Information Note on Real Time Dispatch (RTD) Schedules and Dispatch

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Background to Scheduling

Scheduling is the process of planning dispatch instructions based on fixed and variable inputs e.g. demand forecast, commercial offer data, unit technical capabilities, real time conditions, system constraints.

Indicative Operations Schedules

Three separate optimisation sequences cover different timeframes and are continuously updated throughout the day to produce Indicative Operations Schedules (IOS).

The Long-Term Schedule (LTS) sequence is initiated a minimum of six times daily to produce a unit commitment schedule over a varying time horizon. The horizon typically starts two hours ahead of the run and can run out a further 30 hours, depending on the timing of the schedule run. The longest horizon LTS is the first run after the results of the day-ahead market for the next day are available. The shortest horizon LTS is the last run before the results for the next day are available. LTS runs provide unit commitment (whether a unit's status of synchronised or de-synchronised should change) advice and indicative MW output levels for all units in the market.

The Real-Time Commitment (RTC) sequence automatically runs every 15 minutes and provides a unit commitment schedule of between 30 minutes and four hours ahead. RTC can provide both unit commitment and indicative MW output levels for units that have the capability to synchronise to the system quickly. This is a much smaller set of units than available to the LTS sequence.

The Real-Time Dispatch (RTD) sequence initiates every five minutes and has the shortest time horizon, from 10 minutes to one hour ahead. RTD does not determine new unit commitment advice although it does take the unit commitment advice of LTS and RTC. Its purpose is to economically optimise the MW output across all committed units.

More information on the IOS is available in the Balancing Market Principles Statement.

Dispatch

All of the IOS which produce schedules to inform dispatch instructions are produced using inputs ahead of real-time. System frequency is the ultimate, real-time indicator of system balance or imbalance. System frequency indicates the real-time balance between demand and generation of the system. The overriding objective, when issuing active power dispatch instructions, is to maintain the system frequency within operational limits. Rising frequency indicates an excess of generation requiring an overall decrease in MW output while the converse is true for falling frequency.

Dispatch instructions produced by RTD act as indicative instructions to the system operator but may diverge from the actual real-time instructions.

Variations between RTD Schedule and Dispatch

The variations between the dispatch advised by RTD and the actual dispatch instruction issued are largely due to timing and the limitations of forecasted inputs.

Causes of the variation between RTD and actual dispatch include, but not limited to, the following aspects of the IOS and real-time control centre observations:

- **Load forecast error**
  The best available forecast is used to predict demand. However, as it is a forecast some degree of inaccuracy will always remain, resulting in a discrepancy between RTD dispatch advice and dispatch required to manage system frequency in real-time.

- **Renewable energy forecast error**
  The system operators are obliged to ensure that certain types of generation are given priority in dispatch. This includes renewables sources. To facilitate this priority position other types of generation must be dispatched down before renewables when generation and demand need to be balanced. Differences between forecast and actual renewable output can result in dispatch which is different to the schedule advised by RTD. For example renewable output may be forecast to fall by 50 MW over a ten minute period. In this situation RTD would advise a net increase (generation or Demand Side Units) of 50 MW, perhaps spread across several units in the economic incremental merit order considered for increasing the output of units. If an actual increase in wind output of 50 MW was to occur the grid controller would be required to instead net decrease the other generation or Demand Side Units using the economic decremental merit order considered for decreasing the output of units. Therefore in this scenario the RTD schedule advice for this dispatch would not be instructive.

- **Time lag**
  For a given RTD run, which occurs every five minutes, inputs are gathered before the sequence, optimisation occurs in the second five minutes with a further five minutes allowed for the review and issue of dispatch instructions.

Approximate Times	Sequence Step	Description
Up to 15:05	Data Inputs Updating	All inputs, conditions and status updating.
15:05	Dispatch Schedule Initialisation	Retrieves all inputs, conditions and status including: Generator Technical Offer Data Renewables Forecast Load Forecast Commercial Offer Data Final Physical Notifications Interconnector Reference Programme

		LTS and RTC Synchronise Data LTS and RTC De-synchronise Data Real-Time Dispatch Instructions Actual Output Data Operational Reserve Requirements Transmission Constraint Group Limits Outage Schedule etc.
15:05 – 15:07	Security Constrained Economic Dispatch (SCED)	Resources are scheduled based on an iterative optimisation of inputs while obeying unit and system constraints.
15:07	Schedule Published and Saved	RTD advisory scheduled published to control centre interface for period from 15:15 to 16:15.
15:10	Next Dispatch Schedule Initialisation	

Table 1: Simplified RTD Sequence

This latency means that certain information, and in particular the output of generator units, could be 10 to 15 minutes out of date. Within that period the actual output may have changed e.g. in response to a previous dispatch instruction or due to a unit trip. From an output perspective a time lag may exist between the issuing of a dispatch instruction and its execution by an individual generator. As a result RTD advice may be less relevant than when the sequence started.

- **Deviation from Technical Offer Data**
  If a particular unit's ramp rate is faster or slower than submitted values (which are used in the IOS sequences including RTD) additional dispatch instructions may be required for other units.

- **Managing system constraints**
  A parallel objective to managing the frequency, when issuing dispatch instructions, is to manage system constraints. These are largely accounted for in advance either as an input to, or during, scheduling optimisation. However, the schedulers are based on models and assumptions that do not always reflect the complex nature of the power system. Therefore, we also use other tools in the Control Centres to guide us in our dispatch decisions. Issues presented by these tools may require remedial actions in real-time which will not be reflected in the RTD schedules.

- **Time Error Correction**
  Devices using system frequency to regulate time assume a constant 50 Hz. A time error deviation can build up over a period as the system frequency fluctuates in real time. This requires correction by the system operator by running the system slightly higher or lower than nominal frequency resulting in possible small changes to dispatch.