

**DETERMINATION OF THE MARKET SURVEILLANCE AND COMPLIANCE PANEL
MSCP/2009/D3**

Market Surveillance and Compliance Panel (“MSCP”)

Mr Thean Lip Ping, Chair
Professor Lim Chin
Mr Lee Keh Sai
Mr TPB Menon

Date of Determination

23 June 2009

Party

Energy Market Company Pte Ltd (“EMC”)

Subject

Failure to determine, release and publish information on 17 February 2009 for

- a. Real-time dispatch schedules for periods 21, 22, 23, 24 and 25;
 - b. Short-term dispatch schedules for periods 22, 23, 24, 25, 26; and
 - c. Pre-dispatch schedules for periods 25 and 29
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Applicable Rule(s) in the Singapore Electricity Market Rules

1. Section 9.2.1 of Chapter 6

“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...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; and
- d. regulation prices.”

The market operations timetable in Appendix 6A of Chapter 6 provides for the EMC to begin computing a real-time dispatch schedule using the market clearing engine 5 minutes prior to the beginning of the dispatch period.

The market operations timetable in Appendix 6A of Chapter 6 provides for the EMC to release the real-time dispatch schedule to the PSO prior to 30 seconds before the beginning of the dispatch period.

2. Section 9.2.3 of Chapter 6

“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.”

The market operations timetable under Appendix 6A of Chapter 6 provides for the EMC to release the real-time dispatch schedule and real-time pricing schedule prior to 30 seconds before the beginning of the dispatch period.

3. Section 9.2.4 of Chapter 6

“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;
- 9.2.4.2 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...;
- 9.2.4.6 the uniform Singapore energy price...;
- 9.2.4.7 reserve prices for each reserve class and reserve provider group...;
- 9.2.4.8 regulation prices...;
- 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; and
- 9.2.4.12 a list of security constraints and generation fixing constraints applied.”

The market operations timetable in Appendix 6A of Chapter 6 provides that the EMC must publish the market information set out in section 9.2.4 of Chapter 6 prior to 30 seconds before the beginning of the dispatch period.

4. Section 7.4.1 of Chapter 6

“The EMC shall, in accordance with section 7.6 and Appendix 6A, determine three pre-dispatch schedule scenarios corresponding to the nodal load forecast described in section 7.2.1 adjusted where applicable under section 7.2.3.”

5. Section 7.4A.1 of Chapter 6

“The EMC shall, in accordance with section 7.6 and Appendix 6A, determine a short-term schedule corresponding to the nodal load forecast described in section 7.2.1.1.”

According to the market operations timetable, the EMC is required to commence computing the short-term schedule 4 minutes prior to the beginning of the dispatch period.

6. Section 7.7.2 of Chapter 6

“Not later than 15 minutes prior to the commencement of the first dispatch period of each of the three pre-dispatch schedule scenarios referred to in section 7.4.1, the EMC shall, for each dispatch period included in each of those three pre-dispatch schedule scenarios:

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

7.7.2.2 publish the information described in section 7.7.3; and

7.7.2.3 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.”

7. Section 7.7.2A of Chapter 6

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

8. Section 7.7.3 of Chapter 6

“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;

7.7.3.2 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....;
- 7.7.3.7 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; and
- 7.7.3.12 a list of security constraints and generation fixing constraints applied.”

Facts and Circumstances

9. According to the EMC, the NEMS system crashed on 17 February 2009 at 10:04 am.
10. EMC said that it implemented a change in the storage disk configuration for the Production database during its Disaster Recovery Exercise on 13 February 2009. As part of the change, it added disks to divide the I/O (input/output) load among more disk storage to increase NEMS system performance.
11. The change was carried out in two phases.
12. The first phase was to implement the disk configuration changes at the Production Site while NEMS systems were running at its Disaster Recovery Site. After the disk configuration changes, EMC performed detailed tests of all application interfaces and connectivity to Production site database copy to ensure the changes in the storage disk configuration had no impact on the NEMS System database.
13. The second phase was carried out at the Production site with the new disk configuration change when the NEMS system was switched back to the Production site on 13 February 2009.
14. As part of the second phase, EMC re-created a local copy of the database (Local Data Guard) at its production site on 16 February 2009. The Local Data Guard is to provide a faster failover in case of any data corruption occurring in the main production database.
15. The creation of the Local Data Guard was successfully completed late in the night of 16 February 2009. On 17 February 2009 at 10:04am, when EMC started up the Local Data Guard to begin the replication from the Production database, the Local Data Guard overwrote the production main database files and the NEMS system crashed.
16. Upon investigation, EMC found that the initialization file used by the Local Data Guard was pointing to the wrong location which was not updated with new file directory path names.
17. EMC then tried to recover the database at the Production site, but as the database files were being overwritten by the Local Data Guard, the Production database could not be started.
18. EMC then decided at 10:30 am to switch over to its Disaster Recovery site to continue the NEMS operation.
19. The backup site database was recovered up to 9:53 am with potential loss of data from 9:53am to 10:04am.

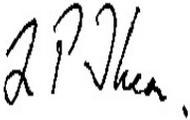
20. The switch-over to the Disaster Recovery site finished around 12 noon and the NEMS systems were released to the market at 12:05 pm after the verification of all interfaces and dispatch runs results.
21. As NEMS system crashed at 10:04 am and recovered at 12:05 pm, the following dispatch schedules were not determined and released and the relevant information was not published as required under the market rules:

Real-time dispatch schedules: periods: 21, 22, 23, 24 and 25;
Short-term dispatch schedules: periods 22, 23, 24, 25 and 26
Pre-dispatch schedule: period 25 and 29.
22. The real-time dispatch schedule for period 21 was determined on time. However, EMC said that due to data loss from 9:53 am to 10:04am, the data for real-time dispatch schedule for period 21 was found missing from the database.
23. EMC said that it took the following actions after the incident:
 - 1) It reviewed all the initialization files used by the database to ensure that all had the correct file path names based on the disk configuration changes;
 - 2) It reviewed all offers submitted during 9:53 am to 10:04 am on 17 February 2009 and advised the affected market participants of the potential data loss. It also advised them to re-submit offers which were submitted during 9:53 am to 10:04am;
 - 3) It recreated the production site database and switched over all NEMS system from Disaster Recovery site to Production site on 19 February 2009. All NEMS market systems were normalized at 6:16pm on 19 February 2009; and.
 - 4) To ensure that this kind of incident does not recur, it had included an extra mandatory check of the directory file path names as part of the change release checklist for these kinds of critical changes which require a change of directory file path names.
24. For the purposes of dispatch, the PSO, in the absence of the real-time schedule, used the relevant short-term schedule in accordance with the system operation manual. Price was determined by EMC re-running the market clearing engine in accordance with the market rules.

Determinations

25. On 18 May 2009, the MSCP issued a letter informing EMC that it considered that EMC had prima facie breached sections 9.2.1, 9.2.3, 9.2.4, 7.4A.1, 7.7.2A, 7.4.1 and 7.7.2 of Chapter 6 of the Singapore Electricity Market Rules (the 'market rules') and invited EMC to make written representations. EMC replied that it would not be making any representations.
26. The MSCP determined on the basis of the facts referred to above that EMC breached sections 9.2.1, 9.2.3, 9.2.4, 7.4A.1, 7.7.2A, 7.4.1 and 7.7.2 of Chapter 6 of the market rules.

27. However, the breach was self-reported, rectified quickly and without significant impact on the wholesale electricity markets.
28. Therefore, the MSCP determined that the appropriate action to be taken was to issue a letter of non-compliance to EMC and to direct EMC to pay costs, fixed at \$1,300.



Thean Lip Ping
Chair
Market Surveillance and Compliance Panel