

# PJM FERC Filing Simulation Summary

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In order to estimate the impacts on the PJM energy and ancillary service markets from the proposed reserve price formation enhancements, several simulations were performed using the PROBE Perfect Dispatch simulation tool. The following 3 scenarios were simulated for the 2018 calendar year and the changes made to each scenario are described below. Due to the very small impacts on the simulation results, all the scenarios included the consolidation of the Tier 1/Tier 2 reserve products and did not include the modeling of the Mid-Atlantic Dominion (MAD) reserve sub-zone.

## **Base Case (CT and Diesel Unit Commitment):**

This simulation case was meant to model current PJM market operations. Currently, in the real-time energy market combustion turbine units (CTs) and diesel units are able to be committed by the real-time market clearing engine. As a result, the simulation market clearing engine was allowed to commit these units. The commitment of all other resources was held fixed based on their actual commitment during that day. However, these units were allowed to be redispatched. The current two-step operating reserve demand curves (ORDCs) with \$850/MWh maximum penalty factors were also used.

## **Base Case (Steam, CT and Diesel Unit Commitment):**

The exact same input parameters and settings were used as in the Base Case with CT and Diesel Unit Commitment scenario with the one exception that steam units were also allowed to be committed by the simulation market clearing engine. The reason for this change was to quantify the impact of aligning PJM's current day-ahead and real-time reserve market products. By aligning the products across the two markets, the unit commitment in real-time market will be much closer to the optimal solution to provide the required amount of real-time reserves. Allowing the simulation market clearing engine to commit the steam units allows the simulation to obtain a lower bid production cost based solution that was better able to meet the real-time reserve requirements.

## **Simulation Case (Steam, CT and Diesel Unit Commitment):**

The simulation case was meant to incorporate PJM's proposed reserve market enhancement changes, which included the alignment of the day-ahead and real-time reserve products, the addition of the new sloped ORDCs with higher maximum penalty factors, and the lowering of the synchronized reserve offers to near zero. As described above, to simulate the alignment of the day-ahead and real-time reserve products, the simulation market clearing engine was allowed to commit steam, CT and diesel units.

**Important:**

It should be noted that none of the simulation results are intended to mimic actual market results as the processes used to clear the actual market differ from those of the simulation tool. Instead, the intent of all the simulations is to provide an estimate of the impacts of the different market design changes, holding all other variables (i.e. such as participant behavior) constant.