

RCP PAPER NO. : **EMC/RCP/68/2013/CP46**

SUBJECT : **PROPOSED REJECTION OF OFFERS WITH ZERO RAMP RATES**

FOR : **DECISION**

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DATE OF MEETING : **9 July 2013**

Executive Summary

In their energy offers submitted to EMC, generation registered facilities (GRF) can specify ramp-up and ramp-down rates lower than those in their standing data. This allows them to de-rate their units to better reflect their units' physical capability, and provides them with greater offer flexibility.

There have been instances when zero ramp-up/down rates were offered. In such cases, the GRF in question will be scheduled at its start generation ("StartGen") level regardless of its actual energy offer price, and will not take part in the price discovery process. If the GRF's total offer quantity is less than its StartGen level, ramp rate violation will be triggered, resulting in a very heavy penalty of 20x VoLL¹.

To address cases of zero ramp rates being submitted by mistake, leading to undesirable outcomes for the market, a proposer suggested adding an offer validation rule to prevent zero ramp rates from being offered, unless the maximum energy ramp-up and ramp-down rates in the standing data are both zero.

Nevertheless, some MPs have suggested that they do prefer the flexibility of using zero ramp rates in their offers. In any case, the proposed offer validation rule disallowing zero ramp rates is inconsistent with the market's principle of self-commitment, whereby generation companies (Gencos) are responsible for their own offers.

While EMC does not recommend disallowing zero ramp rates, one alternative to reduce the likelihood of mistakes could be to provide a prompt to Gencos when they input zero or low ramp rates. If a prompt is to be added in the user interface, EMC recommends Options B or

¹ VoLL is the Value of Lost Load and is equal to \$5,000/MWh.

C, where the prompt would be given after MPs' offer submission is accepted, so as to achieve consistency across both the Offer Management System (OMS) and EMC's Web Services user interfaces. Adding a prompt would not require market rule changes for implementation. Nevertheless, given the relatively low frequency of zero ramp rate energy offers, the resulting net benefit of addressing such cases would not be significant.

The concept paper was published for industry consultation on 4 June 2013. Comments received were in line with EMC's view of not rejecting zero ramp rates from being offered. Feedback also indicated that the high costs of implementing a prompt in the user interface may not be justified given the low frequency of such zero ramp rate cases.

In view of the above considerations, EMC recommends that the RCP:

- (a) **Reject** the proposal to disallow zero ramp rates in the energy offers, and
- (b) **Reject** the implementation of a prompt in the user interface to alert MPs when they have submitted offers at or below a ramp rate threshold.

At the 68th RCP meeting, the Panel unanimously decided **not to support** the proposal to disallow zero ramp rates in the energy offers, and **not to support** the implementation of a prompt in the user interface to alert MPs when they have submitted offers at or below a ramp rate threshold.

1. INTRODUCTION

In their energy offers submitted to EMC, generation registered facilities (GRFs) can specify ramp-up and ramp-down rates lower than those in their standing data. This allows them to de-rate their units to better reflect their units' physical capability, and provides them with greater offer flexibility.

There have been instances when zero ramp-up/down rates were offered. In such cases, the GRF in question will be scheduled at its start generation ("StartGen") level regardless of its actual energy offer price, and will not take part in the price discovery process. If the GRF's total offer quantity is less than its StartGen level, ramp rate violation will be triggered, resulting in a very heavy penalty of 20x VoLL².

A proposer was of the view that such zero ramp rate instances were likely mistakes leading to undesirable outcomes for the market. He thus suggested adding an offer validation rule to prevent zero ramp rates from being offered, unless the maximum energy ramp-up and ramp-down rates in the standing data are both zero.

2. BACKGROUND

2.1 Current Rule in the Market Manual

All GRFs have maximum energy ramp-up and ramp-down rates in the standing data to limit their ramp rates based on their physical capabilities. When the energy offer of a GRF is submitted for a particular dispatch period, it can specify energy ramp-up and ramp-down rates below the standing data's limits to de-rate the unit for that period. Annex 1 shows a sample of the submission forms for standing offers and offer variations.

Currently in the Market Manual (Market Operations – Standing Offers, Offer Variations and Standing Capability Data), Section 2.7 Rule 2 requires a validation that the ramp rates for energy offers are not greater than the maximum values in the corresponding standing capability data. Each of the energy ramp-up and ramp-down values in the energy offer must be expressed in MW/minute to one decimal place and must not be less than 0.0 MW/minute.

2.2 Proposal Received

There have been cases of Market Participants (MPs) entering zero ramp rates in their energy offer submissions, seemingly by mistake. Such cases could have undesirable effects on the pricing and scheduling (see Section 3).

To address such cases of potential oversight, a proposal suggested adding a condition (in italics below) to the current Rule 2, as follows:

Rule 2: Validate that the ramp rates for energy offers are not greater than the relevant standing capability data maximum values;
Validate that the ramp rates for energy offers are greater than zero if the relevant standing capability data maximum values are greater than zero.

The proposed rule requires that so long as standing data ramp rate is non-zero, then offer ramp rates must be non-zero.

² VoLL is the Value of Lost Load and is equal to \$5,000/MWh.

3. ANALYSIS

3.1 Frequency of Energy Offers with Zero Ramp Rates

Based on historical data from 2008 to 2012, there were four separate episodes in which generation companies (Gencos) submitted zero ramp rate energy offers. These cases involved 7 different generating units and affected a total of 56 periods. Of these 56 periods, 16 periods (29%) resulted in ramp rate violation by the MCE, as the offered quantity was less than the StartGen level. For the remaining 71% of periods, the offered quantity was greater than the StartGen level, so ramp rate violation was avoided, with the constrained GRF being scheduled at its StartGen level.

3.2 Mistakenly Offered Zero Ramp Rates

The problem with mistakenly offered zero ramp rates is that it distorts the merit order dispatch schedule, leading to inefficiencies and losses for both the affected MP and the industry. The possible scenarios are summarised in the table below:

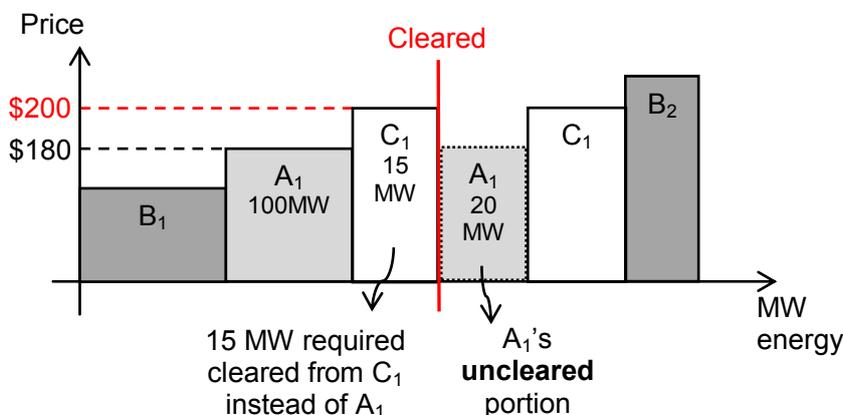
Table 2: Possible Scenarios of Mistakenly Offered Zero Ramp Rates

Scenario	StartGen Level	Offer Prices	Key Issue
1	Below Total Energy Offers	Below Clearing Price	Out-of-merit-order dispatch - Offers below clearing price not scheduled
2		Above Clearing Price	Out-of-merit-order dispatch - Offers above clearing price scheduled
3	Above Total Energy Offers	Above/Below Clearing Price	Ramp Rate Violation Incurred

The above scenarios are discussed in detail in the subsequent section.

Scenario 1

Figure 1: GRF A's StartGen (100MW) < Total Offer Quantity (120MW); Offer Block Price (\$180) < Marginal Price (\$200)



In Figure 1, GRFs A, B and C offer energy price-quantity pairs A_1 , B_1/B_2 and C_1 respectively. GRF A is partially scheduled (at its StartGen of 100MW, instead of its energy offer quantity of 120MW) even though its offer price (\$180) is lower than the marginal price (\$200). Assuming the total load forecast has to be met with another 15MW of energy, this would be served by C_1 at a higher price, instead of A_1 , so as to avoid violating the ramp rate constraint.

In this first scenario, as a result of GRF A's zero ramp rate energy offer,

- (1) the marginal price is higher than it would have been (i.e. \$200 instead of \$180) if A₁ can be cleared for more than its StartGen level;
- (2) GRF A is scheduled less energy than if its ramp rate offer was positive, possibly leading to reduced profits

In the extreme scenario that GRF A's StartGen is 0 MW, it would not be scheduled at all, regardless of its offer price.

Scenario 2

Figure 2: GRF A's StartGen (100MW) < Total Offer Quantity (120MW); Offer Block Price (\$200) > Marginal Price (\$100)

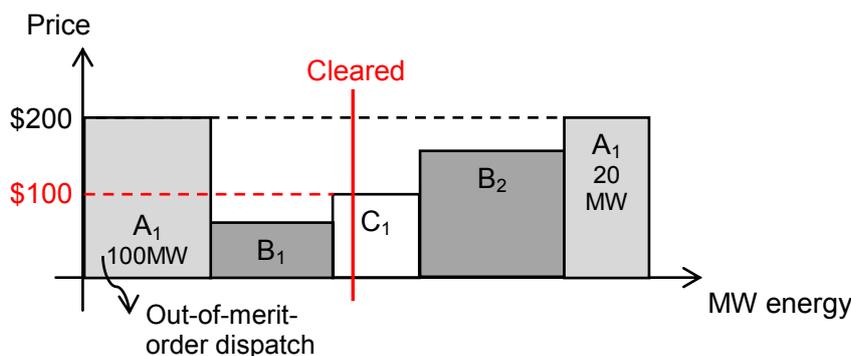


Figure 2 illustrates the second scenario where GRF A's StartGen of 100MW is also less than its total energy offer quantity of 120MW. This time, its offer block price of \$200 is greater than the marginal clearing price of \$100. To avoid violating the ramp rate constraint, there is out-of-merit-order dispatch whereby the Market Clearing Engine (MCE) schedules GRF A's StartGen quantity of 100MW to prevent ramp rate violations, even though cheaper offers from C₁ and B₂ are available.

In this second scenario, as a result of GRF A's zero ramp rate energy offer,

- (1) the marginal price is lower³ than it would have been because C₁ becomes the marginal block instead of B₂ due to 100MW of the load being served by A₁;
- (2) GRF A becomes a price taker; even though it is scheduled, it is paid the marginal price of \$100 rather than its offer price of \$200, leading to possible losses;
- (3) GRF B is not scheduled from its offer block B₂, when it otherwise would be

Scenario 3: GRF A's Total Offer Quantity < StartGen

In the 3rd scenario where the GRF's total offer quantity is less than its StartGen, the GRF's total offer quantity will be scheduled regardless of price so as to minimise the amount of Constraint Violation Penalty ("CVP") incurred⁴ and it will become a price-taker. The amount of CVP incurred will depend on the shortfall between the total offer quantity and the StartGen level.

³ In this example, the marginal price is lower than it would have been without the zero ramp rate constraint. However in general, the marginal price in such scenarios would always be less than or equal to that which would have been without the constraint. This is due to the "increase in supply" at the lower offer tranches due to the out-of-merit-order dispatch.

⁴ The ramp rate CVP will be incurred in the MCE because the GRF can at most be scheduled its total offer quantity, which is less than its StartGen in this case.

If the GRF's offer price is low and it is scheduled in accordance with the merit order, there would not be any effect on the marginal price as a result of its zero ramp rates. However, if the GRF's offer price is high and it is dispatched out-of-merit so as to minimise the amount of CVP incurred, the resulting marginal price will be lower than it would have otherwise been. This is because there is now "additional supply" at a lower offer tranche, since that GRF has effectively become a price-taker. Therefore in Scenario 3, the resulting marginal price will always be less than or equal to what it would have been without the zero ramp rate constraint (like Scenario 2).

3.3 Intentionally Offered Zero Ramp Rates

While the earlier section lays out the negative effects of having zero ramp rates, some stakeholders have responded that zero ramp rate energy offers should still be allowed as there are times when they are useful.

Based on the feedback received, some MPs may require a few continuous periods of stable generation output during regular testing for certain commercial generating units. While it is possible in practice to offer in at lower prices to increase the chances of being dispatched at the desired output level, setting zero ramp rates in their offers effectively "locks in" their output at the StartGen level for subsequent periods. In such cases, the decision to offer zero ramp rates is a deliberate one, and disallowing them may undermine offer flexibility.

3.4 Principle of Self-Commitment

In line with the market design principle of self-commitment, it is the responsibility of individual MPs to ensure that their offer submissions are accurate (i.e. not contain careless mistakes). If the Market Rules were to disallow zero ramp rates, this opens up a slippery slope of other possible mistakes to consider. Having such restrictions could be overly paternalistic and undermine the flexibility of Gencos to make their own offers. The corollary of this flexibility is that Gencos would have to bear the consequences of any mistakes that they make.

4. ALTERNATIVE OPTION

Based on the discussion thus far, EMC is **not** in favour of rejecting zero ramp rate energy offers. Nevertheless, in view of the potential issues that such mistakes could bring to the market (affecting marginal prices and MPs' scheduled quantities), as well as to the constrained GRF (foregone profits or losses)⁵, there is merit in reducing the likelihood of MPs submitting zero ramp rate energy offers by mistake. One feasible option is to include a prompt in the user interface to alert MPs when they have submitted zero ramp rate energy offers. This prompt could be given either:

- A. **before their offer submission is approved** (to inform them about the zero ramp rates before proceeding with submission), or
- B. **after their offer submission is approved** (to inform them about the zero ramp rates, allowing them to decide if they would like to re-submit their offers in the event of a mistake made).

This option would not explicitly reject zero ramp rate energy offers, yet would achieve the intended effect of reducing mistakes made regarding zero ramp rate energy offers. As a further enhancement, we could allow individual Gencos to determine their respective ramp rate thresholds for each GRF, and the prompt would be given whenever their offered ramp rate is

⁵ Please refer to Section 3.2 of this paper.

below this pre-determined threshold. In this case, Gencos could set the threshold as part of their offer validation process. If no threshold is chosen, the default threshold would be set at zero.

The estimated system implementation time and cost for the various options are set out in Table 3 below.

Table 3: Estimated System Implementation Time and Cost

Options	Cost* for Zero Threshold	Cost* for Genco-Defined Threshold
Option A (Give prompt <u>before</u> offer submission is approved)	\$20,400	\$35,200
Option B (Give prompt <u>after</u> offer submission is approved)	\$69,600	\$79,000
Option C (Give prompt <u>before and after</u> offer submission is approved)	\$70,700	\$80,800

*Note: Cost refers to the cost of engaging external vendors for the implementation.

Based on the above table, Options B and C are more expensive than Option A because they require back-end changes to the submission module, whereas Option A only requires changes to the front-end layer. However, the cheaper Option A can only be implemented for the Offer Management System (OMS) user interface, and not for EMC's Web Services due to the design and architectural constraints of the latter. In contrast, Options B and C of providing the prompt after the offer submission work for both of these interfaces.

Despite the higher cost of implementing Option B as compared to Option A, Option B is preferred because of its more consistent treatment across both platforms.

Comparing the two approaches of whether the threshold will be fixed at zero or determined by the respective Gencos for each GRF, the latter costs slightly more by between \$9,400 to \$14,800. As mentioned earlier, if the threshold is captured in the GRF's standing data, then changes would be necessary to the GRF's standing data forms in the SOM.

5. CONCLUSION

The proposal to disallow zero ramp rate offers seeks to address cases when MPs submit zero ramp rates by mistake, leading to undesirable impacts on the market. However, some MPs have suggested that they do prefer the flexibility of using zero ramp rates in their offers. In any case, the proposed offer validation rule disallowing zero ramp rates is inconsistent with the market's principle of self-commitment, whereby Gencos are responsible for their own offers.

While EMC does **not** recommend disallowing zero ramp rates, one alternative to reduce the likelihood of mistakes could be to provide a prompt to Gencos when they input zero or low ramp rates. If a prompt is to be added in the user interface, EMC recommends Options B or C, where the prompt would be given after MPs' offer submission is accepted, so as to achieve consistency across both user interfaces. Adding a prompt would not require market rule changes for implementation. Nevertheless, given the relatively low frequency of zero ramp rate energy offers, the resulting net benefit of addressing such cases would not be significant.

6 INDUSTRY CONSULTATION

The concept paper was published for industry consultation on 4 June 2013, and the following comments were received from the PSO, Sembcorp Cogen and Keppel Energy.

Comments from PSO

1. *Gencos should be responsible for consequences caused by their bids. If zero ramp rate is offered, the unit become 'Constraint ON' and will be price taker*
2. *Agreed with EMC-Market Admin's recommendation not to reject the zero ramp rate offer, but disagree with the implementation of setting a threshold to 'prompt' for zero ramp rate as they could be genuine. Thus, the money spent on creating such prompt may be redundant*
3. *In the event that decided to go ahead to create the 'prompt', the threshold should not be part of standing capability data as there is no technical verification required in view of the maximum ramp rate has already been verified by PSO*

EMC's Response

PSO's comments are noted.

Comments from Sembcorp Cogen

1. *Agree with EMC's recommendation not to support the original proposal to disallow zero ramp rates in the energy offers*
2. *Do not support the update of the user interface because:*
 - i. *go against the market design principle of self-commitment*
 - ii. *Insufficient justification to spent \$80,000 to address an issue where only four separate cases occurred over the last 5 years*

EMC's Response

EMC notes Sembcorp's agreement with our recommendation not to disallow zero rate rates in the energy offers. EMC also agrees that the low frequency of zero ramp rate energy offers historically would mean that the resulting net benefit of addressing such cases would not be significant.

Comments from Keppel Energy

Keppel is agreeable with EMC's recommendation to not support the original proposal to disallow zero ramp rate in the energy offers. In line with the market design principle of self-commitment, Keppel believes that it should be the responsibility of individual MPs to ensure their offer submissions are accurate. Energy offers with zero ramp rates do have its purpose and should not be removed to allow offer flexibility in the dynamic market.

Keppel is also of the opinion that the alternative options that require changes to the systems are not necessary due to the high costs of implementation and low incidence of such events.

EMC's Response

Keppel Energy's comments are noted.

7 RECOMMENDATIONS

In view of the above considerations, EMC recommends that the RCP:

- (a) **Reject** the proposal to disallow zero ramp rates in the energy offers, and
- (b) **Reject** the implementation of a prompt in the user interface to alert MPs when they have submitted offers at or below a ramp rate threshold.

8 DELIBERATION AND DECISION AT THE 68TH RCP MEETING

At the 68th RCP meeting, the Panel unanimously decided **not to support** the proposal to disallow zero ramp rates in the energy offers, and **not to support** the implementation of a prompt in the user interface to alert MPs when they have submitted offers at or below a ramp rate threshold.

Annex 1: Sample submission forms for standing offers and offer variations

The image shows two side-by-side screenshots of a web application interface for creating offers. Both screenshots have a breadcrumb trail: 'Offer Management >> Offer Creation >> New Offer' (left) and 'Offer Management >> Offer Creation >>' (right). The left screenshot is titled 'Criteria' and shows the 'Standing' radio button selected, with a red circle around it. Below it are fields for 'Energy' (set to 'Energy'), a table for selecting days (Monday to Sunday) with 'From' and 'To' values, and a 'Select Unit' dropdown. The right screenshot is also titled 'Criteria' but shows the 'Variation' radio button selected, with a red circle around it. It includes a 'Select Offer Type' dropdown, 'Date' and 'Period' fields (both set to 07/05/2013 and 38), and a 'Select Unit' dropdown. Both screenshots have an 'ADD' button at the bottom.

Standing Offer: Changing Ramp up and Ramp down rates

Offer Management >> Offer Creation >> Create Offer

Create Offer

Comments: Allow Gate Closure Violation Allow Partial Submission

Results 1-1 of 1

Offer Type	Unit	Day	P	Capacity	R.Up	R.Down	P1(\$)	Q1(MW)	P2(\$)	Q2(MW)	P3(\$)	Q3(MW)
EGO	...	MON	1	...	8.0	9.0	0.00	0.0	0.00	0.0	0.00	0.0
					10.0	10.0						

Offer Variation:

Offer Management » Offer Creation » Create Offer

Create Offer

Comments Allow Gate Closure Violation Allow Partial Submission

Results **1-1 of 1**

Offer Type	Unit	Date	P	Capacity	R.Up	R.Down	P1(\$)	Q1(MW)	P2(\$)	Q2(MW)	P3(\$)	Q3(MW)
EGO		07/05/2013	38		10.0	10.0	0.00	0.0	0.00	0.0	0.00	0.0