Congestion Analysis Using PROBE

ESPWG Update

September 19, 2003

PROBE Analysis Update

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Congestion Analysis Using PROBE

- PROBE
  - Software Available at NYISO to Mirror the SCUC
  - Data Fed From Actual Day Ahead Market
  - Assumes Given Unit Commitment
  - Hourly Power Flow Models Available
  - Viewer Mode for Analyzing History
  - Simulator Mode for "What If " Analysis

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Congestion Analysis Using PROBE

- Idea
  - Use the PROBE Software to Analyze 2003 Congestion Cost and Causes
  - Attribute Congestion Cost to Constraints
  - Adjust Cost to Remove "Unusual Events"
  - Use Results to
    - Quantify Congestion Cost
    - Establish a Congestion Cost Analysis Procedure
    - Inform Grid Planning
  - Perform Monthly Assessments Going Forward

- In Previous Episodes
  - <u>August 19</u>: PROBE Used to Allocate DAM Congestion Cost Component to Constraints
    - Congestion Occurs at Almost All Times
    - A Maintenance Contingency was ¼ of Congestion Cost
    - Find Cost "What If" this Maintenance Contingency (MTN) Did Not Occur
    - Benchmark between SCUC & PROBE Desired for New Unit Commitment
  - <u>Sept 3</u>: "What If" Analysis of MTN Contingency
    - SCUC and PROBE Matched Revenue & MWHr
    - SCUC & PROBE Matched Congestion Outside Zones J & K, but Not There
    - With the MTN Contingency Out the Cost to Load Shifted, Not Decreased
    - SCUC/PROBE Benchmark with New UC Needs to Be Done

- **Issues**
  - Zone J & K Congestion Discrepancy
  - SCUC/PROBE Benchmark with New Unit Commitment
  - PROBE Enhancements Schedule & Cost

SCUC vs. PROBE Simulator
July 15, 2003

Constraints with >2% Cost Difference ($1000)

Constraint	Contingency	SCUC	PROBE Sim	Diff
E179THST 138 HELLGT_E 138 1	BASE CASE	$839	$557	$282
DUNWODIE 345 SHORE_RD 345 1	SPRNBRK_345_EGRDNCTY345CY49_	$837	$335	$502
			Total	$784

Work Since 8/19/03 Meeting

- Zone J & K Congestion Discrepancies

    Causes Analyzed in Detail

    Fixes Underway, But Will Take Time

SCUC vs. PROBE Simulator
July 15, 2003
Zone K (LI) Dunwoodie – Shore Rd Mismatch

- Congestion Underestimation Due to PROBE Ancillary Services Modeling
  - PROBE Assumes Set-Aside for Ancillary Services (AS) (Regulation & Reserves).
  - Ignored Impact of Ancillary Services on LMP (Not Optimized Together)
  - Ancillary Services Modeling Being Added to PROBE As We Speak
  - 10 Min LI SPIN has market clearance price ~20$/MW when PROBE and SCUC didn't match. This caused LI LBMP increase difference of ~5-15$/MW

SCUC vs. PROBE Simulator
July 15, 2003
Zone J 179th - St Hellgate (NYC) Mismatch

- Congestion Underestimation Due to PROBE GT Modeling When Mitigation is in Effect
  - Previous PowerGEM report assumed GT's fixed and not participating directly in setting LBMP
  - What is the Constraint and Price Determinant When GT's are the Marginal, but Mitigated Units ?

- Mapping of Parallel Circuits in the SCUC to Power Flow Models ?

- Resolution: Discussions with NYISO & ABB and PROBE Adjustments

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SCUC / PROBE Benchmark Analysis

- "Apples to Apples" SCUC/PROBE Comparison Possible After 9/1/03

- PROBE is Able to Study Past Periods Where SCUC Finds This Difficult

- First Half of September Did Not Have Any 'Unusual" Events Affecting Congestion

- Sept 20 – 22 Has a Lot of Outages (Fraser – Gilboa, Sprainbrook – 49TH St, Lafayette – Oakdale) …

A Good Test Sample ?

(Also 10/14 – 10/17 Edic Fraser 345 kV out)

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PROBE Enhancements
Immediate

- Report New Congestion Measures
  - Bid Cost Reports – **Nov 1**
  - Report by Bid Type (separate fixed load from price capped and virtual) – **Nov 1**

- Add Reports for Congestion analysis
  - ***Nov 15***

- "What If" Analysis
  - Smooth Data Extraction at NYISO
    - *Underway & Continuing*
  - Analyze Zone J and K Congestion Discrepancies
    - *Ancillary Service Modeling (Underway from MMU Effort);* ***Nov. 1***
    - *GT & Mitigation Modeling – **Nov 1***

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PROBE Enhancements
Next 3 Months

- Unit Commitment –
  - **Underway** With MMU Funding for their purposes

- Ancillary Services Modeling
  - **Underwa**y With MMU Funding for their purposes

- Develop New Congestion Measure
  - Investigate Different or Distributed Reference Point – **Jan 04**

- "What If" Analysis
  - Simplify Set-up of "What if" Events
    - First Parts (exclude, n -1 analysis) **Jan 04**

PROBE Enhancements
Next Year

- Unit Commitment – **Jan 04**
  - **Underway** With MMU Funding
  - Changes for Planning **TBD**

- Ancillary Services Modeling
  - **Underwa**y With MMU Funding
  - Changes for Planning **TBD**

- PAR Modeling or Optimization & improve SCUC/PROBE Flows Matching - **March 2004**

- Real Time Market Viewer – **TBD** *(w/MMU)*

- Real Time Market Simulator – **TBD** *(w/MMU)*

- Automate Multiple Days Viewing and Data Collection - **TBD**

- "What If" Analysis
  - Simplify Set-up of "What if" Events
    - Power Flow Model Changing - **TBD**

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Next Work

- Write Up Descriptive Report of Work Done & Congestion Allocation Definition
- Continue Investigating Zone J and K Congestion Discrepancies

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