

RCP PAPER NO. : **EMC/RCP/151/2026/06**

SUBJECT : **RULES CHANGE PANEL WORK PLAN 2026**

FOR : **DECISION**

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DATE OF MEETING : **13 MARCH 2026**

Executive Summary

This paper presents a proposed update of the Rules Change Panel (RCP) Work Plan, incorporating input from stakeholders following the joint briefing sessions held between 16th and 20th January 2026.

At the 151st RCP Meeting, the RCP approved EMC's proposed Work Plan for April 2026 – March 2027.

1. Introduction

This paper first takes stock of the progress made in the previous Work Plan approved in March 2025. It then presents existing issues and new ones raised in the recently concluded Work Plan Prioritisation Exercise, ranked and commented on by stakeholder respondents. Based on these, the Rules Change Panel (RCP) discusses and approves a revised RCP Work Plan for 2026.

2. RCP Progress on Work Plan: April 2025 – March 2026

2.1 Overview

In March 2025, the RCP approved the 2025 Work Plan (see Annex 1) and tasked EMC to address and monitor its progress. The 2025 Work Plan comprised of 30 issues, with 12 prioritised over March 2025 – March 2026.

Of the 12 issues, the RCP completed work on 3 of them:

- (1) Publication of other Temporary Price Cap (TPC) information
- (2) Exclude provisional prices from Temporary Price Cap (TPC) Moving Average Price (MAP) calculation
- (3) Provision under Automatic Financial Penalty Scheme (AFPS) to exempt any Generation Registered Facility (GRF) on local control that deviated from its scheduled load due to frequency response

The RCP supported the referral of the following issues to EMA, following EMC's recommendation to do so as the issues fall under EMA's policy jurisdiction and thus would be better equipped to address them. The RCP further made a joint representation to EMA on items 3, 4 and 5 below:

- (1) Methodology to calculate Vesting Contract Reference Price (VCRP)
- (2) Basing the Demand Response Bid Price Floor on an average pricing benchmark derived from recent two weeks' USEP data
- (3) Reevaluating the Regulation Requirements in Singapore's Power System: The Impact of Intermittent Generation and Solar Energy
- (4) Review of the market's regulation requirement
- (5) Review of regulation requirement in response to increased pulsing of GRFs arising from solar intermittency

The RCP also supported the removal of 7 issues, which were ranked in the bottom half in 3 consecutive exercises:

- (1) Review of Expected Net Exposure (ENE) formula and application
- (2) Review of handling the metering adjustment payment arising from settlement reruns on a defaulting market participant
- (3) Review of the requirement for registration as commissioning generation facility for generation settlement facilities, except for intermittent generation facilities of aggregate name-plate rating 10MW or more
- (4) Improvement of the prepayment process
- (5) Adjustment for regulation charges and the price neutralisation after final settlement
- (6) Redeeming the full amount of an MP's Banker Guarantee (BG) upon default

- (7) To require an MP submitting a request for cancellation of facility registration to also state the intended effective date of cancellation.

At the same time, significant progress was made on the following 7 issues:

- (1) **Holistic Review of the Current Prudential Requirement Obligations and its Enforcement Process under the Market Rules**

At the 137th RCP meeting, EMC structured this proposal into 4 sub-proposals, namely

- Proposal 1: Shortening of the Settlement Cycle (By streamlining of processes within the Settlement Cycle)
- Proposal 2: Adjustment of Average Daily Exposure Calculation
- Proposal 3: Reconfiguration of Credit Support (To consider insurance bonds and mandating a mix of credit support instruments)
- Proposal 4: Residual Default Risk Insurance (Guarding against potential default levy).

At the 143rd RCP meeting, the RCP supported the market rules for Proposal 3 (RC389), to not introduce corporate guarantees, insurance bonds, and a tiered credit support arrangement at this time; and to support the removal of Treasury Bills as an allowable form of credit support. The related market rules have been approved by EMA and have been effective since 13 Nov 2024.

At the 150th RCP meeting, EMC has tabled the concept paper for Proposal 4. The RCP supported EMC's proposal to not introduce any new mechanism to specifically address residual default risk; and to focus on reviewing existing prudential requirements with the intent to update exposure calculation and low potential market exposure, through Proposals 1 and 2.

- (2) **Holistic Review of the Market Rules Related to Cessation of Business, Liquidation, and Insolvency**

At the 138th RCP meeting, the RCP supported EMC's proposal for an automatic suspension framework for cases involving insolvency-related events of default. EMC is drafting the rule modifications to effect said proposal.

- (3) **Review of Scope and Framework for Compensation Arising from Complying with PSO Issued Overriding Dispatch Instructions**

The RCP agreed to review the issues surrounding compensation and price revision together due to their interlinked nature. This issue is on hold as EMA prefers to manage the compensation methodology internally.

- (4) **Facilitating Integration of Large-Scale Imports into the Market**

EMC is working with EMA to identify the rule changes required to facilitate the import projects at various stages and will prioritise such rule change items accordingly.

- (5) **Review of Rules Governing Participation and Offers for Batteries and Distributed Energy Resources**

EMC conducted internal studies on how to enhance existing participation models for generation facilities to various distributed resource business models. This issue is on hold as there is significant overlap with EMA's sandbox directives.

- (6) **Exemption from Gate Closure Rules for Cancelled Synchronisation**

At the 150th RCP meeting, EMC tabled a concept paper reviewing gate closure exemptions for cancelled synchronization. RCP agreed with EMC's recommendation and tasked EMC to draft the relevant rule change modifications. EMC plans to table a paper on said rule change modifications at the 151st RCP meeting.

- (7) Load forecasting, MCE dispatch and price determination when contracted Fast Start unit(s) is performing monthly test or during actual activation

EMC has initiated internal analysis on load forecasting and price determination when contracted Fast Start units undergo monthly tests or are activated. EMC plans to discuss with relevant stakeholders before tabling a concept paper.

3. RCP Work Plan Prioritisation Exercise 2026

3.1 List of Issues for Prioritisation

Stakeholders raised 6 new issues this year; the PSO's issue was identified as an extension of an existing issue and was addressed via an update. New and updated issues are briefly described below:

New Issues:

- (1) Compensation Framework for Battery Energy Storage Systems (BESS) Forced Dispatch/Schedule

When PSO overrides a Battery Energy Storage System (BESS) scheduled dispatch, this may cause economic losses to operators and discourage future investments. This proposal seeks to introduce a compensation framework for BESS.

(Proposed by: Sembcorp)

- (2) Incorporation of Behind-the-Meter Energy Storage Measurements into Demand Response (DR) Performance Verification

Current DR rules rely only on the SP meter to measure a facility's load. This creates inaccuracies for sites with behind-the-meter BESS, as battery charging and discharging can change the net SP reading even when the actual building load remains unchanged. This proposal recommends installing a side BESS meter data to improve accuracy in DR verification.

(Proposed by: Crystal Clear Environmental)

- (3) Setting the appropriate Reserve and Regulation requirements

This proposal suggests including solar generation and its intermittency in the modelling of reserve and regulation, to ensure that the right ancillary products are procured to maintain system stability and reduce burden on incumbent GRFs.

(Proposed by: Senoko Energy)

- (4) Review of Directed Supply Scheme (DSS) instruction criteria

Currently, PSO will issue DSS instructions to Gencos if there is a shortfall (SF) after the 6PM Day Ahead Run (DAR) for the following day. This potentially distorts price signals and removes the ability for the market to adjust itself. The proposal seeks to review the DSS instruction criteria.

(Proposed by: Senoko Energy)

- (5) Review of Constraint Violation Penalty (CVP)

The Market Clearing Engine (MCE) is allowed to violate certain constraints at the cost of incurring associated penalty values (i.e., CVP), for instance during shortfall conditions. However, when DSS instructions are issued during shortfalls, it works against the principle that CVP has been crafted for. This proposal suggests reviewing and aligning the CVP parameters with PSO/EMA's priorities to reduce shortfalls, and in turn out-of-market interventions.

(Proposed by: Senoko Energy)

Updated Issue:

- (1) To revise the frequency and information on the publication of the Adequacy and Security Assessment (ASA) Reports

This proposal recommends reviewing the frequency and measurement period of the 14-days ASA reports (e.g. revising daily 14-days ASA reports to weekly 7-days ASA report) and including solar PV generation in the current ASA report.

3.2 Consultation Process

During the joint briefing sessions on 16th and 20th Jan 2026, EMC presented a list of 32 issues to stakeholders; a comprehensive list of the 32 issues is attached in Annex 2. The sessions provided stakeholders an overview of the issues and walked them through the voting process¹. Section 4 below summarises stakeholders' ranking with their comments supplemented in Annex 2.

4. Ranking Methodology

A Simple Average Methodology was used to determine the overall ranking of each issue for the RCP's consideration. This methodology averages the scores for 'Importance' and 'Urgency' of each issue across all stakeholders.

Table 2 summarises the ranking results, including the progress of the issue, the number of stakeholders who proposed to remove the issue and the corresponding reasons. A comprehensive breakdown of these rankings is provided in Annex 3 and further details on calculation methodology can be found in Annex 4.

4.1 Ceasing the calculation of Group-Weighted rankings

The Group-Weighted Methodology considers average scores for 'Importance' and 'Urgency' of each issue across each of the 4 groups of representatives/stakeholders (generation licensees, retail licensees, wholesale trader licensees and service providers).

Since inception, Group-Weighted rankings were calculated but have not been useful. As housekeeping and for simplicity, we have dropped the calculation from our Work Plan Prioritisation Exercise. This declutters the report and aligns with the RCP's decision to assess issues based on the Simple Average Methodology.

¹ EMC received responses from 21 market participants and 3 service providers, namely National Environment Agency (NEA), Blue Whale Energy, Keppel Electric, Keppel Merlimau Cogen, Keppel Sakra Cogen, Energy Market Company (EMC), Crystal Clear Environmental, Energy Market Authority (PSO), Meranti Power, Senoko Energy, Senoko Energy Supply, Sembcorp Floating Solar Singapore, Sembcorp Power, Sembcorp Cogen, Sembcorp Solar Singapore, PacificLight Power, PacificLight Energy, Tuas Power Generation, Tuas Power Supply, TP Utilities, YTL PowerSeraya, Taser Power, Seraya Energy, SP Energy Services.

Table 2: Work Plan Issue by Rank²

Issue No.	Issue Title	Rank (Simple Average)	Work Started ?	Propose to Remove	Summary of Reasons for Removal
1	Holistic review of the current prudential requirement obligations and its enforcement process under the market rules	N.A.	Y	N.A.	N.A.
2	Holistic review of the Market Rules related to cessation of business, liquidation and insolvency	N.A.	Y	N.A.	N.A.
3	Review of Scope and Framework for Compensation Arising from Complying with PSO Issuing Overriding Dispatch Instructions	N.A.	Y	N.A.	N.A.
4	Facilitating Integration of Large-Scale Imports into the Market	N.A.	Y	N.A.	N.A.
5	Review of rules governing participation and offers for batteries and distributed energy resources	N.A.	Y	N.A.	N.A.
7	Exemption from Gate Closure Rules for cancelled synchronisation	N.A.	Y	N.A.	N.A.
8	Load forecasting and MCE dispatch and price determination when contracted Fast Start	N.A.	Y	N.A.	N.A.

² Arising from the RCP's decision at its 78th meeting, ongoing issues need not be ranked.

Issue No.	Issue Title	Rank (Simple Average)	Work Started ?	Propose to Remove	Summary of Reasons for Removal
	unit(s) is performing monthly test or during actual activation				
19	When energy, reserve or regulation shortfall situation applies, allow for offers of additional quantities of energy, reserve and regulation	2.35	N	0	N.A.
9	Review Reserve Responsibility Share (RRS) calculation	2.31	N	2	<ul style="list-style-type: none"> Solar Generation cannot be controlled unlike a power plant, if needed to pay, should be under another scheme like a small tax per kwh produced. the purpose of RRS was meant for power generation from stable power plants, not intermittent power sources. To remove as it is a policy issue which hinges on the implementation of the Intermittency Pricing Mechanism (IPM).
30	Setting the appropriate Reserve and Regulation requirements	2.29	N	1	<ul style="list-style-type: none"> It is a policy issue which hinges on the implementation of the Intermittency Pricing Mechanism (IPM).
32	Review of Constraint Violation Penalty (CVP)	2.15	N	0	N.A.
31	Review of Directed Supply Scheme (DSS) instruction criteria	1.98	N	1	<ul style="list-style-type: none"> DSS is an EMA regulatory/policy direction and there is no market rule to be reviewed. To refer the proposal to EMA.

Issue No.	Issue Title	Rank (Simple Average)	Work Started ?	Propose to Remove	Summary of Reasons for Removal
18	Enhance the publication frequency of the Pre-Dispatch Schedules (DAR) from every 120 minutes to 60 minutes	1.96	N	1	<ul style="list-style-type: none"> RCP has agreed to publish additional scenarios for the STS. There is no need to create additional PDS which will result in more system changes and costs incurred.
28	Compensation Framework for Battery Energy Storage Systems (BESS) Forced Dispatch/Schedule	1.94	N	1	<ul style="list-style-type: none"> It is similar to Issue 3 and EMA had expressed a preference to manage the compensation methodology internally.
10	Review of Regulation Effectiveness Factor or similar compensation scheme to reward greater responsiveness of facilities for Regulation	1.90	N	0	N.A.
15	Additional Market Re-run for Meter Data Error discovered between First and Second Nominated Day	1.83	N	0	N.A.
12	Review of gate closure dispatch periods following a forced outage	1.81	N	2	<ul style="list-style-type: none"> I think every form of power generation except intermittent types should be treated equally. Gate closure exemption was reviewed last year in CP102 on Gate Closure Exemptions For The Cancellation Or Delaying Of, And Bringing Forward Of Synchronisation.
6	Review of Obligation to Act Within 5 Minutes When an Action is to be Taken "Promptly" or "Immediately"	1.75	N	1	<ul style="list-style-type: none"> Gencos must notify the Power System Operator (PSO) immediately when a generator trips, even before the cause is confirmed. As asset owners, they are responsible for verifying whether the circuit breaker is open or closed, so PSO can distinguish between a genuine trip and a false

Issue No.	Issue Title	Rank (Simple Average)	Work Started ?	Propose to Remove	Summary of Reasons for Removal
					alarm. Delays in communication compromise system security and grid reliability. While Gencos may need time to investigate and rectify the cause of tripping, prompt status updates are essential, followed by swift restoration of the generator to service.
24	Optimizing Battery Energy Storage System (BESS) Participation in the Regulation Market: A Proposal for Split Regulation Categories	1.73	N	1	<ul style="list-style-type: none"> BESS operator should be able to charge and discharge according to market dispatch.
27	Allow representation in voting for RCP members who are unable to attend RCP meetings	1.65	N	1	<ul style="list-style-type: none"> Should not be allowed as member vote after listening to presentation and discussion during meeting. Hence, representative at meeting might have different opinion from member.
21	Review of standing probability of failure (SPF) for new commissioning Generation Registered Facility (GRF) and Import Registered Facility (IRF)	1.60	N	1	<ul style="list-style-type: none"> SPF methodology is not in the market rules.
16	Modelling of on-site ambient temperature into the MCE such that GTs/CCPs' maximum capacity are adjusted dynamically	1.52	N	2	<ul style="list-style-type: none"> It is evident that Solar swings have been observed to be larger than the stated loss of combined CCP capacity during warm days. More focus and attention should be given towards a better load forecast, which can even swing around from period to period.
26	Increasing offered quantity within gate closure due to technical constraints	1.48	N	3	<ul style="list-style-type: none"> Gate closure exemptions are reviewed last year in CP102 on Gate Closure Exemptions For The

Issue No.	Issue Title	Rank (Simple Average)	Work Started ?	Propose to Remove	Summary of Reasons for Removal
20	Refund of credit support to market participants (MPs) who have closed the designated bank account for NEMS settlement	1.42	N	0	<p>Cancellation Or Delaying Of, And Bringing Forward Of Synchronisation.</p> <ul style="list-style-type: none"> The proposed rule change does not encourage the correct behaviour which is to offer at or above its minimum required load before gate closure based on its consideration of its technical capability. Allowing such amendment to the market after gate closure also means that it will unfairly displace quantities from other units that were supposed to be scheduled.
22	Review of the gate closure exemptions	1.38	N	3	<ul style="list-style-type: none"> Gate closure exemption was reviewed last year in CP102 on Gate Closure Exemptions For The Cancellation Or Delaying Of, And Bringing Forward Of Synchronisation. A similar issue (Item 9: Review of the definition of forced outages in gate closure exemptions) from year 2024 appears to have been voted to be removed from the list of issues to be prioritised. Furthermore, the problem statement described in the issue here is unclear. It does not mention what the ambiguity in the Market Rules is.
23	Revise the frequency on publication of the Daily 14-days Adequacy and Security Assessment (ASA) Reports to weekly ASA Reports	1.38	N	0	N.A.

Issue No.	Issue Title	Rank (Simple Average)	Work Started ?	Propose to Remove	Summary of Reasons for Removal
17	Introduction of SWIFT as a form of Bank Guarantee	1.35	N	0	N.A.
25	Publishing of electricity import data split into categories based on how “green” the electricity import is	1.33	N	4	<ul style="list-style-type: none"> We do not believe that EMC should be the appropriate entity to publish the requested import data. The Daily Trading Report is not under the market rules.
11	Alignment of performance standards of Interruptible Load scheme and Spinning Reserves	1.29	N	3	<ul style="list-style-type: none"> This issue on IL has been addressed previously by RCP and concluded to compensate IL accordingly. This was implemented (compensation to IL) accordingly. Under the current rule, there are proper compensation framework in place if IL activations lasted for more than 120 minutes. Moreover, EMA will undertake a comprehensive review of the IL product after the cessation of the IL sandbox. EMA has also announced that IL activation duration will be reduced to half-hourly intervals. Propose to remove as IL has undergone a 2-year sandbox and final determination has been made to retain existing framework.
29	Incorporation of Behind-the-Meter Energy Storage Measurements into Demand Response Performance Verification	1.27	N	3	<ul style="list-style-type: none"> It is related to the Metering code. The behind-the-meter BESS is part of the load facility which affects the final import of electricity by the load facility. When bidding for demand response, the load facility should already have accounted for the BESS charge or discharge. The proposal to exclude the behind-the meter BESS from DR assessment introduces room for gaming by such DR participants.

Issue No.	Issue Title	Rank (Simple Average)	Work Started ?	Propose to Remove	Summary of Reasons for Removal
13	Provisions regarding settlement bank and settlement account	1.17	N	2	<ul style="list-style-type: none"> Propose to remove as rule change for multiple settlement accounts for MPs with diversified portfolio is ongoing. MPs can also perform funds transfer between its multiple bank accounts to serve the same purpose.
14	Review of Automatic Financial Penalty Scheme (AFPS)	0.92	N	6	<ul style="list-style-type: none"> AFPS was reviewed last year in RC394 on <i>Exemption From Automatic Financial Penalty Scheme For Deviating Generation Registered Facilities On Free Governor Control</i>. Propose to remove. While partial forced outage is not provided with AFPS exemption, it is also not penalised on its PoF. The penalty on PoF and AFPS exemption should come as a pair. The unit should not be able to benefit from both sides. As a unit that experienced partial outage is able to still generate albeit at lower load, it should not be considered a full outage.

5. Approach to Prioritisation

EMC recommends that the RCP consider the following in its deliberation:

- Ranking by stakeholders – The rankings indicate which issues will likely impact the market performance most.
- Ongoing issues – EMC expended considerable effort on ongoing issues. Therefore, it would be sensible to continue with these work streams.
- Issues that address similar concerns should be combined for efficiency.
 - a. Since Issue 3: **Review of Scope and Framework for Compensation Arising from Complying with PSO Issuing Overriding Dispatch Instructions** and Issue 28: **Compensation Framework for Battery Energy Storage Systems (BESS) Forced Dispatch/Schedule** shares similar compensation concerns, EMC recommends consolidating them for a more efficient review. During a preliminary check-in with EMA, EMA expressed preference for the ESS compensation philosophy to be aligned with EMA's compensation methodology that is currently under development. By combining these issues, EMC can review compensation issues holistically and consistently throughout.
- As supported by the RCP in its 120th meeting, to maintain the efficiency and quality of the prioritisation exercises, existing issues not ranked in the top half in the 3 immediately preceding exercises will be automatically removed from the current prioritisation exercise.

The following 3 issues will be automatically removed from the Work Plan as the stakeholders did not rank the issues in the top 50 percentile in the 3 immediately preceding exercises³:

- a. **Issue 11: Alignment of performance standards of Interruptible Load scheme and Spinning Reserves**
- b. **Issue 13: Provisions regarding settlement bank and settlement account**
- c. **Issue 14: Review of Automatic Financial Penalty Scheme (AFPS)** – this issue was also proposed to be removed from the Work Plan by stakeholders, receiving 6 votes for removal.
- EMC's view is that the following issues, rated significantly by stakeholders, are issues that fall under the purview of the EMA. EMC proposes referring these issues to EMA as they would be better equipped to address them effectively.
 - a. **Issue 29: Incorporation of Behind-the-Meter Energy Storage Measurements into Demand Response Performance Verification**
 - b. **Issue 30: Setting the appropriate Reserve and Regulation requirements**
 - c. **Issue 31: Review of Directed Supply Scheme (DSS) instruction criteria**
- Additionally, EMC proposes the removal of the existing issue below where significant work has already begun. This workstream overlaps with an existing workstream under EMA on "*Harnessing Distributed Energy Resources via Virtual Power Plants to Provide Energy and Ancillary Services in the Singapore Wholesale Electricity Market*". It will be more appropriate and efficient to address this matter via the workstream under EMA.
 - a. **Issue 8: Review of Rules Governing Participation and Offers for Batteries and Distributed Energy Resources**

Considering the above, EMC proposes for the RCP to discuss the Work Plan (Table 3) for the next 12 months starting from April 2026 to March 2027. EMC has included the top-ranked issues for RCP's consideration.

³ As supported by the RCP at its 120th meeting

Table 3: Work Plan Issues to be Addressed in the Next 12 Months

Serial No.	Issue Title	Issue No.
1	Holistic review of the current prudential requirement obligations and its enforcement process under the market rules	1
2	Holistic review of the Market Rules related to cessation of business, liquidation and insolvency	2
3	Review of Scope and Framework for Compensation Arising from Complying with PSO Issuing Overriding Dispatch Instructions	3
4	Facilitating Integration of Large-Scale Imports into the Market	4
5	Exemption from Gate Closure Rules for cancelled synchronisation	7
6	Load forecasting and MCE dispatch and price determination when contracted Fast Start unit(s) is performing monthly test or during actual activation	8
7	When energy, reserve or regulation shortfall situation applies, allow for offers of additional quantities of energy, reserve and regulation	19
8	Review Reserve Responsibility Share (RRS) calculation	9
9	Review of Constraint Violation Penalty (CVP)	32
10	Enhance the publication frequency of the Pre-Dispatch Schedules (DAR) from every 120 minutes to 60 minutes	18
11	Review of Regulation Effectiveness Factor or similar compensation scheme to reward greater responsiveness of facilities for Regulation	10
12	Additional Market Re-run for Meter Data Error discovered between First and Second Nominated Day	15

6. Conclusion

The panel, having considered the list of 25 issues and EMC's recommendations, made the following decisions:

- **The Rules Change Work Plan 2026**

The RCP agreed on the Rules Change Work Plan 2026 (as set out in Table 3) and tasked EMC to monitor its progress.

- **Issues to be Referred**

The RCP agreed to refer the following issues to the EMA:

- Issue 29: **Incorporation of Behind-the-Meter Energy Storage Measurements into Demand Response Performance Verification**
- Issue 30: **Setting the appropriate Reserve and Regulation requirements**
- Issue 31: **Review of Directed Supply Scheme (DSS) instruction criteria**
- Issue 8: **Review of Rules Governing Participation and Offers for Batteries and Distributed Energy Resources**

- **Issue to be Combined**

- Issue 28: **Compensation Framework for Battery Energy Storage Systems (BESS) Forced Dispatch/Schedule**

- **Issues to be Removed**

The RCP had no objections to the automatic removal of the following three issues which were ranked in the bottom half in 3 consecutive exercises:

- Issue 11: **Alignment of performance standards of Interruptible Load scheme and Spinning Reserves**
- Issue 13: **Provisions regarding settlement bank and settlement account**
- Issue 14: **Review of Automatic Financial Penalty Scheme (AFPS)**

Annex 1: RCP Work Plan finalised at the 146th RCP Meeting on 13 March 2025

No.	Issue Title	Status
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(After the 150th RCP Meeting in January 2026)

Issues from the Rule Change Work Plan 2025

In-Progress (1 of 4 proposals completed)

EMC has explored potential changes to the current prudential requirements to enhance the financial integrity of the Wholesale Market to withstand market volatility and to strengthen the resiliency of all retailers.

The concept paper has been discussed at the 137th meeting, where four proposals were presented for RCP's discussion.

- (1) Proposal 1: Shortening of the Settlement Cycle (By streamlining of processes within the Settlement Cycle)
- (2) Proposal 2: Adjustment of Average Daily Exposure Calculation
- (3) Proposal 3: Reconfiguration of Credit Support (To consider insurance bonds and mandating a mix of credit support instruments)
- (4) Proposal 4: Residual Default Risk Insurance (Guarding against potential default levy).

1 Holistic review of the current prudential requirement obligations and its enforcement process under the market rules, Review sufficiency of credit support taking into account price volatility.

The Panel has tasked EMC to prioritise Proposals 1 and 3 and defer the consideration of Proposals 2 and 4 until there is more clarity on the execution and ramifications of the EMA's Final Determination on the Enhancement to the Regulatory Regime for Retailers.

EMC has studied proposal 3 and tabled the concept paper to the 142nd RCP meeting. At the meeting, the RCP discussed the proposal and decided to remove T-bill as an acceptable form of credit support. The relevant rule change required to give effect to the RCP's decision was tabled at the 143rd RCP meeting and supported by the RCP. The rule change had since been approved by the EMA.

EMC has tabled Proposal 4 in the 150th RCP meeting. At the meeting, the RCP unanimously agreed on the proposal to not introduce any new mechanism to address residual default risk and focus on reviewing existing prudential requirements with the intent to update exposure calculation and low potential market exposure (Proposal 1 and 2).

No.	Issue Title	Status (After the 150 th RCP Meeting in January 2026)
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2	<p>Holistic review of the Market Rules related to cessation of business, liquidation, and insolvency</p>	<p>In-Progress</p> <p>This proposal is a continuation of RC367: Review of Allowable Remedies for Events of Default.</p> <p>This proposal calls for a review of the rules to clarify the powers EMC and MSCP have under applicable legislations against an MP that has become insolvent. This includes a review of various current processes regarding events of default.</p> <p>EMC has explored solutions/actions that EMC may take against an insolvent MPs in order to protect the financial integrity of SWEM.</p> <p>EMC has consulted MSCP on the possible solutions and sought legal advice on the legality of these actions to ensure the solutions are consistent with other applicable laws.</p> <p>The concept paper was published for industry comments in Oct 2023 and was supported by RCP at its 138th meeting. EMC is drafting rule modification to give effect to the solutions</p>
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3	<p>Review of Scope and Framework for compensation arising from complying with PSO issued overriding dispatch instructions</p>	<p>In-Progress</p> <p>This proposal involves a review of the scope and framework for compensation.</p> <p>At the 130th and 131st RCP meetings, the RCP discussed the proposal regarding “Price Revision when Unanticipated Load Shedding Occurs and when PSO Issues Overriding Instructions”, which involved discussing a) the suggestions of price revision, particularly for periods when there is real time power interruption, and when the PSO issues overriding instructions; and b) compensation framework for generators that are adversely affected under such scenarios.</p> <p>The Panel has agreed to review both issues a) and b) together.</p> <p>This issue is currently on hold as EMA had expressed a preference to manage the compensation methodology internally.</p>
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4	<p>Facilitating Integration of Large-Scale Imports into the Market</p>	<p>In-Progress</p> <p>EMA has announced the conditional approval of large-scale electricity imports from Cambodia, Indonesia, and Vietnam. EMC is working with EMA to identify the scope of rule changes required to be made to facilitate these import projects at different stages and prioritise the rule change items accordingly.</p>
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No.	Issue Title	Status (After the 150 th RCP Meeting in January 2026)
		<p>In-Progress</p> <p>EMC has conducted internal studies on how existing participation model(s) for generation facilities can be enhanced to adapt to various business models of different distributed energy resources.</p> <p>However, as this workstream has significant overlap with a workstream under the EMA on “Harnessing Distributed Energy Resources via Virtual Power Plants to Provide Energy and Ancillary Services in the Singapore Wholesale Electricity Market”, EMC will propose for its removal from the Work Plan in the upcoming prioritisation exercise.</p>
6	Publication of other Temporary Price Cap (TPC) information	<p>Completed</p> <p>This paper assesses the proposal to publish of information relating to the Temporary Price Cap (TPC) mechanism.</p> <p>The concept paper was presented to RCP at the 141st RCP meeting. The Panel in principle supported the conceptual proposal.</p> <p>At the 144th RCP meeting, the Panel assessed the EMC’s proposal on the implementation approach and effort required.</p> <p>At the 146th RCP meeting, EMC tabled the rule changes to effect the RCP’s decisions on this proposal; the rule changes were unanimously supported by the RCP.</p>
7	Review of Obligation to Act Within 5 Minutes When an Action is to be Taken “Promptly” or “Immediately”	<p>Not Started</p>
8	Exemption from Gate Closure Rules for cancelled synchronisation	<p>In Progress</p> <p>At the 150th RCP meeting, EMC tabled a concept paper reviewing gate closure exemptions for cancelled synchronization. RCP agreed with EMC’s recommendation and tasked EMC to draft the relevant rule change modifications. EMC plans to table a paper on said rule change modifications at the 151st RCP meeting.</p>
9	Load forecasting and MCE dispatch and price determination when contracted Fast Start unit(s) is performing monthly test or during actual activation	<p>In Progress</p> <p>EMC has initiated internal analysis on load forecasting and price determination when contracted Fast Start units undergo monthly tests or are activated. EMC plans to discuss with relevant stakeholders before tabling a concept paper.</p>
10	Review Reserve Responsibility Share (RRS) calculation	<p>Not Started</p>

No.	Issue Title	Status (After the 150 th RCP Meeting in January 2026)
11	Exclude provisional prices from Temporary Price Cap (TPC) Moving Average Price (MAP) calculation	Completed The concept paper was presented to RCP at the 148 th RCP meeting. The Panel supported the proposal not to exclude provisional prices from the MAP calculation.
12	Provision under Automatic Financial Penalty Scheme (AFPS) to exempt any Generation Registered Facility (GRF) on local control that deviated from its scheduled load due to frequency response	Completed At the 149 th RCP meeting, the RCP unanimously supported the removal of the exemption's dependency on the occurrence of a power system disturbance event.
Other Work Plan Issues		
13	Review of Regulation Effectiveness Factor or similar compensation scheme to reward greater responsiveness of facilities for regulation	Not Started
14	Alignment of performance standards of Interruptible Load scheme and Spinning Reserves	Not Started
15	Review of gate closure exemptions following a forced outage	Not Started
16	Provisions regarding settlement bank and settlement account	Not Started
17	Review of Automatic Financial Penalty Scheme (AFPS)	Not Started
18	Additional Market Re-run for Meter Data Error discovered between First and Second Nominated Day	Not Started

No.	Issue Title	Status
(After the 150 th RCP Meeting in January 2026)		
19	Modelling of on-site ambient temperature into the MCE such that GTs/CCPs' maximum capacity are adjusted dynamically	Not Started
20	Introduction of SWIFT as a form of Bank Guarantee	Not Started
21	Enhance the publication frequency of the Pre-Dispatch Schedules (DAR) from every 120 minutes to 60 minutes	Not Started
22	When energy, reserve or regulation shortfall situation applies, allow for offers of additional quantities of energy, reserve and regulation	Not Started
23	Refund of credit support to market participants (MPs) who have closed the designated bank account for NEMS settlement	Not Started
24	Review of standing probability of failure (SPF) for new commissioning Generation Registered Facility (GRF) and Import Registered Facility (IRF)	Not Started
25	Review of the gate closure exemptions	Not Started
26	Revise the frequency on publication of the Daily 14-days Adequacy and Security Assessment (ASA) Reports to weekly ASA Reports	Not Started

No.	Issue Title	Status
(After the 150 th RCP Meeting in January 2026)		
27	Optimizing Battery Energy Storage System (BESS) Participation in the Regulation Market: A Proposal for Split Regulation Categories	Not Started
28	Publishing of electricity import data split into categories based on how “green” the electricity import is	Not Started
29	Increasing offered quantity within gate closure due to technical constraints	Not Started
30	Allow representation in voting for RCP members who are unable to attend RCP meetings	Not Started

Annex 2: Issues for Consultation and Stakeholders' Comments

Issue Description

1. Holistic review of the current prudential requirement obligations and its enforcement process under the market rules

Issue description

This issue suggests a review of the existing prudential requirements to mitigate the risk and reduce the financial impact to non-defaulting MPs in the event of default. At the 137th RCP meeting, the RCP supported EMC's proposal to structure this issue into 4 sub-proposals as follows:

a) Proposal 1: Shortening of the Settlement Cycle

Where processes within the current 20-day settlement cycle can be streamlined, there will be a reduction of credit support requirements owing to lower exposure for MPs.

b) Proposal 2: Adjustment of the Average Daily Exposure Calculation

The Average Daily Exposure (ADE) is a 90-day rolling simple average of an MP's net settlement amounts. The ADE being a simple average may not fully capture recent price spikes. Adjustments to the ADE formula, which can include adjustments to the calculation period or method, will be explored.

c) Proposal 3: Reconfiguration of Credit Support

It is proposed to review the current allowed forms of credit support, including whether to consider insurance bonds that could free up cash or credit lines for the MP, and whether MPs should be mandated to provide credit support consisting of each instrument (for e.g., to provide a set proportion in cash, a set proportion as a Banker's Guarantee, etc).

d) Proposal 4: Residual Default Risk Insurance

It is proposed to explore implementing a tail-end risk insurance scheme as an additional layer of safeguards before EMC will have to impose a default levy on non-defaulting MPs. Such insurance may be funded by annual premiums collected by all MPs.

Status

In-progress – no rating required. The Panel has tasked EMC to prioritise Proposals 1 and 3 and defer the consideration of Proposals 2 and 4 until there is more clarity on the execution and ramifications of the EMA's Final Determination on the Enhancement to the Regulatory Regime for Retailers.

EMC has studied proposal 3 and tabled the concept paper to the 142nd RCP meeting. At the meeting, the RCP discussed the proposal and decided to remove T-bill as an acceptable form of credit support. The relevant rule change required to give effect to the RCP's decision was tabled at the 143rd RCP meeting and supported by the RCP. The rule change had since been approved by the EMA.

EMC has tabled Proposal 4 in the 150th RCP meeting. At the meeting, the RCP unanimously agreed on the proposal to not introduce any new mechanism to address residual default risk and focus on reviewing existing prudential requirements with the intent to update exposure calculation and low potential market exposure (Proposal 1 and 2).

2. Holistic review of the Market Rules related to cessation of business, liquidation and insolvency

Issue description

This proposal is a continuation of RC367: Review of Allowable Remedies for Events of Default. This proposal calls for a review of the rules to clarify the powers EMC and MSCP have under applicable legislations against an MP that has become insolvent. This includes a review of current processes regarding events of default, namely:

- a) To clarify the course of action when multiple events of default happen concurrently
- b) To clarify whether post-commencement debts can be collected or whether EMC and other creditors would have to file a Proof of Debt with the liquidator
- c) To specify the applicant for a leave of court in cases of default involving insolvency, such that the applicant can make its case in a suspension hearing.

- d) To allow direct termination orders for MPs under dissolution or winding up.
- e) To allow automatic suspension orders for MPs ceasing or intending to cease their business operations.
- f) To stipulate an automatic suspension process when a suspension hearing is not required
- g) To align the responsibilities of a suspended retailer in the market rules vis-a-vis the Retailer Code of Conduct.

This proposal would help ensure the market rules are aligned with applicable legislations in default events involving insolvent MPs.

Status

In-progress – no rating required. At the 138th RCP meeting, the RCP discussed EMC’s proposal on an automatic suspension framework to allow the timely suspension of market participants who had incurred insolvency-related events of default, preventing them from accumulating excessive exposure in the market. The RCP supported this proposal and had tasked EMC to draft the relevant rule modifications to effect said proposal. EMC has explored solutions/actions that EMC may take against an insolvent MPs in order to protect the financial integrity of SWEM.

EMC has consulted MSCP on the possible solutions and sought legal advice on the legality of these actions to ensure the solutions are consistent with other applicable laws.

The concept paper was published for industry comments in Oct 2023 and was supported by RCP at its 138th meeting. EMC is reviewing the draft rule modifications and other related areas to give effect to the RCP’s decision.

3. Review of Scope and Framework for Compensation Arising from Complying with PSO Issued Overriding Dispatch Instructions

Issue description

The NEMS is an “energy-only” wholesale electricity market, where the only source of remuneration for generators is the revenue from the sale of electricity and provision of ancillary services. Price signals serve to encourage market participants to operate their assets and undertake new investment efficiently.

- a) It is proposed that the wholesale market price be revised to the market price cap of \$4,500/MWh ex-post to reflect the scarcity of capacity in real time power interruption event in order not to undermine the investment signals in an energy-only wholesale electricity market.

When PSO overrides dispatch instructions generated by the MCE, the market prices may remain artificially suppressed leading to distorted price signals and affecting the ability of a well-functioning energy-only market to convey price signals to MPs that encourage them to operate their assets and undertake new investments efficiently.

It is proposed that when PSO overrides dispatch instructions in real-time, a MCE rerun be conducted ex-post to produce a market price which reflects the PSO’s dispatch instructions. For instance, if the PSO instructs a peaking plant to generate even though it was not scheduled by the MCE, the prices in that period should be revised to reflect that such a peaking plant was running.

The previous proposal on compensation sought to review the framework for compensation, in particular with regards to Section 5.6.2 of Chapter 5 of the Market Rules, and proposed a framework to determine compensation claim amounts, as a pre-determined methodology for compensation would reduce uncertainty and administrative burden for MPs. It also proposed to expand the scope of compensation to include abnormal events in the PSO controlled system that can affect the output of any GRF.

Status

In progress – no rating required. The RCP agreed in principle to resolve the issues of compensation and price revision together, due to the interlinked nature between the two issues. The issue is on hold, noting that EMA had expressed a preference to manage the compensation methodology internally.

4. Facilitating Integration of Large-Scale Imports into the Market

Issue description

One significant avenue to realise Singapore’s net-zero aspirations is to have imports of low-carbon electricity from other countries. Market changes are required to facilitate the integration of such large-scale imports into the market.

a) Enable Imports Registered Facilities (IRFs) to participate in Reserves and Regulation

Presently, IRFs do not provide reserve/reserve payment and regulation services. For parity with local generators, IRFs should be able to participate in these product markets.

b) Settlement framework for electricity imports

Energy via the existing interconnector with Malaysia is based on “pay-as-scheduled”. In future, imports should be “pay-as-metered”, as announced by https://www.ema.gov.sg/cmsmedia/Electricity/Imports/Electricity-Imports-Guide_v1.1_1Jul2022.pdf EMA.

c) Enable multiple importers to use a single interconnection

For shared interconnections, a “single aggregator” approach by default is preferred, where settlement, cost allocation and reserve requirements are to be settled by one aggregator across the shared interconnection. Currently, there is no such “single aggregator” entity in the Market Rules. Also, a fallback approach is required if settlement with the default “single aggregator” fails (e.g., how then should costs be equitably distributed to each importer).

Status

In progress – no rating required. EMA has announced the conditional approval of large-scale electricity imports from Cambodia, Indonesia, and Vietnam. EMC is working with EMA to identify the scope of rule changes required to be made to facilitate these import projects at different stages and prioritise the rule change items accordingly. EMC is working with EMA to further identify the scope of the rule changes required to be made to facilitate the import projects at various stages, and to prioritise each item accordingly.

5. Review of rules governing participation and offers for batteries and distributed energy resources

Issue description

With the imminent increase in the participation of resources such as batteries and distributed energy resources (e.g., virtual power plants), this proposal calls for a review of relevant rules governing their participation to better respect the characteristics of these facilities.

a) Introduction of a new facility category for batteries

Batteries have a two-way energy flow, differentiating it from most existing generation and load facilities. They are most closely tied to the GRF classification, which caters mostly for generating units exporting energy to the grid, and the embedded generator classification may not be suitable due to the minimal auxiliary load consumption of batteries. A new category catering to facilities like batteries could smoothen the registration processes for such facilities.

b) Review of gate closure provisions for batteries

Batteries’ generation capacity can vary more quickly, tied to factors such as their state-of-charge. The current 65-minute gate closure provisions can hence be restrictive for batteries. A review of

these provisions would allow batteries to better reflect real-time operational conditions through their offers.

c) Allowing the provision of regulation at the low-tension level from facilities such as the virtual power plant

As the grid becomes increasingly decentralized, market participation at low tension (LT) should be explored. This will expand and diversify the source of regulation/reserve services from which PSO/EMC can procure.

Status

In progress – no rating required. EMC has conducted internal studies on how existing participation models for generation facilities can be enhanced to adapt to various business models of various distributed energy resources.

However, as this workstream has significant overlap with a workstream under the EMA on “Harnessing Distributed Energy Resources via Virtual Power Plants to Provide Energy and Ancillary Services in the Singapore Wholesale Electricity Market”, EMC will propose for its removal from the Work Plan in the upcoming prioritisation exercise.

6. Review of obligation to act within 5 minutes when an action is to be taken “promptly” or “immediately”

Issue description

Under the current Market Rules in section 1.2.5 of Chapter 5, wherever the Chapter specifies that an action is to be taken “promptly” or “immediately”, actions shall be taken within 5 minutes. It has been raised with the MAU/MSCP that 5 minutes is unreasonable and insufficient for a genco to update the corrected status of the facility (e.g., when there is a trip). More time is usually required to investigate the technical issues encountered.

This was raised during two cases of non-compliance with PSO’s directions that MAU investigated. The facilities encountered a technical issue and were unable to comply with the directions from PSO. To confirm if the facility will still be able to follow the instructions as directed, despite the technical issue, the maintenance team was required to be at the scene to check. 5 minutes was not sufficient to confirm the technical issue, try to fix the incident and attempt to start up to comply with PSO directions.

It is proposed to review the obligation to act within 5 minutes when an action is to be taken “promptly” or “immediately”.

The MAU/MSCP notes the urgency for PSO to be notified, so that there is sufficient time to alleviate situations of contingency shortfall, high-risk operating state and/or emergency operating state. Therefore, this timing is proposed to be revised and evaluated in consultation with the PSO, such that it allows gencos to “promptly” resolve technical issues, while providing the PSO sufficient time to direct alternative generation facilities to alleviate tight supply conditions.

Status

Not started

Comments on Issue Description, Scope, etc

- **Changes should be incorporate without the RCP Work Plan Prioritization exercise.**
- **More time should be allowed for personnel to check on the situation before a response can be provided**

7. Exemption from Gate Closure Rules for cancelled synchronisation

Issue description

We would propose to include two new gate closure exemption rules under Section 10.4.1.1 of the Market Rules (i) to account for cancellations / delays of synchronisation arising from an unanticipated

technical fault/issue, and (ii) to bring forward the synchronisation where the technical fault/issue is resolved earlier than expected.

Under the existing Market Rules, a GRF will be exempted from the gate closure rules if it fails to synchronise. However, there might be instances whereby prior to synchronisation, a facility may be required to:

- Cancel the synchronisation due to an unanticipated technical fault;
- Delay the synchronisation for investigation of new issues which have arisen i.e., an alarm is triggered; and
- Bring forward the synchronisation as the technical fault/issue is resolved.

The gate closure exemptions should be extended to account for the above.

Status

In progress – no rating required.

At the 150th RCP meeting, EMC tabled a concept paper reviewing gate closure exemptions for cancelled synchronization. RCP agreed with EMC's recommendation and tasked EMC to draft the relevant rule change modifications. EMC plans to table a paper on said rule change modifications at the 151st RCP meeting.

8. Load forecasting and MCE dispatch and price determination when contracted Fast Start unit(s) is performing monthly test or during actual activation

Issue description

When performing the monthly tests or during actual activation, the fast start units are expected to generate >100 MWh per hour of energy into the system.

The running of the fast start units is an out of market activity; its generation output artificially displaces the system requirement from the other generation facilities. At the moment, it is not clear how the demand forecast, MCE dispatch and price determination will be impacted when the fast start units are dispatched.

We propose an efficient market re-run methodology whenever the fast start units are operated. Depending on how the demand forecast, MCE dispatch and price determination will be impacted, the MCE should re-run as-if generation from the fast start unit was not available to offset the artificial market disturbance.

This will ensure that market integrity and the price formulation process is not disturbed by artificial out-of-market activities. The price formulation process would not be impacted by artificial out-of-market activities.

Status

In progress – no rating required. EMC has initiated internal analysis on load forecasting and price determination when contracted Fast Start units undergo monthly tests or are activated. EMC plans to discuss with relevant stakeholders before tabling a concept paper.

9. Review Reserve Responsibility Share (RRS) calculation

Issue description

Currently, RRS is calculated for GRFs, based on the modified runway model. GRFs are allocated more RRS depending on their probability of failure (POF). To include RRS for solar generators.

Solar generators contribute energy to the system and could trip or disconnect from the grid due to system exigencies, as described in the Intermittent Pricing Mechanism (IPM) final determination paper as "Expected % Output Reduction Rate (EORR)". Hence, they should also pay a share of reserve costs, as they are also posing a risk to the market. This will send the right market signals and ensure that solar

generators pay a fair share of ancillary services, and it will incentivise them to invest in systems to reduce their intermittency.

To add on, the IPM paper which was first published in 2017 and its final determination paper in 2018 mentioned that the IPM will be implemented around 2020. However, in Dec 2020 EMA shared that the IPM will be deferred, and an industry consultation on an enhanced IPM in 2H 2021 will be launched. To date, the consultation paper on the enhanced IPM has yet to be published and we are hoping to kick-start this process to ensure that the SWEM maintains its causer-pays principle.

Status

Not started

Comments on Issue Description, Scope, etc

- **Good to review, but the mechanism needs to be elaborated and clarified, the IPM paper has not been updated in a while and with almost 2 years of Solar injection and dispatch data, EMC should relook into this using the latest data available**

10. Review of Regulation Effectiveness Factor or similar compensation scheme to reward greater responsiveness of facilities for Regulation.

Issue description

This proposal calls for the addition of a compensation scheme for Fast Regulation. This can be done via a review of Regulation Effectiveness Factor consultation paper. Alternatively, a premium can be paid on top of Regulation price when a facility provides Regulation at a distinctively higher rate compared to conventional generation facilities, e.g., Reg D vs Reg A in PJM, or if the facility can ramp up to the desired power output level within a specific timeframe (e.g., 10 seconds).

As intermittent renewable energy sources are progressively integrated into the electricity grid, the grid is increasingly susceptible to high frequency fluctuations and instability. As such, the grid will benefit from generating units with faster response time. Generation/Regulation facilities should be rewarded based on the response speed to reflect the energy and cost efficiencies as a result of a faster response rate and stabilisation of grid frequency. This will improve commercial feasibility of facilities such as Energy Storage Systems (ESS) in providing Regulation services.

Comments on Issue Description, Scope, etc

- Fast responding resources (including BESS/VPP) provide disproportionate system value as intermittency increases. We support introducing a mechanism (e.g., effectiveness factor or premium) that rewards response speed/accuracy, to strengthen investment signals and improve system stability.
- Other than reviewing the regulation effectiveness factor for generator, the same should be applied to ESS as well. There is an urgency to implement this as ESS is already in operation and more such facilities maybe required to support more renewable sources in our power system.
- Provides a commercial case to increase ESS adoption.
- Adding a premium effectively means raising the Regulation Price cap. The current Regulation Price cap is the result of a direction by EMA in 2009. EMA should first be consulted on this.

11. Alignment of performance standards of Interruptible Load scheme and Spinning Reserves

Issue description

Given ILs' ability to directly compete with generators in the Contingency Reserve market, ILs should be held to a similar performance standard as spinning reserves, where activation should be met by load shedding within 10 minutes and held for 30 minutes instead of the current process of an unstipulated

period of interruption (where restoration of interrupted load can only occur upon receipt of PSO's clearance message).

Having a more defined load interruption window will provide more certainty and lower the barrier to entry for more loads that wish to participate in the IL scheme, since many interested load facilities may not be designed for long-term interruption.

Aligning the performance standards should also consider a penalty system where IL providers are penalized for the full/partial non-performance based on counterfactual reserve prices if such non-performance was removed from the market clearing run, since ILs are not allocated any reserve costs.

This change will hence allow ILs to remove or reduce reserve offers outside of gate closure to reflect their true capability to provide reserves for an extended period of time, creating an IL scheme that is more congruent with incentivizing load participation as a supplementary source of reserves to NEMS.

Comments on Issue Description, Scope, etc

- As an IL provider/aggregator, we support clearer and more predictable IL activation/holding requirements to reduce barriers for more C&I loads to participate. A defined activation duration (e.g., 30 minutes) can improve participation and planning. We would love to see penalty frameworks calibrated and account for aggregator-operated resources (including BTM BESS) that can reliably meet response requirements.

12. Review of gate closure dispatch periods following a forced outage

Issue description

Shell Eastern Petroleum is a process site. GRFs are process driven. During a trip, operations will need to focus on stabilizing the process unit before proceeding to perform the forced gate closure. This will allow more time for operations to react to the site situation. It is proposed to revisit gate closure exemptions, which is to revise the number of consecutive dispatch periods exempted from gate closure from three to five.

Comments on Issue Description, Scope, etc

- **While exemption is applied to 5 periods instead of 3, it should remain that GRF only need to reflect its revised capability for the 3 consecutive dispatch periods and not 5 (Chapter 6, section 10.4.1.1 b).**

13. Provisions regarding settlement bank and settlement account

Issue description

(a) Introduction of settlement account flexibility and settlement bank diversification

MPs are currently restricted to one bank account for settlement purposes with the settlement bank (i.e. OCBC).

This proposal is intended to improve options available to MPs and also diversify settlements to flow through more than one financial institution. This can be performed by (a) introducing multiple settlement banks, and (b) allowing a MP to nominate which account is to be used for the settlement of the designated service(s) and/or (c) introducing a GIRO arrangement for settlement.

This will provide greater flexibility to MPs and also improve the ability of the market to sustain operations in the situation if the settlement bank were to become unstable.

(b) Allowing MPs without embedded generators to have multiple settlement accounts

At the 82nd RCP Meeting, when the Panel was discussing RC333 (Rectification of Settlement Formula for Net Participant Settlement Credit), Mr. Dallan Kay noted that MPs without embedded generators (EGs) are allowed to have only 1 settlement account. He requested allowing MPs without EGs to also be able to have multiple settlement accounts, for greater flexibility.

14. Review of Automatic Financial Penalty Scheme (AFPS)

Issue description

Waste-to-Energy Plants GRF comprises two steam turbo generators. Due to the plant design, the two steam turbo generators have to be registered as a single GRF. The tripping of a turbo generator is only considered as a partial forced outage, and thus do not exempt the GRF from the AFPS. Tuas South Incineration Plant thus suggests for the forced outage of one of its turbo generators to also be considered as a full outage of the GRF.

15. Additional Market Re-run for Meter Data Error discovered between First and Second Nominated Day

Issue description

It is proposed to have an additional re-run on T + 120 business days so that meter errors discovered can be settled more efficiently.

Currently, the MSSL submits corrected meter data for metering errors to EMC following the timeline below.

Metering errors discovered up to:	Deadline for submission of corrected metering data to EMC:
T+9 business days	On T+9 business days, 5:00pm
First nominated day	After T+9 business days, 5:00pm and no later than T+47 business days, 5:00pm
Second nominated day	After T+47 business days, 5:00pm and no later than T+252 business days, 5:00pm

Under the current process, the second re-run is supposed to cater for the very rare case of meter error adjustment. However, we observe an increasing number of metering adjustments discovered after first re-run and thus can only be settled after the second re-run has been done. The cash flow impact of these metering errors falls on retailers and consumers, both of whom have no control over the errors.

As such, it is proposed to have an additional re-run on T + 120 business days so that the majority of meter errors discovered can be settled more efficiently.

16. Modelling of on-site ambient temperature into the MCE such that GTs/CCPs' maximum capacity are adjusted dynamically

Issue description

A GT/CCP's maximum capacity falls as on-site ambient temperature increases. This issue looks at modelling this linkage between the GT/CCP's maximum capacity and ambient temperature into the MCE, such that their maximum capacities can be adjusted dynamically by the MCE for the purpose of scheduling energy, reserve and regulation.

Table: Ambient Temperature Historical Extremes (source: NEA website)

	Highest Daily Max Temp (Deg C)	Date	Est. Loss of CCP Registered Capacity (MW)
Annual	37.0	17/4/1983	356
Jan	35.4	26/1/2020	249
Feb	36.0	23/2/2005	289

Mar	36.6	4/3/2010	329
Apr	37.0	17/4/1983	356
May	36.5	3/5/2016	323
Jun	36.2	10/6/2014	303
Jul	36.0	3/7/2016	289
Aug	35.4	9/8/2020	249
Sep	36.8	30/9/2016	343
Oct	35.7	13/10/2019	269
Nov	35.8	18/11/2019	276
Dec	35.9	6/12/2016	283

On a monthly basis, the highest daily maximum ambient temperature was registered in the last 5 years from 2016 to 2020. It will result in the estimated loss of CCP capacity which can range from 249 to 356MW, equivalent to one CCP not available under high ambient temperature because combustion turbines have power output that is inversely proportional to their inlet air temperature. As climate change is a real concern, it is important to the reliability of the PSO-controlled system that there is better recognition of weather capability in operations.

PSO has real-time ambient temperature from the Gencos for each CCP and PSO is already sending the real-time ambient temperature data of each CCP to the EMC. This rule change should be prioritised as contribution of electricity generations from CCPs has increased to above 95%. MCE should schedule generation facilities based on their effective capacity and not a fixed registered capacity which the generation facility cannot attain under high ambient temperature. This will have impact on system security. Noted that no additional testing is required from the generators as the ambient temperature effect on CCP's rated capacity can be referenced against the generation output vs temperature curve.

17. Introduction of SWIFT as a form of Bank Guarantee

Issue description

This proposal calls for SWIFT to be allowed as a form of a banker's guarantee (BG) for an MP's credit support provision.

The current process of raising or amending a BG takes more time and effort than it should. After the BG is raised by a bank, the Market Participant (MP) will require a minimum of 3 – 5 days for it to take effect. MPs will also have to give EMC advance notice for the collection of the physical copy of the BG at EMC's premises.

Streamlining this process with the introduction of SWIFT as a form of BG will greatly reduce administrative efforts for all parties involved. EMC will be able to receive the new BG electronically on the same day, and no physical copy will be required.

Removing the need to receive a physical copy of the BG will not only be in line with Covid '19 best practices, but it will also be environmentally friendly. It could enable the market to be nimbler should sudden changes in BG requirements arise.

18. Enhance the publication frequency of the Pre-Dispatch Schedules (DAR) from every 120 minutes to 60 minutes

Issue description

It is proposed that the frequency with which the Pre-dispatch Schedule (PDS, also known as the Day Ahead Run or DAR) is produced be increased from every 2-hour interval to 1-hour interval.

At present, the PDS includes the forecast for the next day after 10am each day and refreshes every 2 hours.

It is also noted that in the context of the Directed SLF Scheme, currently, market participants are required to submit day-ahead offers by the 6pm DAR run to adhere to EMA's standing direction-A. With the 120-minute interval allowing only four DAR runs (e.g., at 10am, 12pm, 2pm, and 4pm), Gencos face constraints in structuring and finalizing their offers before the crucial 6pm DAR run. Increasing the number of DAR runs provides Market Participants (MPs) with enhanced visibility, ensuring optimal dispatch of generation units, especially in the face of greater intermittent generation, such as renewables.

A higher frequency of DAR runs beyond 6pm offers PSO greater visibility, allowing for a more comprehensive assessment and determination of appropriate regulatory interventions. This becomes crucial to avoid instances of over-intervention, as observed when MPs could only submit offers by the 8pm DAR, while PSO had already issued regulatory interventions based on the 6pm DAR. Such scenarios result in market over-intervention. Market over-intervention proves to be ineffective and inefficient in the long run, leading to the wasteful expenditure of taxpayer money.

Under this proposal, the higher frequency run for PDS will facilitate price discovery and allow MPs to react timely to the changes in the short-term market, enabling greater market efficiency.

Comments on Issue Description, Scope, etc

- **To facilitate price discovery, suggest extending the duration of Look Ahead Run or LAR instead.**

19. When energy, reserve or regulation shortfall situation applies, allow for offers of additional quantities of energy, reserve and regulation

Issue description

Chapter 6 Section 10.4.1.1.f allows for increased supply of energy, reserve or regulation to contribute positively to the resolution of energy, reserve or regulation shortfall situations in that dispatch period, where: (i) the shortfall situations were indicated in a system status advisory notice issued by the EMC in respect of a high-risk operating state or emergency operating state declared by the PSO; and (ii) at the time of submission of such offer variation or revised standing offer, the EMC has not yet withdrawn, in respect of that dispatch period, such system status advisory notice.

However as drafted it appears to limit the increased supply to only what there is shortfall of, that is when there is energy shortfall, can only increase the supply of energy. The same MW of capacity can be used to provide energy, reserve or regulation so increasing the supply of reserve and/or regulation even when there is only energy shortfall can actually relieve the energy shortfall as such increased supply of reserve and/or regulation can replace capacity which can instead be used for energy instead. This is similarly so when there is a reserve or regulation shortfall when there is increased supply not limited to just what there is shortfall of.

Also, during periods of reserve shortfall, a unit that hasn't been previously offered into the system will be unable to relieve the system stress arising from reserve shortfall as the unit is required to be scheduled for energy before it can be scheduled for Reserves due to the reserve proportion factor. Hence, for this unit to positively contribute to the resolution of reserve shortfall, it would have to within gate closure, offer energy & reserves.

It is therefore proposed that Chapter 6 Section 10.4.1.1.f be amended to stipulate the allowance for Market Participants to provide within gate closure:

Energy Shortfall → Additional Reserves & Regulation

Reserves Shortfall → Additional Energy and Regulation

Regulation Shortfall → Additional Energy & Reserves

This would lead to an improvement in system security and less volatile prices. It will also lead to a reduced need for intervention by PSO as market participants are better able to take action to relieve shortfall situations, and less volatile prices for consumers.

Status

Not started

20. Refund of credit support to market participants (MPs) who have closed the designated bank account for NEMS settlement

Issue description

For MPs who have withdrawn from the market, the credit support pledged by the MPs is refunded after the final metering adjustment is made 252 days later. In some instances, the designated bank account for NEMS settlement is no longer operational.

Currently the market rules do not provide an avenue for the market operator (EMC) to handle refund of monies to MPs who have closed their designated accounts and are not contactable to make alternative arrangements even after reasonable efforts were made to contact the MP or in instances where MPs opt to forfeit the refund. As the money does not belong to EMC, approval from the regulator had to be sought to return the money to the market.

It is proposed to update the market rules to allow EMC to offset the credit supporting owing to the MP in the situations highlighted above, from EMC’s administrative fees.

The inclusion in the market rules will provide clarity on the required action to be taken in instances where the MPs cannot be contacted or elect to forfeit the refund.

This will also reduce the administrative burden of having to seek the necessary approval from the regulator to return the credit support to the market.

21. Review of standing probability of failure (SPF) for new commissioning Generation Registered Facility (GRF) and Import Registered Facility (IRF)

Issue description

Existing SPF calculations methodology for new GRF (excluding transferred generation facilities)/IRF suggests that SPF of new GRF/IRF to be the average SPF of all GRFs/IRFs that are within the same GRF/IRF classification. The calculation methodology penalizes a new GRF/IRF that has no historical records of forced outages in the specified time frame which is not in accordance with our understanding of the causer-pay principle, where a more unreliable GRF/IRF should pay a larger share of reserve cost.

Hence, we will like to propose that SPF of a new GRF/IRF to be 0.001% instead, until IEQ data (more than 0) is captured for at least 4380 settlement intervals with IEQ more than 0 (or 4392 settlement intervals with IEQ more than 0 during a leap year). We will like to propose that calculation of SPF of new units that encounter at least 1 forced outage to be calculated the same methodology as the rest of the units (number of forced outages / total number of settlement intervals with IEQ more than 0).

MPs with newly commissioned GRF/IRF is given a fair playing field and clean slate for their operational reliability instead of imposing the reliability of other operators with similar GRF/IRF classification on them. This is align with the causer-payer spirit of the market rules and not penalising new participants for the actions of existing MPs.

22. Review of the gate closure exemptions

Issue description

Section 10.4.1.1b of Chapter 6 indicates that offer variations after gate closure shall be submitted where it is intended for a generation registered facility to reflect its revised capability for the three consecutive dispatch periods immediately following a forced outage or its failure to synchronise.

Section 1.1.117 of Chapter 8 defines a forced outage to be an unanticipated intentional or automatic removal from service of equipment or the temporary de-rating of, restriction of use or reduction in performance of equipment.

There is ambiguity in the Market Rules in the assessment of gate closure violations related to the definition of the forced outage.

Updated Issue

23. To revise the frequency and information on the publication of the Adequacy and Security Assessment (ASA) Reports

Issue description

PSO is already assessing on the adequacy and security of supply as part of outage coordination by working with the relevant Licensees. In addition, unavailability of generating units is published under AGOP as soon as the outage requests are approved. Hence, it is not necessary to publish the daily ASA Reports as information is reflected in the latest AGOP/AEOP updates.

Furthermore, some of the information in the Adequacy and Security Assessment Reports cannot be reasonably projected as it is not possible to know whether there is excess/ deficit output from generation facilities in the next 12 months or 14 days. Information reflected in the reports is only accurate at the point of publication, while the most up to date information are reflected in the latest AGOP/AEOP updates.

If there is a system wide impact e.g. shortfall in the NEMS, EMC will also issue advisory notice to inform all the Licensees of any projected shortfall. Such projected supply shortfall will be provided in the Short-term, Day-ahead and Week-ahead dispatch schedules after EMC runs the MCE using offers submitted by the Market Participants.

PSO therefore proposes to revise the frequency of the publication of Daily 14-days Adequacy and Security Assessment Reports to a weekly 7-Days Adequacy and Security Assessment Reports.

On Section 6.2.1.1 of Chapter 5, with the increasing penetration of solar PV generation in Singapore's energy mix, it has become essential to account for solar PV output in supply adequacy assessments. By incorporating solar PV output forecasts into the ASA Reports, PSO can provide a more accurate and comprehensive assessment of system adequacy and security.

The inclusion of solar PV output will enable better visibility of available generation capacity, taking into account both conventional generation and renewable energy sources. This enhanced transparency will support more informed decision-making by Market Participants and Licensees regarding system operations and planning.

PSO therefore proposes to include Solar PV generation in the current 12-month ASA report. For avoidance of doubt, the Solar PV generation shall also be included in the current 14-days ASA report

Comments on Issue Description, Scope, etc

- **Support the inclusion of solar PV output forecasts in the ASA reports.**

24. Optimizing Battery Energy Storage System (BESS) Participation in the Regulation Market: A Proposal for Split Regulation Categories

Issue description

Battery Energy Storage Systems (BESS) play a critical role in stabilizing the grid and maintaining frequency regulation in modern power systems, especially in regions with a high penetration of renewable

energy. However, there is a mismatch in energy prices and regulation prices with the current market structure in Singapore. This creates financial disincentives for BESS to participate in the market.

When the energy price is low, BESS is called upon to discharge to maintain grid frequency, while at times of high energy prices, BESS is forced to charge, with little opportunity to discharge later at higher prices. This results in financial losses, discouraging BESS participation and underutilizing its capabilities.

This paper proposes the separation of regulation into two distinct categories: one for charging BESS and one for discharging, to better reflect the value of BESS services and encourage investment in energy storage technologies in Singapore.

Comments on Issue Description, Scope, etc

- If regulation continues to be a key flexibility product, the current structure can create adverse economics for BESS (charging at high prices / discharging at low prices). We support separating regulation into distinct charge and discharge categories (or otherwise differentiating reg-up/reg-down in a way that is economically coherent) to unlock BESS/VPP participation and avoid structural disincentives.
- For a split regulation service, want to make sure that CCGT GRFs should be able to participate in these split categories. As CCGT GRFs can be pulsed up and down as well

25. Publishing of electricity import data split into categories based on how “green” the electricity import is

Issue description

In the Daily Trading Reports published by EMC, for Generation (MW), there is a column header “Import” for the scheduled MW for imported electricity. For imported electricity, consumers are interested in knowing whether such electricity imports are “green” – solely from renewable sources or at least “greener” due to being from a mix of renewable and non-renewable sources compared to “brown” power. Consumer interest in such information includes for benchmarking their electricity procurement with respect to “greenness” as well as for assessing the availability of “green” electricity when planning electricity procurement.

Given the above interest, request that the category for “Import” be split into three sub-categories, one sub-category for “Green” sources, that is solely from renewable sources such as solar, wind, hydro and biomass, a second sub-category for “Mixed” sources, that is from a mix of renewable and non-renewable sources but with emissions not exceeding 0.15tCO₂e/MWh on annual basis, and a third sub-category for “Others” that is for electricity imports which do not fall under the “Green” and “Mixed” sub-categories.

This would allow for greater transparency as to how “green” the electricity that is being imported into Singapore, with consumers able to use the information to benchmark their electricity procurement with respect to greenness and assess the availability of “green” electricity when planning electricity procurement.

26. Increasing offered quantity within gate closure due to technical constraints

Issue description

The proposal allows GRFs to increase their offer quantity within gate closure to result in running at a higher load. Certain operational circumstances require a unit to be loaded higher as running at a lower load could result in the tripping of the unit. Hence, this rule change is to allow market participants to increase their offers within gate closure at a stipulated price (E.G., utilising the lowest existing price band to increase MWs) within the market rules to reflect their unit’s true capabilities.

This would allow market participants to reflect their units’ true capabilities, preventing potential unit forced outages. The reduced number of forced outages would also improve system security.

Comments on Issue Description, Scope, etc

- Safeguards would be needed to ensure that such increased offer quantity is based on substantiated need to lower risk of tripping.

27. Allow representation in voting for RCP members who are unable to attend RCP meetings

Issue description

We propose a change to the rules that will allow RCP members to send a designated representative to meetings, who will have the authority to vote on behalf of the member. The member who will be absent must formally designate their representative in advance of the meeting. The representative will be authorized to vote as though they were the member they represent, ensuring that full range of perspectives is considered in decision-making.

Comments on Issue Description, Scope, etc

- Allowing for this would reduce the RCP members incentive to attend meetings as not attending would no longer result in forfeiting of voting due to designated representative being able to vote in place. The designated representative would be expected to not be as qualified/experienced as the RCP member. This matters as voting is usually after further discussion at RCP meetings. Having the designated representative attend when otherwise the RCP member would attend would therefore be expected to lower the quality of RCP deliberations.

28. Compensation Framework for Battery Energy Storage Systems (BESS) Forced Dispatch/Schedule

Issue description

Battery Energy Storage Systems (BESS) are increasingly critical for grid stability and reliability. In Singapore, the MCE may forced scheduled the BESS on certain energy products to achieve the most economic outcome while Power System Operator (PSO) may occasionally override a BESS's scheduled dispatch to manage real-time system needs. While necessary for security, these interventions can cause economic losses to BESS operators, especially when the units are pulsed to charge or discharge outside optimal market conditions. This compensation framework for Forced Schedule and Dispatch deviations that is market-aligned, transparent, and supports continued BESS investment.

In Singapore's energy market, BESS operators primarily earn revenue through energy arbitrage and ancillary services. However, MCE/PSO interventions can result in:

- Arbitrage losses
- Degradation costs
- Lost market opportunities

These events are out-of-market actions that disrupt commercial operations. Without an appropriate compensation mechanism, operators face increased financial risk, discouraging future participation in grid-support roles.

The compensation shall include the following components:

Component	Description
Arbitrage Revenue Loss	Lost Revenue due to dispatch deviation from profitable charge/discharge cycles.
Degradation Cost	Costs incurred from additional cycling or depth-of-discharge not scheduled
Lost Opportunity Cost	Missed revenue from foregone market participation due to PSO instruction
Administrative Cost	Costs incurred to document, report, and verify claims

Formula-Based Calculation Approach

Arbitrage Revenue Loss

A. When pulsed to discharge more than scheduled during low prices:

Deviation in MWh = Actual Export (discharge) - Dispatched schedule (Energy + regulation)

Price disadvantage =

If: (Weighted average energy price for the day during scheduled withdrawal > Actual price at time of discharge)

Then: Loss = Deviation in MWh * (weighted average energy price for the day during scheduled / RTE - Actual dispatch price)

B. When pulsed to charge more than scheduled during high prices:

Deviation in MWh = Actual injection (charge) - Dispatched schedule (Energy - regulation)

Price disadvantage =

Then: Loss = Deviation in MWh * (Actual dispatch price – day average energy price for the day)

Degradation Cost

The degradation cost is estimated as a levelized cost of energy (SGD/MWh), capturing both capital expenditure (CAPEX) and operating expenditure (OPEX). It reflects the cost of wear and tear on the battery system due to additional, unscheduled throughput from PSO-directed dispatch deviations.

Degradation Cost = (CAPEX Component + OPEX Component) * Energy throughput from deviation

CAPEX Component (SGD/MWh): CAPEX * WACC / Economic Life (years) / 365 days / Nameplate Capacity (MWh)

- Includes: plant and equipment costs, delivery, land, site preparation, connection, owner's costs (pre- and post-financial closure), engineering, initial spares, startup, construction insurance, permits, licences, fees, legal, financial services, and in-house costs.

OPEX Component (SGD/MWh): Total annual OPEX / (365 days * Nameplate Capacity)

- Includes: fixed and variable running costs, manpower, head office service allowances, emergency fuel usage or reserves, fixed maintenance and operations, working capital, insurance, property tax, EMA licence fee, long-term service agreements, EMC/PSO fees, and consumables.

Lost Opportunity Cost

Estimated based on missed bid or regulation offer, capped at approved historical performance or shadow price methodology.

Administrative Cost

Fixed fee or percentage of claim reviewed periodically.

Settlement and Dispute Resolution

- Claims submitted monthly with logs of dispatch schedules, market prices, IEQ/WEQ and PSO instructions (non DSS).
- As per Dispute management process

Cost Recovery Mechanism Compensations will be recovered via Monthly Energy Uplift Charge, funded through:

- Uniform uplift charges to all consumers or
- Allocation to market participants during periods of system stress

Comments on Issue Description, Scope, etc

- For BESS, PSO overrides/forced scheduling can impose measurable opportunity costs and degradation costs. A transparent compensation framework (with clear eligibility, measurement, and cost recovery) will improve market confidence and support continued BESS investment.
- Any such review of the compensation framework should also include non-BESS generation facilities for completeness and fairness.
- To be part of a compensation framework, we require that BESS have an official Ancillary Services Contract with EMC. Regardless, we recognise that it is fair to have a framework in place.

29. Incorporation of Behind-the-Meter Energy Storage Measurements into Demand Response Performance Verification

Issue description

Current DR rules rely only on the SPPG meter to measure a facility's load. This creates inaccuracies for sites with behind-the-meter BESS, because battery charging or discharging before or during a DR period alters the net SPPG reading even though the actual building load has not changed. As a result, WLQ baselines can be understated or overstated, causing participants to be unfairly penalised for “under-performance” even when they have not attempted to game the system. At the same time, consumers become restricted from optimising their BESS operations for peak shaving or other legitimate uses.

By allowing the DR verification process to include certified BESS meter data, the WLQ and performance calculations would instead reflect the true underlying load, not just net import. This improves fairness, reduces unintended penalties, enables co-optimisation of BESS and DR, and increases confidence and participation in the DR market. It also enhances system reliability by giving the market operator a more accurate view of actual load flexibility.

Comments on Issue Description, Scope, etc

- Blue Whale aggregates behind-the-meter BESS at C&I sites to provide Demand Response. Using only the SPPG/SP meter (net import) can misstate the underlying facility load whenever the BESS charges/discharges, which distorts WLQ baselines and “curtailment” calculations. This creates unintended under-performance penalties and discourages legitimate co-optimisation (e.g., peak-shaving vs DR readiness). We strongly support allowing certified BESS meter data to be integrated into an “Adjusted WLQ/Adjusted Curtailment” methodology so performance reflects true site load rather than net import. Please ensure (i) a practical meter standard, (ii) timestamp alignment and auditability, and (iii) safeguards against gaming
- Fair to include BESS meter data to determine DR performance.

30. Setting the appropriate Reserve and Regulation requirements

Issue description

Currently, Primary reserves, Contingency reserves and Regulation requirements are based on the SOM, which considers load swings (Singapore's energy demand) and the loss of the largest generating unit in the system.

None of these 3 products consider the influence of Solar generation and the intermittency that comes along with it.

Proposal – Primary Reserves

To be modelled based on containing the dip in frequency by <0.2Hz with the largest scheduled output based on the methodology as per the proposal for Contingency Reserves below.

Proposal – Contingency Reserves

To be modelled based on the greater of (1) Largest Generating GRF MW or (2) Largest Observed Solar Swing (LOSS) %[^] x Solar Forecast MW

For example, if the largest generating GRF is 580MW, LOSS % = 60% and Forecasted Solar Output = 1000MW, we will take the larger of 580MW and 600MW. Hence, Contingency requirement = 600MW.

Δ LOSS % = Utilising historical solar forecast vs actual generation, identify the largest absolute variance and determine the %. I.E., $\text{Generation MW} / \text{Forecast MW} = \%$

Proposal – Regulation

As raised in the previous rule change proposal exercise, Regulation has been static and of late shown to be decreasing in its requirement. With installed solar capacity now sitting at 1684MWac, we would expect regulation requirement to increase in tandem with Solar capacity. However, the reverse has been observed.

Hence, we are proposing the regulation requirement to be modelled based on the combination of System Load (Singapore’s energy demand) swings and the Largest Observed Solar Swing (LOSS). The arbitrary cap of 2% of forecasted peak system demand must be removed.

Comments on Issue Description, Scope, etc

- The costs for additional reserve should not be allocated to GRFs who neither cause the need for additional reserves nor benefit from solar. Such costs should be allocated to solar generation and/or electricity consumers. It is crucial for the PSO to adopt a more prudent approach to resource planning by ensuring sufficient reserves are in place to support the integration of solar energy. A more robust planning strategy will help mitigate potential risks and maintain a reliable energy supply for Singapore.

31. Review of the Directed Supply Scheme (DSS) instruction criteria

Issue description

Currently PSO will issue DSS instructions to Gencos should there be a shortfall (SF) after the 6PM Day Ahead Run (DAR) for the following day.

At times, this could be for SF amounts of less than 10 MW, and for periods more than 12 hours away. This removes the ability for the market to adjust itself as a liberalised market should.

Excessive external market interventions will lead to the loss in market efficiencies and credibility of a liberalised market. In the long run, this will lead to reluctance or reduction in investments.

Proposal for DSS instruction criteria

1. Aside from Energy SFs, ancillary SF amounts should be greater than the block 1 shortfall amount before sending out DSS instructions
 - a. I.E., Regulation deficit block 2
 - b. Primary reserve deficit block 2
 - c. Contingency reserve deficit block 2

2. Given that Tier 1 SFs are usually able to be met with fast ramping units such as Open Cycle Gas Turbines (OCGTs), the DSS instructions should only be sent out at a later time, instead of 12 – 24 hours in advance.
 - a. For running up an OCGT including SLF gas nominations, it only requires a 4-hour lead time.
 - b. This also provides the market more time / Day-ahead runs before issuing instructions

32. Review of the Constraint Violation Penalties (CVP)

Issue description

The CVP was introduced as there were many previous occasions where the Market Clearing Engine (MCE) was unable to find a feasible solution to satisfy every constraint.

The CVP concept allows the MCE to violate certain constraints, for the benefit in the reduction in overall system cost. However, we have observed that PSO sends out DSS instructions each time there is a shortfall (SF), which works against the very principle that CVP has been crafted for.

Review and align the CVP parameters with PSO / EMA's priorities. Given PSO is unable to accept any system SFs, we should increase CVP to a level whereby there are much lesser SFs which in turn reduces for out-of-market interventions.

Annex 3: Ranking Results by Key Stakeholders

For issues where significant work has not started, stakeholders were first asked to evaluate if an issue should be removed from the Work Plan. For those not marked for removal, stakeholders will then be asked to rate the importance and urgency of each issue – where a score of 3 corresponds to “High”, 2 corresponds to “Medium”, and 1 corresponds to “Low”.

In the Grand Total column, the value in the bracket represents the number of stakeholders providing a specific rating. For example, “1(7)” means 7 stakeholders have ranked the particular issue as 1 or “Low”.

The issues are then ranked by the overall score represented in the last column of Table 3A. Overall score is calculated by taking the combined average of importance and urgency scores.

Table 3A: Scoring of issues by stakeholders

Issue No.	Issue Title	Grand Total	Overall Score (Simple Average Method)
19	When energy, reserve or regulation shortfall situation applies, allow for offers of additional quantities of energy, reserve and regulation	Importance: 1(3), 2(8), 3(13) Urgency: 1(3), 2(11), 3(10)	2.35
9	Review Reserve Responsibility Share (RRS) calculation	Importance: 1(2), 2(6), 3(14) Urgency: 1(2), 2(7), 3(13)	2.31
30	Setting the appropriate Reserve and Regulation requirements	Importance: 1(2), 2(8), 3(13) Urgency: 1(2), 2(12), 3(9)	2.29
32	Review of Constraint Violation Penalty (CVP)	Importance: 1(6), 2(6), 3(12) Urgency: 1(11), 2(1), 3(12)	2.15
31	Review of Directed Supply Scheme (DSS) instruction criteria	Importance: 1(8), 2(3), 3(12) Urgency: 1(9), 2(6), 3(8)	1.98

18	Enhance the publication frequency of the Pre-Dispatch Schedules (DAR) from every 120 minutes to 60 minutes	Importance: 1(10), 2(2), 3(11) Urgency: 1(10), 2(2), 3(11)	1.96
28	Compensation Framework for Battery Energy Storage Systems (BESS) Forced Dispatch/Schedule	Importance: 1(7), 2(6), 3(10) Urgency: 1(11), 2(3), 3(9)	1.94
10	Review of Regulation Effectiveness Factor or similar compensation scheme to reward greater responsiveness of facilities for Regulation	Importance: 1(10), 2(4), 3(10) Urgency: 1(10), 2(9), 3(5)	1.90
15	Additional Market Re-run for Meter Data Error discovered between First and Second Nominated Day	Importance: 1(8), 2(8), 3(8) Urgency: 1(13), 2(6), 3(5)	1.83
12	Review of gate closure dispatch periods following a forced outage	Importance: 1(7), 2(9), 3(6) Urgency: 1(8), 2(6), 3(8)	1.81
6	Review of Obligation to Act Within 5 Minutes When an Action is to be Taken “Promptly” or “Immediately”	Importance: 1(7), 2(10), 3(6) Urgency: 1(13), 2(4), 3(6)	1.75
24	Optimizing Battery Energy Storage System (BESS) Participation in the Regulation Market: A Proposal for Split Regulation Categories	Importance: 1(10), 2(6), 3(7) Urgency: 1(13), 2(3), 3(7)	1.73
27	Allow representation in voting for RCP members who are unable to attend RCP meetings	Importance: 1(12), 2(3), 3(8) Urgency: 1(15), 2(2), 3(6)	1.65
21	Review of standing probability of failure (SPF) for new commissioning Generation Registered Facility (GRF) and Import Registered Facility (IRF)	Importance: 1(12), 2(4), 3(7) Urgency: 1(16), 2(1), 3(6)	1.60
16	Modelling of on-site ambient temperature into the MCE such that GTs/CCPs’ maximum capacity are adjusted dynamically	Importance: 1(12), 2(4), 3(6) Urgency: 1(14), 2(3), 3(5)	1.52

26	Increasing offered quantity within gate closure due to technical constraints	Importance: 1(12), 2(2), 3(7) Urgency: 1(14), 2(1), 3(6)	1.48
20	Refund of credit support to market participants (MPs) who have closed the designated bank account for NEMS settlement	Importance: 1(16), 2(5), 3(3) Urgency: 1(17), 2(5), 3(2)	1.42
22	Review of the gate closure exemptions	Importance: 1(13), 2(4), 3(4) Urgency: 1(13), 2(4), 3(4)	1.38
23	Revise the frequency on publication of the Daily 14-days Adequacy and Security Assessment (ASA) Reports to weekly ASA Reports	Importance: 1(15), 2(6), 3(3) Urgency: 1(20), 2(2), 3(2)	1.38
17	Introduction of SWIFT as a form of Bank Guarantee	Importance: 1(15), 2(8), 3(1) Urgency: 1(18), 2(5), 3(1)	1.35
25	Publishing of electricity import data split into categories based on how "green" the electricity import is	Importance: 1(11), 2(4), 3(5) Urgency: 1(14), 2(2), 3(4)	1.33
11	Alignment of performance standards of Interruptible Load scheme and Spinning Reserves	Importance: 1(13), 2(4), 3(4) Urgency: 1(15), 2(4), 3(2)	1.29
29	Incorporation of Behind-the-Meter Energy Storage Measurements into Demand Response Performance Verification	Importance: 1(11), 2(7), 3(3) Urgency: 1(18), 2(0), 3(3)	1.27
13	Provisions regarding settlement bank and settlement account	Importance: 1(18), 2(2), 3(2) Urgency: 1(18), 2(2), 3(2)	1.17
14	Review of Automatic Financial Penalty Scheme (AFPS)	Importance: 1(15), 2(1), 3(2) Urgency: 1(16), 2(1), 3(1)	0.92

Annex 4: Rating Methodology

Simple Average Methodology

Simple Average Methodology considers the averages scores for 'Importance' and 'Urgency' of each issue across all stakeholders.

$$Issue\ Score_x = \frac{(Mean\ Score\ for\ 'Importance'_x) + (Mean\ Score\ for\ 'Urgency'_x)}{2}$$

Legend:

x = Represents an individual issue

Treatment of Removal Votes

Votes on removal are treated as a "0" rating. Such votes are still considered in the calculation of an issue's average urgency and importance.

For example, if out of a total of five stakeholders, one votes on removing the issue. The overall score will be calculated as such:

Table 4: Scoring of issue by 5 stakeholders

Participant	A	B	C	D	E
Urgency	[Remove]	2	3	1	2
Importance	[Remove]	1	2	1	3

- Urgency = $(0 + 2 + 3 + 1 + 2) / 5 = 1.6$
- Importance = $(0 + 1 + 2 + 1 + 3) / 5 = 1.4$
- Overall score = $(1.6 + 1.4) / 2 = 1.5$