

Comments on the 11-16-2023 Price Formation Enhancements Working Group

Department of Market Monitoring

December 18, 2023

In the November 16, 2023 Price Formation Enhancements working group, the CAISO provided more detail regarding potential improvements to the balancing authority area (BAA)-level mitigation process.

The BAA-level mitigation process as is currently implemented in the Western Energy Imbalance Market (WEIM) is triggered by a positive shadow price of a BAA's power balance constraint. This condition triggers a dynamic competitive path assessment (DCPA) evaluation of whether the available generation in that WEIM BAA can satisfy the demand in that BAA without additional WEIM transfer imports.

The DCPA process used for local market mitigation determines which constraints are competitive versus non-competitive by conducting a three pivotal supplier test. The three pivotal supplier test determines whether there is sufficient supply of competitive counter-flow to meet the demand for counter-flow. The demand for counter-flow of the constraint is the aggregate demand for counter-flow of all relevant resources (which is all resources with a negative shift factor to that particular constraint). The formula to calculate demand for counter-flow of a resource is:

$$- \min(0, SF) * DOT(t)^1$$

Where:

SF is the shift factor of an injection at the resource's location to the relevant constraint

DOT(t) is the resource's optimal dispatch at interval t

DMM's understanding is that the DCPA calculation for the current approach to BAA-level mitigation is implemented the same way, and the demand for counter-flow is the amount of internal generation within a BAA that is dispatched up in the real-time market. DMM is requesting clarification that this is how the demand for counter-flow is currently calculated, and DMM highlights that this method inherently treats transfers as competitive.

To illustrate the issue, consider the following example.

BAAA	BAA B
Load = 75 MW	Load = 30 MW
Supplier A1: 100 MW @ \$30	Supplier B1: 8 MW @ \$40
	Supplier B2: 7 MW @ \$45
	Supplier B3: 6 MW @ \$50
	Supplier B4: 5 MW @ \$52

The optimal schedule would be for A1 to provide 100 MW and B1 to provide 5 MW.

¹ Market Operations BPM Appendix B. Note this calculation varies for generating versus not-generating resources.

The formula for the RSI is provided below:

$$\frac{\text{supply of counterflow}_{PPS} + \text{supply of counterflow}_{FCS}}{\text{demand for counterflow}}$$

The competitive supply of counter-flow is the sum of non-withholdable supply from the potentially pivotal suppliers ($\text{supply of counterflow}_{PPS}$) and the available capacity of the fringe competitive suppliers ($\text{supply of counterflow}_{FCS}$).

When calculating the RSI for BAA B, suppliers B1-B3 are considered potentially pivotal. Assume all three are able to withhold all of their capacity and thus $\text{supply of counterflow}_{PPS} = 0$. Supplier B4 is a fringe competitive supplier thus $\text{supply of counterflow}_{FCS} = 5$, meaning the total supply of counter-flow would be 5.

The demand for counter-flow in BAA B would be:

$$\sum_{i=1}^4 DOT(t)_i = 5$$

Since the only generator in BAA B that has an optimal schedule is generator B4, this would be 5 MW. This is equal to the net demand forecast (15-10) = 5 MW.

Thus, the RSI in this example would be 5/5= 1 and BAA B would be deemed competitive.

However, this calculation assumes that transfers are competitive. In comparison, if the RSI instead used BAA load, rather than net load, as the demand for counter-flow then the denominator would be 30 MW. The numerator, or the competitive supply of counter-flow, would depend on whether the 25 MW of potential transfers were competitive. If competitive, then supply of counter flow would be 5+25= 30, which implies an RSI of 1 and BAA B would be deemed competitive. If the transfers were non-competitive, then the RSI would be 5/30 and BAA B would be deemed non-competitive.

DMM is requesting clarification on how the demand for counter-flow is calculated in the current BAA-level DCPA process. If the demand for counter-flow is calculated as it is for flow-based constraints, then DMM highlights that this approach assumes transfers are competitive. DMM is not necessarily recommending that transfers be treated differently, but believes it requires further consideration especially when discussing potential grouping methodologies.