FACTS AND CIRCUMSTANCES

1. Energy Market Company Pte Ltd ("EMC") submitted a self-report on 14 July 2020 and made a second submission on 27 July 2020 for its failure to determine, release and publish the real-time dispatch schedule ("RTS") for period 21 and short-term schedule ("STS") for period 22, as required under the Singapore Electricity Market Rules ("Market Rules").

2. The market clearing engine ("MCE") experienced a high solve time on 24 June 2020 (Wednesday) and 26 June 2020 (Friday).

3. On 27 June 2020 (Saturday), the database administrators ("DAs") conducted an initial investigation for system load condition in the test environment as a troubleshooting measure. As the initial investigation was inconclusive in the test environment, EMC undertook a deeper troubleshooting investigation.

4. During the investigation, the primary DA was logged on to the production database, with the secondary DA remotely viewing via the shared screen function in Microsoft Skype for Business. The role of the secondary DA is to provide an additional line of verification by concurrently reviewing the step-by-step actions performed by the primary DA in the production database.
5. The DAs were tracing the execution steps in the source code of the “NEM.JAM$SCHEDULING” database package (“Scheduler Package”) using the database management tool (“Toad tool”) in the administration user interface when the Toad tool became unresponsive between 9:40 hours to 9:55 hours, and the mouse cursor failed to respond. Following the unresponsiveness of the Toad tool, there was an accidental trigger of the “Execute” function by the DA which resulted in the invalidation of the production database.

6. EMC further revealed that the various factors for the Toad tool turning unresponsive could have been operating system issues, concurrent operation of applications on the DA’s laptop, hardware failure or user’s broadband issues.

7. As a result of the invalidation:
   a. the market clearing runs (“MCR”) scheduler failed and was unable to produce the RTS for period 21 and the STS for period 22 between 9:58 hours and 10:16 hours; and
   b. the invalidation of the Offer Submission Package resulted in market participants (“MPs”) being unable to successfully submit offers via WebOffer Services between 9:51 hours and 11:35 hours.

8. EMC clarified that apart from WebOffer Services, MPs may also submit their offers using EMC’s WebOffer Application. However, EMC was unable to ascertain if offer submissions made using WebOffer Application during the incident would have been unsuccessful as there were no offer submissions made via WebOffer Applications and no database errors were observed for WebOffer Application during the incident. There was also no incident logged by any MP in relation to unsuccessful offer submissions via WebOffer Applications for the duration of the incident.

9. EMC has since implemented preventive measures to detect and prevent similar occurrence:
   a. the troubleshooting guidelines for the DA team have been updated with immediate effect as at 30 June 2020. In particular, the follow updates have been made:
      i. reboot the computing device in the event of non-responsive interface: This serves to ensure unintended activations can be avoided; and
      ii. request for approval from Head of Technology: This serves to ensure that the risk assessment on impact to the National Electricity Market of Singapore (“NEMS”) arising from any troubleshooting or execution works have been reviewed prior to commencement; and
   b. creation of production read-only account: This DA read-only account will be granted necessary privileges to view database package source codes without execution or recompilation permissions. This will minimise the risk of a similar occurrences as the DA will not be able to execute or recompile the database packages while using the read-only account.

10. On 31 August 2020, the Market Surveillance and Compliance Panel (“MSCP”) wrote to inform EMC that it considered EMC to be in prima facie breach of sections 7.4A, 7.7.2A, 7.7.3, 9.1.1.2, 9.2.1, 9.2.3, 9.2.4 and Appendix 6A of Chapter 6 of the Market Rules on 28 June 2020. The MSCP invited EMC to submit written representations by 14 September 2020 before the MSCP makes a determination.
11. On 14 September 2020, EMC submitted its written representations to the MSCP, indicating its priority for the recovery of NEMS services to MPs to mitigate any adverse or prolonged consequences, incident sharing to increase awareness within the Technology team, as well as the update to its troubleshooting guidelines to minimise the likelihood of reoccurrence.

12. EMC was of the view that a hearing was not necessary unless the MSCP required any further clarification.

APPLICABLE MARKET RULES

13. Section 7.4A of Chapter 6 provides that

7.4A1 The EMC shall, in accordance with section 7.6 and Appendix 6A, determine three short-term schedules corresponding to the nodal load forecasts described in section 7.2.1, adjusted where applicable under section 7.2.3.

7.4A2 Each short-term schedule shall include all dispatch periods in the short-term horizon current at the time when the short-term schedule is due to be released in accordance with section 7.7.2A.

14. Section 7.7.2A of Chapter 6 provides that:

Not later than 25 minutes prior to the commencement of the first dispatch period of each of the three short-term schedules referred to in section 7.4A, the EMC shall, for each dispatch period included in each of those three short-term schedule:

7.7.2A.1 release to the dispatch coordinator for each registered facility the projected schedules for energy, regulation and reserve, by reserve class, for that registered facility;

7.7.2A.2 publish the information described in section 7.7.3; and

7.7.2A.3 communicate to the PSO the projected schedules for energy, regulation and reserve, by reserve class, for each registered facility, together with the information described in section 7.7.3, in accordance with the system operation manual and any applicable market manual.

15. Section 7.7.3 of Chapter 6 provides that:

In accordance with sections 7.7.1, 7.7.2 and 7.7.2A, the EMC shall publish the following information for each dispatch period and for each market outlook scenario, pre-dispatch schedule scenario and short-term schedule:

7.7.3.1 the projected total load;

7.7.3.1A the projected total load curtailment of all LRFs with REB;

7.7.3.2 the projected transmission losses;

7.7.3.3 total reserve requirements by reserve class;

7.7.3.4 total regulation requirements;

7.7.3.5 projected energy prices associated with each market network node at which a generation registered facility or generation settlement facility is located….;

7.7.3.6 the projected uniform Singapore energy price….;

7.7.3.6A the projected load curtailment price, determined in accordance with D24.10 of Appendix 6D;

7.7.3.6B the projected counterfactual uniform Singapore energy price, determined in accordance with sections D.24.8 and D.24.9 of Appendix 6D;

7.7.3.7 projected reserve prices for each reserve class and reserve provider group….;

7.7.3.8 projected regulation prices….;
7.7.3.9 any predicted system energy shortfalls;
7.7.3.10 any predicted system reserve shortfalls, by reserve class;
7.7.3.11 any predicted system regulation shortfalls;
7.7.3.12 a list of security constraints and generation fixing constraints applied; and
7.7.3.13 the projected estimated hourly energy uplift rebate, determined in accordance with section D.25.1.13 of Appendix 6D.

16. Section 9.1.1.2 of Chapter 6 provides that

The EMC shall for each dispatch period and in accordance with the market operations timetable:
9.1.1.2 determine and communicate real-time dispatch schedules in accordance with section 9.2.

17. Section 9.2.1 of Chapter 6 provides that

The EMC shall, prior to the commencement of each dispatch period and in accordance with the market operations timetable, use the market clearing engine to determine for that dispatch period:

9.2.1.1 a real-time dispatch schedule, containing schedules of energy, reserve and regulation for registered facilities, to be released to the PSO, which in accordance with section 9.1.2 of Chapter 5 shall be deemed to constitute the dispatch instructions issued by the PSO to the applicable dispatch coordinators unless and until further dispatch instructions are issued by the PSO to a given dispatch coordinator pursuant to section 9.1.3 of Chapter 5; and

9.2.1.2 a real-time pricing schedule determined by the market clearing engine in accordance with section D.24 of Appendix 6D, including:
a. energy prices for each market network node;
b. the uniform Singapore electricity price;
c. reserve prices for each reserve class and for each reserve provider group;
d. regulation prices; and
e. the load curtailment price.

18. Section 9.2.3 of Chapter 6 provides that

The EMC shall, in accordance with the market operations timetable, release to the dispatch coordinator for each registered facility a real-time dispatch schedule comprising that portion of the real-time dispatch schedule referred to in section 9.2.1.1 that describes the quantities of energy, reserve by reserve class and regulation scheduled in respect of that registered facility.

Explanatory Note: Participants will be sent the specific schedule quantities that pertain to them under section 9.2.3 and will be provided with the associated prices under section 9.2.4.

19. Section 9.2.4 of Chapter 6 provides that

The EMC shall, in accordance with the market operations timetable, publish the following information as it pertains to each dispatch period:

9.2.4.1 total load;
9.2.4.1A total load curtailment of all LRFs with REB;
9.2.4.2 total transmission losses;
9.2.4.3 total reserve requirements by reserve class;
9.2.4.4 total regulation requirements;
9.2.4.5 energy prices associated with each market network node at which a generation registered facility or generation settlement facility is located, determined in accordance with sections D.24.1 and D.24.5 of Appendix 6D;
9.2.4.6 the uniform Singapore energy price, determined in accordance with section D.24.6 of Appendix 6D;
9.2.4.6A the load curtailment price, determined in accordance with section D.24.10 of Appendix 6D;
9.2.4.6B the counterfactual uniform Singapore energy price, determined in accordance with sections D.24.8 and D.24.9 of Appendix 6D;
9.2.4.7 reserve prices for each reserve class and reserve provider group, determined in accordance with sections D.24.3, D.24.5 and D.24.7 of Appendix 6D;
9.2.4.8 regulation prices, determined in accordance with sections D.24.4 and D.24.5 of Appendix 6D;
9.2.4.9 any system energy shortfalls reported by the market clearing engine;
9.2.4.10 any system reserve shortfalls, by reserve class, reported by the market clearing engine;
9.2.4.11 any system regulation shortfalls reported by the market clearing engine;
9.2.4.12 a list of security constraints and generation fixing constraints applied; and
9.2.4.13 the estimated hourly energy uplift rebate, determined in accordance with section D.25.1.13 of Appendix 6D.

20. The market operations timetable in Appendix 6A of Chapter 6 provides for EMC to release the above real-time dispatch schedule, real-time pricing schedule and market information 30 seconds prior to the start of the dispatch period. In addition, Appendix 6A of Chapter 6 provides for EMC to release the above short-term dispatch market information 5 minutes after the beginning of each dispatch period.

ENFORCEMENT

21. The MSCP determined based on the facts referred to above that EMC had breached sections 7.4A, 7.7.2A, 7.7.3, 9.1.1.2, 9.2.1, 9.2.3, 9.2.4 and Appendix 6A of Chapter 6 of the Market Rules on 28 June 2020.

22. The incident was self-reported and did not have a significant impact on the wholesale electricity market. EMC had also taken immediate recovery actions following the incident.

23. While there was some level of due diligence exercised by EMC when it conducted the troubleshooting activities, the incident was nonetheless due to a human error that resulted in the invalidation of the production database.

24. In view of the above, the MSCP hereby imposes a financial penalty of $5,000 on EMC and directs EMC to pay costs fixed at $2,000.

T P B Menon
Chair, Market Surveillance and Compliance Panel