Energy Market Company

RCP PAPER NO. : **EMC/RCP/47/2010/CP19**

SUBJECT : **SHORTLIST OF DATA TYPES CONSIDERED FOR RELEASE IN SWEM**

FOR : **DECISION**

PREPARED BY : **HENRY WEE**
ANALYST

REVIEWED BY : **PAUL POH LEE KONG**
SVP, MARKET ADMINISTRATION

DATE OF MEETING : **5 JANUARY 2010**

Executive Summary

At the 44th RCP meeting, the Rules Change Panel (RCP) approved the shortlist of data types to be reviewed for release in the Singapore Wholesale Electricity Market (SWEM) and the methodology for assessing if such data should be released. The shortlist was selected from 5 categories of data types presented in the 2007 CRA survey of data release practices in centrally-dispatched electricity markets.

Subsequently, on 5 September 2009, EMC published this paper requesting for comments on the benefits and costs, if any, pertaining to the release of information on (i) unit specific operational parameters and (ii) load flow model. EMA's view was also sought to assess if releasing such information will have an adverse impact on national security.

Two Market Participants (MPs), Diamond Energy and Senoko Power, responded with comments (see Annex 5 for details). EMA replied that information relating to load flow model should not be released to any party as it is critical to system security (see Annex 6 for EMA's letter).

EMC's market operations and information technology (MOIT) estimated the cost and implementation timeline for releasing such information, while EMC's legal counsel gave feedback on the potential legal implications from EMC's standpoint.

Given EMA's decision that the load flow model should not be released, EMC focused on reviewing whether data on unit specific operational parameters should be released. All in all, no specific benefit was identified. In terms of costs, an implementation cost will be incurred and a concern was also raised over the commercial sensitivity of such data.

Thus, from our cost-benefit analysis, EMC recommends that the RCP do not support the

release of data on unit specific operational parameters.

At the 47th RCP meeting, the panel unanimously decided not to release the data on unit specific operational parameters as the costs outweigh the benefits.

1. Introduction

At the 40th RCP meeting in November 2008, the RCP considered the proposal to publish generation offer and dispatch information (CP16: Publishing Generator Offer and Dispatch Quantities) and decided against it. The Panel decided that the decision should be reviewed when the level of market concentration has declined. In addition, the Panel requested EMC to review if there are other types of useful information studied in the 2007 CRA survey "Analysis of Data Release Practices in Centrally-Dispatched Electricity Markets" that should be released for the benefit of the SWEM. This review was prioritized, in the 2009 RCP work plan, to be looked into in the financial year 2009/2010.

At the 44th RCP meeting, the RCP approved a shortlist of data types (described in section 2) to be reviewed for release in the SWEM and the methodology (described in section 3) for assessing if such data should be released.

Subsequently, on 5 September 2009, EMC published this paper for comments on the benefits and costs, if any, pertaining to the release of information on (i) unit specific operational parameters and (ii) load flow model. EMA's view was also sought to assess if releasing such information will have an adverse impact on national security.

Given EMA's decision that the load flow model should not be released, we focused on reviewing whether data on unit specific operational parameters should be released in the SWEM. Using the approved methodology, we assessed the costs and benefits pertaining to the release of this data. We considered MPs' comments on releasing this data and the implementation cost, estimated by EMC's MOIT, which will be incurred. This paper presents our cost-benefit analysis and our recommendation on whether data on unit specific operational parameters should be released.

2. Shortlisted data types

The shortlisted data types and what specifically will be considered for release in the SWEM is described below:

i) Hourly energy and A/S schedules, dispatch instructions (with ID or masked)

This refers to the scheduled energy, scheduled reserve of each reserve class and regulation. For the SWEM, the information to be considered for release in the dispatch instruction for each generation dispatch facility or load registered facility is equivalent to the dispatch schedule. It has the following details:

a. Identity of the GRF/LRF
b. Scheduled Energy (generation level) for the dispatch period
c. Scheduled Regulation up & down
d. Scheduled Primary Reserve
e. Scheduled Secondary Reserve
f. Scheduled Contingency Reserve

Note: The NEMMCO publishes this information with a one day lag, while the ERCOT with a 60-day lag. As a review to release such information entitled 'Publication of Historical Dispatch Schedule' is already included in this year's RCP work plan. This set of information will thus not be considered in this paper.

ii) Unit specific operational parameters, unit commitment data

This category of data published in other markets include generator ID, Zonal or Group name, minimum run time or down time, start up cost curve and notification time curve etc. (An example of the generator commitment data defined in New York ISO can be

found in table 1 of Annex 1. Information for unit specific operational parameters is not published for public viewing so no sample is available). In SWEM, the relevant equivalent data to be considered for release is that found in Table 1 (Generation Facility Standing Capability Data) of the PSO data form and the Standing Capability Data for Load Facility. The details covered in Table 1 of the PSO data form are described in Appendix 6E of Market Rules). They are:

a. Name of Generation (Appendix 6E.1.1.1)
b. Type of Generation Facility (Appendix 6E.1.1.1)
c. Max. Generation Capacity (Appendix 6E.1.1.2)
d. Max. Ramp-up rate (Appendix 6E.1.1.3)
e. Max. Ramp-down rate (Appendix 6E.1.1.4)
f. Max. Reserve Capacity for each reserve class (Appendix 6E.1.1.5)
g. Low Load (Appendix 6E.1.1.12)
h. Reserve Capacity at low, medium high output level for each class of reserve (Appendix 6E.1.1.13)
i. Maximum combined generation capacity and reserve capacity for each reserve class (Appendix 6E.1.1.6)
j. Reserve Proportionality Factor for each class of reserve (Appendix 6E.1.1.7)
k. Max. Regulation Capacity (Appendix 6E.1.1.8)
l. Max. Energy output at which AGC can operate (Appendix 6E.1.1.9)
m. Min. Energy output at which AGC can operate (Appendix 6E.1.1.10)
n. Time delay before responding to contingency event (Appendix 6E.1.1.11)

For Load Facility:
a. Owner Name (Appendix 6E.2.1.1)
b. Site Address (Appendix 6E.2.1.1)
c. Maximum Reserve Capacity for each class for each Load Facility (Appendix 6E.2.1.2)

iii) Load flow model & Related Data types

The following 3 items are discussed together as they are either inter-related or subsets of the load flow model, they are:
1. Load Flow Model
2. Total Transfer Capability (TTC), Reservation, Available Transfer Capability (ATC)
3. Interface Flow (boundary or internal)

*1. Load Flow Mode**l***

This is equivalent to a Power Flow model. To model this, the network configuration and transmission parameters are required. Transmission parameters would include details like the resistance, reactance, thermal rating or capacity of the network elements like the transmission line, transformers etc.

The California Independent System Operator CAISO) publishes the Congestion Revenue Rights Full Network Model (CRR FNM[1]) to support the CAISO CRR Allocation and Auction processes. The CRR FNM is a static snapshot of grid condition and is slightly different from the FNM used for the real time market. The FNM used for the real time market is not released. The model is segregated by geographic regions and updates are done with the following taken into consideration:

[1] Chapter 2 Business Practice Manual for Managing Full Network Model, revised March 23, 2009 (published by CAISO)

(1) Recent Transmission Network changes and updates
(2) Scheduled and past Forced Outages
(3) Update local area load level (or segment)
(4) Modify major path flows
(5) Update generation level
(6) Maintain Voltage Levels

2. Total Transfer Capability (TTC), Reservations, Available Transfer Capability (ATC)

Available Transfer Capability (ATC)[2] is a measure of the transfer capability remaining in the physical transmission network for further commercial activity over and above already committed uses. Mathematically, ATC is defined as the Total Transfer Capability (TTC)[1] less the Transmission Reliability Margin (TRM), less the sum of existing transmission commitments (which includes retail customer service) and the Capacity Benefit Margin (CBM).

- Total Transfer Capability (TTC) is defined as the amount of electric power that can be transferred over the interconnected transmission network in a reliable manner while meeting all of a specific set of defined pre- and post-contingency system conditions.

- Transmission Reliability Margin (TRM) is defined as that amount of transmission transfer capability necessary to ensure that the interconnected transmission network is secure under a reasonable range of uncertainties in system conditions.

- Capacity Benefit Margin (CBM) is defined as that amount of transmission transfer capability reserved by load serving entities to ensure access to generation from interconnected systems to meet generation reliability requirements.

To determine the transfer capability and availability, the Load Flow Model is needed to model it. The CAISO provides such information (in their website for download as excel or pdf file) for each transmission interface (with ID) for their Day-Ahead Market and Hour Ahead Scheduling Process. The Nord Pool publishes only static data of total (or maximum) transfer capacities at major interfaces (interties between Russia & Finland, Sweden & Finland, Norway & Sweden, West Denmark & Germany etc). NYISO publishes hourly transfer limits (TTC & ATC) in pdf, html or csv for their day-ahead market, while NEMMCO publishes both public and private file that contains data (by region) on interconnector flow limits, actual flows and violations.

3. Interface flows (internal/boundary)

For internal or boundary interface flow, it refers to the usage (actual flow) information at specific interfaces within the system governed by the system operator. As to the type of the interface, internal or boundary, it is dependent on jurisdiction that the system operator is in charge. In certain markets, the system operator's jurisdiction may cover their own grid and third party grid (privately owned). In fact, this type of interface data is related to those mentioned in point 2 above i.e. total transfer capability or availability of a specific interface.

[2] "ATC Definition and Determination", NERC, June 1996

In SWEM's Context

The information going into the load flow model and the resulting outcomes from the model will contain information of available transfer capability as well as usage information at every interface in the network system.

As for the load flow model, information used to build the model will come from the standing data that PSO has of the grid. This standing data information will contain the network configurations and transmission parameters of the grid such as transmission lines, transformers, load and generators. As it is now, such information is found in the following categories of the PSO standing data, i.e. Branches and Losses; Bus; Connectors; and Facility (Generation & Load). While the standing data is a static snapshot of the entire grid, the network status file gives the real time information of the grid status 10 minutes before the next period, revealing which switches are open or close which effectively determine which transmission line or transformer is in operation, amongst other information like off-take load's loading and generators' generation. Together with information like load forecast (from the VSTLF) and generation offers, the MCE will complete its optimization run and produce the predicted load flow for each dispatch network line for the Real Time Dispatch Schedule.

As for the short term schedules (STS), pre-dispatch schedules (PDS) and market outlook scenarios (MOS), the MCE utilizes inputs from the short term load forecast (STLF), the very short term load forecast (VSTLF) and the outage schedule instead of the network status file to produce the forecasted schedule and expected load flow. Thus Load Flow Model is available for each dispatch period of the RTS, STS, PDS and MOS.

An example of a portion of the load flow model, and the information relating to it is illustrated in Annex 2 Diagram 1. The diagram/information will reveal the status, parameters and scheduled results of the grid components such as substations, transmission lines and transformers, switches or connectors, load and generators. When "mouse over" each of the components in the diagram, the parameters and relevant MCE scheduled results of that component will be revealed. The table below shows what will be displayed for each type of component.

No	Component	Information revealed
1	Transmission Line	Name Real flow Effective Maximum Rated Maximum Branch Usage
2	Transformer	Name Real flow Effective Maximum Rated Maximum Branch Usage
3	Generator	Name Energy Schedule MNN Price
4	Load	Name Load Schedule
5	Substation	E.g. Substation Name, Busbars and their prices If double-click: It would display more information like energy injection, node angle and energy violation

3. Methodology to assess whether the shortlisted data type should be released

For the shortlist of data types that are reviewed for release, the following tests will be applied to evaluate the costs of releasing such data. If the data fails any of the tests, the data will not be recommended for release, unless the benefits of releasing the data exceed the costs.

3.1 National Security Test

Information will be considered to have adverse impact on national security if it:

1. enables the identification of a critical power installation in the Singapore power system network; or

2. is key to locating a critical power installation and useful to a person planning an attack on the installation that can cause disruption or serious interference with public utilities.

Such information shall be kept confidential.

Where EMC cannot reasonably ascertain the above, it shall consult the EMA. The EMA's decision on the impact on national security of disclosing such information shall be final. Information deemed to have adverse impact on national security will be kept confidential.

3.2 Financial Test

Information or data will be deemed to cause adverse financial impact if it:

a) Causes the trading behavior of other market participants to alter in a manner such that any identified party is financially disadvantaged;

b) Causes the electricity market to behave in a way that financially disadvantages any identified party; and/or

c) Causes the competitive position of any identified party to be disadvantaged vis-à-vis other parties.

3.3 Commercial Test

If the information or data is a trade secret by its nature, it will be considered to have adverse commercial impact.

"Trade secrets" are defined as (but are not limited to) any formula, plan, pattern, process, tool, mechanism, compound, procedure, production data, or compilation of information which is not patented, which is known only to certain individuals within a commercial concern who are using it to fabricate, produce, or compound an article of trade or a service having commercial value and which gives its user an opportunity to obtain a business advantage over competitors who do not know or use it.

3.4 Legal Test

a) The release is prohibited by any applicable Singapore law.
b) The release would adversely cause an impact on any contractual arrangement to which EMC is a party.
c) The release would adversely cause an impact on any contractual arrangement to which the identified party is a party

3.5 Market Efficiency Test

a) The release of data will adversely affect market efficiency e.g. enable a party with a dominant market position to potentially abuse his dominant position
b) The release of data will weaken the NEMS Market Design Principles (e.g. Uniform Marginal Pricing

3.6 Cost Test

The cost of making the shortlisted data type available.

3.7 EMA Directive on Information Release

EMA issued a directive, in its letters dated 5 July 2004 and 25 August 2004 to EMC (see Annex 3), that information on generation and transmission facilities — including but not limited to their identity, location and availability — should not be released to the public. EMA stated that it considers such facilities as critical infrastructure, thus, any information pertaining to such facilities is highly sensitive and is seen toaffect national security.

Our review on whether any shortlisted data type should be released will need to take into account EMA's directive.

4 Consultation

Following the 44th RCP meeting, EMC published this paper for comments on 5 September 2009. We requested for feedback, to be provided using the template in Annex 4 – Table 1, on the benefits and costs pertaining to the release of data on:-

a) Unit specific operational parameters;
b) Load Flow Model,

We received feedback from two MPs, Diamond Energy and Senoko Power. Their comments are detailed in Annex 5.

As indicated in the paper published for comments, EMC also sent a letter to EMA requesting for its view on whether any of the shortlisted data should not be released because of national security concerns. EMA replied (see Annex 6) that information relating to load flow model is critical to the security of Singapore's electricity system, hence, it should not be released to the public or MPs.

As EMA had decided that data on load flow model cannot be released, we focused our review on assessing whetherdata on unit specific operational parameters should be released. Our assessment, which takes into consideration MPs' comments and uses the RCP-approved methodology to evaluate the costs of releasing this data and also takes into con, is detailed in section 6.

5 Implementation timeline and costs

EMC's Market Operations and Information Technology (MOIT) department estimated that the effort and cost required to make such information available is:

i Unit specific operational parameters data, as specified in section 2ii

The estimated ballpark time and cost for implementing this is 11 man-weeks and S$27,500. This will cover:

1. Adding of new data field to DB
2. Changes to standing data front-end
3. Changes to OMS front-end
4. Changes to data warehouse to capture the additional data field. This excludes report changes.
5. UAT

ii Load Flow Model, as specified in section 2iii

For the Load Flow Model, the ballpark estimate of the implementation cost is 30 man-months at a cost of S$600,000. However, this estimate may change depending on the actual scope of implementation.

6 Assessment of whether to release Unit specific operational parameters data

The original shortlist of data types (as detailed in section 2) was:

1. Hourly energy and A/S schedules, dispatch instructions (with ID or masked)
2. Unit specific operational parameters, unit commitment data
3. Load flow model

However, data type 1 will not be considered in this paper as it has already been earmarked for a separate assessment in the 09/10 RCP workplan. As for the load flow model, EMA had assessed such information to be critical to system security and directed that it should not be released to the public or market participants. Hence, we have narrowed down our review to data type 2, which we will assess for release based on the RCP-approved assessment methodology (section 3).

The benefits and costs relating to releasing data on unit specific operational parameters are assessed in Table 1 below.

Table 1: Assessing *Unit specific operational parameters*

No	Test	Assessment
1	Benefits	No one has provided any feedback on the specific benefit of releasing this information. Instead Senoko Power indicated that this information is not needed as operational parameters required for the smooth operation of the system is already available to the PSO.
2	Cost - National Security	EMA has assessed that the release of this data does not have an adverse impact on national security.
3	Cost - Financial	Senoko Power raised the concern that this information is commercially sensitive and would compromise the competitive position of Gencos.
4	Cost - Commercial	Senoko Power raised the concern that this information is highly sensitive and should not be provided.
5	Cost - Legal	Senoko Power stated that this information may be

		used to derive upstream costs, which can be confidential information from their contractors. There is no deemed adverse impact on contractual arrangment to which EMC or the identified party is a party. There is no known prohibition by Singapore Law.
6	Cost - Market Efficiency	Currently, this information is available to the system operator and market operator to ensure smooth operations of the electricity system and market. It is not anticipated that the release of this information would adversely affect market efficiency due to abuse of dominant market position. Neither does the release of this information weaken the NEMS market design principles.
7	Cost – Implementation	EMC has estimated a cost of $27,500

Overall, the assessment in Table 1 identified no specific benefits of making the data available. In terms of costs, there is an implementation cost of $27,500 and a concern raised by one MP that this data is commercially sensitive. Therefore, on balance, there are no grounds to release this data in the SWEM.

7 Recommendation

Based on the assessment in section 6, EMC recommends that the RCP do not support releasing data on unit specific operational parameters in the SWEM.

8 Decision by RCP

At the 47th RCP meeting on 5 January 2010, the RCP unanimously decided not to release the data on unit specific operational parameters in SWEM as the costs outweigh the benefits.

Annex 1

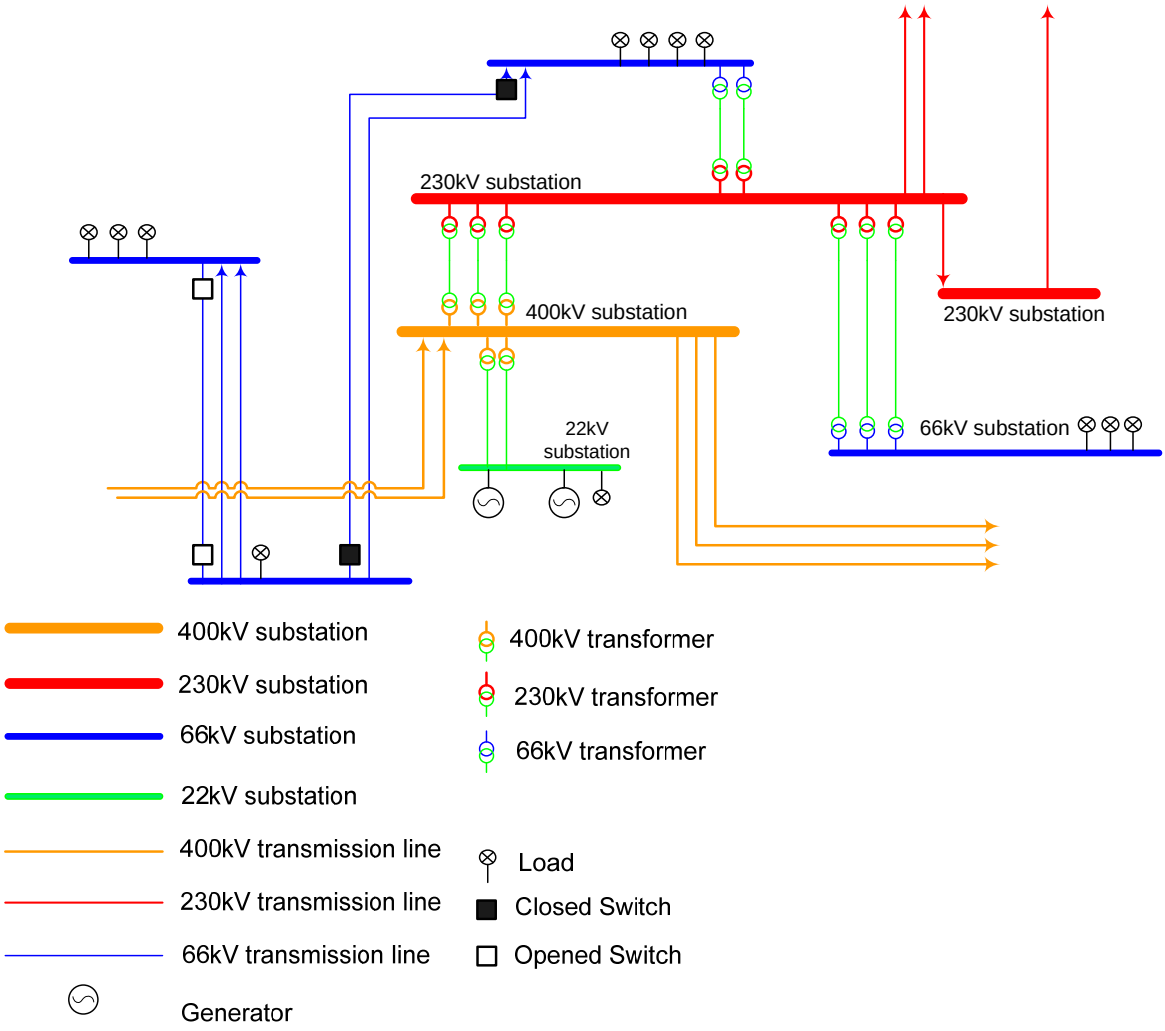
Table 1
Example of NYISO Generator Commitment Parameters:

Parameter	Data Type	Description
Generator	NUM or CHAR	Name or PTID for the generator shown in MIS
Generator ID	NUM	PTID of the generator
Min. run time	NUM	Min hours in a dispatch day a unit must run once started by the ISO.
Min. down time	NUM	Min hours in a dispatch day a unit must be down once decommitted by the ISO.
Max. stops per day	NUM	No of times a unit can be decommitted in a dispatch day
Start-up notification	NUM	The time it takes for a generator to reach its own min gen level after notification from NYISO.
Start-up bid time	NUM	Start-up cost curve, hours off-line
Start-up bid cost	NUM	Start-up cost curve, $ to start
Notification hours to start	NUM	Start-up notification time curve, hours to start.
Notification hours off line	NUM	Start-up notification time curve, hours off-line
Commitment ID	NUM	Unique identifier identifying the commitment data being supplied.
Update User	CHAR	User who supplied the current data
Update Time	CHAR	Time bid was submitted
Sample file:  20081101biddata_ucdata.csv		

Annex 2

Diagram 1

An example of the grid schematic diagram that may be released with the load flow model



Annex 3

ENERGY MARKET AUTHORITY

Our ref :

Your ref :

Date : 5 Jul 2004

Tel : 6835 8069
Fax : 6835 8084
Email : wong_siew_kwong@ema.gov.s

Chief Executive Officer
Energy Market Company
9 Raffles Place
#22-01 Republic Plaza
Singapore 048619

Dear Sir

ASSESSING THE IMPLICATIONS ON NATIONAL SECURITY OF PUBLISHING INFORMATION ON EQUIPMENT OUTAGES

I refer to your letter dated 18 May 2004.

2 EMA views generation or transmission equipment outage information as sensitive information. Such information should not be released to the public domain.

Yours faithfully

WONG SIEW KWONG
DIRECTOR (MARKET DEVELOPMENT & ASSESSMENT)
for DEPUTY CHIEF EXECUTIVE
REGULATION DIVISION

111 Somerset Road #11-06 Singapore 238164 • Republic of Singapore • Tel: 68358000 Fax: 68358020 Website: www.ema.gov.sg

ENERGY MARKET AUTHORITY

Our ref :

Your ref :

Date :25 Aug 2004

Tel : 6835 8132

Fax : 6835 8084

Email : daniel_lee@ema.gov.sg

Chief Executive Officer
Energy Market Company
9 Raffles Place
#22-01 Republic Plaza
Singapore 048619

Dear Sir

ASSESSING THE IMPLICATIONS ON NATIONAL SECURITY OF PUBLISHING INFORMATION ON EQUIPMENT OUTAGES

I refer to your letter dated 13 August 2004.

2 Generation and transmission facilities are critical infrastructure that are vital to Singapore. The incapacity or destruction of such facilities would have a debilitating impact on the security, national economic security, or safety. Information on these facilities, including but not limited to their identity, location and availability should not be released to the public domain.

Yours faithfully

Daniel Lee

DANIEL LEE KONG LENG
ANALYST (WHOLESALE MARKET)
for DEPUTY CHIEF EXECUTIVE
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Annex 4

Table 1

Tests **(Details in section 3)**	**Unit specific operational parameters** **(Details in section 2ii)**	**(1) Load flow model** **(2) Total Transfer Capability(TTC), Reservations, Available Transfer Capability** **(3) Interface flow (internal or at boundary)** **(Details in section 2iii)**	**Additional Comments from your company's perspective.**
Benefits of releasing information	(Yes/No/No comments) (If Yes, pls provide reasons and supporting justifications)	(Yes/No/No comments) (If Yes, pls provide reasons and supporting justifications)	
National Security Test i.e. enables identification of critical installations and its location such that it facilitates a terrorists attack	(Yes/No/No comments) (If Yes, pls provide reasons and supporting justifications)	(Yes/No/No comments) (If Yes, pls provide reasons and supporting justifications)	
Financial Test i.e. causing an identified party to be financially or competitively disadvantaged	(Yes/No/No comments) (If Yes, pls provide reasons and supporting justifications)	(Yes/No/No comments) (If Yes, pls provide reasons and supporting justifications)	
Commercial Test i.e. whether such information is a trade secret by its nature	(Yes/No/No comments) (If Yes, pls provides reason and supporting justifications)	(Yes/No/No comments) (If Yes, pls provides reason and supporting justifications)	
Legal Test i.e legal to be released by Singapore law? Does it have an adverse impact on existing contractual	(Yes/No/No comments) (If Yes, pls provides reason and supporting justifications)	(Yes/No/No comments) (If Yes, pls provides reason and supporting justifications)	

Tests **(Details in section 3)**	**Unit specific operational parameters** **(Details in section 2ii)**	**(1) Load flow model** **(2) Total Transfer Capability(TTC), Reservations, Available Transfer Capability** **(3) Interface flow (internal or at boundary)** **(Details in section 2iii)**	**Additional Comments from your company's perspective.**
agreement to which an identified party is a party			
Market Efficiency Test i.e. does it adversely affect market efficiency or weaken the NEMS Market Design Principles (Uniform Marginal Pricing)	(Yes/No/No comments) (If Yes, pls provide reasons and supporting justifications)	(Yes/No/No comments) (If Yes, pls provide reasons and supporting justifications)	
Cost Test i.e. The cost of making the data available	(Amount if any or N.A.)	(Amount if any or N.A.)	

Annex 5

Comments from Diamond Energy

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Private & Confidential

30th September 2009

Energy Market Company
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Singapore 307684

Attention: Mr. Dave Carlson
Chair Rule Change Panel
c/o Energy Market Company

Subject: SWEM Data Release

Dear Mr. Carlson,

I refer to RCP Paper No EMC/RCP/2009/CP19 titled Shortlist of Data Types Considered for Release in SWEM.

Diamond Energy Pte Ltd ("Diamond Energy") fully supports the proposal to release additional market outcome data and sees this as an important step in the development of a competitive and efficient electricity market (both wholesale and retail) in Singapore. Based on Diamond Energy's experiences in the NEMS and other similar markets, we also advocate that the release of information should go further than that which is proposed. The reasons for this are briefly outlines below.

The release of market data is essential to the efficient operation of electricity markets, and in our experience this should at a minimum include system demand levels, generator dispatch data, and generator offer data.

Item 11 of *Minutes of the Rules Change Panel 44th Meeting held on Tuesday, 7 July 2009 at 10.10 AM at EMC* indicates that in addition to what is already released, the following data-types will be assessed for release subject to a set of tests:

- Hourly energy and A/S schedules, Dispatch instructions (with ID or masked);
- Unit specific operational parameters;
- Load flow model;
- Total Transfer Capability (TTC), Reservations, Available Transfer Capability (ATC);
- Interface flows (internal); and
- Interface flows (boundary).

This package of release data covers all the major data items with the exception of supply offer data. Diamond Energy understands that offer data has been the most contention data release issue in many markets mainly due to concerns of providing information that could assist in market gaming behavior by major generator companies. We also recognize that given the size and industry structure of the SWEM, this is a particularly important issue.

COMPANY REGISTRATION NUMBER
200208266G

However, based on our experience in electricity markets, both as an "outside" investor and as an incumbent, we are firmly of the view that release of generator offer data can only improve market efficiency, lower market entry barriers through increased transparency, and lower the ability of generator portfolio companies to exert market power. Key issues associated with the full release of data relate to the following:

- The ability of outside investors to understand the market and have confidence that assessments of wholesale or retail projections have a sound basis. There is not only competition within electricity markets but also between these markets;
- The ability of the industry to understand and verify the spot price determination process;
- Issues associated with information asymmetry between regulators / market surveillance bodies and the wider industry. Without the ability of the industry to undertake the same analysis as any regulatory body and to comment on analysis undertaken there is a very real risk of inappropriate assessments and compromised regulatory decisions. It has been our experience that the ability of the industry to review, check and undertake independent analysis based on full information substantially increases confidence in the market;
- Improves risk management through increased market understanding. For example, without release of supply offer data it would not be clear how the relative contributions of transmission or generation have influenced prices or the reliability of physical supply;
- Reduce the information gap between the smaller market players and the larger players who have the capital to better assess the dynamics of the market; and
- The potential for improved contract trading through an increased ability to price such contracts.

We note that reviews regarding concerns of releasing supply offer data have resulted in this data being released, and that once released, such concerns have been found to be unfounded. To illustrate this, the practices of four other energy-only gross pool electricity markets in the Asia-Pacific region are summarized in the table below.

Table 1 Generator Offer Release Practices in Similar Markets

Electricity Market	Is Supply Offer Data Released?	Time Lag (Delay)	Format
Australian National Electricity Market (NEM)	YES	1 Day	Offers of each unit are identified
Western Australia Independent Market Operator (WA-IMO)	YES	2 Weeks	Offers released aggregated on a generation portfolio basis
New Zealand Electricity Market (NZEM)	YES	2 Weeks	Offers of each unit are identified
Philippines Wholesale Electricity Market (WESM)	YES	1 Month	Offers of each unit are identified

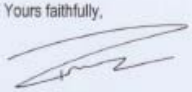
We also note that the CRA paper ("Review of Data Releases studied in the CRA 2007 survey "Analysis of Data Release Practices in Centrally-dispatched Electricity Markets" (Paper No. EMC/RCP/44/2009/CP19)") suggests that in the USA, it is generally considered reasonable within the confines of the FERC Standard Market Design to release generation offer with some lag – the recommended lag being 6 months. Despite a suggested lag of 6 months, there are many examples of electricity markets within the USA that release data with shorter lag times. We urge the Singapore NEMS to keep pace with what has become standard industry practice elsewhere. To ensure the NEMS continues to meet the challenges of future competition it should

consider to release of supply offer data. This could commence with earlier years data and upon review move to move recent data.

We recommend, as a first step, that generator unit offer data be made available for the calendar years 2003, 2004 and 2005. This could in no way influence market bidding behavior as the information is dated, however, it would provide increased transparency.

I look forward to your consideration on this important matter.

Yours faithfully,



Rozaiman Rosidi
Business Development Manager

cc Mr. Paul Poh, SVP Market Administration
Mr. Henry Wee, Analyst Market Administration

Comments from Senoko Power

Tests **(Details in section 3)**	**Unit specific operational parameters** **(Details in section 2ii)**	**(1) Load flow model** **(2) Total Transfer Capability(TTC), Reservations, Available Transfer Capability** **(3) Interface flow (internal or at boundary)** **(Details in section 2iii)**	**Additional Comments from your company's perspective.**
Benefits of releasing information	(~~Yes~~/No/~~No comments~~) Operational parameters required for the smooth operation of the system is already accessible to the PSO. This information is not needed	(Yes/~~No/No comments~~) Transparent transmission load flow characteristics allow market participants to do its own modeling. Currently market participants are not able to incorporate technical factors in its economic modeling. Availability of this data also enhances market efficiency as market participants can observe technical conditions that are driving price / dispatch patterns in the market.	
National Security Test i.e. enables identification of critical installations and its location such that it facilitates a terrorists attack	(~~Yes~~/No/~~No comments~~) (If Yes, pls provide reasons and supporting justifications)	(~~Yes~~/No/~~No comments~~) NOTE – release to Market Participants only	
Financial Test i.e. causing an identified party to be financially or competitively disadvantaged	(Yes/~~No/No comments~~) (If Yes, pls provide reasons and supporting justifications) Data is commercially sensitive. Publication of such data would compromise the competitive position of the gencos.	(~~Yes~~/No/~~No comments~~) (If Yes, pls provide reasons and supporting justifications)	

Tests **(Details in section 3)**	**Unit specific operational parameters** **(Details in section 2ii)**	**(1) Load flow model** **(2) Total Transfer Capability(TTC), Reservations, Available Transfer Capability** **(3) Interface flow (internal or at boundary)** **(Details in section 2iii)**	**Additional Comments from your company's perspective.**
Commercial Test i.e. whether such information is a trade secret by its nature	(Yes/~~No/No comments~~) Data is highly sensitive and should not be provided	(~~Yes~~/No/~~No comments~~) (If Yes, pls provides reason and supporting justifications)	
Legal Test i.e legal to be released by Singapore law? Does it have an adverse impact on existing contractual agreement to which an identified party is a party	(Yes/~~No/No comments~~) Information may be used to derive upstream costs that can be confidential information from contractors.	(~~Yes~~/No/~~No comments~~) (If Yes, pls provides reason and supporting justifications)	
Market Efficiency Test i.e. does it adversely affect market efficiency or weaken the NEMS Market Design Principles (Uniform Marginal Pricing)	(Yes/~~No/No comments~~) (If Yes, pls provide reasons and supporting justifications)	(Yes/No/No comments) (If Yes, pls provide reasons and supporting justifications)	
Cost Test i.e. The cost of making the data available	(Amount if any or N.A.)	(Amount if any or N.A.)	

Annex 6

ENERGY MARKET AUTHORITY

Our ref :
Your ref :
Date : 28 October 2009

Tel : 6376 7548
Fax : 6835 8020
Email : wong_mui_quee@ema.gov.sg

Mr Paul Poh
SVP, Market Administration
Energy Market Company
238A Thomson Road
#11-01 Novena Square Tower A
Singapore 307684

Dear Paul,

Review of shortlisted data types to be released for publication

I refer to your letter dated 9 September 2009.

2 The release of unit specific operational parameters as presented in Annex A, part i of your letter has no impact on system security of the electricity system. However, EMA would like to highlight that such information may be commercially sensitive.

3 The information pertaining to load flow model is critical to the security of our electricity system. Such information should not be released to the public or market participants.

4 We would also point out that the related data type that you have listed such as total transfer capability, reservations, available transfer capability and interface flow are not applicable to our system currently.

Yours faithfully

Wong Mui Quee

WONG MUI QUEE (MS)
DIRECTOR (MARKET DEVELOPMENT & SURVEILLANCE)
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