



October 24, 2018

To: Market Sellers Using an Opportunity Cost Adder in Cost-Based Energy Market Offers

Re: PJM Approval of IMM Opportunity Cost Calculator as an Alternative Method

Background

This letter provides clarification on PJM-approved methods of calculating the Energy Market Opportunity Cost Adder or the Non-Regulatory Opportunity Cost Adder in Cost-Based Energy Market Offers and approval of the IMM Opportunity Cost Calculator as a PJM-approved alternative method of calculating Energy Market Opportunity Costs.

Market Sellers may include in the calculation of “other incremental operating costs” in cost-based energy market offers an amount reflecting the unit-specific Energy Market Opportunity Costs expected to be incurred if the generating unit is subject to operational limitations due to energy or environmental limitations, as described in Schedule 2 of the PJM Interconnection Operating Agreement.

Market Sellers may include in the calculation of “other incremental operating costs” in cost-based energy market offers an amount reflecting the unit-specific Non-Regulatory Opportunity Costs expected to be incurred if the generating unit is subject to operational limitations due to a physical equipment limitation due to an original equipment manufacturer recommendation, insurance carrier restriction, or a fuel supply limitation resulting from a Catastrophic Force Majeure, as described in Schedule 2 of the PJM Interconnection Operating Agreement.

The opportunity cost adder may be calculated by:

1. The Opportunity Cost Calculator available in Markets Gateway
2. A PJM-approved alternative method (See Operating Agreement, Schedule 2, section 1.1 (a))

PJM Review of the IMM Opportunity Cost Calculator

PJM staff, in cooperation with IMM staff, has performed an extensive review of the IMM's Opportunity Cost Calculator with the intent of analyzing the differences between the PJM and IMM calculators and determining if PJM could approve the use of the IMM calculator for use by Market Participants (see [Market memo from August 7, 2018](#)).

Based on this review PJM considers the IMM's Opportunity Cost Adder to be an approved alternative method of calculating Energy Market Opportunity Costs and Non-Regulatory Opportunity Costs (See Operating Agreement Schedule 2 Section 1.1(a)). Usage of the adder produced by the IMM's calculator in a Market Participant's cost based energy offer is conditioned on the following process being followed:

- Market Participant will include PJM (via email at fuelcostpolicyanalysis@pjm.com) on the initial request to the IMM to utilize the IMM opportunity cost calculator. Operating Agreement Schedule 2 Section 1.1(a) requires Market Participants to submit a request to



PJM for consideration and approval of an alternative method for calculation opportunity cost.

- IMM will provide to PJM any and all results from its calculator provided to a Market Participant.
- IMM will alert PJM of any and all pending changes to the IMM calculator prior to implementation to allow PJM sufficient time to review the impact and results of such changes.

PJM has determined that the IMM's calculator is a valid alternative method for calculating opportunity costs. However, PJM does not believe the IMM Opportunity Cost Calculator directly adheres to the methodology for calculating Energy Market Opportunity Costs as documented in PJM Manual 15, Section 12. Specifically, the features and assumptions described below highlight the differences between the methodology described in Manual 15 (consistent with PJM's Opportunity Cost Calculator in Markets Gateway) and the IMM's Opportunity Cost Calculator.

- The IMM calculator models a unit's Minimum Down Time operating parameter. The PJM calculator does not utilize this parameter.
- The IMM calculator models a unit's start up emissions and coordinates duct burner operation with base load operation. The PJM calculator does not.
- The IMM calculator uses an additional scalar to line up the day of the week between the historical LMPs and the forecasted LMPs. The PJM calculator does not.
- The IMM calculator uses the Platt's balance of the month fuel forward for the current month. The PJM calculator uses the Platt's forwards for all months including the current month.
- The IMM calculator uses an optimization method as opposed to the block margin solution method utilized in the PJM calculator.
- The IMM calculator simultaneously enforces all rolling period emission limits. PJM calculator may require a solution for each limitation in order to determine the most constrained limit.
- The IMM calculator derives the shadow price of the binding constraint by taking the difference in generator revenue from an initial run and a subsequent run that restricts the operating hours within the constrained period by one hour; the shadow price is the marginal opportunity cost adder. The PJM calculator uses the margin of the lowest block added before the run hour limitation is reached.
- The IMM calculator utilizes historical bidding behavior to determine the expected unit offer behavior when calculating opportunity cost. The PJM calculator is based on unit cost as documented in M-15.

Additional questions on the PJM calculator can be addressed to Jennifer Freeman at Jennifer.Freeman@pjm.com.

Sincerely,
Glen Boyle
Manager, Operations Analysis and Compliance