# I-SEM Market Trial

## I-SEM Balancing Market Operations during Market Trial

# Version 1.0



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# 1    Introduction

This Technical Briefing provides I-SEM Market Trial participants with information which will support understanding of the processes required to execute the Balancing Market. In particular, this document sets out some important considerations in relation to the conduct of the Market Trial in relation to the use of "real-time" data and the implications of its use on Market Trial outcomes.

# 2    Core Balancing Market "Real-Time" Functions

The core Balancing Market functions of the I-SEM Market Trial that are impacted by "real time" data are:

- **Scheduling & Dispatch** (determination of System Operator actions to control the power system securely to match electricity supply and demand);
- **Instruction Profiling / QBOA** (profiling of Dispatch Instructions to determine the quantities of energy procured as a result of System Operator actions, along with the associated prices); and
- **Imbalance Pricing** (calculation of Imbalance Prices, the price of imbalances to be used in Balancing Market settlement.

# 3    Scheduling & Dispatch

Scheduling and dispatch are the System Operator control room activities which are required to control the electricity transmission system to balance supply/demand and maintain system security. This includes forward-looking planning of how generators may be utilised to meet forecast demand (scheduling) and taking actions in real-time based on real-time conditions (dispatch).
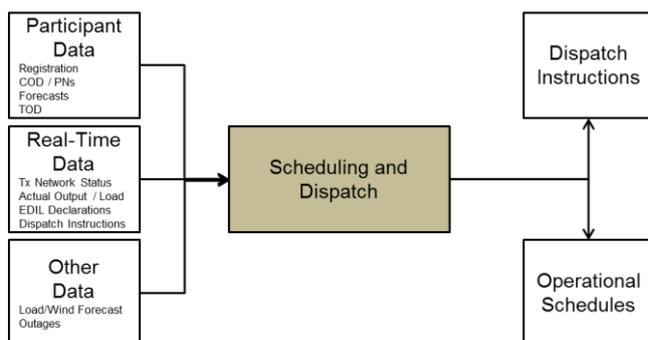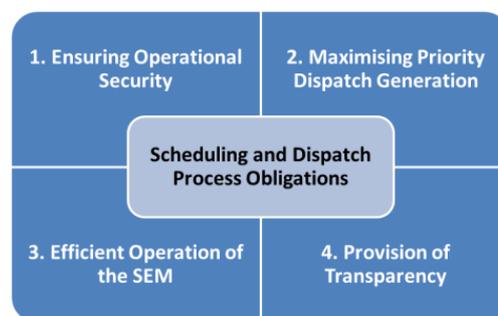


The System Operators utilise numerous different inputs to determine correct scheduling and dispatch decisions, including:
- *Participant Data (particularly COD and TOD);*
- *real-time data (particularly SCADA/EMS[1] data); and*
- *other data (including load/wind forecasts).*

System Operator actions are communicated via Dispatch Instructions, from which Imbalance Prices and settlement outcomes are later determined.

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[1] SCADA (Supervisory Control and Data Acquisition) and EMS (Energy Management System) are the systems used by the System Operators to collect and present the real-time condition of the power system.  This information includes the real-time status (on/off) and production/consumption level of each unit on the system.

## 3.1 Scheduling

Scheduling is the process of planning the Dispatch Instructions which may be issued, based on the information available at the time at which the relevant Indicative Operations Schedule is produced. Indicative Operations Schedules are critical decision-making tools in relation to System Operator actions. Given the time it takes for units to respond (i.e. start-up, shut-down and change output) can range from seconds to many hours, the System Operator Indicative Operations Schedules consider a range of timescales:

- **Long Term Scheduling (LTS)**
  - *looking at a horizon of 24+ hours, primarily using forecast data and seeking to identify long term commitment and de-commitment decisions required*
- **Medium Term Scheduling (RTIC)**
  - *looking at a horizon of the next few hours, which utilises a combination of forecast and real-time data*
- **Real-Time Scheduling (RTID)**
  - *looking at a horizon of one hour, utilising a consistent and accurate set of real-time data as its "initial conditions" (principally provided by the System Operators' energy management system (EMS), including:*
    - *real-time output and status of units*
    - *real-time demand on the power system*
    - *transmission system network topology and status*
    - *system frequency*

Real-Time (RTID) Operations Schedules are critically important to Imbalance Pricing, as the non-energy flags are determined as part of the output of each scheduling run

The production of Indicative Operations Schedules (referenced as LTS, RTIC and RTID in the market rules) is a point-in-time estimate of the actions that the System Operators may take, but does not always result in corresponding actions (Dispatch Instructions) as real-time conditions can change (e.g. when a unit trip occurs). All Indicative Operations Schedules take into account all of the System Operator actions that have already been taken (e.g. Dispatch Instructions that have already been issued, as once a Dispatch Instruction is issued the resulting energy has been procured and is expected to be delivered).

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*Important Market Trial Considerations:*

*For the I-SEM Market Trial, it is very important for Participants to understand that the outcomes of the Market Trial are based on real-time data from the power system which is being scheduled and dispatched per the current SEM rules. This means that the outcomes from the RTID Operational Schedule Runs have initial conditions that are derived from the state of the "real" power system, as there is no EMS-simulator to match the dispatch outcomes that would result in I-SEM (which would be infeasible to achieve). Also, given the relationship between the RTID Operations Schedule and the medium and longer term RTIC and LTS Operations Schedules, all schedules will be linked to the state of the "real" power system.*

*As a result, the utilisation of real-time data fully facilitates the trialling of MT processes but does not mean that the MT outcomes are necessarily as they would be post I-SEM Go-Live.*

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However, it is important to stress that other inputs (e.g. Commercial Offer Data) utilised in the Market Trial may not be reflective of what will happen post Go-Live (as Participants will want to develop their trading strategies throughout the Market Trial). As a result, no Market Trial is ever a simulation of outcomes post market Go-Live.

## 3.2  Dispatch

Based on the Indicative Operations Schedules, actions may be taken by the System Operators by issuing Dispatch Instructions to units.  These instructions include synchronisation, de-synchronisation and changes to MW production/consumption levels. In addition, there are also instructions to provide System Services, change operating modes, change fuels, maximise output and implement emergency actions.

For I-SEM, System Operator actions (i.e. issuance of Dispatch Instructions) have an important interaction with the production of subsequent LTS, RTIC or RTID Operations Schedules. Once issued, Dispatch Instructions are observed in subsequent Operations Schedules, ensuring that future Operations Schedules take account of actions already taken.
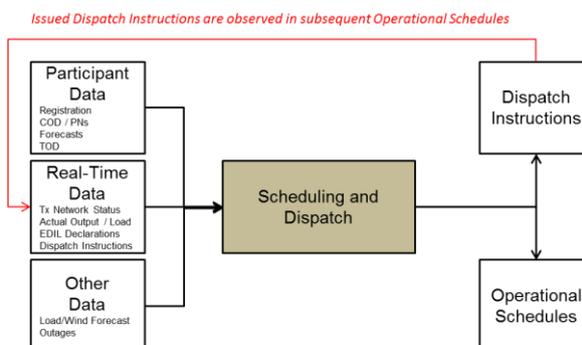


*Important Market Trial Considerations:*

*For the I-SEM Market Trial, it is very important for Participants to understand that:*

- *"MT Dispatch Instructions" (instructions produced for the purposes of the Market Trial) will have no impact on the real-world as they will not be issued to Participants. Units will continue to respond to (real) "EDIL Dispatch Instructions".*

- *Dispatch Instructions issued for the purposes of the Market Trial will (where possible) be derived from Operations Schedules produced by the System Operators according to the I-SEM market design (e.g. proposed schedules will result from an assessment of the costs of diverging from PNs submitted by Participants). However, the System Operators may issue "MT Dispatch Instructions" to avoid divergence from the real time commitment status which would otherwise cause its scheduling tools to be unable to produce a meaningful solution.*

- *"MT Dispatch Instructions" will be utilised in downstream processes (e.g. QBOA and to calculate the Imbalance Price).*

- *As real-time data (i.e. the actual power system) will reflect "EDIL Dispatch Instructions" and "MT Dispatch Instructions" will be used for QBOA/Imbalance Pricing processes, Market Trial outcomes will unavoidably contain mismatches between the real world and outcomes seen in Market Trial.*

*The essential utilisation of real-time data causes this issue, however the approach enables some understanding of the Dispatch Instructions that may occur and allowing the Market Trial scheduling and dispatch processes to be trialled.*

## 3.3  Balancing Market Principles Statement

The Balancing Market Principles Statement describes how the System Operators' scheduling and dispatch process works in I-SEM. In particular, it explains why the Indicative Operations Schedules produced may diverge from Physical Notifications submitted by Participants. The Balancing Market Principles statement is found here.