



# Update of Unit Specific Ramp Rate Feasibility Study

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Presented to WMS-August 17<sup>th</sup>, 2005

# Introduction

- Real Time Balancing Market overview
- PRR 476  
Ramp Rate Adherence During Local Congestion
- ERCOT was requested by TAC to do a feasibility study of implementing resource specific ramp rate in current real time market



August 17th, 2005

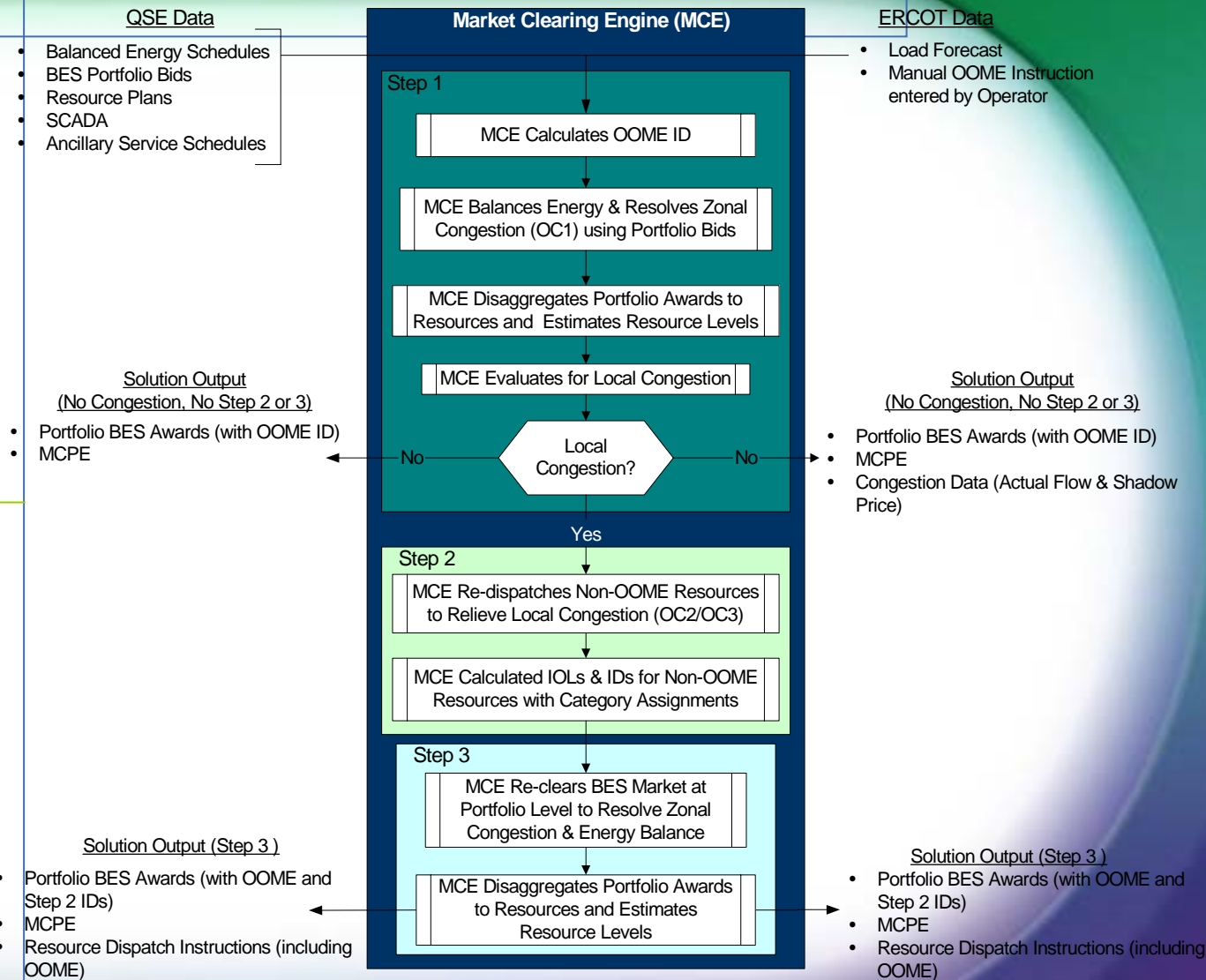
# Balancing Market Overview

- ERCOT Balancing Market has three major steps:
  - Step 1: Resolve zonal congestion and energy balance with portfolio-based balancing energy clearing
  - Step 2: Resolve local congestion without considering resource specific ramp rate
  - Step 3: Resolve zonal congestion and energy balance by balancing energy deployment considering instructed deviation of resource specific deployment



August 17th, 2005

# Balancing Market Clearing Engine



# PRR 476

- PRR 476: Ramp Rate Adherence During Local Congestion  
recommends provisions be added to the Protocols requiring that ERCOT Dispatch Instructions include and adhere to unit Resource Plan ramp rate
- Sponsored by Exelon on 11/13/03
- Remanded to TAC by Board on 6/15/04
- Remanded to WMS by TAC on 7/8/04
- Feasibility study by ERCOT is under way



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# Work Has Been Done

- Develop Alternatives
- Identify impacted areas
- Document of the proposal
- Preparation of simulation



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# Alternative I

Modify Resource upper and lower limit based on starting MW and resource ramp rate

## Pros:

- Consistency among all steps
- Low implementation cost and could be done quickly

## Cons:

- May have extensive impact on balancing market clearing, pricing and deployment
- Intensive simulation is needed to identify the degree of market impact



# Alternative II

Formulate Resource Ramp Rate as a soft constraint in all three steps

Pros:

- Balancing energy market may produce more robust solution than Alternative I;
- Could help to maintain consistency among three steps

Cons:

- Needs to change SPD for simulation and implementation;
- Could cost more time and human resources.



# Alternative III

Use resource ramp rate in Step 2 only,  
no major changes in step 1 and step 3

## Pros:

- May have smaller impact on balancing market clearing and deployment

## Cons:

- Need to change SPD for simulation and system implementation;
- May take longer time for system implementation;
- Inconsistency may arise among the 3 steps  
e.g. Balancing Energy estimated award in Step 1 may be infeasible with regard to ramp rate limits in Step 2

# Impacts

Some areas identified for further study by simulation

1. What is the initial starting MW for enforcing unit ramp rate in real time- SCADA, Resource Plan, ERCOT estimated level?
2. What is the impacts on enforcing unit ramp rate with respect to Energy schedule? How to deal with those schedules that is infeasible when considering unit ramp rate?
3. What is the impacts on enforcing unit ramp rate in portfolio disaggregation (after Step 1, before Step 2): BES cleared. How to allocate those balancing awards that become infeasible when considering ramp rate?
4. What is the relative penalty factor for unit ramp rate violation relative to power balance and congestion constraints? Portfolio ramp rate? When there is no local congestion solution, should unit ramp rate be relaxed?

# Impacts

5. How will enforcing unit ramp rate impact:  
a) Portfolio ramp rate with no recall and b)  
Portfolio ramp rate with recall? How to deal  
with Unit specific deployment recall?
6. What is the cross impact with constraint  
oscillation management?
7. What is the impact on MCPE due to  
enforcing unit ramp rate?
8. What payment is due to a unit that was  
limited by its ramp rate?
9. What is the cross impact of ramp rates  
being enforced on OOME vs. Balancing  
Market?

# Impacts

10. Will unit ramp rate also be considered in unit commitment process?
11. How should ramp rate be considered in Resource Plan validation? How to deal with those infeasible Resource Plans when considering ramp rate?
12. If there is an inconsistency between ramp rate value in the Resource Plan and the real time SCADA signal, which one should be used? (RT vs HA)
13. How to consider the capacity beyond the ramping capability of this resource when checking for Ancillary Services capability?
14. What is the impact of unit ramp rate on dynamic scheduling, responsibility transfer and capacity auction?

# Document the feasibility study

Unit Specific Ramp Rate  
Feasibility Study report is  
being drafted

- Overview
- Proposed modification
- Simulation and validation
- Summary



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# Preparation of Simulation

- Market Case Sampling
  - Random sampling from period: 7/1/2004-7/1/2005
  - Both single and multiple transmission violations are considered
  - 80 interval-cases from real time study with local congestion
  - 20 interval-cases from hour ahead study with local congestion
- This simulation will use the ramp rate submitted by the Resources and it can not predict how the market participants will submit their unit ramp rates when the PRR is implemented.
- While the simulation on Alternative I is feasible, it will be very hard to do the complete simulation for Alternative II and III due to SPD changes will be needed.



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# Preparation of Simulation (cont'd)

- Simulation environment
  - ERCOT EMMS database
  - SPD (Scheduling, Pricing and Dispatch) Engine
  - Modify Input SPD File
- Resource
  - O&M Project number: PR-30018
  - The simulation may take time due to same Resource is deployed for:
    - Release 4 testing and support,
    - Texas Nodal Project,
    - Support of existing market operations,
    - New PRRs and system improvements...



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# Work to be done

- Simulation for the sampled intervals
- Analyze market/reliability impact of enforcing ramp rate limits
- Entire one year simulation will be conducted, if needed
- Complete the feasibility study report
- The conclusion will depend on the simulation results by analyzing the comprehensive simulation results; nevertheless, it is predictable that this project might be the most complicated one which can have extensive impacts on market efficiency and system reliability.

# Stakeholders Inputs

- Should ERCOT continue this feasibility study considering the Commission approval of Texas Nodal market design?
- If the feasibility study finds a way to implement the unit ramp rate and it is a high cost/effort solution, should we still proceed with the system implementation considering ERCOT will move to a nodal system sometime in the future?



August 17th, 2005



Questions

