

Operating Reserves Education

Ray Fernandez

Manager, Market Settlements Development

GOFSTF

July 22, 2015

- Accounting Definition of Operating Reserves
 - Make-whole payments to pool-scheduled generation and transactions
 - Defined in Operating Agreement (Schedule 1-3.2.3 & 3.3.3)
- Preserves incentive for demand and supply to bid and offer into the day-ahead market based on their actual costs
- Results in prices and compensation that preserves the incentive for generation and Demand Resources to follow real-time dispatch signals/instructions
 - Generation guaranteed to cover costs as represented in its offer
- Performed on a daily basis



Credits for Operating Reserve are calculated for each of the following situations:

- pool-scheduled generating resources (day-ahead and balancing markets)
- pool-scheduled transactions (day-ahead and balancing markets)
- canceled pool-scheduled resources (balancing market)
- resources providing quick start reserve (balancing market)
- resources reduced or suspended due to a transmission constraint or for other reliability purposes (balancing market)
- resources performing annual scheduled black start tests (balancing market)
- resources scheduled to provide Black Start service (day-ahead and balancing market)
- synchronous condensing for purposes other than providing synchronized reserve
- resources providing reactive services
- dispatchable economic load reduction resources that follow dispatch (day-ahead and balancing markets)

- For each eligible resource, daily credit is day-ahead offer amount in excess of day-ahead market revenue
 - calculation uses day-ahead scheduled MWh, offer data, and day-ahead LMPs
 - Total offered price for start-up and no-load costs and energy determined on the resources scheduled output shall be compared to the value of the resource's energy determined by the Day-ahead Energy Market

- Credits are for any portion of their offer amount in excess of:
 - Any day-ahead operating reserve credits
 - Any day-ahead scheduling reserve market revenues in excess of offer
 - Any synchronized reserve market revenues in excess of offer plus opportunity, energy use and startup costs
 - Any non-synchronized reserve market revenues
 - Any reactive services revenue

- **Bal Op Res Credit** = RT Offer – Balancing Value¹ – DA Value – DA Operating Reserve Credit – Any Sync/Non Sync/Reactive/DASR revenue

- ¹Balancing Value = (RT MW² – DA MW) * RT LMP

- ²Greater of:

- RT MW

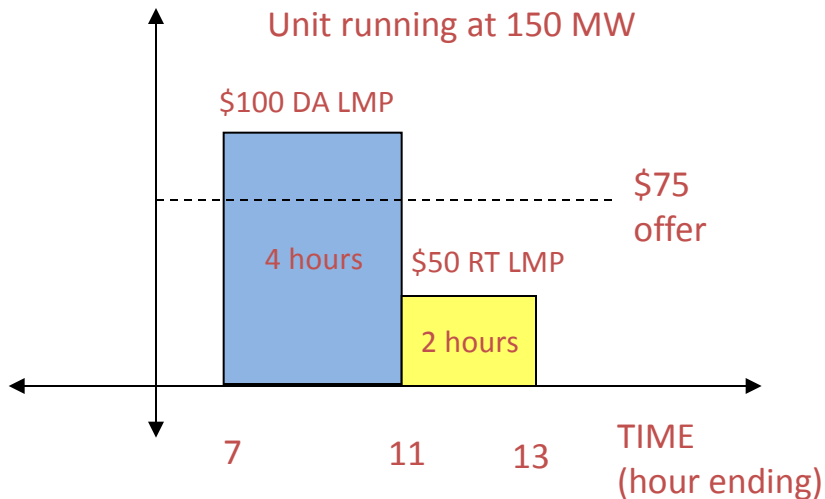
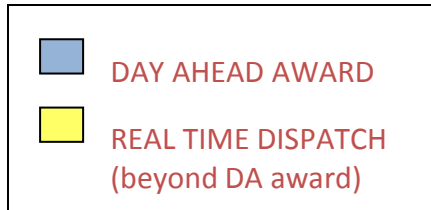
- Lesser of: Desired MW and DA MW

- Segmented Make-Whole Payments as a function of the greater of the DA Schedule or Min Run Time
- A resource will be made whole for two periods for each synchronized start. The two periods are as follows:
 1. greater of the DA Schedule or Min Run time
 2. hours in excess of #1 (above)
- Segment does not “carry over” to the next day
- Start-up costs (and applicable no-load costs) will be in the segment “greater of the DA Schedule or Min Run Time”
- Segmented Make-Whole Payments are an overall benefit to resources

Segmented Make-Whole Payments

Example 1 – Unit Extended Beyond DA Schedule

Example 1: Unit was extended in real time for two hours beyond its day ahead schedule. (LMP is less than offer during extended period)



Explanation:

Segment 1: Day Ahead Schedule

- DA Value = (4 hours * \$100 * 150 MW) = \$60,000
- DA Offer = (4 hours * \$75 * 150MW) = \$45,000
- Day Ahead OR Credit: \$0
- Balancing OR Credit: \$0

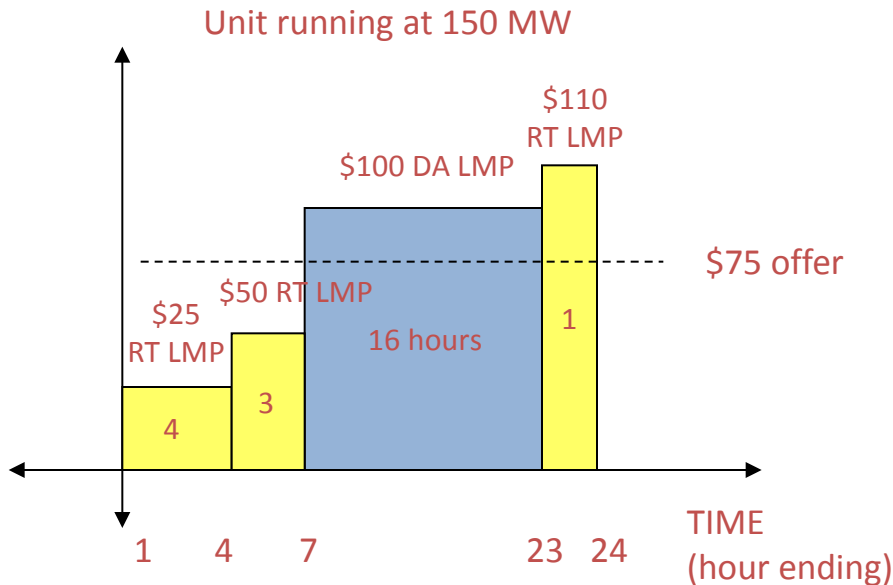
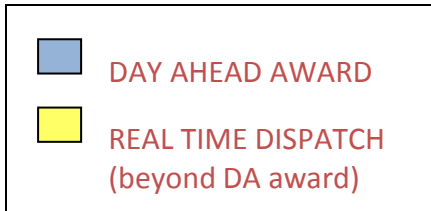
Segment 2: Extended Period

- Balancing Value = (2 hours * \$50 * 150MW) = \$15,000
- RT Offer = (2 hours * \$75 * 150MW) = \$22,500
- Balancing OR Credit: \$22,500 - \$15,000 = \$7,500

Segmented Make-Whole Payments

Example 2 – Unit Extended Before/ After DA Schedule

Example 2: Unit was extended in real time through the midnight period, The unit was uneconomic for most of the extended period.



Explanation:

Segment 1: Day Ahead Schedule

- DA Value = (16 hours * \$100 * 150 MW) = \$240,000
- DA Offer = (16 hours * \$75 * 150MW) = \$180,000
- DA OR Credit: \$0
- Balancing OR Credit: \$0

Segment 2: Extended Period

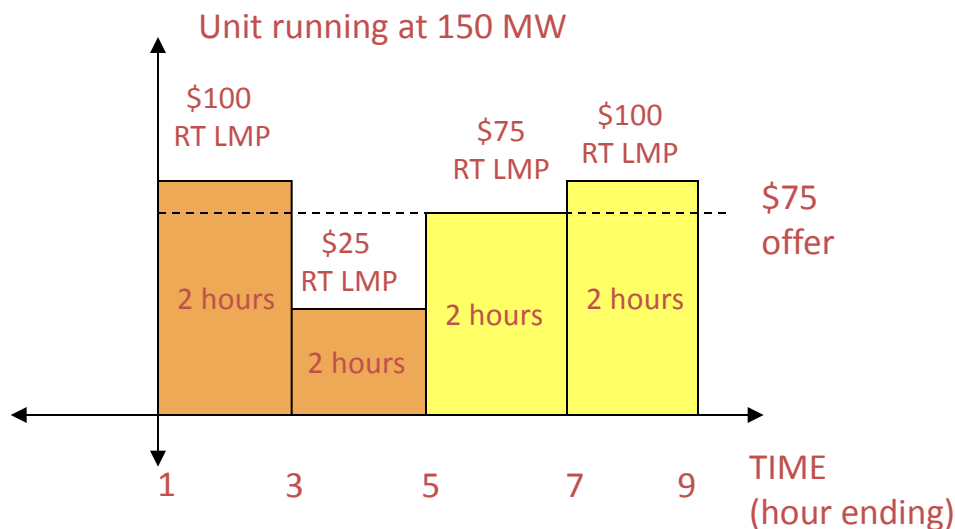
- Balancing Value = (4 hours * \$25 * 150MW) + (3hours * \$50 * 150MW) + (1 hour * \$110 * 150 MW) = \$54,000
- RT Offer = (8 hours * \$75 * 150MW) = \$90,000
- Balancing OR Credit: \$36,000

Segmented Make-Whole Payments

Example 3 – Unit Extended Beyond Min Run Time

Example 3: Unit was extended in real time for four hours beyond its min run time.
(LMP is less than offer during extended period)

- MIN RUN TIME – 4 HOURS
- REAL TIME DISPATCH (beyond DA award)



Explanation:

Segment 1: Min Run Time

- Balancing Value = (2 hours * \$100 * 150 MW) + (2 hours * \$25 * 150 MW) = \$37,500
- RT Offer = (4 hours * \$75 * 150MW) = \$45,000
- Balancing OR Credit: \$7,500

Segment 2: Extended Period

- Balancing Value = (2 hours * \$75 * 150MW) + (2 hours * \$100 * 150MW) = \$52,500
- RT Offer = (4 hours * \$75 * 150MW) = \$45,000
- Balancing OR Credit: \$0