Balancing Congestion

1/18/13

Balancing Congestion

- Exists when system conditions are different in real-time market vs. day-ahead market.
- Balancing Congestion= [(Real time load – Day ahead load)*(Real time LMP)] - [(Real time generation – Day ahead generation)*(Real time LMP)]

For binding constraints:

- Total facility flow = market flow + external area flow
- Balancing Congestion is negative when real-time market flow < day-ahead market flow
- Balancing Congestion is negative when real-time external area flow > day-ahead external area flow

FTRs are funded from the following:

Day-ahead Congestion + Balancing Congestion*+ FTR auction Revenue

Day-ahead congestion = Congestion from Day-ahead market

Balancing congestion = Difference in congestion between Day-ahead and Real-time markets + M2M Payments

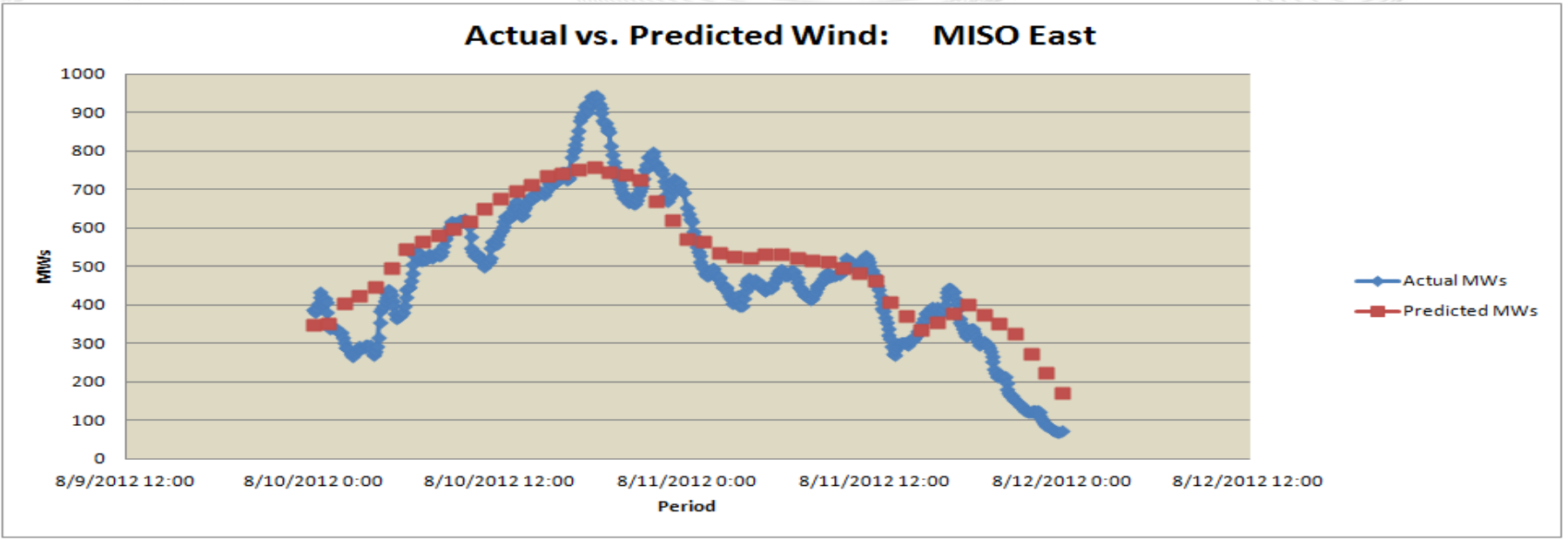
FTR auction Revenue = $ collected from FTR auctions for purchased FTRs minus sold FTRs

*Includes Market to Market payments between PJM and MISO

Major Causes of Negative Balancing Congestion

- External World Flow
  - Increase in wind resources on western part of system
  - Highly unpredictable from day to day
  - Difficult to know what market to market flowgates will be congested in real-time
- Reduction in System Capability
  - Transmission outages not modeled in Day-ahead market from internal and external systems
  - Rating reductions between day-ahead and real-time on internal and external systems

Wind Volatility



- Wind Volatility – Impacts PJM market flow and external world flow
- Daily variation as much as 700 MWs
- Daily predicted vs. actual wind often significantly different
- High impact on lower voltage constraints along PJM-MISO border
- Typically lowers Balancing Congestion

Appendix A:
Market Flow Examples

Example 1: FTR Market Flow = Day-Ahead Market Flow = Real-Time Market Flow

Rating =120 MW: Total Flow= 120 MW

External world flow = 20 MW, FTR market flow= 100 MW

A → B

FTR source MWs of 100

FTR sink MWs of 100

FTR

Rating =120 MW: Total Flow = 120 MW

External world flow = 20 MW, Day-ahead market flow= 100 MW

A LMP=$5 → B LMP=$10

Generation of 100 MW

Load of 100 MWs

Day-Ahead

Day-Ahead Congestion= ($10-$5)* (100 MW)=$500

FTR Target allocations= ($10-$5)* (100 MW)=$500

Day-ahead Congestion = FTR Target Allocations because FTR market Flow = Day-ahead Market Flow

Rating =120 MW: Total Flow = 120 MW

External world flow = 20 MW, Real-time market flow= 100 MW

A LMP=-$20 → B LMP=$100

Actual Generation of 100 MW

Actual Load of 100 MWs

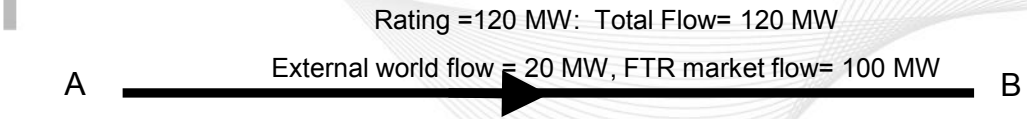
Real-Time

Balancing Congestion= Delta in Load*(RT B LMP) - Delta in Gen*(RT A LMP)

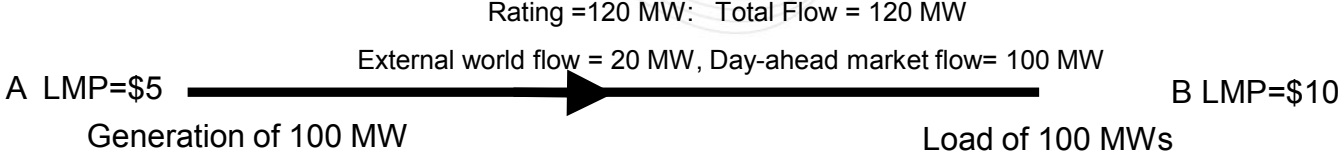
Balancing Congestion= 0($100)-0(-20)=$0

Balancing is zero because market flows match between day-ahead and real-time

Example 2: FTR Market Flow = Day-Ahead Market Flow and Real-Time Market Flow< Day-Ahead Market Flow



FTR

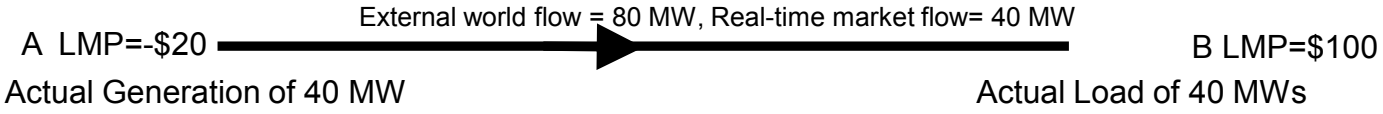


Day-Ahead

Day-Ahead Congestion= ($10-$5)*(100 MW)=$500

FTR Target allocations= ($10-$5)*(100 MW)=$500

Day-ahead Congestion = FTR Target Allocations because FTR market Flow = Day-ahead Market Flow



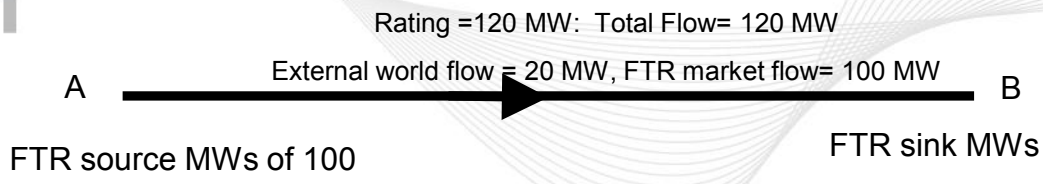
Real-Time

Balancing Congestion= Delta in Load*(RT B LMP) - Delta in Gen*(RT A LMP)

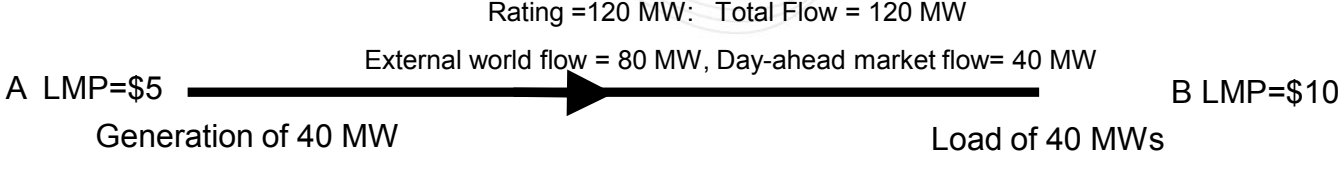
Balancing Congestion= (-60 MW)*($100)-(-60 MW)(-$20)=-$1800

Balancing is negative because real-time market flow < day-ahead market flow

Example 3: FTR Market Flow > Day-Ahead Market Flow and Real-Time Market Flow= Day-Ahead Market Flow



FTR

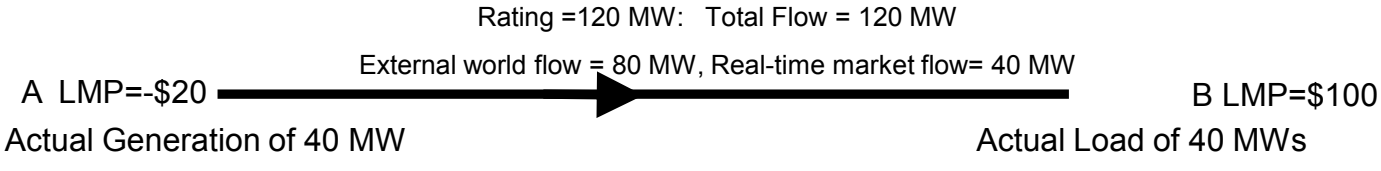


Day-Ahead

Day-Ahead Congestion= ($10-$5)*(40 MW)=$200

FTR Target allocations= ($10-$5)*(100 MW)=$500

Day-ahead Congestion < FTR Target Allocations because FTR market Flow > Day-ahead Market Flow



Real-Time

Balancing Congestion= Delta in Load*(RT B LMP) - Delta in Gen*(RT A LMP)

Balancing Congestion= (0 MW)*($100)-(0 MW)*(-20)=$0

Balancing is zero because market flows match between day-ahead and real-time

Final FTR Settlements

Example 1: FTR Market Flow = Day-Ahead Market Flow = Real-time Market Flow

FTR Target Allocations= $500
Day-Ahead total Congestion= $500
Balancing Congestion= $0
Total Congestion= $500
Net dollars to FTR holders=$500

Example 2: FTR Market Flow = Day-Ahead Market Flow and Real-time Market Flow < Day-Ahead Market Flow

FTR Target Allocations= $500
Day-Ahead total Congestion= $500
Balancing Congestion= -$1800
Total Congestion= -$1300
Net dollars to FTR holders=-$1300

Example 3: FTR Market Flow >Day-Ahead Market Flow and Real-time Market Flow =Day-Ahead Market Flow

FTR Target Allocations= $500
Day-Ahead total Congestion= $200
Balancing Congestion= $0
Total Congestion= $200
Net dollars to FTR holders=$200