

Flexible Ramping Product Discussion

RTD, IFM, FMM Requirement

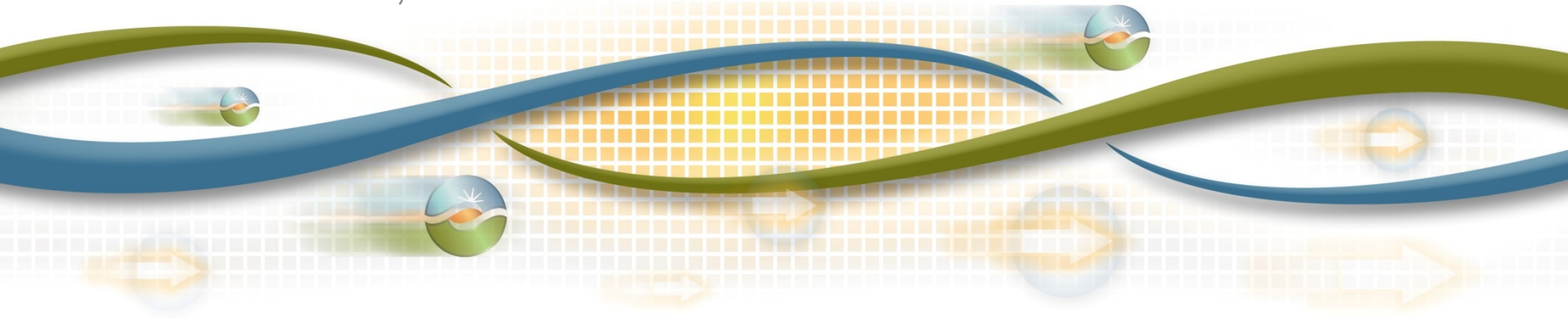
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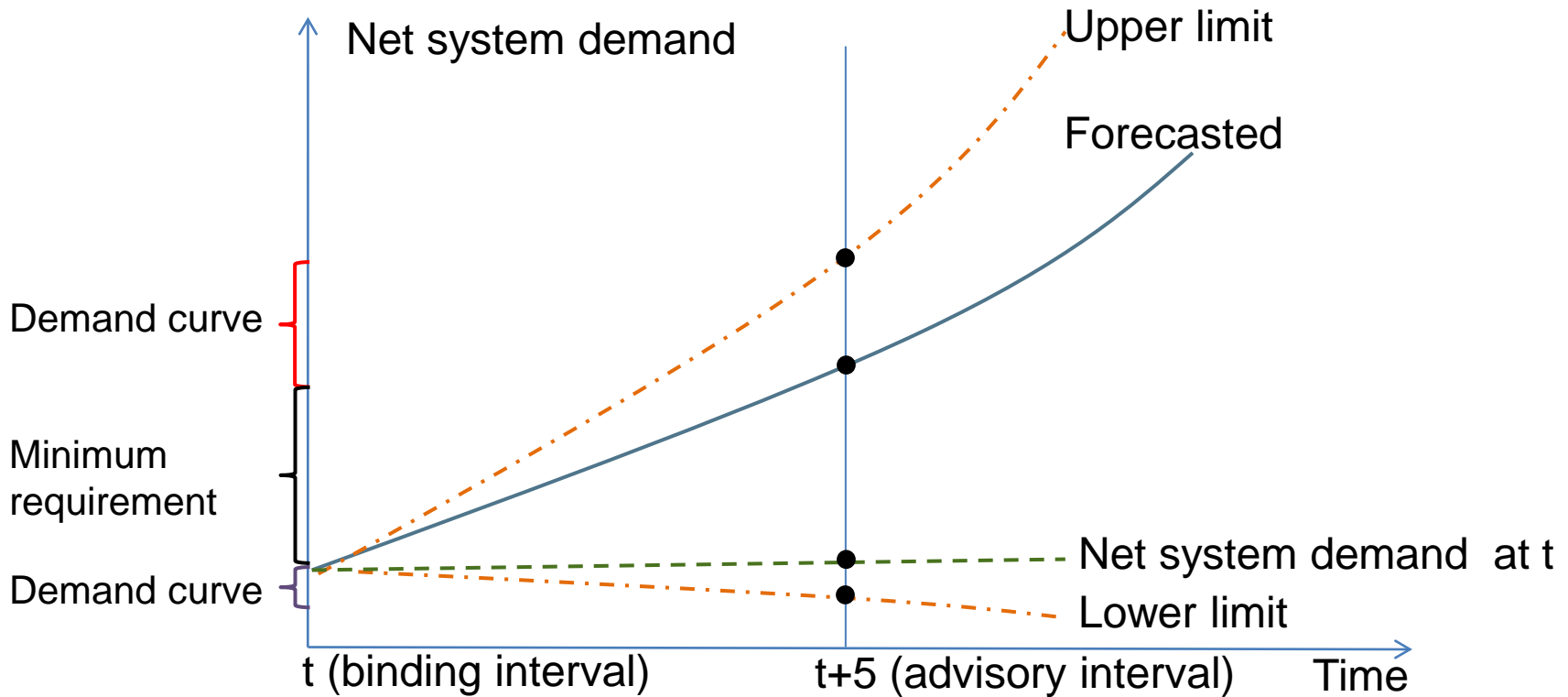
Market Surveillance Committee meeting

General Session

December 16, 2014



Flexible Ramping Product to meet real ramping need



Real ramping need:

Potential movement in net system demand from interval t to interval t+5*
(net system demand t+5 – net system demand t)

How net system demand is calculated (1 of 2)

- Load Movement

- Load forecast RTD1 = 1000 MW, RTD2 = 1010 MW
 - FRU = 10, FRD = 0
- Load forecast RTD 1 = 1100 MW, RTD2 = 1080 MW
 - FRU = 0, FRD = 20

- Interties (includes OA) Movement

- Deemed delivered includes modeled ramps of FMM schedules, hourly blocks and operational adjustments
- Deemed delivered RTD1 = 100 MW (I), RTD2 = 105 MW (I)
 - FRU = 0, FRD = 5
- Demand delivered RTD1 = 200 MW (E), RTD2 = 210 MW (E)
 - FRU = 10, FRD = 0

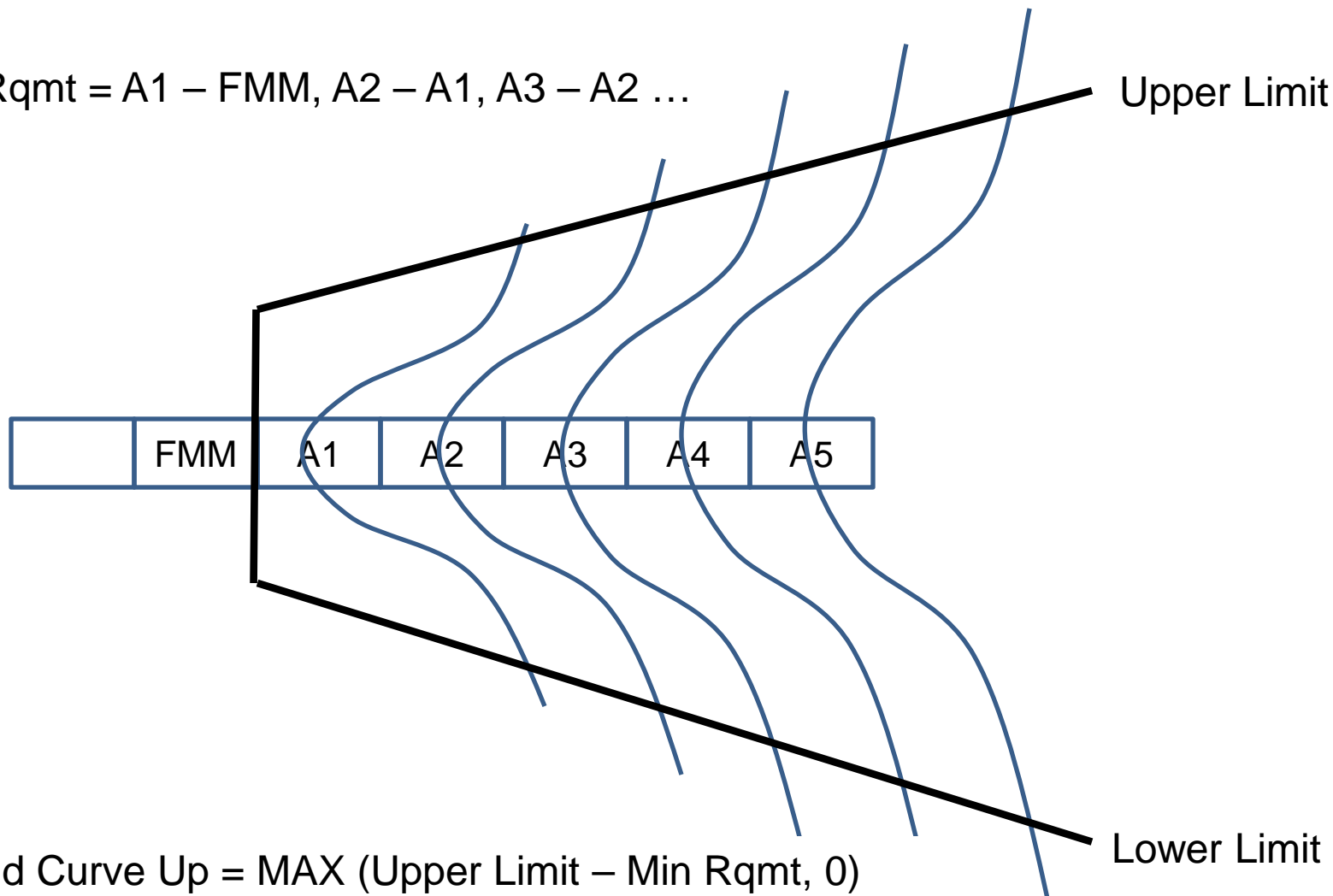
How net system demand is calculated (2 of 2)

- Supply Movement

- Economically dispatched within bid range in either RTD1 or RTD2
 - FRU = 0 MW, FRD = 0 MW
- Dispatched at upper economic limit both RTD1 = 150 MW, RTD2 = 135 MW
 - FRU = 15 MW, FRD = 0 MW
- Dispatched at lower economic limit both RTD1 = 100 MW, RTD2 = 110 MW
 - FRU = 0 MW, FRD = 10 MW
- No economic bids, Dispatched at upper economic limit both RTD1 = 150 MW, RTD2 = 160 MW
 - FRU = 0, FRD = 10
- No economic bids, Dispatched at lower economic limit both RTD1 = 100 MW, RTD2 = 95 MW
 - FRU = 5, FRD = 0
- Manual dispatch, exceptional dispatch, or cut in self-schedule reflected in RTD2 is not movement, it is in response to ISO instruction

Envelope calculated for each FMM and RTD market run

Min Rqmt = $A1 - FMM$, $A2 - A1$, $A3 - A2$...

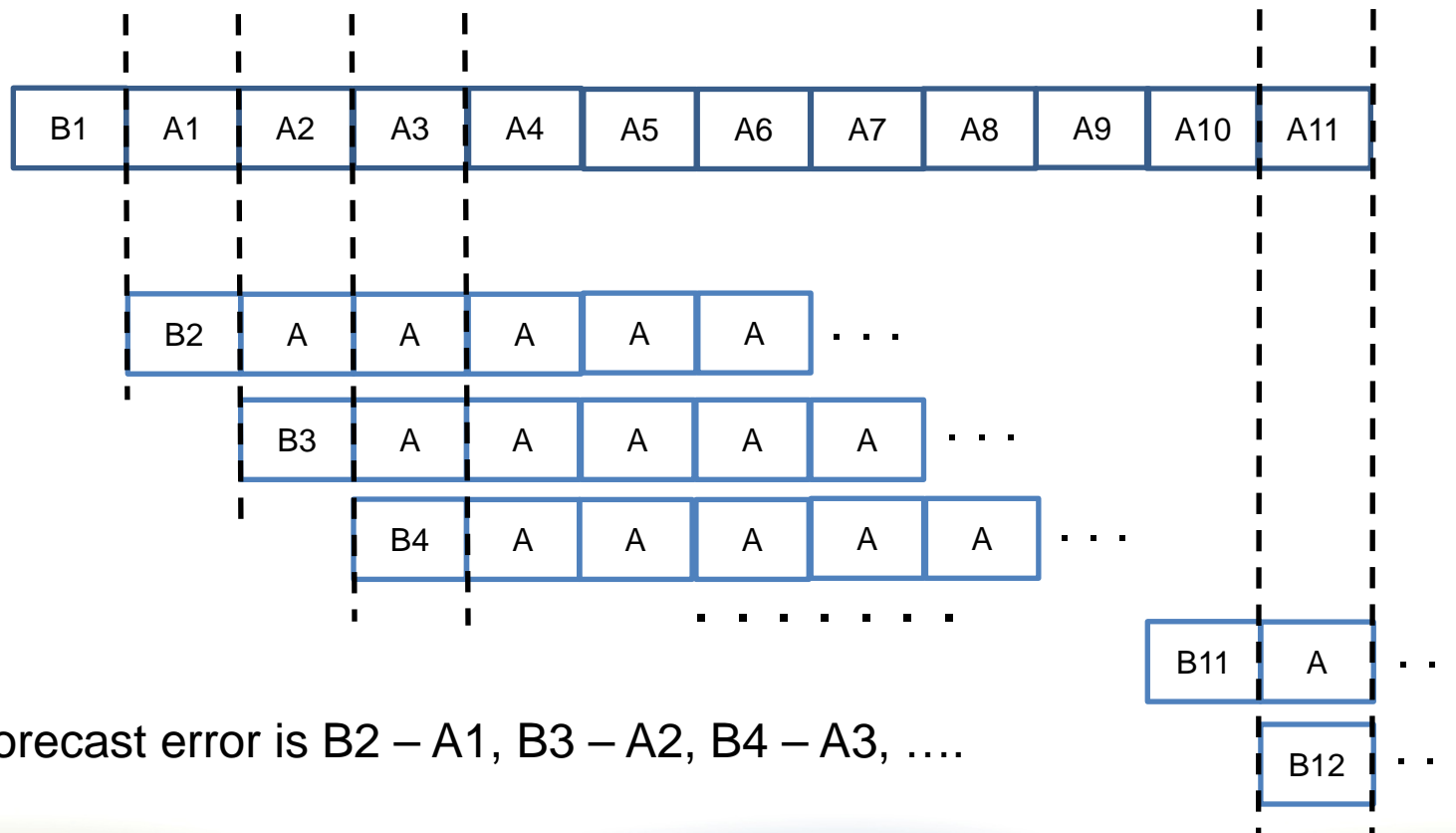


Demand Curve Up = $\text{MAX}(\text{Upper Limit} - \text{Min Rqmt}, 0)$
Demand Curve Down = $\text{MAX}(\text{Min Rqmt} - \text{Lower Limit}, 0)$

RTD forecast error is advisory RTD intervals net load to binding RTD interval net load for each interval in horizon

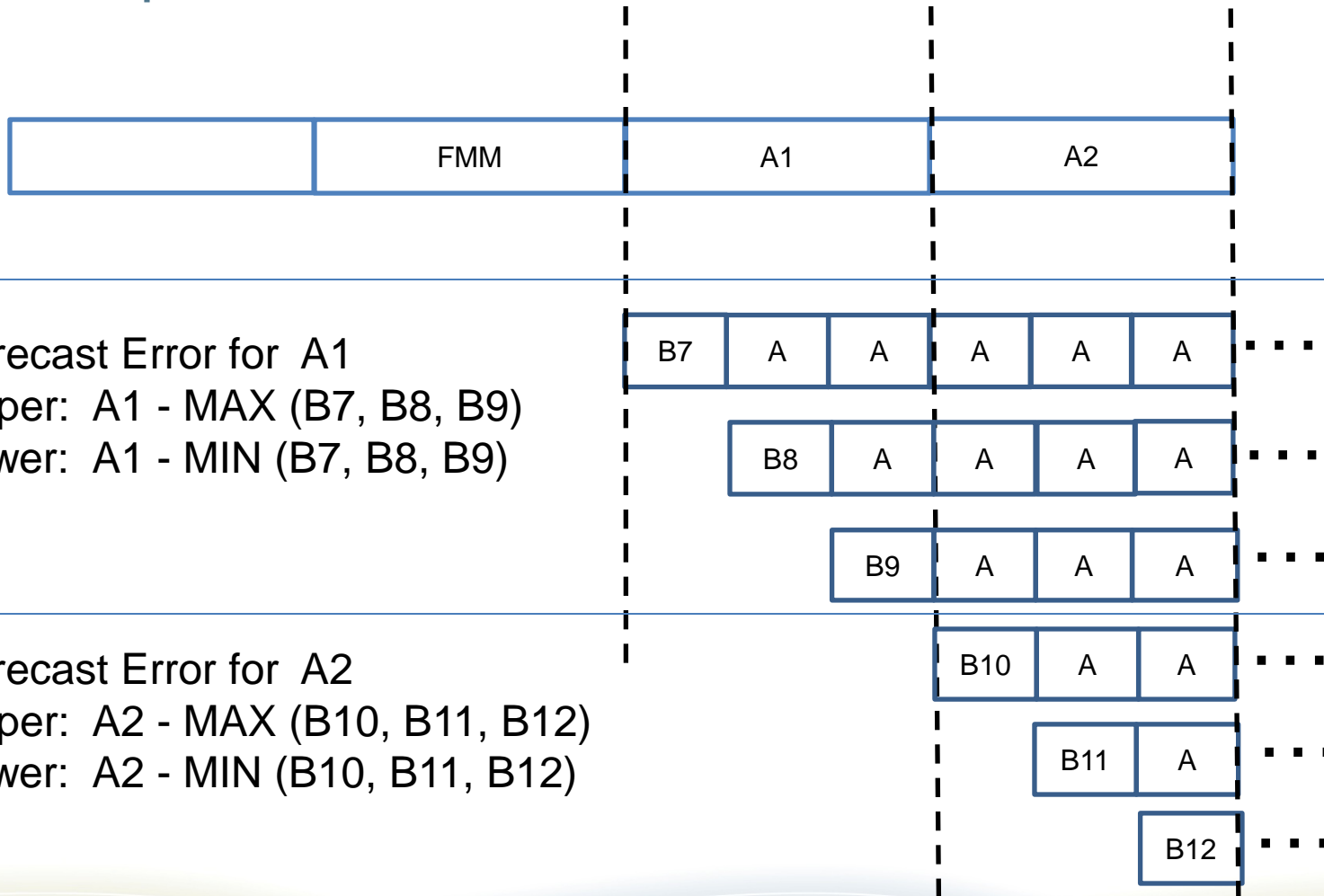
B = Binding A = Advisory

Requirement for RTD run B1



Forecast error is $B2 - A1$, $B3 - A2$, $B4 - A3$,

Use maximum and minimum binding RTD interval net load for each 15-minute interval to create FMM envelope



Forecast Error for A1

Upper: $A1 - \text{MAX}(B7, B8, B9)$

Lower: $A1 - \text{MIN}(B7, B8, B9)$

Forecast Error for A2

Upper: $A2 - \text{MAX}(B10, B11, B12)$

Lower: $A2 - \text{MIN}(B10, B11, B12)$

Day Ahead quantity procured using demand curve only

- Historical observed RTD 5-minute ramp between hours
- Flexible ramping up
 - Maximum binding RTD interval of operating hour – Average binding RTD intervals from preceding hour
- Flexible ramping down
 - Average binding RTD intervals from preceding hour – Minimum binding RTD interval of operating hour

Appendix

Cost is allocated to movement in each hour over entire month within each BAA

