Executive Summary

Energy prices continued declining in Q1 2020, following the decrease observed in Q4 2019. The main drivers behind this trend were reduced fuel oil prices, higher supply and a stronger supply cushion with a lower volume of forced outages in the National Electricity Market of Singapore ("NEMS").

From Q4 2019 to Q1 2020, both the Uniform Singapore Energy Price ("USEP") and the Wholesale Electricity Price ("WEP") decreased to $80.83/MWh. The average USEP and WEP were the same in Q1 2020 as the regulation price and the Power System Operator ("PSO") fee were lower in Q1 2020 and the hourly energy uplift charge (a return to retailers instead of a charge) was higher in Q1 2020. These are components used together with the USEP when calculating the WEP.

From Q4 2019 to Q1 2020, the quarterly decrease in the WEP corresponded to more instances of the WEP within the lower price ranges, in terms of both duration (refer to Chart 4) and energy quantity (refer to Chart 5).

As observed in Chart 2, the capacity ratios of all generation types increased when comparing Q4 2019 and Q1 2020. These changes in the capacity ratios were a result of the increased demand recorded in Q1 2020, which required more generation to be scheduled for the various generation types (refer to Chart 8). Compared to Q4 2019, the capacity ratio of CCGT units increased 0.91 percentage points and the capacity ratio of OT units increased 2.62 percentage points.
Prices in Q1 2020

Table 2. Quarterly Vesting Contract Prices

<table>
<thead>
<tr>
<th>Quarter</th>
<th>Q1 2019</th>
<th>Q4 2019</th>
<th>Q1 2020</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Vesting Contract Prices ($/MWh)</td>
<td>Vesting Contract Prices ($/MWh)</td>
<td>Vesting Contract Prices ($/MWh)</td>
</tr>
<tr>
<td>Allocated Vesting Price</td>
<td>168.40</td>
<td>154.53</td>
<td>157.48</td>
</tr>
<tr>
<td>LNG Vesting Price</td>
<td>168.95</td>
<td>154.53</td>
<td>157.48</td>
</tr>
<tr>
<td>Balance Vesting Price</td>
<td>165.17</td>
<td>N.A.</td>
<td>N.A.</td>
</tr>
</tbody>
</table>

Upon the removal of the Balance Vesting Price on 1 July 2019, the Allocated Vesting Price ("AVP") solely depended on the LNG Vesting Price ("LVP"). For Q1 2020, both the AVP and LVP were $157.48/MWh, a 1.91% increase from the previous quarter.

Chart 3. VCHP versus WEP by Quarter

Chart 3 shows that the WEP remained below the vesting contract hedge price ("VCHP") during Q1 2019, Q4 2019 and Q1 2020. Coupled with an overcapacity in the NEMS, this trend aligned with EMA’s decision to phase out the vesting contract regime gradually.
Charts 4 and 5 show the frequency of the WEP in various price ranges, measured as a percentage of the total number of hours and of the total metered energy quantity in the quarter respectively.

The decrease recorded in the WEP from $85.08/MWh in Q4 2019 to $80.83/MWh in Q1 2020 corresponded to the observations that the distribution of the WEP was in the lower price ranges over longer hours and over a larger amount of metered energy quantities in Q1 2020. This observation was a continuation from that recorded in Q4 2019.

Chart 4. Distribution of WEP over Time

In Q1 2020, there were marginally more hours where the WEP was within the lower price ranges, compared to Q4 2019.

Chart 5. Distribution of WEP over Total Metered Energy Quantity

In Q1 2020, the WEP was observed to be within the lower price ranges over a slightly higher level of metered energy quantity, compared to Q4 2019.

Chart 6 illustrates the correlation between the WEP and the metered energy quantity for each quarter.

An increase in $r^2$ from 0.56 in Q4 2019 to 0.59 in Q1 2020 implied that the metered energy quantity had a greater influence on the WEP. The number of days where $r$ was greater than 0.5 was 80 days in Q1 2020, the same as that in Q4 2019.

However, the WEP decreased in Q1 2020 even though the metered energy quantity increased (refer to Chart 8). As the WEP is also dependent on several other factor (such as supply, fuel oil price, maintenance level, to name a few) the effect of the metered energy quantity on the WEP could have been diluted by the other variables.

Chart 7 shows that the WEP and the fuel oil price\(^1\) moved in tandem from Q4 2019 to Q1 2020. This is typically the relationship between the WEP and the fuel oil price as the latter is an input to the electricity generation in the NEMS.

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\(^1\) Due to the unavailability of Intermediate Fuel Oil ("IFO") 180 price after 19 February 2020, the fuel oil price recorded for Q1 2020 in the MSCP Market Watch has been changed from IFO 180 price to IFO 380 price. The IFO 380 price was recorded from 1 January 2020 to ensure data consistency within Q1 2020.
Demand and Supply in Q1 2020

There are forecasts of average electricity demand and peak electricity demand in the NEMS, calculated by the Market Clearing Engine based on data provided by the Power System Operator.

Forecasts of electricity demand are important in ensuring the reliability of electricity supply, as market participants can anticipate the need for additional generation and adjust their generation accordingly.

Comparing Q4 2019 and Q1 2020, the average forecast demand increased 1.54% from 5,918 MW to 6,010 MW (refer to Chart 8) – the average monthly forecast demand had been below 6,000 MW since October 2019 and only exceeded 6,000 MW in February 2020 and March 2020. Like the forecast, the average actual demand rose 1.98% from 5,795 to 5,910 MW.

The peak demand in Q1 2020 also increased from that in Q4 2019. The forecast and actual peak demand increased to 7,032 MW and 6,999 MW respectively (refer to Chart 9). Both figures were recorded in March 2020, when the average monthly demand was the highest at 6,089 MW.

| Table 3. Quarterly Average Supply and Supply Cushion |
|-----------|-----------|-----------|
|           | Q1 2019   | Q4 2019   | Q1 2020   |
| Average Supply (MW) | 7,962 | 7,738 | 7,883 |
| Supply Cushion (%)   | 25.88  | 23.51  | 23.74  |

The quarterly average supply increased 1.88% from 7,738 MW in Q4 2019 to 7,883 MW in Q1 2020 (refer to Table 3).

Given that supply showed a greater increase than demand, the resultant supply cushion rose 0.23 percentage point to 23.74% in Q1 2020.

Chart 10 shows that the offers priced at or below $100/MWh made up a smaller proportion of the total offer quantity in Q1 2020 when compared to Q4 2019.
Chart 11 shows the average monthly load variation in the forecast schedules, namely the pre-dispatch schedule (“PDS”) and the short-term schedule (“STS”), using the real-time dispatch schedule (“RTS”) as reference.

The variations observed in the PDS and STS in Q1 2020 were smaller than those observed in Q4 2019. Such reduced variations indicate a greater accuracy in the forecast schedules – the forecast schedules provided improved signals which were more reflective of real-time market conditions.

The average monthly load variation between the RTS and the metered energy quantity (i.e. the actual generation recorded) decreased from 2.56% in Q4 2019 to 2.22% in Q1 2020 (refer to Chart 12).

Given that the RTS is closer to the metered energy quantity when there are less unforeseen events in the market, the decrease could be attributed to the reduced forced outage volume recorded in Q1 2020 (refer to Table 1).

Intuitively, when the supply cushion weakens, the USEP rises to reflect the tight supply in the system. Similarly, when the supply cushion increases, the USEP falls to correspond to the excess supply in the system.

In line with the above, Chart 13 shows that the movements in the USEP and supply cushion in Q1 2020 reflect such behaviour:

- The supply cushion fell from 23.18% in January 2020 to 22.66% in February 2020, before rising to 25.38% in March 2020; and

- the USEP increased from $84.15/MWh in January 2020 to $88.64/MWh in February 2020, then decreased to $69.72/MWh in March 2020.
The breakdown of market share in the NEMS by generation company and generation type is shown in Charts 14 and 15 respectively. The market share is calculated based on metered energy quantity and maximum generation capacity.

According to metered energy quantity (refer to Chart 14), the three largest generation companies held 54.08% of the total market share in Q1 2020, which was a decrease from 54.24% in Q4 2019.

The distribution of market share was more concentrated in terms of maximum generation capacity (refer to Chart 15) – the three largest generation companies held 62.36% of the total market share in Q1 2020. This combined market share remained the same since Q4 2019 as there was no change in the generation facilities in the NEMS.

Most of the generation in the NEMS is produced by CCGT units (98.08% of the metered energy quantity in Q1 2020 as shown in Chart 16), as the market moves towards more efficient technology (85.33% of the total maximum generation capacity in Q1 2020 as shown in Chart 17).

ST units take longer to start up so they are increasingly less scheduled to generate electricity (these units have not been scheduled in the recent quarters as shown in Chart 16). ST units are also taking up less market share in terms of maximum generation capacity (refer to Chart 17).

Open cycle gas turbines (“OCGT”) units can start up quickly but are more costly to operate, so they are generally scheduled only when supply cushion is weak. OT units include incineration plants which convert incineration refuse to electricity, accounting for a small but consistent market share over time.
### Compliance Statistics for Q1 2020

<table>
<thead>
<tr>
<th>Potential Breaches of the Market Rules</th>
<th>Determinations*</th>
<th>Enforcement</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>99 cases in total</strong></td>
<td><strong>93 determinations in total</strong></td>
<td><strong>0 case in total</strong></td>
</tr>
<tr>
<td>0 self-report</td>
<td>0 case determined to be in breach</td>
<td>0 financial penalties</td>
</tr>
<tr>
<td>99 referrals/complaints</td>
<td>93 cases determined not to be in breach</td>
<td>0 non-compliance letter</td>
</tr>
<tr>
<td>0 MSCP initiative</td>
<td></td>
<td>0 suspension order</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0 other MSCP order</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$0 of financial penalty imposed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$0 of costs awarded</td>
</tr>
</tbody>
</table>

*This section includes determinations of cases referred to the MSCP in previous quarters.

The MSCP did not issue any rule breach determination in Q1 2020.

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2 The determinations made by the MSCP since the NEMS started are available on the [EMC website](http://emcwebsite.com).

MSCP Market Watch
Issue 55: First Quarter (January to March 2020)
MSCP Market Watch

The MSCP Market Watch is a quarterly report prepared by the Market Assessment Unit (“MAU”) of EMC and submitted to the Market Surveillance and Compliance Panel (“MSCP”). The report summarises 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 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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If you have any specific query or feedback for the improvement of this publication, you may write to mau@emcsq.com.