

Unit Modeling and Dispatch





- Specifically related to shortage pricing changes
 - Inefficient dispatch of units
 - Inaccurate reserve estimate
- PJM attempted to address the issue but there is still lingering concern
 - SpinMax < EcoMax</p>
 - Segment based ramp rates (always existed)

ssue



Overview of SP Changes for GOs

- Energy
 - Still dispatched at the same periodicity
 - Co-optimized with synch reserves
- Regulation
 - No change from today
- SR
 - "Inflexible" resources committed hourly
 - "Flexible" resources co-optimized with energy in real-time
 - Capability can change with energy dispatch
 - Resource assignment will be telemetered
- NSR
 - − No offers → Based on energy offer/availability/capability
 - PJM"s expectation of the resource"s capability will be telemetered



High Level Unit Model

- Startup Time
- Notification Time
- Min Run Time
- Min Down Time
- EcoMin
- EcoMax
- Spin Ramp Rate (optional → energy ramp rate)
- SpinMax (optional \rightarrow EcoMax)
- Segment-Based Ramp Rates (up to 10)



Example #1: Uniform Ramp Rate, No Dead Bands





Example #2: Segmented Ramp Rate, Duct Burning





Example #2: Segmented Ramp Rate, Duct Burning



- If the unit was economic to dispatch at EcoMax using a 15 minute look ahead
 - 2 minutes to get from 575 MW to 596 MW
 - The remaining 13 minutes of the look ahead time would be used trying to dispatch the unit through the "Load Duct Burning" range
 - Similarly, the unit would get a very small reserve estimate
 - About 21 MW
 - Only difference would be due to 10 minute reserve calculation versus 15 minute energy dispatch timeframe



Example #2: Segmented Ramp Rate, Duct Burning



- For combined cycles who do not model the duct burning range discretely, they can set SpinMax < EcoMax
 - This results in no reserves being calculated beyond the SpinMax point
 - Ideally the point where the ducts need to be loaded (596 MW in this case)
 - This includes Tier 1 and Tier 2
 - Tier 1 is only estimated up to the SpinMax
 - Tier 2 would be dispatched with reference to the SpinMax which would be below the duct burning range



Loading of Duct Burning For Energy

- If a unit is modeled with a duct burning type of capability and the loading of that output range takes more than the SCED look ahead period (typically 15 minutes), the unit will likely not be told by SCED to load the duct burners
- IT SCED (about a 2 hour lookout) has the ability to load this output range if it makes sense economically
- System operators use this in addition to other inputs to make that decision and manually communicate this
 - Time of day
 - Accuracy of forecasts (load and interchange)
 - Transmission constraints



Loading of Duct Burning For Energy

- GOs also may call to offer the output range or call to notify PJM that they will be loading it
 - Non-ramp restricted base points in eMKT
 - LMP > cost in duct burning range
- Long Term Goal
 - Revamp combined cycle model
 - Potential to get this done by Summer 2013