

GT Pricing in RTD

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DRAFT: For Discussion Purposes Only

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AGENDA

Today's presentation will illustrate the revised approach for the scheduling and pricing of offline 10-minute GTs in RTD.

The key element of the proposal is the application of a zero downward ramp rate on the offline GTs. This means that if a GT is dispatched up in a particular time step of the RTD run it cannot be reduced below that level in later time steps.

The effect of this change is to honor the minimum run time of the resource. The impact on schedules and prices of this change is that the GT will only be dispatched in the first time step if it is a lower cost option over the remainder of the optimization horizon.

The examples illustrate a number of scenarios that show how the price is set if the GT is economic in one, two, three and five timesteps.

EXAMPLE ASSUMPTIONS

The tables below illustrate the initial conditions for the examples.

GT Details	
Incremental Cost (\$/MWh)	\$100
UOL (MW)	40
Startup cost (\$)	\$480
Adjusted Incremental Cost (\$/MWh)	\$112

Steam Unit Details	
Incremental Cost (\$/MWh)	\$70

GT Economic in the First Time Step

In order for the GT to be dispatched if it is only economic in the first time step, and a \$70 steam unit is marginal in the remaining intervals, the LBMP in the first timestep must climb to \$280.

A \$279 steam unit will be dispatched up in the first interval prior to the GT being scheduled.

This approach reflects the actual redispatch cost over the remainder of the optimization period and incorporates that cost into the first period LBMPs

Economic in First Time Step

	9:05	9:15	9:30	9:45	10:00	
Increased Load to Meet	1					
Increased generation on GT	1	1	1	1	1	
Increased Cost From GT	\$112	\$112	\$112	\$112	\$112	
Decreased steam generation		-1	-1	-1	-1	
Decreased cost on Steam	\$0	(\$70)	(\$70)	(\$70)	(\$70)	LBMP
Net Cost increase in cost	\$112	\$42	\$42	\$42	\$42	\$280

LBMPs	\$280	\$70	\$70	\$70	\$70
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GT Economic in the First Two Time Steps

In order for the GT to be dispatched if it is economic in the first two time steps, a \$120 unit is marginal in the second time step, and a \$70 steam unit is marginal in the remaining intervals, the LBMP in the first time step must climb to \$230.

Economic in First Two Time Steps

Changes

Marginal unit in second time step is \$120 steam unit

	9:05	9:15	9:30	9:45	10:00	
Increased Load to Meet	1					
Increased generation on GT	1	1	1	1	1	
Increased Cost From GT	\$112	\$112	\$112	\$112	\$112	
Decreased steam generation		-1	-1	-1	-1	
Decreased cost on Steam	\$0	(\$120)	(\$70)	(\$70)	(\$70)	LBMP
Net Cost increase in cost	\$112	(\$8)	\$42	\$42	\$42	\$230
LBMPs	\$230	\$120	\$70	\$70	\$70	

GT Economic in the First Two Time Steps

Note that the GT is not dispatched in the second interval even though the LBMP of \$120 is greater than the adjusted incremental cost. The table below shows that the redispatch costs in the third through fifth intervals require the second period LBMP to be \$238 before the GT would be dispatched higher.

	9:05	9:15	9:30	9:45	10:00	
Increased Load to Meet						
Increased generation on GT		1	1	1	1	
Increased Cost From GT		\$112	\$112	\$112	\$112	
Decreased steam generation			-1	-1	-1	
Decreased cost on Steam		\$0	(\$70)	(\$70)	(\$70)	LBMP
Net Cost increase in cost		\$112	\$42	\$42	\$42	\$238

GT Economic in the First Three Time Steps

In order for the GT to be dispatched if it is economic in the first three time steps, a \$120 unit is marginal in the second and third time steps, and a \$70 steam unit is marginal in the remaining intervals, the LBMP in the first time step must climb to \$180.

Economic in First Three Time Steps

Changes

Marginal unit in second and third time steps is \$120 steam unit

	9:05	9:15	9:30	9:45	10:00	
Increased Load to Meet	1					
Increased generation on GT	1	1	1	1	1	
Increased Cost From GT	\$112	\$112	\$112	\$112	\$112	
Decreased steam generation		-1	-1	-1	-1	
Decreased cost on Steam	\$0	(\$120)	(\$120)	(\$70)	(\$70)	LBMP
Net Cost increase in cost	\$112	(\$8)	(\$8)	\$42	\$42	\$180

LBMPs	\$180	\$120	\$120	\$70	\$70
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GT is Marginal in Time Step 1 and Economic Throughout

If the GT is marginal in the first time step and economic throughout the remainder of the optimization horizon then the LBMP in the first time step is \$112. The GT is fully scheduled in the remaining intervals so an increment of the GT generation in the first time step has no redispatch cost implications later in the optimization.

Marginal in First Timestep and Economic in Remaining Time Steps

GT is marginal in first timestep and marginal unit in remaining time steps is \$120 steam unit

	9:05	9:15	9:30	9:45	10:00	
Increased Load to Meet	1					
Increased generation on GT	1	0	0	0	0	
Increased Cost From GT	\$112					
Decreased steam generation						
Decreased cost on Steam	\$0	\$0	\$0	\$0	\$0	LBMP
Net Cost increase in cost	\$112	\$0	\$0	\$0	\$0	\$112

LBMPs	\$112	\$120	\$120	\$120	\$120
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