

July 27, 2016 MRC

Draft Operating Agreement Revisions- For Discussion Purposes Only

Operating Agreement Schedule 2 Revisions for Fuel Cost policies

- (a) Each Market Participant obligated to sell energy on the PJM Interchange Energy Market at cost-based rates may include the following components or their equivalent in the determination of costs for energy supplied to or from the PJM Region:

For generating units powered by boilers

Firing-up cost

Peak-prepared-for maintenance cost

For generating units powered by machines

Starting cost from cold to synchronized operation

For all generating units

Incremental fuel cost

Incremental maintenance cost

No-load cost during period of operation

Incremental labor cost

Other incremental operating costs

For a generating unit that is subject to operational limitations due to energy or environmental limitations imposed on the generating unit by Applicable Laws and Regulations (as defined in the PJM Tariff), the Market Participant may include in the calculation of its “other incremental operating costs” an amount reflecting the unit-specific Energy Market Opportunity Costs expected to be incurred. Such unit-specific Energy Market Opportunity Costs are calculated by forecasting Locational Marginal Prices based on future contract prices for electricity using PJM Western Hub forward prices, taking into account historical variability and basis differentials for the bus at which the generating unit is located for the prior three year period immediately preceding the relevant compliance period, and subtract therefrom the forecasted costs to generate energy at the bus at which the generating unit is located, as specified in more detail in PJM Manual 15. If the difference between the forecasted Locational Marginal Prices and forecasted costs to generate energy is negative, the resulting Energy Market Opportunity Cost shall be zero. Notwithstanding the foregoing, a Market Participant may submit a request to PJM for consideration and approval of an alternative method of calculating its Energy Market Opportunity Cost if the standard methodology described herein does not accurately represent the Market Participant’s Energy Market Opportunity Cost.

For a generating unit that is subject to operational limitations because it only has a limited number of starts or available run hours resulting from (i) the physical equipment limitations of the unit, for up to one year, due to original equipment manufacturer recommendations or insurance carrier restrictions, or (ii) a fuel supply limitation, for up to one year, resulting from an event of Catastrophic Force Majeure, the Market Participant may include in the calculation of its “other incremental operating costs” an amount reflecting the unit-specific Non-Regulatory Opportunity Costs expected to be incurred. Such unit-specific Non-Regulatory Opportunity Costs are calculated by forecasting Locational Marginal Prices based on future contract prices for electricity using PJM Western Hub forward prices, taking into account historical variability and basis differentials for the bus at which the generating unit is located for the prior three year period immediately preceding the period of time in which the unit is bound by the referenced restrictions, and subtract therefrom the forecasted costs to generate energy at the bus at which the generating unit is located, as specified in more detail in PJM Manual 15. If the difference between the forecasted Locational Marginal Prices and forecasted costs to generate energy is negative, the resulting Non-Regulatory Opportunity Cost shall be zero.

(b) All fuel costs shall employ the marginal fuel price experienced by the Member.

(c) The PJM Board, upon consideration of the advice and recommendations of the Members Committee, shall from time to time define in detail the method of determining the costs entering into the said components, and the Members shall adhere to such definitions in the preparation of incremental costs used on the Interconnection.

(d) A Market Seller must have a PJM-approved Fuel Cost Policy for a generation resource prior to submitting a cost-based offer into the PJM Interchange Energy Market for such resource. Each Market Seller shall include in its Fuel Cost Policy the following information, and as further described in the applicable provisions of PJM Manual 15:

(i) The Market Seller is responsible for documenting their established method(s) for calculating fuel costs. A Market Seller may elect to calculate fuel costs using actual costs (if available), spot price(s), index price(s), contract price(s) (short term or long term), or any combination thereof.

(A) All Fuel Cost Policies, regardless of the type of resource they pertain to, shall include the following information:

- A specific description of the Market Seller’s established method of calculating delivered fuel costs, including their method for determining commodity and transportation costs.
- Any applicable contract price(s), which must include the locational cost of fuel for the generating unit(s);

- The source for any applicable spot price(s) used to calculate fuel costs must be documented, publicly available and reflect the locational cost of fuel that is actually deliverable to the generating unit;
- All Market Sellers must provide information to PJM on how and when they calculate fuel costs on days of limited trading in the spot market for the applicable fuel, including any relevant cost adders related to increased price volatility.

(B) For fuel cost policies applicable to natural gas generation resources, a specific description of the pipelines available to provide natural gas to the generation resource, and a specific description of fuel oil sources and transportation sources used to provide fuel oil to the generation resource, if applicable.

(C) Fuel Cost Policies applicable to generation resources other than natural gas shall adhere to the following guidelines related to their fuel costs:

- a. Petroleum: Resources that co-fire more than one fuel shall weight average the cost of the fuel on a per MMBtu basis.
- b. Nuclear: Nuclear fuel costs shall be based on the dollars in FERC Account 518, less in-service interest charges (whether related to fuel that is leased or capitalized). This quantity shall be calculated in units of dollar per MMBtu, as forecasted for the applicable cycle.
- c. Hydro and Pumped Storage: The fuel costs for a Run-of-River hydro unit are zero. Pumped Storage fuel cost shall be calculated on a seven (7) day rolling basis by multiplying the real time LMP at the plant node by the actual power consumed when pumping divided by the pumping efficiency. The pumping efficiency is determined annually based on actual pumping operations or by Original Equipment Manufacturer (OEM) curves if annual data is not available.
- d. Wind: Market Seller shall identify how they intend to account for Renewable Energy Credits (RECs) and Production Tax Credits (PTCs).
- e. Solar: The fuel costs for solar units are zero.
- f. Energy Storage: The fuel costs for energy storage units are zero.
- g. Solid waste, Bio-mass or Landfill gas: Market Seller shall include the costs of such fuels when calculating a fuel cost even when the cost of such fuel is negative. However, cost offers for such units are not required to be less than zero.

(D) Market Sellers must directly or indirectly through an agent or other entity supply supporting documentation to PJM and MMU upon request that would allow confirmation of a specific Operating Day's fuel costs related to any of the foregoing information.

(ii) Other Fuel Related Costs, calculated on a fixed or rolling average of values from one (1) to five (5) years in length, reviewed (and updated if changed) monthly. The term and frequency of the calculations shall be included in the Market Seller's Fuel Cost Policy for a particular generating unit.

(iii) The Market Seller must state its method for determining the cost of SO₂, CO₂, and NO_x emission adders in the unit's Fuel Cost Policy. Such method is subject to the following conditions:

- The time period used for determining the projected SO₂, CO₂, and NO_x discharge and the MMBtu burned. This time period may be based on historical or projected data.
- Units with dual-fuel firing capabilities should use different emission allowance factors based on the SO₂, CO₂, and NO_x emitted for each particular fuel or fuel mix.
- Examples of the cost calculation.

(iv) Any applicable Maintenance Adders to PJM and the IMM. Such adders must be reviewed at least annually by the Market Seller and changed if they are no longer accurate. Maintenance Adders cannot include any costs within a unit's Avoidable Cost Rate.

(v) Heat Rate Curve(s) for all unit operating modes, fuels, and at various operating temperatures, if applicable. Heat Rate Curves can be developed on either a net or gross MW basis, but cost-based offers should be determined on a net megawatt basis. Heat Rate Curves will be based on design or comparable generating unit data and modified by actual unit test data when available. Heat Rate Curves will be based on a higher heating value basis (HHV).

(vi) Unit specific performance factors, and the method used to determine them. Performance Factors may be modified seasonally to reflect ambient conditions.

(vii) Start Cost calculation used and identify for each temperature state the starting fuel (MMBtu), station service (MWh), start Maintenance Adder, and additional start labor cost.

(viii) Any other incremental cost included in a unit's cost based offer.

(e) On an annual basis, all Market Sellers will be required to either submit an updated Fuel Cost Policy that complies with all applicable provisions of subsection (d) and PJM Manual 15, or confirm that their currently effective Fuel Cost Policy still conforms to all applicable provisions of subsection (d) and PJM Manual 15, pursuant to the procedures and deadlines specified in PJM

Manual 15. Market Sellers must submit such information to PJM and the MMU by no later than June 15 of each Delivery Year. PJM shall consult with the MMU, and consider any input received from the MMU in its determination of whether to approve a Market Seller's updated Fuel Cost Policy. After it has completed its evaluation of the request, PJM shall notify the Market Seller in writing, with a copy to the MMU, of whether the updated Fuel Cost Policy is approved or rejected, no later than September 1 of each Delivery Year. If a Market Seller needs to update its effective Fuel Cost Policy outside of the annual review process, or PJM determines that the Market Seller must update its Fuel Cost Policy outside of the annual review process, it must follow the applicable processes and deadlines specified in PJM Manual 15. If the Market Seller does not comply with any of the forgoing deadlines specified, or any applicable deadlines specified in PJM Manual 15 related to updating or submitting a new Fuel Cost Policy, the Market Seller shall be fined \$1,000 per infraction.

(f) If upon review of a Market Seller's cost-based offer, PJM determines that the Market Seller has submitted a cost-based offer that is not in compliance with any applicable provisions of Schedule 2 of this Agreement or PJM Manual 15, the Market Seller shall be subject to the following penalties:

(i) If there were no hours in which the Market Seller's cost-based offer for a resource was marginal, the Market Seller will be referred by PJM to FERC's Office of Enforcement.

(ii) If there were hours in which the Market Seller's cost-based offer for a resource was marginal, the Market Seller shall be referred to FERC's Office of Enforcement, and shall be assessed a penalty equal to the difference between what the Market Seller was paid for each applicable hour and what they should have been paid based on a cost-based offer developed in accordance with their approved Fuel Cost Policy.

$$\text{Total Penalty (\$)} = \text{Sum} [(\text{Hourly LMP (\$/MWh)} - \text{PJM calculated Unit Cost Offer (\$/MWh)}) * \text{Hourly Unit Net Output (MWh)} > 0]$$