Market Surveillance and Compliance Panel
Singapore Wholesale Electricity Market

PUBLIC CONSULTATION ON PROPOSED CATALOGUE OF MONITORING INDICES

The Singapore Electricity Market Rules provide for the Market Assessment Unit ("MAU"), under the supervision and direction of the Market Surveillance and Compliance Panel ("MSCP"), to develop an information requirements system and criteria for evaluation to enable effective monitoring of the market. One of the documents to be developed is a catalogue of monitoring indices to be used by the MSCP and the MAU to evaluate data collected. The market rules provide for the proposed catalogue of monitoring indices to be published by the EMC for public comment prior to its adoption.

The purpose of this paper is to seek comments on a proposed catalogue of monitoring indices which has been developed by the MAU under the supervision and direction of the MSCP. The proposed catalogue of monitoring indices is attached at the end of this paper.

Market participants, the market support services licensee, the PSO, the EMC and other interested parties are invited to provide comments regarding the proposed catalogue of monitoring indices to the MSCP by **25 February 2004** at the following address:

Market Surveillance and Compliance Panel
c/o Market Assessment Unit
9 Raffles Place #22-01
Republic Plaza
Singapore 048619
Fax: 6533 0340
Email: mau@emcsg.com

11 February 2004

INTRODUCTION

The purpose of this paper is to seek comments from market participants, the market support services licensee, the PSO, the EMC and other interested parties on a proposed catalogue of monitoring indices developed by the Market Assessment Unit ("MAU") under the supervision and direction of the Market Surveillance and Compliance Panel ("MSCP").

MONITORING OBJECTIVES

The Singapore Electricity Market Rules provide for the MSCP to carry out market monitoring with the assistance of the MAU.

The monitoring objectives of the MSCP and the MAU are laid down in the market rules. Section 4.1.1 of Chapter 3 provides that the purpose of monitoring and/or investigating the activities in the wholesale electricity markets and the conduct of market participants, the market support services licensee, the PSO and the EMC is to:

(a) identify breaches of the market rules, any market manual or system operation manual;

(b) assess whether the underlying structure of the wholesale electricity markets is consistent with the efficient and fair operation of a competitive market; and

(c) recommend remedial actions to mitigate the conduct and inefficiencies referred to above.

In particular, section 4.3.1 provides for the MSCP, with the assistance of the MAU, to monitor and investigate the conduct of market participants, the market support services licensee, the EMC and the PSO and the structure and performance of, and activities in, the wholesale electricity markets, including conduct or activities that provide indications of:

(a) breaches of the market rules, a market manual or system operation manual;

(b) actual or potential design or other flaws and inefficiencies in the market rules, market manuals, the system operation manual and other rules and procedures of the EMC or the PSO; and

(c) actual or potential design or other flaws in the overall structure of the wholesale electricity markets.

‘

MONITORING TOOLS

To enable effective market monitoring, section 4.3.2 of Chapter 3 provides for the MAU, under the supervision and direction of the MSCP, to develop an information requirements system and criteria for evaluation.

Catalogue of Data

On 29 August 2003, a catalogue of data was adopted by the MSCP after public consultation and taking into account the comments of market players. Data is currently being collected according to this catalogue, with the assistance of the market players.

Catalogue of Monitoring Indices

Section 4.3.2.2 requires the development of a catalogue of the monitoring indices that the MAU will use to evaluate the data it collects. The catalogue of monitoring indices is required to be published by the EMC for public comment prior to its adoption. This paper has been prepared for the purpose of introducing the proposed catalogue of monitoring indices that the MSCP and MAU have developed and to seek public comments on it. The catalogue of monitoring indices that the MSCP adopts after public consultation is also required to be published by the EMC.

The market rules contemplate an ongoing process of re-evaluation and modification of the catalogue of data and catalogue of monitoring indices. This will be undertaken by the MAU, under the supervision and direction of the MSCP, as may be appropriate. The process of consultation and publication will similarly apply to any modifications made to the catalogues adopted by the MSCP.

INTERNATIONAL MONITORING PRACTICES

It is useful to refer to the monitoring practices of other electricity markets when developing the catalogue of monitoring indices for the Singapore market. We have therefore looked at the monitoring programmes of the following electricity markets to understand their scope of coverage:

(i) Ontario Wholesale Electricity Market;
(ii) National Electricity Market of Australia;
(iii) Electricity market operated by the Alberta Power Pool;
(iv) Electricity market operated by the New York Independent System Operator, Inc;
(v) Electricity market operated by the ISO New England Inc; and
(vi) Electricity market operated by the PJM Interconnection, LLC.

Having regard to the monitoring objectives of the MSCP and MAU in the Singapore Electricity Market Rules, we have identified areas in the above monitoring programmes which are relevant. These sources of reference have enabled us to make improvements to the proposed catalogue of monitoring indices.

SCOPE OF PROPOSED CATALOGUE OF MONITORING INDICES

For a start, the MSCP and the MAU are proposing that monitoring indices be developed in the following areas:

1. Supply
2. Demand
3. Price

The indices are intended to be calculated for various periods and comparisons made across time periods and across indices.

Details of indices proposed in each of these areas are discussed below.

1. Supply Indices

1.1 Capacity ratio of a generation registered facility – Ratio of a generation registered facility's (a) scheduled generation output to (b) maximum generation capacity

This index measures the level to which a generation registered facility is scheduled to provide energy, reserve and regulation as compared to its maximum generation capacity. The scheduled generation output is the total amount of energy, reserve and regulation which the market clearing engine ("MCE") schedules a generation registered facility to provide. The maximum generation capacity is the maximum amount of generation output that a generation registered facility can provide at any time, as registered with the EMC.

The capacity ratio assesses the extent to which a generation registered facility is successful in being selected by the MCE.

In a competitive market, more efficient units like combined-cycle gas turbines are expected to have a higher capacity ratio than less efficient ones like steam turbines. This index tells whether supply is drawn from the more efficient sources.

1.2 Supply cushion: Ratio between (a) the difference between total offered volume and system demand) to (b) total offered volume

This index measures supply adequacy. It indicates the level of unused capacity that was offered but not scheduled and could be called up if required. The total offered volume refers to the total amount of a type of product (ie energy, reserve or regulation) offered by all generation registered facilities. System demand refers to the demand forecast by the PSO for each type of product.

This index is usually cross analysed with price indices. In a competitive market, price is expected to be driven by supply and demand. Thus the supply cushion is expected to be inversely related to price.

1.3 Outage frequency

Outages can be divided into planned outage (annual overhaul and short term planned outage), unplanned outage and forced outage. Planned outage is approved by the PSO to ensure that the outage does not affect system security. Unplanned outage and forced outage cannot be anticipated. The frequency of forced outage indicates the reliability of a generation registered facility.

Generation outage can have a significant impact on prices. During periods of high demand, forced outage may contribute to high energy or ancillary service prices.

1.4 Market share by (a) generation licensee and (b) generation registered facility

This index measures the level of market concentration. It may assist in assessing whether the market design facilitates the efficient and fair operation of a competitive market.

1.5 Comparison of metered generation quantity with scheduled dispatch quantity by generation facility/generation licensee

This index measures the deviation of actual generation output from dispatch schedule. It may be indicative of non-compliance with dispatch schedule or unusual operating conditions (e.g. a market shortfall situation or anomalous market behaviour).

1.6 Frequency of issuance by the PSO of dispatch instructions deviating from real-time dispatch schedule

By and large, dispatch should be carried out in accordance with the real-time dispatch schedule generated by the MCE. Intervention by the PSO through issuing of dispatch instructions to override the dispatch schedule generated by the MCE should be necessary only in limited situations mainly for reasons of system security.

Frequent occurrences of issuance by the PSO of dispatch instructions deviating from the real-time dispatch schedule may indicate that the market structure or market behaviour needs to be reviewed.

1.7 Frequency of offer variations or revisions to standing offers exceeding offer change limits

Currently, the market rules provide for no tolerance for offer variations or revisions to standing offers within 4 hours prior to the dispatch period to which the offer variations or revisions relate.

The offer behaviour of market participants may have significant impact on system security and market outcomes such as dispatch schedules, prices, etc. Offer variations or revisions to standing offers made after gate closure affect whether the wholesale electricity markets are a level playing field, one of the characteristics of a competitive market. This index is also useful for signalling potential rule breaches.

2. Demand Indices

2.1 Comparison of latest available look-ahead load forecast with real-time load forecast

The accuracy of the load forecast used in generating the look-ahead schedule is important in producing an accurate look-ahead schedule which enables market participants to respond appropriately in the real-time. Comparison of the look-ahead and real-time load forecasts indicates the degree of accuracy of the look-ahead load forecast.

A competitive market should provide information necessary to facilitate decision making. Information provided in a look-ahead schedule and advisory notices can evoke responses from market participants. Little deviation between the look-ahead load forecast and the real-time load forecast is expected, except when the deviation is due to market participants' response to market situations.

2.2 Comparison of real-time load forecast with metered energy quantity

The accuracy of the load forecast used in generating real-time dispatch and pricing schedules is important as it affects pricing outcomes and system security in the real-time. Comparison of the real-time load forecast and metered energy quantity indicates how closely the load forecast used by the MCE in generating the real-time dispatch schedule matches the actual metered energy quantity.

Little deviation should be expected between the real-time load forecast and the metered energy quantity.

3. Price Indices

3.1 Trend of USEP, reserve prices, regulation price and comparison of trends

The wholesale electricity markets include the real-time markets for energy and ancillary services (ie reserve and regulation). Reserve means generation capacity that can be called upon to replace scheduled energy supply that is unavailable as a result of a forced outage or to augment scheduled energy as a result of unexpected demand. It is divided into three classes: primary reserve, secondary reserve and contingency reserve. Regulation enables the output for a generating unit to be frequently adjusted so that any power system frequency variations or imbalance between load and output from the generating facilities can be corrected. Market clearing prices are co-optimized between energy, reserve and regulation.

Comparison of the price trend for energy and ancillary services with cross reference to supply indices such as the supply cushion and market participants' offer behaviour is useful to identify anomalous market behaviour or potential design flaws.

3.2 Percentage of hours and quantity of load when WEP falls into a particular price range

This index is designed for long term observation. It provides detailed insight of price trends through changes of price distribution.

3.3 Correlation between WEP and system demand

In a competitive market, price should be driven by supply and demand and therefore, a close correlation is expected for this index.

A low or negative correlation coefficient needs to be analyzed together with supply indices such as the supply cushion, market participants' offer behaviour and outages so as to identify anomalous market behaviour or potential design flaws.

3.4 Correlation between WEP and fuel price

This index measures price responsiveness to fuel cost, which makes up the major part of the variable cost of energy. Price is expected to be positively related to fuel cost.

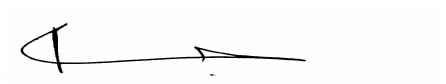
3.5 Comparison of latest available projected prices with real-time prices

A competitive market should provide information necessary to facilitate decision making. Information provided in latest available projected prices can evoke responses from market participants. Little deviation between the latest available projected prices and the real-time prices is expected, except when the deviation is due to market participants' response to market situation.

PUBLIC CONSULTATION

A draft catalogue containing the monitoring indices detailed above is attached. Market participants, the market support services licensee, the PSO, the EMC and other interested parties are invited to provide comments on the proposed catalogue of monitoring indices to the MSCP at the following address by **25 February 2004**:

Market Surveillance and Compliance Panel
c/o Market Assessment Unit
9 Raffles Place #22-01
Republic Plaza
Singapore 048619
Fax: 6533 0340
Email: mau@emcsg.com



Joseph Grimberg
Chair, Market Surveillance and Compliance Panel

11 February 2004

Catalogue of Monitoring Indices
National Electricity Market of Singapore

Type of Indices	Description of Indices
Supply Indices	Capacity ratio of a generation registered facility – Ratio of a generation registered facility's (a) scheduled generation output to (b) maximum generation capacity
	Supply cushion - Ratio of (a) the difference between total offered volume and system demand to (b) total offered volume
	Outage frequency
	Market share by (a) generation licensee and (b) generation registered facility
	Comparison of metered generation quantity with scheduled dispatch quantity by generation registered facility/generation licensee
	Frequency of issuance by PSO of dispatch instructions deviating from real-time dispatch schedule
	Frequency of offer variations or revisions to standing offers exceeding offer change limits
Demand Indices	Comparison of latest available look ahead load forecast with real-time load forecast and Comparison of real-time load forecast with metered generation quantity
Price Indices	Trend of USEP, reserve prices, regulation price and comparison of trends
	Percentage of hours and quantity of load when WEP falls into a particular price range
	Correlation between WEP and system demand
	Correlation between WEP and fuel price
	Comparison of latest available projected prices with real-time prices