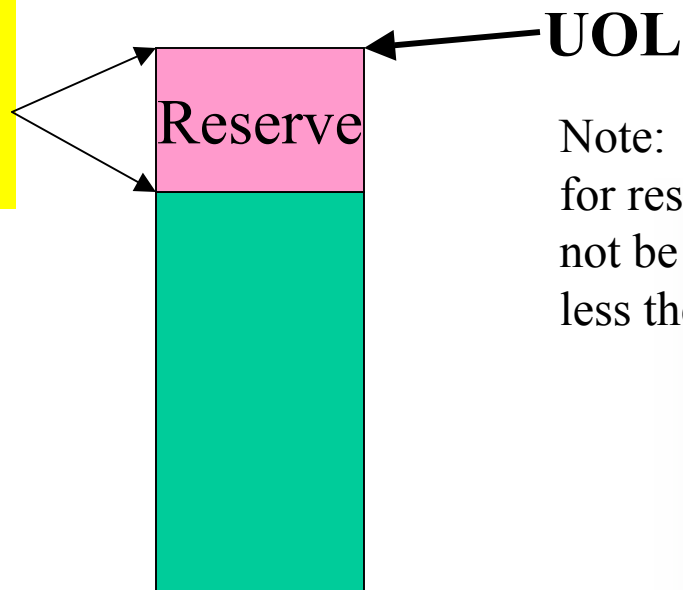# Real Time Scheduling

Reserve Settlements

General Settlement Rules

➢ **There will be a full two settlement. Reserve services will be scheduled and settled nominally on a 5-min. basis.**

➢ **Units are not required to purchase energy at LBMP for failure to perform in a reserve pickup.**

➢ **Units will be paid LBMP for overgeneration during a reserve pickup.**

➢ **Units dispatched by RTD-CAM have the ability to set LBMP**

➢ **Units may need to buy out of their DAM reserve commitment in the event of a de-rate**

➢ **LOC will be incorporated into clearing prices**

Overall Settlement Rule

If a unit is scheduled by RTD for energy into the area bounded by UOL less the DAM reserve award and the UOL, the unit shall buy out of its day-ahead reserve commitment.

If scheduled by RTD into this Area for Energy, the unit shall buy out of its day-ahead Reserve commitment.

Reserve

UOL

Note: A unit can be de-scheduled for reserve due to economics and not be dispatched higher than UOL less the DAM reserve award.

Reserve Schedules

➢ **BAS will use real-time reserve schedules from RTD or RTD-CAM**

- *Advisory 30-minute reserve schedules are computed by RTC_{30} to insure sufficient capacity*

- *Advisory reserve schedules for 10-minute start units are computed by RTC_{45} to insure sufficient capacity*

- *All actual reserve schedules, including 10-minute synchronized reserve, are computed by RTD*

- *RTS considers unit constraints when determining schedules; i.e. ramp rates, de-rates, etc.*

➢ **Settlement for reserve is based on schedule.**

30-Minute Start Units

➤ **Scheduled and committed by RTC$_{xx}$ for xx+30**

  - *RTC$_{00}$ will schedule for :30*
  - *RTC$_{15}$ will schedule for :45, etc.*

➤ **Scheduling by SCUC does not guarantee the unit will run in real-time**

➤ **Units will buy out of their DAM commitment based on their schedule when called upon to start; the clearing price will be the real-time 30-minute reserve price**

➤ **Units will receive real-time LBMP at their bus for energy produced**

10-Minute Start Units

- **Scheduled and committed by RTC$_{xx}$ for xx+15 or RTD-CAM, e.g.:**
    - *RTC$_{45}$ will commit for RTC$_{00}$*
    - *RTD-CAM will commit for a corrective action*
- **Units will buy out of their DAM commitment based on their schedule when called upon to start; the clearing price will be the real-time 10-minute non-synchronized reserve price**
- **Units will receive real-time LBMP at their bus for energy produced**

Synchronized Units

- **Scheduled by RTD or RTD-CAM**

- **Units may buy out of their DAM commitment based on their 10-minute synchronized reserve schedule from RTD**

  - *Schedule based on economics*

  - *Schedule from RTD-CAM for a reserve pickup (also based on economics)*

- **Units will receive real-time LBMP at their bus for energy produced**

30-Minute Start Reserve Settlement Rules

➢ **Settlement made for each RTD period.**

➢ **If the reserve schedule from RTD is less than the DAM schedule the unit will buy out of its day-ahead commitment.**

➢ **For each RTD interval the unit shall pay the balancing reserve MWs multiplied by the real-time 30-minute reserve clearing price.**

10-Minute Start Reserve Settlement Rules

➤ **Settlement made for each RTD period.**

➤ **If the reserve schedule from RTD is less than the DAM schedule the unit will buy out of its day-ahead commitment.**

➤ **For each RTD interval the unit shall pay the balancing reserve MWs multiplied by the real-time 10-minute non-synchronized reserve clearing price.**

10-Minute Synchronized Reserve Settlement Rules

➢ **Settlement made for each RTD period.**

➢ **If the reserve schedule from RTD or RTD-CAM is less than the DAM schedule the unit will buy out of its day-ahead commitment.**

➢ **For each RTD interval the unit shall pay the balancing reserve MWs multiplied by the real-time 10-minute synchronized reserve clearing price.**

Example – The DAM

Consider a 40 MW unit capable of starting and coming up to full load within 10 minutes. A bid for HB xx is submitted in the DAM as follows:

• Energy: 40 MW @ $200/MWh

• Reserve: 40 MW @ $3/MW

The DAM clears as follows:

• LBMP for energy: $50

• Clearing price for 10-minute non-synchronized reserve: $4

Therefore, the unit is accepted for 0 MW of energy and 40 MW of 10-minute non-synchronized reserve for HB xx.

Example – Real Time, Scenario 1

The next day, RTC_{45} calculates an LBMP of $300 for HB xx. RTC_{45} therefore schedules the unit to produce 40 MW of energy and provide 0 MW of reserve for HB xx. The unit performs as expected. RTS calculates a $10 clearing price for 10-minute non-synchronized reserve.

Settlement is as follows:

DAM:

•Energy: 0 MW x $50 = $0

•Reserve: 40 MW x $4 = $160

Real-time:

•Energy: 40 MW x $300 = $12,000

•Reserve: -40 MW x $10 = ($400)

Total settlement: $11,760

Example – Real Time, Scenario 2

In this scenario, the unit fails to start. Settlement will be as follows:

DAM:
- Energy: 0 MW x $50 = $0
- Reserve: 40 MW x $4 = $160

Real-time:
- Energy: 0 MW x $300 = $0
- Reserve: -40 MW x $10 = ($400)

Total settlement: ($240)

Other Changes to BAS due to Settlement Rule Changes

➢ **Remove requirement to purchase replacement LBMP energy for failure to perform during a reserve pickup**

➢ **Remove LOC calculation for units providing reserve; LOC is included in the clearing price**

➢ **Remove reduction in availability payment for units that fail to perform; units buy out of their day ahead commitments based on schedule.**