ISO New England Manual for

Measurement and Verification of Demand Reduction Value from Demand Resources

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Measurement and Verification of Demand Reduction Value from Demand Resources

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Introduction

Welcome to the ***ISO New England Manual for Measurement and Verification of Demand Reduction Value from Demand Resources***. In this introduction, you will find the followin g information:

- What you can expect from this ISO New England Manual (see "About This Manual").

About This Manual

The ***ISO New England Manual for Measurement and Verification of Demand Reduction Value from Demand Resources*** is one of a series of manuals. The manual provides guidance and required criteria for the measurement and verification of Demand Reduction Values for Demand Resources participating in the Forward Capacity Market (FCM) administered by the ISO pursuant to Section III.13 of Market Rule 1. A copy of the Market Rule and ISO Tariff may be obtained from the ISO website at www.iso-ne.com.

This manual was written assuming that the reader has read the Market Rule before or in conjunction with using this manual. Terms that are capitalized in this manual shall have the meaning ascribed to them in the Market Rule or ISO Tariff.

The reader is referred first to the Market Rule for an explanation and information regarding that aspect of the operation of the FCM or requirements for complying with the FCM. This manual provides additional implementation or other detail for those provisions of the Market Rule which require the Market Participant to take an action. Manual provisions are developed and refined through the NEPOOL stakeholder processes. Manuals are not filed with or approved by the Federal Energy Regulatory Commission. In the event of any conflict between a Market Rule provision and this manual, the text of the Market Rule provision governs.

To demonstrate a Demand Reduction Value, qualified Market Participants shall comply with the Measurement and Verification standards defined in this manual. The measured and verified electrical energy reductions during Demand Resource On-Peak Hours, Demand Resource Seasonal Peak Hours, Real-Time Demand Response Event Hours, or Real-Time Emergency Generation Event Hours or audits are the basis of FCM payments to Market Participants participating in the FCM.

Section III.13.1.4 of Market Rule 1 requires Project Sponsors to submit a Measurement and Verification Plan, and Measurement and Verification Documents. The plan and documents shall be reviewed and subject to approval by ISO New England. The ***ISO New England Manual for Measurement and Verification of Demand Reduction Value from Demand Resources*** describes the content of the Measurement and Verification Plan necessary to comply with the requirements established in Section III.13.1.4. This manual specifies required information, details, approaches, methodologies, conditio ns, calculations, variables, parameters, monitoring, validations, reporting, certifications, responsibilities, and plan format for measurement and verification of Demand Reduction Values to be used for On - Peak Demand Resources, Seasonal Peak Demand Resources, Real-Time Demand Response

Resources, Real-Time Emergency Generation Resources and provides information concerning how certain data must be submitted and how Real -Time Demand Response Resources and Real-Time Emergency Generation Resources are dispatched . This manual is divided into the following Sections:

Section 1: Overview
Section 2: Project Information
Section 3: Project General Assumptions
Section 4: Equipment, Measure, and Practice Detail
Section 5: Measurement and Verification Approach
Section 6: Establishing Baseline Conditions
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Section 1: Overview

1.1 Special Provision for Real-Time Demand Response and Real-Time Emergency Generation Resources Communications Compliance

Real-Time Demand Response and Real-Time Emergency Generation Resources and their associated Demand Assets receive dispatch instructions through a Demand Designated Entity (DDE). The DDE is identified in Customer and Asset Management System (CAMS) by the Project Sponsor. The communication mechanism between the ISO and DDE is specified in ISO New England Operating Procedure No. 18, Metering and Telemetering Criteria. The communication mechanism specified in ISO New England Operating Procedure No. 18 is abbreviated "ISO CFE/RTU" in this manual.

1.2 Special Provision for On-Peak Demand Resources, Seasonal Peak Demand Resources, Real-Time Demand Response Resources, Real-Time Emergency Generation Resources Registration

On-Peak Demand Resources, Seasonal Peak Demand Resources, Real-Time Demand Response Resources, Real-Time Emergency Generation Resources qualified for participation in the Forward Capacity Market shall consist of demand reduction measures registered as Demand Assets in CAMS. All criteria and requirements for Asset registration are contained in other ISO New England Manuals not limited to the ***ISO New England Manual for Registration and Performance Auditing, M-RPA***.

1.3 Special Provision for Real-Time Price Response Assets

Real-Time Price Response Assets are not Demand Resources subject to Measurement and Verification Plan provisions for On-Peak Demand Resources, Seasonal Peak Demand Resources, Real-Time Demand Response Resources, and Real -Time Emergency Generation Resources.

Section 2: Project Information

2.1 Description

The Project Sponsor shall specify in its Measurement and Verification Plan each of the measures, systems, processes and/or strategies that make up its Project.

The Measurement and Verification Plan shall include how each of the measures, systems, processes and/or strategies will be installed and operated to result in additional and verifiable reductions in end-use demand on the electricity network in the New England Control Area during Demand Resource On-Peak Hours, Demand Resource Seasonal Peak Hours, Real-Time Demand Response Event Hours, or Real-Time Emergency Generation Event Hours.

The Project description in the Measurement and Verification Plan and other Measurement and Verification Documents associated with the Project shall be consistent with the Project description in the Project Sponsor's Qualification Package and shall not replace the required information that shall be included in the New Capacity Project Description form, which may be found on the ISO website.

2.2 General Requirements

The Project Sponsor shall specify in its Measurement and Verification Plan each of the following[1]:

(1) Lead Market Participant;

(2) Project contact name, phone and e-mail;

(3) Resource name and ID;

(4) Project name and ID;

(5) Project Sponsor's Market Participant status;

(6) Demand Resource type (On-Peak Demand Resource, Seasonal Peak Demand Resource, Real-Time Demand Response Resource, or Real-Time Emergency Generation Resource);

(7) Load Zone for On-Peak and Seasonal Peak Demand Resources, Load Zone for Real-Time Demand Response and Real-Time Emergency Generation Resources for the first delivery period starting on June 1, 2010, or Dispatch Zone for Real -Time Demand Response and Real-Time Emergency Generation Resources for the delivery periods after June 1, 2011 and later within which the Project will be located;

(8) Project Location, including the name and address of the retail customer(s) where the Project will be implemented for projects including Distributed Generation or Energy Efficiency implemented at a single facility with a Demand Reduction Value greater than 5 MW or all other measures if known at the time the Measurement and Verification Plan is submitted to the ISO subject to the provisions in Section 12.2 of this manual;

(9) Program Name, describing overall program or operation of Demand Resource, for example (residential lighting);

(10) Measures, end uses, systems, processes or strategies that will be implemented;

(11) Types of facilities in which the measures, systems, processes or strategies will be implemented;

(12) Customer classes and end-uses served;

(13) Types of measures that will be implemented including but not limited to, energy efficiency, load management, Distributed Generation Demand Response, Emergency Generation;

[1] Some of the required information is submitted through the Forward Capacity Market Tracking System (FCTS) interface. As a result, some of the information is inherently indentified by the registered user inputting the information (such as Project Sponsor and by default their Market Participant status).

(14) Directly metered or stipulated/sampled measures;

(15) Weather sensitive measure;

(16) Estimated Demand Reduction Value (MW) per measure and/or per customer facility (measured at the customer meter), including supporting documentation (e.g., engineering estimates or documentation of verified savings from comparable projects) to substantiate the reasonableness of the estimated Demand Reduction Value that the Project Sponsor intends to offer into the Forward Capacity Auction;

(17) Estimated total Demand Reduction Value of the Project;

(18) The date by which the Project Sponsor expects to reach commercial operation;

(19) Status under the ISO generation interconnection procedures, if applicable;

(20) A description of the typical qualifications and experience of the Project Sponsor's Project team members and subcontractors that will be directly i nvolved in measurement and verification activities.

For Projects where one or more of the requirements identified in items (8) thru (13) listed above are not explicitly known at the time the Project Sponsor submits its Measurement and Verification Plan to the ISO for review and approval, the Project Sponsor shall provide best approximations of proposed activity with respect to programs, measures, customer classes served and location. The manner in which project development efforts will be pursued shall be consistent with the approach identified in the Project Sponsor's Project Description, Customer Acquisition Plan, Measurement and Verification Plan, Funding Plan and operable Capacity Analysis as defined in the Market Rule submitted to the ISO as part of the Project Qualification Process.

The Project Sponsor shall provide to the ISO information that demonstrates the products, services, systems, processes, and measures actually installed or affected are functionally equivalent to those identified in its Measurement and Verification Plan as part of Critical Path Schedule Monitoring.

2.3 Additional Requirements for Distributed Generation

For Projects involving the use of Distributed Generation measures for On-Peak Demand Resource, Seasonal Peak Demand Resource, Real-Time Demand Response Resource, and Real-Time Emergency Generation Resources, the Project Sponsor shall provide in its Measurement and Verification Plan supporting documentation in the Measurement and Verification Plan and shall provide on the Project Description Form:

(1) The aggregate nameplate capacity of the Distributed Generation;

(2) The most recent annual non-coincident peak demand (absent Distributed Generation output) of the end-use metered customer at the location where the Distributed Generation is directly connected;

(3) The Distributed Generation output during the most recent annual non-coincident peak;

(4) An estimate of the monthly average hourly load for each month of the Capacity Commitment Period (absent Distributed Generation output) of the end-use customer to which the Distributed Generation is directly connected; and

(5) An estimate of the Distributed Generation's monthly average hourly output for each month of the Capacity Commitment Period.

Section 3: Project General Assumptions

3.1 Description

The Project Sponsor shall specify in its Measurement and Verification Plan any variables that affect the Project's electrical energy usage or Distributed Generation output (such as outside temperature, time of day, process changes, occupancy, etc.) that will be measured or monitored and used in the determination of the Project's Demand Reduction Value during Demand Resource On-Peak Hours, Demand Resource Seasonal Peak Hours, Real-Time Demand Response Event Hours, or Real-Time Emergency Generation Event Hours.

3.2 Requirements for All Demand Resources

The Project Sponsor shall specify in its Measurement and Verification Plan all substantive assumptions for the Project's Demand Reduction Value, including but not limited to, baseline energy usage, post measure installation energy usage, process changes, and measure life.

If one or more of the variables that will be measured or monitored and/or assumptions that will be used in the determination of the Project's Demand Reduction Value during Demand Resource On-Peak Hours, Demand Resource Seasonal Peak Hours, Real-Time Demand Response Event Hours, and Real-Time Emergency Generation Event Hours are not known at the time the Project Sponsor submits its Measurement and Verification Plan to the ISO for review and approval, the Project Sponsor may provide alternative information and/or forecasts and specify the portion of the Demand Reduction Value associated with such variables and/or assumptions and explain the basis for such forecasts.

Section 4: Equipment, Measure, and Practice Detail

4.1 Description

The Project Sponsor shall specify in its Measurement and Verification Plan a description of the equipment, measures, and/or practices to be implemented for the On -Peak Demand Resource, Seasonal Peak Demand Resource, Real-Time Demand Response Resource, and Real-Time Emergency Generation Resources.

4.2 Requirements

The Project Sponsor shall provide in its Measurement and Verification Plan and Measurement and Verification Documents specifications of the equipment or types of equipment for projects being installed and/or modified. The equipment, measure, and practice specifications may include, but is not limited to, engineering analysis utilized to specify equipment, program design measures and/or practices, or applications of equipment, measure, or practice relative to end use or processes in the facility.

For Projects involving changes to business practices or strategies, the Project Sponsor shall specify the practice or strategy that will affect the facility's energy usage during the Demand Resource On-Peak Hours, Demand Resource Seasonal Peak Hours, Real-Time Demand Response Event Hours, and Real-Time Emergency Generation Event Hours relative to baseline conditions.

Section 5: Measurement and Verification Approach

5.1 Description

The Project Sponsor shall specify in its Measurement and Verification Plan which of the approved methodologies or combination of methodologies identified in Section 5.2 are proposed for use in determining its Project's Demand Reduction Value.

If the Project Sponsor elects a methodology other than those listed, the Project Sponsor shall include in its Measurement and Verification Plan acceptable justification for the methodology or combination of methodologies proposed for its Project. Project Sponsors shall provide references not limited to: engineering practices in the Measurement and Verification literature, reference reports, local, state or federal manuals or code to demonstrate that it's proposed Measurement and Verification approach is appropriate for the Demand Resource type and will produce accurate and reliable Demand Reduction Values.

5.2 Acceptable Measurement and Verification Methodologies

The following are the acceptable measurement and verification methodologies. This manual contains the minimum standards required for measurement and verification methodologies for On-Peak Demand Resource, Seasonal Peak Demand Resource, Real-Time Demand Response Resource, and Real-Time Emergency Generation Resource. Further details and guidance on the methodologies may be obtained from the International Performance Measurement and Verification Protocol Manual (IPMVP).

5.2.1 Option A: Partially Measured Retrofit Isolation/Stipulated Measurement

Option A may involve an equipment specific retrofit or replacement, new installation or a system level Measurement and Verification assessment. The approach is intended for measures where either performance factors (such as lighting wattage) or operational factors (such as operating hours) can be measured on a spot or short-term basis during baseline establishment and post-installation periods, or for measures for which a measured proxy variable can, in combination with well -established algorithms and/or stipulated factors, can provide an accurate estimate of the Demand Reduction Value.

Option A methodology consists of the following:

(1) The factors, parameters , and/or variables not measured can be stipulated based on assumptions, analysis of historical data, or manufacturer's data. If a stipulated factor is subject to change over the Demand Resource On-Peak Hours, Demand Resource Seasonal Peak Hours, Real-Time Demand Response Event Hours, and/or measure life of the Demand Resource, the Project Sponsor shall specify how the changes will be factored into the calculation of the Demand Reduction Value.

(2) Option A involves measuring a variable other than electrical demand (MW) and using that variable in the calculation of the Demand Reduction Value. Measurements can include short-term or long-term end-use metering of a variable such as current (amperage) and voltage to calculate demand, equipment operating status (on/off), equipment operating times, equipment quantities (i.e., number of units installed, cubic feet of insulation installed) or facilities served where the Demand Reduction Value per facility is constant.

(3) Option A requires that a correlation be established between the metered/monitored proxy variable and electrical demand (MW). The Project Sponsor may establish the correlation by conducting short-term monitoring or a series of spot measurements of both stipulated parameters, and correlating the data sets (e.g., by performing a regression analysis) to determine the functional relationship between the two parameters.

(4) Engineering correlations may also be specified using documented engineering algorithms or as part of an engineering simulation.

(5) Equipment manufacturer's data, equipment data compiled by a recognized industry group or equipment data compiled as part of a State-sponsored demand side management program (i.e., lighting fixture wattage tables) may be used in combination with the other measurements, variables or factors as identified above to calculate Demand Reduction Value. Data from a manufacturer shall be determined in a manner consistent with standards established by a recognized United States government agency or national recognized industrial manufacturing association.

5.2.2 Option B: Retrofit Isolation/Metered Equipment

Option B involves a retrofit or system-level Measurement and Verification assessment. The approach is intended for retrofits with performance factors and operational factors that can be measured at the component or system level using interval electrical demand meters, as defined in Section 10 of this manual, installed on the affected end-use. Option B shall be used for Distributed Generation and is the preferred method for Real-Time Demand Response Resources.

Option B methodology consists of the following:

(1) Spot or short-term electrical demand measurements can only be used when variations in operations are not expected to change over the measure life.

(2) When temporal variations are expected, electrical demand measurements shall be made over a period of time sufficient to represent performance during the Demand Resource On-Peak Hours, Demand Resource Seasonal Peak Hours, Real-Time Demand Response Event Hours, and Real-Time Emergency Generation Event Hours and across the measure life of the project.

(3) This method may be applied when the electrical loads to be impacted by the Project are small relative to the building load, a facility does not currently have whole-premise interval metering, or if end-use electrical demand data can be readily obtained from a building energy management or control system.

(4) The Project Sponsor shall take into consideration any interactive effects that may alter electrical loads on other end-use equipment being monitored.

(5) Whole facility direct metering shall constitute retrofit isolation methodology for Real-Time Demand Resources and in limited cases for Real-Time Emergency Generation Resources as specified in the metering configurations Section 5.6.

5.2.3 Option C: Whole Facility/Regression

Option C estimates Demand Reduction Values by analyzing the overall energy use in a facility and identifying the impact of the implemented measure on the total building or facility energy use patterns. The evaluation of whole-building or facility level metered data is completed using techniques ranging from simple billing comparison to multivariate regression analysis.

Option C methodology consists of the following:

(1) Demand Reduction Value is measured using whole-premise interval meters during the Demand Resource On-Peak Hours or Demand Resource Seasonal Peak Hours.

(2) Option C is applicable to measures that cannot be measured directly, such as insulation or other building envelope measures.

(3) Option C should not be used if the Demand Reduction Value is expected to be small relative to the total facility load, due to the small "signal-to-noise ratio,"

5.2.4 Option D: Calibrated Simulation

Option D involves calibrated computer simulation models of component or whole building energy usage to determine measure energy savings. Engineering simulation models (such as DOE-2) can model both residential buildings (homes, apartments and condominiums) as well as more complex commercial buildings. Operational simulations can be used for industrial processes that take into account the specifics of the process addressed by the energy efficiency actions. Both engineering and operational simulations are made more powerful by calibrating these methods to actual MW and MWh data from the site or process being examined, even if these data are available for a monitoring period shorter than or different from the required Demand Resource On-Peak Hours or Demand Resource Seasonal Peak Hours. Short-term metering and monitoring are methods that produce data that can be used to adjust engineering simulations. This approach is generally termed "calibrated engineering simulations." Linking simulation inputs to baseline and post-installation conditions completes the calibration. Characterizing baseline and post-installation conditions may involve metering performance and operating factors both before and after the retrofit. Long-term whole-building energy use data may be used to calibrate the simulations.

5.3 Alternative Measurement and Verification Methodologies

The Project Sponsors may propose alternative methodologies not listed in Section 5.2. Project Sponsors proposing alternative methodologies shall demonstrate that the alternative methodologies will be equivalent to one of the accepted methodologies described in Section 5.2 above, and demonstrate justifiable need for deviation from the acceptable methodologies described in Section 5.2 based on unique Project requirements.

5.4 Other Acceptable Methodological Techniques

In addition to the acceptable methodological approaches described above, several techniques may be applied to one or more of the methods described in Section 5.2. The following describe other acceptable methodological techniques.

5.4.1 Engineering Calculations and Audit Results

The Project Sponsor may use engineering algorithms to calculate the Project's Demand Reduction Value during the Demand Resource On-Peak Hours, Demand Resource Seasonal Peak Hours, and Real-Time Demand Response Event Hours. Engineering algorithms shall be supplemented with data collected on the energy-consuming equipment affected by the measures.

5.4.2 Load Shape Analyses

The Project Sponsor may use verifiable measure hourly load shapes to calculate a Project's Demand Reduction Value during the Demand Resource On-Peak Hours, Demand Resource Seasonal Peak Hours, or Real-Time Demand Response Event Hours. Measure load shapes shall be based on actual metering data, load research, and/or simulation modeling.

Values for monthly or annual energy savings, whether from engineering calculations, analysis of billing data, simulation modeling or other means described in this manual, can be combined with information on verifiable measures to produce values for electrical energy reduction (MWh) during the Demand Resource On-Peak Hours, Demand Resource Seasonal Peak Hours, Real-Time Demand Response Event Hours. Measure load shapes shall be based on actual metering data, load research (meeting the requirements in Section 15 of this manual), and/or simulation modeling.

5.5 Additional Supplemental Requirements

The Project Sponsor shall specify methods to comply with each of the applicable requirements listed below.

(1) Project Sponsors using Option D for existing buildings, systems, processes, or equipment shall calibrate the simulation model to actual MW or MWh data from the buildings, systems, processes, or equipment being modeled.

(2) Projects that include the use of Distributed Generation shall follow Option B and directly measure the electrical demand (MW) output of the Distributed Generation; however, if the Distributed Generation is a Real-Time Emergency Generation Asset and no other Demand Resource is at the facility, direct measurement of the entire facility load is an acceptable meter configuration (see acceptable metering configurations described in Section 5.6 in this manual).

(3) If statistical sampling is used to determine any variables, factors, parameters, engineering factors, or load shapes used in the calculation of Demand Reduction Values, the statistical sampling shall satisfy the requirements described in Section 7.

5.6 Metering Configurations for Demand Resources Defined as Real-Time Demand Response or Real-Time Emergency Generation[2]

Acceptable metering configurations for Real-Time Demand Response and Real-Time Emergency Generation Resources are described below. The ISO may at its discretion approve alternative metering configurations or alternate uses of the acceptable metering configurations listed below. The Demand Reduction Values calculated for assets using metering configurations that include load reduction shall be calculated as the difference between the adjusted Customer Baseline and the actual metered usage of the facility. However, for facilities with Distributed Generation at the site, determination of total facility load (load actually served from the grid plus load served from the Distributed Generation) must be measured. The preferred metering configuration for Real-Time Emergency Generation shall be generator output metered directly. An alternative metering methodology for Real-Time Emergency Generation, provided there are no other measures at the facility that require a Customer Baseline, may include a combined measurement of the site load and Distributed Generation. A Project Sponsor proposing to use the alternative configuration shall demonstrate that the alternative configuration will be equivalent to one of the preferred configurations. There are six acceptable meter configurations which are:

(1) Load reduction only with no Distributed Generation at the facility

(2) Distributed Generation output directly metered (includes Real-Time Emergency Generation Assets that are directly metered)

(3) Distributed Generation only used to reduce load at the asset (includes Real-Time Emergency Generation Assets only)

(4) Load reduction only with directly metered Distributed Generation used at another on-site asset (with Distributed Generation used by a different asset at the facility)

(5) Distributed Generation used to reduce load at the asset and directly metered Distributed Generation used at another on-site asset (includes Real-Time Emergency Generation Assets only)

(6) Load Reduction pursuant to a Measurement and Verification Plan (includes Statistical Sampling)

The Facility Metered Load (FML) is the electricity used at a facility that is purchased from the grid.

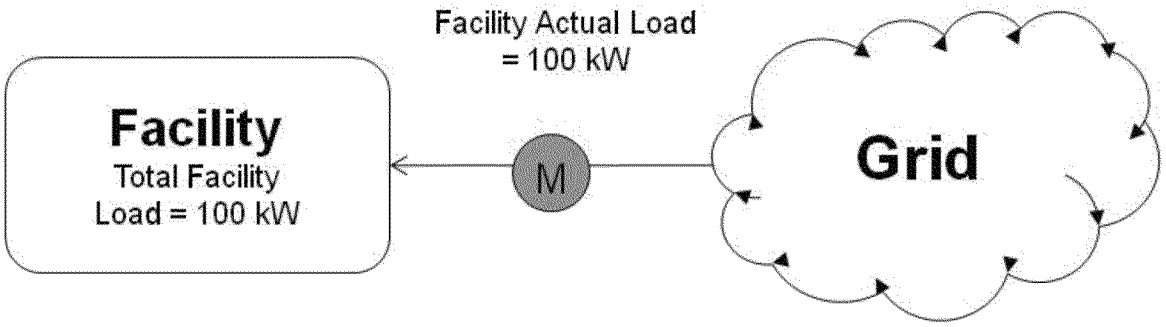
The Total Facility Load (TFL) is the total electricity used at a facility inclusive of that purchased from the grid and that produced on-site from Distributed Generation.

TFL = FML + Distributed Generation

[2] RTEG is a defined term in Section III.1.3 of Market Rule 1.

5.6.1 Load reduction only with no Distributed Generation at the facility

Exhibit 5.1: Load reduction only with no Distributed Generation at the facility



For facilities subscribing only the load, performance for each hour shall be calculated as:

$$P_h = CB_h - AL$$

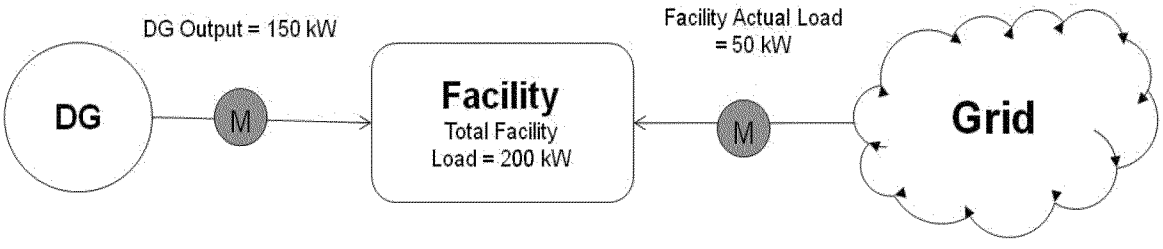
Where: P_h = performance for the hour

CB_h = Customer Baseline for the hour as calculated using the methodologies defined in Section 6 of this manual.

AL = actual load for the hour

5.6.2 Distributed Generation output directly metered (includes Real-Time Emergency Generation Assets that are directly metered)

Exhibit 5.2: Distributed Generation output directly metered



For facilities subscribing for only Distributed Generation and metered at the generator, performance for each hour shall be calculated as:

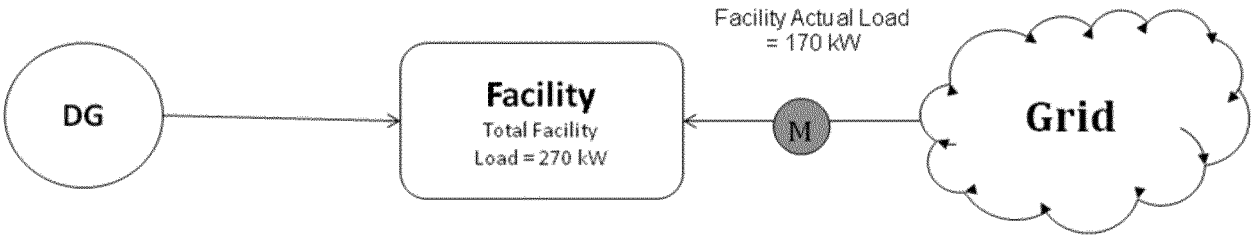
$$P_h = OG_h$$

Where: P_h = performance for the hour

OG_h = Metered Distributed Generator output for the hour

5.6.3 Distributed Generation only used to reduce load at the asset (includes Real-Time Emergency Generation Assets only)

Exhibit 5.3: Distributed Generation only used to reduce load at the asset



For facilities subscribing only Real-Time Emergency Generation, where the generator output is not metered, but the Real-Time Emergency Generation operation is isolated from the grid, the performance for each hour shall be calculated as:

$$P_h = CB_h - AL$$

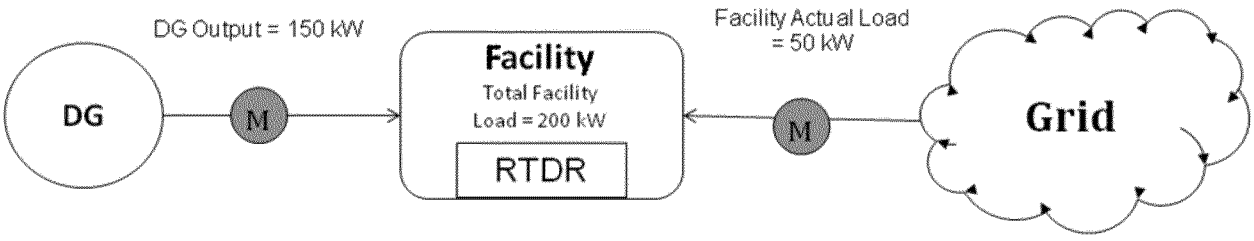
Where: P_h = performance for the hour

CB_h = Customer Baseline for the hour as calculated using the methodologies defined in Section 6 of this manual.

AL = actual load for the hour

5.6.4 Load reduction only with directly metered Distributed Generation used at another on-site asset

Exhibit 5.4: Load reduction only with directly metered Distributed Generation used at another on -site asset



For facilities using both the Distributed Generation and load reduction as separate Assets, performance for Real-Time Demand Response load reduction for each hour shall be the net of Distributed Generation and load as defined below.

Where Distributed Generation and load are metered separately:

$$P_h = CB_h - TFL$$

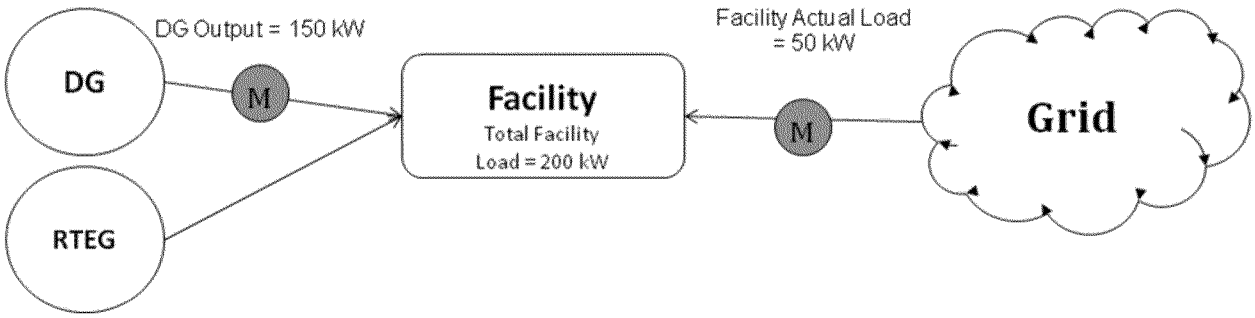
Where: P_h = performance for the hour

CB_h = Customer Baseline for the hour as calculated using the methodologies defined in Section 6 of this manual using total facility load.

TFL = total facility load for the hour

5.6.5 Distributed Generation used to reduce load at the asset and directly metered Distributed Generation used at another on-site asset

Exhibit 5.5: Distributed Generation used to reduce load at the asset and directly metered Distributed Generation used at another on-site asset



For facilities using both the Distributed Generation (Real-Time Emergency Generation) used for load reduction and having another Distributed Generation as separate Assets, performance for Real-Time Emergency Generation load reduction for each hour shall be the net of the second Distributed Generation and load as defined below provided there are no other measures at the facility that require a Customer Baseline (e.g., if the facility also included interruptible load then the Real-Time Emergency Generation Asset must be directly metered before the interruptible load could be registered as a Real-Time Demand Response Asset).

Where Distributed Generation and load are metered separately:

$$P_h = CB_h - TFL$$

Where: P_h = performance for the hour

CB_h = Customer Baseline for the hour as calculated using the methodologies defined in Section 6 of this manual using total facility load.

TFL = total facility load for the hour

5.6.6 Load Reduction pursuant to a Measurement and Verification Plan (includes Statistical Sampling)

Where the load reduction of a Real-Time Demand Response Asset is provided from an aggregation of direct load control, the performance for each hour shall be calculated in accordance with an approved Measurement and Verification methodology. The performance shall be reported to the ISO in real-time by the DDE through the ISO CFE/RTU. This Measurement and Verification methodology shall not be applicable to Distributed Generation.

Section 6: Establishing Baseline Conditions

6.1 Descriptions

The Project Sponsor shall specify in its Measurement and Verification Plan the methodology used to determine baseline conditions for the measures comprising its Project. Baseline conditions are defined as the load (MW) that would have existed, but for the implementation of a demand reduction measure that affected such measure's load in use during Demand Resource On-Peak Hours, Demand Resource Seasonal Peak Hours, Real-Time Demand Response Event Hours and Real-Time Emergency Generation Event Hours. Baseline conditions may be used synonymously with the term Customer Baseline for Real-Time Demand Response Assets and Real-Time Emergency Generation Assets, distinguished by the fact that the Customer Baseline for Real-Time Demand Response Assets and Real-Time Emergency Generation Assets is determined from actual load data.

The Project Sponsor shall identify in its Measurement and Verification Plan any and all equipment, systems, practices or strategies or type of the aforementioned, whose alteration from its baseline condition operation will lead to reduced demand durin g the Demand Resource On-Peak Hours, Demand Resource Seasonal Peak Hours, Real-Time Demand Response Event Hours, and Real-Time Emergency Generation Event Hours.

6.2 General Requirements for Baseline Conditions for All Demand Resources

The Project Sponsor shall specify in its Measurement and Verification Plan compliance with each of the applicable requirements listed below.

(1) For Projects where the Demand Reduction results from measures involving variable load equipment or equipment whose operation is time-dependent or weather-dependent, the baseline conditions shall be calculated for each hour across the Demand Resource On-Peak Hours and Demand Resource Seasonal Peak Hours.

(2) For Projects where Demand Reduction is actively controlled by the Project Sp onsor, facility personnel, or an energy management system, results from measures involving variable load equipment or equipment whose operation is time -dependent or weather-dependent and baseline conditions are calculated based on historical hourly load or output data, the Project Sponsor shall demonstrate that the variance in the historical hourly load or output data used in the calculations of baseline conditions comply with the statistical reliability criteria set forth in Section 7.2 of this manual.

(3) For Projects where the Demand Reduction is actively controlled by the end -use facility personnel, or an energy management system and baseline conditions are calculated using a rolling average of historical hourly load or output data over some period prior to the Demand Resource On-Peak Hours and Demand Resource Seasonal Peak Hours, the Project Sponsor shall exclude historical hourly loads or output coincident with the Demand Resource On-Peak Hours and Demand Resource Seasonal Peak Hours from the baseline condition calculations.

(4) For Projects in which existing and operating equipment is removed from service during the defined Demand Resource On-Peak Hours and Demand Resource Seasonal Peak Hours or has its electrical usage reduced during the defined Deman d Resource On-Peak Hours and Demand Resource Seasonal Peak Hours, the baseline conditions shall be the load (MW) of that operating equipment across the Demand Resource On-Peak Hours and Demand Resource Seasonal Peak Hours, prior to such equipment removal or reduced use.

(5) For Projects in which failed equipment is replaced by a more efficient equivalent or by an alternative strategy for delivering comparable equipment operation or process function or output, the baseline condition shall be the nameplate ra ting of the equipment meeting the level of efficiency required by applicable state code, federal product efficiency standard, or standard practice, whichever is most stringent. If there is no applicable state code or federal energy efficiency standard , then standard practice shall be used as the basis for establishing baseline conditions and shall be documented in the Measurement and Verification Plan.

(6) For Projects in which operating equipment is replaced with a more efficient equivalent unit, the baseline condition is the MW load of that operating equipment across the

Demand Resource On-Peak Hours and Demand Resource Seasonal Peak Hours. In the absence of a measured baseline, the baseline values shall be level of efficiency required by applicable state code or federal energy efficiency standard or standard practice if there is no applicable state code or federal energy efficiency standard. If applicable, the Project Sponsor shall indentify the method by which the baseline condition may be adjusted over the Measure Life. If standard practice is used as the basis for the baseline condition, it shall be documented in the Measurement and Verification Plan.

(7) For Emergency Generation Projects metered at the generator output, (Demand Resources whose operation is limited to loss of external power to the facility or the implementation by the ISO of voltage reduction of 5% requiring more than 10 minutes to implement), the baseline condition electricity output shall be zero.

(8) For Emergency Generation Projects metered at the customer billing meter or a sub - meter within the facility, the Project Sponsor is required to submit real-time five minute data from the billing meter or sub-meter within the facility as described above.

(9) For all Demand Resources, Project Sponsors shall indicate compliance with Baseline Methodologies as well as specify Performance Measure Methodology consistent with North American Energy Standards Board (NEASB) Business Practices for Measurement and Verification of Wholesale Electricity Demand Response:

(a) Baseline Type-I: A Baseline performance evaluation methodology based on a Demand Resource's historical interval meter data which may also include other variables such as weather and calendar data. (Required for Real-Time Demand Response, and Real-Time Emergency Generation Resources).

(b) Baseline Type-II: A Baseline performance evaluation methodology that uses statistical sampling to estimate the electricity usage of an aggregated Demand Resource where interval metering is not available on the entire population.

(c) Metering Generator Output: A performance evaluation methodology, used when a generation asset is located behind the Demand Resource's revenue meter, in which the Demand Reduction Value is based on the output of the generation asset. (Distributed Generation, including Real-Time Emergency Generation Resources, are required to use one of the metering configurations defined in Section 5 of this manual.)

6.3 Requirements for Demand Resources Involving New Construction or Major Renovations

For new construction or major renovation Projects, the baseline conditions shall be equal to the load during the applicable Demand Resource On-Peak Hours and Demand Resource Seasonal Peak Hours of equipment meeting the level of efficiency required by:

(1) Applicable state code or federal energy efficiency standard, or

(2) Standard practices, provided the Project Sponsor can document the standard practices in the Measurement and Verification Plan, if there are no applicable state codes or federal energy efficiency standards, or

(3) Standard practices that are less stringent than applicable state code or federal energy efficiency standards, provided the Project Sponsor can document the less stringent standard practices by providing a study, report or analysis conducted in a manner consistent with the requirements in Section 7 and other applicable Sections of this manual, or

(4) Standard practices that are more stringent than applicable state code or federal energy efficiency standards, provided the Project Sponsor can document the more stringent standard practices in the Measurement and Verification Plan.

6.4 Requirements for Real-Time Demand Response, Real-Time Emergency Generation and Real-Time Price Response Program Assets

The requirements for determining baseline conditions (Customer Baseline calculation) for Real-Time Demand Response Resources, Real-Time Emergency Generation Resources and Real-Time Price Response Program Assets are described below. For the purposes of the following criteria, Demand Resources shall be dispatched and the Customer Baseline shall be calculated on the Demand Assets that are mapped to the Demand Resources. Real -Time Price Response Program Assets shall have its Customer Baseline calculated as specified in this manual, consistent with program design requirements as specified in the Market Rule and ***ISO New England Manual for the Real-Time Price Response and Day-Ahead Load Response Programs, M-RTPRP/DALRP***.

6.4.1 Calculation of Baseline Conditions (Customer Baseline)

The Demand Reduction Value for Demand Assets with metering configurations that include load reduction shall be measured as the difference between the Customer Baseline (adjusted as described in Section 6.4.1.1(4)(a) below) and the actual metered usage by hour during the event.

6.4.1.1 Customer Baseline Calculation Method

The Customer Baseline is calculated as the average interval load, rounded to the nearest kW, for each interval as appropriate[3] of the 24 hours in a day. The Customer Baseline used for computing performance for Real-Time Demand Response Assets, Real-Time Emergency Generation Assets, and Real-Time Price Response Program Assets shall consist of eligible weekdays (excluding Demand Response Holidays, weekends and event days). A Customer Baseline shall be required whenever load is participating as part of a Demand Resource unless an approved alternative measurement and verification methodology is used. For Distributed Generation or for Customer Baselines calculated using statistical sampling in an approved alternative Measurement and Verification Plan , where the actual generator output is metered, the metered output or the calculation in accordance with the measurement and verification methodology will be used for the performance measurement.

The Customer Baseline for the Real-Time Demand Response Assets and Real-Time Emergency Generation Assets shall be calculated using five minute data, and the five minute baseline is available to the DDE for managing end -use facility performance. The five minute baseline values shall be integrated to obtain hourly values for performance calculations. Real-Time Price Response Program Assets shall only supply hourly data, and therefore their baseline shall always be calculated on an hourly basis. The Customer Baseline for the Real-Time Demand Response Assets, Real-Time Emergency Generation

[3] For Real-Time Demand Response Assets and Real -Time Emergency Generation Assets, the average load interval is 5 minutes. For the Real-Time Price Response Program, the average load interval is hourly.

Assets, and Real-Time Price Response Program Assets shall be calculated as the simple average for each interval as defined below:

(1) For a new Real-Time Demand Response Assets, Real-Time Emergency Generation Assets, and Real-Time Price Response Program Assets (assets with no previously computed baseline): The Customer Baseline is the simple average and will be calculated for each interval in the day based on meter data from the initial five business days of reported meter data. The initial five days are identified as the first five days with complete interval data (for five minute data: 288 data intervals each day for five consecutive business days; for hourly data: 24 data intervals each day for five consecutive business days). Since the asset is not available to interrupt for a Real-Time Demand Response, Real-Time Emergency Generation or Real-Time Price Response events during this five-day period, all business days are included (Demand Response Holidays are excluded) in the calculation of the Customer Baseline for a new asset. Once the Customer Baseline can be computed and the window for establishing ready to respond assets for the next month has not passed, the asset will be ready to interrupt in the upcoming month. Therefore, the Customer Baseline for any interval of the first day after the first five days with complete interval data (day 6) is:

Customer Baseline 6 = (Sum Meter Reading for the interval) / 5

[day 6 Customer Baseline calculation]

From this point forward, the Customer Baseline is calculated the same as an existing asset.

(2) For an existing Real-Time Demand Response Asset, Real-Time Emergency Generation Asset, and Real-Time Price Response Program Asset whose initial Customer Baseline has been calculated as explained above:

(a) For each day (weekdays and non-Demand Response Holidays), the asset's Customer Baseline is calculated starting from the previous day's Customer Baseline. If for the present day a Real-Time Demand Response Resource or Real-Time Emergency Generation Resource is dispatched or a Real-Time Price Response event is initiated, the asset's Customer Baseline for the present day is equal to the Customer Baseline for the previous program day. If for the present day a Real-Time Demand Response Resource or Real-Time Emergency Generation Resource is not dispatched or a Real-Time Price Response event is not initiated , then the asset's Customer Baseline for the present day is calculated solely for the purpose of determining the asset's Customer Baseline for the next day. The asset's Customer Baseline for a non-dispatched or non-event day is calculated starting from the previous day's Customer Baseline and then applying the interval data from the present day.

(b) The asset's Customer Baseline is only calculated for non-dispatch or non-event days. The asset's Customer Baseline for a Real-Time Demand Response or Real-

Time Emergency Generation Resource when the Demand Resource is dispatched or a Real-Time Price Response event is initiated, or the present day is a Demand Response Holiday or weekend, is equal to the asset's Customer Baseline for the previous day. If for the present day the Demand Resource is not dispatched or an event in not initiated, the asset's present day's Customer Baseline is computed using the weighted average of the asset's previous day's Customer Baseline and the asset's meter data for the present program day. The weighting for this calculation are 0.9 applied to the previous day's Customer Baseline and 0.1 applied to the meter data. The computed asset's Customer Baseline becomes the asset's Customer Baseline for the next day. Since Real-Time Demand Response, Real-Time Emergency Generation, Real-Time Price Response or Day-Ahead Load Response event days are excluded from the computation of the asset's Customer Baseline, if there are multiple, consecutive days where the Demand Resource is dispatched or an event is initiated, the asset's Customer Baseline calculated from the last non-dispatched day will be the asset's Customer Baseline for the consecutive event days as well. The computation is performed separately for all data intervals of the day.

(c) Continuing with the formula from day six above, if for day seven the Demand Resource is dispatched or an event is initiated; the asset's Customer Baseline for day seven is the asset's Customer Baseline from day six (the previous day). If for day seven the Demand Resource is not dispatched or an event is not initiated , then the asset's Customer Baseline for day seven is calculated. The asset's Customer Baseline for each hour of day seven is calculated using the following formula:

If day seven is a Demand Response Holiday or weekend; or the Demand Resource is dispatched; or an event is initiated then:

Customer Baseline 7 = Customer Baseline 6 [day 7 Customer Baseline]

If for day seven the Demand Resource is not dispatched or an event is not initiated, and it is not a Demand Response Holiday or a weekend then:

Customer Baseline 7 = 0.9 * Customer Baseline 6 + 0.1 * Meter Reading 7
[day 7 Customer Baseline calculation]

(3) The Customer Baseline for Real-Time Demand Response and Real-Time Emergency Generation Assets is made available in the Demand Resource Market User Interface ("DR MUI") and the DDE will have the ability to download the data each day, and will be based upon the assumption that for the present day, the Demand Resource will be dispatched. Customer Baselines for Real-Time Price Response Assets will continue to be available on Market Information Server settlement reports.

(4) When computing the asset's Customer Baseline as described above, no data will be excluded from the computation. Missing data will be assigned the value of zero.

(a) In determining the actual interruption provid ed by an asset, the asset's Customer Baseline is subject to adjustment as follows:

(i) If a Real-Time Demand Response or Real-Time Emergency Generation Resource's dispatch results from an Operating Day implementation of ISO New England Operating Procedure No. 4 or a Demand Resource audit and no Demand Resource Forecast Peak Hours were forecasted for the dispatch day, then the Customer Baseline for the assets affected will be increased or decreased to reflect the actual usage for the two hours commencing t wo and a half hours before the first Reduction Deadline[4] in the dispatch day.

(ii) If one or more Demand Resource Forecast Peak Hours were forecasted for Real-Time Demand Response Resources in the dispatch day, then the Customer Baseline will be adjusted to reflect the actual usage for the two hours commencing two and a half hours before the first Reduction Deadline in the dispatch day, provided, however, that no adjustment will be applied that would reduce the Customer Baseline.

(iii) If a Real-Time Deman d Response Asset is participating in the Day-Ahead Load Response Program and clears in one or more hours for the dispatch day, then the Customer Baseline will be adjusted to reflect the actual usage for the two hours commencing two and a half hours before the first Reduction Deadline in the dispatch day, provided, however, that no adjustment will be applied that would reduce the Customer Baseline.

(iv) If a Real-Time Price Response Asset is participating in the Day-Ahead Load Response Program and clears in one or more hours for the dispatch day or if there is a Real-Time Price Response event in the dispatch day, then the Customer Baseline will be adjusted to reflect the actual usage for the two hours commencing two hours before the first Reduction Deadline in the dispatch day, provided, however, that no adjustment will be applied that would reduce the Customer Baseline.

(v) If the Real-Time Demand Response or Real-Time Emergency Generation Resource dispatch or Real-Time Price Response event coincides with a scheduled shutdown of the facility or scheduled maintenance of energy consuming equipment associated with the asset, then no adjustment will be applied to the asset's Customer Baseline and the asset's Customer Baseline as originally computed is used to determine the amount of interruption. If the actual usage for the two hours commencing two and a half hours before the Reduction Deadline is equal to or less than 10% of the Customer Baseline, the ISO will deem the Real-Time Demand Response Asset or the Real-Time

[4] Defined term in NAESB Wholesale Demand Response Standards.

Emergency Generation Asset to be on scheduled facility shutdown or scheduled equipment maintenance on the dispatch day and no adjustment will be applied.

(vi) If there are multiple consecutive dispatch days for an asset, the Customer Baseline adjustment used on the first day will be compared to the Customer Baseline (adjusted as described above) for each consecutive event day, and the adjustment that is more beneficial will be applied to the Customer Baseline for the second and subsequent consecutive event days.

(b) Example 1: The Real-Time Demand Response Asset's Customer Baseline is 330 kW for hour-beginning 1000, the time of the Reduction Deadline based on the dispatch instruction, and the asset's actual usage from 0730 to 0930 is 20 kW below the asset's Customer Baseline. The calculated adjustment would be down 20 kW in each hour to reflect the actual load prior to the start of the dispatch. The Demand Resource's dispatch resulted from one or more Demand Resource Forecast Peak Hours for the dispatch day and this adjustment would reduce the asset's Customer Baseline, the adjustment is not applied and the asset's Customer Baseline as originally computed for the dispatch day is used to determine the amount of interruption.

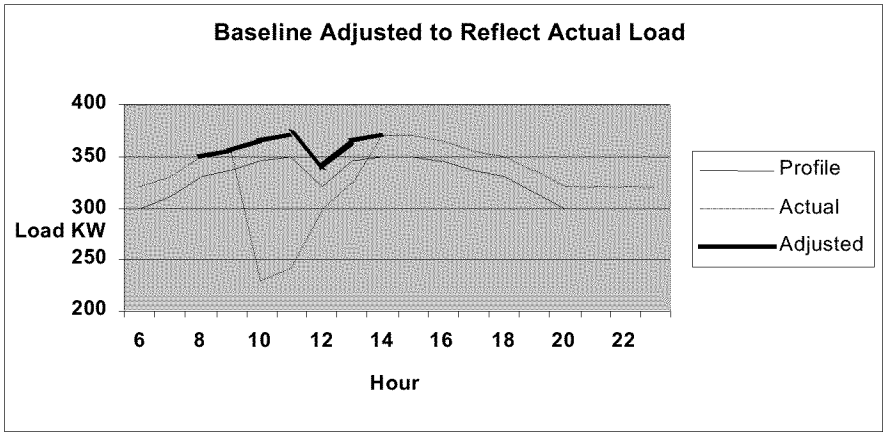
(c) Example 2: The Real-Time Demand Response Asset's Customer Baseline is 330 kW for hour-beginning 1000, the time of the Reduction Deadline based on the dispatch instruction, and the asset's actual usage from 0730 to 0930 is 20 kW below the asset's Customer Baseline. The calculated adjustment would be a decrease of 20 kW in each hour to reflect the actual load prior to th e start of the dispatch. The Demand Resource's dispatch resulted from the implementation of ISO New England Operating Procedure No. 4 during the Operating Day and no Demand Resource Forecast Peak Hours in the dispatch day; therefore the downward adjustment will be applied to the asset's Customer Baseline for the dispatch day to determine the amount of interruption.

(d) Example 3: The Real-Time Demand Response Asset's Customer Baseline is 330 kW for hour-beginning 1000, the time of the Reduction Deadline based on the dispatch instruction, and the asset's actual usage from 0730 to 0930 is 20 kW above the asset's Customer Baseline. The calculated adjustment would be a n increase of 20 kW in each hour to reflect the actual load prior to the Reduction Deadline. Since this adjustment would increase the asset's Customer Baseline, the adjustment is applied and the adjusted Customer Baseline is used to determine the amount of interruption.

(5) The ISO will calculate the Customer Baseline on a daily basis for Real -Time Demand Response Assets and Real-Time Emergency Generation Assets. The Customer Baseline for Real-Time Price Response Program Assets will be calculated once per month.

The following graphic shows the Customer Baseline load profile, adjusted profile, and actual load based on metered data described in example 3.

Exhibit 6.1: Baseline Adjustment



6.4.1.2 Exclusion Provisions

Two exclusions are required when computing the Customer Baseline: Demand Response Holidays and days when the Demand Resource is dispatched as defined below:

(1) Demand Response Holidays are listed in ISO New England Operating Procedure No. 14, Appendix C (OP-14, Appendix C).

(2) Days when the Demand Resource is dispatched are excluded from the associated Demand Asset's Customer Baseline calculation for the applicable Real-Time Demand Response Assets or Real-Time Emergency Generation Assets and therefore do not result in a recalculation of the Customer Baseline. The Customer Baseline for a day when the Demand Resource is dispatched, is equal to the Customer Baseline calculated for the last prior day that the Demand Resource was not dispatched . For Demand Assets that are submitting their meter data to building their initial Customer Baseline and are not eligible to interrupt, therefore there are no dispatch days to exclude from the Customer Baseline calculation.

Section 7: Statistical Significance

7.1 Description

The Project Sponsor shall demonstrate in its Measurement and Verification Plan that statistical sampling will meet or exceed the statistical precision and accuracy requirements as identified in the Market Rule and in this Section. The Measurement and Verification Plan shall include a description of the methods used to mitigate and adjust for the potential types of bias resulting from statistical methods . Where monitoring is specified over the measure life, the Measurement and Verification Plan shall demonstrate how accuracy and precision will be maintained over the measure life.

7.1.1 Requirements

(1) All Project Sponsors shall include a description of methods used to achieve precision and accuracy requirements applicable to the measurement and verification approach.

(2) If the measurement and verification methodology includes the use of measurement and verification reference documents including but not limited to, engineering estimates, load profiles, measure life, and coincidence factors, shall provide jus tification for use in the measurement and verification methodology.

(3) If the measurement and verification methodology includes calculations based on engineering-based direct measurements, measurement of proxy variables or simulations, the Project Sponsor shall include methods to control relevant types of bias including, but not limited to: (a) accuracy and calibration of the measurement tools described elsewhere in this manual); (b) measurement error; (c) engineering model bias; (d) modeler bias; (e) deemed parameter bias; (f) meter bias; (g) sensor placement bias; and (h) sample selection bias or non-random selection of equipment and/or circuits to monitor.

(4) If the measurement and verification methodology includes calculations using regression or statistical analyses, the Project Sponsor shall include methods to control relevant types of bias including, but not limited to: (a) model misspecification; (b) statistical validity; (c) error in measuring variables; (d) autocorrelation; (e) heteroscedasticity; (f) collinearity; (g) outlier data points; and (h) missing data.

(5) If the measurement and verification methodology includes any form of population sampling, survey or interview data, the Project Sponsor shall include methods to control relevant types of bias including, but not limited to: (a) construct validity; (b) sampling frame versus population; (c) selection bias (for a sample and for a census attempt where not all sites within the census received usable data); (d) non-response bias; (e) error in measuring variables; (f) sample homogeneity relative to project (external validity); (g) outlier data points; and (h) missing data.

(6) All requirements in Section 7 shall be included in the Measurement and Verification Plan and included in a sampling plan attached to the Measurement and Verification Plan as part of the supporting Measurement and Verification Documents.

7.2 Statistical Sampling

Sampling the total population of demand reduction measures is permitted, provided the population estimates derived from sampling achieve 10% relative precision with no less than 80% confidence interval. Additional statistical sampling requirements as it relates to precision and accuracy are described below.

7.2.1 General Requirements

If sampling will be conducted, the Project Sponsor shall include each of the following general sampling conditions:

(1) A description of the population to be sampled,

(2) The required sample size in accordance with this manual,

(3) The estimated sample size, plus contingencies for sampling bias, as described in Section 7.2.2,

(4) All assumptions and calculations for determining the sample size, and

(5) The method for selecting sample points.

7.2.2 Sample Size Requirements

If population sampling will be conducted, the Project Sponsor shall satisfy each of the requirements listed below for determining the sample size:

(1) Where one or more samples are used, the required sample size(s) shall be based upon achieving 10% relative precision with an 80% confidence level. If a Demand Resource Project consists of multiple facilities or measures and the Project Sponsor uses multiple sample sets to estimate the aggregated Demand Reduction Value , the estimate shall have the minimum a precision and accuracy requirement applied to (1) each sample or combination of samples used, (2) the combination of all samples, or (3) stratified samples as described in Section 7.2.2(2).

(2) If the Demand Reduction Value is estimated from a sample drawn from two or more strata, the overall sample size shall be based upon achieving 10% relative precision with an 80% confidence interval. Strata shall be defined as any subset of the Project's population that is based on operation constants, variables and characteristics. The concept of strata includes, but is not limited to: measures, practices, equipment, programs in a state sponsored demand side management portfolio or subsets of an entire population of affected equipment at a facility having similar operating characteristics.

(3) All sampling calculations shall inco rporate methods to compensate for potential data loss through,

(a) Over sampling

(b) Sample site replacement in the course of the study,

(c) Demonstration that precision and confidence targets will still be met with a smaller sample size.

(4) The Project Sponsor shall identify methods for controlling bias in sample selection including, but not limited to random sampling, census or rolling census for each sample and strata used.

(5) The Coefficient of Variation (c.v.) used to derive the required sample size shall be the measured c.v. for the primary measurement including all its error components.

(6) The Project Sponsor shall identify methods for controlling bias attributed to the c.v. as it relates to sample size determination.

(7) If a c.v. from a prior Measurement and Verification Plan or supporting document approved by ISO New England is not available for the primary measurement applicable to the segments of sites, installed measures, and/or strategy, the Project Sponsor shall use a default value for the initial c.v., not less than 0.5 for homogeneous samples (samples from populations that are uniform with respect to operation constants, variables and characteristics) and 1.0 for heterogeneous samples (samples from populations that are variable with respect to operation constants, variables and characteristics), until such time that a c.v. can be estimated from the Project sample population.

(8) If a method such as stratified ratio estimation is used to take advantage of supporting information for the population, the c.v. may be adjusted to take account of the added efficiency of the stratification and estimation methodology and must still meet the requirements in Section 7.2.2.

7.2.3 Sample Size Calculation Requirements

The formulas below shall be used for the calculation of required sample size and precision. Alternative sample size determination may be used provided they meet the minimum requirements set forth in Section 7.2.2 and are documented in the Measurement and Verification Plan.

(1) The Project Sponsor shall calculate the sample number to achieve a precision of 10% using the following equation, utilizing a t value of 1.282, which corresponds to a two tailed 80% confidence interval of an infinite population, where

n' = number of samples in an infinite population

c.v. = coefficient of variation as set by a default value or where it is known, and

r.p = precision

$$n' = \left(\frac{1.282 \times c.v.}{r.p.} \right)^2$$

(2) The sample size (n) for the finite population (N) less than 200 shall be calculated using the following equation, where

n' = number of samples in an infinite population

$$n = \frac{n'}{1 + \frac{n'}{N}}$$

7.3 Sample Size Recalibration Based on Monitoring Data

In the absence of a reliable c.v. the Project Sponsor may use a default c.v. as described in Section 7.2.2. However, once performance data has been collected, the Project Sponsor shall demonstrate that the level of precision and accuracy is met using the sampling methodology by calculating the relative precision with a new estimate of the c.v.

7.3.1 Sample Recalibration Requirements

(1) The Project Sponsor shall calculate and report (as determined by ISO New England) the relative precision of sampling studies based on the measured estimate of the sample coefficient of variation calculated using the following equations, where:

$\bar{x}$ = sample mean,

s = standard deviation, and

n' = number of samples in an infinite population.

$$c.v. = \frac{s}{\bar{x}}$$

$$r.p. = \frac{1.282 \times c.v}{\sqrt{n'}}$$

(2) Where a study design is based on a finite population (N) less than 200, the relative precision of the sampling study shall be calculated using the following equation, where:

n = number of samples in a finite population, and

N = total number of units in the population

$$r.p. = \sqrt{1 - \frac{n}{N}} \frac{1.282 \times c.v}{\sqrt{n}}$$

(3) If a method such as stratified ratio estimation is used to take advantage of supporting information for the population, the estimated c.v. and achieved relative precision may be adjusted to take account of the added efficiency of the stratification and estimation methodology.

7.4 Sampling Over Load Zones or Dispatch Zones

If the Project Sponsor conducts sampling for a population of similar Demand Assets spanning multiple Load Zones or Dispatch Zones, the Project Sponsor shall include in its Measurement and Verification Plan the requirements listed below:

7.4.1 Requirements

(1) The Project Sponsor shall demonstrate that the accuracy and precision requirements discussed above apply to the overall population of Demand Assets being studied, rather than to the Project or Projects within each individual Load Zone or Dispatch Zone.

(2) The Project Sponsor shall demonstrate the method for controlling any bias attributed to sampling across Load Zones or Dispatch Zones.

Section 8: Demand Reduction Value Calculations

8.1 Description

The Project Sponsor shall specify in its Measurement and Verification Plan methodologies for calculation of the Demand Reduction Value during the applicable Demand Resource On-Peak Hours, Demand Resource Seasonal Peak Hours, Real-Time Demand Response Event Hours, and Real-Time Emergency Generation Event Hours for the Project. Such information shall be provided in the Demand Reduction Value calculation supporting documents and attached to additional Measurement and Verification Plan as supporting Measurement and Verification Documents. The description shall include, but not be limited to the following factors used in the Demand Reduction Value calculations:

(1) Equations and Formulas

(2) Assumptions

(3) Manufacturers Equipment Specifications

(4) Direct Measurement Data

(5) Indirect Measurement Data

(6) Engineering Factors, Parameters and Other Variables

If the one or more of the factors listed above are not known or not available at the time the Project Sponsor submits its Measurement and Verification Plan to the ISO, the Project Sponsor shall specify when the unknown or unavailable factors will be known and available. Further, the Project Sponsor shall indicate if the absence of known factors would at any time during the performance hours in a Commitment Period, cause the statistical precision and accuracy of the Demand Reduction Value to fall below the minimum requirement established in the Market Rule and Section 7 of this manual.

8.2 Requirements

The Project Sponsor shall specify in its Measurement and Verification Plan compliance with the following requirements:

(1) The reported monthly Demand Reduction Value shall achieve at least a 10% relative precision at an 80% confidence level.

(2) If baseline conditions are used in the calculation of Demand Reduction Value, the Project Sponsor shall make adjustments to the baseline conditions to reflect operating conditions at the time of the Demand Resource On-Peak Hours, Demand Resource Seasonal Peak Hours, Real-Time Demand Response Event Hours, or Real-Time Emergency Generation Event Hours.

(3) Formulas used by the Project Sponsor to determine Demand Reduction Values shall include any modifying factors, including, but not limited to, coincidence with applicable performance hours, realization rate, measure life, and equipment failure rate.

(4) If a Demand Resource Project consists of multiple sites and/or measures, the Project Sponsor may calculate the aggregated Demand Reduction Value during the applicable performance hours for each asset as the sum of all measured Demand Reduction Values, provided that each measured Demand Reduction Value achieves at least a 10% relative precision at an 80% confidence level, or the aggregated Demand Reduction Value achieves at least a 10% relative precision at an 80% confidence level.

(5) If sampling will be conducted, the Project's aggregated Demand Reduction Value in each Load Zone or Dispatch Zone shall be calculated from the measured data of the sample, consistent with the methodologies indicated in the sampling plan.

Section 9: Monitoring Parameters and Variables

9.1 Description

The Project Sponsor shall specify in its Measurement and Verification Plan compliance with requirements relative to the variables that will be measured, monitored, counted, recorded, collected, and maintained to determine the Project's Demand Reduction Value during Demand Resource On-Peak Hours, Demand Resource Seasonal Peak Hours, Real-Time Demand Response Event Hours, and Real-Time Emergency Generation Event Hours.

The Project Sponsor shall specify in its Measurement and Verification Plan if alternative variables other than kW, MW, kWh or MWh will be measured, monitored, recorded, collected and maintained.

9.2 Requirements

The Project Sponsor shall specify in its Measurement and Verification Plan compliance with each of the requirements listed below. When equipment manufacturer, model, serial number and age are not readily available, the Project Sponsor must specify alternative means of acquiring or estimating the required information.

(1) For Projects affecting **HVAC Systems,** the Project Sponsor shall, at a minimum, collect and maintain, the following information:

(a) On HVAC equipment: equipment capacity, quantity, manufacturer, model and serial numbers, and age.

(b) On HVAC system controls: location of zones, temperature set-points, control set-points and schedules, and any special control features.

(2) For Projects affecting **Building Envelope,** the Project Sponsor shall, at a minimum, collect, maintain and report on all key variables effecting savings associated with the measures.

(3) For Projects affecting **Interior or Exterior Lighting Systems,** the Project Sponsor shall, at a minimum, collect and maintain the following information: number and types of lamps and ballasts, with nameplate data.

(4) For Projects affecting **Major Electric Consuming Equipment,** the Project Sponsor shall, at a minimum, collect and maintain the following information: equipment capacity, quantity, manufacturer, model and serial numbers and age.

(5) For Projects affecting **Weather Sensitive Electrical Loads including HVAC**, where temperature, humidity or degree-days will be used in the calculation of Demand Reduction Value, the Project Sponsor shall collect and maintain representative site weather data, either measured on-site or obtained for a nearby site, from the National Climatic Data Center. On-site measurement equipment shall satisfy the measurement equipment requirements described in Section 10 of this manual.

(6) For Projects that include Distributed Generation, including Real-Time Emergency Generation Resources, the Project Sponsor shall measure and record the electrical output of the generator during Demand Resource On-Peak Hours, Demand Resource Seasonal Peak Hours, Real-Time Demand Response Event Hours, or Real-Time Emergency Generation Event Hours (as appropriate) using an interval meter that satisfies the measurement equipment requirements described in Section 10 of this manual. Additionally, the Project Sponsor shall report in a manner specified by ISO New England:

(a) The most recent annual non-coincident peak demand (absent Distributed Generation output) of the end-use metered customer at the location where the Distributed Generation is directly connected for each year that the Distributed

Generation participates in the FCM along with the output of the Distributed Generation during the most recent annual non-coincident peak; and

(b) The monthly average hourly load of the end-use customer to which the Distributed Generation is directly connected separately from the Distributed Generation's monthly average hourly output for each month of the Capacity Commitment Period.

9.3 Requirements for Real -Time Demand Response Resources and Real-Time Emergency Generation Resources

For Real-Time Demand Response Resources and Real-Time Emergency Generation Resources, the Project Sponsor shall specify compliance with the following metering and telemetry requirements.

(1) Receive dispatch instructions from the ISO through direct communication with Demand Designated Entities (DDE).

(2) Transmit in real-time, five-minute interval data (for all intervals in an operating day) from the DDE to ISO through the direct communication link between the DDE and the ISO.

9.3.1. Direct Communication Between ISO and DDE

The dispatch of Real-Time Demand Response and Real-Time Emergency Generation Resources will be communicated from the ISO to the DDE as prescribed in ISO New England Operating Procedure No. 18, Metering And Telemetering Criteria, (available on the ISO website). The DDE will be responsible for determining which Real-Time Demand Response Assets and Real-Time Emergency Generation Assets to dispatch to fulfill the Resource's dispatch instruction.

Dispatch instructions issued by ISO New England to a DDE for the dispatch of Real-Time Demand Response Resources or Real-Time Emergency Generation Resources shall be directed to end-use customers by the DDE.

Failure of a Project Sponsor to establish a DDE for a Real-Time Demand Response Resource or Real-Time Emergency Generation Resource may result in a zero Demand Reduction Value for those Resources. Inadequate management of the ISO CFE/RTU, and failure to provide telemetering of Real-Time Demand Response Assets or Real-Time Emergency Generation Assets, may also result in the removal of the contribution of those Demand Assets to the Demand Reduction Values.

9.3.2 Real-Time Demand Response Resources

(1) The ISO shall issue Dispatch Instructions (Advanced Notification[5]) to Real-Time Demand Response Resources for Demand Resource Forecast Peak Hours by 2200 on the day before the relevant Operating Day. Such Dispatch Instructions shall apply to specific Real-Time Demand Response Resources. The amount (MW) of Demand Resources dispatched for each Demand Resource Forecast Peak Hour will be the MW that the ISO determines is necessary to meet the forecasted capacity deficiency.

[5] Defined term in NAESB Wholesale Demand Response Standards.

(2) The ISO may issue Dispatch Instructions in real-time that reduce or increase the amount dispatched. The dispatch of Demand Resources during Demand Resource Forecast Peak Hours will not require the actual implementation of ISO New England Operating Procedure No. 4 unless real-time conditions require the dispatch of additional Demand Resources during the Operating Day.

(3) A Project Sponsor shall manage its Real-Time Demand Response Assets that are mapped to a Real-Time Demand Response Resource as of the first of a month such that the Real-Time Demand Response Resource shall be capable of responding to Dispatch Instructions requiring 100% of the Capacity Supply Obligation.

(4) Real-Time Demand Response Resources will receive a separate Dispatch Instruction indicating the end of the Deployment Period [6] when it can restore its loads to Normal Operations[7].

9.3.3 Real-Time Emergency Generation Resources

(1) The ISO shall issue Dispatch Instructions to Real-Time Emergency Generation Resources to curtail (including the Reduction Deadline) and restore loads to Normal Operations during Real-Time Emergency Generation Event Hours. Dispatch Instructions shall apply to specific Real -Time Emergency Generation Resourc es. The amount of Real-Time Emergency Generation Resources dispatched for each Real -Time Emergency Generation Event Hour will be the amount the ISO determines is necessary to meet the capacity deficiency.

(2) A Project Sponsor shall manage its Real-Time Emergency Generation Assets that are mapped to a Real-Time Emergency Generation Resource as of the first of a month that the Real-Time Emergency Generation Resource complies with Dispatch Instructions.

Real-Time Emergency Generation Resources will receive a separate Dispatch Instruction indicating the end of the Deployment Period when it can restore its loads to Normal Operations.

[6] Defined term in NAESB Wholesale Demand Response Standards.
[7] Defined term in NAESB Wholesale Demand Response Standards.

Section 10: Measurement Equipment Specifications

10.1 Description

The Project Sponsor shall specify in its Measurement and Verification Plan compliance with requirements for measurement, monitoring and/or data recording device type that will be used to measure, monitor and record data for each parameter and variable indicated in the Project Sponsor's Measurement and Verification Plan pursuant to Section 9 of this manual.

The Project Sponsor may specify in its Measurement and Verification Plan and or Measurement and Verification Documents alternatives to the requirements in this Section provided the alternatives meet the minimum specifications, function and quality for measurement, monitoring and/or data recording devices that will be installed and operated to measure, monitor and/or record data from each of the parameters and variables indicated in the Project Sponsor's Measurement and Verification Plan pursuant to Section 9 of this manual.

10.2 Requirements

The Project Sponsor shall specify in its Measurement and Verification Plan compliance with the following requirements:

(1) All solid-state measurement, monitoring and data r ecording equipment shall meet or exceed the relevant standards set by the American National Standard Institute ("ANSI") or equivalent standard for the equipment.

(2) Measurement, monitoring and data recording equipment that is directly measuring watt-hour, volt-hour, volt-ampere-hours, reactive volt-ampere-hour, and the associated demand components should conform to ANSI or equivalent standards for the equipment.

(3) Instruments or transducers for the analog or digital measurement of volt, volts -squared, amperes, amperes-squared, phase angle, volt-amperes, watts, and reactive volt-amperes should conform to ANSI or equivalent standards for the equipment.

(4) Data recorders that are recording pulses from measurement and monitoring devices shall utilize a pulse rate within the resolution capabilities of the recorder.

(5) All measurement, monitoring and data recording equipment installed on electric circuits with significant harmonics shall meet the relevant standards provided by the Institute of Electrical and Electronics Engineers (IEEE).

(6) Any measurement or monitoring equipment that directly measures electrical demand (MW) shall be a true RMS[8] measurement device with an accuracy of no less than ±2%.

(7) Any measurement or monitoring equipment that directly measures electrical demand from three-phase devices shall be installed such that measurements are taken on all three-phases to account for any phase imbalance or an equivalent method that can measure electrical demand using two phases.

(8) Any measurement or monitoring equipment that directly measures electrical demand on circuits with significant harmonics shall have a digital sampling rate of at least 2.6 kHz as defined in the relevant IEEE Standards.

(9) Any measurement or monitoring equipment of pr oxy variables that do not directly measure electrical demand, including but not limited to voltage, current, temperature, flow rates and operating hours, shall have an accuracy rating such that the overall accuracy of the calculated demand (MW) using the p roxy variables is not less than ± 2%.

[8] Root Mean Square

(10) Any measurement or monitoring equipment of current (amps) and nominal voltage used to calculate electrical demand shall include the power factor of the end-uses in the demand (MW) calculations.

(11) Data recorders shall be synchronized in time, within an accuracy of ± 2 minutes per month, with the National Institute of Standards and Technology ("NIST").

(12) All measurement, monitoring and data recording equipment shall be calibrated by the Project Sponsor or its independent calibration contractor in such a way to meet or exceed the Federal Energy Management Program ("FEMP") Measurement and Verification Guidelines, applicable American Society of Heating, Refrigeration and Air Conditioning Engineers ("ASHRAE") standards, NIST, or equivalent standard for the equipment.

(13) The Project Sponsor shall ensure that all measurement, monitoring and data logging equipment shall be maintained in such a way as to meet or exceed industry and manufacturer maintenance standards.

(14) The Project Sponsor shall maintain documentation on all measurement, monitoring and data recording equipment maintenance and calibration activities. Documentation and records shall be maintained as specified in Section 12 of this manual.

(15) The Project Sponsor shall provide to ISO, upon request, measurement equipment maintenance, calibration and testing records to demonstrate that the Project Sponsor's measurement equipment is calibrated and maintained in accordance the requirements described in this manual.

(16) Interval metering devices shall collect electricity usage data at a frequency of 15 minutes or less.

(17) The Project Sponsor may propose alternative methods to demonstrate the measurement, monitoring and data recording equipment used in the determination of Demand Reduction Value provided it satisfies the accuracy, calibration and maintenance standards described in this manual subject to ISO approval.

10.3 Requirements for Demand Resources Defined as Real-Time Demand Response or Real-Time Emergency Generation

10.3.1 Telemetering Requirements

The term Interval Meter as used with respect to Real-Time Demand Response Assets and Real-Time Emergency Generation Assets in this manual refers to a meter that records energy usage (or generation) on at least a five minute interval basis and may store energy usage (or generation) at a smaller interval. For Real-Time Demand Response Resources and Real-Time Emergency Generation Resources, the Project Sponsor shall comply with the requirements established in ISO New England Operating Procedure No, 18, Metering And Telemetering Criteria. For the purposes of the Real-Time Demand Response Assets and Real-Time Emergency Generation Assets, an Interval Meter will include meters that meet the following requirements:

(1) Where the Interval Meter is the same meter used by the distribution company for billing purposes and will be a revenue quality meter the accuracy on the meter shall be ± 0.5%.

(2) Where Interval Metering is installed specifically for the Rea l-Time Demand Response Asset or Real-Time Emergency Generation Asset and will not be used for other billing purposes, the meter installation can either be a revenue quality meter as described above or a non-revenue quality meter with an overall accuracy of ± 2.0% as the source of the performance data. For each non-revenue interval meter device used, the Project Sponsor will submit certification from the meter manufacturer that the model in question meets the ± 2.0% accuracy threshold, and shall specify accuracy for the following:

   (a) Current measurement

   (b) Voltage measurement

   (c) A/D conversion

   (d) Calibration

(3) Revenue quality meters shall be periodically tested and calibrated in accordance with the standards for revenue quality metering.

(4) Data shall be transmitted through the DDE to the ISO in accordance with the ISO CFE/RTU for Demand Resources.

10.3.2 Other Telemetering Requirements

A Project Sponsor may specify an alternative to the telemetering requirements in its Measurement and Verification Plan subject to ISO New England approval providing the proposed methodology meets all the minimum requirements specified in Section 10 of this manual.

Section 11: Monitoring Frequency and Duration

11.1 Description

The Project Sponsor shall specify in its Measurement and Verification Plan compliance with requirements for monitoring frequency and duration of each monitoring parameter and variables indicated in the Project Sponsor's Measurement and Verification Plan pursuant to Section 9 of this manual.

11.2 Requirements

The Project Sponsor shall specify in its Measurement and Verification Plan compliance with the following requirements:

(1) The duration and frequency of metering and monitoring shall be sufficient to ensure an accurate representation of the amount of electrical demand used or generated during periods in which baseline conditions are measured and during Demand Resource On-Peak Hours, Demand Resource Seasonal Peak Hours, Real-Time Demand Response Event Hours, and Real-Time Emergency Generation Event Hours.

(2) For Projects using Option B methodology described in Section 5.2 the direct measurement of electrical demand or generation shall be made using an interval meter that satisfies the requirements described in Section 10 of this manual.

(3) All measurements shall be taken at typical system conditions within the time periods and frequency that shall demonstrate coincidence with the Demand Resource On-Peak Hours, Demand Resource Seasonal Peak Hours, Real-Time Demand Response Event Hours, and Real-Time Emergency Generation Event Hours.

(4) If independent parameters, such as but not limited to: temperature, humidity, or heating degree days are used in the calculation of Demand Reduction Values, the Measurement and Verification Plan shall specify methods to ensure the measurement is performed over a duration and frequency sufficient to accurately represent of the amount of electrical demand used or generated during periods in which baseline conditions are measured and during Demand Resource On-Peak Hours, Demand Resource Seasonal Peak Hours, Real-Time Demand Response Event Hours, and Real-Time Emergency Generation Event Hours.

(5) The Project Sponsor may propose alternative methods for monitoring frequency and duration for each monitoring parameter and variable indicated in the Project Sponsor's Measurement and Verification Plan pursuant to Section 9 of this manual providing the proposed methodology meets all the minimum requirements specified in Section 11 of this manual.

11.3 Requirements for Demand Resources Defined as Real-Time Demand Response or Real-Time Emergency Generation

For Real-Time Demand Response and Real-Time Emergency Generation Assets, the Project Sponsor shall comply with the requirements established in the ISO CFE/RTU for Demand Resources for real-time telemetry.

Section 12: Data Validation, Retention and Management

12.1 Description

The Project Sponsor shall specify in its Measurement and Verification Plan compliance with the requirements for systems, processes and methods for validation, estimation of missing, and maintenance of all data used in the calculation of Demand Reduction Values for Demand Resource On-Peak Hours, Demand Resource Seasonal Peak Hours, Real-Time Demand Response Event Hours, and Real-Time Emergency Generation Event Hours.

12.2 Requirements

The Project Sponsor shall specify in its Measurement and Verification Plan compliance with the following requirements:

(1) For Demand Resource Projects targeting customer facilities with greater than or equal to 10 kW of Demand Reduction Value per facility, the Project Sponsor shall maintain the following:

(a) Retail customer's address,

(b) The retail customer's utility distribution company,

(c) Utility distribution company account identifier such as account number or meter number,

(d) Measures installed, and

(e) The corresponding monthly Demand Reduction Values until the end of the Measure Life, the Demand Asset is retired, or until the Demand Resource is permanently De-Listed or retired from the FCM.

(2) For Demand Resource Projects targeting customer facilities with less than 10 kW of Demand Reduction Value per facility, the Project Sponsor shall have the option of maintaining records as described above for customer facilities with greater than or equal to 10 kW of Demand Reduction Value per facility, or maintaining records of aggregated Demand Reduction Values and measures installed by Load Zone, Dispatch Zone and Meter Domain for each Demand Resource type.

(3) The Project Sponsor shall validate all measured data used in the Demand Reduction Value calculations. Data that has failed validation may not be used in any Demand Reduction Value calculation.

(4) For Projects involving an individual facility, generator or energy consuming equipment, the Project Sponsor shall conduct the following validation checks on any interval data from an individual facility:

(a) Time Check: The Project Sponsor shall validate that the measurement devices time clock is within ± two minutes of the true time as defined by the National Institute of Standards and Technology.

(b) Sum Check: The Project Sponsor shall validate that the difference between the sum of the values recorded over the intervals and the value recorded by the meter over the same time period is within plus or minus two percent. This check may be done on either usage or pulse data, provided the data scaling is consistent throughout the period.

(c) High/Low Check: The Project Sponsor shall establish minimum and maximum expected values for each Demand Asset, facility, or measure. The minimum and maximum values shall be based on equipment ratings or historical equipment and/or facility usage data. The Project Sponsor shall identify any and all interval data that is greater than the maximum expected value or less than the minimum expected value. Any such interval data shall be deemed to fail validation.

(d) Zero Value Check: The Project Sponsor shall identify any and all interval data with a value equal to zero. The Project Sponsor shall verify whether or not the zero value is the correct value for that interval. If the Project Sponsor determines that the zero value is incorrect, the Project Sponsor shall substitute a corrected or estimated non zero value for the zero value. Under no circumstances shall the Project Sponsor substitute a zero value for missing interval data.

(e) The Project Sponsor shall identify all estimated data used in the Demand Reduction Value calculations, as well as the methodology used to develop the estimate.

(f) The Project Sponsor shall classify all data that has passed validation and is used in the Demand Reduction Value calculations as either: (i) actual data, (ii) estimated data or (iii) missing data. The data classification shall be stored along with the data values in the Project Sponsor's data retention and management system described in Section 12.1.

12.3 Requirements for Demand Resources Defined as Real-Time Demand Response or Real-Time Emergency Generation

For Real-Time Demand Response Resources and Real-Time Emergency Generation Resources, the Project Sponsor shall also comply with the requirements established in the ISO CFE/RTU for Demand Resources for real-time telemetry with regard to data validation, retention and management.

The Project Sponsor shall ensure the DDE will provide the ISO with the appropriate interval data, meeting the minimum requirements specified in this manual, for the Real-Time Demand Response Asset or Real-Time Emergency Generation Asset. Interval data shall be consistent with ISO settlement requirements as defined in other ISO Manuals and Procedures. If the Demand Asset is Ready-to-Respond, but the DDE fails to submit the required interval data, it remains the responsibility of the Project Sponsor to ensure submission to the ISO of adequate interval data. Real-Time Demand Response Assets and Real-Time Emergency Generation Assets shall only become Ready-to-Respond on the first of the month subject to the customer's requested effective date and other requirements defined in this manual and in the ***ISO New England Manual for Registration and Performance Auditing, M-RPA***, including but not limited to: building a Customer Baseline, affirming the requisite metering is installed and operational, and the process to update the ISO CFE/RTU communications model.

For Demand Assets that do not require a Customer Baseline, the Ready -to-Respond date shall be the first of the month after the Project Sponsor indicates the appropriate metering is installed and operational and the DDE is ready to submit interval data to the ISO and after the ISO has approved the Project Sponsor's registration of the Demand Asset. The Demand Asset registration process is defined in ***ISO New England Manual for Registration and Performance Auditing, M-RPA***.

Section 13: Performance Reporting

13.1 Description

The Project Sponsor shall specify in its Measurement and Verification Plan compliance with the requirements for monthly data performance reporting.

13.2 Requirements

The Project Sponsor shall specify in its Measurement and Verification Plan compliance with the following requirements:

(1) On a monthly basis, the Project Sponsor shall report for each of its Demand Assets registered with the ISO the total Demand Reduction Value (MWh) during the Demand Resource On-Peak Hours, Demand Resource Seasonal Peak Hours, Real-Time Demand Response Event Hours, and Real-Time Emergency Generation Event Hours applicable to the Demand Resource in the Obligation Month. For Distributed Generation, the reported values should reflect parasitic loads and be reported as the net output for each interval.

(2) The Project Sponsor shall report the Demand Reduction Values (MWh) for each Demand Assets according to the submission and timing requirements defined in ***ISO New England Manual for Market Rule 1 Accounting, M-28***.

(3) The Project Sponsor may report revised Demand Reduction Values (MWh) for each Demand Assets according to the submission and timing requirements defined in ***ISO New England Manual for Market Rule 1 Accounting, M-28***.

(4) The Project Sponsor shall report the Demand Reduction Values (MWh) for each of its Demand Assets in a format defined by the ISO.

(5) The Project Sponsor shall report the Demand Reduction Values (MWh) for each of its Demand Assets using a software application and electronic interface defined by the ISO. Performance data for On-Peak and Seasonal Peak assets that are not Distributed Generation shall be submitted through the CAMS. Performance data for On-Peak and Seasonal Peak assets that are Distributed Generation shall be submitted through the Settlement Market System metering interface.

(6) The Project Sponsor shall provide to the ISO on a monthly basis work sheets, engineering calculations, reference materials, meter readings, and any other data necessary to support the Demand Reduction Values for each of its Demand Assets. The ISO may update the reported Demand Reduction Values (MWh) based on its review of the supporting documentation provided with the submittals or through an audit as defined in the ***ISO New England Manual for Registration and Performance Auditing, M-RPA***.

(7) For Demand Resources using Statistical Sampling, the Project Sponsor shall provide to the ISO, as part of its Annual Certification of Accuracy of Measurement and Verification Documents as specified in Section 14.2, a statement that the Demand Reduction Value complies with the minimum statistical significance requirements described in Section 7.2.2 of this manual. The Project Sponsor shall specify any deviations from minimum statistical significance requirements and any and all actions taken to correct deviations.

(8) For Demand Resources where Demand Reduction Values (MWh) are derived using baseline conditions, the Project Sponsor shall provide to the ISO on a monthly basis a description of any and all adjustments made to baseline conditions used in the Demand Reduction Value calculations.

(9) For Distributed Generation, Project Sponsors shall report the Facility Metered Load in hourly intervals for purposes of calculating the Demand Reduction value and pushback to the grid during Demand Resource On-Peak Hours, Demand Resource Seasonal Peak Hours, Real-Time Demand Response Event Hours, or Real-Time Emergency Generation Event Hours (as appropriate) subject to metering requirements as specified in Section 5 of this manual.

13.3 Requirements for Demand Resources Defined as Real-Time Demand Response Assets or Real-Time Emergency Generation Assets

For Real-Time Demand Response Assets and Real-Time Emergency Generation Assets, the Project Sponsor shall also comply with the requirements established in the ISO CFE/RTU for Demand Resources for real-time telemetry with regard to performance reporting.

Section 14: Independence and Auditing

14.1 Description

The Project Sponsor shall specify in its Measurement and Verification Plan compliance with requirements for measurement and verification processes that will be conducted by independent third-parties. An independent third-party is a party that is not an Affiliate of the Project Sponsor, that has no financial interest in the outcom e of the certification, and that is qualified in the measurement and verification of Demand Resource measures.

The Project Sponsor shall specify in its Measurement and Verification Plan that the Project Sponsor shall provide an Annual Certification to the ISO that the Demand Resource projects continue to perform in accordance with the submitted Measurement and Verification Plan and with the Measurement and Verification Documents reviewed and approved by the ISO for the applicable Capacity Commitment Period.

14.2 Requirements

The Project Sponsor shall indicate in its Measurement and Verification Plan compliance with the following requirements:

(1) The Project Sponsor shall provide to the ISO an Annual Certification of Accuracy of Measurement and Verification Documents, with a statement certifying that the Projects for which the Project Sponsor is requesting compensation continue to perform in accordance with the submitted Measurement and Verification Documents approved by the ISO. Acceptable methods for satisfying the Annual Certification of Accuracy of Measurement and Verification Documents include, but are not limited to, certification by a state public utility commission with jurisdiction over the Project, or an auditor that is not an Affiliate of the Project Sponsor, that has no financial interest in the outcome of the certification, and that is qualified in the measurement and verification of Demand Resource measures.

(2) The Project Sponsor shall cooperate in any unannounced audits or tests of a Demand Resource conducted by the ISO. Audits may be conducted on a periodic basis, or at the ISO's discretion should the ISO have a reason to suspect a deficiency in the Project Sponsor's compliance with any requirement. On site audits will be coordinated with the Project Sponsor and scheduled during normal business hours.

(3) The Project Sponsor shall allow the ISO to audit testing and calibration records, and order and witness the testing of metering and measurement equipment installed pursuant to the Demand Resource's approved Measurement and Verification Plan

(4) The Project Sponsor shall be responsible for all expenses associated with installing, maintaining, calibrating and testing the metering, data recording and measurement equipment installed pursuant to the Demand Resource's approved Measurement and Verification Plan.

(5) The Project Sponsor shall also comply with the requirements in ***ISO New England Manual for Registration and Performance Auditing, M-RPA*** for registration, audit, and testing.

14.3 Requirements for Demand Resources Defined as Real-Time Demand Response or Real-Time Emergency Generation

For Real-Time Demand Response Resources and Real-Time Emergency Generation Resources, the Project Sponsor shall comply with the requirements established in the ISO CFE/RTU for Demand Resources for real-time telemetry with regard to independence and auditing.

Section 15: Measurement and Verification Supporting Documents

15.1 Description

The Project Sponsor shall provide a list in its Measurement and Verification Plan of all reports, studies, specifications and other documents referenced in its Measurement and Verification Plan. Such documents shall be submitted as Measurement and Verification Documents.

15.2 Requirements

The Project Sponsor shall indicate in its Measurement and Verification Plan compliance with the following requirements:

(1) All reports, studies, specifications and other documents referenced in the Project Sponsor's Measurement and Verification Plan shall have been prepared and published within five years of the Measurement and Verification Plan's submission date to the ISO.

(2) The Project Sponsor shall specify in its Measurement and Verification Plan adequate justification for use and relevance of reports, studies, specifications and other documents referenced in the Project Sponsor's Measurement and Verification Plan published more than five years from the time of the Measurement and Verification Plan's submission. Additional justification for use of out of date documents shall be submitted in addendums to the Measurement and Verification Documents by the New Capacity Qualification deadline or Existing Capacity Qualification deadline for the applicable Forward Capacity Auction for reports, studies, specifications and other documents referenced in the Project Sponsor's Measurement and Verification Plan that become out of date during after a Capacity Commitment Period and shall be subject to ISO approval.

(3) The Project Sponsor shall provide to the ISO electronic copies (and upon request hardcopies) of any and all reports, studies, specifications and other documents referenced in its Measurement and Verification Plan.

Section 16: Responsible Parties

16.1 Description

The Project Sponsor shall specify in its Measurement and Verification Plan the parties involved in various aspects of the Project.

16.2 Requirements

The Project Sponsor shall specify in its Measurement and Verification Plan the parties involved in various aspects of the Project, including but not limited to the names or titles of the parties, professional qualifications, and typical responsibilities in the following area:

(1) Project Management

(2) Measure Implementation

(3) Measure Operation and Maintenance

(4) Measurement Equipment Calibration and Testing

(5) Monthly Demand Reduction Value Calculations

(6) Data Validation, Retention and Management

(7) Monthly Performance Reporting

(8) Independent Project Auditing

(9) Quality Assurance

Section 17: Measurement and Verification Plan Format

17.1 Description

The Project Sponsor shall prepare and submit its Measurement and Verification Plan in a format and manner as specified by ISO New England.

17.2 Requirements

The Project Sponsor's Measurement and Verification Plan shall contain all information as specified in this manual in a format specified by the ISO [9]. In each Section, Project Sponsor shall specify required elements of its proposed plan and indicate compliance with all the applicable requirements specified in this manual:

(1) Project Information

(2) Equipment, Measure, and Practice Description

(3) Project General Assumptions

(4) Measurement and Verification Approach

(5) Establishing Baseline Conditions / Metering Scheme

(6) Statistical Significance

(7) Demand Reduction Value Calculations

(8) Monitoring Parameters and Variables

(9) Measurement Equipment Specifications

(10)Monitoring Frequency and Duration

(11) Data Validation, Retention and Management

(12) Performance Reporting

(13) Independence and Auditing

(14) Measurement and Verification Documents

(15) Responsible Parties

[9] The Measurement and Verification Plan form for Demand Resources is available on the ISO website. http://www.iso-ne.com.

Revision History

Approval

Approval Date: April 13, 2007 Effective Date: April 13, 2007

Revision History

Revision: 1 -	Approval Date: August 2, 2007
Section No.	Revision Summary
List of Figures and Tables…..	Added "ISO New England Business Procedures" to the Table 1.1 title.
Introduction…	Added "ISO New England Business Procedures" to this section.
Table 1.1……	Added "ISO New England Business Procedures" to the title and adds "Ancillary Service Schedule No. 2 Business Procedure" to the Transmission column.
A2.4(7) & A4.4……	Replaced "90 days following the dispatch day" with "the 101 day Data Reconciliation Process deadline".

Revision: 2 -	Approval Date: May 7, 2010
Section No.	Revision Summary
Entire Manual	revised to reflect the Forward Cap acity Market as contained in Section III.13 of Market Rule 1.

Revision: 3 -	Approval Date: May 6, 2011
Section No.	Revision Summary
6.4.1……..	Added a reference to Section 6.4.1.1(4)(a) for the location of the Customer Baseline adjustment description to the first sentence and deleted the second and third sentences.
6.4.1.1(4)(a)(i)..	Added reference to dispatch results from a Demand Response audit, deleted reference to a Real-Time Price Response event being initiated , and clarified that the actual usage would occur before the first Reduction Deadline in the dispatch day.
6.4.1.1(4)(a)(ii).	Clarified that the actual usage would occur before the first Reduction Deadline in the dispatch day.
6.4.1.1(4)(a)(iii)	Deleted the reference to a Real-Time Price Response Asset and clarified that the actual usage would occur for the two hours commencing two and a half hours before the first Reduction Deadline in the dispatch day.
6.4.1.1(4)(a)(iv)	Added a new subsection (iv) describing the Customer Baseline adjustment f or a Real-Time Price Response Asset participating in the Day -Ahead Load Response Program or a Real-Time Price Response event occurring in the dispatch day.
6.4.1.1(4)(a)(v).	Previous subsection (iv) becomes the new subsection (v).
6.4.1.1(4)(a)(vi)	Previous subsection (v) becomes the new subsection (vi) and the previous content is replaced with a new sentence detailing the application of the Customer Baseline

	adjustment for the second and subsequent consecutive event days when there are multiple consecutive dispatch days for an asset.