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Received - 2021-11-02 10:34:49 AM
Control Number - 38578
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CC: Keith Rogas, Public Utility Commission of Texas (PUCT)

SUBJECT: Technical Reference Manual (TRM) winter load management update

DATE: October 28, 2021

To better support winter load management programs, this memo presents additional redlined changes to the Program Year (PY) 2022 Technical Reference Manual (TRM) 9.0 commercial load management (CLM) methodology, which is found in TRM Volume 4 Measurement & Verification (M&V) protocols.

Background

The redlined PY2022 TRM Volumes 1-4 was filed for a two-week Energy Efficiency Implementation Project (EEIP) review period October 18[1]. During this review period, Oncor submitted preliminary plans[2] for a commercial Winter Load Management Pilot as part of their Energy Efficiency Portfolio in response to S.B. 3[3]. The pilot may start as early as December 1, 2021. Oncor is planning to use the TRM commercial load management (CLM) M&V methodology to calculate demands reduction from the Winter Load Management Pilot.

The current CLM measure calculates reductions for a curtailment event based on a baseline of energy use from the highest 5 out of 10 days preceding the curtailment event coupled with a day-of-adjustment. Because winter weather is considerably more variable in day-to-day temperatures than summer weather, the EM&V team recommends an update to the baseline period to days directly preceding and/or following the curtailment event for winter peak. This modification is in keeping with ERCOT's 8-of-10 baseline methodology. From ERCOT's Demand Response Methodologies version 19.0[4]:

> "*The underlying rationale for the Middle 8-of-10 Like Days Model is that the load for a Load site on days of the same day-type that occur close to a demand response event are likely to be similar to "business as usual" load for the event day. In most cases days prior to the event day are used. In some cases, where improved baseline accuracy is achieved, days following the event day, or a combination of days before and after the event day are used."* (p. 16)

In addition, for the winter peak period, we further recommend the TRM is consistent with ERCOT's methodology and use 8-of-10 like days instead of the 5-of-10 used for summer peak. Below we present the CLM measure in the PY2022 TRM filed October 18 for EEIP review. To facilitate review, the additional updates for the winter load management programs are redlined and highlighted in yellow.

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[1] Draft Version - Texas Technical Reference Manual 9.0 filed by PUC Infrastructure, October 18, 2021, Project No. 38578,

[2] EXPEDITED PETITION FOR APPROVAL OF INTERIM LOAD MANAGEMENT PROGRAMS FOR NONRESIDENTIAL CUSTOMERS AND FOR AN ACCOUNTING ORDER, Docket NO. 52689 before the Public Utility Commission, Oncor Electric Delivery

[3] S.B. 3, 87th Leg., R.S. (2021), Section 16, creating Public Utility Regulatory Act (PURA), Tex. Util. Code Ann. § 38.075.

[4] Demand Response Baseline Methodologies version 19, ERCOT, September 2019, Demand Response (ercot.com)

Next steps

The EM&V team believes the proposed modification in the baseline methodology will better accommodate more variable winter weather patterns and recommends the filing of this additional TRM update in Project No. 38578 for EEIP review.

Nonresidential Load Curtailment Measure Overview

TRM Measure ID: NR-LM-LM

Market Sector: Nonresidential

Measure Category: Load management

Applicable Building Types: Any building that meets minimum facility demand requirements

Fuels Affected: Electricity

Decision/Action Type: Operation and maintenance (O&M)

Program Delivery Type: Custom

Deemed Savings Type: Not applicable

Savings Methodology: EM&V

Utilities operate nonresidential load management programs to obtain demand savings. Energy savings are estimated as a function of the estimated demand savings.[5] Demand savings calculations are performed using utility customer interval energy demand data from IDRs or advanced meters. Measured and verified demand savings for the curtailment period is presented here.

Measure Description

This document presents the M&V savings methodology for participation in a load management program that involves the curtailment of an interruptible load during the summer or winter peak periods. Project sponsors, who have agreed to deliver demand savings to the utility from the utility's customer, must commit to an availability of curtailed load throughout the summer or winter peak demand periods. These project sponsors may include national or local energy efficiency service providers (EESPs), retail electricity providers (REPs), or individual customers. Different utilities offer different details on their programs, but they all have similar eligibility criteria, listed below:

[5] Some utilities may determine energy savings associated with load management events, which would be calculated as the difference between the baseline and curtailment kW values times the length of the event(s).

Eligibility Criteria

A project will be eligible for incentives under the load management standard offer program (SOP) if the following criteria are met:

Each meter included in a project must include a total potential demand savings of a specified minimum kW during the peak demand periods outlined in Table 1.

Table 1. Peak Demand Periods

Hours[6]	Months	Exceptions
1:00PM—7:00PM	June, July, August, September	Weekends, federal holidays
6:00AM—10:00AM, 6:00PM—10:00PM	December, January, February	Weekends, federal holidays

A single project may involve identifying curtailable load at more than one customer facility, provided the curtailment demand savings at the facilities are recorded using a single interval data recorder (IDR).

The project sponsor agrees to verify that the curtailable load that is being used in its application will not be used and counted in any other curtailable load or load management program during the duration of the customer contract. The project sponsor will notify the utility company within 15 business days of any change in the status of the curtailable load or its inclusion in another load management program.

Curtailable load must produce demand savings through a curtailment of electrical consumption during the performance period.

Project sponsors must commit to making the curtailable load available during the summer or winter peak period for the program.

Be served by an interval data recorder (IDR) and/or smart meter that is monitored by the utility. A sponsor owned meter may be substituted in the event of a non-systemic utility-owned IDR meter failure. When using a sponsor owned meter, all data must otherwise conform to the High 5 of 10 method and be used for both the baseline and event-day calculations. Documentation of the case must be provided along with all supporting meter data.

Customer agrees to respond to at least one event (scheduled or unscheduled) per year for the purpose of verifying the load reduction is available for potential calls. Scheduled events are used to provide an estimate of the load reduction in the event that no unscheduled interruptions occur during the season.

For sponsors on a curtailment tariff, if the event or baseline periods include a tariff-based curtailment, the event day performance for the load management program will be net

[6] Xcel's period hours are 12 pm to 8 pm. Note that although Xcel starts and ends events outside the 1 pm to 7 pm period, Xcel only claims savings for deliveries during the rule-defined 1-7 pm peak period.

of firm delivery under the tariff. Documentation must be provided to describe the overlap of load management and tariff-based curtailments along with supporting firm delivery contract amounts.

The following loads are excluded from consideration:

A customer who has load contracted with a REP where that contract prevents the load from participating in a curtailment

Loads where curtailment would result in negative environmental or health effects

Curtailable load that receives an incentive through any other energy efficiency program

Curtailable load that takes electric service at transmission voltage and that serves a for-profit end-use customer

A customer that is categorized as a critical load customer (an exception may be if the customer has back-up generation and can still curtail when requested)

Baseline Condition

Standard facility operation.

High-Efficiency Condition

Load management customers are required to participate in a number of unscheduled interruptions. Programs will provide a minimum of 30 minutes advanced notice, allowing facility managers time to use non-automated approaches. Another option is for facilities to install a load-control device on specific end-uses, equipment, or circuit loads.

Additional Utility Program Details

Each utility in Texas provides slightly different guidelines for its load management program. These details differ in the length of the unscheduled interruptions (also called curtailments), the maximum number or maximum number of hours of unscheduled interruptions, and the length of notification provided to the project sponsor.

Each utility states that participants will be willing to participate in a maximum number of unscheduled interruptions, or a maximum number of scheduled (test) interruption hours. In addition to these, all utilities require that a scheduled interruption be performed. The purpose of this is to ensure that the project sponsor will be able to curtail the requested kW within the required notification time and to provide an estimate of the load reduction in the event that no unscheduled interruptions occur during the season. Additionally, some of the utilities offer different baseline methods or options for their customers to choose from.[7]

Energy and Demand Savings Methodology

Not applicable.

[7] More details about the utility programs can be found in the program manuals (see Relevant Standards and Reference Sources).

Savings Algorithms and Input Variables

Utilities operate load management programs to obtain demand savings: to the extent energy savings are also estimated, they are estimated as a function of the estimated demand savings.[8] Demand savings calculations are performed using utility customer interval energy usage data from IDRs or advanced meters. The verified demand savings for the curtailment period uses the following algorithm:

$$Verified\ Demand\ Savings = Baseline\ Period\ kW - Curtailment\ kW$$

Equation 1

Where:

$Baseline\ Period\ kW$ = *Baseline average demand calculated according to the High 5 of 10 for summer or High 8 of 10 for winter baseline method, detailed below*

$Curtailment\ kW$ = *Average demand measured during the curtailment period*

High 5 of 10 baseline (High x of y method) with day-of adjustment:

For summer peak periods, a High X of Y baseline considers the Y most recent days preceding an event and uses the data from the X days with the highest load within those Y days to calculate the baseline. For winter peak periods, to accommodate the greater variability in winter weather patterns, a High X of Y baseline considers the Y most recent days directly preceding and/or succeeding an event and uses the data from the X days with the highest load within those Y days to calculate the baseline. Day-of adjustments are used to scale the baseline load estimate to the load conditions on the day of the event using data from the hours prior to the time on the event day when participants were notified of the pending call for curtailment.

Applying this concept to the load management measure, the high 5 of 10 baseline (summer) or 8 of 10 baseline (winter) for a given curtailment event is estimated by first identifying the 10 non-holiday weekdays immediately preceding or preceding/succeeding the event depending on summer or winter peak as described above in which no prior program curtailment events were called, and calculating each participant's average demand during the same hours as the hours for which the curtailment event was implemented on each of those 10 days. The five highest of these ten average demand values are then averaged to estimate the "unadjusted high five for summer or 8 for winter baseline".

The day-of baseline adjustment is estimated by comparing participants' average demand for electricity on the day of the event during the two hours prior to notification of the pending event (the "adjustment period") to participants' average demand for electricity on the "high five" days during those same two hours. The difference (positive or negative) between day-of demand and high five demand in the adjustment period is the "uncapped additive adjustment". In the situation where notification may not be given, the two hours preceding one hour before the event begins on the event day and baseline days will be used as the adjustment period. The average load of

[8] Some utilities do determine energy savings, which would be calculated as the difference between the baseline and curtailment kW values times the length of the event(s).

the adjustment period on the event day are compared to the average load of the adjustment periods from the baseline days. The difference (positive or negative) between day-of demand and high three baseline day demand in the adjustment period is the uncapped additive adjustment. To apply the adjustment period to the unadjusted baseline, one of two options are selected in the following steps:

Step 1. Calculate an uncapped additive adjustment. The uncapped additive adjustment is the difference of the adjustment period hours' load of the event day subtracted from the baseline days' average adjustment period load. For example, if the baseline days have an adjustment period average load of 530.20 kW and the event day has an adjustment period load of 575.80 kW, the uncapped additive adjustment is 575.80 kW (-) 530.20 kW = 45.60 kW.

Step 2. Calculate an adjustment cap. The adjustment cap is 50 percent of the baseline days' average load during the event hours. For example, if a participant has a load of 504.00 kW during the baseline days' event hours, the adjustment cap is 504.00 kW (x) 0.50 = 252.00 kW.

Step 3. Select the lowest of the adjustment cap and the absolute value of the uncapped additive adjustment to be the additive adjustment. Using the examples of the preceding two steps, the uncapped additive adjustment (45.60 kW) has the lowest magnitude between the two numbers and is selected as the additive adjustment.

Step 4. Add the additive adjustment to the unadjusted High 5 of 10 baseline or High 8 of 10 to calculate the final baseline used for calculating savings.

An example, below, illustrates the entirety of applying the High 5 of 10 summer method to calculate load management savings for a single participant.

Example Calculation

Table 2 serves to illustrate the steps of the High 5 of 10 summer baseline calculation method. Specific participant's results may vary. Numbers from the table in bold font represent data selected for the calculation.

Table 2. High 5 of 10 Example Load Management Event Data

Event day and potential baseline days	Load mgmt. event date	Potential baseline day 1	Potential baseline day 2	Potential baseline day 3	Potential baseline day 4	Potential baseline day 5
Event Hours	1500-1600	1500-1600	1500-1600	1500-1600	1500-1600	1500-1600
Average kW During Event Hours	1078.89	990.57	919.45	926.36	892.42	880.13
Notification Hour	1400					
Adjustment Period Hours	1200-1400	1200-1400	1200-1400	1200-1400	1200-1400	1200-1400
Adjustment Period Average kW	959.39	752.26	672.08	637.98	695.12	698.88

Event day and potential baseline days	Potential Baseline day 6	Potential Baseline day 7	Potential Baseline day 8	Potential Baseline day 9	Potential baseline day 10

Event day and potential baseline days	Load mgmt. event date	Potential baseline day 1	Potential baseline day 2	Potential baseline day 3	Potential baseline day 4	Potential baseline day 5
Event Hours	1500-1600	1500-1600	1500-1600	1500-1600	1500-1600	
Average kW During Event Hours	950.63	842.19	1008.69	795.80	1049.24	
Notification Hour						
Adjustment Period Hours	1200-1400	1200-1400	1200-1400	1200-1400	1200-1400	
Adjustment Period Average kW	657.64	539.75	801.02	647.12	850.18	

Calculation Steps:

Step 1. Unadjusted High Five Baseline = Average kW during event times in five highest days of ten prior in summer prior to event day (kW)

Unadjusted High Five Baseline = (990.57+926.36+950.63+1008.69+1049.24)/5 = 985.10 kW

Step 2. Uncapped Additive Adjustment = Average kW during adjustment time on event day (kW)—Average kW during adjustment time in the same five highest days of ten prior to event day

Uncapped Additive Adjustment = 959.39—(752.26+637.98+657.64+801.02+850.18)/5 = 219.57 kW

Step 3. Adjustment Cap = 50% of Unadjusted High Five Baseline (kW)

Adjustment Cap = 0.5 * 985.10 = 492.55 kW

Step 4. Choose Additive Adjustment = Minimum {Absolute value of Uncapped Additive Adjustment, Adjustment Cap} (kW)

Additive Adjustment = Minimum {219.57, 492.55} = 219.57 kW

Step 5. Final Baseline = Additive Adjustment + Unadjusted High Five Baseline (kW)

Final Baseline = 219.57 + 985.10 = 1204.67 kW

Step 6. kW Savings = Final Baseline—Curtailment kW (kW)

kW Savings = 1204.67—1078.89 = 125.78 kW

Additional Calculation Considerations

In the case that individual meters fail to record data sufficient for applying the High 5 or 8 of 10 calculation method, savings will not be calculated.

When selecting baseline days in the High 5 or 8 of 10 method, it is possible that some days have the same load for an individual participant, potentially leading to more than five or eight days that could be selected for the baseline days. If more days could be selected as baseline days based on their loads during event hours, the days with the highest loads and closest to the event should be picked for the baseline.

Program year kW load management event savings will be calculated as the sum of each sponsor's average savings of all events in which the sponsor participated.

Rounding

Data rounding to the nearest whole number should only occur at the customer and program levels for commercial load management programs. Without this standard practice, utilities should document when rounding is occurring in their calculations (e.g., no rounding or rounding at the event level) and inform the EM&V team (see Volume 5, Section 3.1 for more details). Utilities should round commercial load management impacts consistent with how incentives are awarded, which is at the customer-sponsor level for each event.

Meters

Utilities are responsible for calling a test event each program year for the load management programs. If a program has both a winter and summer peak component, a test event needs to be called in each applicable peak period. The test event has several purposes, including assuring the proper functioning of program meters. Utilities are responsible for maintaining working program meters.

Without complete interval meter data to calculate the baseline and event impacts, savings may not be claimed. However, if a customer has alternate interval meter data available, this can be used in lieu of program meter data to calculate claimed savings. Using customer meters for load management program savings requires that the data meet interval metering requirements presented in the version of the current TRM. In general, it is recommended that customer owned interval meters should only be used if utility interval meters fail. Data from each meter should not be combined for claiming savings for a specific event and must be able to cover both the event day data and baseline data.

Utilities should notify the EM&V team in these circumstances. All calculations and data stemming from the use of customer meters should be provided as part of the EM&V data request similar to when program meter data is used. If requested by the utility, the EM&V team is available to review the use of customer meter data in advance of a program claiming savings from customer meters.

Measure Life and Lifetime Savings

The estimated useful life (EUL) is one year.

Program Tracking Data and Evaluation Requirements

IDR or Advanced Meter data associated with the project will be provided by the project sponsor or retrieved by the utility following an event. Depending on the utility, the data will be provided at 30-minute increments (or smaller) to evaluate both baseline demand usage and demand usage during curtailment.

Documentation describing the time stamp and whether the time stamp reflects the forward-looking period or period preceding the time stamp

Utilities should provide a description of their practices related to whether scheduled or test events are or are not included in their program year kW savings results. kWh savings will be calculated from all events.

A list of all load management events affecting nonresidential participants within the program year, describing the date of each event, the time the event started, and the time the event ended.

A list of all participants and addresses with a variable linking to the load or energy consumption interval data and that describes their enrollment date, load management control commissioning date, and any events in which the participant did not participate due to enrollment or equipment installation timing, equipment failures, or other factors known to the implementer or utility.

Tools, calculators or other datasets that may be useful to the EM&V team, based on discussion between the EM&V team, utilities, and/or program implementer. The process for calculating kW and kWh savings should be provided in the program documentation, including any summation and rounding practices.

References and Efficiency Standards

Petitions and Rulings

Not applicable.

Relevant Standards and Reference Sources

AEP SWEPCO: Manual not available online.

AEP Texas: Load Management Standard Offer Program Manual can be found under Load Management at https://aeptexasefficiency.com/#/commercial

CenterPoint: Commercial Load Management Program Manual can be found under Commercial Load Management at https://www.centerpointenergy.com/en-us/business/services/commercial-industrial/efficiency-programs?sa=ho

El Paso Electric: Load Management Program Manual can be found at https://www.epelectric.com/business/save-money-and-energy/texas-load-management-program

Entergy: Load Management Manual can be found at https://www.entergy-texas.com/your_business/save_money/ee/load-management/

Oncor: Commercial Load Management Program Manual can be found under Commercial Load Management at https://eepm.oncor.com/Commercial.aspx

TNMP: Load Management Program Manual can be found under Resources at https://www.tnmpefficiency.com/commercial.php#load-management

Xcel Energy: Load Management Program Manual can be found at http://www.xcelenergyefficiency.com/TX/Business/LM/

Document Revision History

Table 3. M&V Nonresidential Load Management History

TRM version	Date	Description of change
v3.0	4/10/2015	The baseline calculation methodology was modified to be the highest 5 of 10 prior days for all the programs. In addition, a new day-of adjustment factor was added with an adjustment cap.
v3.1	11/05/2015	TRM v3.1 Volume 4 origin.
v4.0	10/10/2016	Clarified language related to applying the adjustment factor to the High 5 of 10 Baseline and additional data provision details.
v5.0	10/10/2017	Updated equation, figure, and table references.
v6.0	10/2018	No revisions.
v7.0	10/2019	Transferred metering and rounding guidance from Vol 5.
v8.0	10/2020	Added guidance on rounding.
v9.0	10/2021	Added eligibility exclusion for critical load customers and removed tables detailing the utility programs. Updated links to program manuals. Updated for winter peak