 104th RCP meeting held on 11 September 2018. The RCP **unanimously supported** EMC's recommendation to **hold the proposal in abeyance**.

¹⁰ See RC272: <https://www.emcsg.com/f315.9531/EMC272-EMA-TLC.pdf>