Evergy Missouri West, Inc. Evaluation, Measurement, and Verification Report – FINAL

Program Year 2019

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Table of Contents

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How to Use This Report

Guidehouse has constructed this report to consist of three key pieces:

- **Main Report:** This document—which provides the summary of our evaluation, measurement, and verification (EM&V) analyses and findings by program
- **Appendices:** The appendices are composed of an Excel file that provides detailed cost-effectiveness results, and a Word document that provides:
    - Survey instruments fielded by the Guidehouse team
    - Process maps that identify the key steps of each program
    - Methodology sections for each program that explain (in greater detail than in the main report) the Guidehouse team's approach to analyzing each program
- **Databook:** An Excel file that provides detail on the midstream calculations and inputs used in the engineering analyses.

Report Definitions

Note: Definitions provided in this section are limited to terms that are critical to understanding the values presented in this report.

Reporting Periods

Cycle 1
Refers to programs implemented in the timeframe of program years 2013-2015 (PY2013-PY2015).

Cycle 2
Refers to programs implemented in the timeframe of program years 2016-2019 (PY2016-PY2019).

Cycle 3
Refers to program implemented in the timeframe of program years 2020-2023 (PY2020-PY2023).

Savings Types

Gross Reported Savings
Savings reported in the Evergy MO West's annual reports prior to any EM&V ex-post gross adjustments and net-to-gross (NTG) adjustments. In previous Guidehouse EM&V reports, gross reported savings were referred to as ex-ante gross savings.

Gross Verified Savings
Savings verified through Guidehouse's impact evaluation methods prior to NTG adjustments. In previous EM&V reports, gross verified savings were referred to as ex post gross savings.

Gross Realization Rates
The ratio of gross verified savings to gross reported savings.

Missouri Energy Efficiency Investment Act (MEEIA) Target
Three-year savings target approved by the Missouri Public Service Commission for a given program.

Net Verified Savings
Savings verified through Guidehouse's impact evaluation methods and inclusive of NTG adjustments.

Percentage of MEEIA Target Achieved
The ratio of net verified savings to the MEEIA target; reflects Evergy MO West's overall achievement toward the MEEIA target.

Net-to-Gross Components

Free Ridership (FR)
The program savings attributable to free riders—i.e., program participants who would have implemented a program measure or practice in the absence of the program.

Participant Spillover (PSO)
The additional energy savings achieved when a program participant—as a result of the program's influence—installs energy efficiency measures or practices outside the efficiency program after having participated.

Nonparticipant Spillover (NPSO)
The additional energy savings achieved when a nonparticipant implements energy efficiency measures or practices because of the program's influence (e.g., through exposure to the program) but is not accounted for in program's gross verified savings.

Net Sales Analysis Approach to NTG
Approaches to estimating NTG that rely on the effect of program activity on total sales, yielding a market-level estimate of NTG that take FR, PSO, and NPSO into account. This involves establishing the sales with the program and estimating sales in the absence of the program, often based on expert opinions (e.g., the input of trade allies), stated participant and non-participant actions in the absence of the program (e.g., in-store intercept surveys), quasi-experimental designs (e.g., the use of comparison areas), or statistical modeling (e.g., modeling the impact of program activity on sales), thereby identifying the overall lift associated with program activity. Note that in some cases, such as the Home Lighting Rebate (HLR) program, sales data are limited to program bulbs only. Regression analysis of this subset of sales facilitates FR estimation, but not spillover (SO) estimation. For lighting specifically, net savings are based on a combination of methods (shopper responses to in-store intercepts and regression analysis) to make certain the estimation reflects both FR and SO.

Billing Analysis Approach to NTG

Approaches to estimating NTG that rely on the use of control groups, either through randomized control trials (RCT) or quasi-experimental designs (e.g., the use of matching techniques to develop relevant non-participant comparison groups), and billing analysis to model participant net savings.

Key Report Sources

Below is a list of the most commonly referenced documents that the evaluation team used for this year's analysis.

Illinois Technical Reference Manual Version 5.0. (IL TRM v5)
http://www.ilsag.info/il_trm_version_5.html

Illinois Technical Reference Manual Version 6.0. (IL TRM v6)
http://www.ilsag.info/il_trm_version_6.html

Illinois Technical Reference Manual Version 7.0. (IL TRM v7)
http://www.ilsag.info/il_trm_version_7.html

Missouri Public Service Commission. Missouri Energy Efficiency Investment Act (MEEIA) Rules and the Stipulation and Agreement approved April 6, 2016, were approved by the Missouri Public Service Commission.

Missouri Code of State Regulations 20 CSR 4240-22.070 (8)

California Public Utilities Commission. *California Standard Practice Manual: Economic Analysis of Demand-Side Programs and Projects.* October 2001.
http://www.cpuc.ca.gov/NR/rdonlyres/004ABF9D-027C-4BE1-9AE1-CE56ADF8DADC/0/CPUC_STANDARD_PRACTICE_MANUAL.pdf.

Daniel M. Violette and Pamela Rathbun. "Estimating Net Savings: Common Practices," Chapter 23 in *The Uniform Methods Project: Methods for Determining Energy Efficiency Savings for Specific Measures*. 2014. http://energy.gov/sites/prod/files/2015/02/f19/UMPChapter23-estimating-net-savings_0.pdf.

Jane Peters and Ryan Bliss. Common Approach for Measuring Free Riders for Downstream Programs. Research Into Action. October 4, 2013.

California Public Utilities Commission. "2007 SPM Clarification Memo." 2007.
http://www.cpuc.ca.gov/NR/rdonlyres/004ABF9D-027C-4BE1-9AE1-CE56ADF8DADC/0/CPUC_STANDARD_PRACTICE_MANUAL.pdf.

Evaluation, Measurement, and Verification Plan: KCP&L Energy Efficiency and Demand Response Program 2013-2015 prepared by Navigant. October 2013.

Rachel Brailove, John Plunkett, and Jonathan Wallach. Retrofit Economics 201: Correcting Commons Errors in Demand-Side Management Benefit-cost Analysis. Resource Insight, Inc. Circa 1990.

Acronyms and Abbreviations

ACUR	Air Conditioning Upgrade Rebate
AMI	Advanced Metering Infrastructure
BOEA	Business Online Energy Audit
BYOD	Bring Your Own Device
C&I	Commercial & Industrial
CBL	Customer Baseline
CET	Customer Engagement Tracker
CF	Coincident Factor
CL	Curtailable Load
CV	Coefficient of Variation
DI	Direct Install
DIY	Do It Yourself
DOE	Department of Energy (United States)
DR	Demand Response
DRI	Demand Response Incentive
DSM	Demand-Side Management
EA	Energy Analysis
EC	Energy Consultant
EE	Energy Efficiency
EEP	Energy Efficiency Professional
EER	Energy Efficiency Rebate (Business)
EISA	Energy Independence and Security Act
EM&V	Evaluation, Measurement, and Verification
EPD	Estimated Peak Demand
EUL	Effective Useful Life
EV	Electric Vehicle
ESI	Evergy Services, Inc.
FPL	Firm Power Level
FR	Free Rider(ship)
GPM	Gallons per Minute
GMO	Greater Missouri Operations
GPES	Great Plains Energy Services
GW	Gigawatt
GWh	Gigawatt-Hour
HDD	Heating Degree Day
HER	Home Energy Report
HLR	Home Lighting Rebate

HOEA	Home Online Energy Audit
HOU	Hours of Use
HVAC	Heating, Ventilation, and Air Conditioning
IC	Implementation Contractor
IE	Income-Eligible
IEMF	Income-Eligible Multifamily
IEW	Income-Eligible Weatherization
INF	Infinite benefit-cost ratio when there are positive benefits and no participant costs
ISR	In-Service Rate
KCP&L	Kansas City Power and Light
KCP&L-MO	KCP&L Missouri Operations Company
kW	Kilowatt
kWh	Kilowatt-Hour
LED	Light-Emitting Diode
LIHTC	Low Income Housing Tax Credit
M&V	Measurement and Verification
MEEIA	Missouri Energy Efficiency Investment Act
MHDC	Missouri Housing Development Commission
MO	Missouri
MOU	Memorandum of Understanding
MW	Megawatt
MWh	Megawatt-Hour
NPSO	Nonparticipant Spillover
NTG	Net-to-Gross
O&M	Operational and Maintenance
PCT	Participant Cost Text
PSO	Participant Spillover
PT	Programmable Thermostat
PY	Program Year
QC	Quality Control
QI	Quality Installation
RCT	Randomized Control Trial
RFP	Request for Proposal
RFQ	Request for Qualifications
RHR	Rush Hour Rewards
RIM	Ratepayer Impact Measure
RUL	Remaining Useful Life
SBL	Small Business Lighting
SCT	Societal Cost Test
SEER	Seasonal Energy Efficiency Ratio

SEM	Strategic Energy Management
SO	Spillover
SPM	Standard Practice Manual
SS	Seasonal Savings
TMY3	Typical Meteorological Year 3
TRC	Total Resource Cost
TRM	Technical Reference Manual
UCT	Utility Cost Test
USDA	United States Department of Agriculture
VFD	Variable Frequency Drive
W	Watts
WACC	Weighted Average Cost of Capital
WHE	Whole House Efficiency
WHF	Waste Heat Factor
WHFd	Waste Heat Factor Demand
WHFe	Waste Heat Factor Energy
WUM	What Uses Most

1. Introduction

This evaluation report is provided by Evergy Services, Inc. (ESI) on behalf of its affiliate Evergy MO West (formerly Kansas City Power and Light (KCP&L) – Greater Missouri Operations Company (GMO)) in accordance with the Missouri Energy Efficiency Investment Act (MEEIA) Rules and the Stipulation and Agreement of April 6, 2016, which were approved by the Missouri Public Service Commission. The analyses contained in this report are designed to evaluate, measure, and verify the information tracked by Evergy MO West for its portfolio of 15 demand side management (DSM) programs for program year (PY) 2019.

Guidehouse conducted the following tasks as part of its impact evaluation, process evaluation, and cost-effectiveness analysis for PY2019:

- Evaluate the gross and net energy and peak demand savings from Evergy MO West's energy efficiency (EE) and demand response (DR) programs
- Evaluate the effectiveness of and develop actionable recommendations to improve the design of Evergy MO West's suite of EE and DR programs
- Estimate the cost-effectiveness of Evergy MO West's EE and DR programs

The evaluation team consists of Guidehouse, Inc., Illume Advising LLC (Illume), and NMR Group, Inc. (NMR). As the primary contractor, Guidehouse is the main point of contact for Evergy MO West and the implementation contractors (ICs). Guidehouse has ultimate responsibility for managing the effort, for quality control, and for ensuring that deliverables are submitted on time and on budget. Illume, a women-owned business, applied its recognized national expertise in behavioral research and evaluation to lead the evaluation of the Home Energy Report (HER), Income-Eligible Multifamily (IEMF), and Online Energy Audit (OEA) programs. NMR led the Home Lighting Rebate (HLR) and Small Business Lighting (SBL) program evaluations. Throughout this report, the team is referred to as Guidehouse or the evaluation team.

1.1 Document Structure

As agreed to with Stakeholders and discussed during the Evergy Missouri Metro-West DSMAG Quarterly Meetings (December 3, 2019 and March 6, 2020), the Guidehouse team is providing a condensed EM&V report that focuses on key impact evaluation findings and recommendations. Additionally, this report provides an summary of the MEEIA Cycle 2 portfolio process evaluation findings that address the five required questions per the Missouri Code of State Regulations 20 CSR 4240-22.070 (8) (Missouri regulations). Guidehouse divided the document into the following sections:

- **Summary of Approaches:** Provides a summary of the evaluation approaches for the impact evaluation, including the process for using secondary sources. It also includes overviews of the approach for net-to-gross, cost effectiveness and process research.

- **Portfolio Findings and Evaluation Results:** This section provides findings and recommendations at the portfolio and sector level for gross and net savings, cost effectiveness, and overarching process findings.

Several appendices accompany this document, including:

- **Appendix A. Survey Instruments:** Provides detailed survey guides, including participant, trade ally, and supplier interview guides.
- **Appendix B. Standard Methodologies:** Covers Guidehouse's overall approach toward cross-cutting methodologies, namely determining cost-effectiveness and NTG savings.
- **Appendix C. Missouri Requirements for Impact Evaluation:** Provides an overview of MO regulation requirements for conducting an impact evaluation.
- **Appendix D – O. Program-Specific Methodologies:** Details program-specific methodologies, including any differences between the standard methodologies and those the evaluation team used for each program.
- **Appendix P. Summary of Program Findings and Recommendations:** Details the findings and recommendations that resulted from the evaluation of each program.
- **Appendix R. Cost-Effectiveness Data – CONFIDENTIAL**: An Excel databook containing the following:
    - All measure-specific input assumptions.
    - Program-level administrative costs incurred by the program administrator.
    - Detailed benefit and cost breakdowns by cost test and program/portfolio.
- **Excel Databook – CONFIDENTIAL:** Provides additional analytical data and figures for each program in addition to summary results tables for the portfolio.

2. Summary of Approaches

The team summarizes the approach for gross impact, net savings analysis, and process evaluation below and describes the key methods in the following sections.

2.1 Impact Evaluation Approach

The evaluation team employed a variety of methods to evaluate, measure, and verify the energy and demand savings achieved by each of Evergy Metro's DSM programs. Guidehouse's **gross impact** evaluation strategy had three basic components:

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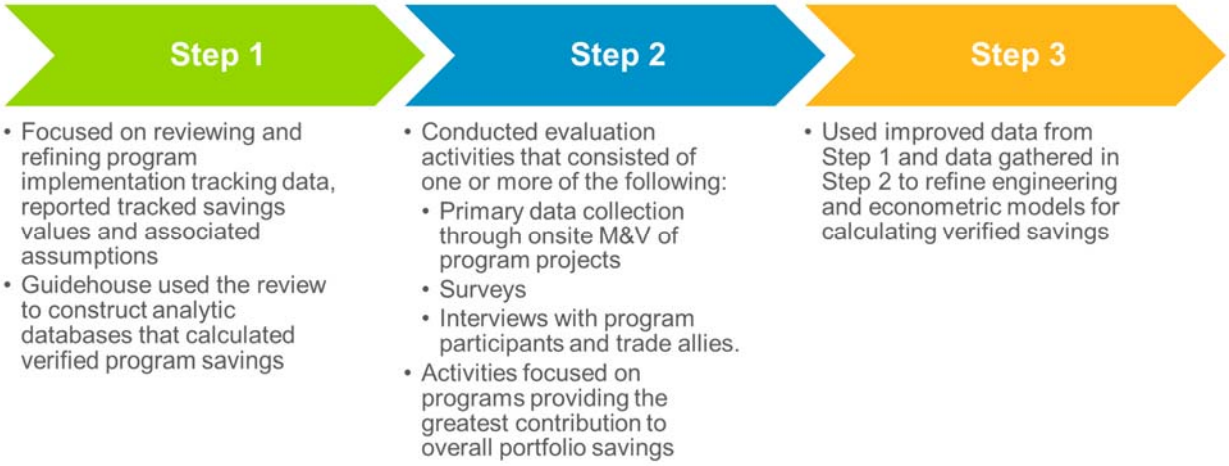


In accordance with Missouri regulations,[1] Evergy MO West is required to complete an impact evaluation for each program using one or both methods and one or both protocols detailed below.

1. **Impact evaluation methods.** At a minimum, comparisons of one or both of the following types shall be used to measure program and rate impacts in a manner that is based on sound statistical principles:

    a. Comparisons of pre-adoption and post-adoption loads of program or demand side rate participants, corrected for the effects of weather and other intertemporal differences

    b. Comparisons between program and demand side rate participants' loads and those of an appropriate control group over the same period

[1] Missouri Code of State Regulations 20 CSR 4240-22.070 (8)

2. **Load impact measurement protocols.** The evaluator shall develop load impact measurement protocols designed to make the most cost-effective use of the following types of measurements, either individually or in combination:

    a. Monthly billing data, hourly load data, load research data, end-use load metered data, building and equipment simulation models, and survey responses

    b. Audit and survey data on appliance and equipment type, size and efficiency levels, household or business characteristics, or energy-related building characteristics

Guidehouse's methods and protocols for the impact evaluation (as they align with the MO requirements) are summarized in Table 2-1.

Table 2-1. MO Regulations Impact Evaluation Methods and Protocols

Program		Impact Evaluation Method	Impact Evaluation Protocol
Commercial and Industrial (C&I) Energy Efficiency (EE) Programs	Business EER – Standard Program	1a	2a and 2b
	Business EER – Custom Program	1a	2b
	Block Bidding*	1a	2b
	Strategic Energy Management (SEM)	1a	2b
	Small Business Lighting (SBL)	1a	2a and 2b
Residential EE Programs	Income-Eligible Weatherization* (IEW)	N/A	N/A
	Whole House Efficiency (WHE)	1a	2b
	Income-Eligible Multifamily (IEMF)	1a	2b
	Home Lighting Rebate (HLR)	1a**	2b
Educational/Behavioral Programs	Home Energy Report (HER)	1b	2a
	Business Online Energy Audit	N/A	N/A
	Home Online Energy Audit	N/A	N/A
DR Programs	Business Programmable Thermostat	1b	2b
	Residential Programmable Thermostat	1b	2b
	Demand Response Incentive (DRI)	1a	2a

*No savings were claimed for the IEWx program in PY2019.

**The upstream nature of the HLR program does not allow for identification of participants and nonparticipants for assessments for comparisons of load shapes; for budgetary reasons, the evaluation did not include an hours of use study, which could have provided lighting load shapes for all households.

Source: Guidehouse analysis

2.1.1 Process for Using Secondary Sources

Evaluation results in MEEIA Cycle 2 reflect findings from research conducted concurrent with each program year. When all stakeholders and Evergy MO West agree, these research findings are applied to the following program years. For example, in PY2019, Guidehouse

conducted NTG research for the Business Energy Efficiency Custom program. The results from this research were applied to PY2019 gross savings.

The evaluation team uses primary in-state data when possible and agrees with the applicability to the Evergy MO West territories. Primary out-of-state data is used when primary in-state data is not available. Secondary out-of-state data is used when neither reliable primary in-state data or primary out-of-state data are available.

2.1.2 Net-to-Gross

Guidehouse used three primary methods to develop net savings for each program in PY2019:

- **Net to gross (NTG) ratios,** which involved the derivation of NTG components including free ridership (FR) and spillover (SO) informed by participant and trade ally surveys.
- **Direct estimation** of net savings, which involved conducting billing or net sales analyses.
- **Deemed NTG estimates,** which applied pre-determined estimates that did not warrant data collection or were informed by MEEIA Cycle 1's NTG findings for programs that did not have substantial program changes between Cycle 1 and Cycle 2, or by NTG findings from research conducted in PY2016, PY2017, PY2018 and PY2019.

For programs where the NTG ratios are developed, the components are either based on data collected in PY2016, PY2017, PY2018 and PY2019 from participants and—where appropriate—from trade allies. Guidehouse used the following component definitions, provided by the Uniform Methods Project,[2] to calculate the NTG ratios:

- **FR:** The program savings attributable to free riders—i.e., program participants who would have implemented a program measure or practice in the absence of the program.
- **Participant SO (PSO):** The additional energy savings achieved when a program participant—as a result of the program's influence—installs EE measures or practices outside the efficiency program after having participated.
- **Nonparticipant SO (NPSO):** The additional energy savings achieved when a nonparticipant implements EE measures or practices as a result of the program's influence (for example, through exposure to the program) but is not accounted for in program savings.

Using these definitions, the NTG ratio is calculated as follows in Equation 2-1:

[2] Daniel M. Violette and Pamela Rathbun. *Estimating Net Savings: Common Practices*, Chapter 23 in *The Uniform Methods Project: Methods for Determining Energy Efficiency Savings for Specific Measures*. 2014. http://energy.gov/sites/prod/files/2015/02/f19/UMPChapter23-estimating-net-savings_0.pdf.

Equation 2-1. NTG Ratio

$$\text{NTG Ratio} = 1 - \text{FR rate} + \text{PSO rate} + \text{NPSO rate}$$

Where:

FR rate =	Free ridership rate
PSO rate =	Participant spillover rate
NPSO rate =	Nonparticipant spillover rate

As discussed in prior stakeholder meetings and evaluation reports, the direct savings approach is applied to the Demand Response Incentive (DRI), Strategic Energy Management (SEM) and Home Energy Report (HER/IEHER) programs. These programs directly estimate net impacts through a billing analysis that utilizes controls. Additionally, the evaluation team applied a deemed NTG ratio of 1.0 for the following programs:

- Home Online Energy Audit (HOEA) and the Business Online Energy Audit (BOEA) programs, which did not claim any savings.
- Income-Eligible Multifamily, as the cost of assessing net savings for this program is judged to exceed the value given the program's small contribution to total energy savings targeted for this program year.

2.2 Cost-Effectiveness Approach

Guidehouse calculated benefit-cost ratios and total net benefits at the program and portfolio level for the five standard benefit-cost tests: Total Resource Cost (TRC) test, Societal Cost Test (SCT), Utility Cost Test (UCT), Participant Cost Test (PCT), and Ratepayer Impact Measure (RIM) test. Benefit-cost ratios are informative as they show the value of monetary benefits relative to the value of monetary costs as seen from various stakeholder perspectives.

Cost-effectiveness values were calculated using Evergy MO West's DSMore model in conjunction with Guidehouse-verified EM&V findings, including: energy and demand impacts, incremental costs, NTG ratios, participation numbers, and measure lifetimes. All program and avoided cost data, and discount rates, are consistent with those used by Evergy MO West in calculating cost-effectiveness as part of its annual filing. Guidehouse will provide Evergy MO West with the evaluated savings included in this analysis to support its performance incentive calculation.

Consistent with previous years evaluations, the process used for calculating cost-effectiveness in PY2019 involved the following steps:[3]

1. Evergy MO West provided a template to Guidehouse which contained all the measures available in the Plan Year along with the associated Technical Reference Manual (TRM) values.

[3] This approach was agreed upon by Evergy MO West, MPSC Staff, and Guidehouse on January 22, 2018 to ensure consistency in the avoided cost values and cost-effectiveness methodology used in Evergy Metro's annual reports and Guidehouse's EM&V reports.

2. Guidehouse updated any measure value that changed as a result of the EM&V process (i.e., energy savings, demand savings, NTG, measure life, and incremental measure cost).

3. The template was sent back to Evergy MO West where it was loaded into the DSMore batch tool. The tool was then executed by Evergy MO West with the new measure values and the cost effectiveness was calculated.

4. The results were sent to Guidehouse for inclusion in the EM&V report.

Guidehouse analyzed early retirement measures in the Whole House Efficiency (WHE) program using a two-part savings stream (i.e., a dual baseline approach) and accounting for the adjustments in equipment investment timing due to the early retirement of functional equipment. This approach was necessary to ensure that early retirement measures were fairly burdened with the full cost of the efficient equipment, and to ensure the savings stream correctly accounted for differences in baseline assumptions over the lifetime of the measure.

Table 2-2 summarizes how program costs and benefits are assigned to each of the cost tests consistent with the California SPM.

Table 2-2. Cost and Benefit Assignments by Cost Test

Item	TRC Test	SCT	UCT	PCT	RIM Test
Avoided Costs	Benefit	Benefit	Benefit	N/A	Benefit
Incentives	Transfer	Transfer	Cost	Benefit	Cost
Lost Revenues	Transfer	Transfer	N/A	Benefit	Cost
Administrative Costs	Cost	Cost	Cost	N/A	Cost
Participant Equip. Costs	Cost	Cost	N/A	Cost	N/A

TRC = total resource cost, SCT = societal cost test, UCT = utility cost test, PCT = participant cost test, RIM = ratepayer impact measurement
Source: Guidehouse analysis

2.2.1 Source of Benefit and Cost Assumptions

The sources of data used in the benefit-cost analysis are summarized in Table 2-3. Many of the input assumptions used in Guidehouse's analysis came directly from Evergy MO West. Critical assumptions that differed in the evaluation team's analysis were energy and peak demand savings (derived from verified data rather than reported estimates), NTG ratios, effective useful life (EUL) and remaining useful life (RUL) values, and participant equipment costs. Reference Appendix R for inputs to Guidehouse's benefit-cost model.

Table 2-3. Sources of Benefit and Cost Data

Data[4]	Source
Avoided energy costs	Provided by Evergy MO West
Avoided capacity costs	Provided by Evergy MO West
Retail rates	Provided by Evergy MO West
Load shapes	Provided by Evergy MO West
Discount rates	Provided by Evergy MO West and classified by Evergy MO West as highly confidential
Participant equipment costs	Illinois Technical Reference Manual (TRM), Evergy MO West prescribed values.
Energy and peak demand savings	Guidehouse engineering analyses
EUL	Illinois TRM, program tracking data, Evergy Metro prescribed values.
RUL	Guidehouse analysis based on lifetime of replaced equipment and related mortality analysis techniques.
NTG	Guidehouse NTG analysis
Line loss factors	Provided by Evergy MO West
Incentives	Program tracking database
Participation	Program tracking database
Administrative costs	Provided by Evergy MO West

Source: Guidehouse analysis

2.3 Process Evaluation Approach

Guidehouse's process evaluation focused on the following: (1) addressing the five required questions per the Missouri Code of State Regulations 20 CSR 4240-22.070 (8) (Missouri regulations) as shown below, and (2) identifying program process improvements to increase program participation and savings.

[4] Guidehouse did not provide the avoided energy and capacity costs in this report as they are confidential to Evergy MO West.

QUESTION 1
What are the primary market imperfections that are common to the target market segment?

QUESTION 2
Is the target market segment appropriately defined, or should it be further subdivided or merged with other market segments?

QUESTION 3
Does the mix of end-use measures included in the program appropriately reflect the diversity of end-use energy service needs and existing end-use technologies within the target market segment?

QUESTION 4
Are the communication channels and delivery mechanisms appropriate for the target market segment?

QUESTION 5
What can be done to more effectively overcome the identified market imperfections and to increase the rate of customer acceptance and implementation of each end-use measure included in the program?

Guidehouse performed the following process activities to inform its evaluation:

Program Staff and IC Interviews
- All Programs

Materials Review
- All Programs

Trade Ally Surveys
- Business EER – Custom, Block Bidding

Participant Surveys
- Business EER – Custom, Block Bidding

Guidehouse summarized findings for the Missouri-required process evaluation questions across all program years, regardless of when the research was conducted during MEEIA Cycle 2, to help Evergy Metro understand the overall progress of the Company's portfolio of programs toward meeting its 4-year MEEIA targets and improving overall customer engagement. PY2019 Program specific process findings and recommendations are provided in Appendix Q.

2.4 PY2019 Evaluation Research Summary

This section presents Guidehouse's evaluation approach for the impact evaluation, process evaluation and NTG research in PY2019.

2.4.1 Gross Impact Evaluation Summary

The evaluation team employed a variety of methods to evaluate, measure, and verify energy and demand savings achieved by each of Evergy's DSM programs in PY2019.

2.4.1.1 Impact Evaluation Methods

Guidehouse followed impact evaluation and data collection methods as required by Missouri Regulations (MO Regulations).

Guidehouse employed the evaluation methods shown in Table 2-4 below with varying levels of rigor and different objectives for evaluating impacts of Evergy's DSM programs.

Table 2-4 Summary of Impact Evaluation Activities

	Program	Tracking System & Database Review	Deemed Savings Review	Analytic Database Development & Engineering Analysis	Desk/Phone Review	Billing Analysis	On-site EM&V
C&I EE Programs	BEER Custom Program	All Programs	All Prescriptive Programs		X		X
	BEER Standard Program			X			
	Block Bidding				X		
	Strategic Energy Management			No Program Activity Reported			
	Small Business Lighting						
Residential EE Programs	Whole House Efficiency			X			
	Income-Eligible Multi-Family			X	X		
	Home Lighting Rebate			X			
Demand Response Programs	Business & Residential Programmable Thermostat			X			
	Demand Response Incentive			X		X	
Educational/ Behavioral Programs	Income-Eligible Home Energy Report / Home Energy Report			X			
	Online Home & Business Energy Audit			X			

Source: Guidehouse analysis

1. **Tracking System and Database Review**

   Guidehouse reviewed program implementation databases and identified additional data required for calculating gross energy and demand savings.

2. **Deemed Savings Review and Memo**

   Guidehouse reviewed the algorithms and assumptions supporting current reported savings for all programs and measures. We leveraged recent EM&V reports and other secondary sources for similar programs and measures to identify the operating characteristics that best reflect Evergy's service territories and program designs. These operating characteristics include operation hours, coincidence factors, installation rates, and leakage rates.

3. **Analytic Database Updating**

   Guidehouse updated the analysis tools that calculate savings based on engineering algorithms and project-specific equipment specifications and performance data provided in the implementation databases. Guidehouse's research from the MEEIA 2 PY2016 through PY2019 period was used to update these analytic databases.

   These savings verification tools will provide Evergy with an indication of how reported savings are tracking against verified values.

4. **Desk/Phone Review**

   For some custom measures without deemed savings, field metering was not warranted. In those cases, we conducted a thorough review of the reported savings models used to estimate impacts. The results of this review resulted in refinements to the algorithm, the inputs to the algorithm, or an entirely new engineering model. We reviewed the algorithms and assumptions supporting reported savings for all programs and leverage recent EM&V reports and other secondary sources for similar programs and measures to identify the operating characteristics that best reflect the Evergy service territories and program designs. These operating characteristics include operation hours, coincidence factors, installation rates, and leakage rates.

   Additionally, Guidehouse conducted telephone surveys with program participants with the primary objective of verifying the installation and operation of measures rebated through the programs or the delivery of a service rebated through the programs. This evaluation activity was leveraged for both the impact and process evaluations.

5. **Billing Analysis**

   Guidehouse used a billing analysis approach to estimate gross savings for the Demand Response Incentive (DRI) program using the following approaches:

   1. Within-subject regression: Uses loads of participating customers on non-event days to estimate the reference load. Demand is specified as a function of temperature and other variables that influence usage in the regression equation.

2. Day averaging (CBL): Reference load calculation, which is the simple arithmetic mean of loads from the same hour on preceding non-event days.

6. On-site EM&V

Guidehouse conducted on-site verification of non-lighting projects to support the PY2019 impact evaluation. The objectives of the on-site verification included the following.

- Support the impact evaluation of non-lighting projects:
  - Guidehouse verified that the measures listed in the project tracking data were successfully installed and implemented. Guidehouse reviewed the HVAC system, control strategies and building energy management system (EMS) to verify that the assumptions used for calculating savings are accurate reflections of the site conditions. Finally, Guidehouse requested trend data for all non-lighting measures[5].
  - On-site verification helped Guidehouse to understand how Custom measures were being implemented, the customers' experiences, and their expectations.
  - Whenever possible, Guidehouse determined verified savings using the actual performance data collected during the site visit.
  - The on-site verification improved the accuracy of the verified savings analysis.
- Support the participant NTG research in PY2019:
  - The objective of the NTG research was to understand customer's experience with the Custom program, quantify the free ridership and spillover, and identify areas for improvement. While on-site, Guidehouse asked customers if they would be willing to participate in the NTG survey distributed in early February 2020. During this time, Guidehouse made sure that the customers had access to the survey.
- Update demand factors for non-lighting end uses:
  - The verified savings calculated by leveraging the actual performance data was used to update the demand factors for non-lighting end uses, including unitary AC, HVAC control, motors and drive, and refrigeration. These updated demand factors will be intended for use in Cycle 3 PY2.

2.4.2 Process Evaluation Summary

Guidehouse conducted limited process evaluation in PY2019 that provided updates to the previous year (i.e. PY2018) process findings and recommendations as they related to the five required questions per the Missouri Code of State Regulations.

For each program, our process evaluation activities for 2019 consisted of (1) program manager/implementation contractor interviews, and (2) a review of new program material and

[5] Guidehouse has had limited success with collecting trend data as part of customer phone interviews. Guidehouse has generally had more success overall collecting trend data as part of on-site verification efforts.

information. Customer and trade ally surveys were conducted for the Business EER – Custom program.

1. **Program Manager/Implementer Interviews**

   The process evaluation for each program included an in-depth, qualitative interview with Evergy program staff and implementers. The Guidehouse team used these interviews to develop a thorough understanding of the final program design, procedures, and implementation strategies for each program and to gain a deeper understanding of current issues for each continuing program. The team also used the interviews to identify research topics to include in future trade ally interviews and customer surveys and to discuss available program materials (e.g., marketing and outreach materials, print and radio advertising copy) that can be used to support the evaluation.

2. **Review of Program Information**

   The Guidehouse team also reviewed new or updated program materials including application forms, marketing and outreach materials, web-based promotional content, point of purchase materials, print and radio advertising copy, and any cooperative marketing materials. This review helped us to understand how the programs are being marketed, determine whether the materials are complete, and begin to explore other efforts that could improve program participation and manage levels of free ridership to the extent these issues are observed.

3. **Customer and Trade Ally Surveys**

   For the Custom program, Guidehouse conducted customer and trade ally surveys. Guidehouse leveraged the surveys developed in PY2017 and PY2018 to survey participants in PY2019 to develop a net-to-gross ratio for the program.

2.4.3 Net-to-Gross PY2019 Research Summary

Guidehouse applied net-to-gross (NTG) ratios developed over the course of the MEEIA Cycle 2 for all programs in PY2019, with the exception of the Custom program which was the only program in PY2019 to receive primary research. This program received additional evaluation focus because a new implementation contractor had assumed the C&I Business Custom program for PY2019.

3. Portfolio Findings and Evaluation Results

3.1 Gross and Net Savings Summary

This section summarizes the gross and net savings achievements for the Evergy MO West portfolio to date and for PY2019. PY2019 represented a 9-month extension period of MEEIA Cycle 2 and presents the conclusion of an overall successful cycle. Evergy MO West's portfolio performed well and exceeded their MEEIA Cycle 2 4-year energy targets and came close to achieving the 4-year demand target. Table 3-1 and Table 3-2 indicate that, at the close of PY2019, the portfolio achieved 110% of its 4-year energy target and 95% of its 4-year demand target. At the close of MEEIA Cycle 2, the commercial and residential sectors exceeded their targets by 17% and 18%, respectively, for net energy savings. The educational and demand response programs both fell short of achieving their 4-year energy targets. The residential suite of programs exceeded their net demand target by 79%. Although the commercial, education and demand reduction programs did not achieve their 4-year net demand targets, they did contribute approximately 82% of total verified net demand savings.

Table 3-1. Program to Date Energy Savings at the Customer Meter by Sector

Sector	Gross			Net		
	Reported Savings (kWh)	Verified Savings (kWh)	Realization Rate (%)	MEEIA Cycle 2 4-Year Target (kWh)	Verified 4 - Year Savings (kWh)	Percentage of MEEIA 4-Year Target Achieved
Commercial EE Programs	190,061,831	165,532,240	87%	127,615,141	148,771,341	117%
Residential EE Programs	97,572,544	97,936,330	100%	68,918,670	81,601,678	118%
Educational Programs	12,813,477	11,787,812	92%	21,070,772	11,787,812	56%
DR Programs	9,909,017	6,512,553	66%	7,778,925	6,512,553	84%
Evergy MO West TOTAL	**310,356,870**	**281,768,935**	**91%**	**225,383,508**	**248,673,384**	**110%**

Source: Guidehouse analysis

Table 3-2. Program to Date Demand Savings at the Customer Meter by Sector

Sector	Gross			Net		
	Reported Savings (kW)	Verified Savings (kW)	Realization Rate (%)	MEEIA Cycle 2 4-Year Target (kW)	Verified 4 - Year Savings (kW)	Percentage of MEEIA 4-Year Target Achieved
Commercial EE Programs	33,227	28,666	86%	25,786	25,558	99%
Residential EE Programs	20,125	24,796	123%	11,286	20,233	179%
Educational Programs	3,410	3,291	97%	4,215	3,291	78%
DR Programs	69,815	62,705	90%	76,215	62,705	82%
Evergy MO West TOTAL	**126,577**	**119,458**	**94%**	**117,502**	**111,787**	**95%**

Source: Guidehouse analysis

Table 3-3 and Table 3-4 summarize the program to date gross and net verified energy and demand savings at the customer meter for Evergy MO West's programs. Table 3-5 and Table 3-6 summarize the gross and net verified energy and demand savings at the customer meter for Evergy MO West's programs and the overall portfolio for PY2019. Portfolio to date results are presented first, followed by PY2019 results. Guidehouse has highlighted key metrics of the portfolio performance and findings of the most impactful programs.

Evergy MO West Program-to-Date Results

Program to date, the portfolio has achieved 281,768,935 kWh and 119,458 kW in **gross energy and demand** savings at the customer meter. This corresponds to realization rates of 91% and 94%, respectively. To date, the portfolio has achieved 248,673,384 kWh and 111,787 kW in **verified net energy and demand savings**. **This corresponds to the portfolio achieving approximately 110% and 95% of its cumulative 4-year MEEIA Cycle 2 energy and demand targets, respectively.** Table 3 through Table 6 provide energy and demand evaluation findings. **The points below highlight key program impact findings to date.**

GROSS ENERGY SAVINGS:
281,768,935 kWh

GROSS DEMAND SAVINGS:
119,458 kW

- **The portfolio's energy and demand realization rates were driven primarily by the realized savings for the Business Energy Efficiency Rebate (EER) – Standard program**, driven largely by corrections to baseline fixture wattages for high bay lighting. Program to date, the **Standard program achieved 230% and 247% of its 4-year MEEIA Cycle 2 target for energy and demand,** respectively, and it represented 41% and 17% of total verified net energy and demand savings, respectively.

- **The Business EER – Custom program achieved approximately 64% (an increase from 56% in PY2018) and 49% (and increase from 45%) of its 4-year MEEIA Cycle 2 energy and demand targets, respectively**. Although the Custom program did not achieve its 4-year MEEIA Cycle 2 target, the program has consistently grown in program participation year-over-year (representing 1% of portfolio energy savings in PY2016 to 14% of savings in PY2019). In addition to increasing participation, the program has also diversified participation in end-use types beyond lighting measures, targeting more complex HVAC, motor, process and refrigeration projects.

NET ENERGY SAVINGS:
248,673,384 kWh

NET DEMAND SAVINGS:
111,787 kW

- **The portfolio's suite of residential energy efficiency (EE) programs performed well, accounting for 35% and 21% of verified gross energy and demand savings, respectively.** Continued strong performance from the WHE program (representing 10% and 13% of verified PTD gross savings) and an increase in participation in the HLR program (representing 20% and 6% of verified PTD gross savings) contributed to the suite of residential programs **achieving 118% and 179% of their MEEIA Cycle 2 4-year target for energy and demand, respectively.**

- **The Programmable Thermostat programs represents 28% of total portfolio verified net demand savings while the DRI program represented approximately 29% of total portfolio verified net demand savings, for a combined contribution of 56% of net demand savings.** Together, the thermostat programs and the DRI program deliver strong demand reductions and demonstrate the value they provide as a flexible capacity

resource. Further, the Programmable Thermostats programs provides an opportunity for customer bill savings as Evergy MO West considers Time-of-Use (TOU) rates.

Table 3-3. Energy Savings at the Customer Meter: Program to Date

Sector	Program	Gross			Net		
		Reported Savings (kWh)	Verified Savings (kWh)	Realization Rate (%)	MEEIA 4-Year Cycle 2 Target (kWh)	Verified 4-Year Savings (kWh)	Percentage of MEEIA 4-Year Target Achieved
Commercial Energy Efficiency (EE) Programs	***Commercial EE Programs Subtotal***	***190,061,831***	***165,532,240***	***87%***	***127,615,141***	***148,771,341***	***117%***
	Business EER - Standard	138,921,385	115,710,357	83%	48,388,453	111,081,943	230%
	Business EER - Custom	34,330,320	34,215,568	100%	37,599,915	24,193,938	64%
	Block Bidding	6,252,181	6,591,574	105%	22,004,934	4,999,312	23%
	Strategic Energy Management	6,011,417	4,963,232	83%	15,159,385	4,963,232	33%
	Small Bus. Lighting	4,546,529	4,051,509	89%	4,462,454	3,532,916	79%
Residential EE Programs	***Residential EE Programs Subtotal***	***97,572,544***	***97,936,330***	***100%***	***68,918,670***	***81,601,678***	***118%***
	Income-Eligible Weatherization	304,972	309,812	102%	143,458	309,812	216%
	Whole House Efficiency	31,749,935	28,619,677	90%	24,647,183	22,895,742	93%
	Income-Eligible Multifamily	12,815,744	11,894,677	93%	12,517,848	11,894,677	95%
	Home Lighting Rebate	52,701,893	57,112,164	108%	31,610,181	46,501,447	147%
Educational Programs	***Educational Programs Subtotal***	***12,813,477***	***11,787,812***	***92%***	***21,070,772***	***11,787,812***	***56%***
	Home Energy Report	12,813,477	11,787,812	92%	21,070,772	11,787,812	56%
	Home Online Energy Audit	Educational programs are not part of MEEIA Targets for Energy or Demand Savings					
	Business Online Energy Audit						
Demand Response (DR) Programs	***DR Programs Subtotal***	***9,909,017***	***6,512,553***	***66%***	***7,778,925***	***6,512,553***	***84%***
	Business Programmable Thermostat	255,076	149,032	58%	98,753	149,032	151%
	Residential Programmable Thermostat	9,653,941	6,363,521	66%	7,680,173	6,363,521	83%
	Demand Response Incentive	The Demand Response Incentive Program did not claim any energy savings.					
Evergy MO West TOTAL		**310,356,870**	**281,768,935**	**91%**	**225,383,508**	**248,673,384**	**110%**

Source: Guidehouse analysis

Table 3-4. Coincident Demand Savings at the Customer Meter: Program to Date

Sector	Program	Gross			Net		
		Reported Savings (kW)	Verified Savings (kW)	Realization Rate (%)	MEEIA 4-Year Cycle 2 Target (kW)	Verified 4-Year Savings (kW)	Percentage of MEEIA 4-Year Target Achieved
Commercial Energy Efficiency (EE) Programs	***Commercial EE Programs Subtotal***	***33,227***	***28,666***	***86%***	***25,786***	***25,558***	***99%***
	Business EER - Standard	25,341	20,500	81%	7,981	19,680	247%
	Business EER - Custom	6,375	6,802	107%	9,698	4,783	49%
	Block Bidding	737	778	106%	3,815	590	15%
	Strategic Energy Management	0	-45	N/A	3,552	-45	-1%
	Small Bus. Lighting	773	631	82%	740	551	74%
Residential EE Programs	***Residential EE Programs Subtotal***	***20,125***	***24,796***	***123%***	***11,286***	***20,233***	***179%***
	Income-Eligible Weatherization	226	128	57%	53	128	244%
	Whole House Efficiency	13,251	15,854	120%	6,340	12,683	200%
	Income-Eligible Multifamily	1,462	1,481	101%	1,696	1,481	87%
	Home Lighting Rebate	5,186	7,333	141%	3,197	5,941	186%
Educational Programs	***Educational Programs Subtotal***	***3,410***	***3,291***	***97%***	***4,215***	***3,291***	***78%***
	Home Energy Report	3,410	3,291	97%	4,215	3,291	78%
	Home Online Energy Audit	Educational programs are not part of MEEIA Targets for Energy or Demand Savings					
	Business Online Energy Audit						
Demand Response (DR) Programs	***DR Programs Subtotal***	***69,815***	***62,705***	***90%***	***76,215***	***62,705***	***82%***
	Business Programmable Thermostat	768	868	113%	269	868	322%
	Residential Programmable Thermostat	29,561	29,897	101%	20,946	29,897	143%
	Demand Response Incentive	39,486	31,940	81%	55,000	31,940	58%
Evergy MO West TOTAL		**126,577**	**119,458**	**94%**	**117,502**	**111,787**	**95%**

Source: Guidehouse analysis

Evergy MO West PY2019 Results

In PY2019, the portfolio achieved 76,346,692 kWh and 53,768 kW in **gross energy and demand** savings at the customer meter. This corresponds to gross realization rates of 107% (and increase from 102% in PY2018) and 92% (an increase from 75% in PY2018), respectively. The portfolio achieved 66,062,760 kWh and 51,605 kW in verified net energy and demand savings. This corresponds to the portfolio achieving approximately 29% and 44% of its cumulative 4-year MEEIA Cycle 2 energy and demand targets, respectively, in PY2019. **The points below highlight key PY2019 impact findings.**

GROSS ENERGY SAVINGS:
76,346,692 kWh

GROSS DEMAND SAVINGS:
53,768 kW

- **In PY2019, the Standard program achieved 39% and 53% of its 4-year MEEIA Cycle 2 target for energy and demand, respectively.** This program represented approximately 26% of verified gross energy savings and approximately 8% of verified gross demand savings. Realization rates for the Standard program were driven by adjustments to baseline fixture wattages for the largest total savings measure (high bay lighting).

- **The Business EER – Custom program has grown in participation and verified energy and demand year over year, largely attributable to Evergy MO West's increased marketing and outreach efforts to customers.** The program achieved approximately 20% and 14% of its 4-year MEEIA Cycle 2 energy and demand targets, respectively. The Custom program increased participation within the HVAC measure in PY2019, contributing 21% and 40% to the verified gross energy and demand savings, respectively. In PY2018, HVAC measures represented 9% and 14% of verified gross energy and demand, respectively.

NET ENERGY SAVINGS:
66,062,760 kWh

NET DEMAND SAVINGS:
51,605 kW

- **The portfolio's suite of residential energy efficiency (EE) programs performed well, accounting for 44% (an increase from 23% in PY2018) and 14% (an increase from 10%) of verified energy and demand savings, respectively.** The HLR program contributed 33% of energy and 6% of demand portfolio savings in PY2019. The HLR program continued addressing imperfections of price, product availability, and consumer knowledge of efficient lighting choices. The program made strong progress on each, offering incentives that reduce the shelf price of LEDs, diversifying the retail channels and venues through which consumers can buy supported LEDs, and engaging in marketing and educational campaigns that explain the benefits of energy efficient lighting. The program also expanded offerings to an online popup store through which consumers could purchase multipacks of both standard and specialty bulbs during the holiday season.

- **The DRI program achieved approximately 58% of its 4-year MEEIA Cycle 2 target and represented approximately 62% of total portfolio verified net demand savings.**

The Cycle 2 extension presented the Evergy Product Manager and the DRI Implementation Contractor, CLEAResult, the opportunity to readjust customer's EPD and CL with new contracts, which improved the accuracy in calculating program potential and further progress Evergy MO West's ability to achieve the MEEIA Cycle 2 demand target. The DRI program had a PTD realization rate of 81% for demand savings, an increase from 62% in PY2018.

Table 3-5. Energy Savings at the Customer Meter: PY2019

Sector	Program	Gross			Net		
		Reported Savings (kWh)	Verified Savings (kWh)	Realization Rate (%)	MEEIA 4-Year Cycle 2 Target (kWh)	Verified Savings (kWh)	Percentage of MEEIA 4-Year Target Achieved
Commercial Energy Efficiency (EE) Programs	***Commercial EE Programs Subtotal***	***29,180,247***	***30,361,721***	***104%***	***127,615,141***	***26,233,232***	***21%***
	Business EER - Standard	18,115,902	19,569,054	108%	48,388,453	18,786,292	39%
	Business EER - Custom	11,064,346	10,792,667	98%	37,599,915	7,446,940	20%
	Block Bidding	0	0	N/A	22,004,934	0	N/A
	Strategic Energy Management	0	0	N/A	15,159,385	0	N/A
	Small Bus. Lighting	0	0	N/A	4,462,454	0	N/A
Residential EE Programs	***Residential EE Programs Subtotal***	***28,707,556***	***33,444,643***	***117%***	***68,775,212***	***27,289,200***	***40%***
	Whole House Efficiency	6,297,355	6,636,825	105%	24,647,183	5,309,460	22%
	Income-Eligible Multifamily	1,533,561	1,423,120	93%	12,517,848	1,423,120	11%
	Home Lighting Rebate	20,876,641	25,384,698	122%	31,610,181	20,556,620	65%
Educational Programs	***Educational Programs Subtotal***	***12,813,477***	***11,787,812***	***92%***	***21,070,772***	***11,787,812***	***56%***
	Home Energy Report	12,813,477	11,787,812	92%	21,070,772	11,787,812	56%
	Home Online Energy Audit	Educational programs are not part of MEEIA Targets for Energy or Demand Savings					
	Business Online Energy Audit						
Demand Response (DR) Programs	***DR Programs Subtotal***	***681,029***	***752,516***	***110%***	***7,778,925***	***752,516***	***10%***
	Business Programmable Thermostat	15,760	20,164	128%	98,753	20,164	20%
	Residential Programmable Thermostat	665,269	732,352	110%	7,680,173	732,352	10%
	Demand Response Incentive	The Demand Response Incentive Program did not claim any energy savings.					
Evergy MO West TOTAL		**71,382,310**	**76,346,692**	**107%**	**225,240,049**	**66,062,760**	**29%**

Source: Guidehouse analysis

Table 3-6. Coincident Demand Savings at the Customer Meter: PY2019

Sector	Program	Gross			Net		
		Reported Savings (kW)	Verified Savings (kW)	Realization Rate (%)	MEEIA 4-Year Cycle 2 Target (kW)	Verified Savings (kW)	Percentage of MEEIA 4-Year Target Achieved
Commercial Energy Efficiency (EE) Programs	***Commercial EE Programs Subtotal***	***5,711***	***6,313***	***111%***	***25,786***	***5,548***	***22%***
	Business EER - Standard	3,549	4,414	124%	7,981	4,237	53%
	Business EER - Custom	2,163	1,899	88%	9,698	1,311	14%
	Block Bidding	0	0	N/A	3,815	0	N/A
	Strategic Energy Management	0	0	N/A	3,552	0	N/A
	Small Bus. Lighting	0	0	N/A	740	0	N/A
Residential EE Programs	***Residential EE Programs Subtotal***	***4,437***	***7,262***	***164%***	***11,233***	***5,864***	***52%***
	Whole House Efficiency	2,221	3,611	163%	6,340	2,889	46%
	Income-Eligible Multifamily	212	172	81%	1,696	172	10%
	Home Lighting Rebate	2,003	3,479	174%	3,197	2,803	88%
Educational Programs	***Educational Programs Subtotal***	***3,410***	***3,291***	***97%***	***4,215***	***3,291***	***78%***
	Home Energy Report	3,410	3,291	97%	4,215	3,291	78%
	Home Online Energy Audit	Educational programs are not part of MEEIA Targets for Energy or Demand Savings					
	Business Online Energy Audit						
Demand Response (DR) Programs	***DR Programs Subtotal***	***44,611***	***36,902***	***83%***	***76,215***	***36,902***	***48%***
	Business Programmable Thermostat	113	120	107%	269	120	45%
	Residential Programmable Thermostat	5,012	4,841	97%	20,946	4,841	23%
	Demand Response Incentive	39,486	31,940	81%	55,000	31,940	58%
Evergy MO West TOTAL		**58,169**	**53,768**	**92%**	**117,449**	**51,605**	**44%**

Source: Guidehouse analysis

Net Savings

Table 3-7 provides a summary of the final FR, participant spillover (PSO), and nonparticipant spillover (NPSO) estimates for each applicable program. The bolded items in the table represent programs' primary data collected by Guidehouse to inform the NTG analysis.

Guidehouse did not collect primary data for the remaining programs due to one or more of the following reasons. As discussed in prior stakeholder meetings, the evaluation team applied a NTG ratio of 1.0 when necessary:

- Programs did not claim any savings (e.g., Home Online Energy Audit, Business Online Energy Audit).
- For the DRI program, the billing analysis generates net results rather than gross results because FR is zero for curtailment programs, as customers have no incentive to reduce peak demand in the absence of the program.
- Impact evaluation methods directly estimate net impacts through a billing analysis that uses controls (e.g., HER).
- Guidehouse applied a NTG value of 1.0 for the SEM program. SEM programs are delivered in a series of training sessions that educate the customer/participant to identify and address potential EE opportunities that are above their current practice (i.e., baseline activity).
- For the Income-Eligible Multifamily (IEMF) program, the cost of assessing net savings for this program was judged to exceed the value given the program's small contribution to total energy savings targeted for this program year, though the team notes this will not necessarily be the case for the future program years.

Please refer to section 2.1.2 for further details on the NTG approach.

Table 3-7. PY2019 NTG Components by Program

Program Name*	FR	PSO	NPSO	NTG Ratio
Business EER – Standard	0.05	0.002	0.004	96%
Business EER – Custom	**0.32**	**0.01**	**0**	**69%**
Block Bidding	Projects Originating from the Custom Program			69%
	Projects Originating from the Standard Program			96%
Strategic Energy Management	Guidehouse assumed a NTG value of 1.0 for the SEM program			
Small Business Lighting	0.14	0.002	0.01	87%
Income-Eligible Weatherization	Deemed 1.0			100%
Whole House Efficiency	0.35	0.01	0.14	80%
Income-Eligible Multifamily	Deemed 1.0 pending future research.			100%
Home Lighting Rebate	0.36	0.18	0.00	81%

Program Name*	FR	PSO	NPSO	NTG Ratio
Home Energy Report	Guidehouse assumed a NTG value of 1.0 for the HER program			
Home Online Energy Audit	N/A – Savings not claimed in PY2019			
Business Online Energy Audit	N/A – Savings not claimed in PY2019			
Residential Programmable Thermostat	Guidehouse assumed a NTG value of 1.0 for the Programmable Thermostats programs and Demand Response Incentive program			
Business Programmable Thermostat				
Demand Response Incentive				
Portfolio Level NTG (Demand/Energy)	**N/A**	**N/A**	**N/A**	**94%/88%[6]**

*NTG Ratios are rounded to the nearest whole number

Source: Guidehouse analysis

3.2 Cost-Effectiveness Summary

Guidehouse calculated benefit cost ratios and total net benefits at the program and portfolio level for the five standard benefit cost tests. These tests include the Total Resource Cost (TRC) test, Societal Cost Test (SCT), Utility Cost Test (UCT), Participant Cost Test (PCT), and Ratepayer Impact Measure (RIM) test. Cost-effectiveness values were calculated using Evergy MO West's DSMore model in conjunction with Guidehouse-verified EM&V findings including: energy and demand impacts, incremental costs, NTG ratios, participation numbers, and measure lifetimes. All program and avoided cost data, and discount rates are consistent with those used by Evergy MO West in calculating cost-effectiveness as part of its annual filing. The following tables present the cost-effectiveness results. Table 3-8 through Table 3-10 present program to date results for PY2016 through PY2019. Table 3-11 through Table 3-13 present results for PY2019 alone. At the program group level, presented in Table 3-9 and Table 3-12, all sectors are cost-effective in the TRC, SCT, and UCT tests, with the DR program passing the RIM test. Evergy MO West's portfolio of programs have achieved $74,152,459 in net benefits in MEEIA Cycle 2. For program level details, refer to the "Overall Results PY 2019" sheet within the Evergy MO West databook.

Guidehouse analyzed early retirement measures in the Whole House Efficiency (WHE) program using a two-part savings stream (i.e., a dual baseline approach) and accounting for the adjustments in equipment investment timing due to early retirement of functional equipment. This approach was necessary to ensure that early retirement measures were fairly burdened with the full cost of the efficient equipment and to ensure the savings stream correctly accounted for differences in baseline assumptions over the lifetime of the measure.

[6] A portfolio level NTG of 95% for demand and 90% for energy was calculated by dividing the verified net savings by the verified gross savings.

Table 3-8. Benefit-Cost Ratios by Program and Cost Test: Program to Date**

Sector	Program	TRC	SCT	UCT	PCT	RIM
		Guidehouse				
Commercial EE Programs	Business EER – Standard	1.39	1.64	3.23	1.52	0.85
	Business EER – Custom	1.11	1.40	2.09	1.33	0.76
	Block Bidding	1.00	1.19	1.24	2.35	0.54
	Strategic Energy Management	1.29	1.36	1.28	12.13	0.48
	Small Business Lighting	0.92	1.09	1.37	1.46	0.63
Residential EE Programs	Income-Eligible Weatherization	1.15	1.45	1.15	INF*	0.59
	Whole House Efficiency	1.05	1.28	1.86	1.58	0.64
	Income-Eligible Multifamily	1.23	1.43	1.23	9.97	0.39
	Home Lighting Rebate***	2.07	2.42	2.77	5.32	0.49
Educational/ Behavioral Programs	Home Energy Report	1.01	1.02	1.01	INF*	0.37
	Home Online Energy Audit	N/A	N/A	N/A	N/A	N/A
	Business Online Energy Audit	N/A	N/A	N/A	N/A	N/A
DR Programs	Business Programmable Thermostat	1.60	1.85	2.36	0.39	2.00
	Residential Programmable Thermostat	1.96	2.28	3.08	0.88	1.97
	Demand Response Incentive	3.65	3.67	1.49	830.49	1.49

*Ratios are infinite because there are positive benefits and no participant costs.

**Guidehouse did not perform benefit-cost calculations for the Home Online Energy Audit or Business Online Energy Audit because Evergy MO West does not claim savings for these programs; therefore, Guidehouse did not verify savings.

***Includes the commercial segment of HLR in total.

Source: Guidehouse analysis

Table 3-9. Benefit-Cost Ratios by Program Groups and Cost Test – Program to Date

	Total Resource Cost Test	Societal Cost Test	Utility Cost Test	Participant Cost Test	Rate Impact Measure Test
Portfolio	1.44	1.69	2.30	1.93	0.80
EE Programs*	1.31	1.57	2.43	1.90	0.69
Residential EE Programs	1.35	1.62	2.03	2.85	0.54
C&I EE Programs	1.30	1.55	2.70	1.51	0.80
DR Programs**	2.19	2.47	2.44	1.38	1.83

*Includes only EE programs, inclusive of administrative costs for educational program costs, market research, software development, and EM&V.
**Includes only DR programs, inclusive of administrative costs for educational program costs, market research, software development, and EM&V.
Source: Guidehouse analysis

Table 3-10. Portfolio Level Costs and Benefits Summary (USD) – Program to Date

Sector	Rebate Costs	Direct Program Admin Costs	Total Costs	Benefits from Energy and Demand Savings	Total Benefits	Total Net Benefits
Portfolio	**$31,548,885**	**$39,547,250**	**$71,096,136**	**$145,248,595**	**$145,248,595**	**$74,152,459**

Source: Guidehouse analysis

Table 3-11. Benefit-Cost Ratios by Program and Cost Test: PY2019**

Sector	Program	TRC	SCT	UCT	PCT	RIM
		Guidehouse				
Commercial EE Programs	Business EER – Standard	1.32	1.55	3.23	1.41	0.88
	Business EER – Custom	1.22	1.54	2.20	1.50	0.75
	Block Bidding	0.00	0.00	0.00	N/A	0.00
	Strategic Energy Management	N/A	N/A	N/A	N/A	N/A
	Small Business Lighting	N/A	N/A	N/A	N/A	N/A
Residential EE Programs	Income-Eligible Weatherization	N/A	N/A	N/A	N/A	N/A
	Whole House Efficiency	1.64	2.04	2.24	2.90	0.64
	Income-Eligible Multifamily	0.84	1.03	0.84	4.79	0.33
	Home Lighting Rebate***	3.11	3.62	4.66	6.51	0.51
Educational/ Behavioral Programs	Home Energy Report	1.59	1.59	1.59	INF*	0.45
	Home Online Energy Audit	N/A	N/A	N/A	N/A	N/A
	Business Online Energy Audit	N/A	N/A	N/A	N/A	N/A
DR Programs	Business Programmable Thermostat	1.54	1.79	2.15	0.48	1.84
	Residential Programmable Thermostat	1.88	2.19	2.65	0.94	1.86
	Demand Response Incentive	4.29	4.29	1.76	531.86	1.76

*Ratios are infinite because there are positive benefits and no participant costs.

**Guidehouse did not perform benefit-cost calculations for the Home Online Energy Audit, or Business Online Energy Audit because Evergy MO West does not claim savings for these programs; therefore, Guidehouse did not verify savings. The Block Bidding, Strategic Energy Management and Small Business Lighting programs did not claim savings in PY2019.

***Includes the commercial segment of HLR in total.

Source: Guidehouse analysis

Table 3-12. Benefit-Cost Ratios by Program Groups and Cost Test – PY2019

	Total Resource Cost Test	Societal Cost Test	Utility Cost Test	Participant Cost Test	Rate Impact Measure Test
Portfolio	1.69	1.98	2.48	2.62	0.74
EE Programs*	1.60	1.92	2.78	2.60	0.64
Residential EE Programs	2.14	2.56	2.90	4.82	0.53
C&I EE Programs	1.27	1.53	2.67	1.46	0.82
DR Programs**	2.46	2.68	2.18	1.98	1.82

*Includes only EE programs, inclusive of administrative costs for educational program costs, market research, software development, and EM&V.

**Includes only DR programs, inclusive of administrative costs for educational program costs, market research, software development, and EM&V.

Source: Guidehouse analysis

Table 3-13. Portfolio Level Costs and Benefits Summary (USD) – PY2019

Sector	Rebate Costs	Direct Program Admin Costs	Total Costs	Benefits from Energy and Demand Savings	Total Benefits	Total Net Benefits
Portfolio	**$7,601,670**	**$7,654,227**	**$15,255,897**	**$30,388,727**	**$30,388,727**	**$15,132,830**

Source: Guidehouse analysis

3.3 Process Evaluation Summary

This section provides an overview of the portfolio MEEIA Cycle 2 process evaluation findings. Table 3-14 provides a summary of the 5 MO process questions and the overarching themes across Evergy MO West's portfolio of DSM programs. These findings are intended to provide the reader with a broad understanding of the portfolio and the progress made throughout the entirety of MEEIA Cycle 2. For specific program findings, please refer to Appendix Q.

Figure 3-1 and Figure 3-2 below summarize customer and trade ally program satisfaction analyzed over the MEEIA Cycle 2 period. Customers and trade allies were asked to rank their satisfaction with the respective program s in which they participated (on a scale of 1 through 5, 1 being the lowest, 5 being the highest). The predominant response provided by survey respondents ranked was a five, or highly satisfied. The average participant satisfaction score for nearly all programs surveyed by Guidehouse ranked above a four,[7] and the average trade ally satisfaction for all programs surveyed also ranked a score of four or above. The consistently high satisfaction scores among program participants and trade allies is indicative of Evergy's leadership and Product Managers focus on addressing their specific market needs, removing barriers to participation, offering an extensive and comprehensive array of measures and broadening means of communicating with customers and key market players.

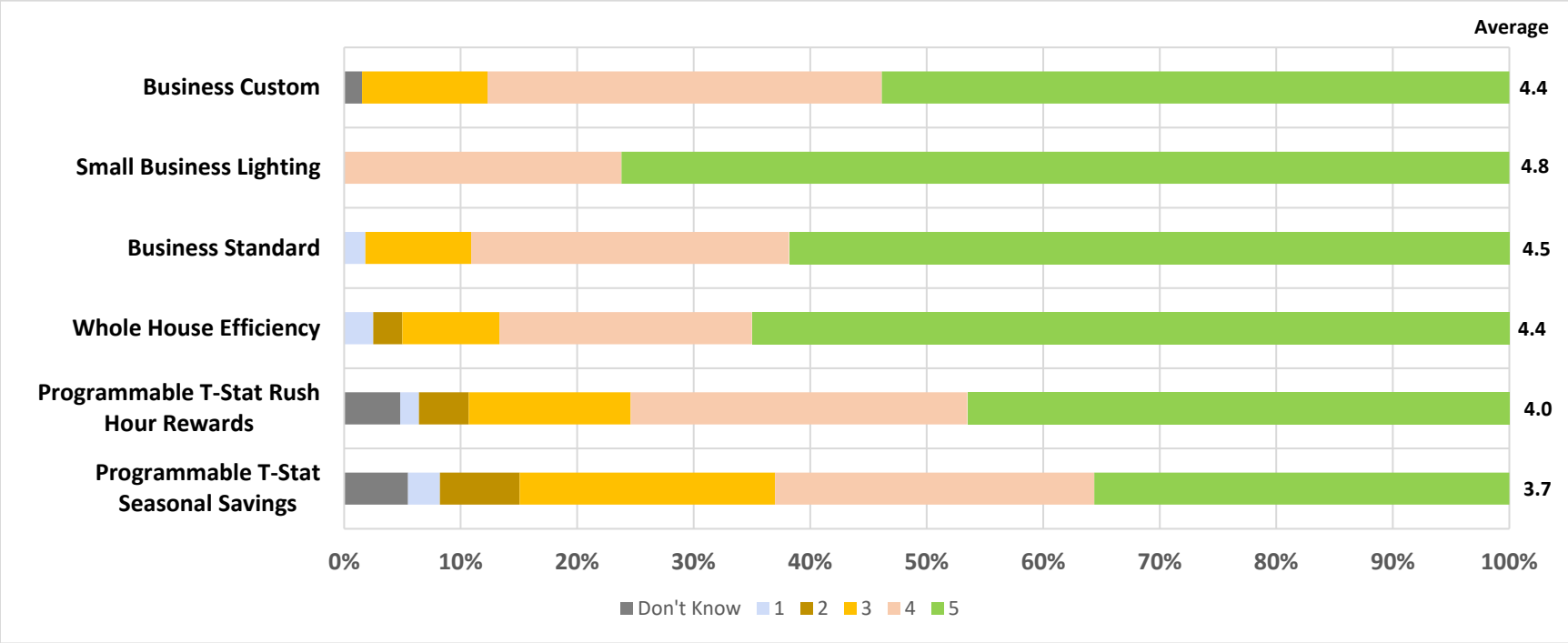
[7] The lone exception was the with the Programmable Thermostats Seasonal Savings program, which had a slightly lower overall satisfaction rate. When asked why they rated their overall experience as 1-2 or Don't Know, many customers indicated they were uninformed or had a misconception about program purpose and operation. For example, some customers suggested moving event hours to the first half of the day, demonstrating a lack of understanding the program's objective. This apparent confusion or lack of awareness of program purpose may also contribute to the sizable number of participants who rated their satisfaction as a neutral 3 (neither satisfied nor dissatisfied).

Table 3-14. Portfolio Missouri Requirement-Based Findings

Missouri Question	Guidehouse Findings
1. What are the primary market imperfections that are common to the target market segment?	Overall, Evergy addressed the market imperfections that are common to each of the programs, as is evident in the strong program-to-date performance of the portfolio when measured against the MEEIA Cycle 2 4-year target. A common barrier among energy efficiency programs at the conclusion of MEEIA Cycle 2 is the high upfront cost of equipment. Evergy Metro's portfolio of programs have continued to address this barrier by altering program incentive rates (i.e. Business Custom), offering new avenues to participate in the programs (e.g. HLR's online popup store) and providing customer with an ability to reduce electricity usage during hours of peak demand (i.e. residential programmable thermostat program).
2. Is the target market segment appropriately defined, or should it be further subdivided or merged with other market segments?	Evergy Metro's suite of program's target markets are largely well-defined. While all business customers are eligible to participate in the Custom program, as a segment, Tier One customers continue to provide the most energy savings to the program. Because these customers also have the option of opting out of Evergy's energy efficiency programs, they are a segment deserving of additional targeted focus. Residential programs continue to drive participation through their upstream and downstream delivery options, as seen in the increasing participation within the HLR and WHE programs throughout MEEIA Cycle 2.
3. Does the mix of end-use measures included in the program appropriately reflect the diversity of end-use energy service needs and existing end-use technologies within the target market segment?	Yes, the mix of end-use measures within Evergy's portfolio address the needs of their target markets. Within the C&I sector, the Standard program focuses on predominantly lighting measures while the Custom program addresses lighting and non-lighting measures. The Whole House Efficiency, IEMF and HLR programs provide a wide range of energy efficiency solutions for the residential sector.
4. Are the communication channels and delivery mechanisms appropriate for the target market segment?	Guidehouse's process research throughout MEEIA Cycle 2 has indicated that both customers and trade allies are highly satisfied with communication from Evergy. Evergy Metro continues to evolve to the dynamic marketplace, including identifying and implementing new means of communicating with program participants. For example, in PY2019, Evergy released an online customer portal to better communicate with and educate customers about the programmable thermostats programs.
5. What can be done to more effectively overcome the identified market imperfections and to increase the rate of customer acceptance and implementation of each end-use measure included in the program?	Up-front costs continue to be an important barrier to many participants – especially prospective low-income participants. Evergy is looking at alternative financing mechanisms, including a Pay As You Save (PAYS) program to help offset the cost of large building envelope or HVAC measures.

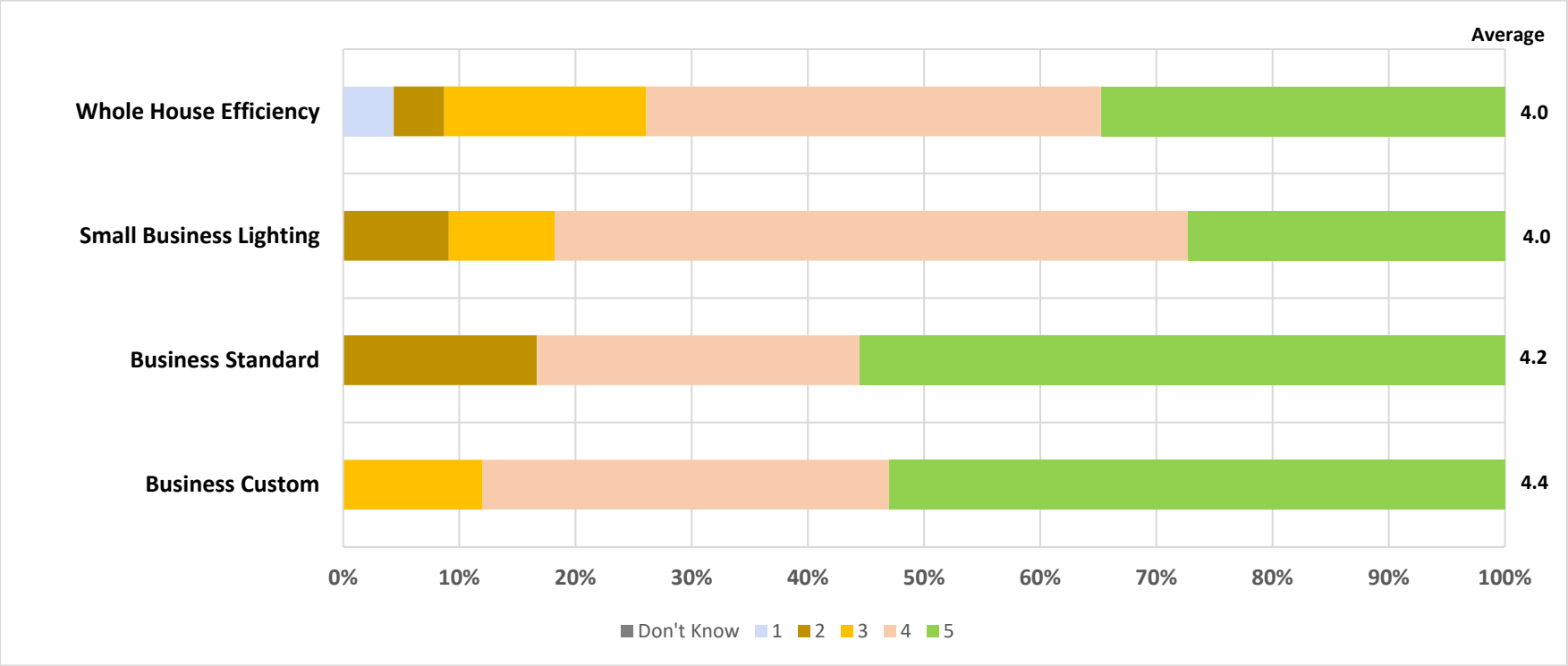
Source: Guidehouse analysis

Figure 3-1. Participant Satisfaction with Programs in MEEIA Cycle 2



Source: Guidehouse analysis

Figure 3-2. Trade Ally Satisfaction with Programs in MEEIA Cycle 2



Source: Guidehouse analysis