Orange & Rockland

Orange & Rockland Utilities, Inc.
390 W Route 59
Spring Valley, NY 10977

Customer Energy Services Department
Energy Efficiency/Demand Management Section

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Energy Efficiency and Demand Management Procedure

Calculating Customer Baseline Load

File: Energy Efficiency and Demand Management: Manual No. 1

Target Audience	Customers Enrolled in the Commercial Demand Response Programs
NESC Reference	NONE

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1.0 Introduction

This document is an excerpt from the NYISO (New York System Operator) Emergency Demand Response Program Manual (12/02/2010 version 6.2 Section 5.2). It is intended for use by Customers/Aggregators enrolled in the Orange & Rockland Utilities, Inc. (O&R) Demand Response Programs as it provides guidance for calculating the Customer Baseline Load (CBL).

2.0 Definitions

2.1 **Curtailment Service Providers (CSP):** NYISO-approved Curtailment Customer Aggregators (Aggregators) of retail end users capable of load reduction. Aggregators may claim load reductions from Demand Side Resources with which they have a contractual arrangement.

2.2 **Customer Base Load (CBL):** Average hourly energy consumption as calculated in Section 5, used to determine the level of load curtailment provided.

3.0 Select a CBL method

3.1 The participant selects the CBL formula when it enrolls, or is enrolled by its CSP, with O&R for program participation. The choice of CBL becomes effective when O&R accepts enrollment.

3.2 At the initial enrollment in the Programs participants may elect either the Average Day CBL or the Weather Adjusted CBL formula.

3.3 A change in the CBL formula can be made when resources reenroll in the Programs during each capability period.

4.0 Baseline Calculation Method for All Accounts

4.1 It is the responsibility of O&R to provide the Customer Baseline Load (CBL) calculation to the CSP.

5.0 The Average Day CBL

5.1 Average Day CBLs for Weekdays

    a.   *Step 1*. Establish the CBL Window. Establish a set of days that will serve as representative of participant's typical usage.

        a.   Determine the participant's peak hourly load during the event window over the past 30 days or the period covered by the load data file, whichever is lower. The value becomes the initial seed value for the average event period usage level.

        b.   Beginning with the weekday that is two days prior to the event:

            i.   Eliminate any holidays as specified by O&R

            ii.   Eliminate any days when O&R declared a DLRP (Distribution Load Relief Program) or CSRP (Commercial System Relief Program) event for which the participant was eligible for payment for a curtailment.

            iii.   Eliminate any days when NYISO declared a SCR (Special Case Resources) or EDRP (Emergency Demand Response Program)

event for which the participant was eligible for payment for a curtailment.

    iv.   Eliminate the day prior to any day when O&R declared a DLRP or CSRP event for which the participant was eligible for payment for a curtailment.

    v.   Create the average daily event period for usage for that day, defined as the simple average of the participant's actual usage over the hours that define the event for which the CBL is being developed.

    vi.   Eliminate low usage days. If the average daily event period usage is less than 25% of the average event period usage level, eliminate that day.

    vii.   If the day has not been eliminated, update the average event period usage level by including the average daily event period usage for this day. If this is the first day added to the CBL Window, replace the average event period usage level (which was the initial seed value) with the average daily event period usage. Add this day to the CBL Window.

    viii.   Move back one day and loop to step 1.b.i.

    ix.   Final Weekday CBL Window must contain 10 weekdays.

Figure 1 below shows CBL window selection for a single weekday event. The calendar view illustrates the reverse order selection of the 10 days of the CBL window. The table view shows the dates of the CBL window for the event.

SUN	MON	TUE	WED	THU	FRI	SAT
JUN 15	JUN 16	JUN 17	JUN 18	JUN 19	JUN 20	JUN 21
JUN 22	JUN 23 *CBL DAY 10 FOR 7/9*	JUN 24 *CBL DAY 9 FOR 7/9*	JUN 25 *CBL DAY 8 FOR 7/9*	JUN 26 *CBL DAY 7 FOR 7/9*	JUN 27 *CBL DAY 6 FOR 7/9*	JUN 28
JUN 29	JUN 30 *CBL DAY 5 FOR 7/9*	JUL 1 *CBL DAY 4 FOR 7/9*	JUL 2 *CBL DAY 3 FOR 7/9*	JUL 3 *CBL DAY 2 FOR 7/9*	JUL 4 HOLIDAY	JUL 5
JUL 6	JUL 7 *CBL DAY 1 FOR 7/9*	JUL 8 INELIGBLE DAY (DAY BEFORE)	JUL 9 DLRP/CSRP EVENT	JUL 10	JUL 11	JUL 12

CBL WINDOW FOR SINGLE WEEKDAY EVENT EXAMPLE										
EVENT DATE	PROGRAM	DAY 1	DAY 2	DAY 3	DAY 4	DAY5	DAY 6	DAY 7	DAY 8	DAY 9	DAY 10
9-JUL	DLRP/CSRP	7-JUL	3-JUL	2-JUL	1-JUL	30-JUN	27-JUN	26-JUN	25-JUN	24-JUN	23-JUN

Figure 1 Example of CBL Window Selection – Single Weekday Event

- Figure 2 below shows the CBL windows when multiple weekday events occur. The calendar view illustrates the reserve order selection of the 10 days of the CBL window for each event. For example, June 27 will be used as:
  - Day 1 for the June 30th event and
  - Day 2 for the July 3rd event.

SUN	MON	TUE	WED	THU	FRI	SAT
JUN 15	JUN 16	JUN 17	JUN 18	JUN 19	JUN 20	JUN 21
JUN 22	JUN 23 *CBL DAY 10 FOR 7/9*	JUN 24 *CBL DAY 9 FOR 7/9*	JUN 25 *CBL DAY 8 FOR 7/9*	JUN 26 *CBL DAY 7 FOR 7/9*	JUN 27 *CBL DAY 6 FOR 7/9*	JUN 28
JUN 29	JUN 30 *CBL DAY 5 FOR 7/9*	JUL 1 *CBL DAY 4 FOR 7/9*	JUL 2 *CBL DAY 3 FOR 7/9*	JUL 3 *CBL DAY 2 FOR 7/9*	JUL 4 HOLIDAY	JUL 5
JUL 6	JUL 7 *CBL DAY 1 FOR 7/9*	JUL 8 INELIGBLE DAY (DAY BEFORE)	JUL 9 DLRP/CSRP EVENT	JUL 10	JUL 11	JUL 12

CBL WINDOW FOR MULTIPLE WEEKDAY EVENT EXAMPLE										
EVENT DATE	PROGRAM	DAY 1	DAY 2	DAY 3	DAY 4	DAY5	DAY 6	DAY 7	DAY 8	DAY 9	DAY 10
30-JUN	DLRP/CSRP	27-JUN	26-JUN	25-JUN	24-JUN	23-JUN	20-JUN	19-JUN	18-JUN	17-JUN	16-JUN
3-JUL	DLRP/CSRP	1-JUL	27-JUN	26-JUN	25-JUN	24-JUN	23-JUN	20-JUN	19-JUN	18-JUN	17-JUN

Figure 2 Example of CBL Window Selection – Multiple Weekday Events

    b.   *Step 2.* Establish the CBL Basis. Identify the five days from the 10-day CBL Window to be used to develop CBL values for each hour of the event.
        a.   Order the 10 days in the CBL Window according to their average daily event period usage level, and eliminate the five days with the lowest average daily event period usage.
        b.   The remaining five days constitute the CBL Basis.

    c.   *Step 3.* Calculate Average Day CBL values for the event.
        a.   For each hour of the event, the CBL is the average of the usage in that hour in the five days that comprise the CBL basis.

SUN	MON	TUE	WED	THU	FRI	SAT
JUN 29	JUN 30	JUL 1	JUL 2	JUL 3	JUL 4 HOLIDAY	JUL 5 *CBL DAY 3 FOR 7/26*
JUL 6	JUL 7	JUL 8	JUL 9	JUL 10	JUL 11	JUL 12 *CBL DAY 3 FOR 7/26*
JUL 13	JUL 14	JUL 15	JUL 16	JUL 17	JUL 18	JUL 19 *CBL DAY 3 FOR 7/26*
JUL 20	JUL 21	JUL 22	JUL 23	JUL 24	JUL 25	JUL 26 DLRP/CSRP EVENT

CBL WINDOW FOR WEEKEND EVENT EXAMPLE											
EVENT DATE	PROGRAM	DAY 1	DAY 2	DAY 3	DAY 4	DAY5	DAY 6	DAY 7	DAY 8	DAY 9	DAY 10
26-JUL	DLRP/CSRP	19-JUL	12-JUL	5-JUL	Weekend CBL Window uses only 3 weekend days of same day type						

Figure 3 Example of CBL Window Selection – Weekend Event

5.2 Average Day CBL for Weekends

    a.   ***Step 1***. Establish the CBL Window
        a.   The CBL Window is comprised of the most recent three like (Saturday or Sunday) weekend days. There are no exclusions for Holidays or event days.

    b.   ***Step 2***. Establish the CBL Basis.
        a.   Calculate the average daily event period usage value for each of the three days in the CBL Window.
        b.   Order the three days according to their average daily event period usage level.
        c.   Eliminate the day with the lowest average value.
        d.   The Weekend CBL Basis contains 2 days.

    c.   ***Step 3***. Calculate Weekend Average Day CBL values for the event.
        a.   For each hour of the event, the CBL value is average of usage in that hour in the two days that comprise the CBL basis.

6.0   Weather Sensitive CBL
    6.1   Elective Weather-Sensitive CBL Formulation
        a.   ***Step 1***. Calculate the Average Day CBL values for each hour of the event period described in (5.0) above.
        b.   ***Step 2***. Calculate the Event Final Adjustment Factor. This factor is applied to each of the individual hourly values of the Average Day CBL.
            a.   Calculate the Adjustment Basis Average CBL

i. Establish the adjustment period, the two-hour period beginning with the start of the hour that is four hours prior to the commencement of the event through the end of the hour, three hours prior to the event.

    b. Calculate the Adjustment Basis Average CBL

       i. Apply the Average Day CBL formula as described in 5.0 The Average Day CBL, to the adjustment period hours as though it were an event period two hours in duration, but using the five days selected for use in the Average CBL Basis (i.e. average the ten hours).

    c. Calculate the average of the two usage values derived in (b, i), which is the Adjustment Basis Average CBL.

    d. Calculate the Adjustment Basis Average Usage

       i. The adjustment basis average usage is the simple average of the participant's usage over the two-hour adjustment period on the event day.

    e. Calculate the gross adjustment factor

       i. The gross adjustment factor is equal to the Adjustment Basis Average Usage divided by the Adjustment Basis Average CBL

    f. Determine the final adjustment factor. The final adjustment factor is as follows:

       i. If the gross adjustment factor is greater than 1.00, then the final adjustment factor is the smaller of the gross adjustment factor or 1.20.

       ii. If the gross adjustment factor is less than 1.00, the final adjustment factors are the greater of the gross adjustment factor of 0.80.

       iii. If the gross adjustment factor is equal to 1.00, the final adjustment factor is equal to the gross adjustment factor.

  c. **Step 3**. Calculate the Adjusted CBL Values

    a. The Event Adjusted CBL value for each hour of an event is the product of the Final Adjustment Factor and the Average CBL value for that hour.

7.0   Example Customer Baseline Calculation

As an example, assume a 5-hour event was called from 11 am to 4 pm; notice was sent out at 0 am. The past 10 days MWh consumption for similar hours, along with the four hours prior to the event initiation, was:

Time	HB 7	HB 8	HB 9	HB 10	HB 11	HB 12	HB 13	HB 14	HB 15	Avg Event Period Usage (MW/h)	Total Event Period Usage (MW)	Rank
CBL Day 1	4	5	5	7	8	10	11	7	5	8.20	41	4
CBL Day 2	5	4	3	5	6	8	6	9	6	7.00	35	7
CBL Day 3	3	4	5	6	8	9	12	9	7	9.00	45	1
CBL Day 4	3	4	4	5	6	7	8	6	6	6.60	33	8
CBL Day 5	3	3	4	5	7	10	11	9	7	8.80	44	2/3
CBL Day 6	2	6	2	5	8	12	8	9	7	8.80	44	2/3
CBL Day 7	3	2	3	4	5	5	8	8	6	6.40	32	9
CBL Day 8	2	3	3	4	6	7	8	8	7	7.20	36	6
CBL Day 9	2	3	2	4	6	7	6	6	5	6.00	30	10
CBL Day 10	3	4	4	5	7	8	10	9	6	8.00	40	5

HB: Hour Beginning

Steps 1 and 2: sum the MWh for the hours 11-4 each day select the 5 highest totals:

Time	HB 7	HB 8	HB 9	HB 10	HB 11	HB 12	HB 13	HB 14	HB 15	Avg Event Period Usage (MW/h)	Total Event Period Usage (MW)	Rank
CBL Day 1	4	5	5	7	8	10	11	7	5	8.20	41	4
CBL Day 3	3	4	5	6	8	9	12	9	7	9.00	45	1
CBL Day 5	3	3	4	5	7	10	11	9	7	8.80	44	2/3
CBL Day 6	2	6	2	5	8	12	8	9	7	8.80	44	2/3
CBL Day 10	3	4	4	5	7	8	10	9	6	8.00	40	5

Step 3: Calculate the CBL for each hour using the five highest days selected:

Time	HB 11	HB 12	HB 13	HB 14	HB 15
Avg Day CBL	7.6	9.8	10.4	8.6	6.4

To calculate the hourly load reduction, for each our, subtract the actual load from the CBL.

Time	HB 11	HB 12	HB 13	HB 14	HB 15
Avg Day CBL	7.6	9.8	10.4	8.6	6.4
EVENT DAY – Actual Load	3	2	3	3	4
Load Reduction using Average Day CBL	4.6	7.8	7.4	5.6	2.4

The CBL shown in Step 3 above is the non-weather-adjusted value. If this customer signed up with the weather-sensitive calculation option, the CBL would be adjusted upward or downward base on the actual usage in the two hours prior to the event notification. In this example, the Adjustment Basis Average CBL will be the average of the MWh for hours beginning 7 and 8 over the five days chosen from the CBL: The table below shows how the adjustment will be calculated.

Time	HB 7	HB 8	Adjustment Basis Average CBL
Avg Day CBL – Adjustment Hours	3	4.4	3.7

On the day of the event (day N), assume the actual metered load consumption is as shown in the following table:

Time	HB 7	HB 8	HB 9	HB 10	HB 11	HB 12	HB 13	HB 14	HB 15	Adjustment Basis Average Usage
EVENT DAY – Actual Load	3	4	5	4	3	2	3	3	4	3.5

In this case, the Adjustment Basis Average Usage is the average of the MWh in hours 7 and 8, or 3.5 MWh.

The Gross Adjustment Factor is the ratio of the Adjustment Basis Average Usage to the Adjustment Basis Average CBL, 3.5/3.7 or 0.95.

Adjustment Basis Average Usage	Adjustment Basis Average CBL	Gross Adjustment Factor
3.5	3.7	0.95

The CBL will therefore be adjusted downward by five percent. The following table shows the resulting weather-adjusted CBL and the computed load reduction for the five hour event period.

Time	HB 11	HB 12	HB 13	HB 14	HB 15
Weather-Adjusted CBL	7.22	9.31	9.88	8.17	6.08
EVENT DAY – Actual Load	3	2	3	3	4
Load Reduction using Weather-Adjusted CBL	**4.22**	**7.31**	**6.88**	**5.17**	**2.08**

It is important to note that if the actual usage in the two hours prior to notification was *higher* than the Adjustment Basis Average CBL, the CBL curve would have been shifted *upward* and would result in load reduction performance that was higher than would have been determined using the Average Day CBL (without weather adjustment).

8.0 Baselines Calculation Method Only for Qualifying Facilities Which Sell Capacity and Energy to O&R (SC-25 Standby Service Accounts)

For a Qualifying Facility with Local Generation that sells capacity and energy to O&R, a similar CBL calculation as above, is used to eliminate any base load portion of the generation form the actual performance during the event.

8.1 Calculate the Local Generation during similar hours over the past 10 weekdays, beginning two days prior to the curtailment event and excluding days where curtailment due to participation in DLRP and CSRP occurred.
  a. MWh(k) = sum(h(i)…h(j)) for each day k = d(n-2)…d(n-11)
  b. Select the 5 lowest values of MWh(k) and use those days d(l), l = 1… 5 to calculate the CBL.
  c. Calculate the CBL for each hour h(i) as the average of the five h(i) values for days d(l), l = 1…5.

9.0 Authorized Personnel

The Section Manager, Program Administrator or designee of Energy Efficiency and Demand Management will be the administrators responsible for updating and maintaining the processes. The procedure shall be reviewed periodically for feasibility.

10.0 Author

The Section Manager and Program Administrator of Energy Efficiency and Demand Management are the authors of this procedure

11.0 Procedural Responsibility

The Program Administrator is responsible for the administration of this procedure.