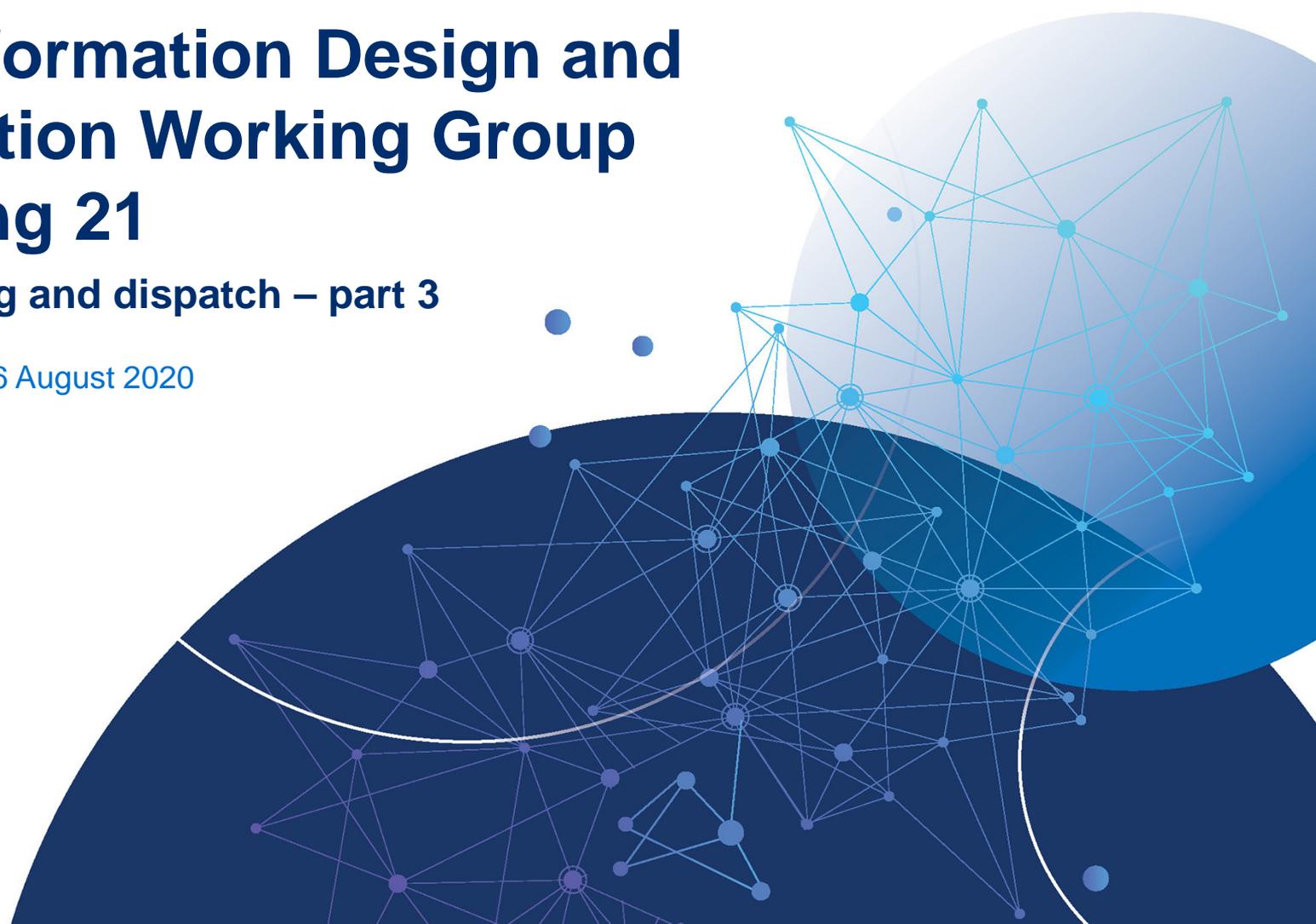**Energy Transformation
Implementation Unit**

Transformation Design and Operation Working Group Meeting 21

Scheduling and dispatch – part 3

Wednesday 26 August 2020

Ground rules and virtual meeting protocols

- Please place your microphone on mute, unless you are asking a question or making a comment.

- Please keep questions relevant to the agenda item being discussed.

- If there is not a break in discussion and you would like to say something, you can 'raise your hand' by typing 'question' or 'comment' in the meeting chat. Questions and comments can also be emailed to TDOWG@energy.wa.gov.au

- The meeting will be recorded. However no minutes will be issued.

- Please state your name and organisation when you ask a question to assist with meeting minutes.

- If there are multiple people dialling in through a single profile, please email TDOWG@energy.wa.gov.au with the names of the attendees to be recorded in the minutes

- If you are having connection/bandwidth issues, you may want to disable the incoming and/or outgoing video.

How to provide feedback

- By email, written submission or face-to-face

- Preference is to receive feedback on rule sections rather than the entire package

- Where feedback refers to specific clauses, please provide in table format

- Please provide alternative drafting suggestions where possible

- Consultation on Tranche-1 closes **cob 28 August**

Agenda

- Price determination
  - Principles (section 7.11A)
  - Market clearing prices (Section 7.11B)
  - Price corrections (7.11C)
  - Intervention pricing examples
- Settlement and monitoring data (section 7.13)

Price determination principles
Section 7.11A

- This section sets out the principles for price determination
- Market Clearing Price (for a Dispatch Interval) is determined through Central Dispatch, as at the Reference Node
- Reference Trading Price (for a Trading Interval) is the time-weighted average of the dispatch interval prices
- Facilities cannot set the price where they:
  - Have been directed to operate at a specific level
  - Are inflexible
  - Are 'trapped' in the ESS trapezium
- The same price will be used for both sales and purchases of energy
- In ESS shortfall, ESS prices are based on the last unit cleared.
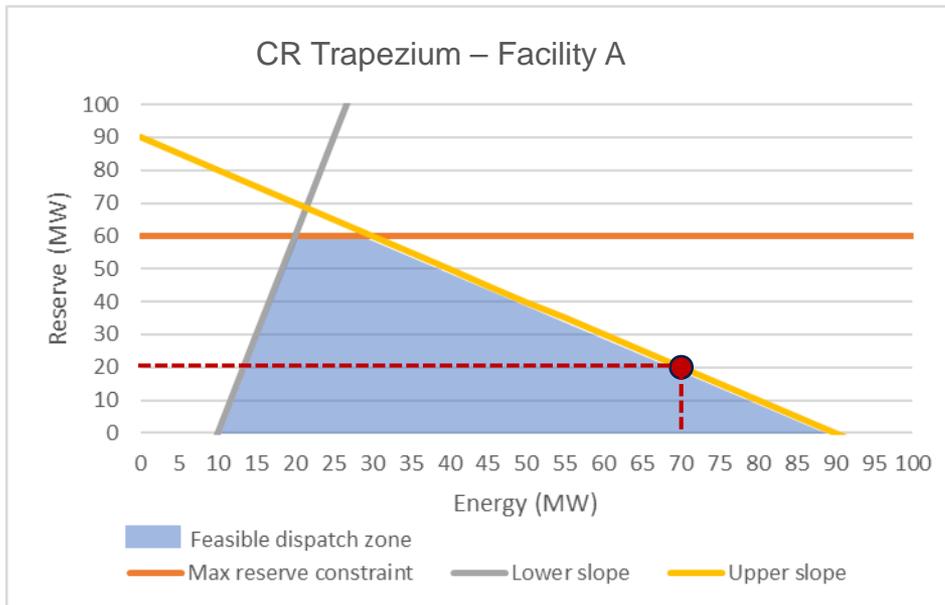
Market clearing prices
Section 7.11B

- The Market Clearing Price is the marginal value of that Market Service – the cost of meeting an incremental change in the requirement for that service at the Reference Node.

- Alternative pricing approach where:
  - Dispatch Algorithm fails to run – prices from forecast schedules will be used.
  - energy shortfall (not enough capacity to serve load) is forecast, and AEMO has instructed involuntary load shedding or dispatched a DSP at the price cap – price will be set to the Alt Max STEM Price
  - Dispatch Algorithm had bad input data – (next slide)
  - AEMO Intervention event (later slide)

- FCESS prices can't be less than zero.

- Prices in one market can drive prices in another market.

Marginal Price Interaction
Energy and Contingency Raise Interaction

	Facility A	Facility B
Energy Offer	$70/MWh	$100/MWh
Contingency Raise Offer	$10/MW/h	N/A
Current Energy Dispatch	70 MW	20 MW
Current CR Dispatch	20 MW	N/A

CR Trapezium – Facility A

Reserve (MW) vs Energy (MW)

Feasible dispatch zone — Max reserve constraint — Lower slope — Upper slope

- Energy demand: 90MW
- CR requirement: 20MW
- Assume extra CR can only come from Facility A
- Next MW of Energy comes from Facility B
  - Energy Price = $100/MWh
- Next MW of CR comes from Facility A
  - Requires backing off of one MW of energy on Facility A, and one extra MW of energy on Facility B
  - CR Price = +$100 - $70 +$10 = $40/MW/h
- Multiple markets may interact simultaneously

Price corrections - Affected Dispatch Intervals
## Clauses 7.11C.1 – 7.11C.5

- "Affected Dispatch Intervals" are where the Dispatch Algorithm has used manifestly incorrect input data.

- Detected via automated processes, to be laid out in a WEM Procedure

- If detected within 30 minutes of publication, prices are replaced with prices from previous unaffected interval

- All instances to be published with reasons and actions to avoid the situation happening again

- AEMO must review effectiveness of the automated processes at least annually and publish a report

Price corrections – Intervention pricing
Clauses 7.11C.6 – 7.11C.11

- Intervention pricing is intended to ensure market prices are not affected by AEMO intervention

- When an AEMO Intervention Event is in effect, the Dispatch Interval is an Intervention Dispatch Interval, and AEMO must set prices as if the intervention had not occurred

- No change to pricing required if:

  - intervention will not have affected the Market Clearing Price (e.g. directed facility is on the other side of a network constraint from the Reference Node)

  - Intervention does not relate to energy or FCESS or a direct substitute

- Process is carried out automatically in real-time, not as an ex-post adjustment.

- AEMO is allowed to deal with immediate system security issues before turning on the intervention pricing process

- Process to be set out in a market procedure
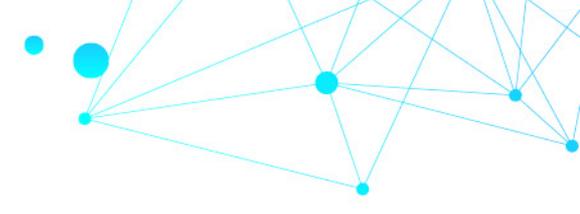
Intervention pricing example 1
AEMO intervenes due to localised conditions

- PASA projects that there is sufficient capacity to meet load

- No energy shortfall projected in Pre-Dispatch Schedule

- Local conditions in one part of the SWIS lead to AEMO directing a facility to deliver MW at a particular level (AEMO intervention event)

- AEMO enters manual constraint equations to ensure facility is dispatched to that level

- Participant updates submissions to ensure that facility is dispatched as directed, including flag that amendments are due to a direction

- Intervention pricing applies – prices are set as if AEMO had not directed the participant to generate at that level

- Intervention pricing run not required if directed facility is separated from the Reference Node by a network constraint

- If facility is not behind a constraint, the intervention pricing run:

  - removes amended Submissions

  - removes manual constraint equations

Intervention pricing example 2
AEMO requires a facility to synchronise to provide energy

- PASA projects that there is sufficient capacity to meet load

- Energy shortfall projected in Pre-Dispatch Schedule due to capacity being offered 'Available' rather than 'In-Service'

- AEMO publishes Low Reserve Condition notice, and time it would intervene to resolve the shortfall

- No response before resolution time – Pre-Dispatch still clearing capability offered as Available Capacity, but there is still a forecast shortfall in In-Service Capacity.

- AEMO directs a participant to synchronise a facility to provide energy (AEMO intervention event), and adds manual constraints to ensure dispatched as required

- Participant updates RTM submissions to show capacity as In-Service, and flag that amendment is due to direction

- Intervention pricing applies – prices are set as if AEMO had not directed synchronisation

- Intervention pricing run removes manual constraints/amended submissions. Energy price likely the marginal cost of the last unit cleared.

Intervention pricing example 3
AEMO requires a facility to synchronise to provide ESS

- PASA projects a Contingency Reserve Raise shortfall
- AEMO publishes Low Reserve Condition notice
- Insufficient changes made to RTM submissions to resolve shortfall
- CR Raise shortfall projected in Pre-Dispatch Schedule
- AEMO directs all participants to offer the full CR Raise capability of their facilities (not an intervention event, as not directing operation)
- Participants do so, Pre-Dispatch clears capability offered as Available Capacity, but there is still a forecast shortfall from In-Service Capacity.
- AEMO directs a participant to synchronise a facility to provide ESS to avoid the projected shortfall (AEMO Intervention Event), and adds manual constraints to ensure dispatched as required
- Participant updates RTM submissions to reflect direction, including flag that amendment is due to direction
- Intervention pricing applies – prices are set as if AEMO had not directed synchronisation
- Intervention pricing run removes manual constraints/amended submission. CR Raise price likely the marginal cost of the last unit cleared

Settlement and monitoring data – pre-real-time
Clauses 7.13.1 – 7.13.1x5

- Dispatch Schedule data to be published within 5 minutes of completion
- Week-Ahead Schedule and Pre-Dispatch Schedule data to be published within 30 minutes of completion.
- Public for all schedules:
  - Total quantity of offers for Available and In-Service
  - Intervention Constraints
- Public for all scenarios within schedules:
  - Load forecast, FCESS requirements, projected shortfalls
  - Dispatch Targets/Caps/Forecasts and ESS enablement by facility
  - Binding and near binding constraint equations
  - Forecast prices
  - Identity of facilities undergoing testing
- Confidential to the participant:
  - Whether each facility is 'trapped' or 'stranded' for ESS
  - Forecast Enablement Losses

Settlement and monitoring data – post-real-time
Clauses 7.13.1x6 – 7.13.5

- AEMO must publish actual data once known:
  - Facility operation data: SCADA MWh injections/withdrawals, (estimates where not monitored by SCADA), final UIGF, storage Charge Levels
  - Temperature data
  - Real-Time Market Submissions
- AEMO must record estimates of:
  - energy not served due to involuntary load shedding
  - energy not consumed by Interruptible Loads providing CR Raise
  - energy volumes requested from dispatched DSPs
  - (estimate of Semi-Scheduled output curtailed through dispatch will be added for use in Appendix 9)
- AEMO can delay up to two business days

Meeting close

- Questions or feedback can be emailed to TDOWG@energy.wa.gov.au

- Two upcoming meetings:
  - WRIG Thursday 27 Aug 9:30 -12:00
  - TDOWG Friday 28 Aug 9:30 -1200