

# Briefing on flexible ramping product

Don Tretheway

Lead Market Design and Regulatory Policy Developer

Market Surveillance Committee

General Session

July 15, 2015



# Agenda

- Introduction
- FMM and RTD histogram construction
- Demand curve
- No pay

# Plan to make incremental improvements in management of resource flexibility in real-time market

- Replace flexible ramping constraint compensation and cost allocation
- Add flexible ramping down
- Only procured in fifteen minute market and real time dispatch

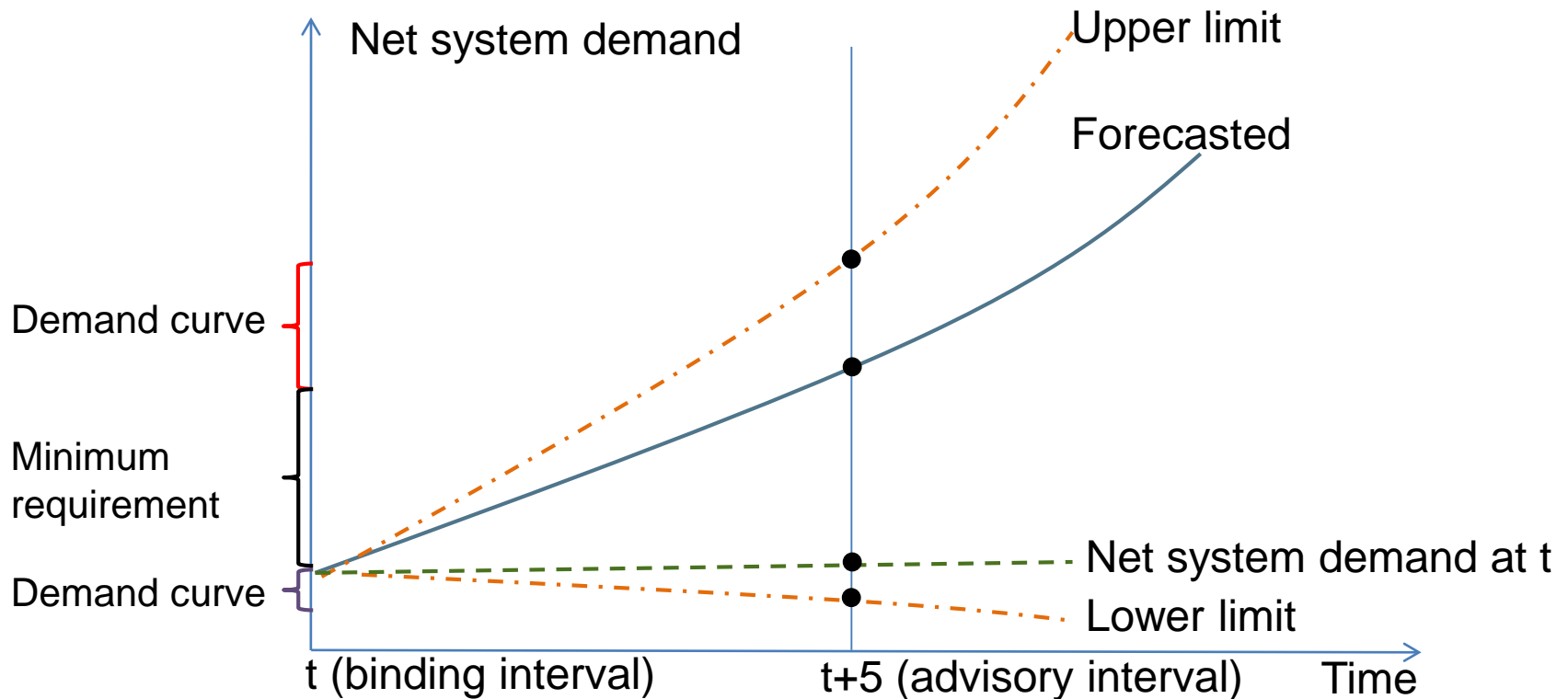
# Updates on flexible ramping product

- The ISO will not procure FRP in the day-ahead market
- Clarifications and enhancements have been made to:
  - formulation of the flexible ramping product
  - histogram and demand curve construction
- The ISO has simplified the “no pay” proposal and modeled the rules to be more similar to energy settlement rather than ancillary services settlement

# Plan to bring FRP for Board decision in December

- Data release planned for September
  - Requirement by BAA
  - Demand curve
  - Resource specific movement
- Update technical appendix and hold technical workshop on data release
- Post revised draft final proposal

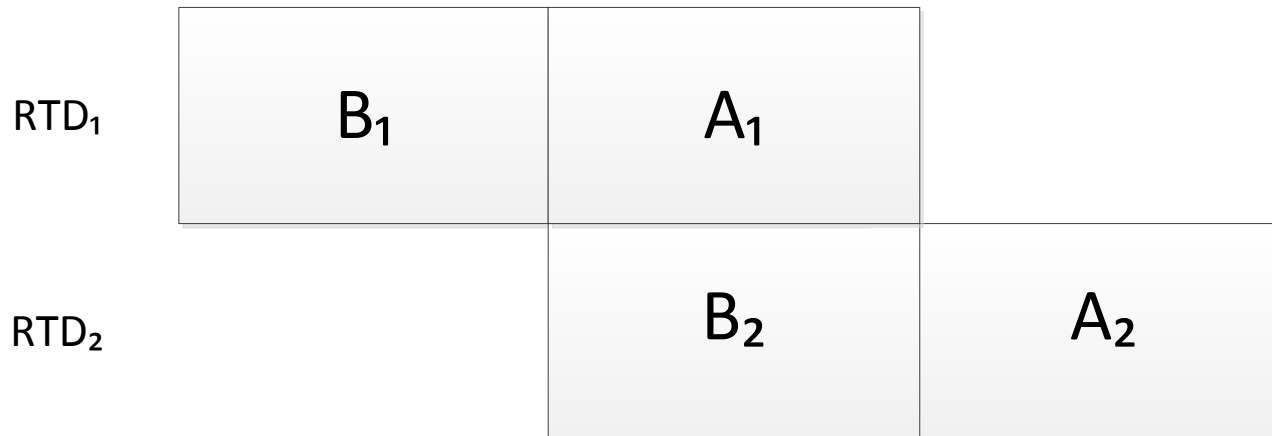
# Flexible ramping product to meet real ramping need



# Histogram Construction

- The ISO will construct histograms as an approximation of the probability distribution of net demand forecast errors. It will construct separate histograms for FRU and FRD for each hour, separately for RTD and RTUC
- For FRU, the histograms will be constructed based on the difference of the net demand the market used in the FMM for the first advisory RTUC interval and the maximum net demand the market used for the three corresponding RTD intervals

# Histogram Construction- RTD



$$B_2 - A_1$$

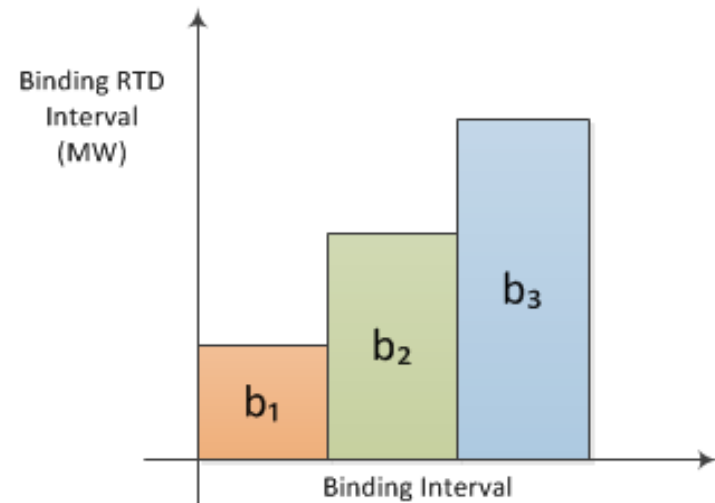
The ISO will construct the histograms by subtracting the net demand the first market run used for the first advisory interval (A1) from the net demand the second market run used for the binding interval (B<sub>2</sub>).



# Histogram Construction- RTUC

RTUC	FMM	A		
RTD <sub>1</sub>		b <sub>1</sub>		
RTD <sub>2</sub>			b <sub>2</sub>	
RTD <sub>3</sub>				b <sub>3</sub>

$b_3 - A$



The FRU histogram will be constructed by comparing the net demand the FMM used for the first advisory RTUC interval to the maximum net demand the market used for the corresponding three RTD binding intervals ( $b_2, b_3, b_4$ )



# Demand curve example

The power balance penalty cost function:

<b>Power Balance MW violation</b>	<b>Penalty (\$/MWh)</b>
-300 to 0	\$-150
0 to 400	\$1000

The net load forecast error probability distribution function:

<b>Net Load Forecast Error MW bin</b>	<b>Probability</b>
-300 to -200	1%
-200 to -100	2%
-100 to 0	44.8%
0 to 100	50%
100 - 200	1.4%
200 - 300	0.5%
300 - 400	0.3%

FRD	Surplus (MW)	Probability	Penalty (\$/MWh)	Surplus Cost (\$)	Surplus Incremental Cost (\$/MWh)
	0	0	-150	0	
	-100	0.01	-150	$-100 \times 0.01 \times (-150) = 150$	$(150 - 0) / (-100) = -1.5$
	-200	0.02	-150	$150 - 100 \times 0.02 \times (-150) = 450$	$(450 - 150) / (-100) = -3$
	-300	0.448	-150	$450 - 100 \times 0.448 \times (-150) = 7,170$	$(7170 - 450) / (-100) = -67.2$
	400	0.5	1,000	$2200 + 100 \times 0.5 \times 1000 = 52,200$	$(52200 - 2200) / 100 = 500$
	300	0.014	1,000	$800 + 100 \times 0.014 \times 1000 = 2,200$	$(2200 - 800) / 100 = 14$
	200	0.005	1,000	$300 + 100 \times 0.005 \times 1000 = 800$	$(800 - 300) / 100 = 5$
	100	0.003	1,000	$100 \times 0.003 \times 1000 = 300$	$(300 - 0) / 100 = 3$
	0	0	1,000	0	
FRU	Surplus (MW)	Probability	Penalty (\$/MWh)	Surplus Cost (\$)	Surplus Incremental Cost (\$/MWh)

Note: with cap below AS relaxation parameter

# Simplified no-pay rules

- The ISO will financially settle FRP in the fifteen-minute market and the five-minute market
- The ISO proposes to implement real-time economic buy-back rules that is similar to uninstructed imbalance energy (UIE) settlement
- The proposed real time economic buy-back rules will prevent resources from receiving an FRP payment if they cannot provide what the real-time market awarded

# The ISO is proposed two alternative methods of measuring unavailable FRP capacity

1. Compare a resource's metered output, upper and lower economic limits to the FRP award to determine if the resource could provide its awarded FRP (similar to the "undispatchable" and "unavailable" no-pay provisions)
2. Simply assume any positive UIE makes the corresponding amount of FRU unavailable and any negative UIE makes the corresponding amount of FRD unavailable

ISO plans to move forward with Option 1