



Hypothetical Study for High Gas Unit EOCs - Update

Congestion Management Working Group

Market Analysis & Validation

9/20/2021

Background

- Stakeholders requested an analysis for a hypothetical scenario:
 - Grid is in a relatively tight condition;
 - Gas price goes to extreme high value;
 - All gas units have to offer at SWCAP.
- ERCOT presented the initial study result on August CMWG:
 - Ran study for SCED data on June 14th, 2021 (from 13:40 to 14:40);
 - When we raise the gas unit EOCs to SWCAP, the hypothetical study result shows significant under-generation MW.
- Further study requested:
 - Analyze the LMP distribution under the hypothetical scenario;
 - Explore the impact of different power balance penalty cost.

Methodology

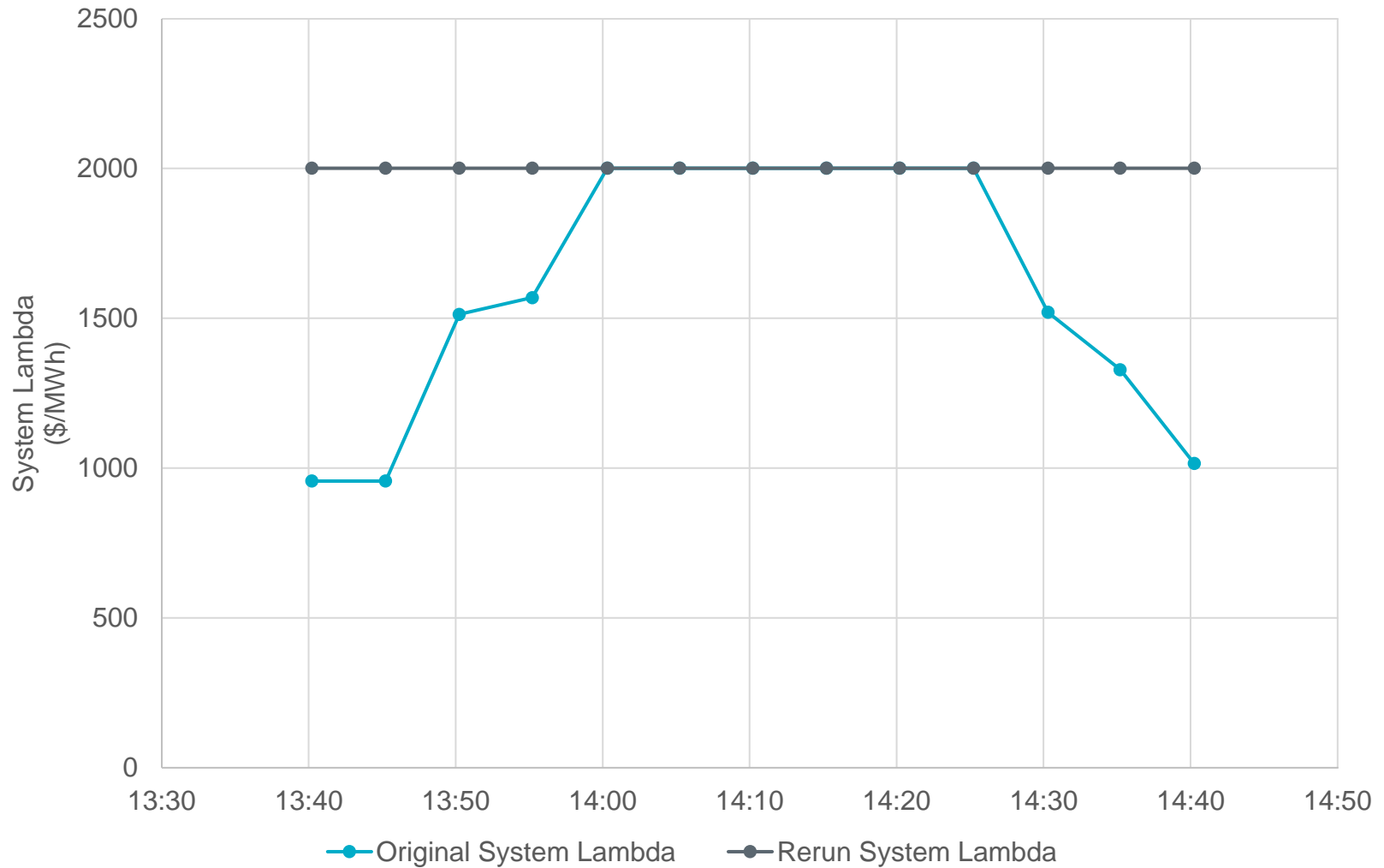
- Analyze SCED data on June 14th, 2021 (from 13:40 to 14:40, which includes the intervals when system lambda reached \$2,001/MWh);
- Change all the gas units Energy Offer Curve to System-Wide Offer Cap (\$2,000/MWh);
- Rerun SCED cases sequentially – The output from previous SCED rerun result will be the input for the following SCED.

- **A series of simulation runs were performed by changing the highest value on power balance penalty curve for the under-generation scenarios.**

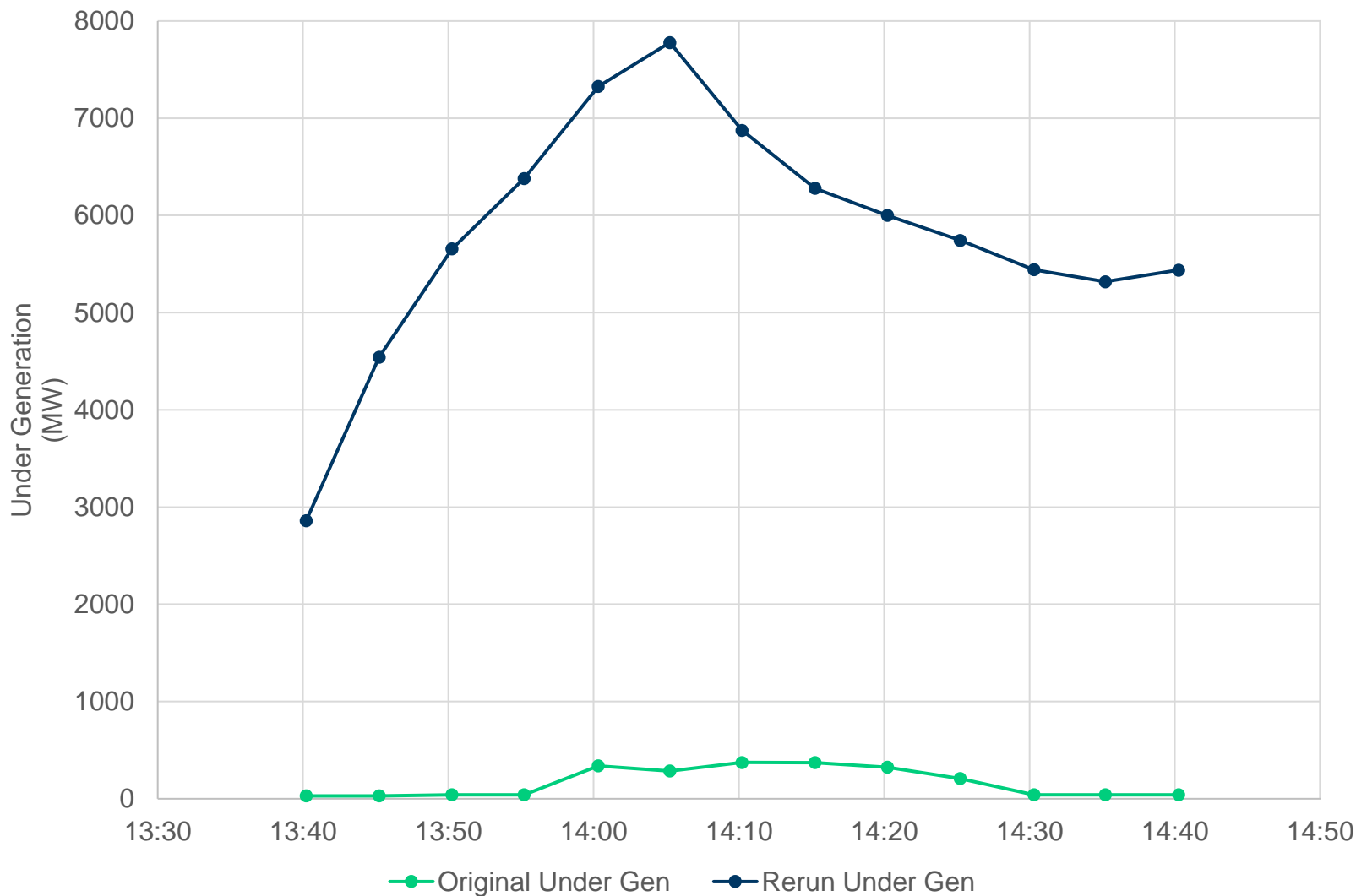
Recap of the original study result (PBPC capped at \$2,001/MWh)

- SCED can always solve under the hypothetical scenario:
 - With large amount of power balance violation.
 - May never happen in reality because we would need actions to manage the power balance violation.
- Transmission Constraints violation would be reduced.
- Most Resources would have lower Base Points.

Study Result – System Lambda (PBPC capped at \$2,001/MWh)

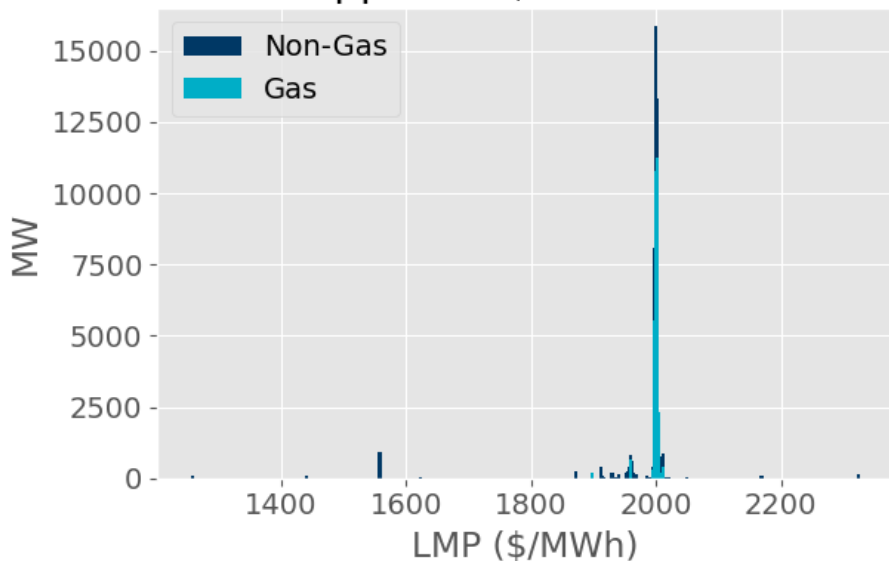


Study Result – Under Generation (PBPC capped at \$2,001/MWh)

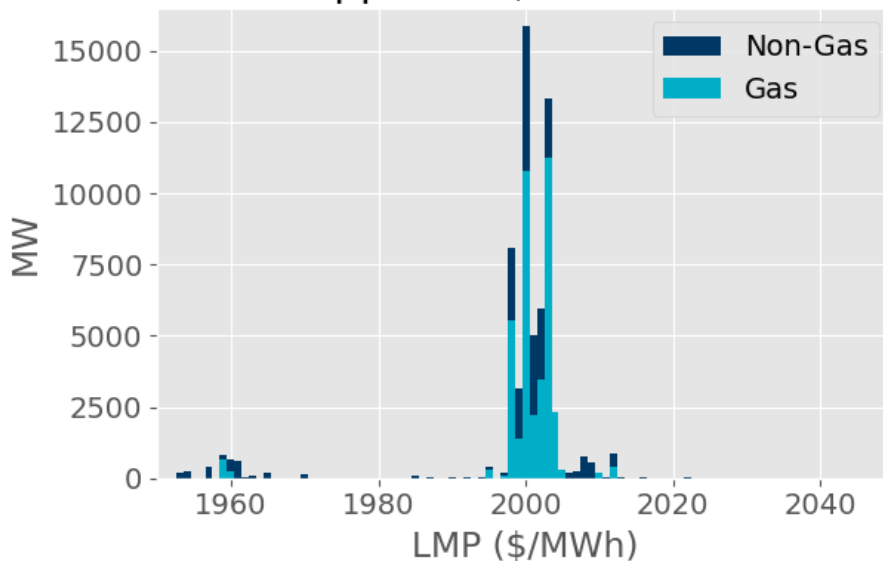


LMP distribution at 14:25 – by MW (PBPC capped at \$2,001/MWh)

LMPs when PBPC capped at \$2,001/MWh

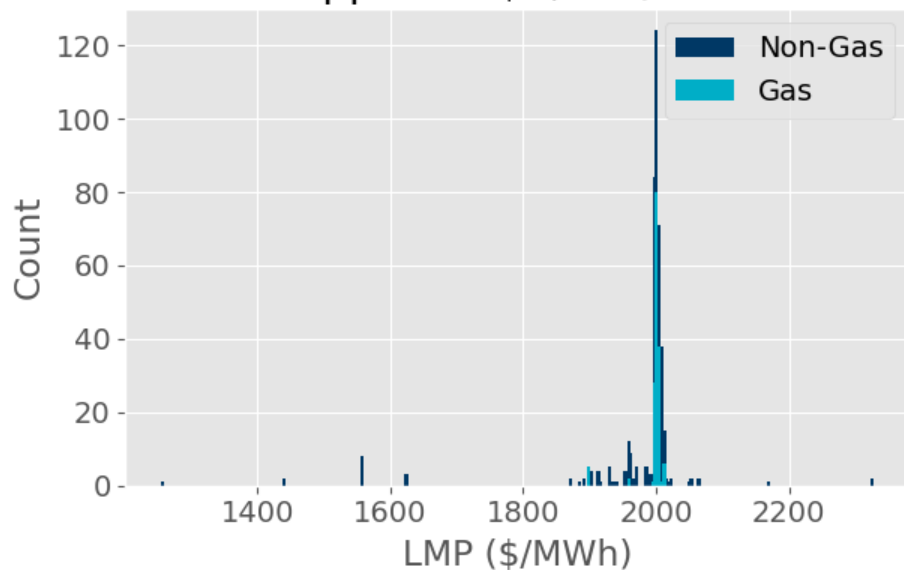


LMPs when PBPC capped at \$2,001/MWh

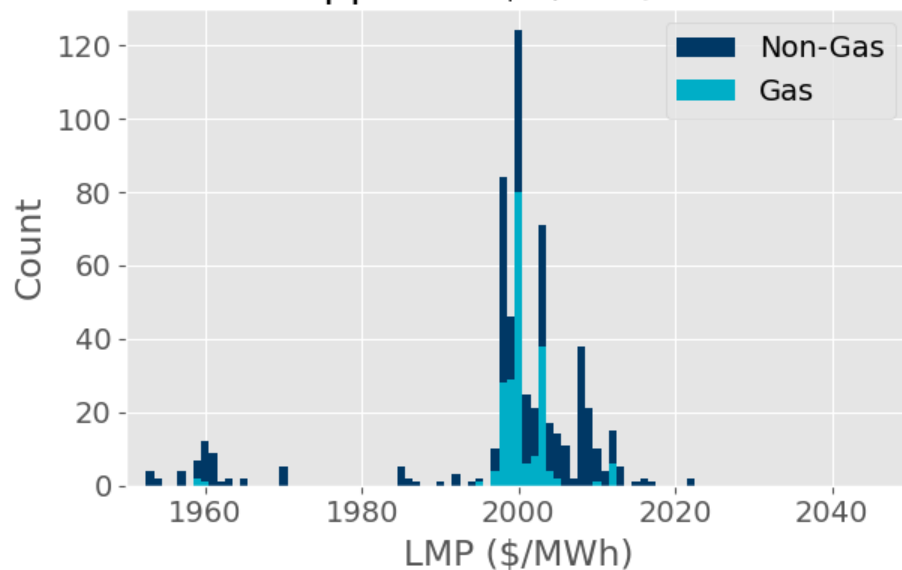


LMP distribution at 14:25 – by Resource Count (PBPC capped at \$2,001/MWh)

LMPs when PBPC capped at \$2,001/MWh

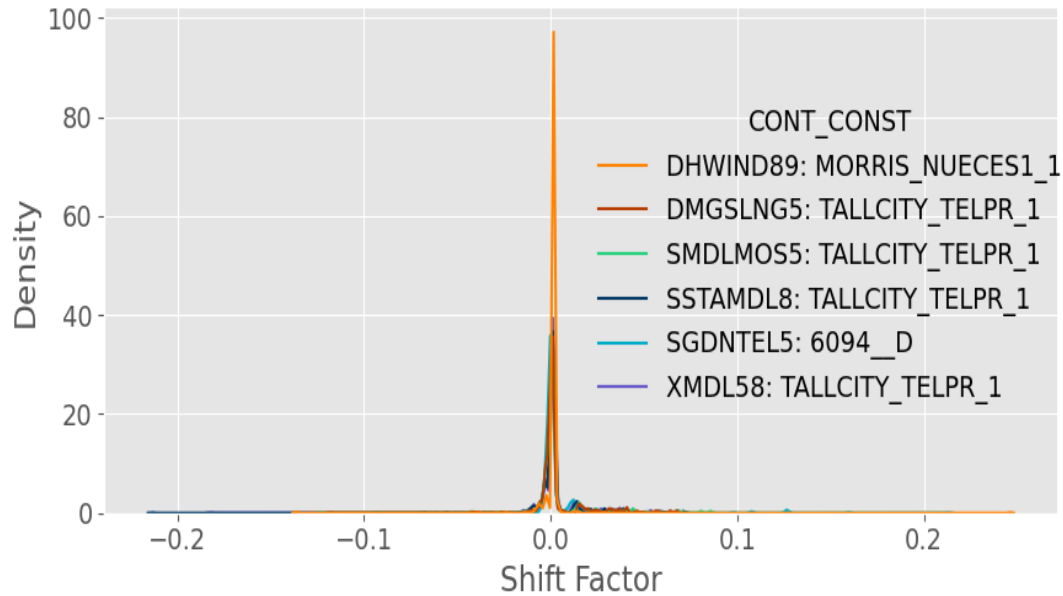


LMPs when PBPC capped at \$2,001/MWh

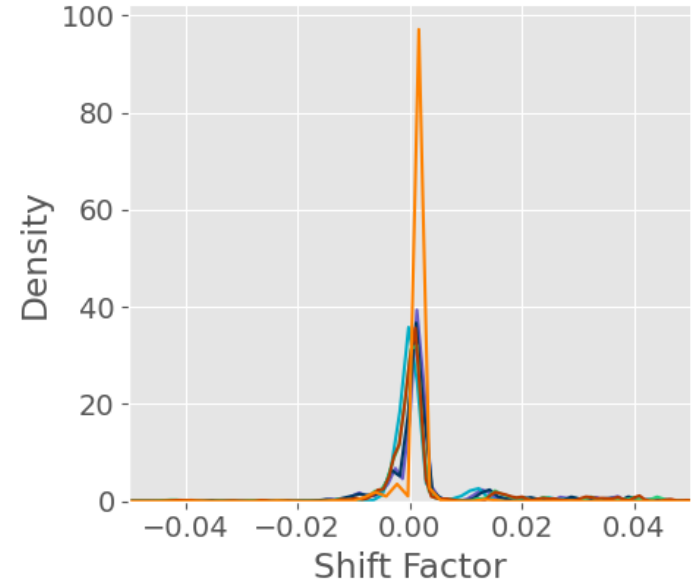


Shift factor distributions at 14:25

Shift Factor Distributions
at 14:25



Shift Factor Distributions
at 14:25



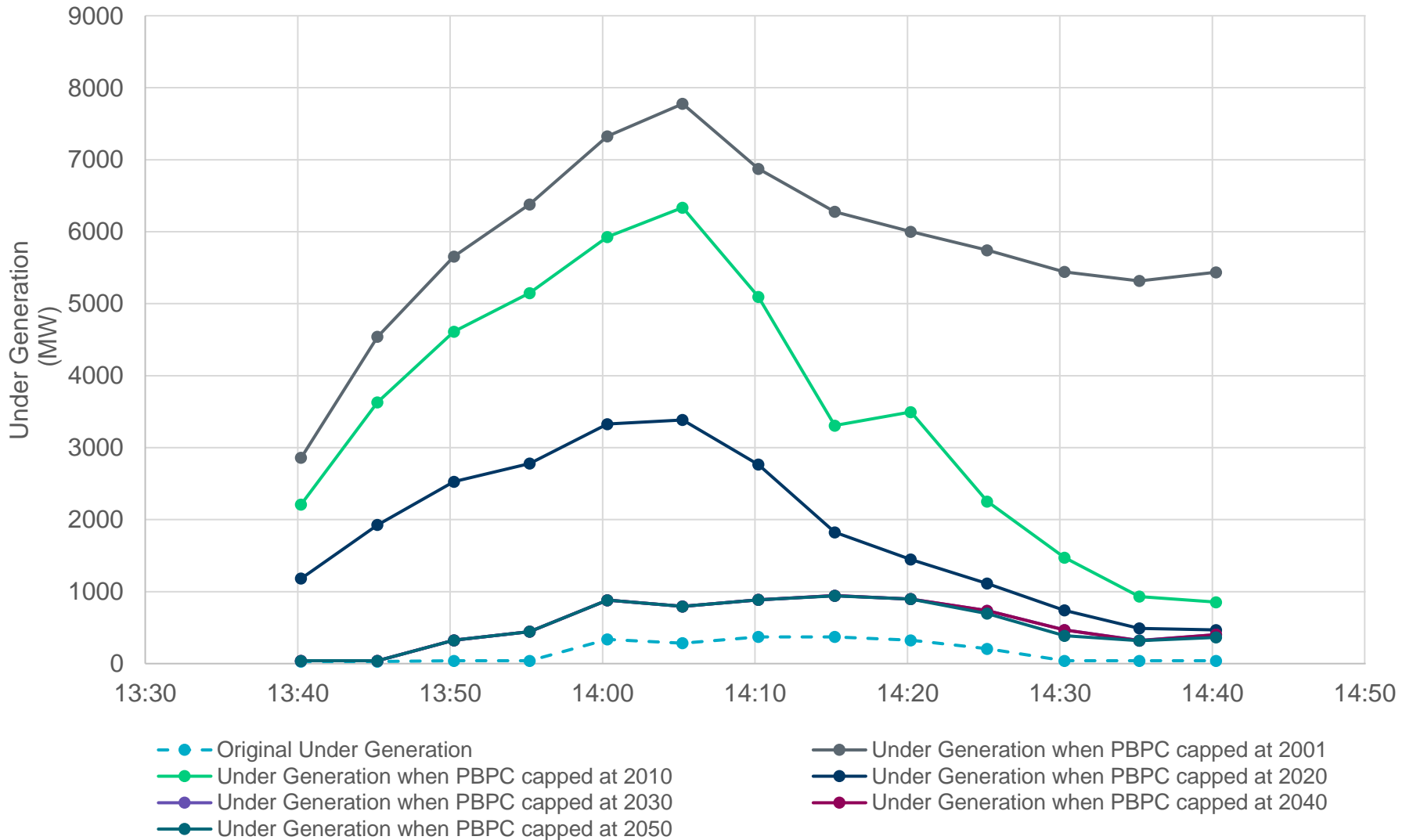
Exploratory Study by Adjusting PBPC Cap to higher values

- From OBD:

“The SCED under-generation Power Balance Penalty curve will be capped at LCAP plus \$1 per MWh whenever the SWCAP is set to the LCAP.”

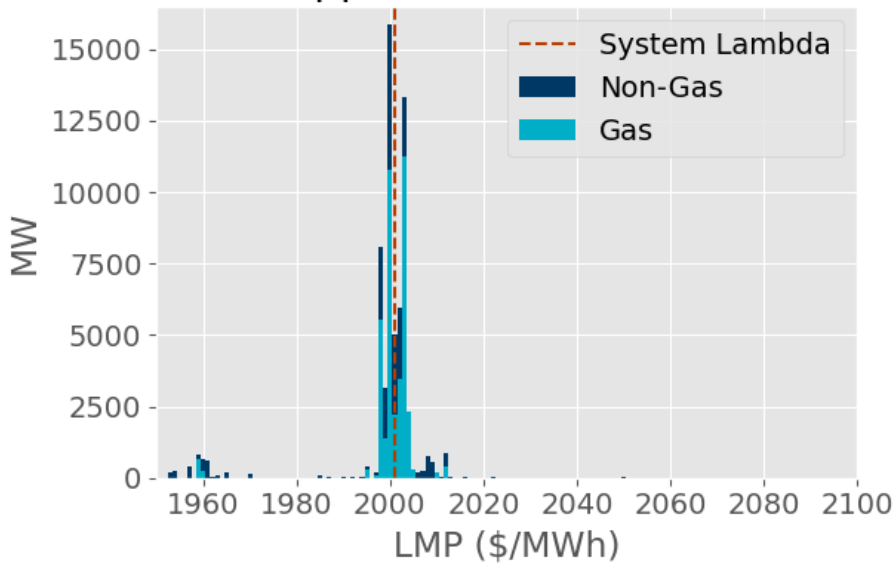
- A series of studies have been performed by adjusting the delta value from \$1/MWh to higher values (\$10/MWh, \$20/MWh...\$50/MWh) and rerunning SCED with the new values.
 - i.e., the Power Balance Penalty Curve would be capped at \$2,010/MWh, \$2,020/MWh...\$2,050/MWh.
 - The result shows that an increase of the delta value on the PBPC cap can greatly reduce the under-generation MW under the hypothetical scenario.

Under Generation MW by Adjusting PBPC Cap to higher values

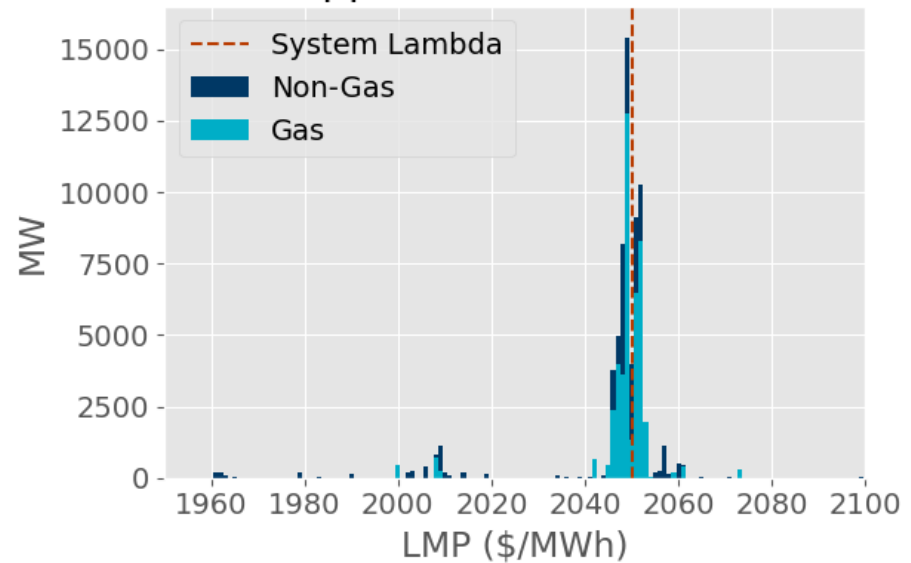


LMP distribution changes – 14:25

LMPs when PBPC capped at \$2,001/MWh

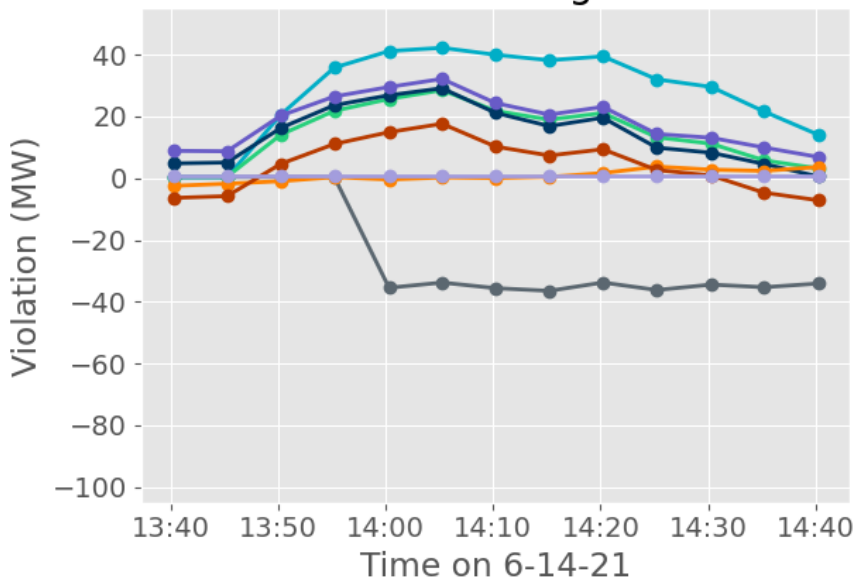


LMPs when PBPC capped at \$2,050/MWh



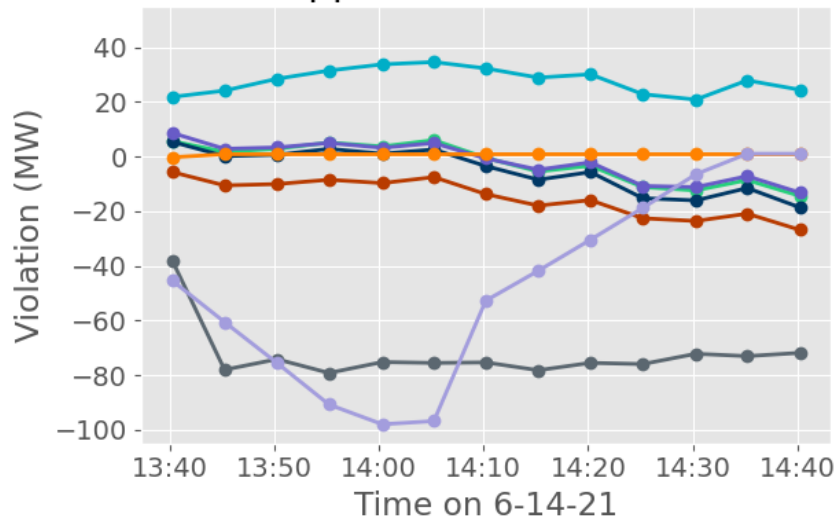
Study Result – Transmission Constraint Violation MW

Violation Original

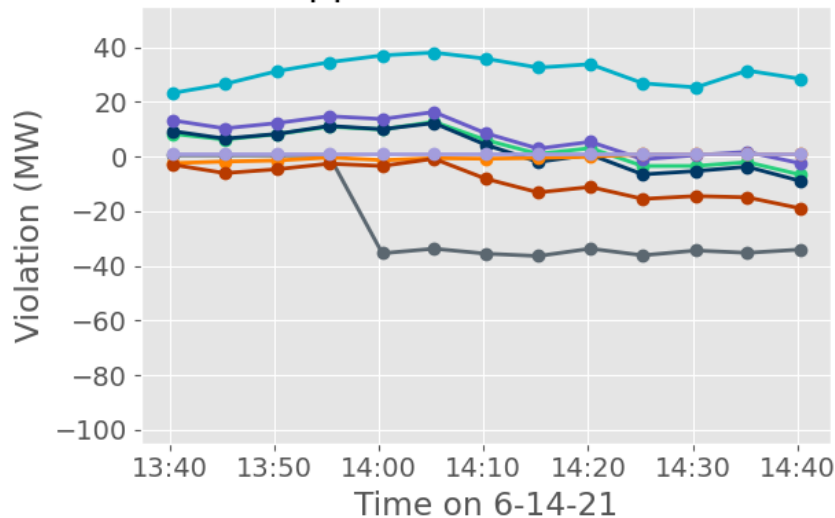


- SGDNTL5: 6094_D
- SLGEI_D8: I_DUPS_LGE1_1
- SMDLMOS5: TALLCITY_TELPR_1
- SSTAMD8: TALLCITY_TELPR_1
- XMDL58: TALLCITY_TELPR_1
- DHWIND89: MORRIS_NUECES1_1
- DMGSLNG5: TALLCITY_TELPR_1
- XDAN89: TAB_DANS_1

Violation when PBPC capped at \$2,001/MWh

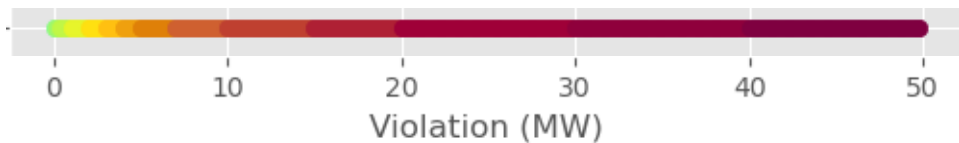
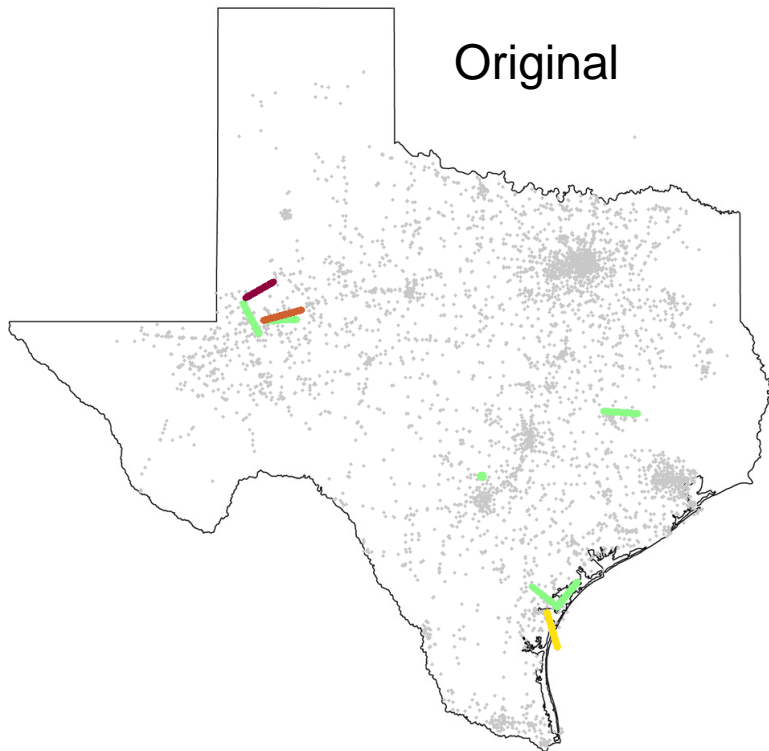


Violation when PBPC capped at \$2,050/MWh

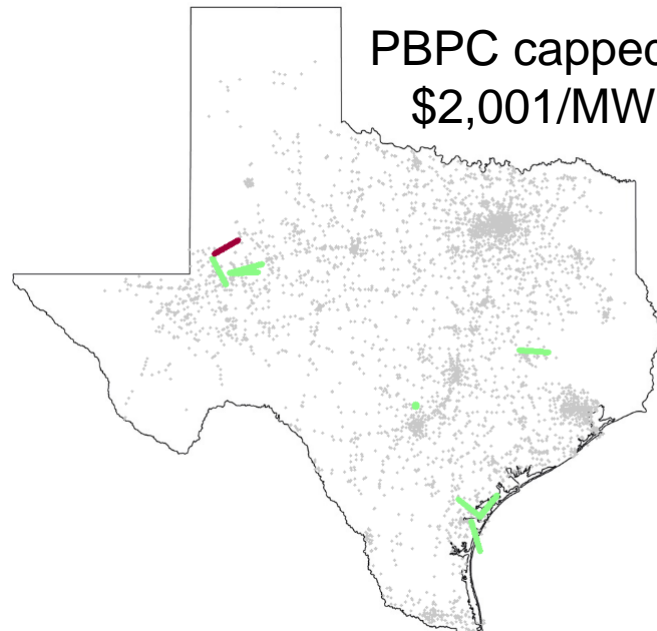


Study Result – Transmission Constraint Violation MW at 14:25

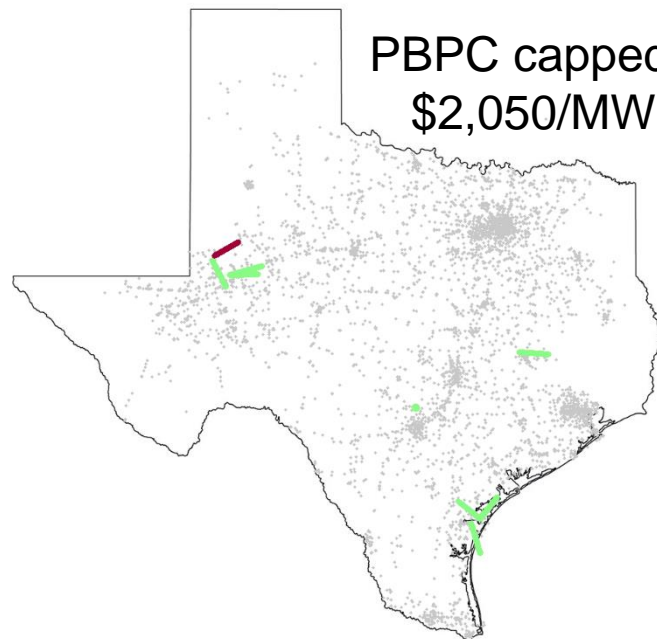
Original



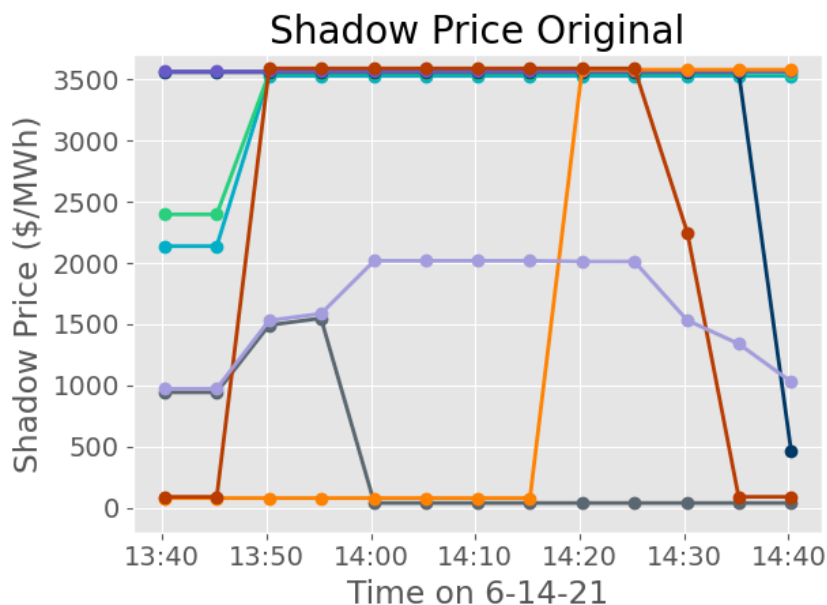
PBPC capped at
\$2,001/MWh



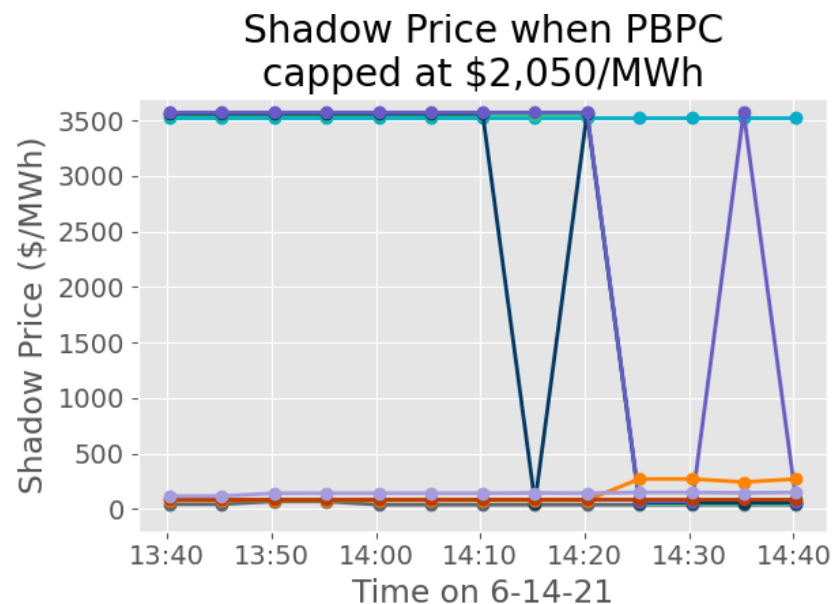
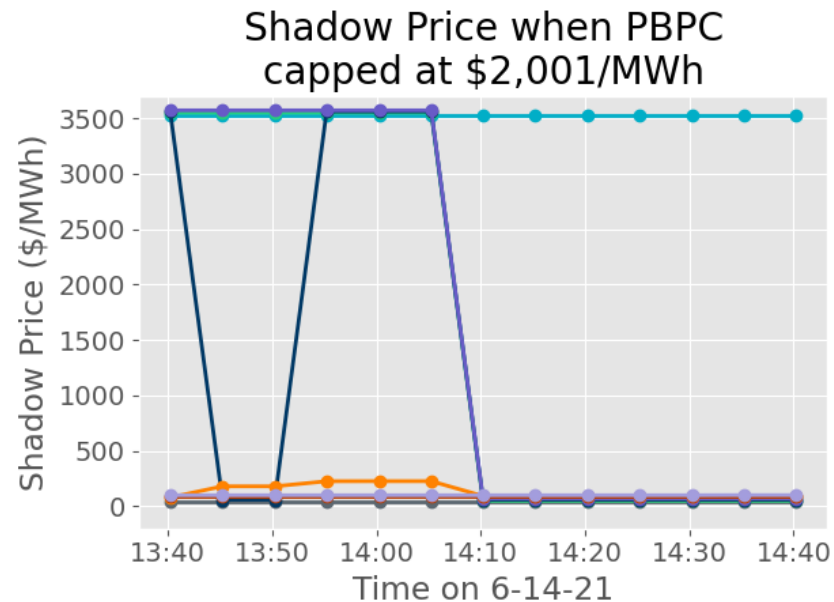
PBPC capped at
\$2,050/MWh



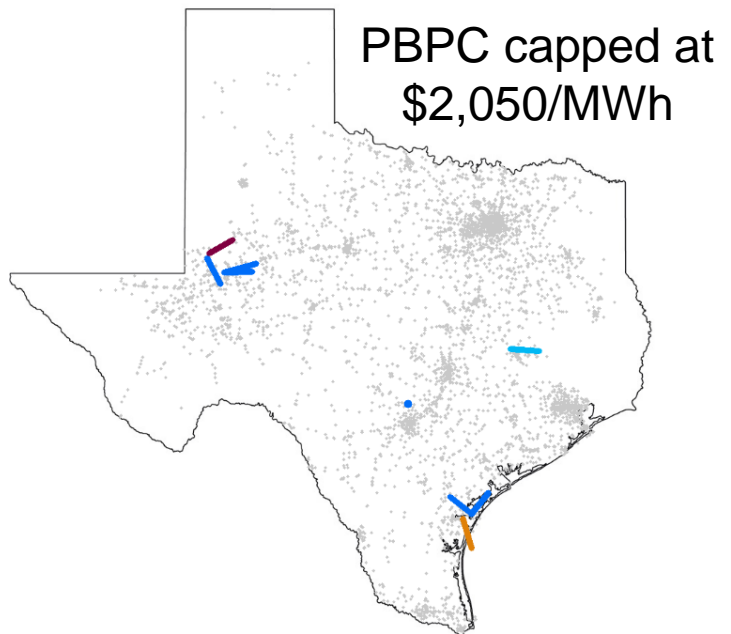
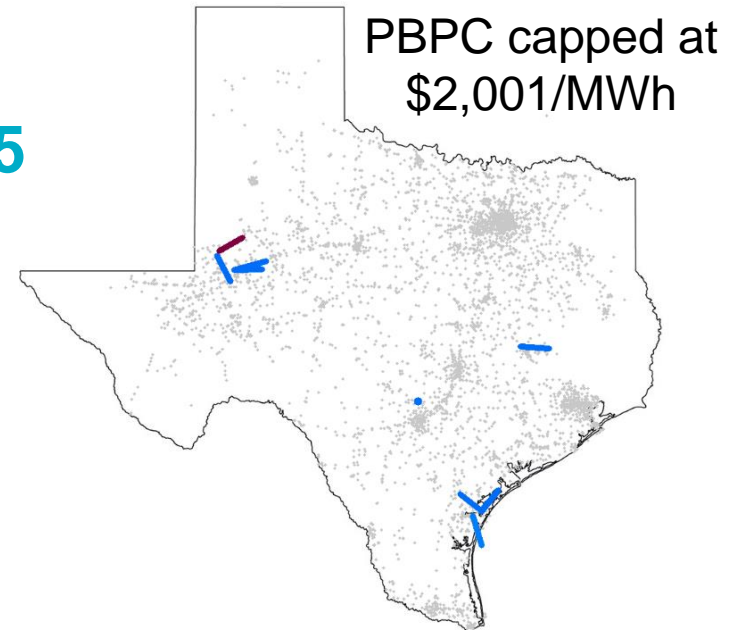
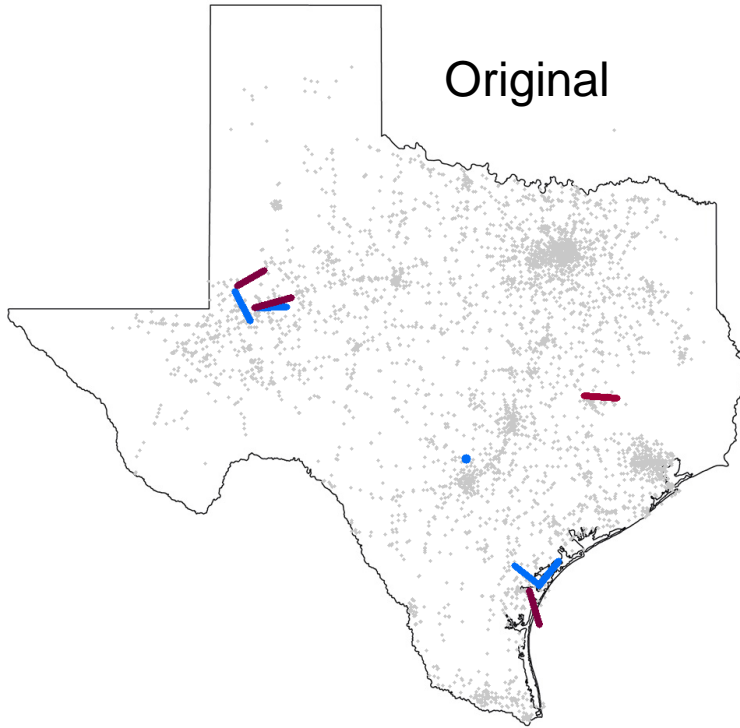
Study Result – Transmission Constraint Shadow Prices



- SGDNTL5: 6094_D
- SLGEI_D8: I_DUPS_LGE1_1
- SMDLMOS5: TALLCITY_TELPR_1
- SSTAMD8: TALLCITY_TELPR_1
- XMDL58: TALLCITY_TELPR_1
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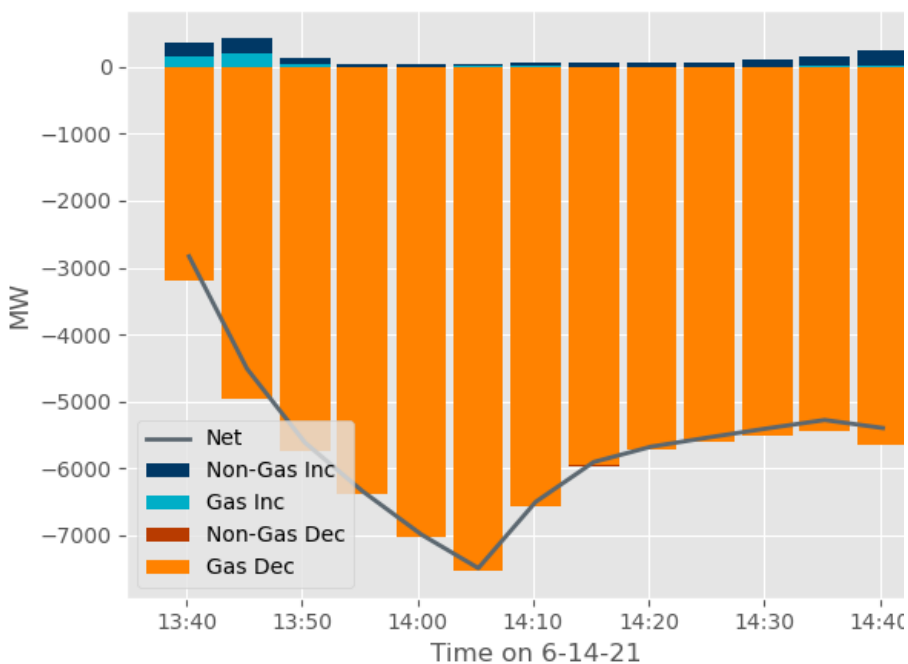


Study Result – Transmission Constraint Shadow Prices at 14:25

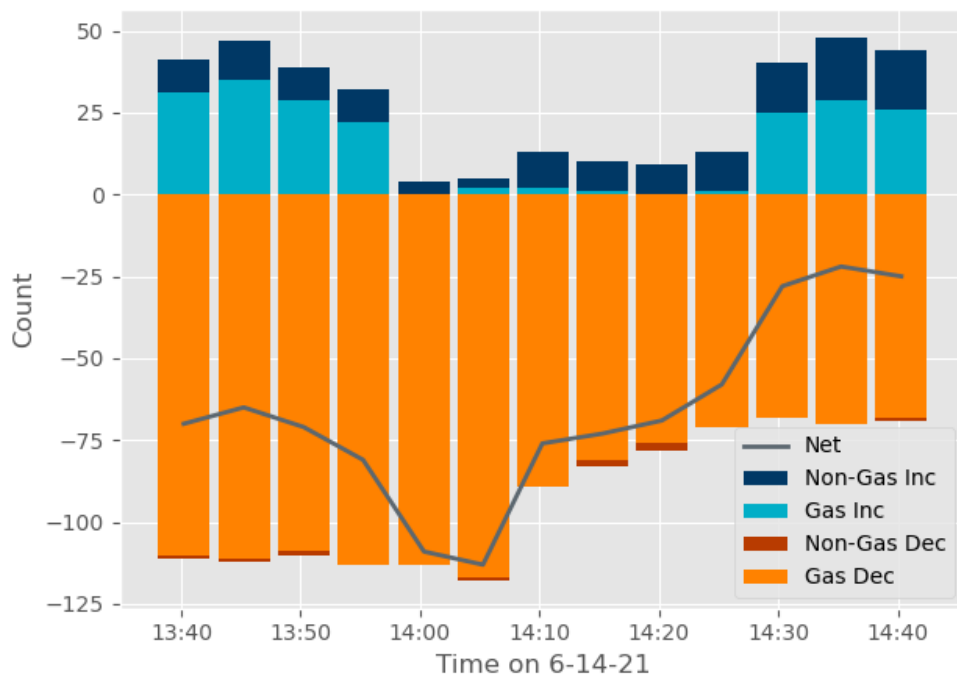


Study Result – Base Points changes (PBPC capped at \$2,001/MWh)

Resource BP Deltas

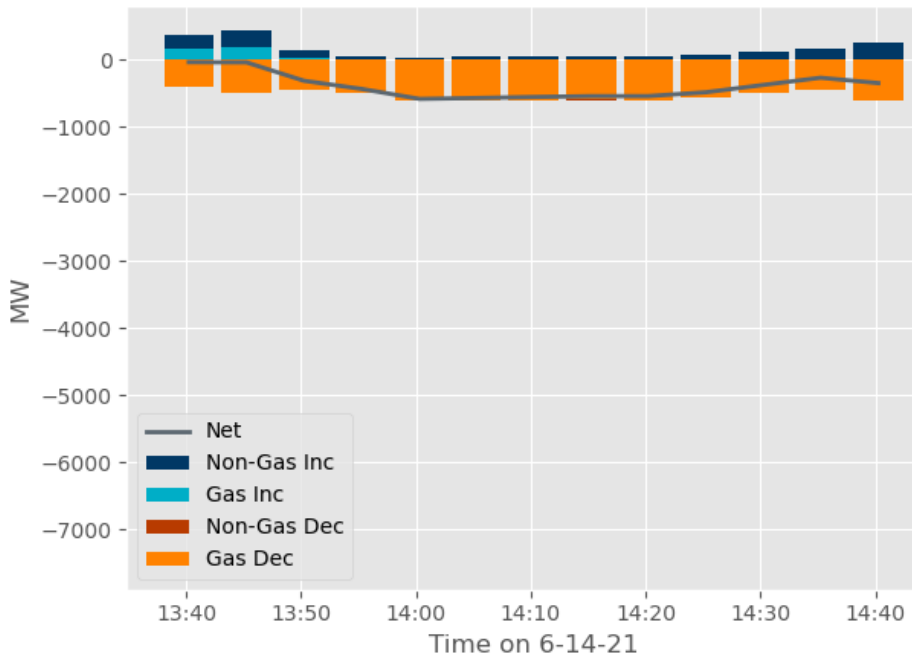


Resource BP Counts

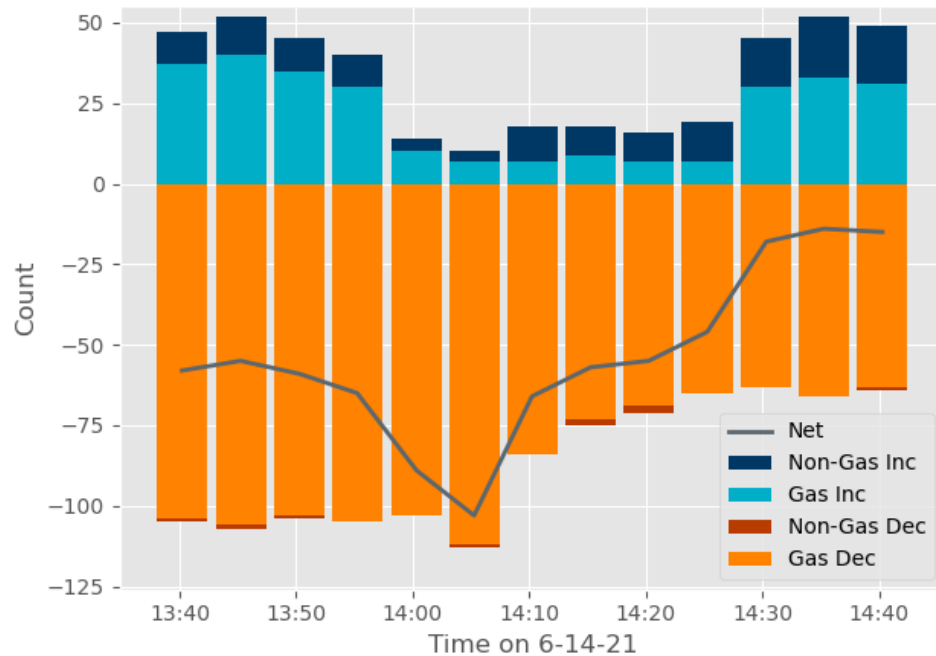


Study Result – Base Points changes (PBPC capped at \$2,050/MWh)

Resource BP Deltas

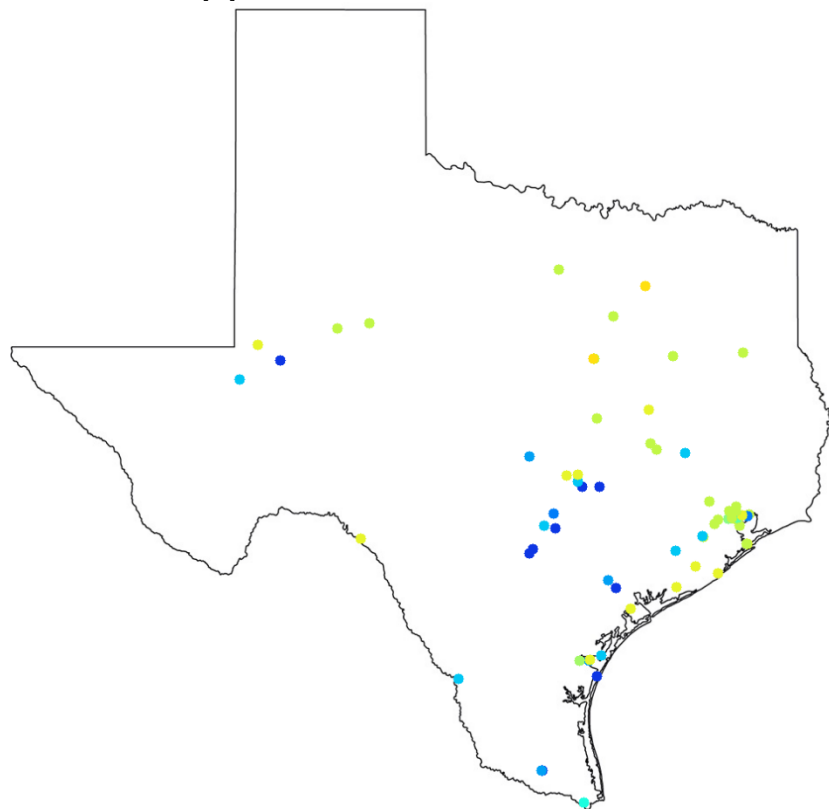


Resource BP Counts

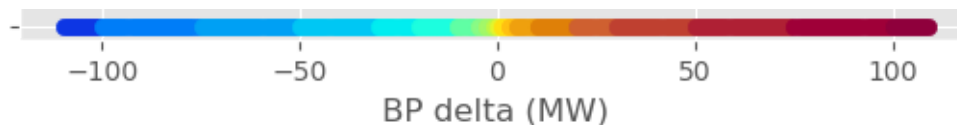
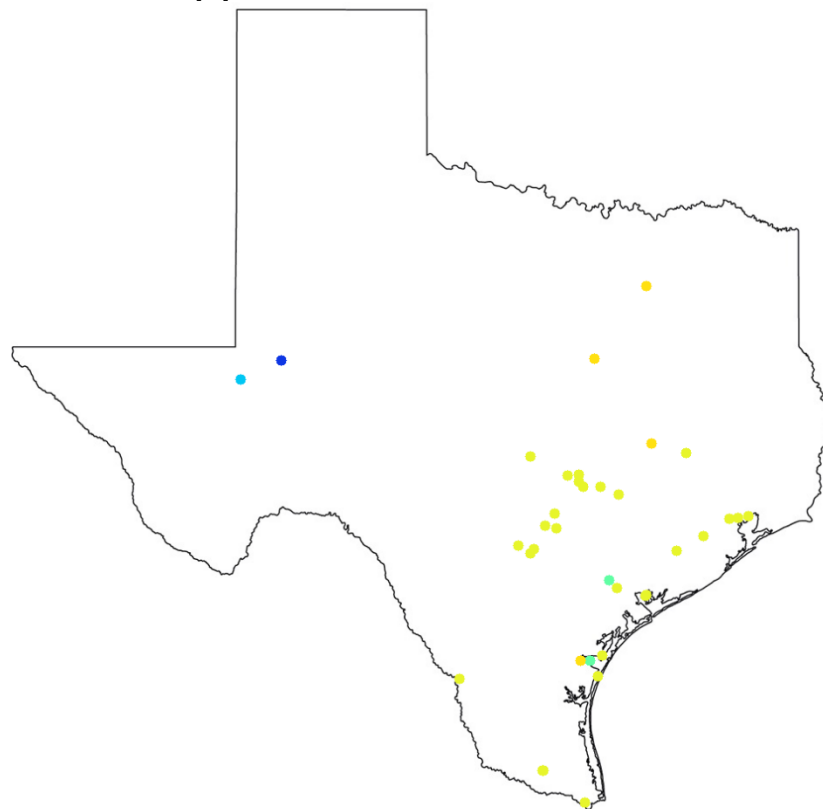


Study Result - Base Point Change on ERCOT Map relative to Original (14:25)

BP change when PBPC capped at \$2,001/MWh



BP change when PBPC capped at \$2,050/MWh



Note: resources with no change are not plotted

Questions

