

# **ISO New England Load Response Program**

## **Manual**

Revision: 7  
Effective Date: June 1, 2005

Prepared by  
ISO New England Inc.

# ISO New England Load Response Program

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## Revision History

### Approval

Approval Date: December 6, 2002  
Effective Date: March 1, 2003

### Revision History

Revision: 1 - Approval Date: February 14, 2003

Section No.      Revision Summary

2.2.4 &

Appendix D....On an interim basis (until the implementation of the Day-Ahead Demand Response Program), existing Type 2 Interruptible Load Customers enrolled as of February 1, 2003 will participate in the Real-Time Profiled Response Program. Unlike other Real-Time Profiled Response Program Customers, the existing Type 2 Interruptible Load Customers will be called upon at Action 3 (rather than Action 9) of OP4 and would have 2 hours (rather than 30 minutes) to respond.

*The following revisions were made as conforming changes to reflect NEPOOL's December 27, 2002 Filing of revisions to the Load Response Program to comply with the December 20, 2002 Order issued by the FERC.*

1 & 2.1.....Extend term to February 28, 2006.

2.2.2, 4.5.1 &

4.5.3.1.....Increase minimum price for interruption in Real-Time Demand Response Programs to \$500/MWh for a minimum of two hours in the 30-minute Demand Response Program and \$350/MWh for a minimum of two hours in the 2-Hour Demand Response Program.

4.5.4.1.....Allocate charges (except IBCS costs) to hourly Real-Time Load Obligation on a system-wide basis.

4.5.4.1.....Commencing on the date that the Day-Ahead Program is implemented, Load Response Program Costs (except for IBCS costs) will be allocated to Network Load on a system-wide basis.

4.7.....Prior to the implementation of the Day-Ahead Load Response Program, Program changes are allocated to Real-Time Load Obligation on a system-wide basis. Commencing on the date that the Day-Ahead Program is implemented, Load Response Program Costs will be allocated to Network Load on a system-wide basis.

6.1.....Add clarifying language to description of cost allocation for IBCS costs.

Appendix B.....Examples in Appendix B were updated to reflect the revisions listed above.

Revision: 2 - Approval Date: June 26, 2003

Section No.      Revision Summary

1.2.....Re-phrase the first sentence of the last paragraph to state that the duration of an interruption may exceed the two-hour minimum guaranteed payment period.

1.4.....Reduce the minimum for Real-Time Profiled Response Program response from 1 MW to 200 kW; notify Participants of mandatory interruptions when Action 3 (rather than

	Action 9) of NEPOOL Operating Procedure #4 is implemented; and clarify that the duration of an interruption may exceed the two-hour minimum guaranteed payment period.
1.5.....	Language is added to clarify that notification of Load Response Events will be transmitted by the IBCS Open Solution.
2.2.2(3)&(4)....	These subsections are re-phrased to clarify when Real-Time Demand Response will be activated under OP4 and to clarify that the duration of interruptions may exceed the two-hour maximum guaranteed payment period.
2.2.4.....	The capability of responding within 30-minutes criterion is changed to capable of responding within 2 hours. Language is added to clarify that the notice to activate these Demand Resources is transmitted through the IBCS Open Solution. The term “expected response quantity” is replaced by “the actual real-time statistically determined response quantity”. Two exceptions to the treatment of Type 2 Interruptible Load Customers are deleted because the criteria for other Real-Time Profiled Response have now been conformed to those applicable to Type 2 Interruptible Loads.
2.3(4).....	New language is added to this section to reflect the minimum size of 200 kW applicable to Real-Time Profiled Response and limiting the aggregation of Customers to reach or exceed that minimum to a Zonal basis.
3.1.2.....	This section is revised to clarify a reference to the IBCS Open Solution and to specify that Real-Time Demand Response Program Customers will be notified only when the specified Actions of OP4 are implemented.
3.1.3.....	This section is revised to indicate that the ISO will initiate notification for the Real-Time Price Response Program when either the results of the Day-Ahead Energy Market or a forecast Real-Time Zonal Price is greater than or equal to \$100/MWh during the program hours.
3.1.3.2.....	This section is modified to clarify that notification via e-mail of Enrolling Participants and Customers under the Low Tech Option is limited to those that have subscribed to the ISO’s list server and to clarify that the MW contracted amount and availability are not monitored by the Control Room.
3.1.4.....	This section is revised to correct a reference to the IBCS Open Solution and to change the notifications from Action 9 of OP4 to Action 3 of OP4.
3.2.....	Language is added to this section to clarify that instructions to activate Real-Time Profiled Response Program Demand Resources will be transmitted through the IBCS Open Solution.
3.3.....	This section is revised to reflect the change in response time for Real-Time Profiled Response from within 30-minutes to within two hours.
4.1.....	This section has been revised to specify the metering accuracy requirements for Demand Response Programs.
4.4.1.....	The list of required data is revised by adding the Block or Zone activated and by making the list applicable to all Real-Time Programs rather than Demand Response Programs.
7.1.1.....	This subsection is revised to clarify that if an event is initiated in the subsequent month the lowest actual amount interrupted in that month or the most recent result of the monthly settlement will be used to establish the Adjusted Capability in the month following the subsequent month. A note is also added after the chart in this subsection that points out that depending upon the timing of the actual settlement process, the “prior month” could represent the most recent monthly settlement, which may not be the prior calendar month.

Revision: 3 - Approval Date: August 1, 2003

Section No.      Revision Summary

- 1.2.....Revises the last paragraph of the Section to refer to blocks of Resources segregated by Load Response Program.
- 1.5.....Revises the Section to replace references to the IBCS with references to their IBCS Provider and to specify that the e-mail notification will be through a list server.
- 2.2.2.....Replaces reference to IBCS with IBCS Provider.
- 2.2.3.....Clarifies that the Real-Time Price Response Program hours are Monday through Friday, non-holidays between 7:00 AM and 6:00 PM.
- 2.2.4.....Adds language stating the eligibility criteria for Real-Time Profiled Response Program Loads, states that the eligibility of such loads to qualify as ICAP Resources is covered in NEPOOL Manual 20, and deletes language dealing with Type 2 Interruptible Load Customers.
- 2.3(7).....Revises this subsection to clarify the requirements for Real-Time Demand Response.
- 2.4.....Replaces a reference to “IBCS supplier” with “IBCS Provider”.
- 2.7(8)(c).....Replaces a reference to “IBCS supplier” with “IBCS Provider”.
- 3.1.2.....Revises the second paragraph of the Section to clarify the initiation of a Load Response Event.
- 3.1.3.1 &
- 3.1.3.2.....Replaces IBCS and IBCS software with IBCS Open Solution.
- 3.1.4.....Revises the second paragraph of the Section to state that a Load Response Event for the Real-Time Profiled Response Program will be initiated for the appropriate Load Zones or Blocks.
- 3.2.....Replaces IBCS with IBCS Provider.
- 4.2.1.....Adds new language to describe new Customer Baseline including treatment of new Assets.
- 4.2.2.....Revises the Section to eliminate one of the three exclusions from the Customer Baseline and to modify another.
- 4.3.1.....Revises the Section to reflect changes in the Customer Baseline adjustment.
- 4.4.....Revises the table to reflect use of IBCS Provider and IBCS Open Solution.
- 4.4.1 – 4.4.3.....Revises the Sections to refer to IBCS Open Solution and clarifies the data requirements for Real-Time programs.
- 4.5.1.....Revises Section to reflect revised calculation of payments.
- 5.....Revises Section to reflect use of the term “IBCS Provider”.
- 6 & 6.1.....Revises Section to reflect use of the term “IBCS Provider”.
- 7.1.1.....Revises Section to reflect revisions to the calculation of adjusted capability and treatment of Load Response Program Customer for ICAP Credit for “short events”.
- Appendix B.....Examples in Appendix B were updated to reflect the revisions to Customer Baseline adjustment.
- Appendix D.....Appendix D is deleted.
- Appendix E.....Adds a new Appendix E: Developing a Measurement and Verification Plan for Participation in the Real-Time Profiled Response Program.

Revision: 4 - Approval Date: November 7, 2003

Section No.      Revision Summary

*The following revisions are contingent upon FERC acceptance of corresponding revisions to Appendix E of Market Rule 1 to be filed by the ISO.*

- 1.....Replaces “The Independent System Operator” with “ISO New England Inc.”
- 1.4.....Adds language to clarify that an approved M&V Plan is required in lieu of Interval Metering.
- 2.3.....Adds references to an approved M&V Plan to subsections (2) (3) & (4) and adds language to subsection (9) to clarify that ICAP credit will be lost until the next Demand Response Event if metering data is not received by the deadline.
- 2.4.....Adds language limiting the requirement that Participants confirm with their IBCS provider that they can and will aggregate loads into a single control point to those customers using an IBCS to aggregate customers.
- 2.6.....Revises subsection (3) by adding a reference to an approved M&V Plan.
- 2.7.....Adds “in accordance with program requirements”: to subsection (3). Adds a requirement for obtaining approval of an M&V Plan and a requirement to provide appropriate statistical confidence for the response in accordance with the approved M&V Plan to subsection (8). Adds language limiting the use of Low-Tech reporting options to the Real-Time Price Response Program to subsection (8).
- 3.1.2.....Revises the notification message and the description following that message. Revises the restoration message
- 3.1.3.1 &
- 3.1.3.2.....Revises the notification messages.
- 3.1.4.....Revises the notification and restoration messages.
- 4.1.....Adds language providing an option to submit an M&V Plan in lieu of Interval Metering.
- 4.1.2.....Adds new language to allow use of an approved M&V Plan for Real-Time Demand Response.
- 4.1.3.....Adds new language to allow use of an approved M&V Plan for Real-Time Price Response
- 4.1.4.....Adds new language to allow use of an approved M&V Plan for Real-Time Profiled Response.
- 4.1.5.....Adds language stating that when an approved M&V Plan is used, measurement of load and curtailment shall be in accordance with the approved M&V Plan..
- 4.2.1.....Adds references to approved M&V Plan.
- 4.4.1.....Adds references to approved M&V Plan.
- 4.4.2.....Adds references to approved M&V Plan
- Appendix E.....Revises title to expand beyond Real-Time Profiled Response Program.
- 8E.1.....Revises Section to reflect applicability of M&V Plans to all Load Response Programs but must meet the program specific data requirements of each Program.
- 8E.2.....Revises Section to state that the objective of the Enrolling Participant’s M&V Plan is to describe the data acquisition and analysis methodology to determine customers’ energy usage or load curtailment by Load Zone and reporting interval.
- 8E.2.1 .....Replaces “Participant” with “Enrolling Participant”. In the subparagraph dealing with “constant load” replaces “treated” with “considered”. In the last sentence of the Section, adds “power factor” to the list of equipment capacity in parentheses.
- 8.E.2.2.....Replaces “load reductions” with “energy usage or load curtailment”. In subsection (1) replaces “could” with “can” Revises Section to describe when various metering or other measurement methods might be appropriate and to require M&V Plans that propose end-use metering to describe why whole-premise metering is either inappropriate or not cost

	effective. Subsection (2) is revised to require the recording and reporting intervals to be consistent with those required by the specific Load Response Program for which the M&V Plan is proposed. Subsection (3) is revised to clarify that alternative methods of measuring demand are required to meet accuracy standards similar to those required of RMS measurement devices.
8.E.3.....	Revises this Section to apply to all Load Response Programs and to vary the methodology by program to reflect each program's requirements.
8.E.3.1.....	"load reductions" is replaced by "energy usage or load curtailment"
8.E.4. ....	Language is added to describe how sampling can be used in an M&V Plan and "Participant" is replaced by "Enrolling Participant"
8.E.4.1 .....	"Participant" is replaced by "Enrolling Participant".
8.E.4.2.....	The Section is revised to make sampling available for all Load Response Programs and to specify that the 90% confidence level is in the load curtailment amount in kW. "Participant" is replaced by "Enrolling Participant"
8.E.4.3.....	Revises the Section to provide that the coefficient of variation will be set to 0.5. "Participant" is replaced by "Enrolling Participant"
8.E.5.....	Adds this new Section to require that data be submitted in the format frequency and method of transmittal consistent with each of the Load Response Programs as described in the Program Manual.

Revision: 5 - Approval Date: April 2, 2004

Section No.      Revision Summary

2.7.....	Reduces the amount of data required for the Customer Baseline calculation from 10 days of data to 5 days of data.
4.2.1.....	Revises the Customer Baseline formulae to reflect the reduction in the amount of data required from 10 days of data to 5 days of data.
4.2.2.....	Revises reference to 10-day data requirement to 5-day data requirement.
5(7).....	Adds a sentence to describe the activation of Price Response Program assets.
7.2 .....	Revises the timeframe for requiring an audit of Load Response Programs eligible for ICAP to say that, if an event has not been called during the calendar year (changed from 365 days) prior to August 15 <sup>th</sup> , an audit will be initiated.

*The following revisions are contingent upon FERC acceptance of corresponding revisions to Appendix E of Market Rule 1 to be filed by NEPOOL.*

1.5.....	Revises the reimbursement by NEPOOL of the costs of installing hardware at the first 1000Customer sites.
6 .....	Revises eligibility criterion for hardware subsidy to exclude Customers providing less than 25 KW (reduced from 100kW).
6.1.....	Revises eligibility criterion for hardware subsidy to exclude Customers providing less than 25 KW (reduced from 100kW).
6.2.....	Revises subsection (1) to refer to hardware installation costs identified in Section 1.5(2).

Revision: 6 - Approval Date: June 28, 2004

Section No.      Revision Summary

Entire Manual revised to reflect RTO terminology and to reflect the Market Rule 1 and the Transmission, Markets and Service Tariff provisions filed with the FERC (e.g., the elimination of Internal Point-to-Point Transmission Service).

Revision: 7 - Approval Date: May 27, 2005

Section No.      Revision Summary

Section 1.....	Extends sunset date from February 28, 2006 to February 29, 2008 and changes the program name from Day-Ahead Demand Response to Day-Ahead Load Response.
1.1.....	Revises Section to describe the Day-Ahead Load Response Program and associated treatment of deviations and the eligibility of participating Resources to be ICAP Resources.
1.2.....	Revises Section to replace “Customer” with “customer” and “Resources” with “Demand Resources”. Also makes some clarifying changes in the wording of the Section.
1.3.....	Replaces “Customers” with “customers”.
1.5.....	Adds a new paragraph referring to the document “Requirements for IBCS OS and IBCS Providers”, which describes the roles, responsibilities and duties of the IBCS Open Solution and IBCS Providers. Also replaces “Customer” with “customer” throughout the Section.
2.1.....	Replaces Day-Ahead Demand Response Program with Day-Ahead Load Response Program and changes the sunset date from February 28, 2006 to February 29, 2008.
2.2.....	Revises eligibility criteria to provide for a minimum size of 100 kW (from 1 MW) and updates terminology.
2.2.1.....	Revises Section to provide that participation in the Day-Ahead Load Response Program is optional and that customers in the Day-Ahead Load Response Program must be participants in the Real-Time Load Response Program. In addition, a paragraph dealing with ICAP Resource eligibility is deleted and “Customers” is replaced by “customers”.
2.2.2.....	Replaces “Customers” with “customers”.
2.2.3.....	Replaces “Customers” with “customers” and “Resources” with “Demand Resources”.
2.2.4.....	Replaces “Customers” with “customers”.
2.3.....	Replaces “Day-Ahead Demand Response Program” with “Day-Ahead Load Response Program”. Replaces “Customers” with “customers”. Decreases the minimum size from 1 MW to 100 kW. Requires meter reading data to be submitted on the third business day after the Operating Day and replaces a reference to ISO New England Manual M-29 with a reference to Section 4.8 of this Manual.
2.4.....	Replaces: “resources” with “Demand Resources”, “Zone” with “Load Zone”, “load response program” with “Load Response Program”, and “Customers” with “customers”. Also deletes a reference to the 1 MW minimum size that is replaced elsewhere by 100 kW.
2.6.....	Replaces “interval meter” with “Interval Meter” and “Customers” with “customers”.
2.7.....	Adds customer notification of curtailment schedules from cleared offers in the Day-Ahead Load Response Program and of Real-Time events requiring customer response to the responsibilities of the Enrolling Participant. Replaces “Customer” with “customer” and up-dates the reference to the meter data submission deadline.
3.1.1.....	Revises title and Section to provide for notification of Enrolling Participants in the same manner as Day-Ahead Energy Market schedules are provided.
3.1.2.....	Revises sample notice to add references to the Zone or Block and revises Section to replace “Customer” with “customer”.
3.1.3.1.....	Adds a reference to the Zone and the 1800 hour end time to the sample notice.
3.1.3.2.....	Adds a reference to the Zone and the 1800 hour end time to the sample notice. Revises timeframe for reporting load reduction amounts to 60 hours (from 36) and replaces “interval meter” with “Interval Meter”. Replaces a reference to ISO New England Manual M-29 with a reference to Section 4.8 of this Manual.
3.1.4.....	Replaces “Customer” with “customer”. Revises the sample notice to include a reference to Zone or Block.

- 3.2.....Replaces paragraph describing program participant contacts with a table summarizing event notification by identifying the program, entity contacted and contact method.
- 3.3.....A statement indicating that Demand Response Resources are expected to curtail in accordance with cleared offers in the Day-Ahead Load Response Program is added. “Customers” is replaced by “customers”.
- 4.1.....”interval metering” is replaced by “Interval Metering”.
- 4.1.1.....Revises title to refer to Day-Ahead Load Response Program rather than Day-Ahead Demand Response Program. Replaces text of Section with a statement that participants in the Day-Ahead Load Response Program must meet the metering requirements of their associated Real-Time Load Response Programs.
- 4.1.2 & 3.....Replaces “Customers” with “customers”.
- 4.1.4.....Replaces “Customers” with “customers” and “amount” with “Amount Interrupted”.
- 4.1.5.....Replaces “interval meter” with “Interval Meter”.
- 4.2.1.....Revises Section to provide for calculating the Customer Baseline for Demand Resources participating in the Day-Ahead Load Response Program. Replaces “load response event” with “Load Response Event”.
- 4.2.2.....Revises Section to provide for exclusion of Load Response Event Days due to cleared offers in the Day-Ahead Market from the calculation of Customer Baseline.
- 4.3.1.....Revises Section to provide for adjustments to align CB with actual meter usage for Day-Ahead Load Response Program cleared offers.
- 4.3.2.....Adds a provision for establishing the Compliance Period for the Day-Ahead Load Response Program.
- 4.4.....Section is replaced by a table summarizing meter submission deadlines and a statement that deadlines for the Day-Ahead Load Response Program Demand Resources whose offers cleared are the same as the Real-Time Load Response Program for which the Demand Resource is registered.
- 4.4.1.....Revises Section to provide for hourly Interval Meter data to be submitted by 1300 on the third business day after the Operating Day. Replaces a reference to ISO New England Manual M-29 with a reference to Section 4.8 of this Manual. Replaces “registered and active” with “Ready to Respond”. Clarifies that the Enrolling Participant is responsible for submitting the required data to the ISO if the IBCS Provider fails to do so.
- 4.4.2.....Replaces “interval meter” with “hourly Interval Meter” and updates reference to the submittal deadline.
- 4.4.3.....Replaces “interval meter” with “Interval Meter”. Replaces a reference to ISO New England Manual M-29 with a reference to Section 4.8 of this Manual.
- 4.4.4.....Revises Section to reflect new timeline and replaces reference to ISO New England Manual M-29 with a reference to Section 4.8 of this Manual.
- 4.5.1.1.....Inserts new subsection providing for the calculation of Day-Ahead Load Response Program LRP Payments.
- 4.5.1.2.....Replaces existing provisions of Section 4.5.1 with a new subsection providing for Real-Time Load Response Programs LRP Payments.
- 4.5.2.....Revises Section to clarify that ICAP and the Adjusted Capability calculation apply only to Real-Time Demand Response Programs.
- 4.5.3.....This Section has been deleted.
- 4.5.4.....Revises the Section to describe the Settlement process for distributing payments and charges.
- 4.5.4.1.....Revises Section to provide for the allocation of LRP Charges to Real-Time Monthly Network Load.
- 4.5.5.....Replaces “Customer” with “customer” and “load reduction” with “Load Reduction”. The last sentence is re-phrased without any change in meaning.

4.6.....	Revises the Section to provide for Real-Time response to cleared Day-Ahead offers or Load Response Events.
4.6.1.....	Replaces the existing Section with new language stating that Day-Ahead offers that clear create financial obligations to respond in Real-Time.
4.6.1.1.....	This Section has been deleted.
4.6.1.2.....	This Section has been deleted.
4.6.2.1.....	Revises the Section to reflect that Day-Ahead offers that clear create financial obligations to respond in Real-Time.
4.6.2.2.....	Revises the Section to reflect that Day-Ahead offers that clear create financial obligations to respond in Real-Time.
4.6.3.1.....	Revises the Section to reflect that Day-Ahead offers that clear create financial obligations to respond in Real-Time.
4.6.3.2.....	Revises the Section to provide for treatment of Profiled Response for ICAP purposes where there is partial performance.
4.7.....	This Section has been deleted.
4.8.....	Provides the Load response Settlement Timeline referred to in Sections 4.5, 4.6 and 4.7 of this Manual.
5(2).....	Replaces “Loads” with “Load Response Assets”, “NX-11C form” with “Customer and Asset Management System”, and “Load Response asset registration Portal” with “SMD Home Page”.
5(3).....	Replaces “submitted Form NX-11C” with “registration submittal”.
5(6).....	Replaces “Customer” with “customer”.
5(7).....	Replaces “resource” with “Demand Resource”. Adds a requirement that an interval meter be operational as well as installed.
6.....	Replaces “Customers” with “customers”.
7.....	Replaces “load response programs” with “Load Response Programs”. Deletes Day-Ahead Demand Response from the list of eligible programs.
7.1.....	Adds a paragraph describing ICAP eligibility of Demand Response Resources and the use of Adjusted Capability.
7.1.1.....	Revises Section to describe the use of Adjusted Capability in calculating ICAP Credit. Several examples and a revised table are also provided.
7.1.2.....	Revises Section to describe the use of ICAP Reserve Margin.
7.2.....	Revises Section to describe consequences of failing an audit and to provide for at least one ICAP audit per year.
Appendix A.....	This Section has been deleted.
Appendix C.....	This Section has been deleted.

Welcome to the ISO New England Load Response Program Manual. In this introduction, you will find the following information:

- ❑ What you can expect from the ISO New England Manuals (see “About ISO New England Manuals, ISO New England Operating Procedures and User Guides”).
- ❑ What you can expect from this ISO New England Manual (see “About This Manual”).
- ❑ How to use this Manual (see “Using This Manual”).

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### **About ISO New England Manuals, ISO New England Operating Procedures and User Guides**

The ISO New England Manuals, ISO New England Operating Procedures and User Guides are the instructions, rules, procedures, and guidelines established by the ISO for the operation, planning, and accounting requirements of the New England Control Area and the Market. Table 1.1 lists the ISO New England Manuals, ISO New England Operating Procedures and User Guides.

**Table 1.1**

**Summary of ISO New England Manuals, ISO New England Operating Procedures and User Guides**

<b>Transmission</b>	<b>Market</b>	<b>Installed Capacity</b>	<b>Accounting and Billing</b>	<b>ISO Administrative</b>
<b>OP2:</b> Meter and Communication Equipment Maintenance	<b>OP3:</b> Transmission Maintenance Scheduling	<b>M-20</b> Installed Capacity	<b>M-27:</b> Tariff Accounting	<b>OP1:</b> Responsibilities and Authorities
<b>OP6:</b> System Restoration	<b>OP4:</b> Capacity Deficiency Procedures		<b>M-28:</b> Market Rule 1 Accounting	<b>OP10:</b> Analysis and Reporting of System Emergencies
<b>OP7:</b> Transmission Emergency Operations	<b>OP5:</b> Generation Maintenance Scheduling		<b>M-29:</b> Billing	
<b>OP11:</b> Black Start Testing	<b>OP8:</b> Operating Reserve and AGC Requirements		<b>User Guide for submitting Internal Bilateral Transactions via SMS</b>	
<b>OP12:</b> Voltage and Reactive Control	<b>OP9:</b> External Transactions		<b>ISO New England Load Response Program Manual</b>	
<b>OP13:</b> Voltage Reduction and Load Shedding	<b>OP14:</b> Technical Requirements for Generators and Dispatchable Loads			
<b>OP16:</b> Transmission System Data	<b>OP18:</b> Metering and Telemetry Requirements			
<b>OP17:</b> Load Power Factor Correction	<b>OP20:</b> Cold Weather Event Operations			
<b>OP19:</b> Transmission Operations	<b>M-06:</b> Financial Transmission Rights			
	<b>M-11:</b> Market Operations			
	<b>M-35</b> Definitions and Abbreviations			
	<b>M-36</b> Forward Reserve			
	<b>User Guide for External Transactions via EES</b>			
	<b>User Guide for Financial Transmission Rights via eFTR</b>			
	<b>User Guide for Submitting Bids and Offers via eMKT</b>			

## About This Manual

The *ISO New England Load Response Program Manual* is one of a series of manuals within the Accounting and Billing set of manuals. This Manual focuses on the Load Response Program within New England pursuant to Appendix E of Market Rule 1. Terms used in this Manual shall have the same meaning as prescribed in the *ISO New England Manual for Definitions and Abbreviations, M-35*, unless otherwise defined, accepted, or noted.

The *ISO New England Load Response Program Manual* consists of eight sections. The sections are as follows:

- Section 1: Program Summary
- Section 2: Eligibility Criteria
- Section 3: Operating Mechanism/Implementation
- Section 4: Telemetry, Verification, Billing and Settlement
- Section 5: Registration Process
- Section 6: Program Fees
- Section 7: ICAP Treatment
- Section 8: Appendices

## Target Users

The target users for the *ISO New England Load Response Program Manual* are:

- Market Participants
- ISO operations staff
- Demand Response Providers

## References

The references to other documents that provide background or additional detail directly related to the *ISO New England Load Response Program Manual* are:

- Appendix F of Market Rule 1
- *ISO New England Manual for Installed Capacity, M-20*
- *ISO New England Manual for Market Rule 1 Accounting, M-28*
- *ISO New England Manual for Billing, M-29*
- *ISO New England Manual for Definitions and Abbreviations, M-35*
- Applicable ISO New England Operating Procedures

## Using This Manual

Because we believe that explaining concepts is just as important as presenting the procedures, we start each section with the “big picture”. Then, we present details and procedures. This philosophy is reflected in the way we organize the material in this manual. The following provides an orientation to this manual’s structure.

### What You’ll Find In This Manual

- A table of contents
- An approval page that lists the required approvals and the revision history
- The introduction
- Eight sections containing the specific guidelines, requirements, or procedures for the ISO New England Load Response Program.

## Section 1: Program Summary

The ISO and the Market Participants are continuing the Load Response Program (LRP) with the goal of reducing peak electricity demand by large power users. The majority of the revisions to the program is scheduled to begin on the SMD Effective Date and will continue through February 29, 2008 (see Appendix C for a detailed listing of implementation times).

Through the LRP, Market Participants (with a settlement account in the Energy Market or Demand Response Providers (DRPs) enrolled directly with the ISO) can enter into agreements with retail customers to encourage them to reduce their electricity consumption during periods of peak demand. The ISO is offering four distinct programs:

- (1) Day-Ahead Load Response Program
- (2) Real-Time Demand Response Program
- (3) Real-Time Price Response Program
- (4) Real-Time Profiled Response Program

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### 1.1 Day-Ahead Load Response Program

The Day-Ahead Load Response Program provides a Day-Ahead option to the Real-Time programs. The Day-Ahead Load Response Program allows Real-Time program participants to offer energy reductions (100 kW minimum) of curtailment concurrent with the Day-Ahead Energy Market. If the curtailment offer clears concurrent with the Day-Ahead Energy Market, the Demand Resource will be paid the applicable Day-Ahead Zonal Price. Differences between the actual curtailment (in Real-Time) and the cleared curtailment are settled at the appropriate Real-Time Zonal Price (except during OP4 events) as specified later in this Manual. Demand Resource offers will clear only if the offer, inclusive of Curtailment Initiation Price, is recovered in full. If a Demand Resource deviates in Real-Time from its cleared Day-Ahead offer, the deviation will not be eligible for Operating Reserve Credits or responsible for Operating Reserve Charges. The Real-Time deviation will be charged or credited at the Real-Time Zonal Price (except during OP4 events) as specified later in this Manual. Operating Reserve Accounting is defined in Appendix F of Market Rule 1. Demand Resources participating in the Day-Ahead Load Response Program are eligible to qualify as an ICAP Resource only if the Demand Resource is either in the Real-Time Demand Response Program or the Real-Time Profiled Response Program. Demand Resources either in the Real-Time Demand Response Program or the Real-Time Profiled Response Program qualify as an ICAP Resource in accordance with *ISO New England Manual for Installed Capacity, M-20* and Section 4.5.2 in this Manual. The performance criteria and level of ICAP credit are specified in Section 7 of this Manual. Demand Resources participating in the Day-Ahead Load Response Program through the Real-Time Price Response Program are not eligible to qualify as an ICAP Resource.

Program participants will be notified that their Day-Ahead offer was accepted (“cleared”) and for which hours.

## 1.2 Real-Time Demand Response Program

The Real-Time Demand Response Program is made up of two sub-programs based upon response time. These are: the 30-Minute Demand Response Program and the 2-Hour Demand Response Program. The Real-Time Demand Response Program requires customers to commit to mandatory energy reductions (100 kW to ~5 MW) on either 30-minutes notice or 2-hours notice from the ISO. Demand Resources in the Real-Time Demand Response Program are eligible to qualify as ICAP Resources in accordance with *ISO New England Manual for Installed Capacity, M-20*. The performance criteria and level of ICAP credit are defined later in this Manual. These program participants receive a payment at the applicable Real-Time Zonal Price for the actual energy they interrupt.

For the Real-Time Demand Response Program, customers will be notified of mandatory interruptions when:

2-Hour Notice Demand Response will be activated during ISO New England Operating Procedure No. 4, Action During A Capacity Deficiency (OP4) when Actions 3, 4, 5, 7 and/or 8 are implemented. 30-Minute Notice Demand Response (not involving backup or emergency generation) will be activated at Action 9, and 30-Minute Notice Demand Response (involving backup or emergency generation) will be activated at Action 12 of OP4.

The duration of an interruption during times of capacity deficiency or system emergency may exceed the two-hour minimum guaranteed payment period. The ISO can call Real-Time Demand Response on either a zonal or system wide block basis. A block is a slice of the Demand Resources segregated by Load Response Program across the entire system approximately 200 MW (in each block of a Load Response Program) and representing similar percentages to the total amount of Real-Time Demand Response in these programs.

### **1.3 Real-Time Price Response Program**

The Real-Time Price Response Program allows customers to voluntarily reduce energy consumption during certain periods as determined by the ISO. The Enrolling Participant in the Price Response Program only receives payments at the applicable Real-Time Zonal Price for the actual energy they curtail. The voluntary energy reduction must be between 100 kW and ~5 MW unless approved by the ISO.

For the Real-Time Price Response Program, voluntary reductions will be allowed when the forecasted hourly appropriate Zonal Price produced by the Day-Ahead Energy Market, the Resource Adequacy or any update of the Resource Adequacy where the Zonal Price is greater than or equal to \$100/MWh. The Real-Time Price Response Program will be implemented on a zonal basis.

## 1.4 Real-Time Profiled Response Program

The Real-Time Profiled Response Program requires the program participant to provide a statistically determined percentage of mandatory response that can be achieved upon demand by the ISO (200 kW minimum). This program is the only group that does not require Interval Metering, but an approved Measurement and Verification Plan (“M&V Plan”) in accordance with Appendix E of this manual is required. This group could include aggregated residential super-thermostat programs, pool pumps, and Distributed Generation. Demand Resources in the Real-Time Profiled Response Program are eligible to qualify as an ICAP Resource in accordance with *ISO New England Manual for Installed Capacity, M-20*. The performance criteria and the level of ICAP credit are defined later in this Manual. These Enrolling Participant receive payments at the applicable Real-Time Zonal Price for the actual energy they interrupt during events initiated by the ISO.

For the Real-Time Profiled Response Program, Participants will be notified of mandatory interruptions, during ISO New England Operating Procedure No. 4 (Action During A Capacity Deficiency OP4) when Action 3 is implemented.

The duration of an interruption during times of capacity deficiency or system emergency may exceed the two-hour minimum guaranteed payment period. The ISO will call Real-Time Profiled Response on a zonal or system wide block basis.

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## 1.5 Internet-Based Communication System (IBCS)

The roles, responsibilities, and duties of the IBCS Open Solution and IBCS Providers are further defined in the document “Requirements for IBCS OS and IBCS Providers” posted on the ISO web site. This document also provides information on becoming a certified IBCS Provider.

During a Load Response Event, Real-Time Demand Response Program customers will be contacted through their IBCS Provider. Real-Time Price Response customers have the option of choosing notification through an IBCS Provider, or a lower technological option, which involves communication through an e-mail list server in conjunction with notice on the ISO web site. Enrolling Participants for the Real-Time Profiled Response Program will be notified of a Load Response Event by notifications transmitted by the IBCS Open Solution.

The first 1000 customers signed up for either the Real-Time Demand Response or the Real-Time Price Response Program (calculated from the June 1, 2000 initial commencement of the program) will be reimbursed for installation of the IBCS data collection equipment according to the following terms:

- (1) For customers enrolled in the Real-Time Demand Response Program, the Enrolling Participant will be reimbursed for 100% of installed hardware costs up to \$2,200 per customer installation, or \$22 per enrolled kW per customer installation, whichever is lower. For customer installations without customer-supplied LANs, the reimbursement rate will be capped at \$2,800 per customer installation or \$28 per enrolled kW per customer installation, whichever is lower. Customers qualifying for such payments must provide an interruption amount of at least 25 kW per customer installation. The reimbursement of installed hardware costs is limited to the first 1000 Real-Time Demand Response Program customer sites (including the former Type 6 Class 1). All payments will be made to the Enrolling Participants.
- (2) For customers enrolled in the Real-Time Price Response Program, the Enrolling Participant will be reimbursed for 50% of installed hardware costs up to \$1100 per customer installation, or \$11 per enrolled kW per customer installation, whichever is lower. For customer installations without customer-supplied LANs, the reimbursement rate will be capped at \$1400 per customer installation or \$14 per enrolled kW per customer installation, whichever is lower. Customers qualifying for such payments must provide an interruption amount of at least 25 kW per customer installation. The reimbursement of installed hardware costs is limited to the first 1000 Real-Time Price Response Program customer sites (including the former Type 6 Class 2). All payments will be made to the Enrolling Participants.

Real-Time Demand Response Program participants 300 kW or greater will be compensated a monthly IBCS Provider fee, not to exceed \$100. Customers must be signed up in only one of the programs; a single customer cannot be in more than one program for the same billing meter.

If an Enrolling Participant receives funds for the reimbursement of hardware costs, the customer to whom the equipment is installed must remain in its original program group for one year or until the expiration of the program, whichever occurs first. If a customer leaves its original program group before this time, the Enrolling Participant must replace the lost asset with a similar asset (without additional reimbursement for installation hardware costs) or pay back the reimbursement originally received.

## Section 2: Eligibility Criteria

### 2.1 Effective Period of the Program

The majority of the LRP begins on the SMD Effective Date, and will continue through February 29, 2008 (see Appendix C for an implementation schedule). However, the Day-Ahead Load Response Program will commence as soon as practicable, after the SMD Effective Date. The effective date for the Day-Ahead Load Response Program will be at least two weeks after the ISO has given the Commission written notice that the System Rules and computer programs necessary to implement the Day-Ahead Load Response Program are fully in place and functional. The ISO shall post on its web site the specified date at the time that the ISO makes such notice to the Commission.

Potential customers wishing to participate, but not currently enrolled in the LRP should direct inquires to the ISO's Market Support Services Group at (413) 540-4220 or [custserv@iso-ne.com](mailto:custserv@iso-ne.com).

## 2.2 Who Can Participate?

Any Market Participant (with a settlement account) or any DRP, collectively known as Enrolling Participants, can subscribe either itself and/or an end-user to provide Load Reductions of not less than 100 Kilowatts (kW) and not more than 5 Megawatts (MW). Aggregation of load by the Enrolling Participant is allowed and can be used to reach or exceed the specific minimum requirement for a program. Reductions greater than 5 MW may be allowed at the discretion and approval of the ISO. Specific programs may have a minimum reduction requirement greater than 100 KW. Day-Ahead Load Response Program participants or any DRP must be at least 100 kW or aggregated by Load Zone to at least 100 kW. An Enrolling Participant can sign up any eligible load located within the New England Control Area.

All customers who participate in the LRP will be referred to as LRP customers. They are sub-divided into four major classes.

### 2.2.1 Day-Ahead Load Response Program

Enrolling Participants that sign up customers to participate in the Day-Ahead Load Response Program can offer curtailments concurrent with the Day-Ahead Energy Market. The submission of Day-Ahead Load Response offers is optional. These program participants agree that the customers in the Day-Ahead Load Response:

- (1) Must be willing and capable of interrupting load within the parameters of the offer.
- (2) Must be able to interrupt Monday-Friday, on non-holidays (Holidays are listed in ISO New England Operating Procedure, No. 14, Technical Requirements for Generation, Dispatchable and Interruptible Loads (OP14), Appendix C), between 7:00 AM - 6:00 PM.
- (3) Must be participants in the Real-Time Demand Response Program, Real-Time Profiled Response Program or the Real-Time Price Response Program.

### 2.2.2 Real-Time Demand Response Program

Customers that participate in either of the Real-Time Demand Response Programs agree to a certain level of reduction at the discretion of the ISO. The difference between the two Real-Time Demand Response Programs is the notice period. These customers:

- (1) Must be willing and able to interrupt load within 30-minutes or within 2-hours (depending on which program they are in) after receiving the instruction from the ISO through their IBCS Provider.
- (2) Must be able to interrupt Monday-Friday, on non-holidays, (Holidays are listed in OP14, Appendix C), between 7:00 AM – 6:00 PM.
- (3) During OP4, when Actions 3, 4, 5, 7 and/or 8 is implemented (2 Hour Notice), or when Action 9 is implemented for 30-Minute Notice (not involving backup or emergency generation), or Action 12 for 30-Minute Notice Demand Response (involving backup or emergency generation), will be activated.

- (4) Duration of interruptions during times of capacity deficiency or system emergency may exceed the two-hour minimum guaranteed payment period.

Real-Time Demand Response Program customers are eligible to qualify as ICAP Resources in accordance with *ISO New England Manual for Installed Capacity, M-20*. The performance criteria and level of ICAP credit are defined later in this Manual. Enrolling Participants are paid for an actual interruption at the higher of:

- the appropriate Real-Time Zonal Price or;
- for the Real-Time 30 Minute Demand Response Program five hundred dollars per MWh (\$500/MWh) for a minimum of two hours; and for the Real-Time 2 Hour Demand Response Program three hundred and fifty dollars per MWh (\$350/MWh) for a minimum of two hours.

More detailed information on payments for this program is provided in Section 4.

### **2.2.3 Real-Time Price Response Program**

Customers that participate in the Real-Time Price Response Program act on a strictly voluntary basis. These customers:

- (1) Utilize price signals to decide whether to voluntarily reduce load.
- (2) Will be notified when the forecast hourly Zonal Price is greater than or equal to \$100/MWh on a Monday-Friday, non-holidays, (Holidays are listed in OP14, Appendix C), between 7:00 AM – 6:00 PM.
- (3) Once notified, the window of availability for Real-Time Price Response can be as early as 7 AM and remain open until 6 PM (i.e., between the hour ending 0800 through the hour ending 1800).

Enrolling Participant will receive the higher of the applicable Real-Time Zonal Price for interrupted consumption (measured against the base line) or a guaranteed minimum payment of \$100/MWh when the eligibility period is open. Real-Time Price Response Program Demand Resources that fail to respond when the ISO opens the window to curtail load are not subject to any penalties.

### **2.2.4 Real-Time Profiled Response Program**

The Real-Time Profiled Response Program is for Enrolling Participants with loads that are capable of being interrupted on demand and within 2-hours, but may not have Interval Metering. These loads must be able to interrupt Monday-Friday, on non-holidays, (Holidays are listed in OP14, Appendix C), between 7:00 AM – 6:00 PM. Program participants are willing and capable of responding in Real-Time to ISO instructions to interrupt load within 2-hours once OP4 Action 3 has been implemented. The implementation of the interruption is under the direct control of the Enrolling Participant. However, the Enrolling Participant can activate these Demand Resources only when instructed to do so by the ISO. The Enrolling Participant will be instructed to activate these Demand Resources by a notice transmitted through the IBCS Open Solution. Demand Resources in this program could include aggregated residential super-thermostat programs, pool pumps and distributed

generation. An Enrolling Participant aggregating Demand Resources for this program is required to provide a statistical response factor for the group. For example, an aggregated 10 MW Demand Resource having a 50% response rate would be credited for 5 MW of response when called. Real-Time Profiled Response Program customers are eligible to qualify as an ICAP Resource in accordance with *ISO New England Manual for Installed Capacity, M-20*. The performance criteria and level of ICAP credit are defined later in this Manual.

Enrolling Participant will receive the higher of the applicable Real-Time Zonal Price or a minimum payment of \$100/MWh for the actual real-time statistically determined response quantity.

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## 2.3 Minimum Qualifications for Load Response

To participate specifically in the LRP a Customer must:

- (1) Be a Market Participant (with a settlement account for the Energy Market or a DRP) or sign an agreement with such a Market Participant who will act as the Enrolling Participant, an intermediary between the ISO and the LRP Customer.
- (2) Interval meters for all Customers or an ISO approved M&V Plan are required for all programs.
- (3) The Real-Time Profiled Response Program requires a statistical representation of research meters, or equivalent technology acceptable to the ISO, to determine the response. The Real-Time Profiled Response Program also may use an approved M&V Plans. The M&V Plan must be approved by the ISO.
- (4) For each interval meter or approved M&V Plan, be able to provide a minimum 100 kW curtailment or aggregate interval meters to obtain a minimum 100 kW curtailment commitment per Zone during Load Response Events. For the Day-Ahead Load Response Program, the minimum size is 100 kW and customers may be aggregated (by Zone) to reach or exceed the minimum of 100 kW. For the Real-Time Profiled Response Program, the minimum size is 200 kW and any aggregation of customers to reach or exceed the minimum must be on Zonal basis.
- (5) Meet the metering requirements set forth in Section 4 of this Manual.
- (6) Real-Time Demand Response Customer must be able to connect to the IBCS.
- (7) Real-Time Demand Response Customer must be able to curtail its load within 30 minutes or within 2-hours of notification from the ISO determined by the program in which the Real-Time Demand Response Customer is enrolled. The Real-Time Demand Response Customer shall adhere to the requested interruption period for a specific Load Response Event for as long as practically possible.
- (8) Enrolling Participants in the Real-Time Profiled Response Program must be capable of receiving activation instructions through the IBCS Open Solution.
- (9) Must be able to submit required meter reading data to the ISO by 1300 on the third business day after the Operating Day. Revised metering data may be submitted up to 90 days following the dispatch day for inclusion in the following month's bill (see Section 4.8 of this Manual for the Settlement Timeline).

## 2.4 Load Aggregation

Load aggregation is permitted for all programs in order to reach or exceed the minimum level for the specific program, but the aggregated Demand Resources must be in the same Load Zone. For a Demand Resource that is able to reduce to the minimum for a given program at each site but are interested in participating in a program, an Enrolling Participant can aggregate these customers using the systems, software, and hardware that the specific Load Response Program requires. The aggregated amount must exceed 100 kW, or 200 kW, as applicable, per Load Zone. Aggregated loads must be located in the same Load Zone. The customers must be aggregated by Load Zone and by program and notice requirement (as applicable). For simplicity and ease of identification, the ISO suggests that aggregated groups are categorized as follows:

- "Participant - 1" 30-Minute Demand Maine
- "Participant - 1" Price Response Maine
- "Participant - 2" 2-Hour Demand NH
- "Participant - 2" Price Response NH

The ISO will expect to see each aggregated group as a single entity. The Enrolling Participants that desire to aggregate these customers using an IBCS will need to confirm with their IBCS Providers that they can and will aggregate the loads into a single control point. If Real-Time Price Response customers are to be aggregated, and the IBCS reporting option will not be used, then the Enrolling Participant is responsible for providing the aggregated data to the ISO.

## **2.5 Restrictions**

A metered Load cannot be subscribed to more than one of the Programs. A meter can only participate in one of these programs. The Demand Resource may not participate in any of the load response programs if it is modeled in the Energy Management System (EMS). Selection of a specific program must remain in affect through the end of the calendar month. Notification to the ISO's Market Support Services Group must be made no later than seven business days prior to the start of the requested month. The Demand Resource must remain in the selected Program for one year.

## **2.6 Requirements for Customers with On-Site Generation**

Owners of on-site and emergency generators including but not limited to hospitals, data centers, office buildings, warehouses, and industrial locations are eligible to participate in the LRP. On-site generation can serve all or part of what otherwise would be the ISO load, thereby reducing the total ISO load during a Load Response Event. The requirements for participation are as follows:

- (1) The owner of the generator must satisfactorily complete the information required on its associated NX-11C form.
- (2) The generator must be capable of responding within 30 minutes notice or within 2-hours notice of a request to reduce load for a Real-Time Demand Response customer depending upon which of these programs they are committed to.
- (3) For participation in any of the programs, except the Real-Time Profiled Response Program, the end-user must have an Interval Meter as described in Section 4.1, Telemetry Requirements, or an approved M&V Plan.
- (4) Real-Time Demand Response customers must be capable of receiving notification through the IBCS.
- (5) The customer must provide assurance that the same Metered Load is not subscribed with more than one Enrolling Participant or included in more than one program.
- (6) If applicable, comply with (at a cost to the generator owner) all state and federal air emissions regulations.

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## 2.7 Responsibilities of Enrolling Participants

Each Enrolling Participant is expected to act as a liaison between the ISO and Enrolling Participant's customers. Enrolling Participants have the following responsibilities:

- (1) Sign up, set up, and train customers at cost to Enrolling Participant.
- (2) Allocate appropriate Demand Resources to ensure appropriate hardware and software installation.
- (3) Notify customer of curtailment schedules resulting from cleared offers in the Day-Ahead Load Response Program.
- (4) Arrange for customer notification of Real-Time events that require the customer's response.
- (5) Ensuring meter readings are submitted to the ISO in accordance with the program requirements for assets not having an IBCS installed.
- (6) Consult with the customers to improve performance during Load Response Events.
- (7) Assist the customers in the development of Load Curtailment strategies, and determine amount of curtailment possible at different price levels (as applicable).
- (8) Field questions about notices, baselines, and reports.
- (9) Enrolling Participant must provide self-certification of the customer's Load Response capability and verification that the ICAP Credit is a realistic estimate of the actual response.
- (10) Notify the customers of program availability and opportunity. The Enrolling Participant will:
  - (a) Obtain the necessary information from the customer required to complete the submission of administrative form (NX-11C) for signup to the LRP.
  - (b) Assure the NX-11C is complete and accurate.
  - (c) If necessary coordinate/ schedule site installation between their IBCS Provider and the customer.
  - (d) For the Real-Time Profiled Response Program, the Market Participant must obtain approval of its M&V Plan and must provide sufficient research meters or equivalent technology acceptable to the ISO, within the group to provide appropriate statistical confidence for the response in accordance with the approved M&V Plan.
  - (e) Settle with the customers, based on contract terms, for payments receive under the program that the customer is enrolled in.
  - (f) Submit Meter data by 1300 hours on the third business day after the Operating Day.
  - (g) Meter data must be submitted for all non-holiday weekdays (Holidays are listed in OP14, Appendix C).
  - (h) Customers using the Low-Tech reporting options for the Real-Time Price Response Program must submit all meter data, including the 5 days of data that is needed for the Customer Baseline calculations, prior to the 90-day resettlement period.

## 2.8 ISO Contact Information

The primary ISO contact (the Market Support Services Group) for the LRP program is the Customer Service Hotline:

Telephone: (413) 540-4220  
Email: [custserv@iso-ne.com](mailto:custserv@iso-ne.com)

## Section 3: Operating Mechanism/Implementation

### 3.1 Event Initiation and Termination

#### 3.1.1 Day-Ahead Load Response Program

The Enrolling Participant will be notified of the Demand Resource's cleared offer and resulting curtailment schedule in the same manner as the Day-Ahead Energy Market schedules are provided. It is the responsibility of the Enrolling Participant to notify the customer to interrupt consistent with the cleared offer.

#### 3.1.2 Real-Time Demand Response Program

ISO Control Room operating personnel will be able to assess the Contracted MW amount and MW available for each program in the Real-Time Demand Response Program on a display provided by the IBCS Open Solution. This monitoring capability will be available at a minimum on weekdays, non-holidays and Sundays. The displays will allow the ISO Control Room to view possible curtailment MW amounts on a zonal or system wide basis. Real-Time Demand Response Program customers will only be notified when the following occurs:

During OP4 when Actions 3, 4, 5, 7 and/or 8 are implemented (2 Hour Notice), when Action 9 is implemented (30-Minute Notice not involving backup or emergency generation) or Action 12 is implemented for 30-Minute Notice Demand Response (involving backup or emergency generation).

The Operations Shift Supervisor or Senior System Operator will initiate a Load Response Event for the Real-Time Demand Response Program using the IBCS Open Solution. The Operations Shift Supervisor will select the appropriate Real-Time Demand Response Program, Zone or Block, enter a Start Date/Time, and enter an ESTIMATED End Date/Time. Prior to sending the notification, the Operations Shift Supervisor will be prompted by a confirmation message, which will be answered YES or NO. The curtailment message sent will be as follows:

```
This is ISO-NE, Curtail (**PROGRAM NAME**) loads
in (**ZONE) or (**BLOCK) at (**TIME) on (**DATE).
Estimated restore time is (**TIME) on (**DATE), do
not reconnect loads without official notice from ISO-
NE. "
```

Separate notifications will be sent to customers in the 30-Minute Demand Response and the 2-Hour Demand Response in accordance with the specific Actions in OP4. The field Program Name will be filled in with one of the following: "30 Minute RT – Action 12", "30 Minute RT – Action 9", "2 Hr RT Demand", or "RT Profiled Response". The notice period

for any program begins at the time specified for the event start time in the message, and not the time stamp on the message itself.

Once a Real-Time Demand Response Program Notification has been issued by the ISO, the ISO Control Room operating personnel will be able to assess the MW contracted amount and MW available for interruption on a monitoring display. This monitoring capability will be available at all times. The Real-Time Demand Response Program customer will be monitored by the Control Room operating personnel to provide system load assessment. The displays will allow the Control Room to view curtailment MW amounts on a zonal or system wide basis.

When the following conditions occur, the Real-Time Demand Response Program customers will be notified to be restored:

- (1) 2 hour notice Demand Resources will be restored with the cancellation of OP4 Actions 3,4,5, 7 and/or 8 are cancelled.
- (2) 30 minute notice when Action 9 is cancelled (30-Minute Notice not involving backup or emergency generation) or Action 12 is cancelled for 30-Minute Notice Demand Response (involving backup or emergency generation).

To restore Real-Time Demand Response Program customers, the Operations Shift Supervisor will:

- Select the Real-Time Demand Response Program Restoration Program;
- Select the specific Load Response Event to restore;
- Enter the Restoration Time to end the curtailment.

The notification will be sent as follows:

"This is ISO-NE, Restore (\*\*PROGRAM NAME\*\*) loads in (\*\*Zone) or (\*\*Block) at (\*\*TIME) on (\*\*DATE)."

Again, separate notifications will be sent for the 30-Minute Demand Response and the 2-Hour Demand Response customers.

### 3.1.3 Real-Time Price Response Program

The results of the Day-Ahead Energy Market will be posted on the ISO external web site ([www.iso-ne.com](http://www.iso-ne.com)) at approximately 1600 each day. Updates of the system conditions will occur regularly. When either the results of the Day-Ahead Energy Market or a forecast Real-Time Zonal Price is greater than or equal to \$100/MWh during the program hours, The ISO will initiate a notification opening the Interruption Period by the following methods.

#### 3.1.3.1 IBCS OPTION

- (1) Select the Price Response - Forecast  $\geq$  \$100 Zonal Price notification
- (2) Select the Price Response - Voluntary Program for the appropriate Load Zone

The notification to be sent to the appropriate Load Zone (s) is as follows:

“ISO-NE is opening the interruption period for RT Price Response loads in (\*\*ZONE) at (\*\*TIME) on (\*\*DATE) and ending on 1800 on (\*\*DATE).”

The Zone, Time and Date fields are populated with the correct times and the message is ready for delivery. Prior to sending notification, the ISO verifies that the Zonal Price  $\geq$  \$100 and between the hour ending 0800 through hour ending 1800; the forecast Zonal Price is for a weekday (Monday through Friday); and the forecast Zonal Price is not on a holiday as listed in OP14, Appendix C. The IBCS Open Solution will relay the notification to provide Enrolling Participants and customers with notification that the “window is open.”

### 3.1.3.2 LOW TECH OPTION

The ISO will notify the ISO’s Market Support Services Group to place notification on the ISO external web site as follows

“ISO-NE is opening the interruption period for RT Price Response loads in (\*\*ZONE) at (\*\*TIME) on (\*\*DATE) and ending on 1800 on (\*\*DATE).”

The ISO will also notify Enrolling Participants and customers that are subscribed to the ISO’s list server via email that a Zonal Price greater than or equal to \$100/MWh has been forecast.

Real-Time Price Response customers may curtail at their choosing during the specified Date and Time.

Once a Price Response Program notification has been issued by the ISO, the ISO’s Control Room operating personnel will only be able to assess the response using the information provided through the IBCS Open Solution. This monitoring capability will be available at a minimum on weekdays, non-holidays and Sundays. The Control Room operating personnel will only monitor Price Response Program loads using the IBCS to provide information on the system response and assessment. The information will assist the Control Room to view possible curtailment MW amounts on a zonal or system wide basis. The MW contracted amount and the MW availability from those using the Low Tech Option will not be monitored by the Control Room. Real-Time Price Response Program customers shall provide their load reduction amounts to the ISO within 60 hours. Program participants using the "Super" Low Tech option for data reporting (where the Interval Meter is not read daily nor is the meter reading supplied to the ISO within the following 60 hours) must provide their load reduction amounts before the 90-day resettlement. Program participants electing this treatment will not be compensated until four months after the dispatch period as outlined in the 90-day resettlement process. (See Settlement Timeline in Section 4.8 of this Manual for further details.) Data will not be accepted after the 90-day resettlement window. If data is received passed this deadline no LRP credit will be given. Curtailment of loads will be solely based upon the willingness of the load to curtail based on acceptable

price signals. It is the obligation of the Enrolling Participant to insure that all necessary meter data is provided to the ISO in time for the 90-day resettlement. Enrolling Participants using the “Super” Low Tech option specifically waive the right to any resettlement with respect to settlement of customers using this option.

### 3.1.4 Real-Time Profiled Response Program

The ISO’s Control Room operating personnel will not be able to assess the Contracted MW amount and MW available for the program. Enrolling Participants of Real-Time Profiled Response Program customers will only be notified to interrupt these Demand Resources when the following occurs:

OP4 when Action 3 is implemented.

The Operations Shift Supervisor or Senior System Operator will initiate a Load Response Event for the Real-Time Profiled Response Program using the IBCS Open Solution. The Operations Shift Supervisor will select the appropriate Real-Time Profiled Response Load Zones or Blocks, enter a Start Date/Time, and enter an ESTIMATED End Date/Time. The curtailment message sent will be as follows:

This is ISO-NE, Curtail RT Profiled Response loads in (\*\*ZONE) or (\*\*BLOCK) at (\*\*TIME) on (\*\*DATE). Estimated restore time is (\*\*TIME) on (\*\*DATE), do not reconnect loads without official notice from ISO-NE. ”

Once a Real-Time Profile Response Program Notification has been issued by the ISO, the ISO’s Control Room operating personnel are not able to directly assess the MW amount of interruption in real-time.

When the following condition occurs, the Enrolling Participants of Real-Time Profiled Response Program customers will be notified that the load can be restored:

Termination of OP4 Action 3.

To restore Real-Time Profiled Response Program Customers, the Operations Shift Supervisor will:

- (1) Select the Real-Time Profiled Response Program Restoration Program;
- (2) Select the specific Load Response Event to restore;
- (3) Enter the Restoration Time to end the curtailment.

The notification will be sent as follows:

“This is ISO-NE, Restore RT Profiled Response loads at (\*\*TIME) on (\*\*DATE).”

### 3.2 Procedures for Contacting Program Participants

Table 3.1 below, provides a summary of event notification and load restoration communication, the entity that is contacted, and the method of contact.

<u>Program</u>	<u>Contact</u>	<u>Contact Method</u>
Day-Ahead Load Response Program	Enrolling Participant	eMkt (same as Day-Ahead Energy Market)
Real-Time Demand Response Program	Enrolling Participant Customer	IBCS Provider
Real-Time Profiled Response Program	Enrolling Participant	IBCS OS
Real-Time Price Response Program	Enrolling Participant Customer	IBCS Provider or Low Tech Option (e-mail from list server and the ISO web-site)

*Table 3.1 – Event Notification and Load Restoration Message Communication*

### **3.3 Response Times**

For the Day-Ahead Load Response Program, the Demand Resource is expected to curtail in accordance with the cleared offer.

After Real-Time Demand Response customers are notified by the ISO, the ISO expects curtailment of contracted load within 30 minutes or within 2-hours depending on the enrolled program. After the Enrolling Participants of Real-time Profiled Response customers are notified by the ISO, the ISO expects curtailment of contracted load within 2-hours. After Real-Time Price Response customers are notified by the ISO, they may voluntarily curtail load at their discretion during the designated Interruption Period.

## **Section 4: Telemetry, Verification, Billing and Settlement**

### **4.1 Telemetry Requirements**

The term Interval Meter as used throughout this manual refers to a meter that records energy consumption (or generation) on at least a fifteen (15) minute basis and may store energy consumption (or generation) to a finer granularity. For the purposes of the Demand Response Programs, an Interval Meter will include meters that meet either requirement provided below. Typically, the Interval Meter will be the meter used by the distribution company for billing purposes and will be revenue quality meter. Generally, the accuracy on a revenue quality meter is  $\pm 0.5\%$ . In the case where Interval Metering is installed specifically for the Demand Response Programs and will not be used for other billing purposes, the meter installation for program purposes can either be a revenue quality meter as described above or a non-revenue quality meter described as follows. A Demand Response asset may use non-revenue Interval Metering devices with an overall accuracy of  $\pm 2.0\%$  as the source of the performance data. For each non-revenue Interval Meter design used, the Enrolling Participant will submit certification from the meter manufacturer that the model in question meets the  $\pm 2.0\%$  accuracy threshold, recognizing errors in:

- Current measurement
- Voltage measurement
- A/D conversion
- Calibration

Such meters shall be periodically tested and calibrated in accordance with the standards for revenue quality metering.

An Enrolling Participant can submit an M&V Plan to the ISO for approval in place of Interval Metering.

#### **4.1.1 Day-Ahead Load Response Program Metering Device Requirements**

Demand Resources participating in the Day-Ahead Load Response Program, must meet the metering requirements of their associated Real-Time Load Response Program.

#### **4.1.2 Real-Time Demand Response Metering Device Requirements**

Per ISO New England OP14, metering devices shall meet the following requirements:

- (1) Real-Time telemetry per OP18 is not required for these customers; Interval Metering or an approved M&V Plan is required. However, the interconnection agreement with the local utility may require such telemetry.
- (2) IBCS through an ISO-approved provider is required.

### **4.1.3 Real-Time Price Response Metering Device Requirements**

- (1) Real-Time telemetering per OP18 is not required for these customers; Interval Metering or an approved M&V Plan is required. However, the interconnection agreement with the local utility may require such telemetering.

### **4.1.4 Real-Time Profiled Response Metering Device Requirements**

- (1) Real-Time telemetering per OP18 is not required for these customers; Interval Metering is not required. However, sufficient research meters, or equivalent technology acceptable to the ISO, shall be used to provide statistical confidence regarding the Amount Interrupted. Information on the customer's specific metering must be provided at time of registration. An approved M&V Plan is required.

### **4.1.5 Telemetering Configuration Requirements**

Premises participating in the LRP shall subscribe under one of three physical configurations: On-Site Generation only, load only, or On-Site Generation and load. Integrated hourly metering devices shall be required (except for the Real-Time Profiled Response) as follows:

- (1) When a premise subscribes only the On-Site Generation, the Interval Meter may be installed to directly measure the generator's output (or as in (3) below);
- (2) When a premise subscribes only the load, the Interval Meter shall be installed to meter the entire facility; for totalized load, an Interval Meter is required for each participating load;
- (3) When a premise subscribes both the On-Site Generation and load, both the On-Site Generation and the load may be metered separately or jointly. Metering of the load can be configured so as to measure only the load, or combined load and generation.

When an approved M&V Plan is used, the measurement of load and curtailment shall be in accordance with the approved M&V Plan.

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## 4.2 Calculation of Customer Baseline

### 4.2.1 Baseline Calculation Method

The Customer Baseline (CB) is the average hourly load, rounded to the nearest kWh, for each of the 24 hours in a day. The CB calculation process does not begin until the registration process and meter data reporting requirements are complete. There will be no retroactive CB calculations performed. The CB used for computing performance for the LRP shall consist of eligible weekdays (weekdays that are non-holidays and non-interruption days). The CB calculation for a Demand Resource participating in the Day-Ahead Load Response Program will exclude any day in which the Demand Resource had a cleared Day-Ahead offer. A CB is required for the LRP whenever load is participating in the program. However, there is no CB for Profiled Response or when an approved M&V Plan is used. For On-Site Generation or for an approved M&V Plan, where the actual generator output is metered, the metered output or the calculation in accordance with the M&V Plan will be used for the performance measurement.

The CB for the LRP shall be calculated as the simple average for each hour as defined below:

For a New Asset (an asset with no previously computed baseline):

The CB is the simple average and will be calculated for each hour in day based on meter data from the initial 5 business days after the asset is approved and hourly meter data begins to be recorded. Missing data during these initial 5 days will be assigned the value of zero and used in the computation of the CB. Since the asset is not available to interrupt for a Load Response Event during this 5-day period, Load Response Event days are included in the calculation of the CB for a new asset. Once the CB can be computed, the asset is ready to interrupt. Therefore, the CB for any hour of the first day that an asset is ready to interrupt (day 6) is:

$$CB_6 = (\text{Sum MeterReading}_{\text{for the hour}}) / 5 \quad \text{[day 6 CB calculation]}$$

From this point forward, the CB is calculated the same as any other asset that is ready to respond.

For Existing Assets (an asset that is ready to respond):

For each program day (weekdays and non-holidays), the CB is calculated starting from the previous day's CB. If the present day is a Load Response Event day, the CB for the present day is equal to the CB for the previous program day. If the present day is not a Load Response Event day, then the CB for the present day is calculated solely for the purpose of determining the CB for the next day. The CB for a non-Load Response Event program day is calculated starting from the previous day's CB and then applying the hourly data from the present day.

If the present day is a Load Response Event day, holiday or weekend, the CB is not computed. The CB is only calculated for non-Load Response Event program days. The CB for a Load Response Event day, a holiday or weekend, is equal to the CB for the previous program day. If the present day is a non-Load Response Event program day, the present day's CB is computed using the weighted average of the previous day's CB and the meter data for the present program day. The weighting for this calculation are 0.9 applied to the previous day's CB and 0.1 applied to the meter data. The computed CB becomes the CB for the next program day. Since Load Response Event days are excluded from the computation of the CB, if there are multiple, consecutive Load Response Event days, the CB calculated from the last non-Load Response Event day will be the CB for the consecutive event days as well. The computation is performed separately for all 24 hours of the day.

Continuing with the formula from day 6 above, if day 7 is a Load Response Event day (for the specific program) then the CB for day 7 is the CB from day 6 (the previous day). If day 7 is not a Load Response Event day, then the CB for day 7 is calculated solely for determining of the CB for day 8. The CB for each hour of day 7 is calculated using the following formula:

If day 7 is a Load Response Event day then:

$$CB_7 = CB_6 \quad \text{[day 7 CB if event day]}$$

If day 7 is not a Load Response Event day then:

$$CB_7 = 0.9 * CB_6 + 0.1 * \text{MeterReading}_7 \quad \text{[day 7 CB calculation]}$$

The CB distributed by the IBCS OS to the IBCS Providers each program day will be based upon the assumption that today will be a Load Response Event day.

When computing the CB as described above, no data will be excluded from the computation. Missing data will be assigned the value of zero.

In determining the actual interruption provided, the CB is subject to adjustment to reflect the actual usage for the two hours preceding the interruption. If the adjustment results in a reduction in the CB (the adjustment would lower the CB), then no adjustment is applied to the CB and the CB as originally computed is used to determine the amount of interruption. If there are multiple, consecutive Load Response Event days, the CB will be the CB from the last non-Load Response Event day. The adjustment to the CB to reflect the actual usage for the two hours preceding the interruption will be calculated separately for each Load Response Event day, and the adjustment for consecutive days will be the higher of the previous Load Response Event day's adjustment or the present day's adjustment. However, the CB adjustment to reflect actual usage for the two hours preceding the interruption is subject to the limitation described above.

Example 1: The Customer Baseline is 330 kWh for hour-beginning 10 AM, the time at which an interruption is due to start, and the customer's actual usage from hour-beginning 8 AM to 10 AM is 20 kWh below the CB. The calculated adjustment would be down 20 kWh in each hour to reflect the actual load prior to the start of the event. However, since this adjustment would reduce the CB, the adjustment is not applied and the CB as originally computed for that day is used to determine the amount of interruption.

Example 2: The Customer Baseline is 330 kWh for hour-beginning 10 AM, the time at which an interruption is due to start, and the customer's actual usage from hour-beginning 8 AM to 10 AM is 20 kWh above the CB. The calculated adjustment would be an increase of 20 kWh in each hour to reflect the actual load prior to the start of the Load Response Event. Since this adjustment would increase the CB, the adjustment is applied and the adjusted CB is used to determine the amount of interruption.

The IBCS OS will calculate the Customer Baseline on a daily basis for Real-Time Demand Response Program customers. For all Real-Time Price Response Program customers, the ISO's Settlement department will calculate the baseline. The Enrolling Participants in the Real-Time Price Response Program may have their IBCS Provider calculate an "estimated" CB for the customer's benefit. However, the customer must be informed that this CB may not be exactly the same as the CB calculated by the ISO and used in the settlement process. The IBCS Provider or the Meter Reader (in the case of the Low Tech and "Super" Low Tech options) of Real-Time Price Response Program customers are required to provide the ISO with hourly meter data in an ISO specified format by 1300 on the third business day after the Operating Day. Meter Readers using the "Super" Low Tech reporting option must provide hourly-integrated values to the ISO in an ISO specified file format before the 90 day resettlement is performed. Enrolling Participants that choose this option waive their ability to request resettlement with respect to billing for these Demand Resources.

For settlement of the Real-time Price Response Program, the Customer Baseline is calculated by the ISO. The CB depicted by the IBCS Provider is for informational purposes only and will not be used in the LRP settlement.

The following graphic shows the CB load profile, adjusted profile, and actual load based on metered data described in example 2.

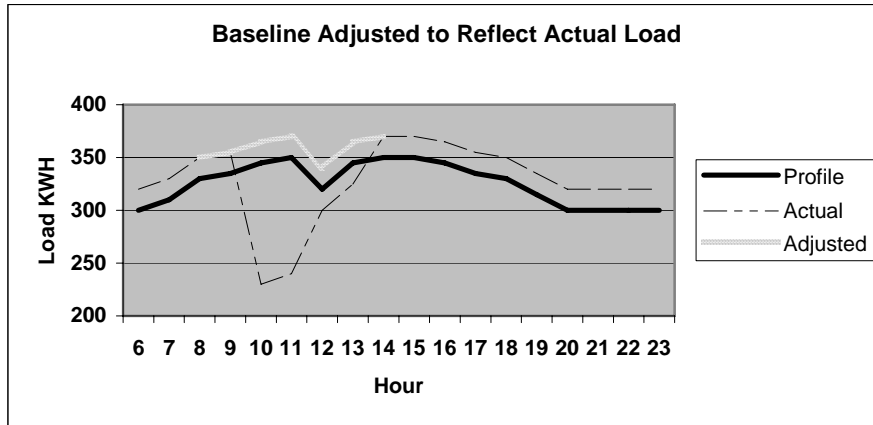


Figure 4.1 – Baseline Adjustment to Reflect Actual Load

## 4.2.2 Exclusion Provisions

Three types of exclusions are required when computing the Customer Baseline: holidays (as listed in OP14, Appendix C), Load Response Event days with events in a given Load Zone, and days that contain a cleared Day-Ahead offer period for a Demand Resource as defined below:

- (1) Holidays are defined in OP14, Appendix C.
- (2) Load Response Event days (for a given Load Zone) are excluded from the CB calculation for the appropriate Load Response Program and therefore do not result in a recalculation of the CB. The CB for a Load Response Event day is equal to the CB calculated for the last non-event day. For assets that are building their 5-day historical data, Load Response Event days are not excluded from the CB calculation, because the asset is not Ready to Respond to a Load Response Event until a CB can be calculated.
- (3) Days that a Demand Resource's offer clears concurrent with the Day-Ahead Energy Market will be treated as a Load Response Event day and excluded from the CB calculation for that Demand Resource. The CB for a day containing a cleared Day-Ahead offer is equal to the CB calculated for the last non-cleared or non-Load Response Event day.

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## 4.3 Performance Measurements and Compliance

### 4.3.1 Performance

Performance for metering configurations that include load reduction is measured as the difference between the CB (adjusted) and the actual metered usage by hour during the event. The CB shall be shifted (adjusted) to align the CB with the actual metered usage for two hours preceding the interruption for the LRP event. For a Day-Ahead Load Response Program cleared offer, the shift (adjustment) to align the CB with the actual meter usage will use the two hours immediately preceding the first hour of the Demand Resource's cleared Day-Ahead offer. However, if there are consecutive Load Response Event days or days containing a cleared Day-Ahead offer, the CB adjustment used on the first day will be compared to the CB adjustment for each consecutive Load Response Event day or day containing a cleared Day-Ahead offer, and the greater adjustment will be applied to the CB for the second and subsequent consecutive days. For On-Site Generation, either the generator output as metered or a combined measurement of the site load and On-Site Generation as metered (at the option of the Enrolling Participant) will be used for performance as defined below.

#### 4.3.1.1 LOAD ONLY CONFIGURATION

For premises 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 simple average method described above in section 4.2.  
 $AL$  = actual load for the hour

#### 4.3.1.2 ON-SITE GENERATION ONLY CONFIGURATION

For premises subscribing for only On-Site 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 on-site generator output for the hour

For premises subscribing for only On-Site Generation and metered such that only the net load reduction value is available, 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 simple average method described above in section 4.2.  
 $AL$  = actual load for the hour

#### 4.3.1.3 LOAD AND ON-SITE GENERATION CONFIGURATION

For premises subscribing both the On-Site Generation and the load and participating in the same LRP, performance for each hour shall be the net of On-Site Generation and load as defined below:

Where On-Site Generation and load are metered separately:

$$P_h = OG_h + [CB_h - AL]$$

Where On-Site Generation and load are metered such that only the net load reduction value is available, performance for each hour shall be calculated as:

$$P_h = CB_h - AL$$

Where:  $P_h$  = performance for the hour  
 $OG_h$  = Metered on-site generator output for the hour  
 $CB_h$  = Customer Baseline for the hour as calculated using the simple average method described above in section 4.2.  
 $AL$  = actual load for the hour

#### 4.3.2 Compliance Period

The Compliance Period includes every hour in the LRP event in which performance was greater than zero, beginning with the initial hour and ending with the end of the Load Response Event.

The Compliance Period for the Day-Ahead Load Response Program is the hours of the cleared Day-Ahead offer.

## 4.4 Settlement Procedures

Program	Responsible Party	Data to Submit	Deadline
Real-Time Demand Response 30-Minute Notice	IBCS OS from IBCS Provider	Event hours only	2.5 business days after the Operating Day
Real-Time Demand Response 2-Hour Notice	IBCS OS from IBCS Provider	Event hours only	2.5 business days after the Operating Day
Real-Time Profiled Response	Meter Reader	All hours for event days	2.5 business days after the Operating Day
Real-Time Price Response Using IBCS Communication	IBCS Provider	Program days, all hours	2.5 business days after the Operating Day
Real-Time Price Response Using Low-Tech Option	Meter Reader	Program days, all hours	2.5 business days after the Operating Day
Real-Time Price Response Using Super Low-Tech Option	Meter Reader	Program days, all hours	Before 90-day meter reading deadline

*Table 4.1 – Meter Data Submission Deadlines*

Meter data submission deadlines for Day-Ahead Load Response Program Demand Resources whose Day-Ahead offer cleared, are the same as the Real-Time Load Response Program in which the Demand Resource is registered.

### 4.4.1 Data Submission for Customers Using IBCS

The IBCS OS will provide the ISO with hourly Interval Meter data, or interval data for an approved M&V Plan, needed to calculate payments in response to Load Curtailment by 1300 on the third business day after the Operating Day. Revised metering data may be submitted up to 90 days following the dispatch day for inclusion in the following months bill (see Section 4.8 of this Manual for Settlement Timeline). Electronic, 5-minute interval data will be collected on an hourly basis from LRP customers. Data will be stored for a term of three years by the IBCS OS. Data will be retrievable in increments of one day at a time, or multiple days if required. Data will be collected via the IBCS, and stored by the IBCS OS. If the Demand Response Asset is Ready to Respond, but the IBCS Provider fails to submit the required data, the Enrolling Participant or DRP is responsible for submitting the required metering data to the ISO.

Meter data for the Real-Time Profiled Response and Real-Time Price Response Programs must be submitted to the ISO in the format defined in the “ISO New England Metering

Upload File Format” document posted on the ISO web site. Meter data must be submitted as identified in Section 4.4 above.

The IBCS OS will also provide the following data to the ISO for all Real-Time Programs:

- (1) Program Identifier (i.e. 30-Minute or 2-Hour Notice Demand Response)
- (2) Load Zone and Block activated
- (3) Date Time (mm/dd/yyyy hh24mnss) of Interruption Start
- (4) Date Time (mm/dd/yyyy hh24mnss) of Interruption End

#### **4.4.2 Data Submission for Real-Time Price Response Program Customers Using IBCS or Low Tech Option, and for Real-Time Profiled Response Program Customers**

The Enrolling Participant will provide or cause to be provided to the ISO, the appropriate hourly Interval Meter data needed to calculate payments in response to Load Curtailment by 1300 on the third business day after the Operating Day. Hourly interval data will be provided to the ISO through the meter data interface. For Real-Time Profiled Response Program or for an approved M&V Plan in the Real-Time Price Response Program, the meter data provided is the Amount Interrupted (on command from the ISO) as statistically determined (MWh to 3 decimal places).

Meter data must be submitted to the ISO in the format defined in the “ISO New England Metering Upload File Format” document posted on the ISO web site. Meter data for the Real-Time Price Response program (except for an approved M&V Plan) must be submitted for all hours of all non-holiday weekdays. For the Real-Time Profiled Response program or for any approved M&V Plan, the only meter data submitted is the calculated Amount Interrupted.

#### **4.4.3 Data Submission for Real-Time Price Response Program Customers Using “Super” Low Tech Option**

The Enrolling Participant will provide or cause to be provided to the ISO, the appropriate Interval Meter data needed to calculate payments in response to Load Curtailment prior to the 90-day resettlement. However, Enrolling Participants electing this option will not receive any LRP compensation prior to four calendar months after the dispatch period (see Section 4.8 of this Manual for the Settlement Timeline). Meter data received after the 90-day resettlement deadline will not receive any credit. Hourly interval data will be provided to the ISO through the meter data interface.

Meter data must be submitted to the ISO in the format defined in the “ISO New England Metering Upload File Format” document that is posted on the ISO web site. Meter data must be submitted for all hours of all non-holiday weekdays.

#### **4.4.4 Settlement Process**

The ISO will publish preliminary Day-Ahead and Real-Time results monthly, approximately one week after the month ends, for informational purposes, and a monthly financial settlement, which is conducted in arrears, as illustrated in the settlement timeline found in Section 4.8 of this Manual.

#### **4.4.5 Reporting Process**

Load Response settlement data is reported to the Enrolling Participant in the formats described under “Market Information Server Reports” on the ISO web site.

## 4.5 Payments and Credits

### 4.5.1 Calculation of LRP Payments

#### 4.5.1.1 DAY-AHEAD LOAD RESPONSE PROGRAM

Settlement for the Day-Ahead Load Response Program will consist of hourly Day-Ahead and Real-Time payments. The Day-Ahead payment is based on a Demand Resource's cleared Day-Ahead offer and the Real-Time payments or charges are based on possible deviations resulting from differences between the calculated Real-Time Amount Interrupted and the cleared Day-Ahead offer. These deviations will be referred to as LR deviations in the remainder of this manual.

The hourly Amount Interrupted for each Demand Resource is the difference between the Customer Baseline (as described in Section 4.2) and the actual hourly Real-Time Metered Load. For Demand Resources associated with the Real-Time Demand Response Programs, the actual Metered Load and the Customer Baseline are measured in 5-minute intervals. The hourly value for each is calculated, by the IBCS OS, by integrating the 5-minute values over the hour. The Amount Interrupted is calculated as the difference in the hourly values. The difference between the Amount Interrupted and the cleared Day-Ahead offer is the LR deviation.

For the Day-Ahead Load Response Program, the Day-Ahead payment is calculated as detailed below:

- (1) For each hour in which a Demand Resource's Day-Ahead offer clears, the resource's hourly Day-Ahead payment is the product of the cleared Day-Ahead offer multiplied by the Day-Ahead Zonal Price (DA cleared MW \* DA Zonal Price).

For Day-Ahead Load Response Program Demand Resources enrolled in either the Real-Time Demand Response Program or the Real-Time Profiled Response Program, the Real-Time payment or charge is calculated as detailed below:

- (1) For each hour in which a Demand Resource's Day-Ahead offer clears, and the associated Real-Time Demand Response Program or Real-Time Profiled Response Program is not activated, any LR deviations will be charged or credited at the Real-Time Zonal Price ((Amount Interrupted – DA cleared MW) \* RT Zonal Price).
- (2) For each hour in which a Demand Resource's Day-Ahead offer clears, and the associated Real-Time Demand Response Program or Real-Time Profiled Response Program is activated, any LR deviations will be charged or credited at the greater of the Real-Time Zonal Price or the applicable program floor price ((Amount Interrupted – DA cleared MW) \* MAX(RT Zonal Price, program floor price)).
- (3) For each hour in which a Demand Resource's Day-Ahead offer does not clear, and the associated Real-Time Demand Response Program or Real-Time Profiled Response Program is activated, any payments will be in accordance with Section 4.5.1.2 below.

- (4) For each hour in which a Demand Resource's Day-Ahead offer does not clear, and the associated Real-Time Demand Response Program or Real-Time Profiled Response Program is not activated, the Demand Resource does not qualify to receive a payment.

For Day-Ahead Load Response Program Demand Resources enrolled in the Real-Time Price Response Program, the Real-Time payment or charge is calculated as detailed below:

- (1) For each hour in which a Demand Resource's Day-Ahead offer clears, and the Real-Time Price Response Program is not activated, any LR deviations will be charged or credited at the Real-Time Zonal Price ((Amount Interrupted – DA cleared MW) \* RT Zonal Price).
- (2) For each hour in which a Demand Resource's Day-Ahead offer clears, and the associated Real-Time Price Response Program is activated, any LR deviations will be charged or credited at the greater of the Real-Time Zonal Price or the applicable floor price ((Amount Interrupted – DA cleared MW) \* MAX(RT Zonal Price, program floor price)).
- (3) For each hour in which a Demand Resource's Day-Ahead offer does not clear, and the associated Real-Time Price Response Program is activated, the payments will be in accordance with Section 4.5.1.2 below.
- (4) For each hour in which a Demand Resource's Day-Ahead offer does not clear, and the associated Real-Time Price Response Program is not activated, the Demand Resource does not qualify to receive a payment.

#### **4.5.1.2 REAL-TIME LOAD RESPONSE PROGRAMS**

The payment descriptions that follow are for Demand Resources that respond to an ISO called Load Response Event in Real-Time and do not clear the Day-Ahead Energy market.

The hourly Amount Interrupted is calculated as described in Section 4.5.1.1 of this Manual.

Real-Time hourly payments for Demand Resources will be the product of the Amount Interrupted during an ISO called Load Response Event times the greater of the Real-Time Zonal Price and the applicable program floor price (listed below).

The ISO will calculate payments using the following guidelines:

- (1) For Real-Time Demand Response Demand Resources, the integrated maximum Amount Interrupted is equal to the largest difference between the Customer Baseline value and the Metered Load for the hour.
- (2) If the Interruption Period is for a Load Response Event involving the Real-Time Demand Response program or the Real-Time Profiled Response program, a minimum two-hour Interruption Period, calculated from the end of the notice requirement for that program, will apply.
- (3) Applicable floor prices are:
  - (a) Real-Time Demand Response (30-minute): \$500/MWh
  - (b) Real-Time Demand Response (2-hour): \$350/MWh

- (c) Real-Time Price Response: \$100/MWh
- (d) Real-Time Profiled Response: \$100/MWh

### **4.5.2 Qualified ICAP Resources**

Demand Resources in the Real-Time Demand Response or the Real-Time Profiled Response Program will qualify as ICAP Resources. The Adjusted Capability will be calculated only during Real-Time Demand Response and Real-Time Profiled Response events. The MW value of the ICAP Resource will be based upon the Adjusted Capability amount calculated in the LRP settlement. Demand Resources that perform in response to a Load Response Event will receive ICAP credit grossed up for the ICAP Reserve Margin. ICAP credit is further explained in Section 7 of this Manual.

Enrolling Participants who have customers in the Real-Time Demand Response or Profiled Response Programs must insure that the ISO is notified:

- (1) At least thirty days in advance, of the unavailability of the Demand Resource to interrupt. For example, it is the Enrolling Participant's duty to notify the ISO that a Demand Resource will be taking an annual facility shutdown. Failure to comply with this requirement could result in loss of ICAP credit for the Demand Resource. Specifically, the Enrolling Participant is responsible to ensure: the ISO is notified at least thirty days prior to the beginning of an Obligation Month of a change in status that would reduce the Demand Resource's ability to interrupt during the upcoming Obligation Month.
- (2) Of the megawatt (or kilowatt) impact of any reduction in the ability to interrupt.
- (3) Of any scheduled maintenance and is provided with assurance that any scheduled maintenance that reduces the ability to interrupt will only be conducted from September 1st through June 30th of any calendar year.

### **4.5.3 (This section has been deleted)**

### **4.5.4 Distribution of Payments and Charges**

Payments and charges will be distributed to Enrolling Participants that have signed up LRP customers and will be processed by Market Settlements.

Payments from the Enrolling Participant to its end use customers are not the responsibility of the ISO.

In order to provide Enrolling Participants with timely settlement results, Market Settlements will process the Day-Ahead and the Real-Time LRP settlements for each settlement month in a two-step process. Enrolling Participants will receive preliminary Day-Ahead and Real-Time market activity reports in the first week of the month following the settlement month. These reports will provide each Enrolling Participant with details of the month's activity and allow them to determine preliminary settlement results. The final Day-Ahead and Real-Time settlements will be included in a monthly financial settlement. The settlement will include all payments and charges related to cleared Day-Ahead offers and Demand

Resources' Load Response Event activity for the Load Response month. The Load Response monthly financial settlement will be included in the Weekly Bill that includes all other monthly services. This financial settlement is issued the first Thursday after the 10<sup>th</sup> of the month, in the second month after the LRP month, in accordance with the settlement timeline found in Section 4.8 of this Manual. In the period between the preliminary market activity reports and the 20<sup>th</sup> of the month (see Settlement Timeline in Section 4.8), the ISO will allow Enrolling Participants to submit any needed Meter Data corrections to the Metering UI. These updated Meter Readings will be captured in the final financial settlement and allow for a more accurate Load Response settlement.

#### **4.5.4.1 LRP CHARGES**

Payments calculated for the Day-Ahead and Real-Time Load Response programs, as described above will be allocated (except for IBCS costs provided for in Section 6) to the Real-Time Monthly Network Load on a system wide basis. Each Participant's portion of the payment will be its Real-Time Monthly Network Load divided by the system wide Real-Time Monthly Network Load times the pool wide Load Response Program charges.

#### **4.5.5 Verification, Errors, Fraud**

The ISO reserves the right to periodically audit customer data to insure that it is consistent with billing meter data.

All Load Reduction information is subject to audit by the ISO. Disputes concerning erroneous payments shall be resolved through the ISO's existing dispute resolution procedures (except for disputes between the Enrolling Participant & end-use customer which are not the responsibility of the ISO).

If, in review of the Enrolling Participant's account, the ISO determines that the Enrolling Participant or one of its customers has committed fraud to extract Load Response Program payments, the ISO will have the right to ban the Enrolling Participant or its customer from the LRP, as well as pursue other legal options at the sole discretion of the ISO.

## **4.6 Failure to Respond in Real-Time**

Demand Resources that fail to respond in Real-Time to a cleared Day-Ahead offer or a Load Response Event will result in the following settlement treatment.

### **4.6.1 Day-Ahead Load Response Program**

For a Day-Ahead offer that clears concurrent with the Day-Ahead Energy market, the Enrolling Participant is financially bound to respond in Real-Time by curtailing load. Failure to interrupt in Real-Time up to the MW value of the cleared Day-Ahead offer will result in a LR deviation which may result in a charge or credit in Real-Time, which will be determined by the level of Day-Ahead and Real-Time LMPs as described in Section 4.5.1.1 of this Manual.

### **4.6.2 Real-Time Demand Response Program**

#### **4.6.2.1 CASE ONE – FAILURE TO REDUCE DEMAND**

A Demand Resource in the Real-Time Demand Response Program that does not reduce demand during a Load Response Event will be subject to financial charges or credits, as outlined in Section 4.5 of this Manual, and will cause its Adjusted Capability to be reduced to zero on a going forward basis, effective for the next eligible ICAP Obligation Month. However, if that Demand Resource is able to fully comply with a subsequent Load Response Event, the Adjusted Capability will be reinstated for the following eligible ICAP Obligation Month.

#### **4.6.2.2 CASE TWO – PARTIAL REDUCTION IN CURTAILMENT OBLIGATION**

A Demand Resource in the Real-Time Demand Response Program that partially reduces during a Load Response Event will be subject to financial charges or credits, as outlined in Section 4.5 of this Manual. This action will cause its Adjusted Capability to be reduced to the level of its performance on a going forward basis, effective for the next eligible ICAP Obligation Month. For example, if a Real-Time Demand Response Program Demand Resource has agreed to a 5 MW curtailment but is able to reduce its demand by only 4 MW during a Load Response Event, that Demand Resource's Adjusted Capability will be reduced to 4 MW on a going forward basis.

### **4.6.3 Real-Time Profiled Response Program**

#### **4.6.3.1 CASE ONE – FAILURE TO REDUCE DEMAND**

A Real-Time Profiled Response Program Demand Resource that does not reduce demand during a Load Response Event will be subject to financial charges or credits, as outlined in Section 4.5, and will cause its Adjusted Capability to be reduced to zero on a going forward basis, effective for the next eligible ICAP Obligation Month. However, if the Demand

Resource is able to fully comply with a subsequent Load Response Event, the Adjusted Capability will be reinstated to the statistically determined level for the following eligible ICAP Obligation Month.

#### **4.6.3.2 CASE TWO – PARTIAL REDUCTION IN CURTAILMENT OBLIGATION**

The response of a Real-Time Profiled Response Program Demand Resource is statistically determined for each event. As a result, differences in response can occur between each Load Response Event. These differences will be treated as if that Demand Resource is able to partially reduce demand during a Load Response Event, but is unable to reduce the full amount of its reduction. As a result, the Demand Resource's Adjusted Capability will be reduced to the amount of the measured statistical performance, to be effective for the next eligible ICAP Obligation Month.. For example, if a Real-Time Profiled Response Program Demand Resource is statistically expected to provide a 5 MW curtailment but the statistically calculated response for a specific Load Response Event is only 4 MW, that Demand Resource's Adjusted Capability will be reduced to 4 MW, effective for the next eligible ICAP Obligation Month.

## **4.7 (This section has been deleted)**

## 4.8 Timeline for Settlement

The Timeline in Figure 4.2 illustrates the settlement timing for the Day-Ahead and Real-Time Load Response Programs as described in Sections 4.5, 4.6 and 4.7 of this Manual.

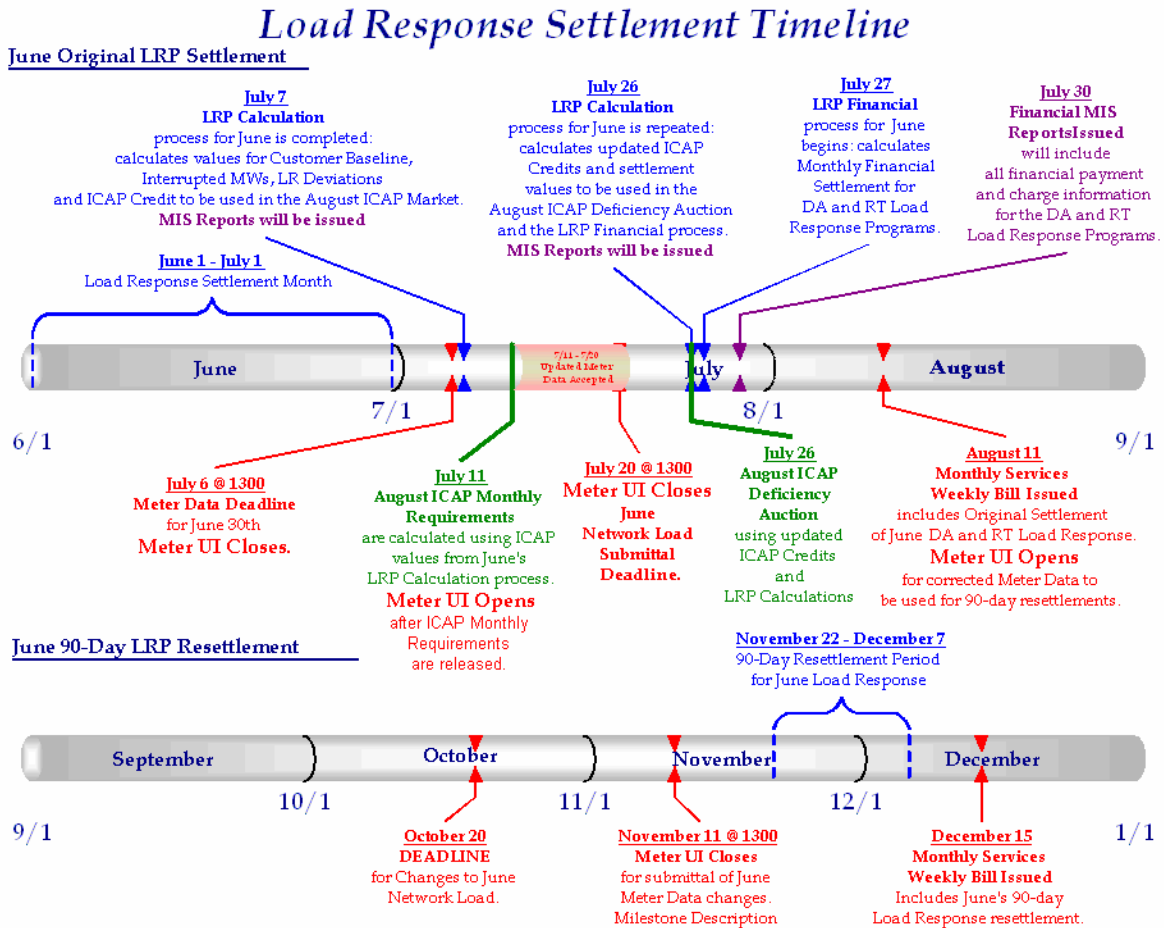


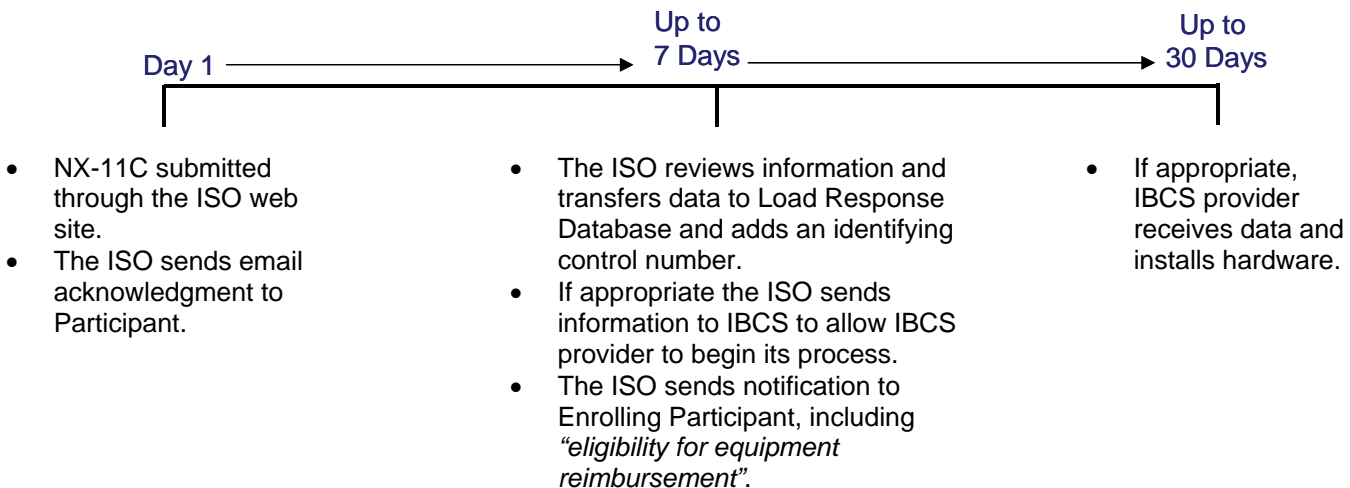
Figure 4.2: Load Response Settlement Timeline

## Section 5: Registration Procedures

The following information describes the Registration Process for the LRP:

- (1) Enrolling Participants that have registered and been approved by the ISO can sign up any eligible load or generator.
- (2) Load Response Assets are to be registered using the web based Customer and Asset Management System found on the SMD Home Page on the ISO web site (<https://smd.iso-ne.com/>)
- (3) Upon receipt by the ISO of a registration submittal, the form will be reviewed for completeness. Incomplete forms will be rejected and returned to the Enrolling Participant for further clarification.
- (4) Following receipt of complete registration materials, the ISO will have seven days to process the registration materials.
- (5) The ISO will notify the registering Enrolling Participant via email at completion of the various registration steps, or if the registered resource is eligible for cost subsidization of its IBCS installation.
- (6) If an IBCS option is selected, the IBCS Provider will work with the Enrolling Participant and the customer to arrange for installation and training with regard to its IBCS.
- (7) Activation for settlement treatment of all Demand Resources is contingent upon the receipt of meter certification. Until the meter certification is received by the ISO, the Demand Resource is not eligible to participate in nor receive compensation for a Load Response Event. For Price Response Program assets, the asset will be activated when the Enrolling Participant notifies the ISO that an interval meter is installed and operational at the asset.

The timeline of events for registration is as follows:



## Section 6: Program Fees

Enrolling Participants in the LRP selecting the IBCS protocol will be subject to fees that will be negotiated directly between the Enrolling Participant and their IBCS Provider.

The installation of any hardware required (including any site hardware) will not be subsidized in whole or in part by Market Participants for customers providing below 25 kW of interruption in order to participate in the LRP.

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### 6.1 Real-Time Demand Response

For the first 1000 installations of Real-Time Demand Response (reduced by the Interruptible Load installations already installed prior to the SMD Effective Date), (excluding individual customers providing less than 25kW) will be reimbursed by the ISO for installation of the IBCS data collection equipment according to the following terms:

- (1) The IBCS hardware costs identified in 1.5(1) are charged back to Market Participants on a Load Zone basis and shall be allocated among Market Participants in a percentage equal to each Market Participant's Real-Time Load Obligation in the appropriate Load Zone for the appropriate month divided by the total Real-Time Load Obligations for the appropriate Load Zone for the appropriate month.
- (2) For customers 300kW or more of load available for interruption, Market Participants will bear \$100 of the monthly user fee from the IBCS Provider. These costs will be allocated among Market Participants on a Load Zone basis and shall be allocated among Market Participants in a percentage equal to each Market Participant's Real-Time Load Obligation in the appropriate Load Zone for the appropriate month divided by the total Real-Time Load Obligations for the appropriate Load Zone for the appropriate month.

## 6.2 Real-Time Price Response

For the first 1000 installations of Real-Time Price Response (reduced by the Type 6 Class 2 Interruptible Load installations already installed prior to the SMD Effective Date):

- (1) The hardware installation cost identified in 1.5(2) shall be borne by Market Participants. The 50% share borne by Market Participants shall be allocated based on a percentage equal to each Market Participant's Real-Time Load Obligation in the appropriate Load Zone for the appropriate month divided by the sum of the Real-time Load Obligation for the appropriate Load Zone for the appropriate month. The Enrolling Participant is charged the remaining 50% share not borne by Market Participants.

## Section 7: ICAP Treatment

Demand Resources enrolled in the following Load Response Programs are eligible to receive ICAP Resource credit. The eligible programs are:

- (1) Real-Time Demand Response, and
- (2) Real-Time Profiled Response.

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### 7.1 Level of ICAP Resource Credit

Only Demand Resources that are enrolled in either the Real-Time Demand Response Programs or the Real-Time Profiled Response Program are eligible to qualify as an ICAP Resource as specified in Section 4.5.2. The level of the Real-Time interruption will be used to determine the Adjusted Capability for the Demand Resource. The Demand Resource's Adjusted Capability is calculated only during a Real-Time Demand Response Program event or a Real-Time Profiled Response Program event.

#### 7.1.1 Adjusted Capability

The Adjusted Capability will be used to establish the next eligible Obligation Month's ICAP credit. The credit for the actual Amount Interrupted during a Load Response Event is determined as the maximum interruption achieved by the Demand Resource in any recording interval. For the Real-Time Demand Response Programs (30-minute notice and 2-hour notice programs), the recording interval is any 5-minute interval during the Load Response Event. For the Real-Time Profiled Response program, the recording interval is any hour during the Load Response Event. In the scenario where there are two or more Load Response Events in the same month, the lowest actual Amount Interrupted will be used in the subsequent eligible ICAP Obligation Month. The last actual Amount Interrupted in the month will be used to establish the Adjusted Capability for the ICAP Obligation Month following the subsequent eligible month if an event is not initiated in the subsequent eligible month. If an event is initiated in the subsequent eligible ICAP Obligation Month, the lowest actual Amount Interrupted in that month (or the most recent result of the monthly settlement) will be used to establish the Adjusted Capability in the ICAP Obligation Month following the subsequent eligible month.

An example of Adjusted Capability is shown in Table 7.1. A 225 kW resource becomes Ready to Respond on April 4<sup>th</sup>. There are three Load Response Events in May and June and none in July, August, September and October. Due to a Monthly Network Load data deadline of the 20<sup>th</sup> of the month, the settlement will generally be run on the 27<sup>th</sup> of the month following the LRP month.

*Table 7.1: Adjusted Capability*

Calendar Month	May			June			July	August	September	October
Event Response	100	150	200	175	95	220	No Events	No Events	No Events	No Events
ICAP Monthly Requirement Established For: (on the 7th)	June			July			August	September	October	November
LRP Calculations Used to Establish Monthly Requirement	March			April			May	June	July	August
Adjusted Capability	225			225			100	95	220	220
Explanation	Registered Amount			Registered Amount			Lowest Performance in May	Lowest Performance in June	Last Performance in June	Last Performance in June
Settled LRP Month (on the 27 <sup>th</sup> )	April			May			June	July	August	September

Note: The LRP settlement software establishes the Adjusted Capability for each Demand Resource and is used by the ICAP settlement software to establish the Monthly Requirement approximately on the 7<sup>th</sup> of each month, using the Adjusted Capability from the most recent LRP settlement. The timing of these settlements delays the effect of event response until such time the event response can be calculated by a LRP settlement. For example: the May event responses will be calculated in the May LRP settlement run on June 5<sup>th</sup> establishing Adjusted Capabilities which will be used in July to establish August’s Monthly Requirement.

The Real-Time Demand Response and Real-Time Profiled Response Programs are activated by the ISO in accordance with the required actions set forth in OP 4. When a specific action in OP 4 is no longer required, a restore notification is initiated by the ISO. The duration of a specific action in OP 4 is defined solely by system conditions and is not constrained by the sum of a Load Response Program’s notice requirement and minimum payment period. As a result, a Load Response Event could be initiated and terminated before the Load Response Program’s notice requirement is reached. These Load Response Events are referred to as “short events.” In the case of a short event, a Load Response Program customer should not be penalized from an ICAP Credit standpoint for reduced or no response. As a result, performance by a Load Response Program customer in the Real-Time Demand Response and Real-Time Profiled Response Programs, as measured by their actual Amount Interruption, during short events will only affect their ICAP credit if it would improve the Demand Resources ICAP credit. Load Response Program customers will still be paid only for actual performance.

### 7.1.2 Reserve Margin Adjustment

A Demand Resource that is willing and able to remove its loads from the system as required by the ISO Control Room does not place a reserve requirement upon the system. As a result, such a Demand Resource should not only be entitled to receive ICAP Resource credit

for the registered amount that can be interrupted, but also for the ICAP Reserve Margin that will be relieved. The ICAP Reserve Margin is established periodically. The ICAP credit for a Demand Resource will be equal to its Adjusted Capability multiplied by the sum of 1 + the ICAP Reserve Margin.

## **7.2 ISO Initiated Audit**

If a Load Response Event for any of the programs that receive ICAP credit, has not been called during the calendar year prior to August 15<sup>th</sup>, the ISO will initiate a Load Response Event, in the appropriate program and Load Zone, to audit each of the Demand Resource's ability to interrupt to its ICAP credit level. Any Demand Resource that is found to under perform during the audit will have its Adjusted Capability adjusted to the level of performance during the audit, effective with the next eligible ICAP Obligation Month. The audit(s) will be conducted at the ISO's discretion between August 15<sup>th</sup> and August 31<sup>st</sup>. Payment and charges for this audit will be made in accordance with the settlement provisions described in this Manual.

**Section 8: Appendices**

**(This section has been deleted)**

# Appendix B: Calculation Examples for Demand and Price Response

## 8B.1 Example 1: Price Response

Participant Name	Participant B
Meter #	62952-3
Maximum Available MW per NX11-C	4.5
Forecast LMP Hour 8	100.00
Forecast LMP Hour 9	120.00

Hour	Profile (MW)	Metered Load (MW)	Adjusted Profile/MW	Curtailed data /MW	Locational Marginal Price Per Hour	Minimum Payment	Total Payment to Participant
Hour 8	6.500	4.500	7.000	2.500	\$ 92.00	\$ 100.00	\$ 250.00
Hour 9	6.500	2.990	7.000	4.010	\$ 100.35	\$ 100.00	\$ 402.40
							\$ 652.40

**Situation:** 4.5 MW reduction commitment by customer and customer interrupts when called upon.

**Payments:** The following payments would be made to the Enrolling Participant:

- Minimum Energy Payment for Price Response equals \$100 per MW interrupted
- Locational Marginal Price for Hour 8 of interruption = \$ 92.00 / MWh
- Locational Marginal Price for Hour 9 of interruption = \$ 100.35 / MWh
- Enrolling Participant delivers 2.5 mw of in hour 8 and 4.01 MW in Hour 9.
- LMP payments to participant are:
  - For Hour 8: 2.5 MWh \* (\$100.00) = \$250.00
  - For Hour 9:4.01 MWh \* (\$100.35) = \$ 402.40
  - Total payment for interruption: = \$ 652.40

## 8B.2 Example 2: Demand Response

Participant Name Participant A  
 Meter # 2508-00  
 Maximum Available MW per NX11-C 4.5  
 Program Name RT 2-Hour Notice Demand Response

**Note:** The Minimum Energy Payment for loads participating in 30-Min Demand Response is \$500 and \$350 for loads participating in 2-hr notice Demand Response. (The example is for 2-Hour Notice and depicts the end of the notice period and 2 hours of response)

Hour	Time / min	Profile	Metered Load (MW)	Adjusted Profile/MW Provided by IBCS OS	5 min Curtailment data /MW	Event Duration to Meet 2-Hour Minimum	Locational Marginal Price	\$350 Minimum	Total Payment to Participant
Hour 8	5	5,000	6,000	6,000					
	10	5,000	6,000	6,000					
	15	5,000	6,000	6,000					
	20	5,000	6,000	6,000					
	25	5,000	6,000	6,000					
	30	5,000	6,000	6,000					
	35	6,000	4,500	7,000	2,500				
	40	6,000	4,000	7,000	3,000				
	45	6,000	3,000	7,000	4,000				
	50	6,000	2,900	7,000	4,100				
	55	6,000	2,800	7,000	4,200				
	60	6,000	2,500	7,000	4,500	1.858	92.00	350	\$ 650.30
Hour 9	5	6,000	4,000	7,000	3,000				
	10	6,000	3,500	7,000	3,500				
	15	6,000	3,500	7,000	3,500				
	20	6,000	3,500	7,000	3,500				
	25	6,000	3,200	7,000	3,800				
	30	6,000	3,200	7,000	3,800				
	35	6,000	3,100	7,000	3,900				
	40	6,000	2,500	7,000	4,500				
	45	6,000	3,190	7,000	3,810				
	50	6,000	2,990	7,000	4,010				
	55	6,000	4,000	7,000	3,000				
	60	6,000	3,000	7,000	4,000	3.693	360.00	350	\$ 1,329.48
Hour 10	5	6,000	4,000	7,000	3,000				
	10	6,000	3,500	7,000	3,500				
	15	6,000	3,500	7,000	3,500				
	20	6,000	3,500	7,000	3,500				
	25	6,000	3,200	7,000	3,800				
	30	6,000	3,200	7,000	3,800				
	35	6,000	3,100	7,000					
	40	6,000	2,500	7,000					
	45	6,000	3,190	7,000					
	50	6,000	2,990	7,000					
	55	6,000	4,000	7,000					
	60	6,000	3,000	7,000		1.758	60.00	350	\$ 615.30
									\$ 2,595.08



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## Appendix E: Developing a Measurement and Verification Plan

### 8E.1 Introduction

The guidelines in this Appendix E provide an opportunity for Enrolling Participants with customers without facility-wide interval metering to participate in ISO New England Load Response Programs. Enrolling Participants must have the ability to cause their customers' electrical loads to be curtailed upon receipt of an event notification and report back their customers' aggregated or calculated energy usage or load curtailment. Examples of potential load curtailment strategies could include:

- Traditional direct load control, such as air-conditioner and electric hot water heater cycling and pool pump curtailments
- Permission-based control of thermostat set-points
- Control of lighting circuits and dimmable ballasts
- Compressor controls on vending machines and refrigeration
- Distributed generation dispatch

Enrolling Participants have several options for measuring and submitting energy usage or load curtailment data. Depending on the Load Response Program, the Enrolling Participant will submit to the ISO:

- **Energy Usage Data** for their customers that the ISO will use to calculate the customers' load curtailment following the methodology described in Section 5.2 of this manual, or
- **Load Curtailment Data** for their customers based on an approved methodology for measurement and verification described in the Enrolling Participant's M&V Plan.

### 8E.2 Developing an Acceptable M&V Plan

The objective of the Enrolling Participant's M&V Plan is to describe both the data acquisition procedure and the analysis methodology that will be used by the Enrolling Participant to determine their customers' aggregate energy usage or load curtailment by Load Zone and reporting interval for each Load Response Event. While unique issues may require attention on a case-by-case basis, all M&V Plans should address the following general issues.<sup>1</sup>

#### 8E.2.1 Description of the load curtailment measures

The M&V Plan should describe the nature of the load curtailment measures, including the type of end-use equipment involved and the manner in which load will be controlled by the Enrolling Participant. It should also characterize the nature of the loads under control, with respect to factors such as whether the loads are constant, staged, or continuously variable; are weather or time-dependent; or have interactive effects on other loads. To verify the

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<sup>1</sup> Participants may wish to consult resources available on standard M&V practice for energy efficiency projects, such as the International Performance Measurement and Verification Protocol (IPMVP).

nature of load characteristics, some short-term monitoring may be necessary and the data included with the submittal of the M&V Plan.

- A **constant load** device is one that operates at the same demand (kW) whenever it is on, such as a bank of fluorescent lights controlled by a single switch or a single-speed compressor in a packaged air conditioner unit. Since demand is rarely perfectly constant, a load can be considered as constant if it varies by no more than 5-10% from its average value during operation.
- A **staged load** is one that can operate at several fixed demand levels, such as a two-speed compressor in a packaged air conditioning unit.
- A **continuously variable** load can operate at any demand within some range – for example, a fan or pump motor with flow controls or a variable speed drive.

The M&V Plan should identify the specifications for each piece of end-use equipment affected by the load curtailment strategy at each customer site. Relevant information may include the equipment capacity (kW, tons, horsepower, full-load amps, power factor, etc.), operating schedule, and customer controls (manual operation, energy management system, etc.).

## 8E.2.2 Measurement and monitoring strategy

The measurement and monitoring activities proposed for calculating energy usage or load curtailment are a central component of the M&V Plan, and the following set of issues should be addressed.

(1) *Monitored Parameter(s)*. At least three general options can be considered:

- (a) **Facility-wide metering of demand (kW)**. This is the traditional approach allowed in all Load Response Programs in which load curtailments are estimated based on the whole-premise interval meters. This approach is preferred if whole-premise interval metering already exists at a facility. However, this approach may not be appropriate if the curtailed loads are small relative to the total facility load due to the small “signal-to-noise ratio” or if installing whole-premise interval metering is not economic relative to other monitoring methods.
- (b) **End-use interval metering of demand (kW)**. This approach may be more appropriate than Option (a) if curtailed loads are small relative to the building load, a facility does not currently have whole-premise interval metering or if end-use demand (kW) data can be readily obtained from a building energy management or control’s system. However, consideration must be given to the possibility of interactive effects that may significantly alter loads on other end-use equipment. For example, control of dimmable ballasts may lead to higher use of task lighting. Therefore, M&V plans that propose end-use metering must describe why whole-premise interval metering is either not cost-effective or inappropriate.

(c) **End-use interval metering of a proxy variable for demand.** This method may include measuring something other than demand (kW) such as current (amperage) and voltage or equipment status (on/off, operating time). This approach is characterized by similar attributes as Option (b), but also requires that a correlation be established between the monitored proxy variable and demand (kW). These correlations may be established by conducting short-term monitoring or a series of spot measurements of both parameters, and correlating the data sets (e.g., by performing a regression analysis) to estimate the functional relationship between the two parameters. Alternatively, engineering estimates of this relationship or use of equipment manufacturer's data may be appropriate in some circumstances. For example, current and voltage measurements together with a power factor estimate an end-use's demand (kW). Similar to (b) above, M&V Plans that propose end-use metering of a proxy variable must describe why whole-premise interval metering is either not cost effective or inappropriate.

(d) **Other M&V Methodologies** such as calibrated building simulation may be proposed, however some may not be economically practicable or appropriate for load curtailment measures.

(2) **Monitoring Interval and Period.** The M&V Plan should specify the period over which monitoring will be conducted and the interval over which monitored values will be averaged, recorded and reported to the ISO. The recording and reporting interval must be consistent with those required by the specific Load Response Program as described in this manual. For example, the Real-Time Demand Response Program requires energy usage data to be recorded and reported every five minutes during events. The Real-Time Price Response Program requires energy usage data to be recorded every hour and reported either on a daily basis or within 90 days of the price event.

(3) **Instrumentation.** The M&V Plan should identify the type of monitoring and data logging equipment (i.e. manufacturer and model number) to be used, and its accuracy, as indicated by calibration or manufacturer's data. The preferred method for measuring demand (kW) is to use a true RMS measurement device with an accuracy of at least  $\pm 2\%$ .<sup>2</sup>

If alternative methods of measuring demand are proposed (i.e. proxy variables, voltage, current, etc.) the **calculated** demand (kW) values from the monitoring data should achieve an accuracy of  $\pm 2\%$  on the **calculated** demand (kW).

If the proposed methods rely on the measured current (amps) and the nominal voltage, the power factor of the end-uses must be included in the demand (kW) calculations.

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<sup>2</sup> This recommendation for meter accuracy follows the performance requirements for solid-state electrical metering devices set by the American National Standard Institute, ANSI C12.16-1991. Additionally, for power measurements on circuits with significant harmonics, IEEE Standard 519 recommends a digital sampling rate of at least 3 kHz.

Furthermore, demand measurements for three-phase devices should be conducted on all phases in order to account for any phase imbalance.

If a facility's energy management system (EMS) will be used to record pulse output from a power transducer, the processing accuracy of the EMS must be verified.

- (4) *Sampling*. If sampling will be conducted, the M&V Plan should define each population to be sampled, the sample size, and the target level of precision and confidence. The M&V Plan should include all calculations conducted for determining the sample size and describe how the sample points will be selected. For additional information on sampling, refer to the section below titled "Sampling."

### **8E.3 Load reduction calculation methodology**

The M&V Plan must describe how the Enrolling Participant will calculate their aggregate energy usage or load curtailments on a zonal basis from the monitored data of individual end-use devices or customers. The methodology will vary by program, as follows:

Real-Time Demand Response and Real-Time Price Response Programs:

The Enrolling Participant must submit their customer(s) actual aggregated and/or calculated energy usage in the frequency, format and method of data transmittal consistent with the requirements of each program. The actual aggregated and/or calculated demand (kW) data will be used to calculate the Enrolling Participant's customers' baseline and load curtailment for each event by Load Zone.

The ISO will use the customer baseline and load curtailment methodology for the Real-Time Demand Response and Real-Time Price Response Programs as described in Section 5.2 of the Program Manual.

Real-Time Profiled Response Program:

- (1) The actual load or value of a monitored proxy variable (e.g., duty cycle) during each hour of the load curtailment event, and
- (2) The baseline load or value of a monitored proxy variable during each hour of the event.

The baseline represents the value that would have been expected of the device or customer absent any load curtailment event. For constant load equipment that operates with a constant schedule and/or duty cycle, the baseline is a fixed quantity. However, for load curtailment measures involving variable load equipment or equipment whose operation is time-dependent or weather-dependent, the baseline must be calculated for each hour of each load curtailment event. The M&V Plan should explain how the actual and baseline loads will be calculated, identifying the period that will be used to calculate the baseline load (e.g., the prior ten similar days), and how any adjustments (e.g., for temperature or time of day)

will be made. Program participants may wish to refer to the general ISO methodology for calculating customer baseline loads, as described in Section 5.2 of the Program Manual.

### **8E.3.1 Calculating load reductions from a sample**

If energy usage or load curtailments will be measured for the entire population of controlled loads or customers, then the Enrolling Participant's aggregated energy usage or load curtailment in each measurement interval and zone will be calculated as the sum of all individual measured energy usage or load curtailments. However, if sampling will be conducted, the Enrolling Participant's aggregated energy usage or load curtailment in each measurement interval and zone must be calculated from the monitoring data of the sample, and the M&V Plan should describe how this calculation will be performed.

The calculation methodology will take one of two general forms:

- (1) Energy usage or load curtailments will be determined for each member of the sample and extrapolated to the population in terms of some average normalized value, such as the average kW reduction per unit, per ton of cooling capacity, per kW of connected load, or some other analogous unit.
- (2) A proxy variable for energy usage or load curtailment (e.g., change in duty cycle) is determined for each member of the sample, and the energy usage or load curtailment for the entire population is calculated based on the average measured value of the proxy variable and additional stipulated or measured input parameters for each member of the population (e.g., connected load).

A variety of other critical issues that relate to calculating energy usage or load curtailments from a sample may also arise and should be addressed in the M&V Plan, including equipment failure and customer over-rides. For control technologies that allow the Enrolling Participant to determine over-ride rates and signal failures, better accuracy is possible using these known rates and applying them to the savings for those with successful signal and no over-ride. For example, some thermostat control technologies allow the Enrolling Participant to know the signal failure and override for all members of the population. In this case, by separating out all members of the sample with signal failures or overrides, the variation in measured load reduction for the remaining sample points will be generally smaller than it would if the load reduction were calculated for the entire sample. The average load reduction for this subset of the sample can then be extrapolated to the portion of the population that had no signal failure or customer override.

## **8E.4 Sampling**

If sampling will be conducted, the M&V Plan must define each population to be sampled, the sample size, and the target level of precision and confidence. The M&V Plan must include all calculations conducted for determining the sample size and describe how the sample points will be selected.

Enrolling Participants using a Sampling Plan are likely to employ load curtailment strategies that involve curtailing similar types of small loads dispersed across a large number of customer sites (e.g., cycling of residential air conditioners) or within a single customer facility (e.g., lighting circuits or vending machines). In some cases, it may not be feasible for the Enrolling Participant to individually monitor each piece of equipment, and it may be appropriate to monitor a representative sample. To do so, the Enrolling Participant must first identify the relevant populations and then determine the appropriate sample size for each population. After monitoring has been conducted, the Enrolling Participant must evaluate the distribution of their sample in order to recalculate their sample size for the following year.

### 8E.4.1 Identifying the Relevant Populations

To monitor a sample of end points, the Enrolling Participant must first identify populations whose members (e.g., end-use devices, customers, lighting circuits) would be expected to have similar values for the monitored parameter. If the populations are defined too broadly, the sample will be unlikely to provide statistically significant results. Populations should consist of members that are similar with respect to:

- (1) Type and size of equipment affected by the load curtailment strategy;
- (2) Usage patterns (e.g., residential vs. commercial; coastal vs. inland weather zones); and
- (3) Load control strategy (e.g., duty cycle control vs. thermostat set point control).

### 8E.4.2 Determining the Appropriate Sample Size

The appropriate sample size depends on the target level of precision at some specified confidence interval. For all programs, the default statistical target is 90/10 (10% precision at a one-tailed 90% confidence level) in the load curtailment (kW) amount.<sup>3</sup>

A generally accepted methodology for calculating the appropriate sample size is to conduct simple random sampling for *each* population. To follow this approach, first calculate the sample size corresponding to an infinite population ( $n'$ ), according to Equation (1):

$$n' = \left( \frac{z \times c.v.}{p} \right)^2 \quad (1)$$

where  $z$  is the z-factor for a given confidence interval ( $z = 1.282$  for a one-tailed 90% confidence interval);  $p$  is the precision ( $p = 0.1$  for 10% precision); and  $c.v.$  is the coefficient of variation, which is equal to the ratio of the standard deviation of the sampled variable to its average value. In general, the greater the expected variation in the variable from one device to the next – e.g., due to operational patterns or equipment size – the greater the value of  $c.v.$  that should be used to calculate the sample size. If monitoring has already been conducted, the  $c.v.$  should be based on the monitored data. Otherwise, a default initial value

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<sup>3</sup> In other words, the sample size should be sufficiently large such that there is a 90% probability that the average value of the sample will not exceed the average value of the population by more than 10%.

of  $c.v. = 0.5$  should be used. For loads curtailments that are likely to have significant variations from one device to the next, a larger  $c.v.$  may be necessary.

The sample size ( $n$ ) for the finite population ( $N$ ) can then be calculated according to Equation (2):

$$n = \frac{n'}{1 + \frac{n'}{N}} \quad (2)$$

where  $n$  is rounded up to the nearest integer.

If an Enrolling Participant has multiple populations, as an alternative they may calculate sample sizes based on a stratified sampling approach, applied across all of the populations. This technique involves more complex sample size calculations, but will generally yield a smaller total number of sample points.

If the Enrolling Participant believes that the sample sizes corresponding to a 90/10 statistical target would result in onerous M&V costs relative to project benefits, they may propose a reduction in sample sizes. However, the ISO will then de-rate the Enrolling Participant's load curtailments. To determine the level of de-rating, first calculate the precision at 90% confidence associated with the reduced sample size, according to Equation (3):

$$p = z \times c.v. \times \sqrt{\frac{\frac{N}{n} - 1}{N}} \quad (3)$$

The de-rating of load curtailments is based on the difference between this precision and the target level of 10%. For example, if the precision associated with a reduced sample size is 15%, load curtailments will be de-rated by  $15\% - 10\% = 5\%$ .

For any sample calculation methodology, it is advisable that the Enrolling Participants over-sample (e.g., by 10%) to compensate for potential data loss due to failures in monitoring equipment or other factors. Also, as described above, the ISO may call a curtailment event in a subset of pricing zones, rather than system-wide. If only a sub-set of customers are called to curtail during such situations, the statistical accuracy of the sample will likely be reduced. To guard against such events, the program participant may wish to over-sample in some number of zones. Once the total sample size has been calculated for each population, the specific sample points should be selected at random from the members of each population.

### **8E.4.3 Evaluating the Sample Distribution Based on Monitoring Data**

During the first year of participation a default value for the coefficient of variation (*c.v.*) will be set to 0.5. However, after curtailment events have been called, the Enrolling Participant can more accurately estimate the *c.v.* of the population, based on the monitoring data for these events. For simple random sampling, the procedure for evaluating the *c.v.* of each population is as follows:

- (1) For each hour of each load curtailment event, calculate the mean value and standard deviation of the sampling variable (e.g., kW reduction per unit).
- (2) Based on the hourly standard deviation and mean values, calculate hourly values for the *c.v.*, equal to the ratio of the standard deviation to the mean.
- (3) Calculate the average of the hourly *c.v.* values for all curtailment events during the calendar year.

Based on these calculated *c.v.* values, the Enrolling Participant can re-calculate the appropriate sample size for the following program year, using Equations (1) and (2). If the calculated *c.v.* values are significantly larger than 0.5, this could indicate either that the population has a wide distribution with respect to the sampling variable, or that the population is composed of two or more distinct groups that should be disaggregated into separate populations. In the latter case, the Enrolling Participant should re-calculate the *c.v.* values for each separate population, based on the existing sample data from each of these groups.

### **8E.5 Submitting energy usage or load curtailment data to the ISO**

Energy usage or load curtailment data must be submitted in the format, frequency and method of transmittal consistent with each of the Load Response Programs as described in the Program Manual.

## 8E.6 M&V Plan Checklist

Enrolling Participants may wish to consult the following checklist to ensure that their M&V Plan addresses the necessary issues and contains adequate detail.

- (1) The M&V Plan describes the load curtailment strategy and related end-use devices, identifying:
  - The type, quantity, and location of end-use devices that will be controlled
  - The manner in which end-use devices will be controlled
  - The general characteristics of the end-use devices, with respect to factors such as load variability, time- or weather-dependence, and interactive effects on other end-use equipment
  - Detailed specifications, to the extent possible, for each end-use device to be controlled, including nameplate capacity, operating schedule, and customer controls
  
- (2) The M&V Plan describes the measurements that will be conducted to calculate load reductions for each hour and zone during the ISO load curtailment events, identifying:
  - The parameters that will be measured
  - The duration over which monitoring will be conducted
  - The interval over which monitoring data will be averaged and recorded
  - The type of monitoring and data logging equipment to be used and their accuracy (include calibration data and/or manufacturer's spec sheets to verify instrumentation accuracy)
  - If applicable, the populations to be sampled, the target level of precision and confidence, and the sample sizes (include all calculations used to determine sample size)
  
- (3) The M&V Plan describes the methodology by which aggregate load reductions for each hour and zone will be calculated from the monitoring data, identifying:
  - How the actual load will be calculated, for M&V strategies that involve the measurement of proxy variables
  - How the baseline load will be calculated, including the period used to calculate baseline loads and adjustments that will be made to account for weather or time of day
  - If sampling will be conducted, the calculation method by which monitored results from the sample will be applied to the entire population, including (if applicable) the effect of customer over-rides and signal or equipment failure
  - Any alternative calculation methods that will be employed specifically in cases that the ISO calls for load reductions in only a sub-set of pricing zones

## **8E.7        Template - ISO New England Real-Time Profiled Response Program Monitoring & Verification Plan**

Company Name:	
Project Name:	
Submission Date:	
Company Address:	
Contact Name:	
Telephone/FAX Number	
E-Mail Address	

### **1.0 Project Summary**

### **2.0 Demand Response Measure Description:**

### **3.0 Demand Response Equipment Specifications and Documentation:**

### **4.0 Measurement and Monitoring Strategy:**

#### **4.1 Monitoring Parameters and Variables:**

#### **4.2 Monitoring Interval and Period:**

#### **4.3 Measurement Equipment Specifications:**

#### **4.4 Measurement Data Collection and Management Plan:**

#### **4.4.1 Measurement Data Validation, Editing and Estimating Plan:**

### **5.0 Statistical Sampling Plan:**

#### **5.1 Description of Population(s)**

#### **5.3 Sample Size Calculations**

#### **5.4 Method of Sampling:**

### **6.0 Demand Reduction Calculation Methodology:**