PJM Manual 15:

Cost Development Guidelines

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Prepared by:

Cost Development Subcommittee

1.7.2 Start Cost

Start costs ($) are defined as the unit costs incurred by a Market Seller to bring the boiler, turbine, and generator from shut-down conditions to the point of breaker closure and is determined based on the cost of start fuel, total fuel-related cost, performance factor, electrical costs (station service), start maintenance adder, and additional labor cost if required above normal station manning. Start-up costs can vary with the unit offline time being categorized in three unit temperature conditions: hot, intermediate and cold. Start cost is a dollar cost and is incurred once each time the unit operates regardless of the period of operation. See Start Cost in Section 2.4 and in each Generator Section under Start.

1.7.3 No Load Cost

No-Load Fuel (MBTU/hour) is the total fuel to sustain zero net output MW at synchronous generator speed.

N**o-load cost ($/hour)** is defined as the hourly cost of a Market Seller, required to create the starting point of a monotonically increasing incremental cost curve (offer curve) for a generating unit. The calculated no-load cost may have to be adjusted to ensure that the slope of the Generator Offer Curve is monotonically increasing.

2.4 Start Cost

2.4.1 Start Cost Definitions

Start Cost – is the dollars per start as determined from start fuel, total fuel-related cost, performance factor, electrical costs, start maintenance adder, and additional labor cost, if required above normal station manning levels. are defined as the unit costs incurred by a Market Seller to bring the boiler, turbine, and generator from shut-down conditions to the point of breaker closure and is determined based on the cost of start fuel, total fuel-related cost, performance factor, electrical costs (station service), start maintenance adder, and additional labor cost if required above normal station manning.

$$\text{Start Cost (\$ / (Start))} =$$

$$[\text{Start Fuel (MBTU / (Start))} * \text{TFRC(\$ / (MBTU)} * \text{Performance Factor)}]$$

$$+[\text{Station Service (MWh)} * \text{Station Service Rate (\$ / (MWh))}]$$

$$+\text{Start Maintenance Adder (\$ / Start)} + \text{Start Additional Labor Cost (\$ / Start)}$$

Station Service Rate – A $/MWh value based on the 12-month rolling average off-peak energy prices updated quarterly by the Office of the Interconnection. Station Service Rates Link.

Start Fuel - Fuel consumed from first fire of start process (initial reactor criticality for nuclear units) to breaker closing (including auxiliary boiler fuel) plus fuel expended from breaker opening of the previous shutdown to initialization of the (hot) unit start-up, excluding normal plant heating/auxiliary equipment fuel requirements

Start Maintenance Adder – see Section 2.6

Start Additional Labor Cost – Additional labor costs for startup required above normal station manning levels.

2.4.2 Engineering Judgment in Start Costs

A Unit Owner may apply engineering judgment to manufacturers' data, operational data, or the results of start tests in order to derive the components of unit start cost. A record of the results of these determinations shall be kept on file by each Unit Owner for use as a single, consistent basis for scheduling, operating, and accounting applications. These records shall be made available to the PJM MMU or PJM upon request.

2.5 No Load

2.5.1 No-Load Definitions

No-load cost is defined as the hourly cost of a Market Seller, required to create the starting point of a monotonically increasing incremental cost curve (offer curve) for a generating unit. is the hourly fixed cost, expressed in $/hr, required to create the starting point of a monotonically increasing incremental cost curve.

2.5.2 No-Load Fuel

All PJM members shall develop no-load costs for their units. The no-load heat input may be determined by collecting heat input values as a function of output and performing a regression analysis. The heat input values as a function of output may be either created from heat rate test data or the initial design heat input curve for an immature unit.

The minimum number of points to develop a heat input curve shall be 2 points for a dispatchable unit with a variable output and 1 point for a unit with a fixed output.

Sufficient documentation for each generating unit's no-load point in MBTUs (or fuel) per hour shall consist of a single contact person and/or document to serve as a consistent basis for scheduling, operating and accounting applications The MMU can verify calculation methods used subject to the Cost Methodology and Approval Process including the elements of Attachment B.

2.5.3 No Load Calculation

The initial estimate of a unit's **No-Load Cost ($/Hr)** is the No-Load fuel Cost multiplied by the performance factor, multiplied by the (Total Fuel-Related Cost (TFRC))

$$No\ Load\ Cost(\$\ /\ Hour) =$$

$$(No\ Load\ Fuel * Performance\ Factor * TFRC)$$

The unit's generator offer curve must comply with PJM's monotonically increasing curve requirement. In some instances, the calculated no-load cost may have to be adjusted to ensure that the slope of the generator offer curve is monotonically increasing. The No-Load cost adjustment is limited to a maximum difference of $1/MW between the unit's first and second incremental cost offers.

As an alternative to adjusting the no-load cost, The no-load cost may also be calculated by subtracting the incremental cost (unit's economic minimum cost-offer value multiplied by MW value) at the unit's economic minimum point from the total cost (from the heat input at economic minimum value) at the unit's economic minimum point.

$$No\ Load\ Cost(\$\ /\ Hour) =$$

$$(Economic\ Minimum\ Heat\ Input * Performance\ Factor * (TFRC + VOM))$$

$$- (Economic\ Minimum\ Incremental\ Cost\ (\$/MWH) * Economic\ Minimum\ (MW))$$

Note that if the unit of VOM is in terms of dollars per Equivalent Service Hours (ESH), the equation changes to:

$$No\ Load\ Cost(\$\ /\ Hour) =$$

$$(Economic\ Minimum\ Heat\ Input * Performance\ Factor * TFRC) + VOM$$

$$- (Economic\ Minimum\ Incremental\ Cost\ (\$/MWH) * Economic\ Minimum\ (MW))$$

When using No Load Fuel to calculate No Load Cost, the user must submit block average cost and cannot select "Use Offer Slope" when entering cost information into eMKT. When using the alternative incremental cost method to calculate No-Load, the user must submit incremental cost and select "Use Offer Slope" when entering cost information into eMKT.