

MMA Reference Level Technical Guide



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Table of Contents

	<i>Table of Figures</i>	<i>iv</i>
	<i>Table of Tables</i>	<i>iv</i>
	<i>Revision History</i>	<i>vii</i>
1.	Introduction	1-1
1.1	Purpose for Technical Guide.....	1-1
1.2	Audience for Technical Guide.....	1-1
2.	Reference Level Consultations	2-2
2.1	Description.....	2-2
2.2	Process and Timelines.....	2-2
2.3	Review Guidelines.....	2-2
2.4	Operational Metrics.....	2-2
3.	NYISO-Initiated Reference Level Consultations	3-3
3.1	Description.....	3-3
3.2	Process and Timelines.....	3-3
4.	Mitigation Consultations	4-4
4.1	Description.....	4-4
4.2	Process and Timelines.....	4-4
4.3	Review Guidelines.....	4-4
4.4	Operational Metrics.....	4-4
5.	Heat Rate Data	5-1
5.1	General Description.....	5-1
5.2	RLS Data Requirements.....	5-1
5.3	Required Documentation.....	5-1
5.3.1	Heat Rate Curves and Heat Input Data.....	5-1
5.3.2	Input-Output Curves.....	5-2
6.	Fuel & Emission Cost Data	6-3
6.1	General Description.....	6-3
6.2	RLS Data Requirements.....	6-3
6.3	Required Documentation.....	6-4
7.	Start-up Cost Data	7-5
7.1	General Description.....	7-5
7.2	RLS Data Requirements.....	7-5
7.3	Required Documentation.....	7-5
7.4	General Description.....	7-6
7.4.1	Operating Costs.....	7-6
7.4.2	Maintenance Costs.....	7-6
7.4.3	Regulatory Costs.....	7-7
7.5	RLS Data Requirements.....	7-7
7.6	Required Documentation.....	7-7
8.	Risk & Opportunity Cost Data	8-8
8.1	General Description.....	8-8
8.2	Reference Level Software (RLS) Data Requirements.....	8-8
8.3	Documentation Requirements.....	8-8
Appendix A.	Variable Cost Categories	A-1

Table of Figures

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Revision History

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1.0	mm/dd/yyyy	Initial Release

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1. INTRODUCTION

1.1 Purpose for Technical Guide

This Technical Guide provides an overview of the NYISO's Reference Level Processes. It defines the categories of costs that can be included within cost-based references and also details the processes used by the NYISO and its MMU to evaluate submitted cost data and also the considerations bearing on the NYISO's decision to approve or reject that data. Lastly, this document details the various timelines that apply to the submission, review, approval, and update of cost-based data.

1.2 Audience for Technical Guide

This Technical Guide is primarily intended to be used by those submitting cost data or seeking consultation on a generator's reference level. It is intended to provide transparency to the consultation processes and guidance to Suppliers preparing to submit revisions to a generator's data or a consultation request in response to the occurrence of mitigation.

2. REFERENCE LEVEL CONSULTATIONS

- 2.1 Description**
- 2.2 Process and Timelines**
- 2.3 Review Guidelines**
- 2.4 Operational Metrics**

3. NYISO-INITIATED REFERENCE LEVEL CONSULTATIONS

3.1 Description

3.2 Process and Timelines

4. MITIGATION CONSULTATIONS

- 4.1 Description**
- 4.2 Process and Timelines**
- 4.3 Review Guidelines**
- 4.4 Operational Metrics**

5. HEAT RATE DATA

5.1 General Description

Heat rate curve data is utilized within the Reference Level Software (RLS) to determine a generator's fuel consumption at its Minimum Generation level and the incremental fuel requirements at each point on its output curve.

Suppliers are required to submit two types of generator-specific Heat Rate data: Heat Input at Minimum Generation (mmBTU/hour) and an Incremental Heat Rate curve. The first, Heat Input at Minimum Generation, provides the total amount of thermal energy (i.e., mmBTUs) used by the generator to produce its minimum generation level for a single hour, including auxiliary equipment fuel or electrical power requirements but excluding normal plant heating. The second, the Incremental Heat Rate curve, provides the amount of thermal energy used by a generator to achieve an incremental change in electrical energy output (i.e., the amount of thermal energy used to produce an additional unit of output) at each designated point on the generator's output curve.

5.2 RLS Data Requirements

Suppliers must provide as part of its Heat Rate submission the generator's minimum generation level, the heat input at minimum generation level, the generator's maximum capacity, and an incremental heat curve for the generator that encompasses the complete range of the unit's output for which the incremental fuel requirement is a monotonically, increasing function of the generator's output.

5.3 Required Documentation

5.3.1 Heat Rate Curves and Heat Input Data

All heat rate curves and heat input data must be submitted in terms of net output. Suppliers may submit heat rate curves and heat input data using the results of tests actually performed on the generator submit the manufacturer suggested heat rate curves and heat input values.

In addition, if available, historical usage data should be submitted which includes fuel consumption rates for the last 25 periods a generator operated at its minimum generation level. If a unit does not have the requisite 25 periods of historical fuel consumption rates, the Supplier must submit the fuel consumption data that it does possess and may also include a fuel consumption rate at the generator's minimum generation level (mmBtu/hour) based on manufacturer suggested values.

5.3.2 Input-Output Curves

Suppliers must develop and submit generator-specific heat-input versus power-output curves (“I/O Curves”). These curves are utilized to validate the accuracy of the submitted heat rate Curves. The generator's total heat (or fuel) I/O curves must be based on the generator's design or data from comparable generators, modified by available actual generator test data. The actual data for the total heat (or fuel) I/O curve must include minimum and maximum output levels and at least two intermediate output levels.

6. FUEL & EMISSION COST DATA

6.1 General Description

The NYISO's tariffs allow the inclusion in cost-based references of fully-burdened fuel costs which, in addition to the raw fuel cost, could include taxes and transportation costs. In addition, the tariffs detail the inclusion of emission costs in the cost-based references.

At the end of each market day, the NYISO obtains from its data provider fuel and emissions costs derived from that day's trading. These costs are then incorporated into the reference levels utilized in the next day's Real-Time Market ($n + 1$) and the following day's Day-Ahead Market ($n + 2$). This data represents the "opportunity cost" of fuel or emissions for a Supplier and is presently viewed to be the best data available to the NYISO in its development of cost-based reference levels.

The NYISO's Reference Level Software (RLS) provides to a limited extent the capability for generators to have multiple fuel pricing points (i.e., pipeline delivery points) and fuel blends (e.g., oil/gas). Generators are initially set with a default fuel but requests to be moved to the alternate fuel type can be made through an RLS submittal. Such change requests may reflect change in fuel availability for a specific period of time, e.g., due to a pipeline operational flow order (OFO).

In addition to the extent that a precise fuel blend is unavailable, Suppliers may request the use of a fuel adder to reflect the additional costs associated with burning a higher percentage of the more expensive fuel. For example, a generator whose default fuel is natural gas but due to pipeline maintenance is required to burn 50% natural gas/ 50% fuel oil can request a temporary fuel adder to reflect the need to burn a gas/oil blend. Whenever possible, requested fuel adders should reflect the historical fuel usage patterns during a similar pipeline maintenance period.

Suppliers may submit fuel cost updates on their Hour-Ahead Market (HAM) bids. These fuel costs should not reflect speculative changes in fuel prices, but must be supported by documented quotations and may later be compared to the actual cost of fuel consumed.

6.2 RLS Data Requirements

Suppliers can submit for inclusion in their cost-based references local tax rates (%) and other adders (\$/mmBTU) to capture additional costs incurred in the delivery of the fuel to the generator beyond those captured in the raw fuel cost. Separate \$/mmBTU adders can be submitted for the Day-Ahead and the Real-Time markets.

Suppliers may also submit for inclusion in their cost-based reference levels the costs associated with securing emission allowances to offset SO_x, CO₂ and NO_x emissions (annual and seasonal). Suppliers are required to submit for each emission type (e.g., natural

gas delivery point), an emissions rate (lb/mmBTU) and any requested emissions adder (\$/MWh).

6.3 Required Documentation

Suppliers must provide all documentation necessary to substantiate any fuel-related or emissions-related costs submitted for approval, including invoices identifying local tax and transportation rates and annual generator-specific emission rates reported to EPA.

7. START-UP COST DATA

7.1 General Description

Start-up Costs for a generator represents all of the costs incurred in order to bring the generator online and make it available to produce power. Only the costs incurred from start-up through Minimum Generation output and from breaker open to Shutdown are permissible start-up costs. Such costs would include fuel costs and start-up adders (\$/start) which may include start-related operation and maintenance costs and additional non-fuel costs incurred during start-up (e.g., water, consumables, labor). Revenues paid to the generator during its start-up/shut-down cycle, if any, should offset the fuel costs incurred. It is expected that the amount of fuel consumed to start-up will be a function of the hours the generator is off-line.

7.2 RLS Data Requirements

Suppliers need to provide separately for the Day-Ahead Market and the Real-Time Market a start-up curve (i.e., hours offline with the associated fuel requirement (mmBTU)) with a minimum of three points, corresponding to a hot, warm and cold start, e.g., 8, 24 and 72 hours offline). Gas turbines should submit a single fuel requirement associated with a 1 hour down-time. Suppliers may also provide a start-up adder corresponding to each of the hours offline levels.

7.3 Required Documentation

Suppliers should provide the methodology, supporting data and calculations utilized in developing the start-up curves and the start-up adders. If available, historical data must be used to determine the typical amount of fuel consumed per start for each point on the start-up curve.

Suppliers should submit, for each point on the start-up curve, fuel consumption rates for the lesser of the last 10 starts or every start within the past three (3) years. For each start type, Supplier should submit the historical fuel consumption data, an average amount of historical fuel consumption, and the requested fuel requirement.

If a Supplier does not have the historical fuel consumption rates for each start described above, the Supplier must submit the aforementioned data that it does possess and may also include per-start fuel consumption rates based on manufacturer suggested values.

If a Supplier submits as supporting documentation historical start-up fuel consumption data on a per hour basis (mmBtu/hour), it must also provide documentation of the average number of hours it requires to reach the generator's minimum generation level for each start-up type. Variable Cost Data

7.4 General Description

7.4.1 Operating Costs

Operating costs are the non-fuel costs incurred while a generator is operated, whether incurred during start-up or at different output levels. These costs may include, for example, labor costs, the cost of consumables and non-durable goods and water costs.

NYISO will only approve operating costs that are incremental costs; fixed operating costs will be rejected. Additionally, NYISO will only approve submitted operating costs to the extent that they reasonably represent the incremental operating costs at the stage of the power generation cycle for which they are submitted (start-up, operation at Minimum Generation output, or operation above Minimum Generation output). For example, NYISO might approve the wages paid to on-call, hourly employees that are needed to help start a generator. On the other hand, NYISO would not approve labor costs that are incurred regardless of an incremental commitment (such as those associated with salaried, on-call employees). The reasonableness of an allocation is highly dependent on individual circumstances; thus, NYISO will make this determination on a case-by-case basis. In making this determination, NYISO will consider factors such as whether a generator's operating costs relate to starting the generator or running at different operating levels, follow industry standards, and coincide with manufacturer expectations.

7.4.2 Maintenance Costs

Maintenance costs are those costs associated with the maintenance, repair, inspection, and upkeep of generation resources, as well as their parts and equipment. Maintenance costs will only be approved to the extent that they represent the maintenance costs resulting from an incremental period of usage. Maintenance costs are a proportionate share of future maintenance costs. They should reflect projected costs to be incurred. The allocation of maintenance costs not yet borne to starts, run-hours or output must be based upon generator usage that is reasonably anticipated to occur during the interim. For example, maintenance expenses might be allocated using hours-based, starts-based, or equivalent-operating-hours criteria.

In considering whether or not to approve submitted maintenance costs, NYISO will consider factors such as whether the costs and frequency of maintenance anticipated by a Supplier coincides with manufacturer expectations; whether the starts and usage anticipated by a resource is practical, or is likely given the type of generator and general market conditions, or coincides with historical data; etc. Prospective opportunity costs, such as the loss of generating capacity during maintenance, are not verifiable and, therefore, will not be approved by NYISO.

7.4.3 Regulatory Costs

Cost-based reference levels may include documented regulatory costs, which could include costs assessed by NYISO.

7.5 RLS Data Requirements

Supplier may submit a Variable O & M cost at each output level as well as an Other Variable Cost (\$/MWh) at each output level. For each value submitted, Suppliers should include a description of the requested costs. Suppliers may also separately submit for inclusion in the cost-based references regulatory and related costs, e.g., the NYISO's Rate Schedule 1 charge for injections.

7.6 Required Documentation

Suppliers must provide the methodology, supporting data and calculations supporting the variable cost data submitted. The data must be generator-specific and must clearly describe how the costs submitted relate to the incremental operation of the generator, i.e., number of starts, run-hours or volume of MWhs generated. Variable O & M costs may be substantiated by costs incurred in historic periods for maintenance associated with the generator's operation (not upgrades) provided that the length of the historic data series is equal to or longer than the periodicity of the scheduled maintenance claimed as costs. For example, a Supplier that claims a cost is incurred every 3 years should submit a minimum of three years of supporting cost data. All maintenance costs submitted should fall within the established variable maintenance categories. (See Appendix A.)

Unplanned maintenance costs should reflect a projection of expected costs (i.e., not a simple aggregation of historic costs). These costs should be averaged over several years and be consistent across generators of similar type and vintage.

Suppliers may submit Long-Term Service Agreements (LTSAs) to support requested maintenance costs to the extent that the maintenance costs covered by the LTSA are consistent with the set of costs approved as variable; the dollar value of each component of the long-term maintenance is defined specifically in the LTSA; and the LTSA clearly defines the frequency of each maintenance activity (i.e., number of starts, run-hours, volume of output).

Supplier should furnish the NYISO with copies of any contracts necessary to document the requested costs and to demonstrate the variable nature of the costs. As with all data submitted in support of a cost-based reference level, contract-related costs are subject to review by the NYISO and its MMU to determine the reasonableness and appropriateness for inclusion in energy reference levels. NYISO has approved for inclusion in cost-based references such items as fuel management fees when presented on a per mmBTU basis.

8. RISK & OPPORTUNITY COST DATA

8.1 General Description

The NYISO's tariffs permit the inclusion of risk and opportunity costs within a generator's cost-based reference level. These costs are broadly segmented into Emergency Output costs, Opportunity costs and Risk Premium costs. Emergency Output adders should reflect costs incurred for a generator to reach UOLe that are not captured in a change in the incremental heat rate or additional O & M costs; for example, costs associated with the removal of a piece of equipment . Risk Premium adders are currently limited to the Day-Ahead Market and reflect costs associated with a generator tripping in real-time and incurring costs to buy-back the MWhs sold into the DAM. Opportunity Cost adders are limited to units with regulatory, environmental, technical, or other restrictions that limit their run-times, and reflect the cost associated with running in lower-priced hours, e.g., hydroelectric generators with pondage.

8.2 Reference Level Software (RLS) Data Requirements

For each of the three categories of risk and opportunity costs, Supplier needs to submit into the RLS the requested costs for each MW segment with a description of the requested costs.

8.3 Documentation Requirements

Suppliers need to provide through attachments to its RLS submittal all methodologies, data and calculations necessary for the NYISO to understand the Supplier's rationale for the costs and process for calculating the costs.

Appendix A. Variable Cost Categories

O&M for All Generating Plants

- Water consumption in plant operations
- Emission credits
- Incremental operating labor
- Auxiliary equipment repair
- Replacement of consumables and normal wear-and-tear items (e.g., seals, lockplates, nuts, bolts, gaskets, etc.)
- Mechanical parts replacement
- On-line running maintenance
- Performance testing (oxygen boiler test, on-line testing, pre-air heater test)
- Vibration analysis monitoring
- Waste water treatment
- Auxiliary equipment maintenance
- Filter changes
- Oil changes
- Oil and water level checks
- Condensate Pump inspection and overhaul
- Circulation Pump inspection and overhaul
- Steam Turbine Generator inspection/repair/overhaul
- Preventive/predictive maintenance tests
- Auxiliary power consumption
- Auxiliary fuels/lubricants
- Compressor and turbine rotors inspection
- Feedwater pump inspection and overhaul
- Cooling tower equipment inspection and overhaul
- Fuel metering equipment replacement
- Gas turbine auxiliaries
- Transformer maintenance and testing
- Relay cleaning
- Battery system service
- Oxygen boiler test
- Condenser inspections and cleaning
- Water demineralization and treatment
- Boiler tube repair
- Generator field rewinds
- Stop valve inspection
- Control valve inspection
- Boiler casing leak repair (where applicable)
- Relay & interlock testing
- Water box cleaning
- Chemical waist disposal fees
- Non-destructive testing
- Hotwell cleaning
- Turning and ratchet gear maintenance
- Instrumentation and controls replacement
- Emissions monitoring tests
- Emissions control equipment repairs
- High energy piping inspections

O&M for Coal-Fired Plants

- Boiler safety valve testing
- Steam drum repairs
- Water wall repairs
- Seals replacement
- Coal bunker repair
- Coal crusher repair
- Coal freeze proofing
- Chemical cleaning of internal heating surfaces
- Burner repairs
- Feedwater heater repairs
- Deaerator repairs
- Air heater repairs
- Ash hopper repairs
- Precipitator/bag house repairs
- Ash handling equipment repairs
- Evaporator tubing repairs
- Superheater/reheater/economizer tubing and headers repairs
- Heat exchanger cleaning
- Coal drying
- Coal-handling and distribution equipment repair
- Stack, fans and draft repair
- Coal feeder pulverizing equipment repair
- Boiler condition assessment

O&M for CT/CC Plants

- Alignment check of the gas turbine to the generator, as well as of the gas turbine to the accessory gear
- Boroscope inspections of compressor casings and turbine shells
- Casings, shells, and frames/diffusers inspected for cracks and erosion
- Checks of alignment between gas turbine and generator; gas turbine and accessory gear.
- Radial and axial clearances check
- Seals for rubs and deterioration of clearance checks
- Device calibrations check
- Chemical Cleaning or Hydro-Blasting of Heat Transfer Surfaces
- Fluorescent penetrant inspection of bucket vane sections
- Combustion Turbine Generator Evaporative cooling system media replacement
- Combustion Turbine Generator Inspections
- Compressor inlet and flow-path inspection for fouling, erosion, corrosion, and leakage
- Compressor wash systems repair
- Distillate Fuel Pumps Inspection and Overhaul
- Electric generator inspection and overhaul
- Environmental: SCR /CO replacement
- Inlet Air Filter Replacement /maintenance
- Inspection of bearing liners and seals for clearance and wear
- Buckets inspection
- Fuel Gas Compressors Inspection and Overhaul
- Fuel System replacement
- Heat Transfer Surface Replacements
- Inspection of compressor blades for rubs
- Hydrogen embrittlement testing
- Inspection of flow sleeve welds for cracking
- Inspection of fuel nozzles for plugging and erosion of tip holes
- HRSG inspections/condition assessments
- Detectors, combustor flow sleeves, flow sleeve welds, combustion system and discharge casing
- Maintenance of fuel treatment system
- Mechanical inlet air cooling chiller and pump inspection and overhaul
- Sampling of turbine lube oil for viscosity, chemical composition, contamination, particulate, and water-contamination
- Impact damage, corrosion, and buildup of deposits
- Inspection of cross-fire tube, retainer, and combustion liner for cracking, oxidation, corrosion, and erosion
- Inspection of fluid, air, and gas passages in the nozzle assembly for plugging, erosion, corrosion, etc
- Inspection of fuel nozzles, liners, transition pieces, crossfire tubes and retainers, spark plug assemblies, flame
- Inspection of inlet systems for corrosion, cracked silencers, and loose parts
- Refurbishing bucket coatings
- Inspection of combustion chamber interior
- Inspection of later-stage diaphragm packing
- Inspection of bucket seals for clearances, rubs, and deterioration
- Inspection of turbine stationary shrouds
- Inspection of wheelspace instrumentation
- Inspection of variable inlet guide vanes (VIGVs)
- Repair and refurbishment of second and third-stage nozzles
- Recoating of turbine buckets
- Replacement or refurbishment of hot gas parts
- Gas turbine combustion and hot gas path inspections
- Compressor and turbine rotors inspection