# Flexible ramping product discussion

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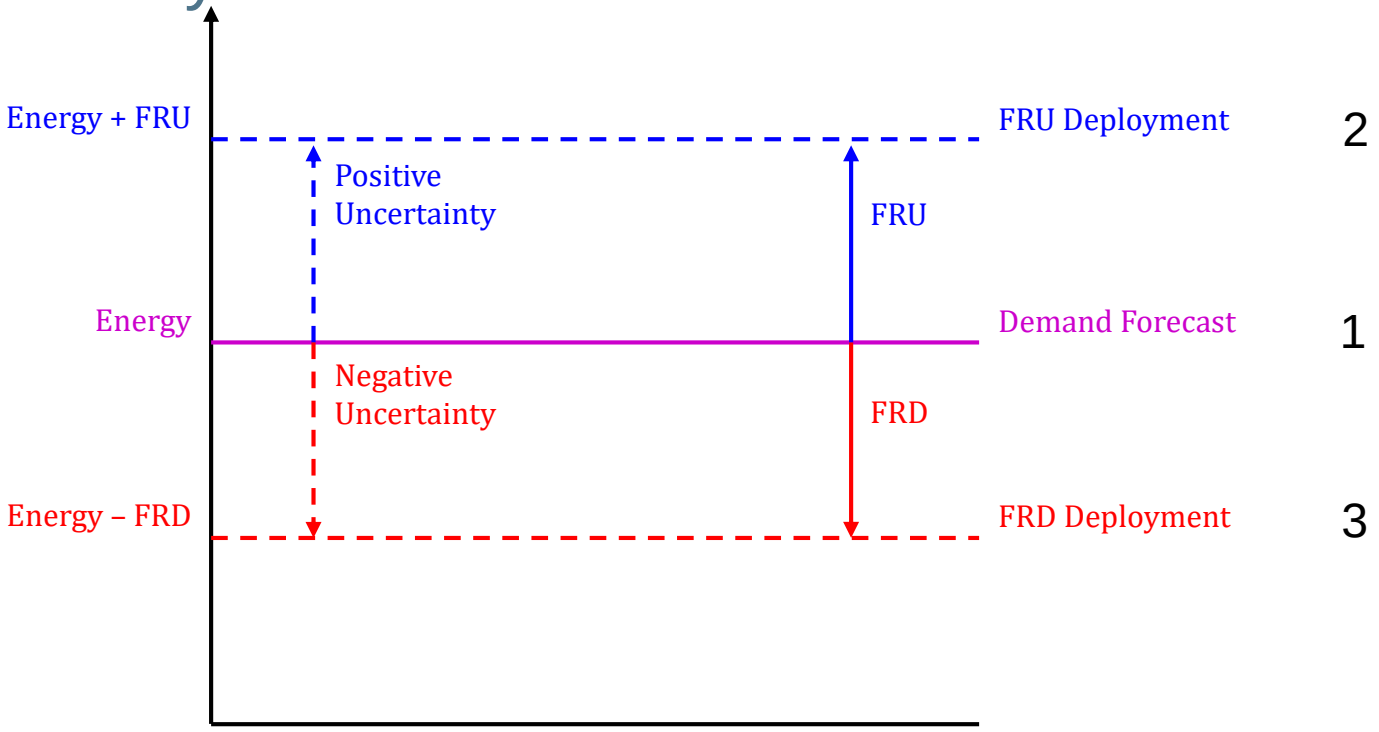
Market Surveillance Committee Meeting
General Session
May 29, 2020

# Improve deliverability by not awarding FRP to resources that have a zero opportunity cost because of congestion

- Flexible ramping up awarded to resource behind constraint
  - Next market run unable to dispatch higher than current output
- Flexible ramping down awarded to resource providing counterflow
  - Next market run unable to dispatch lower than current output

# Introduce deployment scenarios to ensure deliverability




1. EN is deliverable to load forecast
2. EN + FRU is deliverable to meet load and VER upward uncertainty
3. EN – FRD is deliverable to meet load and VER downward uncertainty

# Distributing the demand curve surplus as decision variable at load aggregation points

- Moving to load aggregation points allows for more granular relaxation of the requirement

- Allows a share of the system requirement to be relaxed in a LAP while not limiting procurement of the full share of the system requirement in another LAP

# Deployment scenarios transmission constraints

$$\left.\begin{aligned} \widetilde{LFL}_{m,t}^{(u)} \leq \tilde{F}_{m,t}^{(u)} + \sum_{i} \left(\Delta EN_{i,t} + \Delta FRU_{i,t}\right) SF_{i,m,t} + \sum_{j \in EIM} \sum_{r} \Delta FRUS_{r,j,t}\, SF_{r,j,m,t} \leq \widetilde{UFL}_{m,t}^{(u)} \\ \widetilde{LFL}_{m,t}^{(d)} \leq \tilde{F}_{m,t}^{(d)} + \sum_{i} \left(\Delta EN_{i,t} - \Delta FRD_{i,t}\right) SF_{i,m,t} - \sum_{j \in EIM} \sum_{r} \Delta FRDS_{r,j,t}\, SF_{r,j,m,t} \leq \widetilde{UFL}_{m,t}^{(d)} \end{aligned}\right\},$$

$$\forall m \wedge t = 1,2,\ldots,N$$

# Propose virtual supply and demand not be settled for congestion from the deployment scenarios in real-time

- Since deployment scenarios are not included in the day-ahead market,
  - Systematic difference in MCC between day-ahead and real-time
  - For example, FRU deployment scenario (P97.5) could have congestion while base deployment (P50) would not.
  - Virtual supply would be profitable even though unable to converge with P97.5 scenario, only P50.
  - Will continue to evaluate in the development of the DAME if this settlement treatment remains

# FRP demand curve was intended to gradually raise energy prices as requirement relaxed

- Currently, the FRU requirement is not always relaxed prior to the power balance constraint due to congestion

- Nodal procurement will ensure the FRP requirement is fully relaxed prior to the power balance constraint being relaxed
  - Market will no longer make FRP awards to transmission infeasible capacity and relax power balance constraint