Executive Summary

At the 2019 Rule Change Prioritisation Meeting, the Energy Market Company (EMC) proposed for the Market Clearing Engine (MCE) to invalidate offers of a Generation Registered Facility (GRF) after it experiences a forced outage.

This proposal arose from an event on 18 September 2018, Period 3 (01:00 to 01:30) where the forced outage of 2 GRFs triggered an Emergency Operating State in the power system. The Power System Operator (PSO) had to conduct load shedding to secure the power system. Nevertheless, the market clearing price for Period 4 (01:30 to 02:00) remained relatively low, failing to reflect actual system conditions.

Investigations found that offers from the tripped GRFs were not revised until 20 minutes after the forced outage event. As a result, the real-time dispatch schedule for Period 4 did not reflect the unavailability of these tripped GRFs, which were still scheduled to generate. The PSO had to intervene to ensure that generation capacity was sufficient to meet demand and that the curtailed load can be restored as soon as possible. The consequences are wrong market signals following loss of generation and disruption to system operation.

With such consequences in mind, EMC assessed that there is merit to allow the MCE to invalidate offers (Energy, Regulation and Reserves) of a GRF immediately following its forced outage.

EMC is of the view that invalidating a GRF’s offers immediately following its forced outage benefits the market through producing more efficient and accurate dispatch and price schedules.

We recommend that the RCP:
- support the principles for and approaches to invalidate a GRF’s offers following its forced outage; and
- task EMC to draft the required market rules after rules for the Forward Capacity Market and the required changes to the real-time market are finalised.
The conceptual proposal was discussed and voted on at the 113th RCP meeting held on 21st Jan 2020. **No majority of votes** was achieved to proceed with the conceptual proposal.
1. Introduction

Currently, a generator experiencing a forced outage is expected to remove its offers in good faith if it is going to be unavailable. This ensures that the MCE will consider the generator’s unavailability when determining the dispatch and price schedules in the next period. Non-compliance with this rule is to be reported to the Market Surveillance and Compliance Panel (MSCP).

This paper discusses a proposal for the MCE to automatically invalidate a GRF’s offers immediately following its forced outage.

2. Background

2.1 Outage Event on 18 Sep 2018, Period 3 (01:00 to 01:30)

On 18 Sep 2018, 2 GRFs experienced forced outages in Period 3. The PSO had to conduct load shedding in order to secure the power system. However, it was observed for Period 4 (01:30 to 02:00) that the Uniform Singapore Energy Price (USEP) remained low at $152.90/MWh relative to previous periods of similar demand. The USEP did not reflect actual market conditions. Market conditions were correctly reflected from Period 5 (02:00 to 02:30) onwards, where the USEP rose to $924.33/MWh. Please see Figure 1 for a graphical representation.

![Figure 1: USEP during 18 Sep 2018 event](image-url)
After investigation, it was found that offers from the tripped GRFs were not revised until 20 minutes after the forced outage. Consequently, the real-time dispatch schedule for Period 4 failed to reflect the unavailability of these tripped GRFs, i.e. they were still scheduled to generate. The PSO had to intervene to ensure there is sufficient generation capacity to meet the demand and that curtailed load can be restored as soon as possible. The sequence of events is presented in figure 2 below.

Figure 2: Offer Revision following Forced Outage Event on 18 Sep 2018

2.2 Proposal

During the 2019 Rule Change Prioritisation exercise, EMC proposed for offers from a GRF that has undergone forced outage to be invalidated by the MCE.

The RCP had previously considered a proposal to conduct a price revision when generating units fail to revise their offers in good faith. The RCP by majority vote did not support that proposal. The main argument against a price revision was that “it is unfair to charge consumers a higher ex-post price for quantities consumed based on ex-ante prices, as they would not have had a chance to respond during the affected periods by reducing their consumption”.

The current proposal takes a different approach. Invalidation of offers is proposed to take place before the MCE generates the real-time schedules. This will ensure that the market clearing price correctly reflects prevailing market conditions, thus preserving the principle of ex-ante pricing.

3. Analysis

3.1 Market design principle of self-commitment

Self-commitment is an important design principle of the NEMS. This means market participants (MPs) are responsible for committing their generation units ahead of time, and then offering/bidding into the various product markets to maximize their own profits.

MPs have the most current information on their own abilities to generate or reduce load. The market rules place the obligation on MPs to submit and revise their offers/bids to reflect their capabilities in real-time, before the MCE generates the dispatch and price schedules for that period.

---


2 Market Rules, Chapter 5, Section 5.1.5 and 5.1.6
3.2 Possible factors impeding MPs from reflecting their units’ capabilities in a timely manner

3.2.1 Substantial lead time required for investigation of tripping
The removal of offers by a MP is often a secondary concern following a forced outage. Presumably, the MP’s primary concern is safety of personnel and plant equipment. Time is also required for the MP to investigate the forced outage and to communicate the unit’s actual availability to its trading team.

3.2.2 Financial Incentive to delay offer revision
There is a financial incentive for a MP not to revise its offers if it is unable to cover its contract positions (i.e. taking a net short position in the spot market) and hence must buy from the spot market at the prevailing pool price. By not revising its offer to reflect its generation unit’s reduced capability, pool prices are more likely to remain low, leading to lower procurement cost for the MP.

3.2.3 Analysis of forced outage data in 2018 (58 Cases)
Most Gentailers were able to revise their offers within 10 minutes following a forced outage, as shown in Figure 3 below. The median time taken for MPs to revise their offers following a forced outage is 8 minutes (Blue line) whereas the average time is 11 minutes (Red line). Based on the visualisation in Figure 3, Gentailers\(^4\) tend to revise their offers faster than Non-Gentailers\(^5\). In addition, Gentailers tend to take a longer time to revise their offers when on high load, as seen in Figure 3. The financial incentive as discussed in 3.2.2 could possibly have played a part here.

---

\(^3\) This exclude an outlier event that takes more than 12 hours to revise their offer as it affects the average time taken computation. Before removing the outlier, the average time taken is 26 minutes. After removing the outlier, the average time taken drops to 11 minutes.

\(^4\) Gentailers refer to commercial generators that also operate a retail business in the NEMS.

\(^5\) Non-Gentailers refer to generators that do not operate a retail business in the NEMS. This group includes Embedded Generators (EG) plants, Waste-to-Energy plants and other wholesale generator plants.
3.3 Impact on the NEMS

3.3.1 System Security
For the 18 Sep 2018 event, the real-time dispatch schedule for Period 4 was generated with the tripped units treated as being available. The MCE was unable to use the revised offers because they were made in Period 4 after completion of the dispatch run for Period 4. This created a false sense of security over the availability of supply in the market.

Since 2003, the MSCP made 3 determinations against MPs’ failure to reflect their actual capabilities in their offers. In 2 of these determinations, the risk posed to system security were high.

In its determination “MSCP/2012/D2” made on 31 May 2012\(^6\), the MSCP stated that the failure of tripped units to comply with dispatch instructions based on their offers imposed tremendous stress on the power system, with the possibility of a widespread blackout if another generator in the system tripped.

In its determination “MSCP/2012/D3” made on 17 July 2012\(^7\), the MSCP stated that energy shortfall advisory notices were not issued even though 4 combined cycle plants (CCPs) had tripped. This was because the MCE considered these 4 CCPs to be available based on their offers. This created a false sense of security to the market and created substantial risk to system security. The risk was resolved by the PSO directing another MP to ramp up its generation.

The USEP is the only real-time indicator of system conditions that is readily available to all MPs. A delay in removing offers from tripped units may give other MPs and the PSO a false sense of security over the availability of supply to the market. Without market signals via a price change, some MPs may continue to ramp down their units. The market thus fails, following a forced outage event, to provide the right signal to encourage MPs to contribute positively towards balancing demand and supply.

3.3.2 Market Distortion

![Figure 4: Distribution of economic surpluses](image)

The diagram on the left in Figure 4 shows the distribution of economic surpluses (Red area + Blue area) if tripped units’ offers are not removed in time. The diagram on the right shows the correct distribution of economic surpluses if tripped units’ offers are removed in time. Generators not only

---

\(^6\) https://www.emcsg.com/f224,72596/D02-Sembcorp_Failure_to_Comply_with_Dispatch_Instructions_on_15_August_2011.pdf
\(^7\) https://www.emcsg.com/f224,73348/MSCP_Determination_2012D3-_PowerSeraya_failure_to_revise_offer_PUBLISHED_.pdf
lose their producer surplus, they are also inadequately compensated for generating at a higher load (Cost of production loss) as shown by the green area.

In a tight supply situation, the PSO relies on other online generators to increase their output. But with the USEP artificially depressed, these generators may be reluctant to provide more because there is no certainty that they will be compensated for the additional costs incurred.

An incident that created a significant wholesale market distortion happened on 13 December 2011\(^8\). In its determination “MSCP/2012/D3”, the MSCP estimated the economic impact on the wholesale market to be $1.68 million dollars for 3 periods. Another incident with significant economic impact happened on 15 August 2011\(^9\) (determination “MSCP/2012/D3”). The estimated impact on the wholesale market was $180,868.80 for 2 periods. For the latest incident on 27 December 2016\(^10\) (determination “MSCP/2016/D8”), the economic impact was considered insignificant by the MSCP.

Additionally, while a MP who fails to comply with its dispatch schedule may be imposed a financial penalty by the MSCP, the penalty collected is disbursed via the MEUC to consumers/retailers, and not to producers during affected periods in which they ought to have received higher payments. The deterrent effect of the penalty on the offending MP is further reduced if it has an affiliate retail arm that receives a share of this disbursement.

In 2018, 21 cases of forced outages occurred at high load (>200 MW). Of these, there were 3 cases in which the generator took more than 30 minutes to revise its offers. While a total of 3 cases a year is not high, the security risk and wholesale market distortion that each imposes can be potentially high. Based on this premise, we recommend reviewing the market rules for more timely incorporation of actual generation availability in the real-time dispatch calculation.

### 3.4 Practices in other jurisdictions

**Electric Reliability Council of Texas (ERCOT, Texas)**

ERCOT will be informed of a MP’s Forced Outage automatically via telemetry. However, the MP is still expected to inform ERCOT of the details of the Forced Outage under their market rules. Under ERCOT’s market rules, ERCOT can change the dispatch engine’s inputs which include removing offers from generator to reflect the latest and relevant power system information to determine the dispatch schedule.

**National Electricity Market (NEM, Australia)**

A rebid must be made, as soon as practicable, after the MP becomes aware of the changes in material conditions and circumstances on the basis that it decides to vary its dispatch offer or dispatch bid. Reruns are possible only if the inputs to the dispatch algorithm are incorrect, but this excludes dispatch bids and dispatch offers submitted by MPs.

**Independent Electricity System Operator (IESO, Ontario)**

A MP is expected to inform the IESO of a Forced Outage, as soon as practicable. Under Chapter 7, clause 6.4.2.5 of their market rules “any registered facility in respect of which a forced outage has been detected during a dispatch interval shall be recognized by an adjustment to the input data” allows the IESO to adjust the real-time schedule and prices.

In general, most jurisdictions have the power to take steps to ensure the accuracy of the schedule and pricing. For jurisdictions which have shorter dispatch period (i.e. 5 minutes), forced outages

---


could be detected through their telemetry or SCADA systems and the necessary adjustments are made automatically.

4. Proposed Solution

We propose the approach where the MCE assumes that a unit experiencing a forced outage will not be able to return to service until the MP takes action to confirm that it is able to. Specifically, any tripped unit’s offers are proposed to be automatically invalidated for two dispatch periods following its forced outage. The MP should only submit positive offers if it is certain that the unit is able to meet them.

Benefits of the proposal

The automatic invalidation of offers following forced outage of GRFs will allow outage information to be incorporated in a timelier manner into the MCE and may reduce the need for PSO to override dispatch instructions in real-time. The USEP will then be reflective of actual conditions and not give a false sense of security regarding the availability of supply. It will generate correct price signals for other generators and/or demand response to contribute positively to the tight supply situation and reduce system security risks due to misinformation.

The proposal also prevents the distributive inequity caused by the market distortion described in section 3.3.2.

5. Methods to invalidate offers

EMC proposes to only invalidate offers for units that has experienced a full forced outage. Changes to a machine’s capability due to a partial outage will continue to be managed by the MP’s offer changes since the machine can still inject energy.

In most overseas jurisdictions that practise invalidation of offers, the invalidations are done automatically based on telemetry and/or SCADA systems inputs. In Singapore, there are a few possible ways to trigger invalidation of offers following a forced outage.

5.1 Using the StartGeneration in PSO’s Network Status File

The PSO currently provides, as an input to the MCE, the expected MW energy output level of each generating unit (“StartGeneration”) at the beginning of the upcoming dispatch period. In practice, this is a snapshot of the generators’ output 10 minutes before the start of the next period. This file reaches EMC 10 minutes before the start of the next dispatch period. It is used by the MCE to compute the real-time dispatch schedule 5 minutes prior to the start of the next dispatch period. One option is to trigger the MCE to automatically invalidate the offers if the StartGeneration is zero or below a certain threshold.

Handling of Synchronisation Scenario

There will be circumstances under which this option will not work as intended. For example, if a generator is preparing to synchronise with the system, its StartGeneration will be zero. Here, we should not be invalidating the offers that should be used for real-time dispatch.

A possible solution is for the PSO to override StartGeneration in the network status file. All generating units require the PSO’s prior approval to synchronise with the power system. As a result, the PSO should have information on when each unit is expected to synchronise. If a generating unit is synchronising, the PSO could either: (a) override the StartGeneration to a number that is greater than zero, or (b) insert a generating unit status in the network status file to indicate if the unit is synchronising in the upcoming dispatch period. The MCE can then use this
information, together with the generator’s output level available in the network status file, to invalidate a forced outage unit’s offers if the unit is not synchronising.

Another way would be for an MP to indicate its unit’s status in its offer submission file to EMC. As MPs are in the best position to know when they can synchronise to the power system, they can indicate this in their offer submission to EMC. Similarly, the MCE can then use both the network status file’s StartGeneration and the status of the generating unit to invalidate a forced outage unit’s offers, if the unit is not synchronising.

EMC can work with the PSO and MPs to determine which approach will be feasible and more cost effective if the RCP supports the proposal.

This method is preferred because the additional status information would assist in confirming a forced outage, compared with only depending on the current expected output in the network status file. Further, the taking of snapshots of the system is already automated.

5.2 Using Advisory Notices on Forced Outages

The PSO currently issues Advisory Notices on forced outages on a reasonable endeavour basis. This notice can also be used to invalidate a GRF’s offers following its forced outage.

The use of forced outage Advisory Notices to trigger invalidation of offers following a forced outage is however not preferred. This is because the issuance of Advisory Notice by PSO is manual and thus subject to human error.

The median time taken from the occurrence of a forced outage to the issuance of an advisory notice of the forced outage is 14 minutes (Blue line). The average time taken is 16 minutes (Red Line) as shown in Figure 5.

Furthermore, as discussed in section 3.2.3, the average time taken for MPs to revise offers following forced outage (11 minutes) is shorter than the average issuing time of the PSO advisory notice (16 minutes) following a forced outage. Therefore, relying on forced outage advisory notices to trigger invalidation of offers would not achieve the proposal’s objective.

![Figure 5: Time Taken to Issue an Advisory Notice after a Forced Outage](image-url)
6. Conclusion and Recommendation

This paper discussed the proposal to invalidate a GRF’s offers immediately following its forced outage, so that dispatch schedules reflect actual generation capabilities. Through analysis of generator behaviour during force outage events and potential impact on market outcomes, EMC is of the view that invalidating a GRF’s offers immediately following its forced outage benefits the market in having a more efficient and accurate dispatch and price schedules. EMC has also studied practices in other jurisdictions and proposed options on how to invalidate offers in the context of the NEMS.

7. Consultation (Concept paper)

The concept paper was published for consultation on 9 December 2019 and comments were received from 4 stakeholders.

Comments from Keppel Merlimau Cogen

Keppel would like to seek clarification on the following concerns;

1) Are the proposed invalidation of offers considered as a breach of gate closure, Market Rules, Chapter 6, Section 10.4.1?
2) If a MP was incorrectly identified as having experience a forced outage and subsequently had its offers incorrectly invalidated as a result;
   a. Will the MP be allowed to seek compensation?
   b. What will be the compensation mechanism?
   c. Will there be a re-run of the MCE should there be an incorrect invalidation of offers?
3) Conversely, if a MP’s offers were not automatically invalidated following a Forced Outage, is the MP in breach of market rules for not complying with dispatch instructions in Market Rules, Chapter 5, Section 9.6?

Keppel does not support the proposal if there is no appropriate compensation for any incorrect automatic invalidation of offers.

Keppel also proposes that the automatic invalidation of offers should also be extended to IL facilities if their facilities have been activated for load curtailment.

If a unit is synchronizing in the same dispatch period as its forced outage, the current proposed methodologies will not automatically invalidate the MP’s offers. As such, Keppel proposes that EMC should perform a check with PSO to confirm if a MP had experienced a Forced Outage if EMC is unable to confirm a Forced Outage event automatically through telemetry or SCADA system inputs.

EMC’s Response

1) The proposed invalidation of offers will not be considered a breach of gate closure.
2) EMC will recommend a re-run of the MCE if there is an incorrect invalidation of offers under the Market Rules, Chapter 6, section 10.2.5. Any compensation will follow the re-run process for Type 2 Re-runs.
3) As a MP always has the most updated information about its generation unit, its obligation ensure that offers are reflective of generation capabilities remains. Therefore, MPs will remain obliged to comply with dispatch instructions under the Market Rules, Chapter 5, Section 9.6.

EMC notes Keppel’s suggestion to extend the automatic invalidation of offers to IL and agree in principle. However, there is currently no real-time indicator of IL’s output and status available for the automatic invalidation of offers for IL. As IL’s impact on energy pricing is small, EMC proposes for invalidation of offers to apply only to GRFs that experienced a full forced outage.
MPs will always have the latest information regarding their generating units. The obligation for MPs to reflect their generation units’ capabilities via their offers remain. Having EMC check with the PSO will slow down the offers’ invalidation process and potentially introduce unnecessary human interventions in an automatic process. On average, the time taken for affected MPs to pass on outage information to the PSO is longer than the revision of GRFs offers.

Comments from PSO
As NEMS is a self-commitment market, EMC may consider imposing penalty on MP which fails to revise the offers immediately following a forced outage.

The network status file contains not only the StartGeneration of each generation unit, but also the connectivity of the entire transmission network, hence it is not practical to make changes to the file whenever there is a forced outage. Moreover, all our efforts will be focused in stabilising the power system during any forced outage. Besides, there is a 10 minutes window when there is no update once the network status file is sent to EMC to run the MCE.

The MP is in the best position to know the status of their generating unit. Therefore, EMC can create a status update in the EMC website, similar to how PSO upload the AGOP and ASA reports, so that the MP can quickly update the status of the generating unit once it is tripped.

The 2 methods (5.1 and 5.2) that EMC proposed will not automatically invalidate tripped unit’s offers in real-time as they require human intervention and hence the same scenario may occur.

EMC’s Response
EMC notes PSO’s comments to impose a penalty on MPs which fails to revise the offers immediately following a forced outage. Currently, there are already provisions to penalize offending MPs via the MSCP process.

EMC notes PSO’s comments regarding the practicality of making changes to the network status files and PSO’s processes during forced outage events.

EMC agrees with PSO that a MP is in the best position to know the status of its generating unit and will explore PSO’s suggestion. The proposed invalidation of offers is not intended to invalidate a unit’s offers in real-time. It is meant to maximise the chance of the MCE being able to use the latest accurate information available in the system as inputs for the next dispatch period.

Comments from Senoko Energy
As per the analysis provided, removing outliers, the average time that market participants took to revise their offers after the occurrence of a forced outage is 11 minutes. This average delay is not an unreasonable amount of time, given the fact that for example if a GRF’s forced outage occurred at 10:01pm, as per the market rules, the next available period to adjust the GRF’s offer is 10:30pm – 11:00pm, which equates to a delay of 29 minutes. If the market rules accept a potential delay of 29 minutes, an 11-minutes delay should be deemed more than satisfactory.

The market rules require GRFs to provide reserves. As per 1.1.234, “reserve means generation capacity or load reduction capacity that can be called upon to replace scheduled energy supply that is unavailable as a result of a forced outage….” The cost to provide or procure reserves is borne by generators, and this service is a requirement for all 48 periods in a trading day. Therefore, having 1.5 times the largest generating unit (MW) as reserves should mitigate most of the risks that surface as a result of a GRF tripping.

There are multi-shaft units in the NEMS, for example, 1 unit = 2 gas turbines (GT) + 1 steam turbines (ST).
In a scenario where the running configuration is 1 GT + 1 ST, the multi-shaft unit still has 1 GT remaining on standby which is available to run up for operation if required. If the portion of the running unit (1 GT + 1 ST) were to trip, the existing offer from the remaining GT which is still fully available would then be automatically invalidated should this rule change go through. Therefore, the proposed rule will further add to the system risk by removing the offer of the GT which could contribute positively to the system supply.

Another possible scenario is that a unit faces a momentary trip and can run back up immediately. Should his market rule be approved, the subsequent 2 periods will be automatically set to 0. Given that the current market rules do not allow the addition of MWs in a “break window” period, the market is potentially excluding these MWs which could alleviate the market’s supply shortage.

**EMC’s Response**
EMC notes Senoko’s view that an 11-minutes delay in offer revisions is reasonable and satisfactory for NEMS. However, it is usually the rare events in which more than 20 minutes are taken that have caused significant price distortion and system security concerns.

For multi-shaft units, if the 1 GT + 1 ST trips and disconnects from the grid, the remaining GT would need to synchronize back to the grid. Therefore, the MP will have to update the status to “synchronizing” so that the original offers will not be invalidated. However, if the GT is unable to fulfill the dispatch schedule of 1 GT + 1 ST, they will still be subjected to non-compliance with dispatch schedule.

If the 1 GT + 1 ST trips but it is not disconnected from the grid, the remaining GT would be generating and therefore would not register a zero reading in the telemetry or SCADA system. The offers would hence not be invalidated as proposed.

In the scenario that a unit had a momentary trip and can run back immediately, the offers will not be automatically invalidated as long as the status is updated as “synchronizing” and/or there is a positive reading in the telemetry or SCADA system.

**Comments from EMC, Market Operations**
EMC, Market Operations does not support the proposal for the following reasons:

**Market Design Principle**
As NEMS is a self-commitment market, EMC, Market Operations feels that Market Participants will need to be responsible for their offer submissions. Any non-compliance to the market rules should be investigated by the MSCP.

**Operationally feasibility**
As EMC does not operate the grid like other market operators cited in the examples, we may not have the latest data to re-dispatch the market participants in real-time. Furthermore, relying only on the current available information such as ‘StartGeneration’ data is not enough to indicate a forced outage. The data collected can also be erroneous.

**Other issues**
PSO may still need to intervene in the immediate period if the forced outage happens within the last 10 minutes of each period where the network status file is finalized, and MCE is running as the update information can only be used in the next immediate period.

**Other comments**
Financial impact on the whole market maybe huge if there is any error in the invalidation of the offer process. EMC, Market Operations would like to clarify if invalidation of offers refers to setting energy offer quantity to zero.
EMC’s Response

On operationally feasibility, we recognize that ‘StartGeneration’ data alone is not enough to indicate forced outage. There will be a need to introduce other indicators to further determine the status of the generation unit. Erroneous data is an existing issue which can affect current operations. Reruns can be conducted if input data such as ‘StartGeneration’ is erroneous under the current market rules.

On the need for PSO to intervene in the immediate period if forced outage data is not updated, it is an event that can happen even if the correct schedule is produced. The PSO can intervene in the dispatch if it determines that there are risks to system security. Due to operational time needed to transfer PSO inputs into the MCE for each run, the proposed method cannot possibly capture every period of forced outage.

Conversely, we have shown that the financial impact on the whole market can also be huge if there is no invalidation of the offers. Given that price-reruns can be conducted if the MCE uses inputs that are wrong, market participants have avenues to right a wrong outcome.

Invalidation of offers can be done, but not limited to, the following ways:
- setting the offer quantity to zero
- not using of the offer for the tripped unit
- setting a security constraint on the tripped unit to ensure that its output is zero
- setting the ramp rates to zero

These or other methods to invalidate the offers can be investigated further if the RCP supports the proposal in principle.

8. Conclusion and Recommendations

For economic efficiency, the MCE’s dispatch of GRFs should be based on the latest correct information. EMC is of the view that invalidating a GRF’s offers immediately following its forced outage benefits the market through producing more efficient and accurate dispatch and price schedules.

Nevertheless, the real-time markets are set to be reviewed with the introduction of the Forward Capacity Market (FCM). Notably, market power mitigation measures such as offer caps may be introduced for pivotal suppliers of capacity. There will also be consequential changes required of the market rules relating to offers and offer submissions in the real-time markets. We expect this proposal to have an impact on these upcoming changes, which can only be assessed when the FCM rules are available along with consequential changes required of the real-time markets.

Therefore, we recommend that the RCP:

1. support the principles for and approaches to invalidate a GRF’s offers following its forced outage; and
2. task EMC to draft the required market rules after rules for the Forward Capacity Market and the required changes to the real-time markets are finalised.
9. Decision at the 113th RCP Meeting

The concept paper was discussed and voted on at the 113th RCP meeting held on 21st Jan 2020. **No majority of votes was achieved** to support the proposal.\(^{11}\)

The following Panel members **supported** the principles for and approaches to invalidate a GRF's offers following its forced outage:

1. Mr. Tony Tan (Representative of Generation Licensee)
2. Mr. Matthew Yeo (Representative of Wholesale Electricity Trader)
3. Ms. Ho Yin Shan (Representative of the Market Support Services Licensee)
4. Dr. Toh Mun Heng (Representative of Consumers of Electricity in Singapore)

The following Panel members **did not support**:

1. Mr. Henry Gan (Representative of EMC)
2. Mr. Soh Yap Choon (Representative of PSO)
3. Mr. Senthil Kumar (Representative of Retail Electricity Licensee)
4. Mr. Fong Yeng Keong (Representative of Consumers of Electricity in Singapore)

The following Panel Members **abstained from voting**:

1. Mr. Marcus Tan (Representative of Generation Licensee)
2. Mr. Sean Chan (Representative of Retail Electricity Licensee)

---

\(^{11}\) Pursuant to Section 2.5.2 of Chapter 3 of the market rules, at all meetings of the RCP, every question shall be decided by a majority of votes.