Improvements in frequency control and dispatch

Improvements in control of frequency and removal of cross subsidies in dispatch through Mandatory Primary Frequency Response (MPFR) and the upcoming Frequency Performance Payments (FPP)

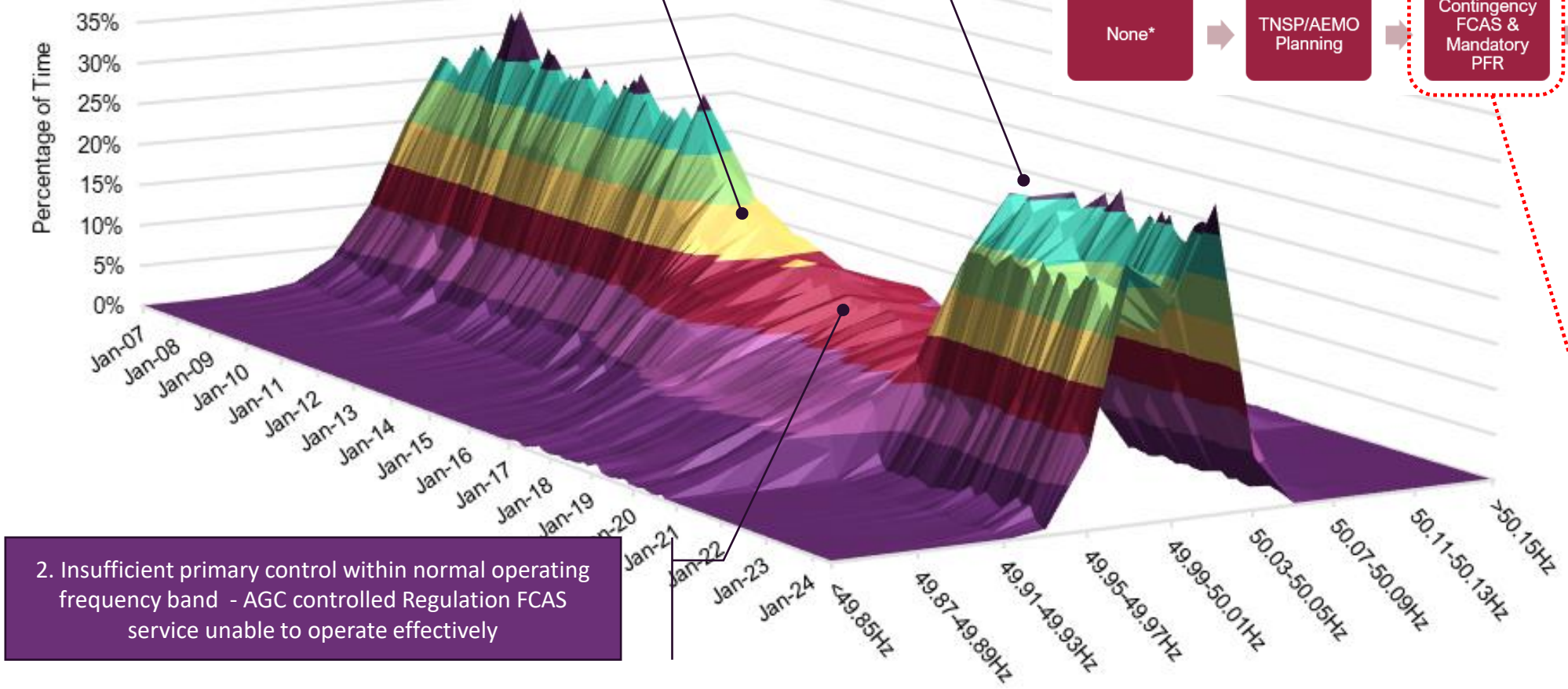
17 October 2024

Agenda

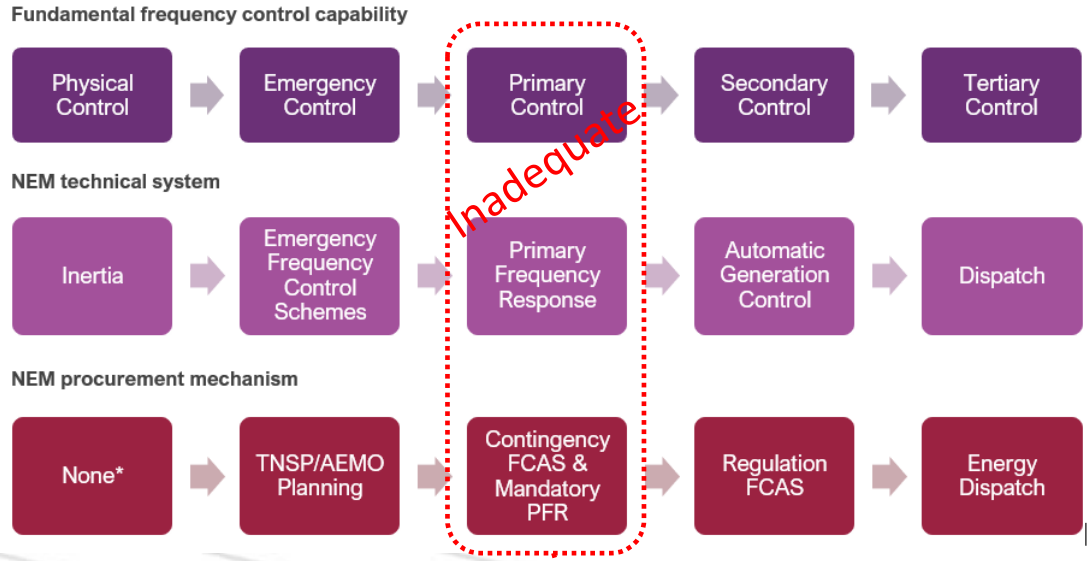
1. NEM frequency control, frequency performance, regulatory change
2. Potential for cross-subsidy of dispatch errors
3. Measuring dispatch errors
4. Identifying whether dispatch errors are good or bad
5. Charging for dispatch errors to improve performance

3. Control reinstated by requiring units to operate with tight deadband +/- 0.015Hz frequency band - Mandatory Primary Frequency Response (MPFR)

1. Closure of old stations, tightening of reserves, remaining units setting deadbands +/-0.15Hz for primary response so could still offer contingency FCAS services



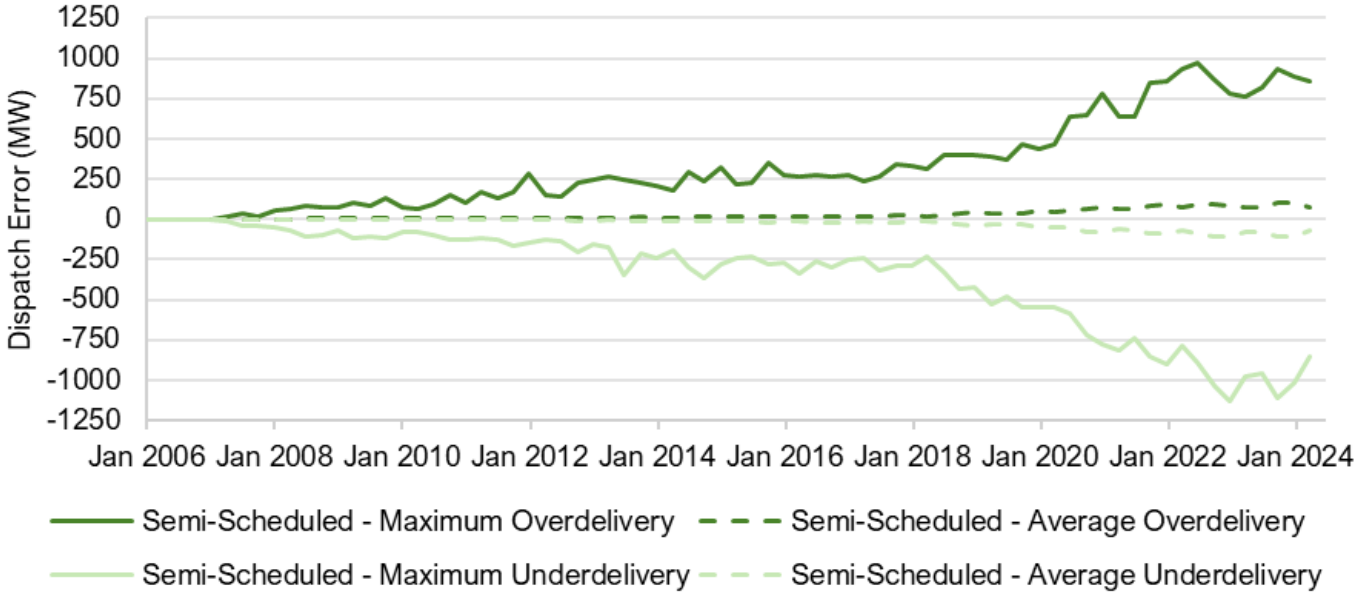
2. Insufficient primary control within normal operating frequency band - AGC controlled Regulation FCAS service unable to operate effectively

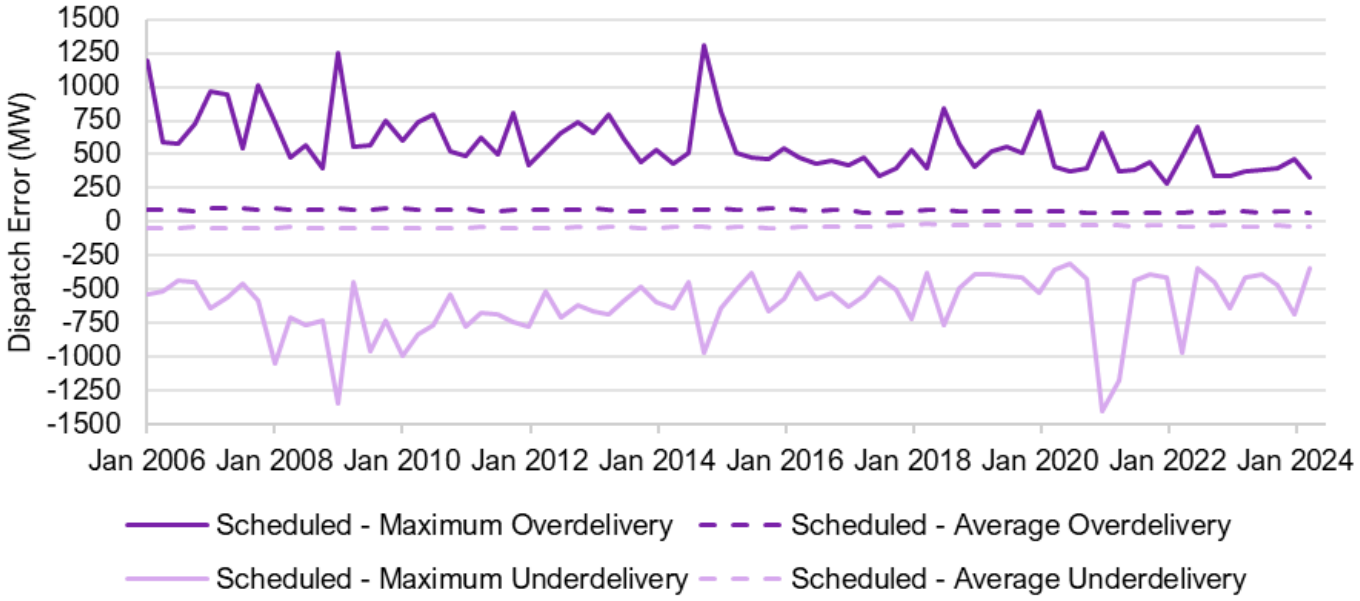


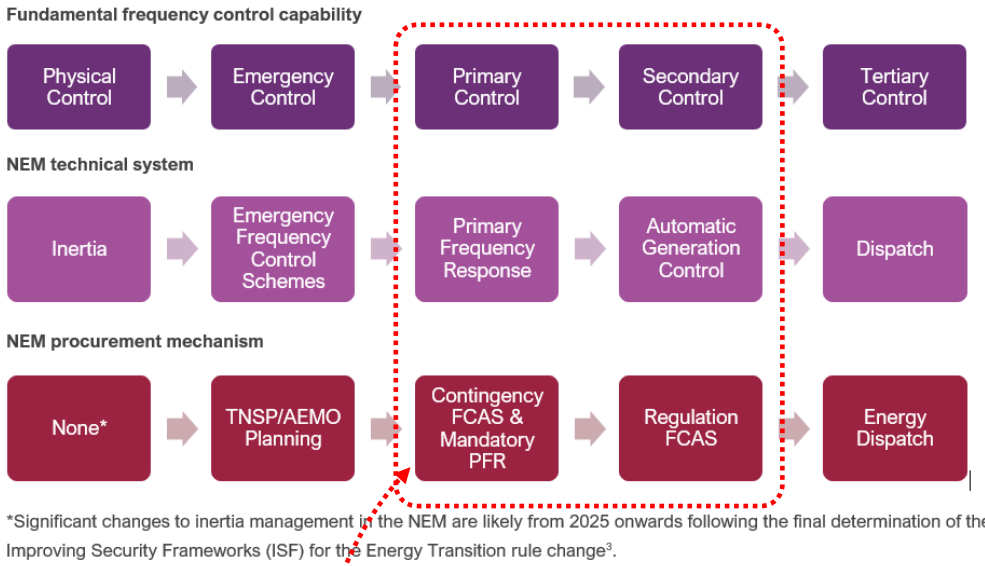
Note:

NEM operated for a period with insufficient primary control. Only limited services with +/- 0.15Hz deadband.

Control was restored by imposing a requirement for plant to operate at a specific droop and deadband.







*Significant changes to inertia management in the NEM are likely from 2025 onwards following the final determination of the Improving Security Frameworks (ISF) for the Energy Transition rule change[3].

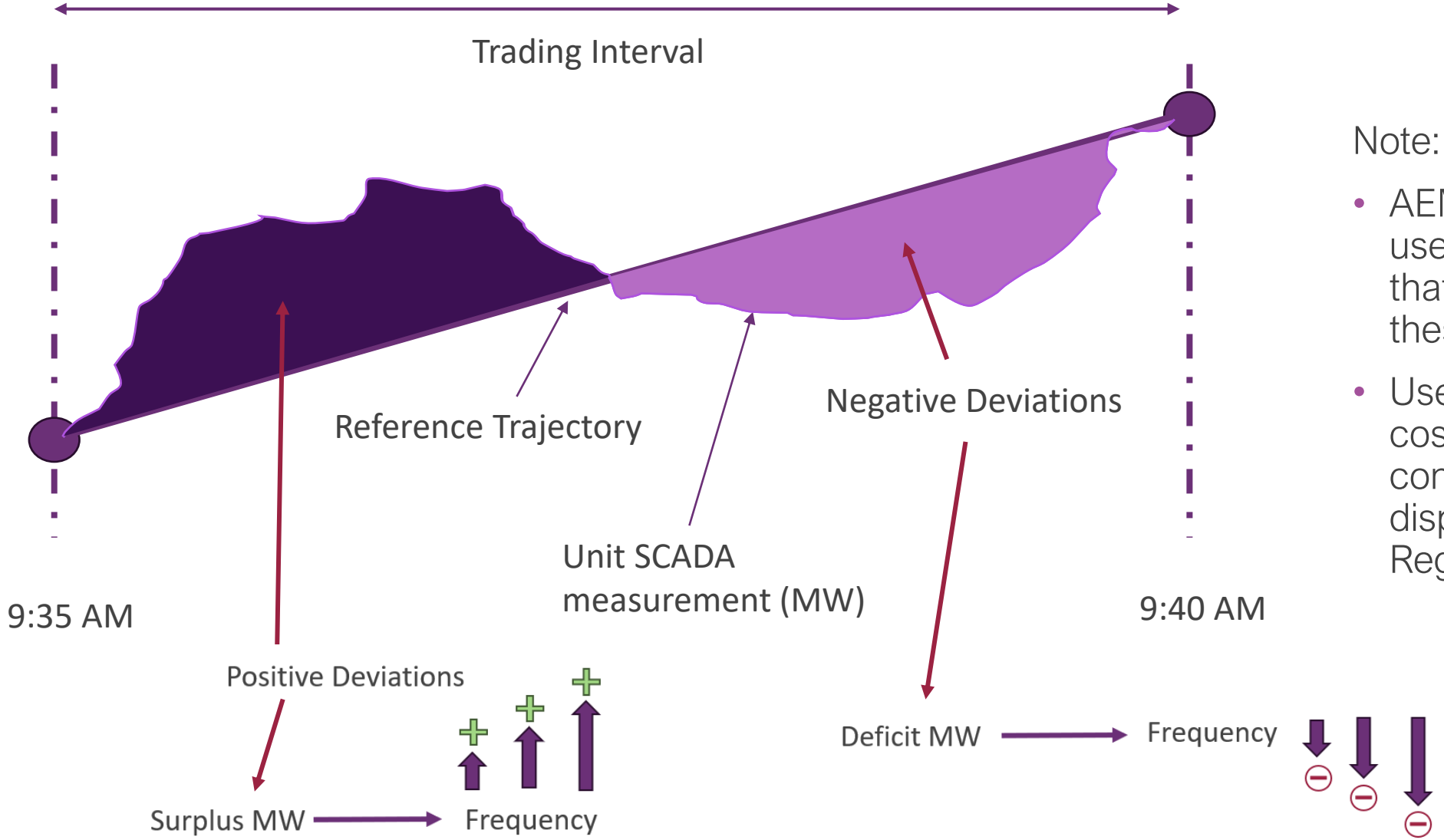
Needed to ensure dispatch errors are paid for to avoid a cross subsidy – existing systems do not do this

Note:

Although control was restored, dispatch errors remain.

They are corrected by primary and secondary response.

Measuring dispatch errors every 4-seconds



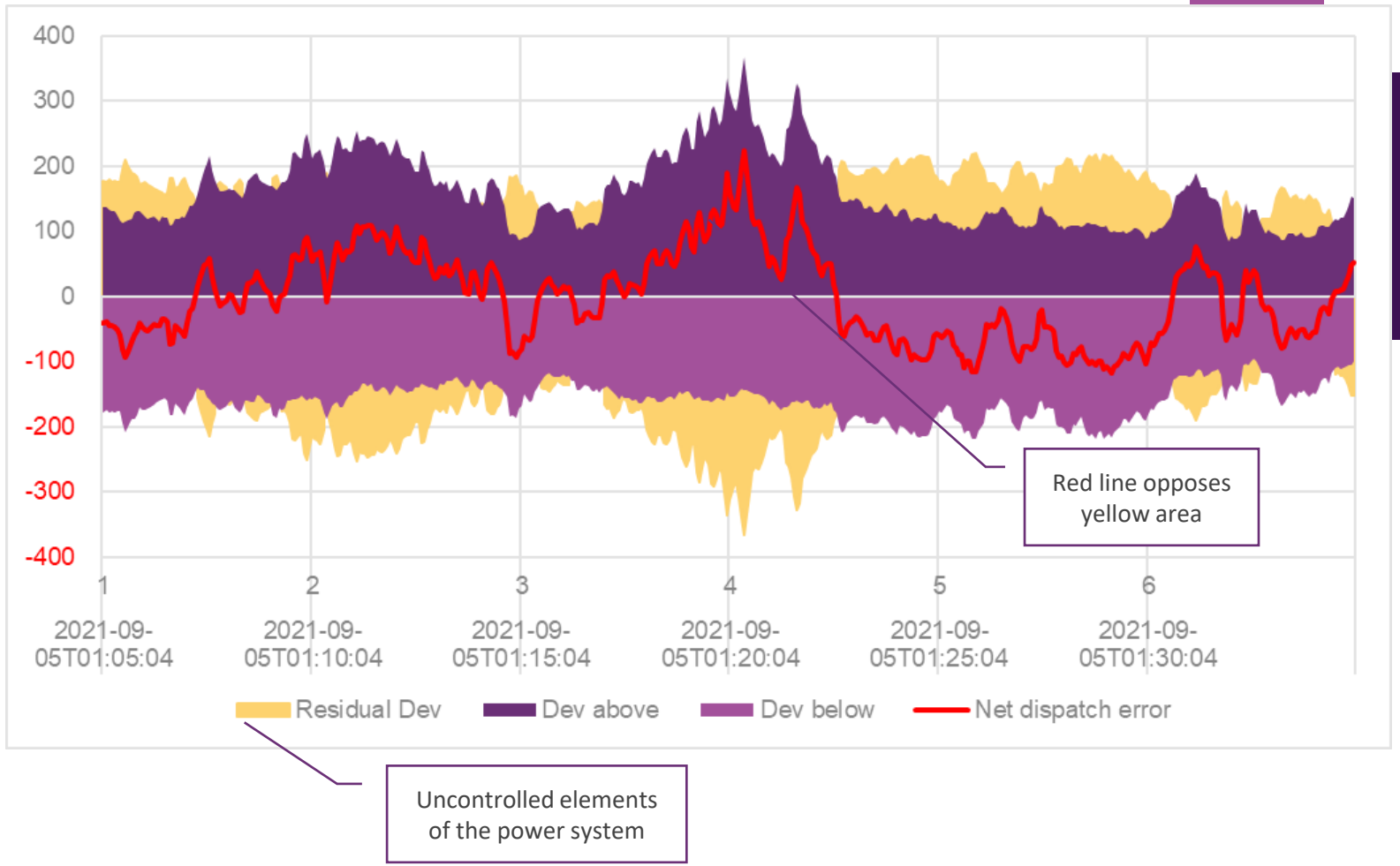
Note:

- AEMO already uses a system that measures these errors.
- Used to allocate cost of secondary control – the dispatched Regulation FCAS.

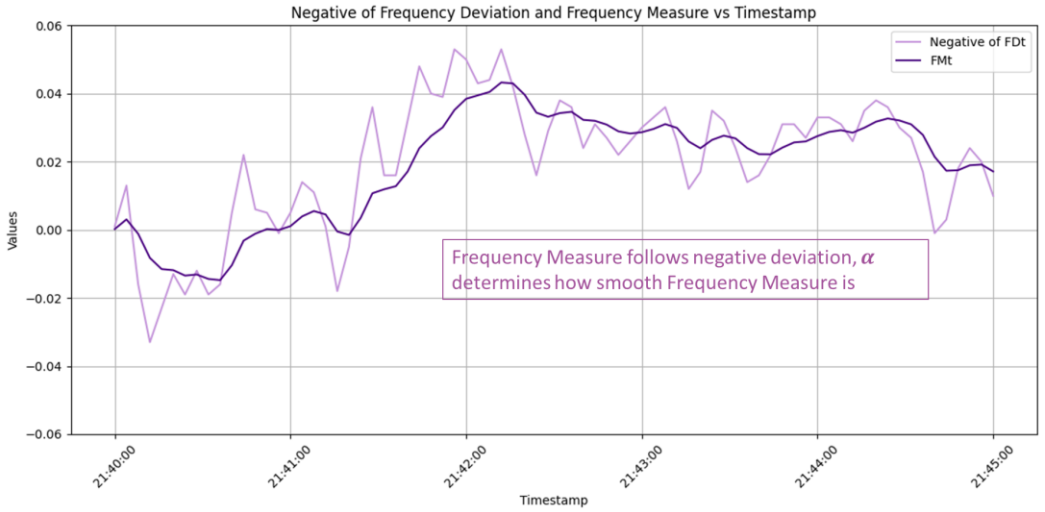
Measuring dispatch errors for whole system

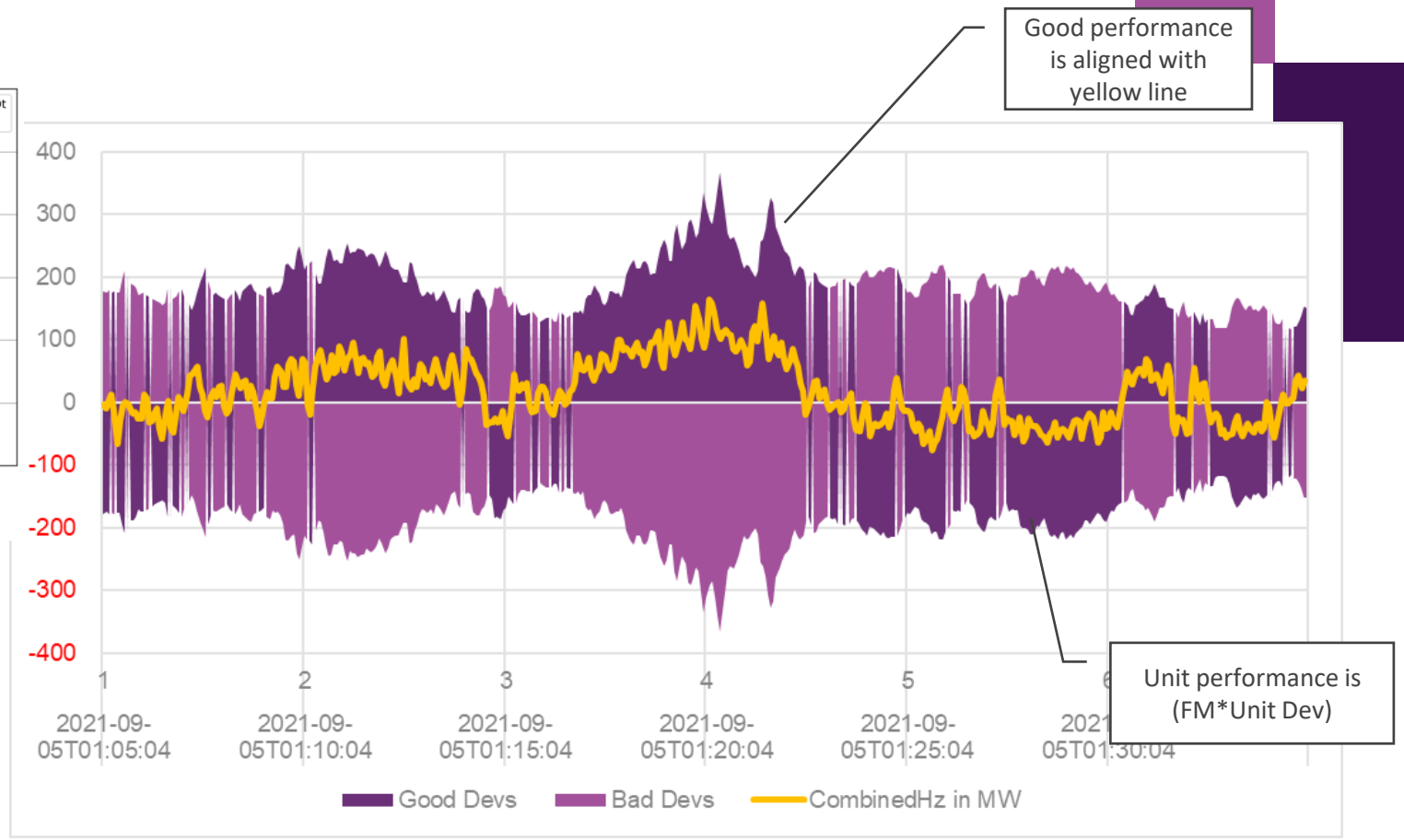
Basic rules:

- All deviations balance
- Therefore residual deviation:
  - Sum all deviations for metered elements, multiply by -1,
  - Provides deviation for unmetered elements



4-sec frequency measure to determine whether dispatch errors are good or bad





Note:

- An exponential weighted moving average with smoothing factor is used to represent the action of primary and secondary control.
- Dispatch errors are good if they align with the Frequency Measure.

Credit & debit for dispatch errors to remove cross-subsidy, improve performance

Calculate a cost of the dispatch error for each trading interval

- Max deviation
  - MW/12
  - 5-minute trading interval
- Regulation FCAS Price $/MW
  - From dispatch
- (MW/12)*($/MW) = $

Distribute cost by share of good/bad deviations

- Calculate 4-sec performance
  - Multiply FM * Deviation
  - Sum over trading interval
- Create share (or factor)
  - Divide unit by total
- Multiply Factor by $

Best performing units should be **batteries** that provide mandated primary control and secondary control whilst enabled for Regulation FCAS and controlled by AGC.
Bad performers like **uncontrolled plant** can avoid costs by improving performance.

Wrap up

- Over time the NEM lost tight deadband primary control because it was not mandated nor a requirement in existing frequency control ancillary services
- Tight deadband primary control reinstated by a change to Rules
- Dispatch errors did not go away – potential cross subsidy with existing cost allocation system for Regulation FCAS
- Dispatch errors can be measured, assessed as to whether they are good or bad by using a frequency measure
- AEMO is implementing a system to **credit & debit dispatch errors** – commences **8 June 2025**, with non-financial operation from 9 Dec 2024
- Important that AEMO monitor dispatch errors, enablement of Regulation FCAS secondary control, and improve the use of AGC

For more information visit

aemo.com.au