

# LBMP Shortage Cost Example

*Management Committee*

*10/17/03*

## Reserve Shortage Cost impact on LBMP

- **There has been some concern regarding the additive nature of the LBMP and reserve shortage costs.**
- **Concern expressed that in situations where energy prices are high (e.g. \$650) in the interval prior to going into a reserve shortage that the price will be \$650 + reserve demand curve shortage cost in the reserve short RTD interval.**
- **Following example has been developed to illustrate that this is not the case.**

# Reserve Shortage Cost Impact on LBMP

## ➤ **Scenario:**

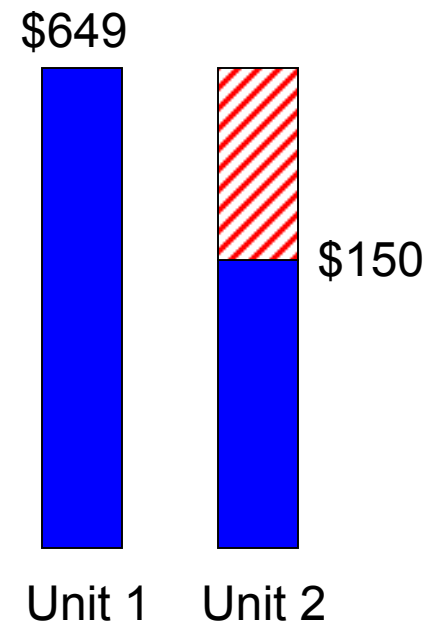
- One operating reserve requirement
- A corresponding reserve demand curve shortage cost of \$500
- 2 available units
  - ▶ One 30-minute GT. Online at cost = \$649
    - Providing energy. Not eligible to provide reserves.
  - ▶ One on-dispatch unit. Online at cost = \$150
    - Providing energy and reserve.
- Nearly capacity constrained.

# Reserve Shortage Cost Impact on LBMP

- **In the RTD interval preceding the shortage condition:**
  - Unit 1 is dispatched to meet the next MW of load and is setting LBMP at \$649.
  - Unit 2 is being held back for reserves at a cost of  $\$649 - \$150 = \$499$  which will be the Reserve Clearing Price (i.e. Lost Opportunity Cost on Unit 2).

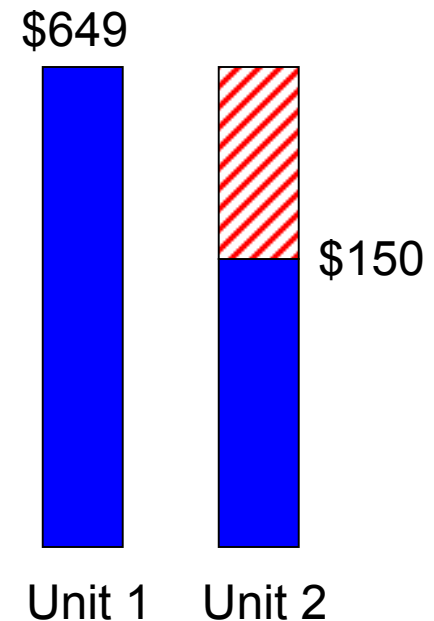
➤ **LBMP = \$649**

➤ **RCP = \$499**



## Reserve Shortage Cost Impact on LBMP

- **In the next RTD interval, load increases slightly resulting in a shortage condition. The last MW of reserve that was scheduled must be converted to energy:**
  - Unit 2, representing the lowest cost reserve provider, is dispatched to meet the next MW of load (\$150) and a reserve shortage cost (\$500) is incurred, setting the LBMP at \$650 (i.e.  $\$150 + \$500 = \$650$ ).
  - The reserve clearing price is determined by the demand curve shortage cost of \$500.
- **LBMP = \$650**
- **RCP = \$500**



## Reserve Shortage Cost Impact on LBMP

	Prior to Shortage	Post Shortage
<b>LBMP</b>	<b>\$649</b>	<b>\$650</b>
<b>Reserve CP</b>	<b>\$499</b>	<b>\$500</b>

- **Note that both the price of energy and reserve are only \$1/MWh higher in the post shortage condition.**
- **The LBMP in the shortage condition equals the energy bid of the MW converted to energy plus the reserve shortage costs.**