Market Surveillance & Compliance Panel
Market Watch

Issue 58
Fourth Quarter (October to December 2020)

Market Assessment Unit
Executive Summary

The National Electricity Market of Singapore ("NEMS") observed a second consecutive quarter of rise in the energy prices in Q4 2020 as Singapore eased the Coronavirus Disease 2019 ("COVID-19") restrictions since Q3 2020. The higher energy prices in Q4 2020 were brought about by a combination of the increase in fuel oil price, higher demand levels, weakness in supply cushion as well as a larger volume of planned maintenance. It was observed that the energy prices in Q4 2020 had rebounded to similar levels to Q4 2019, pre-COVID-19 times.

Chart 1. USEP and WEP by Quarter

<table>
<thead>
<tr>
<th>Quarter</th>
<th>USEP ($/MWh)</th>
<th>WEP ($/MWh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q4 2019</td>
<td>84.81</td>
<td>85.08</td>
</tr>
<tr>
<td>Q3 2020</td>
<td>67.30</td>
<td>67.74</td>
</tr>
<tr>
<td>Q4 2020</td>
<td>81.47</td>
<td>81.64</td>
</tr>
</tbody>
</table>

Table 1. Quarterly Outage Volume and Ancillary Service Prices

<table>
<thead>
<tr>
<th>Quarter</th>
<th>Q4 2019 Total Outage Volume (MWh Cumulative)</th>
<th>Q3 2020</th>
<th>Q4 2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planned Outage</td>
<td>2,773,668</td>
<td>1,279,755</td>
<td>2,826,405</td>
</tr>
<tr>
<td>Forced Outage</td>
<td>117,241</td>
<td>654,337</td>
<td>23,027</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ancillary Services ($/MWh)</th>
<th>Q4 2019</th>
<th>Q3 2020</th>
<th>Q4 2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary Reserve</td>
<td>0.43</td>
<td>1.81</td>
<td>0.80</td>
</tr>
<tr>
<td>Contingency Reserve</td>
<td>16.34</td>
<td>8.00</td>
<td>9.97</td>
</tr>
<tr>
<td>Regulation</td>
<td>17.27</td>
<td>8.93</td>
<td>9.19</td>
</tr>
</tbody>
</table>

From Q3 2020 to Q4 2020, both the Uniform Singapore Energy Price ("USEP") and the Wholesale Electricity Price ("WEP") increased 21.05% and 20.52% respectively. The rise in energy prices could be attributed to a combination of the following movements in Q4 2020 when compared to the previous quarter:

- An increase in fuel oil price of 7.36% to US$274.15/MT;
- a 0.86% increase in demand to 5,896 MW;
- a 1.98 percentage point shrink in the supply cushion to 22.63%; and
- A 47.33% increase in the total planned and unplanned maintenance volume.
In Chart 2, it was reflected that the vesting contract price (LNG Vesting Price and the Allocated Vesting Price) rose for the first quarter this year, averaging at $139.14/MWh in Q4 2020. This was a 25.69% increase from $110.70/MWh observed in Q3 2020. The increase in LNG Vesting price was due to the rise in the LNG spot price driven by high heating demand in the fourth quarter of 2020. On top of which, there was an increase in Brent oil price of 59.6% which has also contributed to the LNG hydrocarbon charge used for calculating LNG Vesting Price.

Vesting contracts were originally introduced as a regulatory instrument to mitigate the exercise of market powers by generation companies. The vesting contracts mandate a specified amount of electricity to be hedged at a specified price and remove the incentive for generation companies to exercise their market power by withholding supply to push up the half-hourly wholesale electricity prices in the wholesale electricity market. The vesting contract regime is set to phase out on 1 July 2023 and transit to the balanced market regime introduced by Energy Market Authority (“EMA”). In Chart 2, it was reflected that the WEP remained below the vesting contract price across the quarters of observation due to the current over-capacity in the electricity market of Singapore. The low WEP aligned with the EMA’s decision to phase out the vesting contract regime.
Charts 3 and 4 show the frequency of the WEP in various price ranges, measured as a percentage of the total number of hours and a percentage of the total metered energy quantity for Q4 2020, compared to the previous quarter and the same quarter a year ago. It was observed that the three quarters reflected similarly with close to 90% of the time where the WEP was observed in the range of $50/MWh and $100/MWh and approximately 90% of the total metered energy quantity in the market.

It is however, notable that in Q3 2020, the WEP was below $50/MWh for 6.45% of the time and across 5.50% of the total metered energy quantity in the market. In contrast, for Q4 2020 the increase in WEP was attributed to the price being below $50/MWh for only 2.04% of the time and across 1.71% of the total metered energy quantity. There was a marginally rightwards shift in the distribution of WEP from Q3 2020 to Q4 2020.

As observed in Chart 5, $r^2$ decreased from 0.60 in Q3 2020 to 0.49 in Q4 2020, this downward movement implied that the metered energy quantity had a smaller influence on the WEP changes in Q4 2020. There were lesser days in Q4 2020 where $r$ was greater than 0.5 – 81 days, compared to 86 days in Q3 2020. The metered energy quantity and the WEP had a strong positive correlation over a longer time in Q3 2020 than in Q4 2020.

Comparing the same quarters of Q3 2020 and Q4 2020, the fuel oil price rose 7.36% from US$255.36/MT to US$274.15/MT. This was reflected in Chart 6, where the fuel oil price surpassing the level seen in Q4 2019. This reflected the heightened pace of global oil demand with the recovery of the economies from the impact of COVID-19 earlier in the year. The increase observed in the WEP to $81.64/MWh this quarter was largely attributed to the rise in the fuel oil price, given that it is an input to the cost of electricity generation.
Demand and Supply in Q4 2020

Chart 7. Average Forecast and Actual Demand

As observed in Chart 7, the average forecast demand shows an increase of 0.86% from 5,845 MW in Q3 2020 to 5,896 MW in Q4 2020. This reflects that Singapore’s demand was still on route to recovery from the restrictions imposed under the COVID-19 outbreak. Comparing the demand level of 5,918 MW in Q4 2019, this was an indication that Singapore had yet to recover back to the demand levels observed before the COVID-19 outbreak.

Similar to the forecast, the average actual demand climbed 1.16% from 5,755 MW in Q3 2020 to 5,822 MW in Q4 2020.

The increment in demand was due to the strong manufacturing sentiments, reflected in the Purchasing Manufacturing Index ("PMI") in Q4 2020 which averaged at 50.5. The Q4 2020 PMI was 0.3 points higher than that recorded in Q3 2020 of 50.2 with the growth in new orders, new exports and factory outputs and the government putting in place safe management measures for businesses to reopen.

Chart 8. Forecast and Actual Peak Demand

Table 2. Quarterly Average Supply and Supply Cushion

<table>
<thead>
<tr>
<th></th>
<th>Q4 2019</th>
<th>Q3 2020</th>
<th>Q4 2020</th>
</tr>
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<tbody>
<tr>
<td>Average Supply (MW)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>7,738</td>
<td>7,755</td>
<td>7,622</td>
</tr>
<tr>
<td>Supply Cushion (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>23.51</td>
<td>24.61</td>
<td>22.63</td>
</tr>
</tbody>
</table>

Table 2 shows a 1.72% decline in the quarterly average supply to 7,622 MW in Q4 2020. The decline in supply availability could be attributed to the higher planned maintenance level of generation units. The total planned and unplanned maintenance increased by 47.33% from Q3 to Q4 2020.

With the growth in demand and reduction in supply, the resultant supply cushion contracted 1.98 percentage points from 24.61% in Q3 2020 to 22.63% in Q4 2020. This was the lowest supply cushion across the year, with the yearly average supply cushion level at 24.00%.

Despite the decline in the total supply in NEMS, the percentage of the total offer quantity at or below $100/MWh increased from Q3 to Q4 2020 as observed in Chart 9.

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1 The historical PMI index data is available in the website here: https://sipmm.edu.sg/about-sipmm-academy/singapore-pmi/
Chart 10 shows the variations in the pre-dispatch schedule ("PDS") and short-term schedule ("STS") against the real-time schedule ("RTS"). Similar to Q3 2020, the average monthly variations in Q4 2020 remained relatively small. In Q4 2020, it was observed that both the variations in PDS and STS were positively correlated to RTS. This indicated that the real-time dispatch schedule recorded a higher than forecasted schedules consistently.

The positive correlation of the individual months in Q4 2020 could be due to the impact of COVID-19 where the forecasted schedules may have accounted the modest level of economic activities. However, the real-time schedules reflected the higher than expected energy requirement as the Singapore government put in place safe management measures to resume its’ economic activities safely.

The variation of the STS remains relatively small across the quarters of comparing to the variations of the PDS. This was the case as STS are generated more frequently and closer to the RTS, hence the load variation tends to be smaller. While the PDS can be generated a day before the RTS, it had shown larger variations which indicated that the PDS were less reflective of the real time market condition during the quarter.

Chart 11. Average Monthly Variation Between Real-Time Dispatch Schedule and Metered Energy Quantity

The average monthly load variation between the RTS and the metered energy quantity (i.e. the actual generation recorded) decreased from 2.12% in Q3 2020 to 1.96% in Q4 2020.

Possible reasons for the reduced variation between the RTS and the metered energy quantity could be due to the adoption of smart meters\(^2\) by small businesses and residential homeowners. This improve the accuracy of the meter readings and reduce the possible variation from the RTS.

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\(^2\)The easing of safe distancing measures after the Circuit Breaker on 2 June 2020 allowed SP Services Limited to resume its physical meter reading services to better keep records of the actual electricity consumption.
In Q4 2020, the supply cushion averaged at 22.63%, this was lower than Q3 2020 and Q4 2019 where the supply cushion levels were at 24.61% and 23.51% respectively. On the quarterly basis, it was observed that the higher USEP was inversely correlated with the lower supply cushion.

On the monthly level, similar inverse correlation was observed for October, November and December 2020 where the higher supply cushion correlates with a lower USEP. The highest monthly USEP for the year was recorded in November 2020 at $92.27/MWh, with a monthly supply cushion level at 21.34%.

Chart 13 reflects the capacity ratios of all generation types going up in Q4 2020. These changes in the capacity ratios were the result of higher demand in Q4 2020 (refer to Chart 7) as more generation was required to be scheduled to meet the higher demand level.

Comparing Q4 2020 to Q3 2020, the capacity ratio of combined cycle gas turbine (“CCGT”) units increased 0.43 percentage point and the capacity ratio of other (“OT”) units increased 5.20 percentage points to 46.60%. Minimal generation was scheduled from open cycle gas turbine (“OCGT”) units in November 2020, giving rise to its capacity ratio of 0.02% for the quarter with the total scheduled output for Q4 2020 at 165.89MW. OCGT units were seldom scheduled to generate electricity due to the high cost of operation. The last time where OCGT units were scheduled was September 2020.
The breakdown of market share in the NEMS by generation company and generation type are shown in Charts 14 and 15 respectively. The market share is calculated based on two scales, the metered energy quantity and maximum generation capacity.

The market share based on metered energy quantity shows that the three largest generation companies held 51.95% of the total market share in Q4 2020, a further dilution from 53.08% in Q3 2020.

The distribution of market share based on generation capacity, as shown in Chart 15 remained largely unchanged from the last quarter – the three largest generation companies held 60.42% of the total market share in Q4 2020.

In Chart 16, it was reflected that most of the electricity generation in the NEMS continued to be produced by CCGT units (with 98.34% of the metered energy quantity in Q4 2020). This was in line with the sustained efforts and uses of efficient generation technology. Other generation types of OT and ST saw a larger proportion of market share, potentially due to the higher maintenance level observed in the CCGT units in Q4 2020.

CCGT units’ market share increased as seen in Chart 17 (with 89.72% of the total maximum generation capacity under CCGT units in Q4 2020). With the retirement of ST units from the NEMS in June 2020, it was observed that the CCGT units held a higher market share since Q3 2020 of 89.72% as compared to 85.33% in Q4 2019. Likewise, the percentage proportion of OCGT and OT units are observed to increase since Q3 2020 with the reduction of ST capacity in the market.
## Compliance Statistics for Q4 2020

### Potential Breaches of the Market Rules

<table>
<thead>
<tr>
<th>Cases in Total</th>
<th>Determinations in Total</th>
<th>Enforcement</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>95</td>
<td>2</td>
</tr>
<tr>
<td>1 self-report</td>
<td>2 cases determined to be in breach</td>
<td>2 financial penalties</td>
</tr>
<tr>
<td>49 referrals/complaints</td>
<td>4 cases determined to take no further action</td>
<td>0 non-compliance letter</td>
</tr>
<tr>
<td>0 MSCP initiative</td>
<td>89 cases determined not to be in breach</td>
<td>0 suspension order</td>
</tr>
</tbody>
</table>

*This section includes determinations of cases referred to the Market Surveillance and Compliance Panel (“MSCP”) in previous quarters.

The MSCP issued one rule breach determination in Q4 2020 to:

i. ExxonMobil Asia Pacific Pte. Ltd. for its failure to comply with gate closure rules for 13 August 2020.

- 2 cases in total
- 2 financial penalties
- 0 non-compliance letter
- 0 suspension order
- 0 other MSCP order
- $10,000 of financial penalty imposed
- $2,000 of costs awarded
MSCP Market Watch

The MSCP Market Watch is a quarterly report prepared by the Market Assessment Unit (“MAU”) of EMC and submitted to the MSCP. The report summarises the MAU’s day-to-day monitoring, cataloguing and evaluation activities and analyses, and compares the market performance for the current quarter with the quarter a year ago and the previous quarter.

All prices and percentages in this report are rounded off to two decimal places.

The User Guide to MSCP Market Watch provides a glossary of the terms used in the MSCP Market Watch among other information to facilitate readers’ understanding.

Market Surveillance and Compliance Panel

The MSCP is established by the EMC Board in accordance to section 2.6 of Chapter 3 of the Singapore Electricity Market Rules.

The MSCP, with the assistance of the MAU, monitors and investigates the conduct of market participants, the market support services licensee, EMC and the Power System Operator and the structure and performance of the wholesale electricity markets.

The MSCP comprises the following members:

• T P B Menon, Chair
• Lee Keh Sai
• Philip Chua
• Professor Euston Quah
• Professor Walter Woon

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