

**DETERMINATION OF THE MARKET SURVEILLANCE AND COMPLIANCE PANEL  
MSCP/2012/D3**

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**Market Surveillance and Compliance Panel ("MSCP")**

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

**Date of Determination**

17 July 2012

**Party**

YTL PowerSeraya Pte Ltd ("PowerSeraya")

**Subject**

Failure to submit offer variations after multiple forced outages of combined-cycle plants on 13 December 2011.

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**BACKGROUND FACTS**

- 1 On 13 December 2011, at 22:36 hrs (Period 46), four combined cycle plants ("CCPs") generation facilities, namely SERCCP1, SERCCP2, SERCCP3 and SERCCP4 (operated by gas) belonging to PowerSeraya encountered forced outage simultaneously. The outages of these four CCPs caused about 1,100 MW of energy offered by PowerSeraya to become effectively unavailable to the wholesale electricity market.
- 2 As a result there was physical shortfall of supply and the Power System Operator ("PSO"), in the same Period, declared an Emergency Operating State and issued advisory notices to inform market participants in the National Electricity Market of Singapore ("NEMS") of such. The PSO had to instruct other standby generation facilities to run up and other online generation facilities to increase their production to higher loading levels than scheduled.
- 3 The forced outages were caused by the sudden and unexpected shutting of a gas valve owned and operated by PowerGas Ltd, which controlled the gas supply to PowerSeraya's generation facilities.
- 4 After PowerSeraya had determined the cause of the incident, it proceeded to restart the CCPs on alternative fuels - diesel oil and natural gas from another source.

## POSITION OF THE FOUR CCPS RESULTING FROM FORCED OUTAGES

- 5 With respect to operation of the four CCPs, SERCCP1 was able to re-synchronise with the system at 23:12 hrs (Period 47) but its output was substantially lower than its scheduled quantity and offered quantity. This inadequate output persisted into Period 48 on 13 December 2011.
- 6 With respect to SERCCP2, it returned online at the end of Period 47 with substantially lower loading than its scheduled quantity and offered quantity. It encountered another brief forced outage at the beginning of Period 48, but was able to re-synchronise with the system. Its output at Period 48 was below the scheduled quantity by a substantial margin.
- 7 With respect to SERCCP3, it returned online at the beginning of Period 48 but experienced another forced outage immediately and was not able to return to service for Period 48 and Period 1 (14 December 2011), for which Periods it was scheduled to generate but did not.
- 8 SERCCP4 returned online in Period 48 and Period 1 (14 December 2011) with inadequate output against its scheduled quantity.
- 9 At 23:23 hrs, PowerSeraya submitted offer variations for SERCCP1 and SERCCP2 for Period 3 (14 December 2011) onwards. At 00:17 hrs (14 December 2011), PowerSeraya submitted offer variations to remove reserve/regulation offers for SERCCP1, SERCCP2, SERCCP4, and energy/reserve/regulation offers for SERCCP3 for Period 2 on 14 December 2011 onwards.
- 10 The emergency operating state was lifted from Period 3 on 14 December 2011.
- 11 Following the forced outages, PowerSeraya did not revise its offers for the four CCPs (as it should have done). The four CCPs continued to be scheduled by the market clearing engine as if they were able to provide the quantity of energy, reserve and regulation as scheduled. In reality, they could not produce the scheduled quantities. For example, SERCCP1 was able to re-synchronise with the system at 23:12 hrs (Period 47) and produce 121MW. This was well short of the 290 MW scheduled by the market clearing engine (MCE) and much lower than the offered quantity of 368MW. SERCCP3 was not able to be synchronized for the Periods concerned. Details of the energy loadings are summarized below.

### SERCCP1

Date	Pd	Quantity		
		Offered	Scheduled	Actual
13 Dec 11	46	368 MW	270 MW	0 MW
13 Dec 11	47	368 MW	290 MW	121 MW
13 Dec 11	48	368 MW	270 MW	251 MW
14 Dec 11	1	368 MW	276 MW	251 MW

### SERCCP2

Date	Pd	Quantity		
		Offered	Scheduled	Actual
13 Dec 11	46	364 MW	270 MW	0 MW
13 Dec 11	47	364 MW	290 MW	4 MW
13 Dec 11	48	364 MW	270 MW	161 MW
14 Dec 11	1	364 MW	278.73 MW	250 MW

### SERCCP3

Date	Pd	Quantity		
		Offered	Scheduled	Actual
13 Dec 11	46	370 MW	290 MW	0 MW
13 Dec 11	47	370 MW	290 MW	0 MW
13 Dec 11	48	370 MW	290 MW	0 MW
14 Dec 11	1	370 MW	285 MW	0 MW

### SERCCP4

Date	Pd	Quantity		
		Offered	Scheduled	Actual
13 Dec 11	46	370 MW	270 MW	0 MW
13 Dec 11	47	370 MW	275.83 MW	0 MW
13 Dec 11	48	370 MW	270 MW	75 MW
14 Dec 11	1	370 MW	285 MW	155 MW

- 12 PowerSeraya was required to submit zero offers between the time its facility was not synchronised and the earliest dispatch Period in which it would be possible for that facility to be synchronised. For example, after the simultaneous forced outages at Period 46, SERCCP 3 and SERCCP4 could not be synchronised in Period 47. PowerSeraya should therefore have submitted zero offers for the Period 47.. PowerSeraya was prima facie in breach of section 5.1.6 of Chapter 6 of the Singapore Electricity Market Rules ("**Market Rules**") for failing to submit zero offers for (a) SERCCP3 and SERCCP4 for Period 47 (13 December 2011), and (b) SERCCP3 for Period 1 (14 December 2011).
- 13 There was also non-compliance on the part of PowerSeraya with regard to following dispatch instructions under section 9.6 of Chapter 5 of the Market Rules.

- 14 There was no significant movement in energy prices for Periods 47 and 48 (13 December 2011) and Period 1 (14 December 2011) following the simultaneous forced outages at Period 46. Reserve prices were also largely unaffected although higher regulation prices were observed from Period 47 (13 December 2011) to Period 1 (14 December 2011).
- 15 However, by failing to revise its offered quantities for the four CCPs in accordance with the Market Rules, PowerSeraya caused a distortion in the market and created a serious threat to system security.
- 16 On 19 December 2011, Senoko Energy Pte Ltd referred the incident in writing to the MSCP for investigation. The Energy Market Authority ("EMA") also requested an investigation into the incident on 22 December 2011.

### INVESTIGATION

- 17 On 29 December 2011, the MSCP informed PowerSeraya that an investigation against it into the events of 13 December 2011 was initiated.
- 18 Shortly following the MSCP's first notification to PowerSeraya, the PSO submitted to the MSCP a complaint against PowerSeraya's four CCPs for not complying with dispatch instructions for Periods 47 and 48 (13 December 2011) and Period 1 (14 December 2011).
- 19 On 16 January 2012, PowerSeraya submitted to the MSCP an account of the incident. In its letter dated 16 January 2012 to the MSCP, PowerSeraya stated, among other things, as follows:

*"Our dispatch coordinator, who was on duty, followed up on the offers in the way that he determined to be proper and responsible under the tight time constraint. Due to the magnitude of the outages, he was overwhelmed by the high volume of calls and information resulting in him having to take a longer time to react. The forced outage occurred in Period 46 and because we have determined clearly the cause of the outage, our personnel were optimistic that by the end of Period 48, all CCPs would be back in operation."*

- 20 On the facts before the MSCP, this optimism is difficult to be justified. First, SERCCP2 and SERCCP3 encountered another forced outage at the beginning of Period 48. Next, from the data the MSCP had obtained, SERCCP1 and SERCCP4 did not reach their scheduled load by the end of Period 48 (13 December 2011). For instance, SERCCP1's and SERCCP4's actual outputs were 251 MW and 75 MW respectively when their scheduled loads were 270 MW each. SERCCP1 and SERCCP4 failed to meet the scheduled loads even at Period 1 (14 December 2011). SERCCP1's scheduled load was 276 MW but it could only produce 251 MW while SERCCP4's scheduled load was 285 MW but it could only produce 155 MW.
- 21 Based on information provided by PowerSeraya on 16 January 2012, the MSCP notified PowerSeraya on 13 February 2012 that it considered that PowerSeraya had prima facie breached sections 9.6 of Chapter 5, 5.1.5 and 5.1.6 of Chapter 6 of the Market Rules.. In the notification, the MSCP invited PowerSeraya to submit written representations and informed PowerSeraya of its rights to request for a hearing before the MSCP.

## RELEVANT MARKET RULES

- 22 The relevant Market Rules are set out below.

### Section 9.6.1 of Chapter 5:

*"Each dispatch coordinator shall ensure that each of its registered facilities complies with the dispatch instructions issued in respect of such registered facility, except as may otherwise be permitted under these market rules."*

### Section 5.1.5 of Chapter 6:

*"Subject to section 10.4.1, for any dispatch Period in the current market outlook horizon, if the quantity currently offered in a valid offer for a registered facility exceeds the relevant quantity that its dispatch coordinator reasonably expects to be available from the registered facility by more than:*

*5.1.5.1 10 MW; or*

*5.1.5.2 5 percent of the quantity currently offered,*

*whichever is greater, then that dispatch coordinator shall immediately submit an offer variation for that registered facility for that dispatch Period to the EMC."*

- 23 Section 5.1.6 of Chapter 6:

*"Subject to section 10.4.1, for each dispatch period that a registered facility is not synchronised and until the earliest dispatch period in which it would be possible for that registered facility to be synchronized, its dispatch coordinator shall:*

*5.1.6.1 submit offer variations where there are existing offer variations; or*

*5.1.6.2 submit revised standing offers where there are no offer variations,*

*so that all the offered quantities are zero."*

## FIRST HEARING BEFORE THE MSCP

- 24 On 24 February 2012, PowerSeraya submitted its written representations and requested for a hearing before the MSCP.
- 25 A hearing was conducted on 29 March 2012 during which PowerSeraya presented further material information on the events surrounding the simultaneous forced outages and provided the MSCP with the "Hot Start" profiles of its CCPs.
- 26 Following the MSCP's notice of 13 February 2012 to PowerSeraya, new inputs were provided by the PSO through e-mail. New information was also provided by PowerSeraya at the said hearing. The MSCP reviewed the information provided and came to the view that, based on the respective "Hot-Start" profiles, it was not unreasonable to expect each of PowerSeraya's four CCPs to be able to reach 300MW within 60 minutes (2 Periods) under "Hot-Start" conditions. This implies that SERCCP1 & SERCCP2 could maximally reach only about 120MW in Period 47 and SERCCP3 & SERCCP4 could maximally reach 95MW in the same Period. As such,

PowerSeraya should have reduced the offers for all four CCPs accordingly for Period 47. Thus, the offers for SERCCP1, SERCCP2 and SERCCP4 should have been revised in accordance with section 5.1.5 of Chapter 6 of the Market Rules. The offer for SERCCP3 should have been revised to zero MW in accordance with section 5.1.6 of Chapter 6 of the Market Rules because it was unable to synchronize.

- 27 There was an apparent misinterpretation by PowerSeraya of the communication it had with the PSO for Periods 48 and Period 1 (14 December 2011) with regard to holding the loading of SERCCP1 at 250MW. The MSCP is prepared to give the benefit of doubt to PowerSeraya and accept that SERCCP1 would have been able to achieve its scheduled load for Period 48 and Period 1 (14 Dec 2011) and SERCCP2 would have been able to achieve its scheduled load for Period 1 (14 Dec 2011), by inference from the "Hot-Start" profiles of the CCPs provided by PowerSeraya. As such, the MSCP is prepared to accept that SERCCP1 and SERCCP2 would have been able to comply with their respective scheduled loads for the Periods mentioned if not for the misunderstanding.
- 28 Taking into consideration new information made available from PowerSeraya's submissions at the hearing and the PSO's inputs, the MSCP revised the preliminary findings from its first notice to PowerSeraya and determined that PowerSeraya had prima facie breached the Market Rules as follows:

#### Summary of Rule Breaches

Generating Facility	Period 47 (13 Dec 2011)	Period 48 (13 Dec 2011)	Period 1 (14 Dec 2011)
SERCCP1	Section 9.6.1 of Chapter 5 Section 5.1.5 of Chapter 6	NIL	NIL
SERCCP2	Section 9.6.1 of Chapter 5 Section 5.1.5 of Chapter 6	Section 5.1.5 of Chapter 6	NIL
SERCCP3	Section 9.6.1 of Chapter 5 Section 5.1.6 of Chapter 6	Section 5.1.6 of Chapter 6	Section 9.6.1 of Chapter 5 Section 5.1.6 of Chapter 6
SERCCP4	Section 9.6.1 of Chapter 5 Section 5.1.5 of Chapter 6	Section 9.6.1 of Chapter 5 Section 5.1.5 of Chapter 6	Section 9.6.1 of Chapter 5 Section 5.1.5 of Chapter 6

- 29 On account of this revised finding, the MSCP, on 15 May 2012, served a second notice to PowerSeraya informing it of the revised finding of prima facie breaches and invited PowerSeraya to submit representations before the MSCP decided on breaches of the Market Rules as indicated, and, if appropriate, the question of penalty and costs. The MSCP also informed PowerSeraya of its right to request a second hearing.

30 PowerSeraya's solicitors, WongPartnership LLP, on behalf of PowerSeraya responded to the MSCP's second notice with written representations dated 11 June 2012 and requested a second hearing before the MSCP.

31 A second hearing was accordingly conducted on 27 June 2012.

### **SUMMARY OF POWERSERAYA'S SUBMISSIONS**

32 The relevant parts of PowerSeraya's representations, explanations and points presented at the hearing may be summarised in these terms.

- (1) The unprecedented simultaneous outage of four CCPs resulted from the shutdown of a gas valve controlled by an external party to PowerSeraya. The original cause of the trips was wholly an external factor beyond PowerSeraya's control. In particular, the trips were caused by the sudden closure of a gas inlet valve which interrupted all supply of natural gas to all PowerSeraya's CCPs.
- (2) When the outage occurred, PowerSeraya's priority was to assess if the cause of the outage and any remedial actions could adversely impact human safety or cause equipment outage. As the Engineer in charge was concerned that there was a risk of gas leakage, which could have potentially catastrophic consequences, he was focused on determining the cause of the trip that the Engineer inadvertently omitted to contact the dispatch coordinator immediately.
- (3) PowerSeraya was in constant communication with the PSO throughout the incident and had kept the PSO informed of all the actions taken by PowerSeraya in restoring the normalcy of operations.
- (4) After ascertaining that there was no major gas leak, PowerSeraya's primary aim was to bring normalcy to the national grid, with a focus on re-starting the affected CCPs with alternative fuel and secondary gas supply under "Hot" conditions.
- (5) However, PowerSeraya's ground operation teams were not able to connect with the dispatch coordinator due to "*phone network issue*" during Period 46.
- (6) In the high pressure and intense situation, any failure lies in the communication issues between the ground operation teams and the dispatch coordinator, thus giving rise to delay to the submission of offer variations for each immediate following dispatch Period. At no time did PowerSeraya act with the intention to avoid financial loss; rather, PowerSeraya was concerned with maintaining both safety and the integrity of the system.
- (7) In view of the short duration between the outage and the re-start, the start-up conditions for all four CCPs were extremely "hot", The Engineer reasonably believed that CCPs 1, 2 and 3 would be able to reach the offered load under 60 minutes, i.e. before the end of Period 48. On hindsight, the dispatch coordinator's expectation that SERCCP4 would be able to meet the offered load for Period 48 may have been unduly optimistic. However, under the severe and intense circumstances, it is submitted that there was insufficient time or opportunity for him to make better assessment. The Engineer's belief

was borne out in the actual start-up curve for SERCCP1. SERCCP1 had reached the load set point by approximately 23.55 hrs, i.e., 63 minutes from the re-start of SERCCP1.

- (8) Based on the lessons it has learned from the incident which was caused by extreme circumstances beyond its control, PowerSeraya has put together a revised standard operating procedure to deal better with and mitigate any inadvertent violation of Market Rules and system operation requirements arising from such extraordinary incidents outside of PowerSeraya's control.

33 PowerSeraya reiterated that its priorities and concerns at the relevant time were:

- (1) Focus on urgent assessment of the cause of the outage;
- (2) Focus on human safety or equipment damage;
- (3) Concern over possible gas leak due to gas pressure collapse;
- (4) Engineer's concern over fresh forced outage occurring to SERCCP2 and SERCCP3 concurrently at 23:32 hrs;
- (5) Overwhelmed by the deluge of activities occurring at the same time; and
- (6) At no time did PowerSeraya act with any intention to avoid financial loss.

#### DETERMINATION

34 The MSCP accepts that the forced outage occurring to the four CCPs simultaneously was beyond PowerSeraya's control and that PowerSeraya's immediate concern at that time was the cause of the outage, adverse impact on human safety and damage to equipment. However, the MSCP notes that PowerSeraya was able to ascertain promptly the cause of the outage, and thereafter (that is, some 8 minutes after the initial outage) it took steps to restart the CCPs using alternative fuels.

35 Nonetheless, the MSCP finds that PowerSeraya did not act promptly to dispatch offer variations in good time, and in particular, its dispatch coordinator failed to put in a revised offer for Period 47. The forced outage occurred at 22.36 hrs, that is 6 minutes after the commencement of Period 46. There were at the site 4 operators led by the Shift Charge Engineer and his Assistant Engineer. According to the written submissions of PowerSeraya, at 22.44 hrs the gas dispatch coordinator (at the site) attempted many times to call the dispatch coordinator on the latter's handphone (the dispatch coordinator being then stationed at his home) but was unable to get through because of "*phone network issue*", and the first successful call was only made at 23.27 hrs, that is, nearly the end of Period 47. It appears to the MSCP that the call did not get through to the dispatch coordinator for one of the following reasons: (i) the phone was engaged all the time, (ii) the phone was switched off or (iii) the dispatch coordinator did not have the handphone with him at that time. This is evident from "CallerAlert" messages as recorded in the handphone at 22.44 hrs. The MSCP is not convinced that there was any "*phone network issue*". At any rate, if the call on the handphone of the dispatch coordinator continued to be unsuccessful, a call could have been made to his phone at home or an urgent SMS could be sent to the handphone of the dispatch coordinator. The obligations the dispatch coordinator failed to fulfill are with respect to –

- (a) making offer variations for SERCCP1, SERCCP2, SERCCP3 and SERCCP4 for the Period 47;
- (b) making offer variations for SERCCP2, SERCCP3 and SERCCP4 for the Period 48; and



(c) making offer variations for SERCCP3 and SERCCP4 for the Period 1 (14 December 2011).

36 It was submitted at the hearing that in re-starting the facilities, the start-up conditions for all the four CCPs were extremely "hot", and that PowerSeraya's engineer reasonably believed that SERCCP1, SERCCP2 and SERCCP3 would be able to reach the offered load under 60 minutes, i.e. before the end of Period 48. However, PowerSeraya did not produce any realistic facts or materials in support of such belief. On the contrary, it was demonstrated to PowerSeraya's representatives by a Member of the MSCP, Mr Lee Keh Sai (who is himself a very experienced electrical engineer) that SERCCP1, SERCCP2 and SERCCP3 could not reasonably be expected to reach the offered load within that time.

37 On the materials before the MSCP, it is clear that PowerSeraya did not comply with the Market Rules with respect of its four CCPs as detailed in paragraph 28 above. The MSCP finds that PowerSeraya had breached these Market Rules.

### **IMPACT OF BREACH ON THE WHOLESALE ELECTRICITY MARKET**

38 The consequence of the above rule breaches was in allowing the market clearing engine to produce dispatch and pricing schedules that did not reflect genuine underlying demand and supply conditions in the three mentioned dispatch Periods. For these Periods, because no energy shortfall was anticipated by the market clearing engine, no automatic issuance of energy shortfall advisory notices to other potential suppliers of energy in the market was made. This created a false sense of security to the market regarding the availability of supply and created a very substantial risk to system security. While a major system failure was avoided through actions taken by the PSO and some market participants, the relatively low and declining system demand at the time played a part in avoiding load shedding.

39 The MSCP considered the impact of PowerSeraya's failure to revise its offers for Periods 47 and 48 of 13 December 2011 and Period 1 of 14 December 2011 on the market outcome. It considered this impact by estimating what the market outcome would have been if PowerSeraya had made offer variations in a manner that the MSCP deems reasonable under the circumstances. By adjusting PowerSeraya's offers for these three Periods to reflect reasonable expectations (based on a combination of actual readings and inferred capability from the "Hot-Start" profiles of PowerSeraya's respective CCPs) and conducting a simulation run of the market clearing engine (MCE), the MSCP estimated the total impact on market outcome to be in the region of **\$1.68 million**. The MSCP considers this amount to reasonably reflect the extent of market distortion caused by formation of market prices that did not reflect actual demand and supply conditions for energy in the said three dispatch Periods.

Revised offers used in the simulation run of the MCE are as follows:

Period	47 (13 Dec 2011)	48 (13 Dec 2011)	1 (14 Dec 2011)
SERCCP1	Inferred Capability from Hot-Start Profile	Original Offer	Original Offer
SERCCP2	Inferred Capability from Hot-Start Profile	Actual Load	Original Offer
SERCCP3	Inferred Capability from Hot-Start Profile	Actual Load	Actual Load
SERCCP4	Inferred Capability from Hot-Start Profile	Actual Load	Actual Load

### Simulated MCE Outcomes and Impact Assessment

Period	47 (13 Dec 2011)	48 (13 Dec 2011)	1 (14 Dec 2011)
USEP	\$3409/MWh	\$540/MWh	\$234/MWh
Estimated Impact on Wholesale Market Settlement	\$1.68 million		

### MITIGATING FACTORS

40 The MSCP now turns to the mitigating factors submitted by PowerSeraya and explanations of its actions given the conditions prevailing at the time of the rule breaches. The MSCP considers the following mitigating factors to be acceptable and applicable:

- The cause of forced outages was beyond PowerSeraya's control;
- There were reasonable immediate attempts by PowerSeraya to find out cause of the outages from a third party without success, which delayed PowerSeraya's response;
- Unprecedented scale of simultaneous forced outage of four CCPs led to decisions being taken "in the heat of the moment";
- PowerSeraya demonstrated lessons learned and commitment to corrective actions in the form of revision to standard operating procedures and consultation with the Authority;
- There was no actualized load-shed although system security was put at high risk; and
- PowerSeraya rendered good co-operation during the investigation.

### FINANCIAL PENALTY

41 Taking into account all the relevant circumstances in this case, including the mitigating factors described above, the MSCP determines that a financial penalty should be imposed on PowerSeraya for breaching Sections 5.1.5 (for SERCCP 1, SERCCP2 and SERCCP4) and 5.1.6 (for SERCCP3) of Chapter 6 of the Market Rules for Periods 47 and 48 of 13 December 2011 and Period 1 of 14 December 2011.

Recognizing the unprecedented nature of this incident, the MSCP assesses the penalty in the sum of \$800,000, being approximately 50% of the estimated market distortion, and also a sum of \$42,861 being recovery of payment made by the PSO to Senoko Energy Pte Ltd as compensation for complying with the PSO's dispatch instructions because of the forced outages. The total amount of penalty is \$842,861. The MSCP hereby directs that PowerSeraya pay the sum of \$842,861 as financial penalty and also the costs of investigation fixed at \$43,750. The total sum of \$886,611 is to be paid forthwith.

#### THE MSCP STANCE ON OBLIGATIONS RELATING TO OFFERS

- 42 The MSCP takes a serious view of any behaviour that undermines the effective functioning of the NEMS. Producing price signals that reflect genuine underlying demand and supply conditions which is one of the fundamental objectives for establishing the NEMS is not to be compromised. The MSCP further stresses its firm stance on all market participants' obligations under the Market Rules relating to offers. This incident involving multiple forced outages on 13 December 2011 was the first of its magnitude and has been treated accordingly and on its own merits. Going forward, the MSCP is inclined to take a less lenient view on breaches of this nature by any market participant and will be guided more closely by the extent of market distortion such breaches create.

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