~~2.7.12~~2.7.13 Hand Dryers Measure Overview

TRM Measure ID: NR-MS-HD

Market Sector: Commercial

Measure Category: Miscellaneous

Applicable Building Types: Retail, commercial, and industrial settings

Fuels Affected: Electricity

Decision/Action Type: Retrofit

Program Delivery Type: Prescriptive

Deemed Savings Type: Deemed savings calculation

Savings Methodology: Engineering algorithms and estimates

Measure Description

This document presents the methodology for calculating the savings realized from installing efficient hand dryers, which save energy by drying with air movement using motion sensors, thus reducing hand-drying time.

Eligibility Criteria

To qualify for this measure, existing hand dryer equipment must currently utilize more than 5 watt-hour (Wh) or more per use and replacement hand dryers must consume no more than 5 Wh per use. This measure is applicable in retail, commercial and industrial settings.

Baseline Condition

The baseline efficiency case is a hand dryer which utilizes more than 5 Wh or more per use. These hand dryers are often push-button activated.

High-Efficiency Condition

Eligible high-efficiency equipment is a hand dryer equipped with motion sensors that uses 5 Wh or less per use.

Energy and Demand Savings Methodology

Savings Algorithms and Input Variables

The energy savings from the installation of efficient hand dryers are a result of savings due to decrease in power and or runtime of the efficient hand dryers over the pre-retrofit equipment. The energy and demand savings are calculated using the following equations:

$$Energy\ Savings\ [\Delta kWh] = \frac{UPD \times DPY \times \Delta Wh}{1{,}000} \times IEF_E$$

Equation 267

$$\Delta Wh = Wh_{Baseline} - Wh_{Efficient}$$

Equation 268

Where:

UPD = *Number of uses per day (see Table 274)*

DPY = *Number of days the facility operates per year (if unknown, see Table 274)*

IEF_E = *Interactive effects factor for energy (see Table* 293)

Table 293. Hand Dryers—Deemed Energy and Demand Interactive Factors[602]

Space conditioning type	IEF_E	IEF_D
Refrigerated air	1.05	1.10
Evaporative cooling	1.02	1.04
None (unconditioned/uncooled)	1.00	1.00

$Wh_{Baseline}$ = *Baseline energy consumption in watt-hours, 20.65*[603]

$Wh_{Efficient}$ = *Efficient energy consumption in watt-hours, 3.94*[604]

$$Peak\ Demand\ Savings\ [\Delta kW] = \frac{\Delta kWh}{AOH} \times CF \times IEF_D$$

Equation 269

[602] Texas Technical Reference Manual, Volume 2, Section 2.1, Table 11, Nonresidential Lighting.
[603] Baseline and efficient Wh per use are averages of the energy consumption of 48 surveyed individual hand dryer units by CLEAResult in Arkansas which consume either greater than 5 Wh or less than 5 Wh per use, respectively. The difference between these equals the assumed Wh savings per use.
[604] Ibid.

Where:

AOH = *Annual operating hours (see Table 294)*

CF = *Peak coincidence factor (see Table 294)*

IEF_D = *Interactive effects factor for demand (see Table 293)*

Table 294. Hand Dryers—Savings Calculation Input Assumptions

Usage level	Building type	Coincidence factor[605]					AOH[606]	UPD[607]	DPY[608]
		CZ 1	CZ 2	CZ 3	CZ 4	CZ 5			
Low	Office	0.87	0.88	0.86	0.90	0.90	36	50	250
	Warehouse	0.79	0.81	0.79	0.80	0.85			
Medium/moderate	Grocery (small)	0.90	0.90	0.90	0.90	0.90	235	225	365
	Restaurant	0.90	0.90	0.90	0.90	0.90			
	Retail	0.90	0.90	0.90	0.90	0.90			
High	Conference center	0.65	0.65	0.65	0.65	0.65	339	500	237
	School[609]	0.39	0.39	0.90	0.87	0.40			
	Stadium	0.65	0.65	0.65	0.65	0.65			
	Theater	0.65	0.65	0.65	0.65	0.65			
	University	0.90	0.90	0.90	0.90	0.90			
High (grocery)	Grocery/retail (large)	0.90	0.90	0.90	0.90	0.90		500	365
Heavy duty/extreme	Airport	0.90	0.90	0.90	0.90	0.90	2,614	2,500	365
	Transportation center	0.90	0.90	0.90	0.90	0.90			

[605] Coincidence factors from the Texas TRM Volume 3, Section 2.1, Table 8, Nonresidential Lighting. It is assumed that building occupancy with respect to lighting is an appropriate proxy for occupants' utilization of hand dryers.

[606] The assumed annual operating hours per building type are calculated as a simple average of 16 surveyed efficient hand dryers' cycle times multiplied by the assumed uses per day and days per year per usage level (as indicated in Table 294), then converted to hours by dividing this product by 3,600.

[607] Industry Standard. Medium/Moderate Uses per day is supported by both Excel Dryer Data (Cost Savings with Hand Dryers vs Average Cost of Paper Towels https://www.exceldryer.com/calculator-dial/) and World Dryer Data (http://staging.worlddryer.com/savings-calculator)

[608] Technology Data Characterizing Water Heating in Commercial Buildings: Application to End-Use Forecasting, Osman Sezgen and Jonathan G. Koomey, Lawrence Berkeley National Laboratory, December 1995. Table 2. https://eta-publications.lbl.gov/sites/default/files/lbnl-37398e.pdf.

[609] Assuming K–12 without summer session

Deemed Energy and Demand Savings Tables

The deemed energy and demand savings for hand dryers with unknown number of operating days per year, base/efficient cycles times, and base/efficient unit wattages are as follows:

Table 295. Hand Dryers—Energy Savings

Usage level	Building type	Deemed energy savings
Low	Office	223
	Warehouse	223
Medium/moderate	Grocery (small)	1,468
	Restaurant	1,468
	Retail	1,468
High	Conference center	2,118
	School[610]	2,118
	Stadium	2,118
	Theater	2,118
	University	2,118
High (grocery)	Grocery/retail (large)	3,262
Heavy duty/extreme	Airport	16,312
	Transportation center	16,312

[610] Assuming K–12 without summer session.

Table 296. Hand Dryers—Peak Demand Savings

Usage level	Building type	Deemed demand savings				
		CZ 1	CZ 2	CZ 3	CZ 4	CZ 5
Low	Office	5.43	5.49	5.37	5.62	5.62
	Warehouse	4.93	5.05	4.93	4.99	5.30
Medium/moderate	Grocery (small)	5.62	5.62	5.62	5.62	5.62
	Restaurant	5.62	5.62	5.62	5.62	5.62
	Retail	5.62	5.62	5.62	5.62	5.62
High	Conference center	4.06	4.06	4.06	4.06	4.06
	School[611]	2.43	2.43	5.62	5.43	2.50
	Stadium	4.06	4.06	4.06	4.06	4.06
	Theater	4.06	4.06	4.06	4.06	4.06
	University	5.62	5.62	5.62	5.62	5.62
High (grocery)	Grocery/retail (large)	8.65	8.65	8.65	8.65	8.65
Heavy duty/extreme	Airport	5.62	5.62	5.62	5.62	5.62
	Transportation center	5.62	5.62	5.62	5.62	5.62

Claimed Peak Demand Savings

Refer to Volume 1, Section 4 for further details on peak demand savings and methodology.

Measure Life and Lifetime Savings

The estimated useful life (EUL) is 10 years[612] for efficient hand dryers.

Program Tracking Data and Evaluation Requirements

The below list of primary inputs and contextual data should be specified and tracked within the program database to inform the evaluation and apply the savings properly:

- Climate zone
- Building type
- Cooling type

[611] Assuming K–12 without summer session.

[612] Based on studies conducted by two separate parties; Comparative Environmental Life Cycle Assessment of Hand Drying Systems by Quantis (pg. 2) and Guidelines to Reduce/Eliminate Paper Towel Use by Installing Electric Hand Dryers by Partners in Pollution Prevention P3 (pg. 17).

- Hand dryer quantity
- Hand dryer make and model

References and Efficiency Standards

Petitions and Rulings

Not applicable.

Relevant Standards and Reference Sources

Please refer to measure citations for relevant standards and reference sources.

Document Revision History

Table 297. Hand Dryers—Revision History

TRM version	Date	Description of change
v10.0	10/2022	TRM v10.0 origin
v11.0	10/2023	TRM v11.0 update. No revision.

2.7.14 Laser Projectors Measure Overview

TRM Measure ID: NR-LT-LP

Market Sector: Commercial

Measure Category: Miscellaneous

Applicable Building Types: Motion picture theaters

Fuels Affected: Electricity

Decision/Action Types: Retrofit

Program Delivery Type: Prescriptive

Deemed Savings Type: Deemed savings calculation

Savings Methodology: Engineering algorithms and estimates

Measure Description

This measure is for the replacement of a lamp-based projector with a laser projector. The conversion from a traditional lamp-based projector system to a laser projector benefits from reduced energy consumption via electricity savings and HVAC savings. With advancements in solid-state technology, laser projectors typically require half the electricity to obtain the equivalent light and resolution output as lamp-based projectors. Due to this reduced electricity consumption, laser projectors also benefit from HVAC savings, with significantly less energy wasted as heat. Another benefit of laser projectors is that they do not require the use of lamps, which can be costly from an equipment and operations standpoint.

Despite the various ways laser projectors result in energy savings, this measure solely focuses on the electricity savings for operating the projector. Due to interactive effects unique to each site, this measure will not consider the corresponding HVAC savings, so annual savings estimates are conservative.

Eligibility Criteria

This measure applies to the replacement of any motion picture theater lamp-based projector. At this time, this measure is limited to retrofit applications where the baseline lamp wattage is specified to match site conditions. Eligibility may be extended to new construction applications once sufficient program implementation data can be collected to establish an appropriate baseline.

Baseline Condition

There is no federal standard applicable to lamp-based projectors. The baseline condition is any commercial cinema lamp-based projector that is replaced by a laser projector. The measure does not consider home, office, venue or any projector replacements that are outside of a professional cinema setting.

High-Efficiency Condition

The high-efficiency condition is a professional commercial cinema laser projector with an equivalent (or no greater than 110%) lumen output of the baseline projector being replaced.

Energy and Demand Savings Methodology

Savings Algorithms and Input Variables

This section describes the deemed savings methodology for both energy and demand savings for laser projectors.

Energy Savings Algorithms

Energy savings for this measure are determined to be the difference in maximum operating input rate for the baseline and efficient projector multiplied by the total yearly operating hours for the facility.

$$Energy\ Savings\ [kWh] = \left(kW_{pre} - kW_{installed}\right) \times Hours$$

Equation 270

$$Summer\ Peak\ Demand\ Savings\ [kW_S] = \left(kW_{pre} - kW_{installed}\right) \times CF_S$$

Equation 271

$$Winter\ Peak\ Demand\ Savings\ [kW_W] = \left(kW_{pre} - kW_{installed}\right) \times CF_W$$

Equation 272

Where:

kW_{pre}	=	*Total kW of existing lamp-based projector*
$kW_{installed}$	=	*Total kW of efficient laser projector*
Hours	=	*Annual operating hours = 3,653 hours[613] (use actual hours if known)*
CF_S	=	*Summer peak coincidence factor = 0.65 (all climate zones)[614]*
CF_W	=	*Winter peak coincidence factor = 0 (all climate zones)[615]*

[613] "HVAC considerations for lamp and laser projectors in cinema," Barco. July 26, 2021. The reference uses 11.5 hours per day (or 4,200 hours) as an example. This measure assumes 10 hr/day as a conservative assumption, but allows for the use of custom hours based on site conditions. Default hours are calculated as 10 hr/day x 365.25 day/year = 3,653 hours.

[614] Refer to Lamps and Fixtures measure for the public assembly building type, which is applicable to motion picture theaters.

[615] Ibid.

Claimed Peak Demand Savings

Refer to Volume 1, Section 4 for further details on peak demand savings and methodology.

Measure Life and Lifetime Savings

The estimated useful life (EUL) is 10 years for cinema laser projectors.[616,617,618]

Program Tracking Data and Evaluation Requirements

The program database should specify and track the list of primary inputs and contextual data provided below. This will inform the evaluation process and ensure proper application of the savings.

- Building type
- Baseline lamp-based projector manufacturer and model number
- Baseline projector lamp wattage
- Baseline lamp-based projector nameplate photo
- New laser projector manufacturer and model number
- New laser projector wattage
- New projector nameplate photo
- Proof of purchase: invoice showing model number and quantity purchased

Document Revision History

Table 298. Laser Projectors—Revision History

TRM version	Date	Description of change
v11.0	10/2023	TRM v11.0 origin

[616] Average rated life of 18 Barco and Christie cinema laser projectors = 41,667 hours. Dividing by annual operating hours yields EUL.

[617] Barco cinema projector product listing. https://www.barco.com/en/products/projection/overview?facets=barco-dxp%3Aproduct%2Fproduct-category%2Fprojection%2Fcinema-projectors.

[618] Christie cinema projector product listing. https://www.christiedigital.com/products/cinema/projection/.

APPENDIX A: MEASURE LIFE CALCULATIONS FOR DUAL BASELINE MEASURES

The following appendix describes the method to calculate savings for any dual baseline measure, including all early retirement measures. This supersedes the previous Measure Life Savings found in PUCT Dockets 40083 and 40885 and is revised to clarify the understanding of the measure life calculations and reduce any misrepresentation of net present value (NPV) of early retirement projects.

Option 1 provides reduced savings claimed over the full EUL. Option 2 provides higher savings claimed over a reduced EUL. The lifetime savings are the same for both options 1 and 2. Option 1 calculations were originally provided in Docket [43681].

Option 1—Weighting Savings and Holding Measure Life Constant

Step 1: Determine the measure life for first-tier (FT) and second-tier (ST) components of the calculated savings:

$$First\ Tier\ (FT)\ Period = ML_{FT} = RUL$$

Equation 273

$$Second\ Tier\ (ST)\ Period = \ ML_{ST} = EUL - RUL$$

Equation 274

Where:

RUL = *The useful life corresponding with the first tier-savings; for early retirement projects, RUL is the remaining useful life determined from lookup tables based on the age of the replaced unit (or default age when actual age is unknown)*

EUL = *The useful life corresponding with the second-tier savings; for early retirement projects, EUL is the estimated useful life as specified in applicable measure from Texas TRM (or approved petition)*

Step 2: Calculate the FT demand and energy savings and the ST demand and energy savings:

$$\Delta kW_{FT} = kW_{retired} - kW_{installed}$$

Equation 275

$$\Delta kW_{ST} = kW_{baseline} - kW_{installed}$$

Equation 276

$$\Delta kWh_{FT} = kWh_{retired} - kWh_{installed}$$

Equation 277

$$\Delta kWh_{ST} = kWh_{baseline} - kWh_{installed}$$

Equation 278

Where:

ΔkW_{FT}	=	*First-tier demand savings*
ΔkW_{ST}	=	*Second-tier demand savings*
$kW_{retired}$	=	*Demand of the first-tier baseline system, usually the retired system*[619]
$kW_{baseline}$	=	*Demand of the second-tier baseline system, usually the baseline ROB system*[620]
$kW_{installed}$	=	*Demand of the replacement system*[621]
ΔkWh_{FT}	=	*First-tier energy savings*
ΔkWh_{ST}	=	*Second-tier energy savings*
$kWh_{retired}$	=	*Energy usage of the first-tier baseline system, usually the retired system*[619]
$kWh_{baseline}$	=	*Energy usage of the second-tier baseline system, usually the baseline ROB system*[620]
$kWh_{installed}$	=	*Energy usage of the replacement system*[621]

Step 3: Calculate the avoided capacity and energy cost contributions of the total NPV for both the ER and ROB components:

$$NPV_{FT,kW} = AC_{kW} \times \frac{1+e}{d-e} \times \left\{1 - \left[\frac{1+e}{1+d}\right]^{ML_{FT}}\right\} \times \Delta kW_{FT}$$

Equation 279

$$NPV_{ST,kW} = AC_{kW} \times \frac{1+e}{d-e} \times \left\{1 - \left[\frac{1+e}{1+d}\right]^{ML_{ST}}\right\} \times \frac{(1+e)^{ML_{FT}}}{(1+d)^{ML_{FT}}} \times \Delta kW_{ST}$$

Equation 280

$$NPV_{FT,kWh} = AC_{kWh} \times \frac{1+e}{d-e} \times \left\{1 - \left[\frac{1+e}{1+d}\right]^{ML_{FT}}\right\} \times \Delta kWh_{FT}$$

Equation 281

[619] Retired system refers to the existing equipment that was in use before the retrofit has occurred.
[620] Baseline used for a replace-on-burnout project of the same type and capacity as the system being installed in the Early Retirement project (as specified in the applicable measure).
[621] Replacement system refers to the installed equipment that is in place after the retrofit has occurred.

$$NPV_{ST,kWh} = AC_{kWh} \times \frac{1+e}{d-e} \times \left\{1 - \left[\frac{1+e}{1+d}\right]^{ML_{ST}}\right\} \times \frac{(1+e)^{ML_{FT}}}{(1+d)^{ML_{FT}}} \times \Delta kWh_{ST}$$

Equation 282

Where:

$NPV_{FT, kW}$	=	*Net Present Value (kW) of first-tier projects*
$NPV_{ST, kW}$	=	*Net Present Value (kW) of second-tier projects*
$NPV_{FT, kWh}$	=	*Net Present Value (kWh) of first-tier projects*
$NPV_{ST, kWh}$	=	*Net present value (kWh) of second-tier projects*
e	=	*Escalation rate* [622]
d	=	*Discount rate weighted average cost of capital (per utility)* [622]
AC_{kW}	=	*Avoided cost per kW ($/kW)* [622]
AC_{kWh}	=	*Avoided cost per kWh ($/kWh)* [622]
ML_{FT}	=	*First-tier measure life (calculated in Equation 273)*
ML_{ST}	=	*Second-tier measure life (calculated in Equation 274)*

Step 4: Calculate the total capacity and energy cost contributions to the total NPV:

$$NPV_{Total,kW} = NPV_{FT,kW} + NPV_{ST,kW}$$

Equation 283

$$NPV_{Total,kWh} = NPV_{FT,kWh} + NPV_{ST,kWh}$$

Equation 284

Where:

$NPV_{Total, kW}$	=	*Total capacity contributions to NPV of both first-tier and second-tier component*
$NPV_{Total, kWh}$	=	*Total energy contributions to NPV of both first-tier and second-tier component*

[622] The exact values to be used each year for the escalation rate, discount rate, and avoided costs are established by the PUC in Substantive Rule §25.181 and updated annually, as applicable. Please note that the discount rates are based on a utility's weighted average cost of capital and, as such, will vary by utility and may change each year.

Step 5: Calculate the capacity and energy cost contributions to the NPV without weighting by demand and energy savings for a scenario using the original EUL:

$$NPV_{EUL,kW} = AC_{kW} \times \frac{1+e}{d-e} \times \left\{1 - \left[\frac{1+e}{1+d}\right]^{EUL}\right\}$$

Equation 285

$$NPV_{EUL,kWh} = AC_{kWh} \times \frac{1+e}{d-e} \times \left\{1 - \left[\frac{1+e}{1+d}\right]^{EUL}\right\}$$

Equation 286

Where:

$NPV_{EUL,\ kW}$ = *Capacity contributions to NPV without weighting, using original EUL*

$NPV_{EUL,\ kWh}$ = *Energy contributions to NPV without weighting, using original EUL*

Step 6: Calculate the weighted demand and energy savings by dividing the combined capacity and energy cost contributions from the ER and ROB scenarios by the non-savings weighted capacity and energy cost contributions from the single EUL scenario. These weighted savings are claimed over the original measure EUL:

$$Weighted\ kW = \frac{NPV_{Total\ kW}}{NPV_{EUL,kW}}$$
$$= \frac{\left[\left(1 - \left(\frac{1+e}{1+d}\right)^{RUL}\right) \times (kW_{retired} - kW_{installed})\right] + \left[\left(1 - \left(\frac{1+e}{1+d}\right)^{EUL-RUL}\right) \times \frac{(1+e)^{RUL}}{(1+d)^{RUL}} \times (kW_{baseline} - kW_{installed})\right]}{\left(1 - \left(\frac{1+e}{1+d}\right)^{EUL}\right)}$$

Equation 287

$$Weighted\ kWh = \frac{NPV_{Total.kWh}}{NPV_{EUL,kWh}}$$
$$= \frac{\left[\left(1 - \left(\frac{1+e}{1+d}\right)^{RUL}\right) \times (kWh_{retired} - kWh_{installed})\right] + \left[\left(1 - \left(\frac{1+e}{1+d}\right)^{EUL-RUL}\right) \times \frac{(1+e)^{RUL}}{(1+d)^{RUL}} \times (kWh_{baseline} - kWh_{installed})\right]}{\left(1 - \left(\frac{1+e}{1+d}\right)^{EUL}\right)}$$

Equation 288

Where:

Weighted kW = *Weighted lifetime demand savings*

Weighted kWh = *Weighted lifetime energy savings*

$NPV_{Total,\ kW}$ = *Total capacity contributions to NPV of both ER and ROB component, calculated in Equation 283*

$NPV_{Total, kWh}$	=	*Total energy contributions to NPV of both ER and ROB component, calculated in Equation 284*
$NPV_{EUL, kW}$	=	*Capacity contributions to NPV without weighting, using original EUL, calculated in Equation 285*
$NPV_{EUL, kWh}$	=	*Energy contributions to NPV without weighting, using original EUL, calculated in Equation 286*

Option 2—Weighting Measure Life and Holding First Year Savings Constant

Repeat Step 1 through Step 4 from Option 1.

Step 5: Reverse calculate the EUL for the capacity and energy contributions to the NPV for a scenario using the first-tier savings:

$$EUL_{kW} = \ln\left[\frac{NPV_{Total,kW} \times (d-e)}{\Delta kW_{FT} \times AC_{kW} \times (1+e)}\right] \Big/ \ln\left[\frac{(1+e)}{(1+d)}\right]$$

Equation 289

$$EUL_{kWh} = \ln\left[\frac{NPV_{Total,kWh} \times (d-e)}{\Delta kWh_{FT} \times AC_{kWh} \times (1+e)}\right] \Big/ \ln\left[\frac{(1+e)}{(1+d)}\right]$$

Equation 290

Where:

EUL_{kW}	=	*EUL for capacity contribution to NPV using first-tier savings*
EUL_{kWh}	=	*EUL for energy contribution to NPV using first-tier savings*

Step 6: Confirm that capacity EUL and energy EUL are equivalent. First-tier savings are claimed over this weighted EUL.

The following files are not convertible:

PY2024 TRM 11.0 Vol 4 MV_22SEP2023 V01.pdf

Please see the ZIP file for this Filing on the PUC Interchange in order to access these files.

Contact centralrecords@puc.texas.gov if you have any questions.

Public Utility Commission of Texas

Texas Technical Reference Manual

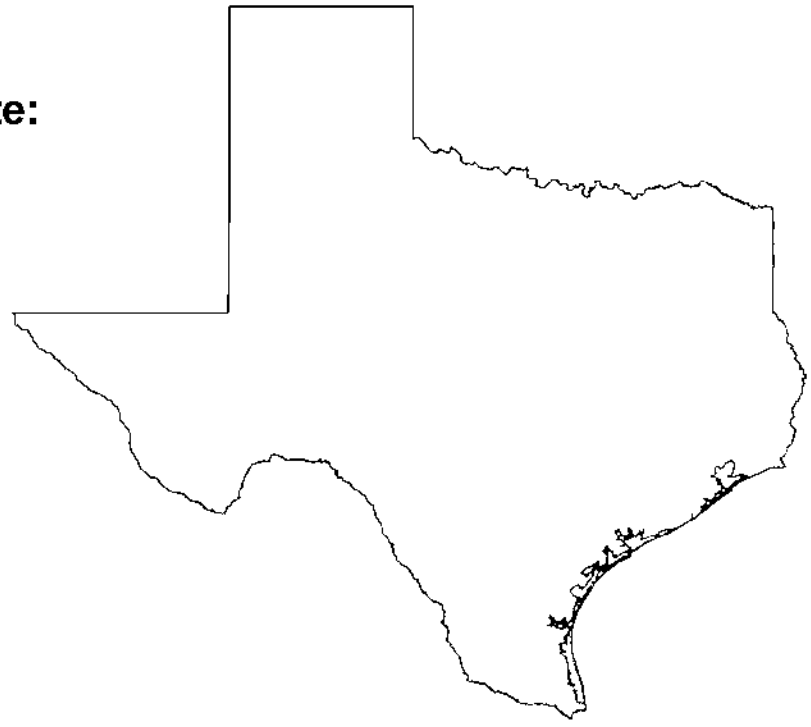
Version 11.0

Volume 5: Implementation Guidance

Program Year 2024

Last Revision Date:

September 2023



Public Utility Commission of Texas

Texas Technical Reference Manual

Version 11.0

Volume 5: Implementation Guidance

Program Year 2024

Last Revision Date:

September 2023

Table of Contents

1. Introduction 2

2. Commercial 3

2.1 Project Documentation 3

2.1.1 Background 3

2.1.2 Additional Documentation Guidance 3

2.2 Incentives and Claimed Savings 7

2.2.1 Background 7

2.2.2 Considerations 7

2.2.3 Recommendations 8

2.3 New Construction 10

2.3.1 Overview 10

2.3.2 Recommendation 10

3. Low-Income 12

3.1 Low-Income Income-Eligible Verification Forms 12

3.1.1 Background 12

3.1.2 Quality Assurance/Quality Control (QA/QC) 13

3.1.3 New Program Strategies 14

3.2 Audit Lists for Low-Income Programs 15

4. Cross-Sector 17

4.1 Load Management Programs 17

4.1.1 Rounding 17

4.1.2 Winter Load Management Implementation 18

4.2 Commercial and Residential HVAC Split-Systems Without AHRI Certification 20

4.2.1 Background 20

4.2.2 Guidance 20

4.3 Data Model 29

APPENDIX A: Low-Income Income-Eligible Verification Forms A-1

List of Tables

Table 1. Project File Organization Example 4
Table 2. Project Verification Applications and Examples 5
Table 3. PY2021 Commercial Statewide NTG Ratios by Program Type 8
Table 4. Specification of an Example Split System 21
Table 5. Example DOE CCMS Filter to Similar Equipment 21
Table 6. Average Performance Metrics of Similar Certified Units 23
Table 7. TRM Calculation Performance Metrics Determination 24

List of Figures

Table 1. Project File Organization Example 4
Table 2. Project Verification Applications and Examples 5
Table 3. PY2021 Commercial Statewide NTG Ratios by Program Type 8
Table 4. Specification of an Example Split System 21
Table 5. Example DOE CCMS Filter to Similar Equipment 21
Table 6. Average Performance Metrics of Similar Certified Units 23
Table 7. TRM Calculation Performance Metrics Determination 24

Acknowledgments

The Texas Technical Reference Manual (TRM) is maintained by the Public Utility Commission of Texas' (PUCT) independent evaluation, monitoring, and verification (EM&V) contractor, Tetra Tech.

This version of the TRM was primarily developed from program documentation and measure savings calculators used by the Texas electric utilities and their energy efficiency services providers (EESPs) to support their energy efficiency efforts and original source material from petitions filed with the Public Utility Commission of Texas by the utilities, their consultants, and EESPs such as Frontier Associates (TXu 1-904-705), ICF, CLEAResult, and Nexant. Portions of the TRM are copyrighted 2001–2017 by the Electric Utility Marketing Managers of Texas (EUMMOT), while other portions are copyrighted 2001–2018 by Frontier Energy. Certain technical content and updates were added by the EM&V team to provide further explanation and direction as well as consistent structure and level of information.

TRM Technical Support

Technical support and questions can be emailed to the EM&V team's project manager (lark.lee@tetratech.com) and PUCT staff (therese.harris@puct.texas.gov).

1. INTRODUCTION

This volume of the technical reference manual (TRM) contains evaluation, measurement, and verification (EM&V) team recommendations regarding program implementation that may affect claimed savings. The EM&V contractor drafts guidance memos for the electric utilities' energy efficiency programs to provide clear direction on calculating or claiming savings. Guidance memos are consistent with the Energy Efficiency Rule P.U.C. SUBSET. R. 25.181 (16 TAC § 25.181) and the TRM but address areas where additional direction is needed for consistency and transparency across utilities' claimed savings from the programs. This volume compiles the various guidance memos produced during the EM&V effort.

Implementation guidance contained in this volume is summarized by sector below:

Commercial

- Project documentation
- Additional savings
- New construction
- ~~Design Light Consortium™ (DLC) Technical Requirements Version~~

Residential

- Low-Income Income-Eligible verification forms
- Audit list for Low-Income programs

Cross-Sector

- Load management programs
- Commercial and residential HVAC split-systems without AHRI certification
- ~~Measurement and verification claimed savings~~
- ~~Upstream/midstream program cross-sector savings~~
- Data model

2. COMMERCIAL

2.1 PROJECT DOCUMENTATION

This section summarizes the progress and current status of the evaluation, measurement, and verification (EM&V) team's assessment of the utilities' efforts to meet and conform to project documentation standards and provides additional guidance for areas still in need of improvement as part of the annual EM&V statewide report.

2.1.1 Background

For all energy efficiency programs, critical inputs and methodologies needed to replicate claimed savings calculations are captured in a combination of the TRM, program manuals, program tracking data systems, and individual project documentation. Project-level documentation is critical to the transparency of claimed savings and facilitates efficient third-party EM&V at the project, program, and portfolio levels. This section specifically addresses individual project documentation needs; individual project documentation includes all relevant site-specific details (e.g., audit reports, worksheets, program applications, invoices, project overviews and descriptions, photos, installation reports).

We provide detail on documentation best practices currently incorporated into many Texas programs (based on information gathered during PY2014 evaluation activities) and recommendations for improvement. The objective is to support the utilities in achieving industry-standard degrees of documentation rigor, clarity, and efficacy; these standards are necessary to organize and manage such information to yield transparency and facilitate efficient and effective evaluation.

2.1.2 Additional Documentation Guidance

In this section, we provide guidance geared specifically to help improve CSOP program documentation scores. However, the guidance may also be used to support the continued improvement of program documentation for other programs.

Recommendation 1: Clearly organize project files.

Organized project files are critical for many reasons, including:

- clear and transparent reporting of documentation used to support claimed savings,
- ease of identification of related program project files that may not have made the data transfer,
- backup support for information within tracking data systems,
- support custom parameter usage, and
- support deviation or enhancement of methodologies to gain greater accuracy.

An important part of organized project folders, files, and documents is clear naming conventions; this helps keep files organized and improves consistency in document placement and locating critical documents to support the EM&V efforts. Below are some examples of the difficulty the EM&V team has had with project-level folders and files received:

- The project folders often contained inconsistencies regarding file and document names, locations, and contents. Files with similar names often contained disparate information, while seemingly identical files contained dissimilar information.
- The project folders included multiple copies of project documents. Locating the final documents used to support the reported savings proved difficult for many projects. For example, when numerous photos are provided, locating those that support the key savings assumptions is difficult. Distinguishing between pre- and post-equipment photos was also, at times, difficult.
- Project folders contained documents labeled as verification reports when they were still actually measurement and verification (M&V) plans with no completed verification data. Such plans provided the methodology to verify project savings estimates yet did not document that project savings estimates were complete.

The project file organization example below provides a list of potential project subfolders and documents that would be ideal for collecting information to determine whether a pre- and post-inspection has been completed. Many documents listed are key elements necessary to support custom project assumptions and review.

Table 1. Project File Organization Example

Stage	Retrofit and new construction
Pre-project*	• Pre-project calculator • Plans (e.g., drawings, fixture list) • Pre-project inspection photos • Pre-project audit reports • Project descriptions, sponsor agreements, etc.
Post-project	• Post-project inspection calculator • Post-inspection field notes • Post-project inspection photos • As-built plans • Installation reports
Supporting documents	• Calculators (old and archived) • Spreadsheets or other backup documentation (especially those to support custom calculations) • Specifications, cut sheets, certifications • Check requests to utility • Partner letters or savings summaries • Material purchase orders and invoices • Email communication • M&V plan for custom key input assumptions (e.g., operating hours) or custom savings methodologies

Stage	Retrofit and new construction
Final documents**	• Final calculator • Final M&V plan for custom projects • Final verification documents for custom projects • Final project notes

* New construction projects may not necessarily include these documents.
** These documents also support EM&V on-site minimum requirements for data collection needs.

Recommendation #2: Use photo verifications to support key measure assumptions.

When on-site fieldwork is complete—whether by trade allies, implementation staff, or utility staff—representative photos can help document and support key measure attributes and assumptions. Most programs include some form of photo documentation to support projects. Some programs in Texas even use tablets in the field whereby the project site and equipment photos are taken by trade allies and automatically uploaded to tracking systems and project folders. The table below outlines how photos can support project documentation for some of the most common commercial project types (i.e., lighting- and HVAC-based projects).

Table 2. Project Verification Applications and Examples

Stage	Lighting projects*	HVAC projects
Pre-project	• Existing lighting system types (e.g., lamp, ballast, fixture) • Existing lighting equipment quantities • Existing control type • Existing lighting equipment operability and inoperability • Building type • Air conditioning type	• Existing HVAC equipment types and sizes • Existing HVAC equipment quantities • Existing HVAC equipment operability and inoperability (e.g., setpoint, load display shots) • Building type
Post-project	• New lighting system types (e.g., lamp, ballast, fixture) • New lighting equipment quantities • New control type • New control schedule automation (e.g., building and lighting automation system screenshots) • New lighting equipment operability • Building type • Air conditioning type	• New HVAC equipment types and sizes • New HVAC equipment quantities • New HVAC equipment operability (e.g., setpoint, load display shots) • Building type

* Note that some of these project parameters may not be possible to capture for all lighting quantities for large lighting projects. In these cases, alternative project documentation types may be preferred.

Recommendation #3: Include clear descriptors of measure type as well as quality assurance/quality control (QA/QC) inspections in the tracking system.

Different projects (e.g., retrofit versus new construction projects, inspected versus not inspected sites) have different documentation needs. Capturing participant descriptors can aid evaluation efforts immensely, keep cost burdens low, and facilitate transparency.

Many commercial programs continue to track and describe measure-level savings at the measure-category level (or savings calculator level) instead of the measure-specific level. For example, the tracking system will document the savings associated with a lighting project captured within a lighting calculator (e.g., Lighting Equipment Survey Form version 9.02). However, the calculator includes many different lighting fixture types, effective useful lives, and related savings. Tracking project data at the measure-specific level (e.g., integrated-ballast LED lamps, linear fluorescent, lighting controls) rather than the measure-category level will improve the data's transparency to readily assess measure types and individual claimed savings. This structure also supports ease for calculating cost-effectiveness.

As another example, new construction projects may not have pre-inspection forms or field notes. In contrast, retrofit projects may have many pre-project documentation types (e.g., pre-project calculator, pre-project plans, pre-inspection photos). Providing information regarding "greenfield" or complete demolition and rebuild projects as a differentiator from retrofits and small remodels upfront is a valuable population segmenting descriptor. When tracking systems use descriptors like these, they become a valuable screening tool; they can inform evaluators not to request certain documentation (that may not exist), which can misdirect time and resources. It also allows better budgeting and allocation of resources, improving overall efficacy. Another example is those sites or program participants that receive internal QA/QC versus those that do not. Some programs have modified their tracking systems to begin logging this data and provide a list as part of the EM&V data collection process; this list notifies the EM&V team that a site will not have specific project-level documentation because it was not site-inspected or verified, etc.

Recommendation #4: Complete M&V plans and reports needed for custom projects.

~~The industry standard for M&V plans and reports is based on the guidelines of Efficiency Valuation Organizations (EVO) International Performance Measurement and Verification Protocol (IPMVP). IPMVP Core Concepts EVO 10000-1:2022 is the current version available; it includes clear recommendations for meeting the minimum information requirements for complying with IPMVP protocols, including those specific to the M&V plan contents summarized in Chapter 5 and M&V reporting summarized in Chapter 6.~~

Utilities and their implementation contractors are encouraged to engage and collaborate with the EM&V team to discuss issues and options, obstacles, and possible solutions for custom calculations and M&V plans as new technologies or offerings become part of the Texas portfolios.

2.2 INCENTIVES AND CLAIMED SAVINGS

This section provides guidance on claiming savings when a financial incentive does not cover all project savings during the implementation of energy efficiency measures.[1]

2.2.1 Background

To meet various program objectives, it is common practice for utilities to set a ceiling or cap for the financial incentive any one energy efficiency service provider (EESP) or project can receive. These "individual incentive caps" are set as an overall percentage of the total incentive budget or as a dollar amount. The established caps vary by utility and are noted in their program manuals.

Individual incentive caps are different from a "set incentive." During the application phase, utilities calculate a project incentive based on pre-installation estimated savings; reserving incentive funds are at that time. Once the project is complete, there may be some variation in the initial agreed-upon savings estimates while setting the incentive and the actual post-installation savings. This variation is due to changes in efficiency levels, quantities, or equipment types that take place between the project planning phase and the project implementation phase.

2.2.2 Considerations

In the case of incentive caps, the EM&V team has some concerns regarding claiming all project savings when reaching an incentive cap. Since all project savings are not being incentivized at the project planning phase, claiming all project savings may result in increased free-ridership. A free rider is "a program participant who would have implemented the program measure or practice in the absence of the program." (16 TAC § 25.181 (c) (24)).[2]

In the case of set incentives, the EM&V team has some concerns that spillover could be claimed incorrectly during post-project inspections. Spillover is "reductions in energy consumption and demand caused by the presence of an energy efficiency program, beyond the program-related gross savings of the participants and without financial or technical assistance from the program." ((16 TAC § 25.181 (c) (53)). Spillover is a component of net savings, and claimed savings are based on gross savings. Therefore, spillover should not be included in claimed savings if found on-site during post-project inspections.

---

[1] This guidance does not apply to behavioral, code or other market transformation programs where the primary program strategy is technical assistance and/or education that results in behavioral or operational changes for energy and demand savings.

[2] In addition to the incentive caps or set incentives at the individual EESP or customer-level, utilities may also set caps on incentives a customer can receive at the measure level. For example, a utility may cap lighting incentives at 50 percent of the total project incentive. The EM&V team does not have the same concerns regarding free-ridership for measure-level caps and the recommendations in this memo do not apply to these situations.

2.2.3 Recommendations

Establish greater consistency in the treatment of projects where claimed savings exceed incentive amounts and most accurately represent the savings results from these projects. The EM&V team recommends utilities either only claim the savings from the incentivized measures or the utilities apply the most updated net-to-gross (NTG) research[3] to the total project savings for the claimed savings[4] as follows:

For projects where the *claimed savings are more than 10 percent higher than the "set incentive*," the NTG ratio inclusive of free-ridership and spillover should be applied to the total project savings. No NTG ratio should be applied for projects where the set incentive and claimed savings differ by 10 percent or less to allow for normal variation between project planning and implementation.

For projects where *claimed savings exceed the "incentive cap" savings up to 20 percent of incentivized savings*, the NTG ratio inclusive of free-ridership and spillover should be applied to the total project savings.

$$NTG\ ratio_{projects\ exceeding\ set\ incentive} = 1 - Free\ Ridership + Spillover$$

Equation 1

For projects where total *claimed savings exceed the "incentive cap" by more than 20 percent of incentivized savings*, the NTG ratio only accounting for free-ridership should be applied to the total project savings. Applying the NTG ratio that is also inclusive of spillover to projects that exceed incentive amounts by a percentage of incentivized savings this large would likely result in double-counting spillover.

$$NTG\ ratio_{projects\ exceeding\ incentive\ cap} = 1 - Free\ Ridership$$

Equation 2

The PY2021 EM&V research updated NTG ratios for the commercial standard offer (CSOP) and market transformation programs (CMTP). The PY2021 NTG research accounts for free riders; spillover rates were derived from the PY2017 EM&V research. The CSOP NTG ratio is 100 percent for kWh and 99 percent for kW. The CMTP NTG ratio is 100 percent for kWh and kW.

Table 3. PY2021 Commercial Statewide NTG Ratios by Program Type

Program type/weighting	Free-ridership	Spillover	NTG
CSOP kWh	23%	24%	100%
CSOP kW	22%	21%	99%
CMTP kWh	19%	22%	100%
CMTP kW	20%	32%	100%

[3] The use of a net to gross adjustment to account for free-riders is addressed in § 25.181 (e)(5)(B)(ii).
[4] This recommendation does not apply to behavioral, code or other market transformation programs where the primary program strategy is technical assistance and education that results in behavioral or operational changes for energy and demand savings.

Projects might have multiple measures with different effective useful lives (EULs) that are taken into account when calculating lifetime savings; for these cases, the EM&V team provides the following additional guidance for adjusting claimed savings that exceed incentive levels:

1. Determine the total calculated savings by EUL.
2. Determine the percent of total project savings attributed to each EUL.
3. Adjust savings as recommended above.
4. Distribute adjusted savings to various project EULs using the percentages calculated in Step 2.

The following is an example of a project with 50 kW and 50,000 kWh of calculated savings. An RTU HVAC project with a 15-year EUL attributes twenty percent of those savings, and a chiller project with a 25-year EUL attributes the remaining 80 percent. The adjusted savings are 40 kW and 40,000 kWh. Those adjusted savings would be attributed to each EUL as follows:

1. 40 kW x 20% = 8 kW and 40,000 kWh x 20% = 8,000 kWh attributed to the 15-year EUL
2. 40 kW x 80% = 32 kW and 40,000 kWh x 80% = 32,000 kWh attributed to the 25-year EUL

2.3 NEW CONSTRUCTION

This section provides additional guidance to select the appropriate baseline for commercial new construction projects.

2.3.1 Overview

Utility programs include incentives for a variety of projects applicable to commercial new construction, such as lighting, HVAC, and roofs. To effectively implement new construction energy efficiency projects, utility programs need to reach decision-makers during the project design phase. However, it is common for several years to pass between the project design phase and project completion in commercial new construction. Since baselines change, this situation raises the question of what baseline utilities should use for commercial new construction projects to claim savings. For example, in PY2016, Texas' new construction baseline was IECC 2009 based on the state code in effect at that time. In PY2023, the baseline is now IECC 2015 based on the state code in effect.

2.3.2 Recommendation

For commercial new construction projects, utilities should use the building permit date to determine the applicable version of the Texas TRM and baseline to calculate savings.

2.4 DESIGN LIGHT CONSORTIUM™ (DLC) TECHNICAL REQUIREMENTS VERSION

This section provides implementation guidance on the eligibility criteria for qualified commercial lighting products given new technical requirements in an updated version of the qualified product list (QPL) by the DesignLights Consortium™ (DLC).

2.4.1 Overview

The PY2023 Texas Technical Reference Manual version 10.0 (TRM 10.0) Measure 2.1 Nonresidential Lighting has criteria that the lamps and fixtures are eligible if the performance criteria meet the requirements of DLC version 3.0 or later, as described on Pages 8 and 9 of Volume 3. The criteria allow the delisted lamps on the QPL, so long as they were previously listed with the Version 3.0 or later eligibility criteria.

DLC updates its QPL requirements periodically, resulting in lighting equipment being delisted from the current QPL. The delisted equipment is still included in the QPL but requires a filter for only delisted products. Once identified, the QPL includes the most recent Technical Requirements Version and the date delisted. This information is acceptable to confirm eligibility with Version 3.0 or greater.

It is unknown what effects new technical version requirements will have on the market or those products seeking a listing on the QPL. But the TRM allows for the submittal of the independent lab testing for equipment life, light output, and energy consumption to meet or exceed the requirements of DLC Version 3.0.

2.4.2 Recommendations

For programs that utilize the current DLC QPL as criteria for eligibility (instead of the DLC V3.0 requirements), the EM&V team recommends a grace period of 12 months following the delisting date that the product will be available to receive incentives to allow for the sell-through of products in the supply chain.

For all programs, LED lamps and fixtures that qualify for energy savings projects must provide clear documentation of the DLC certification version for the product or equivalent performance testing. For previously delisted products, documentation should indicate the date delisted and the version of the QPL that is met. The documentation provided by an independent testing lab does not require QPL information.

3. LOW-INCOME

3.1 LOW-INCOME INCOME-ELIGIBLE VERIFICATION FORMS

This section provides implementation recommendations for the program year (PY) 2023 (PY2023) eligibility verification for low-income and hard-to-reach programs.

3.1.1 Background

Texas utilities provide energy efficiency services to low-income customers through a combination of hard-to-reach and low-income programs as specified in 16 Tex. Admin. Code (TAC) § 25.181, relating to the energy efficiency goal. All regulated Texas electric utilities are required to achieve no less than 5 percent of their total demand reduction goal through programs serving hard-to-reach customers (16 TAC § 25.181(e)(3)(F)). In addition, the ERCOT utilities are required to spend no less than 10% of each program year's energy efficiency budget on a targeted low-income efficiency program (16 TAC § 25.181(r)). The qualifying income level of 200% federal poverty level is the same for hard-to-reach and low-income programs though the programs are implemented differently.

The utilities use program eligibility certification forms maintained by the PUCT on their website. The forms differ by single-family and multi-family, but both include a way to qualify for the programs through other low-income programs and services (Category 1) as well as through self-reported income (Category 2). The PUCT has revised the income eligibility annually based on updated federal poverty level information, but the forms have not had major changes for over a decade. Due to the importance of these forms in determining program eligibility, PUCT Staff and the EM&V team agreed to incorporate the forms into Volume 5 of the Texas Technical Reference Manual (TRM) starting with program year (PY) 2022. Forms will be updated as part of the annual TRM update process. As part of integrating the eligibility certification forms into the TRM, PUCT Staff and the EM&V team worked with the utilities to review the forms and certification processes in-depth. Appendix A contains the Single-Family and Multifamily Income Eligibility for Full-Incentive Energy Efficiency Services forms.

The objectives of the in-depth process review were to, "Revise low-income/hard-to-reach eligibility verification to increase the confidence program services are going to intended customers, improve program outreach and address participation barriers, and develop efficient administration processes," as presented at the March 2021 Energy Efficiency Implementation Project (EEIP) meeting. The PY2023 TRM forms expand Category 1 options to support streamlined participation through an expanded list of qualifying programs and services (1A), direct social service or community action agency qualification (1B), and geographic qualification (1C). If a customer does not qualify through any of the three options, income information may be used to determine eligibility (Category 2). Both Category 1A and Category 2 require customers to submit supporting documentation. Because Category 2 requires income information, all parties recognize this information can be more sensitive for customers to provide and for service providers to store securely although all personal identifying information (PII) should be redacted, except name and address of customer. Given concerns about income information as a participation barrier, Category 1 is the preferred method to verify customer eligibility whenever possible.

3.1.2 Quality Assurance/Quality Control (QA/QC)

Utilities should audit a minimum of 10 percent of all program year projects submitted through each category (1A, 1B, 1C and 2) to ensure the processes are working correctly and the required documentation was submitted and verified to be correct. In the cases where utilities find an error in the process or documentation during their QA/QC processes, utilities should identify a solution to remedy the error. The EM&V team encourages utilities to integrate the program eligibility audit into their existing QA/QC practices to the extent possible to facilitate the most streamlined and effective implementation of this recommendation.

While utilities are not required to store customer documentation on their systems audited as part of the QA/QC process, they should provide contact information of the auditor who has verified the documentation through a visual inspection.

While audit processes can differ to best integrate with utilities' current QA/QC processes, the following are recommended practices by category:

- Category 1A: Verify form is completed and supporting program documentation was provided
- Category 1B: Verify form is completed and signed by social service or community action agency
- Category 1C: Verify address of serviced home is within one of the two qualifying geographic designations; forms are not required for geographical qualification under 1C as long as the relevant information is in the tracking data (service address, geographic qualifier)
- Category 2: Verify form is completed and supporting income information was submitted to service provider/landlord/property manager

Utilities can either conduct the audits themselves or hire a third-party to do so on their behalf. The EM&V team will request a summary of audit results at the end of each program year. The audit result summary should identify solutions to address any errors found during the audit.

A. Program Tracking and Documentation

Utilities should add a field(s) to their program tracking data to clearly track how a low-income and hard-to-reach participant was qualified for the program (Category 1A, 1B, 1C and 2). This will allow both the utility and the EM&V team to sample projects from each category for auditing purposes.

For Category 1A, 1B and 2, all completed forms and supporting documentation, if applicable, should be stored for all projects. Forms are not required for geographical qualification under 1C as long as the relevant information is in the tracking data (service address, geographic qualifier). Forms and supporting documentation should be maintained for a minimum of 24 months.

B. Claiming Master-Metered Savings

Because master-metered complexes are a commercial rate class, costs and savings should be claimed in the commercial sector. However, if the master-metered complex qualifies for hard-to-reach or low-income program services, these costs and savings may be counted toward the utilities' goals (5 percent of total demand reduction goal for hard-to-reach customers (16 TAC § 25.181(e)(3)(F)), and no less than 10% of each program year's energy efficiency budget on a targeted low-income efficiency program (16 TAC § 25.181(r)).). To avoid double-counting, master-metered projects counted toward the goal should be a separate line item.

3.1.3 New Program Strategies

Some utilities are working on partnerships to distribute energy efficiency measures to low-income and hard-to-reach customers such as distributing LEDs at food banks. In these cases, utilities should meet with the EM&V team to agree on an approach for verifying customer eligibility and claiming savings, which will then be presented to Commission Staff. The goal of these discussions is to support the new strategies in keeping with the overall objective of the in-depth process review stated above.

3.2 AUDIT LISTS FOR LOW-INCOME PROGRAMS

This section summarizes implementation guidance for program year (PY) 2023 for low-income programs. Specifically, it overviews and recommends use of the recently approved Department of Energy (DOE) audit lists as applicable. This recommendation directly addresses prior process evaluation findings that should allow more streamlined and cost-effective low-income program implementation.

Background

Households with incomes at or below 200 percent of the Federal Poverty Level are eligible to receive low-income weatherization assistance through the DOE Weatherization Assistance Program (WAP), administered through the Texas Department of Housing and Community Affairs (TDHCA). Local Community Action Agencies (also referred to as subrecipients by TDHCA) provide the weatherization services to qualifying households, including the initial audit.

In an effort to further help low-income electric customers improve the efficiency of their residences, the Texas legislature put forth that ERCOT utilities include a targeted energy efficiency program in their energy efficiency plans (PURA § 39.905(f)). Specifically, the ERCOT utilities are required to set aside a minimum of 10 percent of their energy efficiency budget for low-income programs.

Also outlined in PURA § 39.905(f)), the low-income programs are to coordinate with the federal weatherization program WAP, including complying with the same audit requirements. Therefore, all single-family homes served through the low-income programs to-date have been evaluated using the National Energy Audit Tool (NEAT). NEAT is designed to determine the most cost-effective retrofit measures for single-family and small multifamily buildings. NEAT uses each home's historic energy use data to prioritize measures for installation. Program and project cost-effectiveness is measured using the Savings-to-investment Ratio (SIR) consistent with DOE requirements.

The EM&V team conducted an in-depth process evaluation of the low-income programs in 2015,[5] which found a primary concern raised by utilities and community action agencies alike was the NEAT tool. As noted above, legislative statute requires that the program comply with the same audit requirements as the federal weatherization program. Process evaluation interviews found that, "the NEAT audit, as a modeling tool, is not transparent; therefore, agencies and implementers have difficulty understanding why certain measures do and do not qualify in various homes. Additionally, they reported it is a cumbersome tool to use and is administratively burdensome. Due to the NEAT audit requirement, an implementer (as well as several agencies) reported that training goes into working with agencies who do not work with the DOE program. Last, there was concern that equipment that should be replaced are not prioritized by the tool (e.g., central air conditioning). Several agencies speculated that this was because the tool is set up for colder climate regions and does not recognize the unique issues associated with warmer states such as Texas," (Tetra Tech, p.4-14). While Commission Staff and the EM&V team discussed the possibility of removing the NEAT audit requirement in response to this process evaluation finding, it was determined doing so could be out of keeping

[5] Annual Statewide Portfolio Report for Program Year 2014—Volume I, Section 4, Tetra Tech, October 16, 2015. PY2014v1.pdf (texasefficiency.com)

with PURA's requirement to coordinate with WAP. However, recent development of audit priority lists by DOE and adoption by THDCA now allow alternative starting with PY2023.

DOE and THDCA Priority Lists

Recognizing the need for a more streamlined audit approach for WAP than the NEAT audit, DOE developed weatherization audit priority lists in 2022. DOE approved these lists for implementation starting July 1, 2022. Please refer to the below DOE link for more information:

Weatherization Program Notice 22-8: Streamlining the Energy Audit Process–Optional Regional Weatherization Priority Lists | Department of Energy

In response, DHCA also approved priority audit lists for use in WAP in 2022. While the lists are not exhaustive in the types of homes for which they can be used, most major housing types are covered. Please refer to the below DHCA link for more information:

Community Services Program Guidance (state.tx.us)

Recommendations

The EM&V team fully supports utilities and low-income program service providers assessing and using the DOE audit priority lists available through DHCA in place of the NEAT audit. The use of the audit priority lists is to be determined as applicable to housing types and at the discretion of each utility as it makes sense for their implementation process.

4. CROSS-SECTOR

4.1 LOAD MANAGEMENT PROGRAMS

This section summarizes additional guidance from the EM&V team on two load management topics: (1) data rounding practices for commercial and residential load management programs for PY2021 and after, and (2) implementation for the ERCOT utilities' 2023 winter load management (WLM) pilots.

4.1.1 Rounding

The EM&V team previously provided guidance on rounding practices to avoid minor discrepancies in savings calculations. While rounding differences create only minor discrepancies in calculations, the differences have the potential to sum to a level that creates confusion or doubt. Using a standard practice or documenting differences will reduce the burden on the utilities and EM&V team (as discrepancies are investigated after initial calculations are developed) and will improve the consistency and transparency of savings calculations going forward. As outlined in Table 4, rounding can occur at three different levels: customer, event, and program levels.

Table 4. Load Management Savings Calculation Levels

Customer level	Event level	Program level
Customer 1 Curtailment kW	Event 1 kW savings	Program kW savings
Customer 2 Curtailment kW		
Customer 3 Curtailment kW		
Customer 4 Curtailment kW		
…		
Customer 1 Curtailment kW	Event 2 kW savings	
Customer 2 Curtailment kW		
Customer 3 Curtailment kW		
Customer 4 Curtailment kW		
…		

Commercial Load Management

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.

Residential Load Management

Data rounding to the nearest whole number should only occur at the event and program levels for residential load management programs (NOT at the customer level). Residential programs have a very large number of participants, with the potential for rounding at the participant (customer) level driving substantial differences in savings at the event or program levels. By consistently rounding at the event level (summing individual participant savings), potential discrepancies between the EM&V team and utility calculations can be reduced. Utilities that prefer not to round the savings should document that in their calculations and inform the EM&V team.

4.1.2 Winter Load Management Implementation

This section presents implementation guidance for the ERCOT utilities' 2023 winter load management (WLM) pilots.

Background

Texas electric IOUs have two channels to offer load management programs for nonresidential customers during winter months. One method is found in § 38.075(e) of the Public Utility Regulatory Act ("PURA"); i.e., Senate Bill 3. Specifically, PURA § 39.905(a)(2) states that it is the "goal of the legislature that all customers, in all customer classes, will have a choice of and access to energy efficiency alternatives and other choices from the market that allow each customer to reduce energy consumption, summer and winter peak demand, or energy costs."

The second is through their energy efficiency portfolios, governed by 16 Tex. Admin. Code § 25.181(§ 25 .181). 16 TAC § 25.181 (c)(36) defines load management as "[l]oad control activities that result in a reduction in peak demand, or a shifting of energy usage from a peak to an off-peak period or from high-price periods to lower price periods."

All four ERCOT utilities piloted winter load management (WLM) programs in 2022. CenterPoint Energy (CNP), American Electric Power (AEP) Texas and Texas New Mexico Power (TNMP) piloted programs as a regulatory asset under Senate Bill 3. Oncor Electric Delivery (Oncor) piloted a program as part of their energy efficiency program and filed the program template for comment in the Energy Efficiency Implementation Project No. 38578 in October 2021. Oncor then included a 2023 WLM pilot in their 2022 energy efficiency plan and report (EEPR) filed April 1, 2022. In November 2022, CNP, AEP Texas and TNMP also filed notification in Project No. 38578 that they would offer WLM pilots as part of their energy efficiency portfolios beginning with the 2023 winter peak period. In response to the filings and comments, PUCT Staff facilitated a coordination call with ERCOT, the IOUs and the EM&V team on December 12, 2022.

The EM&V team verifies all claimed energy savings and demand reductions for programs in the energy efficiency portfolio. The Texas Technical Reference Manual (TRM), updated annually by the EM&V team, includes the methodology for calculating energy savings and demand reductions for load management programs.

Pilot guidance for calculated savings

The EM&V team applauds the utilities implementing 24/7 programs, which we believe increases the value of the load management programs during emergency levels when ERCOT would call curtailment events. Our reading of § 25.181 limits claimed savings to peak periods defined in the Rule, which are "the hours from one p.m. to seven p.m. during the months of June, July, August, and September, and the hours of six a.m. to ten a.m. and six p.m. to ten p.m. during the months of December, January, and February, excluding weekends and Federal holidays." Therefore, even if an unscheduled emergency event is called by ERCOT outside of peak periods, those demand reductions could not be claimed by IOUs under § 25.181. We fully recognize this would likely undercount pilot savings as emergency level reductions are likely to be larger than scheduled events called in peak periods. To recognize the value to the grid, the EM&V proposes that the IOUs can use all events, even those outside of the § 25.181 defined peak hours, to calculate savings for the purpose of calculating the pilots' cost-effectiveness. If a utility chooses to do this, the difference in claimed savings and savings in the cost-effectiveness testing should be clearly documented in EEPRs. This will facilitate utilities paying incentives to customers for events outside of peak hours while remaining in compliance with § 25.181.

Secondly, the EM&V team recognizes that business responses to winter weather events that would necessitate an ERCOT winter event may result in scenarios not previously encountered in summer load management programs. One possible scenario provided by a utility on the December 12 coordination call was if a participant decides not to open in response to an unscheduled event, but the baseline period also includes days the business was not open. Recognizing the need for flexibility to support full participation in unscheduled events, the EM&V team will work with utilities on a case-by-case basis to determine the best methodology to most accurately reflect demand reductions within the peak period.

Next steps

Based on responses from the Stakeholder Input Survey fielded in November, the EM&V team, on behalf of the PUCT, will be facilitating four topic-specific working groups. One of the priority topics identified is Demand response/load management programs. The EM&V team recommends utilities discuss with the working group changes to § 25 .181 that would better support 24/7 programs.

4.2 COMMERCIAL AND RESIDENTIAL HVAC SPLIT-SYSTEMS WITHOUT AHRI CERTIFICATION

This section provides guidance in determining efficiency levels of eligible HVAC split systems that do not have AHRI certification. The methodology outlined in this memo can be used starting in PY2023.

Constructing AC and heat pump systems can be done using outdoor units and indoor units from different manufacturers; not all these combinations are certified by AHRI. Savings should be calculated and reported consistently across utilities and in agreement with industry-standard practice and the Energy Efficiency Rule 16 TAC § 25.181.

Projects in PY2020 were affected by changes in supply chains due to COVID-19, leading to project equipment and timeline adjustments; supply chain issues are expected to continue into PY2023. In addition to the AHRI certification, the process outlined in this guidance memo may guide HVAC project efficiency calculations impacted by supply chain issues. Coordination with the evaluation team for alternate applications of the process is recommended.

4.2.1 Background

Texas TRM 10.0 allows air conditioning and heat pump split systems to be either AHRI-certified or listed on the DOE Compliance Certification Management System (CCMS). Split systems consist of an outdoor unit and an indoor unit, which can be made by the same manufacturer or separate manufacturers. The system's efficiency and size are driven primarily by the outdoor unit, although various indoor units can slightly affect the system efficiency.

Texas TRM 10.0 clarifies the allowable efficiency levels for outdoor and indoor unit pairs listed in the DOE CCMS and not AHRI-certified. The TRM states that the claimed efficiency for these non-certified pairs should not exceed the AHRI-certified pairs' average. The guidance below provides an example to identify the not-to-exceed value.

4.2.2 Guidance

The following guidance should be applied if paired outdoor and indoor HVAC units are not in the AHRI certification list and only have DOE CCMS testing results. In that case, the high-efficient condition's capacity and efficiency shall not exceed the average of the AHRI-certified pair listing for the matching outdoor (condenser) unit. The DOE CCMS listing provides documentation of the results that are on the AHRI certification listing and can be downloaded and filtered based on listings that use a similar condenser and various indoor units.

The following is an example scenario designed to direct the user on interpreting the guidance in this memo.

Example: A split system is listed in DOE CCMS and is not AHRI certified.

Analysis scenario: A high-efficiency split-system heat pump is installed with a Goodman GSZ16 outdoor unit (condenser) and a third-party indoor unit (air handler). The specific pair is not listed in the AHRI database.

Step 1: Access the DOE CCMS[6] and select the appropriate measure category for the product pair. In this example, it is the *Air Conditioners and Heat Pump – Central* measure category.[7] Search for the critical component to the system's efficiency (the outdoor unit (condenser)), with model number GSZ160241B*. The * is added near the end of the model number to allow for different condenser unit variations.

Step 2: Identify the specific air handler match and record the specifications from the DOE CCMS. In this example, the Airmark GES244 indoor unit pairs with the Goodman GSZ160241B outdoor unit with the following specifications:

Table 4. Specification of an Example Split System

Cooling capacity (Btu/h)	24,000
Heating capacity (Btu/h)	24,000
SEER	16
EER	13
HSPF	9
Link to FTC Energy Guide label	(blank)*

*(blank) indicates the pair is not listed in the AHRI database.

The *Link to FTC Energy Guide label* column will identify other certifications obtained by this equipment pair. In the example, the column is blank, indicating it is not listed in the AHRI database.

Step 3: Filter the DOE CCMS database to match the specification of the installed pair. Filter the *product code description*, *cooling capacity*, and *Link to FTC Energy Guide Label* to find a representative sample of similar AHRI-listed units. Table 5 details the filter selected for the example. Figure 1 shows the filter on the CCMS database interface.

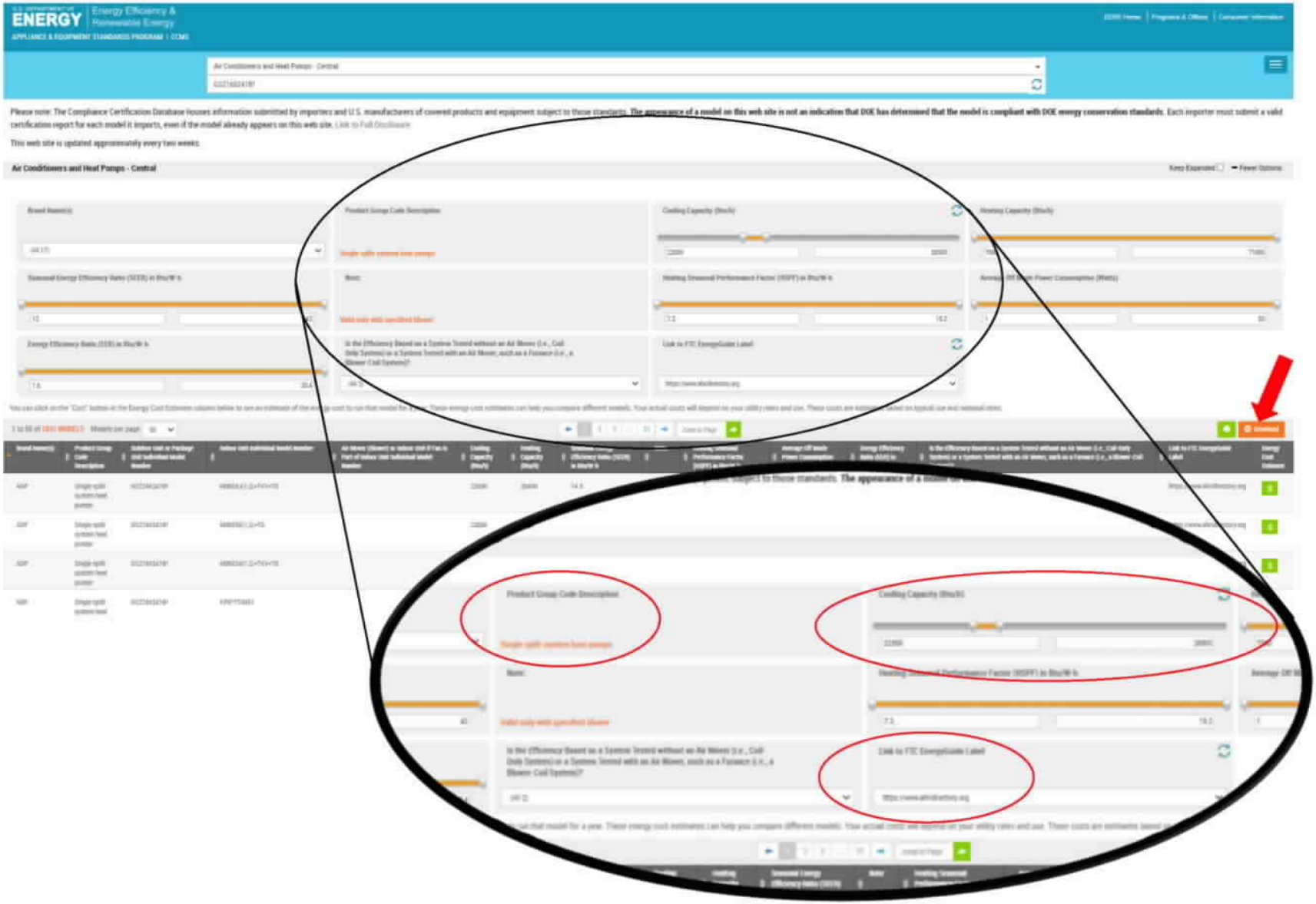
Table 5. Example DOE CCMS Filter to Similar Equipment

Product code description	Single-split-system-heat-pump
Cooling capacity	22,500 to 26,500
Link to FTC Energy Guide Label	www.ahridirectory.org

[6] DOE Compliance Certification Database. https://www.regulations.doe.gov/certification-data/#q=Product_Group_s%3A*

[7] Note that the measure categories are based on technology and not use. The example is for a split system, but the category in the database is central system because the condenser technology meets that definition.

Figure 1. Example Filter of DOE CCMS Database

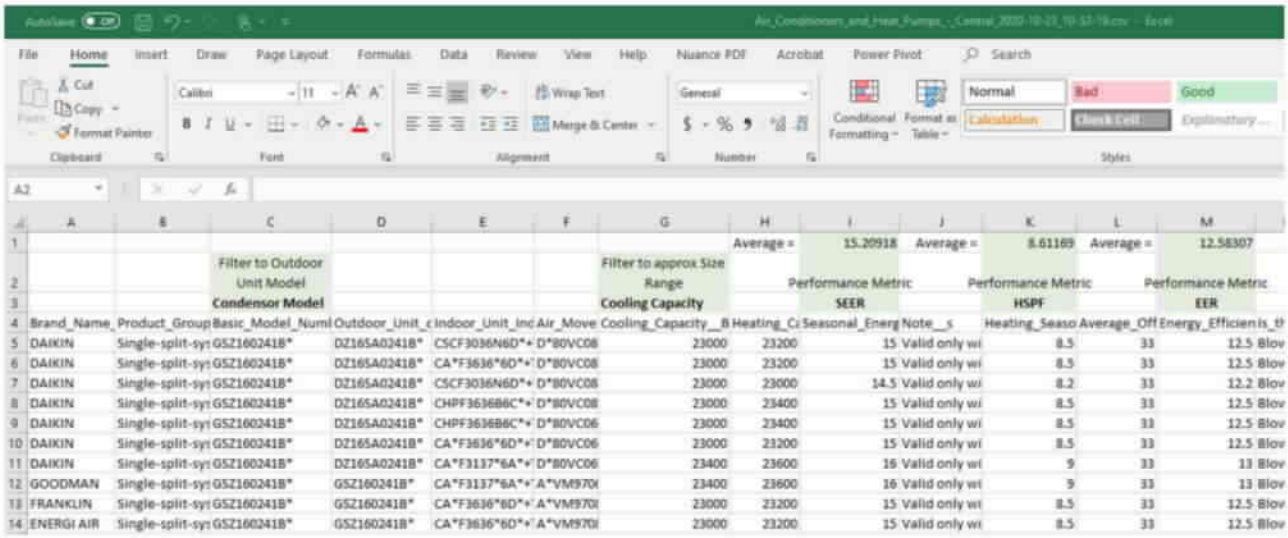


Step 4: Download the filtered database using the *download* button on the right side of the screen. A .csv spreadsheet will download. Project documentation should include a copy of the downloaded .csv file with the download date in the file name. Since the DOE CCMS is constantly updated, this file is the record of the DOE CCMS entries on the date of application review.

Figure 2 below shows the downloaded spreadsheet with three rows added above. Rows 2 and 3 identify the filters and the performance metric columns. Column C is the filter for the outdoor unit in Step 1. Columns G and Q (not shown) are the filters applied in Step 3.

Columns I, K, and M contain the performance metrics for the filtered products and represent the AHRI-certified performance metrics for similar split-system pairs with the matching outdoor unit (condenser).

Figure 2. Sample Downloaded Spreadsheet with Calculation



	A	B	C	D	E	F	G	H	I	J	K	L	M
1								Average =	15.20918	Average =	8.61169	Average =	12.58307
2			Filter to Outdoor Unit Model				Filter to approx Size Range		Performance Metric		Performance Metric		Performance Metric
3			Condensor Model				Cooling Capacity		SEER		HSPF		EER
4	Brand_Name	Product_Group	Basic_Model_Numl	Outdoor_Unit_(	Indoor_Unit_Inc	Air_Move	Cooling_Capacity__B	Heating_Ci	Seasonal_Energ	Note__s	Heating_Seaso	Average_Off	Energy_Efficien
5	DAIKIN	Single-split-sy:	GSZ160241B*	DZ16SA0241B*	CSCF3036N6D*+	D*80VC08	23000	23200	15	Valid only wi	8.5	33	12.5
6	DAIKIN	Single-split-sy:	GSZ160241B*	DZ16SA0241B*	CA*F3636*6D*+	D*80VC08	23000	23200	15	Valid only wi	8.5	33	12.5
7	DAIKIN	Single-split-sy:	GSZ160241B*	DZ16SA0241B*	CSCF3036N6D*+	D*80VC08	23000	23000	14.5	Valid only wi	8.2	33	12.2
8	DAIKIN	Single-split-sy:	GSZ160241B*	DZ16SA0241B*	CHPF3636B6C*+	D*80VC08	23000	23400	15	Valid only wi	8.5	33	12.5
9	DAIKIN	Single-split-sy:	GSZ160241B*	DZ16SA0241B*	CHPF3636B6C*+	D*80VC06	23000	23400	15	Valid only wi	8.5	33	12.5
10	DAIKIN	Single-split-sy:	GSZ160241B*	DZ16SA0241B*	CA*F3636*6D*+	D*80VC06	23000	23200	15	Valid only wi	8.5	33	12.5
11	DAIKIN	Single-split-sy:	GSZ160241B*	DZ16SA0241B*	CA*F3137*6A*+	D*80VC06	23400	23600	16	Valid only wi	9	33	13
12	GOODMAN	Single-split-sy:	GSZ160241B*	GSZ160241B*	CA*F3137*6A*+	A*VM970(	23400	23600	16	Valid only wi	9	33	13
13	FRANKLIN	Single-split-sy:	GSZ160241B*	GSZ160241B*	CA*F3636*6D*+	A*VM970(	23000	23200	15	Valid only wi	8.5	33	12.5
14	ENERGI AIR	Single-split-sy:	GSZ160241B*	GSZ160241B*	CA*F3636*6D*+	A*VM970(	23000	23200	15	Valid only wi	8.5	33	12.5

Column I, K, and M are the DOE CCMS logged values of SEER, HSPF, and EER, respectively. Row 1 uses the *=Average()* function in Microsoft Excel to identify the average performance metrics from the data in the database. Record these values rounded to one decimal point.

Table 6. Average Performance Metrics of Similar Certified Units

SEER (AHRI average)	15.2
EER (AHRI average)	12.6
HSPF (AHRI average)	8.6

Step 5: Identify the performance metrics used for TRM energy efficiency calculations. The installed unit pair's performance metrics for the calculation shall not exceed the similar-sized unit pair's performance metrics in the AHRI database.

Table 7. TRM Calculation Performance Metrics Determination

Performance metric	DOE CCMS (actual)	AHRI certification average	TRM calculation value[8]
SEER	16	15.2	15
EER	13	12.6	12.5
HSPF	9	8.6	8.6

Step 6: Complete the TRM energy savings calculation using the TRM calculation values determined in Table 7.

Include (1) the additional documentation of the original downloaded .csv file and (2) the average efficiency calculation spreadsheet file with the project documentation required in TRM Volume 2 and Volume 3.

[8] TRM calculation was determined using the rounding for EER and HSPF values to matched deemed tables. If the calculator can handle more detail, using the values rounded to the nearest tenth is acceptable.

4.3 MEASUREMENT AND VERIFICATION CLAIMED SAVINGS

This section provides guidance on claiming savings for projects implemented in one program year with measurement and verification (M&V) methodologies across two program years. This guidance aims to balance the level of savings claimed in the same year as the project activities with savings claimed once the M&V is completed.

4.3.1 Introduction

The annual reporting of program savings poses a challenge to accurately estimate impacts when the M&V methodology requires information across program years (such as 12 months of post-project consumption data to see seasonal effects or summer peak metering to estimate kW reductions). Projects extending beyond program years are a common challenge for behavioral programs and complex custom commercial and industrial projects.

Volume 4 of the TRM includes an M&V protocol for behavioral programs based on 12 months of pre-install and post-install data to determine energy savings accurately. Although savings can be estimated through custom calculations, the final amount of energy savings needs to be *trued-up* once all 12 months of post-install data is collected and analyzed. Trueing-up project savings is also common for custom commercial projects where M&V is required across program years. Utilities have employed the standard practice for custom projects of awarding 40 percent of the incentives and claiming 40 percent of the savings in the first program year based on the initially-estimated savings. In the subsequent program year, when M&V post-install data is fully collected and analyzed, the remaining 60 percent, or *trued-up* amount, is awarded and savings claimed. We refer to this as a *40/60* split though the percentage claimed in the second year may be less than or greater than 60.

In addition to these two common examples, this claimed savings guidance could also apply to any program wanting to claim savings through an M&V protocol as opposed to TRM deemed savings.

4.3.2 Recommendation

We recommend a 40/60 split of incentives and claimed savings is employed whenever M&V spans two program years. In other words, award 40 percent of incentives and savings claimed in the first program year—and the true-up, whether it is greater or less than 60 percent—would be awarded and claimed in the second program year. The true-up is required, whether it is to claim the remainder of the estimated savings or increases and decreases to the previously claimed energy savings. For example, if a project is estimated to reduce the peak kW by 100 kW, the project should claim 40 kW at project completion. Once the M&V is completed, the full savings may be claimed. For this example, we assume the M&V found the peak demand reductions were 110 kW. The true-up claim would be 70 kW in the second program year instead of the 60 kW as initially estimated in the 40/60 split. However, if the completed M&V analysis instead finds the total peak demand reduction is 30 kW, the true-up claim would be negative 10 kW.

~~This 40/60 split balances the first program year implementation of the measure and its planned savings with what savings are found actually to be in the second year once M&V is complete. There may be instances when a utility feels a different balance, such as a 50/50 split, which may be more appropriate. The utility should seek the PUCT EM&V contractor's review and approval of a different split of incentives and claimed savings across program years than the standard recommendation of 40/60 in this guidance section.~~

4.4 UPSTREAM/MIDSTREAM PROGRAM CROSS-SECTOR SAVINGS

This section provides guidance to calculate and allocate savings at the sector-level for upstream and midstream programs where installation location is not identified. The methodology that was reviewed and approved for use in PY2023 is also outlined.

4.4.1 Background

TRM v8.0 updated methods to calculate and allocate savings for lighting equipment sold through participating upstream and midstream programs. The TRM v8.0 method attempted to simplify the process for equipment sold when the installation location is not known, although several unintended consequences require adjustment. The recommendations below apply to programs when installation location must be generalized. If location installation is known at the time of sale, the assumptions for building type and lamp watts from the TRM should be used.

4.4.2 Recommendations

Claimed savings by sector. To account for the cross-over between commercial and residential applications in an upstream or midstream delivery method, the EM&V team recommends that five percent of upstream and midstream lighting program benefits and costs are allocated to commercial customers, with the remaining 95 percent allocated to residential customers. This recommendation agrees with the guidance memo put forth by the EM&V team, dated April 28, 2016.

Residential savings. The EM&V team recommends that the calculation methodology outlined in TRM v10.0 Volume 2 be used for the residential portion of the savings. Savings should be calculated using the TRM stipulated average HOU per year for residential applications, 803 hours, and the coincidence factors summarized in Table 5 and Table 11.

Residential low-income savings determination. Programs that are able to determine low-income and hard-to-reach eligibility by collecting customer information are permitted to use the ten-year low-income EUL to claim savings. For PY2023, utilities should continue documenting low-income accounts using the program eligibility certification forms maintained by the PUCT. Updated requirements are incorporated when implemented.

Commercial savings. The commercial lighting savings per lamp can be determined using commercial midstream assumptions identified in Table 12 of PY2023 TRM v10.0 Volume 3. This table identifies the annual operating hours (AOH), coincidence factors, and in-service rates (ISR). Table 8 below is an updated version of Table 12 in PY2023 TRM v10.0 Volume 3 and is recommended to determine assumptions for energy savings calculations.

Table 8. Upstream/Midstream Assumptions by Lamp Type[9]

Lamp type	AOH	Coincidence factors[10]					ISR
		Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	
General service lamp	3,748	0.69	0.69	0.73	0.73	0.71	0.98
Directional/reflector	3,774	0.78	0.79	0.78	0.79	0.82	1.00
LED tube	3,522	0.74	0.75	0.84	0.84	0.76	1.00
High-bay fixture	3,796	0.78	0.79	0.83	0.84	0.80	1.00
Garage	7,884	1.00	1.00	1.00	1.00	1.00	1.00
Outdoor	4,161	0.67	0.71	0.61	0.75	1.00	1.00

The interactive effects should be standardized across all commercial midstream lamp types. All locations should be considered refrigerated air; see Table 9 below (Table 11 from PY2023 TRM v10.0 Volume 3 of the TRM is unchanged by this guidance).

Table 9. Deemed Energy and Demand Interactive HVAC Factors[11]

Space conditioning type	Energy interactive HVAC factor	Demand interactive HVAC factor
Refrigerated air	1.05	1.10
Evaporative cooling[12]	1.02	1.04
Medium temperature refrigeration (33 to 41ºF)	1.25	1.25
Low-temperature refrigeration (-10 to 10ºF)	1.30	1.30
None (unconditioned/uncooled)	1.00	1.00

[9] 2012 CBECS and 2014 MECS.
[10] Outdoor coincidence factors are specified for winter peak. All other values reference summer peak.
[11] PUCT Docket 39146. Table 7 (page 17) and Table 12 (page 24).
[12] These factors are only applicable for projects in climate zones 1 and 5. They are derived by taking a ratio of total HVAC energy use for spaces with evaporative and refrigerated cooling then applying that ratio against the IEF factors specified for refrigerated air.

~~4.5~~4.3 DATA MODEL

With the goal of easing the interpretation of the TRM by database and tracking system developers, the EM&V team worked with EUMMOT and Texas eTRM providers (i.e., Frontier Energy, ANB Systems) to develop a standard data model that outlines common data collected for each prescriptive measure. The data model is for all residential measures in Volume 2 and a variety of commercial measures in Volume 3, which are not already utilizing savings calculators.

For example, the current data model for an ENERGY STAR® clothes dryer includes weather zone, unit type (front-loading, top-loading, compact), capacity (standard, compact), quantity installed, and date of purchase.

A benefit of a standard data model is to improve program and project analytics across service providers and implementers. A standard data model will also standardize project collection forms (e.g., on-site inspection forms) and reduce the time cleaning large data sets.

For more information, please contact an EUMMOT representative.

APPENDIX A: LOW-INCOME INCOME-ELIGIBLE VERIFICATION FORMS

Single-Family (four or less units or owner-occupied)
Income Eligibility for Full-Incentive Energy Efficiency Services

This statement is made to verify my household income eligibility. The Public Utility Commission of Texas has authorized energy efficiency programs to reduce the utility bills of income-eligible households. Contractors participating in the programs receive higher incentive payments when you are income-eligible. The purpose of the higher payment is to enable the contractor to provide the improvements at a very low cost or no cost to you. **Participating in this program will not affect your eligibility for other program benefits listed below.**

The information provided below will be used solely for the purpose of determining household eligibility and will be kept confidential by the investor-owned utility contractor or other representative and by the Public Utility Commission of Texas and their contractor. It will not be sold or provided to any other party.

Name		
Street Address	Apartment Number	
City	State: TX	Zip Code
Phone Number with Area Code: ( ) -	Number of Persons in Household	

☐ **Category 1A:** Eligible through other programs or services

At least one member of my household received benefits from one or more of the programs listed below (☑ check all that applies, **digital or paper copy of proof of participation such as award letter required with this form):**

- ☐ Bureau of Indian Affairs (BIA) General Assistance
- ☐ Federal Public Housing Assistance (FPHA)
- ☐ Food Distribution Program on Indian Reservations (FDPIR)
- ☐ Health Benefit Coverage under Child Health Plan (CHIP)
- ☐ Low-Income Energy Assistance Program (LIHEAP) or Comprehensive Energy Assistance Program (CEAP)
- ☐ Medicaid (includes CHIP)
- ☐ Medicare, Qualified Beneficiary
  - QMB (Qualified Medicare Beneficiary)
  - SLMB Specific Low-Income Medicare Beneficiary)
  - QI (Qualified Individual Program)
  - QDWI (Qualified Disabled & Working Individual Program)
- ☐ National School Lunch Program—Free Lunch Program
- ☐ Section 8 Housing Voucher
- ☐ Supplemental Nutrition Assistance Program (SNAP) (Food Stamps)
- ☐ Supplemental Security Income (SSI)
- ☐ Temporary Assistance for Needy Families (TANF)
- ☐ Texas Lifeline Discount
- ☐ Tribal Head Start (only households that meet the income-qualifying standard)
- ☐ Tribal Temporary Assistance for Needy Families (Tribal TANF)
- ☐ Veterans Pension Benefit or Survivors Pension Benefit
- ☐ Veterans Pension or Survivors Benefit Programs

Your signature is required on the last page of this form.

☐ **Category 1B:** Eligible through community action or social service agency
(COMPLETED BY UTILITY, COMMUNITY ACTION, OR SOCIAL SERVICE AGENCY)

I certify the named household participates in one of the programs in Category 1A or other low-income program service (such as Weatherization Assistance), which our agency qualifies participation.

Agency Name	Contact Name	Contact Phone Number with Area Code: ( ) -

☐ **Category 1C:** Eligible through geographic location
(COMPLETED BY UTILITY OR THEIR REPRESENTATIVE OR PROVIDER)

(☑ check box if applicable): Form is not required for geographical qualification as long as the relevant information is in the utility's tracking data (service address, geographic qualifier)

☐ Housing and Urban Development (HUD) Low-Income Housing-Qualified Census Tract or Block—GEO ID:_____

Rev. 1/2023

Page 1 of 2

Single-Family (four or less units or owner-occupied)
Income Eligibility for Full-Incentive Energy Efficiency Services

☐ **Category 2:** Eligible through income verification
(DO NOT COMPLETE IF 1A, 1B, OR 1C COMPLETED ABOVE)

*To accurately determine your **household income**, you must include the income of all persons residing in your home from all sources. To determine the amount of income in each category, enter the amount(s) on the check or benefit statement.* **Supporting documentation must be provided (all personal identifying information may be redacted except name and address).**

STEP 1: Fill out the Income Calculation table below.

Amounts listed are shown (☑ check one): ☐ Annually ☐ Monthly ☐ Weekly

Income Calculation Table

Source of income	Amount ($)
Wages from full- or part-time employment as shown on a paystub or W-2 form	
Unemployment or worker's compensation	
Social security	
Retirement income	
Child support or alimony	
All other earnings	
Total household income *(add the amount entered on each line to figure your total household income)*	

STEP 2: Compare your total household income per week, month, or year to the amount shown in the table below for the number of persons in your household.

If your total household income is equal to or less than the amount shown in the table, you are income-eligible.

200 Percent of Health and Human Services (HHS) Poverty Guidelines

Size of family unit	Annual income	Monthly income	Weekly income
1	$ 29,160	$ 2,430	$ 561
2	$ 39,440	$ 3,287	$ 759
3	$ 49,720	$ 4,143	$ 956
4	$ 60,000	$ 5,000	$ 1,154
5	$ 70,280	$ 5,857	$ 1,352
6	$ 80,560	$ 6,713	$ 1,550
7	$ 90,840	$ 7,570	$ 1,747
8	$ 101,120	$ 8,427	$ 1,945
Each additional person, add:	$ 10,280	$857	$ 198

* **Notice:** Income ceilings are for February 1, 2023—January 31, 2024.
Annual updates are posted on http://www.puc.texas.gov/industry/electric/forms/

(Electronic) By typing my name below, I certify the above statements to be true and correct to the best of my knowledge, and that this information can be used for the purpose of processing my Single-Family Income Eligibility for Full-Incentive Energy Efficiency Services Form.
(Non-Electronic) If filling out the delineation by hand, please provide your original signature and date.

I understand that the information is subject to audit and investigation by the investor-owned utility or representative providing the program services.

Applicant Signature	Date
Contractor Signature	Date

Keep a copy of this form for your records.

Rev. 1/2023

Page 2 of 2

Multifamily Apartment Complex (five or more units)
Income Eligibility for Full-Incentive Energy Efficiency Services

This form is to verify that at least 75 percent of the units are rented by income-eligible customers. The Public Utility Commission of Texas has authorized energy efficiency programs to reduce the utility bills of income-eligible tenant households. Contractors participating in the programs receive higher incentive payments when at least 75 percent of the tenants qualify as income-eligible. **One form must be filled out for <u>each</u> qualifying multifamily apartment complex.**

The information provided below will be used solely for the purpose of determining household eligibility and will be kept confidential by the investor-owned utility contractor or other representative and by the Public Utility Commission of Texas and their contractor. It will not be sold or provided to any other party.

Name of Applicant (Property Owner or Agent)	Name of Property Owner	
Name of Multifamily Apartment Complex		Number of Units in Complex
Name of Management Company		Name of On-Site Property Manager
Complex Street Address		Suite Number
City	State: TX	Zip Code
Property Owner or Agent's Phone Number with Area Code: ( ) -	Fax Number with Area Code: ( ) -	
Management Company's Phone Number with Area Code: ( ) -	Fax Number with Area Code: ( ) -	

☐ **Category 1A:** Eligible through other programs or services

The multifamily apartment complex qualifies in one or more of the programs listed below (☑ check all that apply, **digital or paper copy of proof of participation such as the land use restriction agreement required with this form**):

- ☐ Affordable Housing Disposition Program
- ☐ HOME Rental Housing Development
- ☐ Low-Income Housing Tax Credit Program
- ☐ Multifamily Bond Program
- ☐ Public Housing Authority (Texas Housing Association)
- ☐ Project-Based Section 8
- ☐ Rural Rental Section 515 (FMHA)
- ☐ Section 811 Project Rental Assistance Program
- ☐ Texas Housing Trust Fund
- ☐ Other income-qualifying housing program
  Program name: _____

Your signature is required on the last page of this form.

☐ **Category 1B:** Eligible through community action or social service agency
(COMPLETED BY UTILITY, COMMUNITY ACTION, OR SOCIAL SERVICE AGENCY)

I certify the named multifamily complex or 75 percent or more of tenants participate in one of the programs in Category 1A or other low-income program service (such as LIHEAP/CEAP and Weatherization Assistance), which our agency qualifies participation.

Agency Name	Contact Name	Contact Phone Number with Area Code: ( ) -

☐ **Category 1C:** Eligible through geographic location
(COMPLETED BY UTILITY OR THEIR REPRESENTATIVE OR PROVIDER)

(☑ check box if applicable): Form is not required for geographical qualification as long as the relevant information is in the utility's tracking data (service address, geographic qualifier).

☐ Housing and Urban Development (HUD) Low-Income Housing-Qualified Census Tract or Block—GEO ID: _____

Rev. 1/2023

Multifamily Apartment Complex (five or more units)
Income Eligibility for Full-Incentive Energy Efficiency Services

☐ **Category 2:** Eligible through income verification
(DO NOT COMPLETE IF 1A, 1B, OR 1C COMPLETED ABOVE)

For an apartment complex to be eligible, at least 75 percent of the tenant household incomes before taxes are at or below 200 percent of the federal poverty guidelines.

STEP 1: Fill out the Apartment Complex Income Calculation Worksheet.
(Excel or hard copy must be included with this form)
*To accurately determine tenant **household income,** you may use the tenant rental application showing the number of individuals residing in the unit and the household income dated from within the past 18 months. If the rental application does not show the required information or the information is over 18 months old, then the tenant(s) must complete the **Single-Family Income Eligibility for Full-Incentive Energy Efficiency Services** form.* Supporting documentation for each unit must be available for utility audit.

STEP 2: Compare the tenant's total household income per week, month, or year to the amount shown in the table below for the number of persons residing in the unit.
If the total household income is equal to or less than the amount shown in the table, the unit is income-eligible for the full incentive. If the unit is not income-eligible, the unit is eligible for the residential incentive level.

200 Percent of Health and Human Services (HHS) Poverty Guidelines

Size of family unit	Annual income	Monthly income	Weekly income
1	$ 29,160	$ 2,430	$ 561
2	$ 39,440	$ 3,287	$ 759
3	$ 49,720	$ 4,143	$ 956
4	$ 60,000	$ 5,000	$ 1,154
5	$ 70,280	$ 5,857	$ 1,352
6	$ 80,560	$ 6,713	$ 1,550
7	$ 90,840	$ 7,570	$ 1,747
8	$ 101,120	$ 8,427	$ 1,945
Each additional person, add:	$ 10,280	$857	$ 198

* **Notice:** Income ceilings are for February 1, 2023—January 31, 2024.
Annual updates are posted on http://www.puc.texas.gov/industry/electric/forms/

STEP 3: Fill out the Apartment Complex Income Calculation Summary below.

Apartment Complex Income Calculation Summary

Apartment complex income calculation summary	Number of units
Number of income-eligible units	
Number of non-income-eligible units, including vacant units	
Total number of units	
Percentage of income-eligible units *(income-eligible units divided by the total number of units)*	

STEP 4: If "percentage of income-eligible units" is 75 percent or higher, please certify the eligibility of the apartment complex with your signature below.

(Electronic) By typing my name below, I certify the above statements to be true and correct to the best of my knowledge and that this information can be used for the purpose of processing my Multifamily Apartment Complex Income Eligibility for Full-Incentive Energy Efficiency Services Form.
(Non-Electronic) If filling out the delineation by hand, please provide your original signature and date.

I understand that the information is subject to audit and investigation by the investor-owned utility or representative providing the program services.

Applicant Signature (Property Owner or Agent)	Date
Contractor Signature	Date

Keep a copy of this form for your records.

Rev. 1/2023

Page 2 of 2

The Apartment Complex Income Calculation Worksheet is posted on Texas PUC Sharepoint.