

MMA Reference Level Technical Guide



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This document was prepared by:

Market Mitigation and Analysis

New York Independent System Operator
3890 Carman Road
Schenectady, NY 12303
(518) 356-6060
www.nyiso.com

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Revision History

Version	Date	Revisions
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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 and details the various timelines that apply to the submission, review, approval, and update of cost-based data and to mitigation consultations. It defines the categories of costs that can be included within cost-based references and also describes the processes used by the NYISO and its MMU to evaluate submitted cost data and the considerations bearing on the NYISO's decision to approve or reject that 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

Suppliers may submit for approval through the Reference Level Software (RLS) updates to cost data for generating facilities that are currently available in the RLS. Suppliers should refer to the Reference Level User's Guide (http://www.nyiso.com/public/markets_operations/documents/manuals_guides/index.jsp) for instructions on how to make RLS submissions.

2.2 Process and Timelines

Upon being noticed of a RLS submittal, NYISO will initiate its review in consultation with its external Market Monitoring Unit ("MMU"). NYISO staff and the MMU are alerted simultaneously when a new submittal is received. The review will occur as follows:

1. The NYISO will establish the urgency and level of effort associated with the submission to determine the appropriate response standard.
 - (a) Extremely time-sensitive (Urgent)
 - (i) Fuel price or availability-related
 - (b) Incremental updates to static data (Normal-Low)
 - (i) Low level of effort required for approvers
 - (ii) Updates to individual cost families (e.g., change in RS1 rate for Suppliers)
 - (iii) Fully documented
 - (c) Major changes to static data (Normal-High)
 - (i) High level of effort required for approvers
 - (ii) Complex updates to multiple cost-families
2. For "Urgent" submittals, the NYISO will promptly contact the MMU to review the request and, following the discussion with the MMU, promptly contact the Supplier by phone (conducting a conference call, if necessary). The discussions will identify the nature of the submittal and the basis for an immediate update. The NYISO will also communicate any concerns with the submittal and identify additional documentation required for approval. Any additional details discussed verbally will be documented in an e-mail from the NYISO and confirmed by the Supplier. If necessary, the Supplier will have the opportunity to provide additional information/detail by adding an attachment to its original RLS submittal. Based on the data documented in the RLS and/or e-mail exchange, the NYISO and its MMU will approve or deny the urgent request within 16 hours of the submittal. The

NYISO will provide the basis for any denial in its comments in the RLS (viewable by the Supplier).

3. For “Normal-Low” submittals, the NYISO will contact the MMU within one business day to review the request and, following that discussion, contact the Supplier by phone within one additional business day. The intent of this call would be to discuss the nature of the RLS submittal and to identify any initial concerns. Any specific comments or questions would be documented in the RLS and routed automatically to the Supplier for review and response. There may be a need for subsequent conversations to resolve open issues with the submittal. To the extent not documented in RLS, substantive discussions would be documented by the NYISO in an e-mail to the Supplier with a reply confirmation from the Supplier. Based on the data documented in the RLS or subsequent e-mails, the NYISO and its MMU will approve or deny the update within 5 business days of the submittal. The NYISO will provide the basis for any denial in its comments in the RLS (viewable by the Supplier).
4. For “Normal-High” submittals, the NYISO will contact the MMU within two business days to review the request, and following that discussion schedule a conference call with the Supplier and the MMU, to occur no later than five business days following receipt of the submittal. As part of the initial discussion, the NYISO and the Supplier will discuss and agree upon a communication plan, specifying the nature and timing of regularly scheduled touch-points. Within ten business days following receipt of the request, the NYISO will insert comments into the RLS indicating either that a determination has been made that all necessary supporting documentation has been provided or that additional data is required, including a detailed description of the additional data. The NYISO anticipates that such requests for additional data would be the focus of the regular touch points or ad hoc discussions. To the extent not documented in RLS, substantive discussions would be documented by the NYISO in an e-mail to the Supplier with a reply confirmation from the Supplier. The NYISO will regularly communicate with the MMU on pending reference consultations to review open issues and to identify additional concerns. The NYISO and the MMU will log the status of internal discussions using the Comments functionality within the RLS. Based on the data documented in the RLS and/or in e-mail correspondence, the NYISO and its MMU will approve or deny the update within 3 months of the submittal. The NYISO will provide the basis for any denial in its comments in the RLS (viewable by the Supplier). Comments associated with a denial of a submission will identify any elements of the submittal that would be approved, if submitted independently. Should the Supplier submit these identified "approvable" elements within ten business days of the denial being issued, the NYISO and its MMU will conduct an abbreviated review of the revised submittal and issue a determination within three business days. The intent of the abbreviated review would be to verify that the revised submittal includes only those items from the initial submittal identified as "approvable".
5. The NYISO, in consultation with the MMU and the Supplier, will determine the appropriate period for which the approved updates should remain in effect.

6. A Supplier may request that its units be exempted from LBMP- or bid-based references because such references do not accurately reflect a generator's marginal costs. These requests need to be submitted through NYISO Customer Relations Department with a specific justification. The NYISO in consultation with its MMU and the Supplier will determine an appropriate period for which the approved exemptions will remain effect.
7. Each Supplier remains responsible for maintaining accurate cost information in the RLS, including timely reflecting cost decreases. Suppliers are expected to submit updated cost data in the event of material changes.

2.3 Review Guidelines

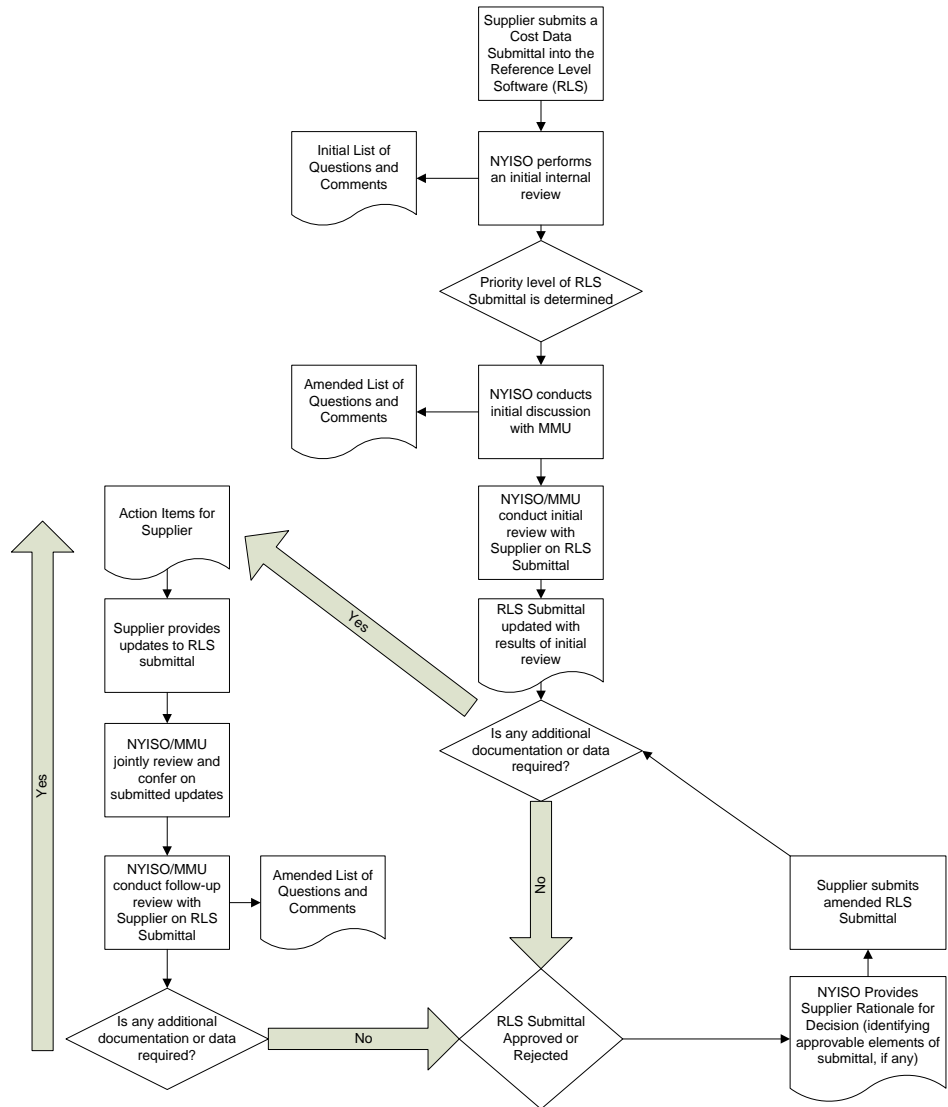
In reference level consultations the NYISO and its MMU will focus on changes from current cost-based data in RLS, will require documentation for all requested updates and may request additional documentation to support maintaining values currently in RLS.

2.4 Operational Metrics

The response standards indicate the time within which the NYISO will approve or reject a submission within the RLS (resulting in an automated e-mail to the Supplier). The targets for the three categories of submittals are as follows:

1. Urgent : 16 hours
2. Normal-Low: 2-5 business days
3. Normal High: 1-3 months

Figure 1: Reference Level Consultation Process



3. NYISO-INITIATED REFERENCE LEVEL CONSULTATIONS

3.1 Description

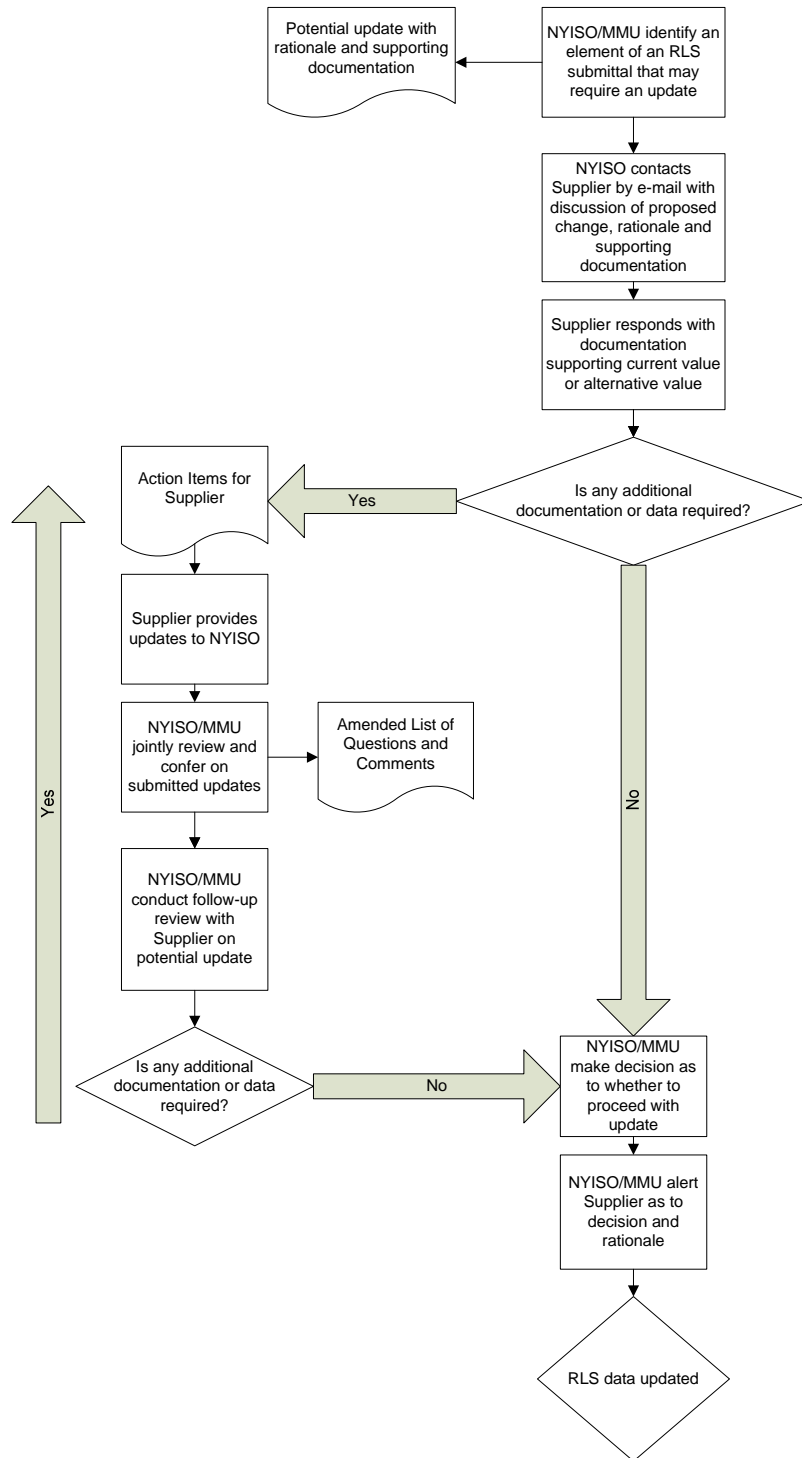
The NYISO, in consultation with its MMU, performs periodic reviews of RLS cost data in order to ensure its completeness and accuracy. This may result in the need to re-verify or revise previously-approved RLS data.

3.2 Process and Timelines

Reviews of existing reference level information will be implemented as follows:

1. Upon determining that an update may be required, the NYISO will provide the Supplier with notice of:
 - (a) the revision that the NYISO is considering;
 - (b) the amounts and or categories that the NYISO proposes to revise;
 - (c) the specific reason(s) for revision, including any documentation, justification or other detailed information that supports the need for a revision
 - (d) the date on which notice is being provided; and
 - (e) the last date on which a Supplier may submit explanatory information.
2. A Supplier will have no less than ten business days after the day on which it receives notice to provide the NYISO with any documents, justifications, and other information that supports inclusion of the cost in question. Dependent upon the complexity of the information requested, the NYISO may provide additional time for the Supplier to respond.
3. After the last day a Supplier can submit explanatory information, the NYISO will ordinarily require 5 business days to determine whether to proceed with the revision.
4. The NYISO will inform the Supplier whether or not it will be implementing the revised cost data at least three business days prior to implementing the change, unless the NYISO, in consultation with the MMU, determines that the inaccurate reference level is having a significant impact on market clearing prices or guarantee payments and needs to be modified sooner.

Figure 2: NYISO-Initiated Consultation Process



4. MITIGATION CONSULTATIONS

4.1 Description

Suppliers whose bids are mitigated may seek to consult on their generators' reference levels after the mitigation has occurred. These requests need to be submitted and documented by opening a Service Center ticket. The Supplier is required to attach a Consultation Request form. An electronic version of the form is posted on the NYISO's website at http://www.nyiso.com/public/markets_operations/services/market_monitoring/index.jsp.

4.2 Process and Timelines

Upon being notified of the consultation request, NYISO will initiate its review jointly with its MMU. The review will occur as follows:

1. The NYISO will contact the Supplier within five business days to review consultations opened within the preceding five business days. This initial review will be to:
 - (a) confirm receipt of request;
 - (b) review Consultation Request Form and data submittal;
 - (c) ask any clarifying questions;
 - (d) identify any documentation concerns; and/or
 - (e) discuss root causes of mitigation and resolutions.
2. At the time of the initial review, the NYISO and the Supplier will also determine whether and when subsequent touchpoints may be required to address the consultations. Such touchpoints would be to:
 - (a) discuss status of open consultation tickets and tickets ready for closure;
 - (b) alert Supplier as to expected resolution and resettlement date (if any); and/or
 - (c) resolve open questions (if any).
3. The NYISO will review each mitigation consultation to identify a root cause and collaborate with the Supplier and the MMU to design and implement a plan to reduce future occurrences.

4.3 Review Guidelines

The NYISO and its MMU will review, as appropriate, fuel invoices and other documentation of acceptable costs not reflected in the reference level upon which the NYISO's application of mitigation was based, to the extent that such costs are documented appropriately and provided to the NYISO in a timely manner.

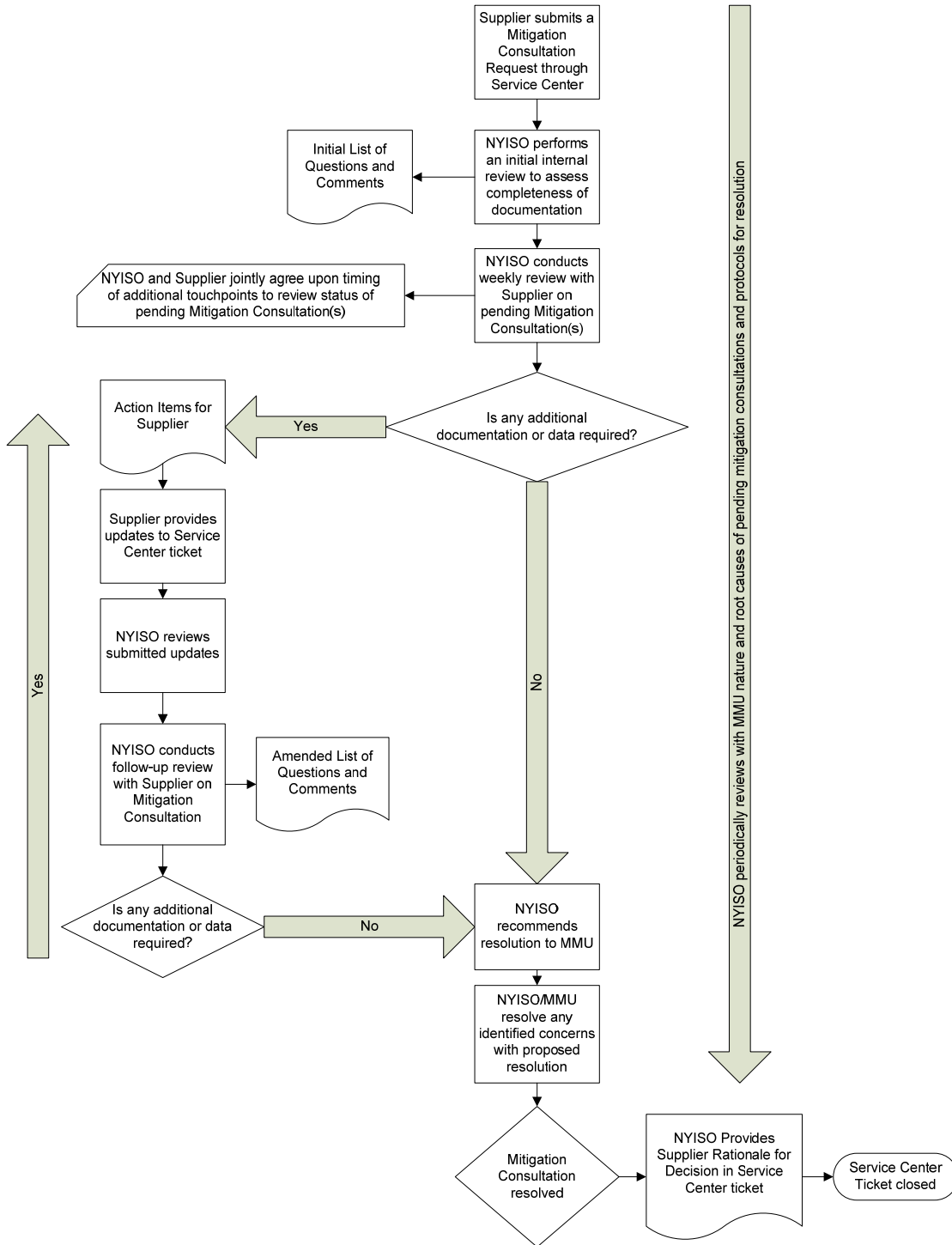
4.4 Operational Metrics

The NYISO will monitor the timeliness of mitigation consultations against the following targets and report to MIWG on a quarterly basis. Targets will be reviewed annually as part of the goal setting process.

1. 75% of fully documented, consultation requests resolved within 20 business days
2. 100% within 50 business days

The NYISO will monitor and report on the results of its root cause analyses to MIWG on a quarterly basis.

Figure 3: Mitigation Consultation Process



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, the generator's maximum capacity, and an Incremental Heat Rate 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 Incremental Heat Rate Curves and Heat Input Data

All Incremental Heat Rate Curves and Heat Input at Minimum Generation 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 or 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 rate data, 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, transportation costs and emission allowance costs.

At the end of each commodities trading day, the NYISO obtains from its data provider fuel and emissions costs derived from that day's trading. The NYISO currently employs the services of Argus Media, Ltd as its data provider and retrieves data from Argus's website at approximately 9:30 p.m..The cost data obtained is 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. In the rare event that the NYISO, or the RLS, are unable to obtain updated fuel cost information, the RLS instead uses the most recent data available to the RLS in its development of cost-based reference levels.

Note that the NYISO fuel indexes only certain fuel types on a daily basis (i.e., natural gas, oil #6, oil #2, kerosene, oil/gas blends). Fuel Types that are not indexed daily (e.g., coal), will have the fuel price entered (RLS) as a static value. Suppliers should periodically review this data and update as necessary with an cost data submission.

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 associated with a default fuel type/source but requests to be moved to the alternate fuel type can be made through an RLS submittal. Such change requests may reflect a 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 if a 50/50 gas/oil blend is not available in RLS. 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 into RLS 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. CO₂, 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 represent all of the costs incurred in order to bring the generator online and to 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/shutdown cycle, if any, should offset any costs incurred. It is expected that the amount of fuel consumed to start a generator will be an increasing 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 off-line 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 one hour down-time (i.e., time off-line). Suppliers may also provide a start-up adder corresponding to each of the time off-line 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.

Suppliers should include in its submittal data on fuel consumption, fuel consumption rates during the shutdown of the unit, if applicable, and revenues earned during start-up/shutdown to the extent that the generator participates in the NYISO's Start-up/Shutdown program.¹

¹ Approved Generators may designate Start-Up/Shut Down (SU/SD) waiver periods during which they will not be subject to performance penalties and will be paid LBMP for all energy produced. For additional information, see Technical Bulletin 146.

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 (i.e., cold, warm or hot).

8. VARIABLE COST DATA

8.1 General Description

8.1.1 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. Conversely, 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.

8.1.2 Maintenance Costs

Maintenance costs are 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 and may generally be allocated using hours-based, starts-based, or equivalent-operating-hours criteria. They should reflect projected costs to be incurred. The allocation of maintenance costs not yet borne to starts or run-hours must be based upon generator usage that is reasonably anticipated to occur during the interim; that is, prior to the maintenance cost being incurred. Suppliers should provide manufacturer recommendations as to maintenance periodicity and, as appropriate, factors associated with the calculation of equivalent-operating hours.

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 for the generator is practical, or is likely given the type of generator and general market conditions, or coincides with historical data. Prospective opportunity costs, such as the loss

of generating capacity during maintenance, are not verifiable and, therefore, will not be approved by NYISO.

8.1.3 Regulatory Costs

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

8.2 RLS Data Requirements

Suppliers 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.

8.3 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.)

In developing cost submittals for operating and maintenance costs, Suppliers may opt to index the historic time-series of actual costs (e.g., using a Handy-Whitman index). In such cases Suppliers should provide the historic data series, raw and indexed; as well as a description of the index used and a rationale for its use.

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.

9. RISK & OPPORTUNITY COST DATA

9.1 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 operating or maintenance costs; for example, costs associated with the removal of a piece of equipment . Opportunity cost adders are limited to generators 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. 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.

9.2 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.

9.3 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 developing 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