

RCP PAPER NO. : **EMC/RCP/75/2014/CP52**

SUBJECT : **RECONCILIATION OF THE DEMAND FORECAST**

FOR : **DECISION**

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DATE OF MEETING : **2 SEPTEMBER 2014**

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### **Executive Summary**

This paper assesses the proposal for EMC to publish a comparison between PSO's load forecasts (used in the preparation of forecast and dispatch schedules) and the actual metered load, showing the load values for each dispatch period and providing reasons for variance where applicable. This is to increase the industry's ability to understand the accuracy of the load forecast and the factors that influence it.

A study on the accuracy of the Very Short Term Load Forecast (VSTLF) had previously been conducted, and the TWG had then decided that the accuracy of the load forecast should be measured by comparing the scheduled (i.e. forecasted) gross generation from the RTS (computed using SCADA) with the actual gross generation from the PSO (recorded using SCADA). This was preferred to the Injection Energy Quantity (IEQ, using metering data), so as to achieve a more appropriate comparison. While there were recognised limitations of the adopted methodology, the TWG had concluded that it was the most suitable approach given data limitations.

However, we recommend that, if such a comparison is considered useful, the most recent VSTLF for Period T (i.e. the forecast input to generate RTS for Period T) be compared with the actual gross generation recorded using SCADA, where both would represent the average value for Period T. The comparison can be made either monthly or quarterly, along with statistical information on the difference between the VSTLF and SCADA values.

At the 74<sup>th</sup> RCP meeting, the panel members unanimously **supported** that (a) PSO provide EMC with the actual gross generation data recorded using SCADA, and (b) EMC publish (without conducting any analysis) both the VSTLF and the SCADA data of actual gross generation received from the PSO in (a), for the MPs to perform their own analyses of the demand forecast. EMC was tasked to consult PSO on a suitable frequency that PSO will be comfortable with to provide EMC with the data in (a). EMC would also review the cost of publishing the VSTLF and the SCADA data of actual gross generation on EMC's website.

**Post-meeting**, PSO offered to publish both the SCADA data of actual gross generation and the VSTLF on EMA's website on a weekly basis. Under this arrangement, PSO would not need to provide the actual gross generation data to EMC (under (a) above), and EMC would not be required to make the necessary system changes to publish such data on EMC's website.

At the 75<sup>th</sup> RCP meeting, the panel members unanimously **supported** that PSO publish both the SCADA data of actual gross generation and the VSTLF on EMA's website on a weekly basis.

## 1. INTRODUCTION

This paper assesses the proposal for EMC to publish a comparison between PSO's load forecasts (used in the preparation of forecast and dispatch schedules) and the actual metered load, showing the load values for each dispatch period and providing reasons for variance where applicable. This is to increase the industry's ability to understand the accuracy of the load forecast and the factors that influence it.

## 2. BACKGROUND

### 2.1 Types of Demand/Load Forecasts from the PSO

The PSO produces the following types of system load forecasts (in MWs) for Singapore:

- Very Short Term Load Forecast (VSTLF) - On a half-hourly basis, a forecast of the average system load for each half-hourly period for the next 7 hours (i.e. 14 dispatch periods).
- Short Term Load Forecast (STLF) - On a daily basis, a forecast of the average system load for each half-hourly period for the next 14 days.
- Medium-Term Load Forecast (MTLF) - On a monthly basis, a forecast of the peak system load for the next 12 months.

The PSO provides the VSTLF to EMC every half-hourly and the STLF once daily.

The VSTLF and STLF forecast the total gross generation required to meet system load, which includes transmission losses and the station/auxiliary load consumed by the generators themselves for each dispatch period.

The VSTLF is used to generate a Real-Time Schedule (RTS).

### 2.2 Schedules Published by EMC

EMC produces the following schedules in accordance with the Market Rules:

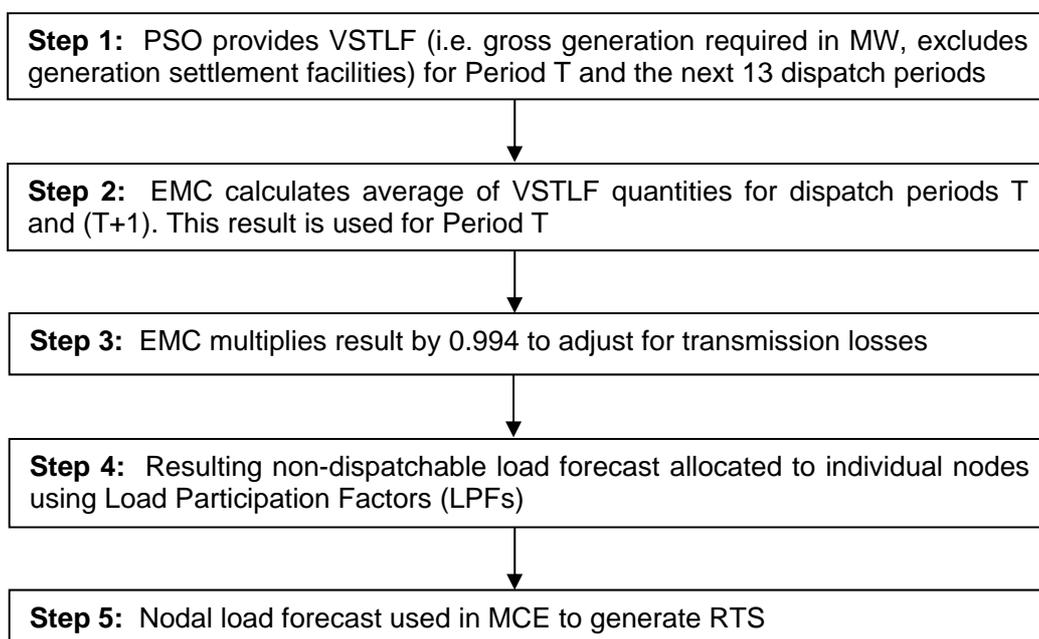
**Table 1: Schedules published by EMC**

Type of Schedule	Real Time Schedule (RTS)	Short Term Schedule (STS)	Pre-Dispatch Schedule (PDS)	Market Outlook Scenario (MOS)
<b>Also Known as</b>	Dispatch Run (DPR)	Look Ahead Run (LAR)	Day Ahead Run (DAR)	Week Ahead Run (WAR)
<b>Frequency of Publication</b>	Every Period	Every Period	Every 2 Hours	Every Day
<b>Published at</b>	T-30 seconds	T+5 Mins	15 Mins before each 2-hour block, starting from 0000hrs	9am of each day
<b>Coverage</b>	Upcoming Period T	Upcoming Periods from T+1 to T+12 Note: Excludes upcoming	Covers at least 24 periods and not more than 72 periods	All Periods from the start of the next day for 6 consecutive days.

		Period T (already covered under RTS)		
<b>Source<sup>1</sup></b>	VSTLF	VSTLF	VSTLF and STLF	VSTLF and STLF
<b>Comments</b>	Binding dispatch schedule	Forecast schedule	Forecast schedule	Forecast schedule

EMC will transform the VSTLF from the PSO into a nodal load forecast for a particular dispatch period, which is then used as an input in the Market Clearing Engine (MCE) to generate a RTS. Figure 1 below illustrates this process.

**Figure 1: Processing of VSTLF<sup>2</sup> (provided by the PSO) to produce RTS for Period T**



Note: In Step 2, the average of the two figures is the expected gross generation that is required at the end of dispatch Period T.<sup>3</sup>

In Step 4, the LPFs are node specific and reflect the share of total load occurring at particular nodes for respective periods.

As the VSTLF covers 14 dispatch periods, it is also used to generate the STS.

### 2.3 Earlier Study in 2005

In 2005<sup>4</sup>, the RCP tasked the TWG to review the accuracy of the VSTLF. The TWG in turn requested EMC to conduct the following analysis:

Compare the scheduled gross generation from the RTS with the actual gross generation from SCADA data for 2004.

<sup>1</sup> The most recent and available forecast for any period will always be used.

<sup>2</sup> The VSTLF is received 11 minutes before Period T.

<sup>3</sup> The VSTLF forecasts the average gross generation required over a half-hour dispatch period. The RTS determines the generation required at the end of a dispatch period (at a discrete point in time). The process of averaging the VSTLFs of two consecutive periods is necessary to turn forecasts of average gross generation in the two dispatch periods into an estimate of the gross generation at the end of the first dispatch period.

<sup>4</sup> "Review of the Scope of the Study on Accuracy of the Very Short Term Load Forecast", as presented at the 19<sup>th</sup> RCP meeting on 3 May 2005

The above issue was investigated, and results presented in the following section.

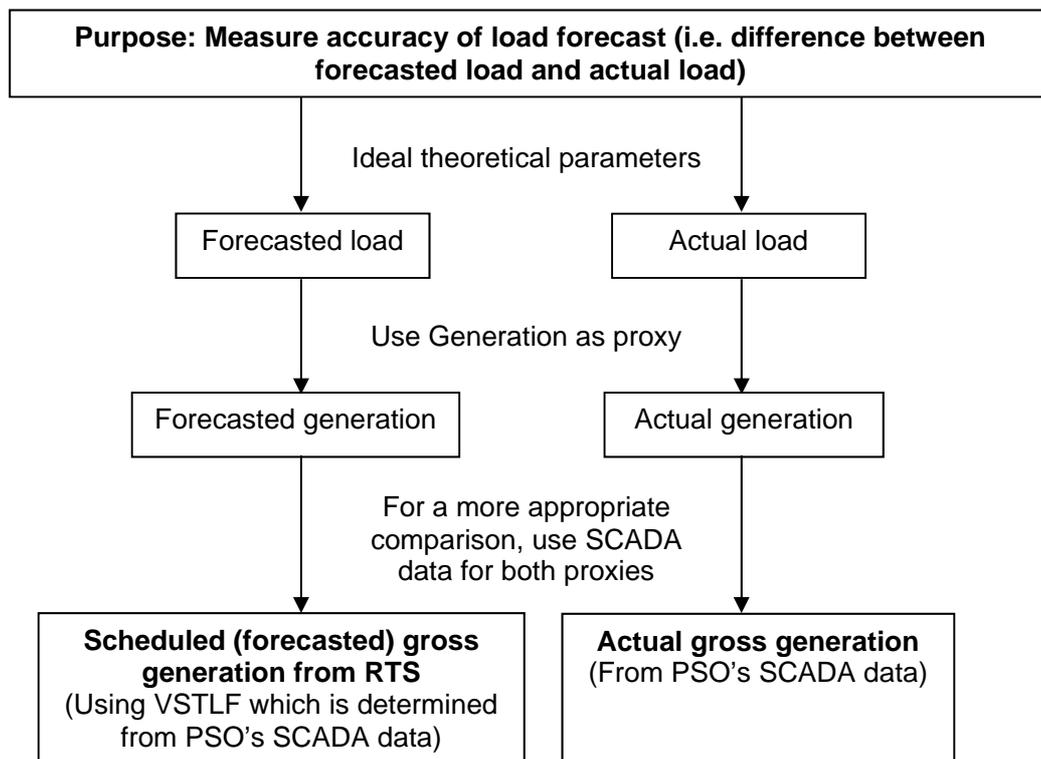
### 2.3.1 Compare scheduled gross generation from RTS with actual gross generation from SCADA data for 2004

An earlier 2004 RCP paper studied the accuracy of the VSTLF<sup>5</sup> by comparing it with the total metered generation quantity (i.e. metered Injection Energy Quantity (IEQ) plus auxiliary load) for every dispatch period for a period of 3 months (Q1 2004). However, the TWG decided that such a comparison was likely to incorporate measurement error because of the two different ways of obtaining the data (i.e. VSTLF based on SCADA/EMS data<sup>6</sup>, versus metering data).

As the scheduled gross generation in the RTS is determined from the VSTLF which uses SCADA/EMS data, the TWG decided to compare it with the actual gross generation recorded using SCADA for a more appropriate comparison. The review in 2005 used per period data over a 12 month period (2004) to assess the accuracy of the load forecast.

Figure 2 below summarises the parameters to be used for measuring the accuracy of the load forecast.

**Figure 2: Parameters to be used for measuring accuracy of load forecast**



<sup>5</sup> "Study of the Accuracy of the Very Short Term Load Forecast", as presented at the 16<sup>th</sup> RCP meeting on 2 Nov 2004

<sup>6</sup> Each half-hourly load forecast in the VSTLF is a summation of the average output, measured at each generating unit's terminal, over a half-hourly period of all generating units monitored by the Energy Management System (EMS) of the PSO. The real-time Supervisory Control and Data Acquisition (SCADA) subsystem is the core function of the EMS. It is essential for the monitoring, alarming and distribution of real-time power system data to other subsystems and real-time control of devices in the PSO controlled system.

## Methodology to assess the accuracy of the load forecast

The TWG used the following methodology to assess the accuracy of the load forecast:

- i. The SCADA values (i.e. actual gross generation) provided by the PSO are *average* MW over the entire Period T.
- ii. The RTS values (i.e. forecasted gross generation) produced by the MCE are *end of period* (“EOP”) scheduled target MW for Period T.
- iii. Therefore, the EOP RTS values should first be converted to average values for a more appropriate comparison with SCADA values. This can be done by taking a simple average of the start and end points of a Period T in MW<sup>7</sup>.
- iv. The next step is to find the difference (i.e. RTS value – SCADA value). This represents the variance between the forecasted gross generation and the actual gross generation.
- v. Finally, divide the difference obtained in the previous step by the SCADA value (i.e. actual gross generation) to establish a percentage error for each period.

$$\text{Hence, Percentage error} = \frac{(\text{RTS} - \text{SCADA}) \times 100\%}{\text{SCADA}}$$

The limitations of the above methodology are as follows:

- The averaging process for RTS in Step (iii) assumes linear ramping in a period. However, in reality, the ramping between the start and end points of a period may be non-linear. Thus, simple averaging may not produce the best results.
- In Step 2 of Figure 1, the scheduled (EOP) values for a Period T in the RTS are produced by averaging the VSTLF values for Periods T and (T+1). Further, Step (iii) above produces an average RTS value for Period T by averaging the EOP RTS values for Periods (T-1) and T. This double averaging is likely to introduce some errors in the final average MW for Period T’s forecasted generation.

Despite these limitations, the TWG at that time noted that given the limitation on data available to EMC for a dispatch period (i.e. values are available only for the start and end points of a period), this was the most suitable approach for the assessment of the accuracy of the load forecast.

## 3. ANALYSIS

### 3.1 Proposed Methodology to Assess the Accuracy of the Load Forecast

The previous section described the methodology of comparing the scheduled gross generation in the RTS with the actual gross generation recorded using SCADA for a more appropriate comparison than comparing the VSTLF with the total metered generation quantity for a given dispatch period. This basis of comparing data obtained from the same source (SCADA) should be retained.

However as highlighted earlier, the methodology has limitations resulting from the averaging process. To circumvent the need for the averaging of values (which was done to convert average VSTLF values to EOP values, and then convert EOP RTS values to average values), the most recent VSTLF for Period T (i.e. the forecast input to generate RTS for Period T) can directly be

<sup>7</sup> This means taking an average of RTS values for Periods (T-1) and T (because the RTS value for Period (T-1) is the value at the end of that period, which is equivalent to the value at the start of Period T).

compared with the actual gross generation recorded using SCADA, where both would represent the average value for Period T.

Therefore, the proposed revised methodology to assess the accuracy of the load (generation) forecast is as follows:

### Revised methodology to assess the accuracy of the load forecast

- i. Find the difference: (VSTLF for Period T – SCADA value of actual gross generation for Period T). This represents the variance between the forecasted gross generation and the actual gross generation.
- ii. Divide the difference obtained in the previous step by the SCADA value (i.e. actual gross generation) to establish a percentage error for each period.

$$\text{Hence, Percentage error} = \frac{(\text{VSTLF} - \text{SCADA}) \times 100\%}{\text{SCADA}}$$

This simplified methodology avoids the limitations of the previous methodology, while still achieving an appropriate comparison of comparing data obtained from the same source (SCADA).

#### 3.1.1 Information to be published

The proposal received by EMC requested that EMC publish a comparison between PSO's load forecasts and the actual metered load, showing the load values for each dispatch period and providing reasons for variance where applicable.

For the reasons earlier described, it would be more appropriate to publish a comparison between the VSTLF for each dispatch Period T and the actual gross generation recorded using SCADA for that Period T. The VSTLF and SCADA values for each dispatch period can be published, along with the following statistical information:

- Average of Y
- Standard Deviation of Y
- Median of Y
- Average Absolute of Y
- Mean Absolute Percentage Error of Y<sup>8</sup>

where Y is the difference found in Step (i) of the revised methodology: (VSTLF for Period T – SCADA value of actual gross generation).

EMC will not have information on the reasons for variance and hence is unable to publish such explanation.

#### 3.1.2 Frequency of publication

The VSTLF and SCADA values for each dispatch period, together with the above statistical information, can be published either monthly or quarterly. A monthly publication means that the statistics would be calculated based on data for all dispatch periods in the month, while a quarterly publication means that the statistics would be calculated based on data for all dispatch periods in the quarter.

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<sup>8</sup> The mean absolute percentage error is the average of all the percentage errors, taken without regard to the sign. This avoids the problem associated with simple averages where the positive and negative errors cancel each other out, giving a potentially misleading picture of an accurate forecast.

### 3.2 Gate Closure

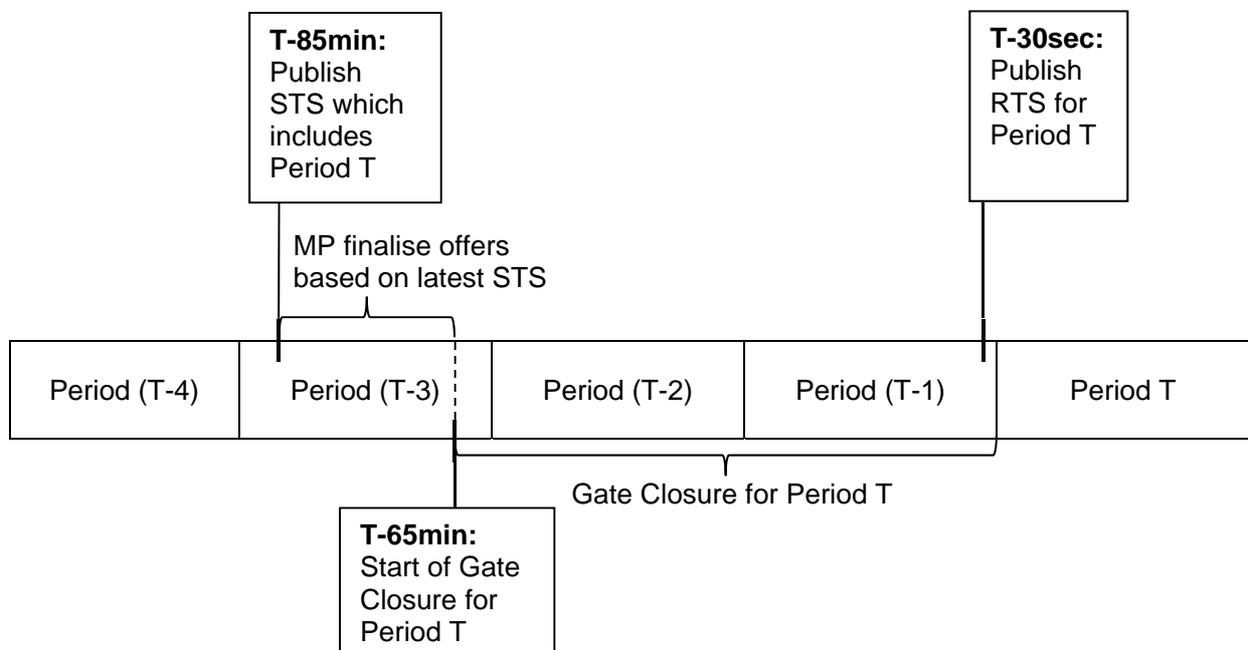
The current Market Rules specify a gate closure period whereby no offer variation or revised standing offer shall be submitted by Market Participants (MPs) within 65 minutes prior to the dispatch period to which the offer variation or revised standing offer applies, except in certain circumstances.<sup>9</sup>

To abide by the gate closure restriction, MPs will have to make their offer decisions for a particular dispatch Period T at least 65 minutes prior to Period T.

This means that they will have to rely on the STS relating to Period T that was published 85 minutes before Period T to submit final offers for Period T.

Figure 3 below depicts the timings of the load forecast information (RTS and STS) made available to the MPs, as well as the gate closure restriction for MPs submitting offers for Period T.

**Figure 3: Relevant STS used for Period T under gate closure restriction**



As can be seen, due to the gate closure restriction, MPs submitting offers for Period T would have to rely on the most recent load forecast available to them before the start of the gate closure period, which is the STS published 85<sup>10</sup> minutes before Period T. Thus how effectively MPs can respond to the load for Period T will depend on how well the load for Period T in the STS predicts the load for Period T in the RTS.

Since the projected total load for both the RTS and the STS is already published, MPs can currently make this evaluation on their own.

<sup>9</sup> Refer to Market Rules Chapter 6 Section 10.4.1.

<sup>10</sup> All of the RTS and STS published during the gate closure period would be irrelevant for the purpose of submitting offers for Period T.

#### 4. SYSTEM IMPLEMENTATION TIME AND COSTS

##### 4.1 Information Required by EMC for Publication

To publish the information as described in Section 3.1.1 to assess the accuracy of the load forecast, EMC will require the following additional information from PSO.

**Table 2: PSO information required by EMC for publication**

	Type of Information	Remarks
<b>Existing Information</b>	VSTLF for each dispatch period	<ul style="list-style-type: none"> <li>Currently already provided to EMC</li> </ul>
<b>New Information</b>	SCADA value of average actual gross generation for each dispatch period	<ul style="list-style-type: none"> <li>This information is obtained by summing up the actual gross generation recorded at every 2-second interval in a half-hour dispatch period, and averaging across the total number of 2-second intervals in the period</li> <li>Not currently provided to EMC</li> </ul>

As shown in Table 2, the SCADA value of average actual gross generation for each dispatch period is currently not provided to EMC. PSO will need to provide this information to EMC if the proposed methodology to assess the accuracy of the load forecast (described in Section 3.1) is to be implemented by EMC. However, EMC cannot provide reasons for the variance.

##### 4.2 Estimated Implementation Time and Costs

Table 3 below shows the breakdown of the estimated time and costs for EMC to publish the information described in Section 3.1. These estimates are based on the assumption that PSO can submit the necessary information (specifically the SCADA value of average actual gross generation for each dispatch period) to EMC via the Single Electronic Window (SEW) platform.

If PSO is unable to, EMC will have to re-evaluate the cost taking into account the means by which the information required is provided by PSO to EMC.

**Table 3: Estimated implementation time and costs**

Frequency of Publication	One-Time Cost **
Option 1: Monthly	52,440
Option 2: Quarterly	52,440

\*\* Breakdown of One-Time Cost:

Scope	Effort (Man-days)	Effort (\$)
1) Analysis and Requirement Gathering/Sharing	14	7,530
2) Development/Testing/Deployment/Documentation	59	32,450
3) Project Management	14	7,810
4) User Acceptance Testing	10	4,650
<b>Total Effort Required</b>	<b>97</b>	<b>52,440</b>

This cost of \$52,440 has not been budgeted and EMC would require EMA's approval to incur the cost and recover it from the market.

#### 4.2.1 PSO's costs

PSO has confirmed during the industry consultation that they are able to provide the requested information to EMC using EMC's SEW interface.

PSO would have to incur costs associated with modification to the EMS system to extract the requested data, and additional manpower to verify, approve and upload the extracted data. The exact costs and implementation timeline would depend on the eventual approach taken.

## 5. INDUSTRY CONSULTATION

The concept paper was published for industry consultation on 30 May 2014, seeking views on the following:

- 1) When making offer decisions, noting the gate closure restriction, is there still significant value to MPs in receiving the published information on the comparison between the most recent VSTLF for Period T (i.e. the forecast input to generate RTS for Period T) and the actual gross generation for Period T recorded using SCADA (as described in Section 3.1.1)?
- 2) Any comments on using the proposed revised methodology (as described in Section 3.1) to assess the accuracy of the load forecast?
- 3) Any comments on the proposed information to be published and its frequency, i.e. monthly or quarterly (as described in Section 3.1.1)?
- 4) Would PSO be able to provide the SCADA value of average actual gross generation for each dispatch period? If so, what would be the means for the information to be provided to EMC, and what would the cost to PSO be?

Comments were received from the PSO, Sembcorp Cogen, PacificLight Power, Senoko Energy, and EMC Market Operations. Their comments and EMC's responses are provided below.

### Comments from the PSO

(Answers correspond to questions given above)

- 1) *As actual demand changes are random in nature, which could be due to many factors such as weather condition, stochastic load variations etc, it is not possible to achieve 100% accuracy (though PSO's load forecast already has high accuracy of > 99% consistently over the years) or to provide the reason for specific variance since it is costly and impractical to monitor individual load (changes). In addition the info to be provided are historical (after the event), hence there is really no value to MPs who are making their Offers decision based on forecasted (future) load projection.*
- 2) *Ok.*
- 3) *Either will do.*
- 4) *Yes, it is possible to provide the requested info. A file containing the requested info could be uploaded using SEW interface of EMC currently for eg ASA reports provision. There would be cost associated with modification to the EMS system to extract the requested data, additional manpower (with cost) would be required to verify, approve and upload the*

*extracted data; these costs and implementation timeline would depend on approach to be taken.*

#### EMC's Response

EMC notes PSO's comments.

#### Comments from Sembcorp Cogen

(Answers correspond to questions given above)

- 1) *Our view is that this information is useful for MPs to gauge the adequacy of regulation reserve provisions. We suggest that, on a monthly basis, the EMC publish the T-85 min STS together with the RTS. This would give market participants an official report on the demand change between the last LAR before gate closure and RTS.*
- 2) *Nil. We agree with the revised methodology.*
- 3) *Our preference is for the information to be published monthly or even more frequently.*
- 4) *N/A. We propose for PSO to publish the report under current communication channels (similar to AGOP, GCS publication). This would save on additional system implementation cost.*

#### EMC's Response

For (1), the T-85 min STS and the RTS are already made available to MPs, so they can currently make their own comparisons and evaluation for these load forecasts. EMC already provides MPs with the ability to automate the delivery and submission of market information between MPs' market systems and EMC's market systems (either through a public Application Programmers' Interface (API) or through Web Services), hence MPs can automate the download of STS and RTS data from the EMC market systems for easier access. A document providing details on how to access the respective data services and define the formats used in these services is currently made available to MPs, therefore developers of MP's applications may use this information to automate the download and submission of data from and to the EMC's market systems.

EMC notes Sembcorp Cogen's comments for (2) - (4).

#### Comments from PacificLight Power

*With publication of the information (3.1.1) currently proposed at an interval of either Monthly or Quarterly (3.1.2), it will have no significant value to make offer decision on real-time basis. As such, it has no relevancy to NEMS 65mins gate-closure. It will however be useful if information were to be published at a lower interval of daily or weekly. Information gathered from closer proximity (eg. Reason of deviation) are useful for decision making when cross-reference against known upcoming constraints (if any).*

*With demand being a core market driver, publication of comparison between forecasted load and actual metered load is definitely a good step moving forward for the market and towards information transparency. With the availability of such information, MPs may benefit from market projection analysis or even ex-post reporting.*

*We support the proposal to publish the comparison. There is also a suggestion to request MAU to be the party publishing the information on MAU quarterly report. We feel that this approach is feasible and impact to implementation would be minimal. Not forgetting MAU is the party holding*

*the role to police the market and forecasted load is a key driver to pool-prices. Whichever the eventual publication frequency, we wish that the period-based data to be made available through the EMC website as with other market information, downloadable in csv format.*

#### EMC's Response

EMC notes PacificLight Power's preference for information to be published more frequently, for example daily or weekly. This would however entail greater cost, hence there is a need to balance the trade-off between the benefits of increasing the frequency of publication and the additional cost required to do so. As mentioned in the paper, EMC is unable to provide reasons for deviations in load forecasts.

Currently, the Market Surveillance and Compliance Panel (MSCP)'s annual report provides a monthly percentage of variation in real-time load forecast, which compares the initial generation output plus scheduled generation (proxy for load) with the metered IEQ for each period. Note however that this comparison uses two different ways of obtaining the data (SCADA data versus metering data) and is inconsistent with the proposed methodology in this paper, which is based on comparing data obtained from the same source (SCADA).

In addition, the quarterly MSCP Market Watch publishes demand indicators such as the monthly load forecast variation (for both the most recent STS versus RTS, and PDS versus RTS) and the quarterly variation in load forecast and metered energy quantities. As the MSCP is an independent body, the RCP would have to make a request to the MSCP to publish any further information via these channels.

#### Comments from Senoko Energy

*Senoko is supportive of the methodology proposed by EMC and values the increased transparency of reconciling between the forecasted demand and actual demand, which will become more important as demand response scheme and more intermittent generation sources are introduced in the Singapore Wholesale Electricity Market (SWEM). The data could be published in the same manner as "Price Information" on EMC's website.*

#### EMC's Response

EMC notes Senoko's support of the proposed methodology.

#### Comments from EMC Market Operations

- *EMC Market Operations feel that the proposed data publication doesn't provide much value to the market. The RTS and STS data is already available to MPs, so they may analyse how the forecast for a particular dispatch period is moving with each successive STS, until the RTS. By giving the MPs historical VSTLF and SCADA data may have little bearing on their offer decisions.*
- *With regards to the proposed methodology, we feel there is no value-add for EMC to calculate the comparison data. Furthermore, EMC are not able to provide explanation of deviations between the VSTLF and SCADA data.*
- *As mentioned during the clarification meeting, we raise the question of whether MAU's Market Watch report could be leveraged upon to provide the required information.*

#### EMC's Response

EMC Market Operation's comments are noted. The feedback from Market Participants on the value to them in receiving additional information as described in Section 3.1.1 would have to be weighed against the cost of implementation. As above, the RCP would have to make a request to the MSCP if any further information were to be published via MSCP's quarterly Market Watch.

## 6. SUMMARY

	<b>Issue for RCP's Decision</b>	<b>Responses from Industry</b>	<b>EMC's Remarks</b>
1.	Whether to publish information on the comparison between the most recent VSTLF for Period T (i.e. the forecast input to generate RTS for Period T) and the actual gross generation for Period T recorded using SCADA (as described in Section 3.1.1).	<ul style="list-style-type: none"> <li>• As actual demand changes are random in nature, not possible to achieve 100% accuracy or to provide the reason for specific variance since it is costly and impractical to monitor individual load (changes). Since the information to be provided is historical, no value to MPs who are making their offers decisions based on forecasted (future) load projection. (PSO)</li> <li>• Useful for MPs to gauge adequacy of regulation reserve provisions. (Sembcorp)</li> <li>• No significant value to make offer decisions on real-time basis if information is published either monthly or quarterly. Will be useful for decision-making if information (including reason for deviation) is published more frequently. (PacificLight Power)</li> <li>• Publication of comparison between forecasted load and actual metered load is definitely a good step moving forward for the market and towards information transparency. With the availability of such information, MPs may benefit from market projection analysis or even ex-post reporting. (PacificLight Power)</li> <li>• We support the proposal to publish the comparison. (PacificLight Power)</li> <li>• Senoko is supportive of the methodology proposed by EMC and values the increased transparency of reconciling between the forecasted demand and actual demand, which will become more important as demand response scheme and more intermittent generation sources are introduced in the SWEM. (Senoko Energy)</li> <li>• Proposed data publication doesn't provide much value to the market. The RTS and STS data is already available to MPs, so they may analyse how the forecast for a particular dispatch period is moving with each successive STS, until the RTS. Giving the MPs historical VSTLF and SCADA data may have little bearing on their offer decisions. (EMC Market Operations)</li> </ul>	<p>There are mixed views about the value of this information publication to MPs.</p> <p>PSO is not able to provide reasons for variances in specific periods.</p>
2.	To decide on the	<ul style="list-style-type: none"> <li>• Our preference is for the information to be</li> </ul>	More frequent

	frequency of publication of information.	<p>published monthly or even more frequently. (Sembcorp Cogen)</p> <ul style="list-style-type: none"> <li>• Prefer more frequent publication – either daily or weekly. (PacificLight Power)</li> <li>• Ok with monthly or quarterly publication. (PSO)</li> </ul>	publication (daily or weekly) would entail greater cost.
3.	<p>If the decision is to publish additional information, who should be the party to publish the information?</p> <p>Through which platform and in what format should the information be provided to MPs?</p>	<ul style="list-style-type: none"> <li>• Propose that PSO publish the report under current communication channels (similar to AGOP, GCS publication). This would save on additional system implementation cost. (Sembcorp Cogen)</li> <li>• Since MAU is the party policing the market and forecasted load is a key driver to pool-prices, feasible to request MAU to publish the information on MAU's quarterly report. Impact to implementation would be minimal. (PacificLight Power)</li> <li>• To consider leveraging on MAU's Market Watch report to provide the required information. (EMC Market Operations)</li> <li>• Propose that the period-based data be made available through the EMC website as with other market information, downloadable in csv format. (PacificLight Power)</li> <li>• The data could be published in the same manner as "Price Information" on EMC's website. (Senoko Energy)</li> <li>• Yes, possible for PSO to provide the requested information. A file containing the requested information could be uploaded using EMC's SEW interface. (PSO)</li> <li>• There would be cost associated with modification to the EMS system to extract the requested data, and additional manpower to verify, approve and upload the extracted data; these costs and implementation timeline would depend on approach to be taken. (PSO)</li> </ul>	<p>The MSCP's Market Watch is only published quarterly.</p> <p>As the MSCP is an independent body, the RCP would have to make a request to the MSCP to publish any further information.</p> <p>If EMC is the party to publish the information, we prefer that PSO submit the necessary information to EMC via SEW. EMC is unable to provide reasons for deviations in load forecasts.</p> <p>PSO is able to provide the requested information to EMC via SEW, but also unable to provide reasons for variance.</p>
4.	Whether EMC should publish comparison of T-85 min STS's demand versus RTS's demand.	<ul style="list-style-type: none"> <li>• Suggest that EMC publish monthly the T-85 min STS together with the RTS. This would give market participants an official report on the demand change between the last LAR before gate closure and RTS. (Sembcorp Cogen)</li> </ul>	The T-85min STS and the RTS are already published to MPs. Therefore, MPs can currently make their own comparisons and evaluation for these load forecasts.

## 7. DECISION AT THE 74<sup>TH</sup> RCP MEETING

At the 74<sup>th</sup> RCP meeting, the panel members unanimously **supported** that (a) PSO provide EMC with the actual gross generation data recorded using SCADA, and (b) EMC publish (without conducting any analysis) both the VSTLF and the SCADA data of actual gross generation received from the PSO in (a), for the MPs to perform their own analyses of the demand forecast. EMC was tasked to consult PSO on a suitable frequency that PSO will be comfortable with to provide EMC with the data in (a). EMC would also review the cost of publishing the VSTLF and the SCADA data of actual gross generation on EMC's website.

The following RCP members unanimously supported (a) and (b) above:

- |                      |   |
|----------------------|---|
| 1) Mr. Toh Seong Wah | Representative of EMC                                   |
| 2) Mr. Lawrence Lee  | Representative of Market Support Services Licensee      |
| 3) Mr. Pak-Juan Koe  | Representative of Generation Licensee                   |
| 4) Mr. Michael Wong  | Representative of Retail Electricity Licensee           |
| 5) Mr. Sean Chan     | Representative of Retail Electricity Licensee           |
| 6) Mr. Daniel Lee    | Representative of Retail Electricity Licensee           |
| 7) Mr. Phillip Tan   | Person experienced in Financial Matters                 |
| 8) Dr. Toh Mun Heng  | Representative of Consumers of Electricity in Singapore |
| 9) Ms. Frances Chang | Representative of Consumers of Electricity in Singapore |

**Post-meeting**, PSO offered to publish both the SCADA data of actual gross generation and the VSTLF on EMA's website on a weekly basis. Under this arrangement, PSO would not need to provide the actual gross generation data to EMC (under (a) above), and EMC would not be required to make the necessary system changes to publish such data on EMC's website. EMC therefore sought the RCP's approval of these proposed changes at the 75<sup>th</sup> RCP meeting.

## 8. DECISION AT THE 75<sup>TH</sup> RCP MEETING

At the 75<sup>th</sup> RCP meeting, the panel members unanimously **supported** that PSO publish both the SCADA data of actual gross generation and the VSTLF on EMA's website on a weekly basis.