Day-Ahead Market Enhancement Settlement discussion

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Sequential approach to commit additional resources if physical supply clears IFM less than ISO net load forecast.
Reliability capacity up and down settlement very similar to RUC today

- No deviation settlement with real-time products

- No pay provision if unable to meet must offer allocation
  - Charged the higher of RC or FMM FRP

- Two tier cost allocation
  - Tier 1 to load, SC-forecastsed VER deviations and SC net virtual position
  - Tier 2 to metered load
Imbalance reserves settlement introduces some new concepts

- 5-minute ramp deviation settlement with flexible ramping product
  - Both for forecasted movement and uncertainty awards

- No pay provision if unable to meet remaining 15-minute must offer obligation in FMM
  - Charged the higher of IR or FMM FRP

- Two tier cost allocation
  - Tier 1 to deviations that require dispatch of other resource due to uncertainty materializing
  - Tier 2 to metered load
Bid cost recover changes to incorporate new products

- Imbalance reserve revenue and cost will be considered in IFM bid cost recovery over the day

- Reliability capacity revenue and cost will be considered in the RTM bid cost recovery over the day

- Flexible ramping product revenue and cost remains in the RTM bid cost recovery over the day
Settlement of ramp deviations between IFM, FMM and RTD (1 of 2)

• Ramp is composed of …
  1. *Forecasted movement* is the change in energy schedules between intervals in same market run
  2. *Uncertainty awards* are additional ramp capability held back to meet changes in net load between market runs

• Marginal value of ramp is the same for both types

• Objective, if the ramp capability is the same as IFM in FMM and RTD, then the ramp deviation settlement should be zero
Complications to address in design

- Forecasted movement compensation can occur through energy price (IFM*) or a side payment (FMM & RTD)
  - Side payment if moving up is paid FRU and charged FRD
- Forecasted movement is included in EIM base schedule changes to calculate forecasted movement deviations in FMM
- No imbalance reserve awards are included in EIM base schedules to meet uncertainty in FMM
- Uncertainty granularity difference between 15-min imbalance reserves and 5-min flexible ramping products
- Ramp for imbalance reserves comes from unloaded capability and energy schedule changes in opposite direction
- Ramp for FRP uncertainty awards comes from unloaded capability and energy schedule changes in opposite direction
Ramp deviation settlement between IFM and FMM

- \( \Delta FRU(t) = FRU(t) - \min\left( RR \times 5 - \min\left(0, \frac{(IFM(h) - IFM(h - 1))}{12}\right), \max(0, IRU(h) - \max(0, \frac{(IFM(h) - IFM(h - 1))}{12})) \right) \)
  - \( RR \) is IFM ramp rate
  - opposite IFM movement
  - concurrent IFM movement

- \( \Delta FRD(t) = FRD(t) - \min\left( RR \times 5 + \max(0, \frac{(IFM(h) - IFM(h - 1))}{12}), \max(0, IRD(h) + \min(0, \frac{(IFM(h) - IFM(h - 1))}{12})) \right) \)
  - opposite IFM movement
  - concurrent IFM movement

- \( \Delta FM(t) = \frac{(FMM(t) - FMM(t - 1))}{3} - \frac{(IFM(h) - IFM(h - 1))}{12} \)
  - FMM movement
  - IFM movement

* \( RR \) is IFM ramp rate
Imbalance reserve no-pay settlement rules

- \( IRUNP(t - 1) = \max \left( 0, IFM(h) + IRU(h) - \min \left( RR \times 5 - \min \left( 0, \frac{(IFM(h) - IFM(h - 1))}{12} \right), \max(0, IRU(h)) - \max(0, \frac{(IFM(h) - IFM(h - 1))}{12}) \right) \right) - UOL(t - 1) \)

- \( IRDNP(t - 1) = \max \left( 0, LOL(t - 1) - IFM(h) + IRD(h) - \min \left( RR \times 5 + \max(0, \frac{(IFM(h) - IFM(h - 1))}{12}), \max(0, IRD(h)) + \min(0, \frac{(IFM(h) - IFM(h - 1))}{12}) \right) \right) \)
Review spreadsheet example

Observations from proposed ramp deviation settlement rules

- No net deviation settlement if full ramp capability is available
  - Forecast movement deviation offset FRU/FRD deviations

- Ramp deviation settlement occurs when …
  - Ramp capability used for energy/capacity is different between IFM and FMM
  - Ramp rate changes between IFM and RTM
  - A resource’s schedule reaches its upper/lower economic limit or limited by outages
  - Congestion differences between IFM and RTM requiring re-dispatch