NEW YORK INDEPENDENT SYSTEM OPERATOR

Consumer Impact Analysis - Total System Cost Explanation

During the November 2, 2017 MIWG presentation of the consumer impact analysis for Securing 100+kV Facilities within the Market Model, stakeholders requested that the NYISO provide a supplemental description of why Total System Cost increased in response to less virtual load clearing in the Day-Ahead Market simulation.

The objective of the Day-Ahead Market optimization is to serve demand while minimizing total system cost. Generation supply offers are represented as positive costs, and price sensitive (price capped) load offers are represented as negative costs. Fixed load is not sensitive to price, has no offer, and therefore no costs to minimize, but is a constraint that must be honored. Decreasing fixed load typically reduces production cost, since it decreases the total amount of energy that needs to be produced. In comparison, *increasing* the amount of price-capped demand cleared will typically reduce production cost, as discussed below.

Virtual load costs are calculated as the negative load offered in MW multiplied by the offer price: Virtual Load (MW) * Price-capped Offer ($/MW). In order to minimize total system cost, the optimization algorithm schedules as much virtual load as economics allow, starting with the highest price-capped offer first, and working in order down the list to the lowest offer. Virtual load continues to be added as long as the effective incremental cost to supply that load is less than the price-capped offer of the load (the maximum price to serve the load).

In the Day Ahead simulation, securing the 115 kV system resulted in a reduction of net virtual load over a number of hours during the study period. For example, one hour in the study yielded a net reduction in price-capped load of approximately 300 MW. The increase in system cost due to the "loss" of the price capped load component was approximately $18,900. The corresponding decrease in supply cost was approximately $4,100, yielding a net increase in total system cost of about $14,800.

These results suggest that new limitations may reduce the amount of virtual load that clears in a given offer stack when the new constraints exceed the local incremental cost, thereby stopping the process of adding virtual load. The reduction in virtual load leads to a net increase of total system cost. Virtual load offers previously accepted into the production version of the market (and their negative cost) may not be feasible in situations where flow is limited on the underlying system under the simulation conditions.

The small total system cost increase observed over the study period was strongly influenced by the local reduction of virtual load. It is important to note that virtual bid offer behavior would likely have been different if the NYISO's proposal to secure 100+kV facilities in the market model were actually in place, and its impacts understood by the market, at the time the virtual bids were being submitted.