

**THE STATE CORPORATION COMMISSION  
OF THE STATE OF KANSAS**

Before the Commissioners:            Andrew J. French, Chairperson  
   Dwight D. Keen  
   Annie Kuether

In the Matter of the Application of Evergy )  
Kansas Metro, Inc., Evergy Kansas South, Inc. )  
and Evergy Kansas Central, Inc. for Approval )            Docket No. 22-EKME-254-TAR  
of its Demand-Side Management Portfolio )  
Pursuant to the Kansas Energy Efficiency )  
Investment Act (“KEEIA”), K.S.A. 66-1283        )

**ORDER GRANTING JOINT MOTION FOR APPROVAL OF  
EVALUATION, MEASUREMENT AND VERIFICATION METHODOLOGY**

This matter comes before the State Corporation Commission of the State of Kansas (the “Commission”) for consideration of the *Joint Motion for Approval of Evaluation, Measurement and Verification Methodology and Updated Metrics and Timeline* filed by Evergy Kansas Metro, Inc., Evergy Kansas South, Inc., and Evergy Kansas Central, Inc. (collectively, “Evergy”) and Commission technical staff (“Staff”) on January 23, 2024. Having examined its pleadings and records, the Commission makes the following findings and conclusions, granting the Joint Motion.

1.        On December 17, 2021, Evergy filed an application (the “Application”) under K.S.A. 66-117 and K.S.A. 66-1283 seeking approval of its KEEIA 2023-2026 Demand-Side Management (“DSM”) Portfolio and updated Energy Efficiency Rider (“EER”) filed in accordance with the Kansas Energy Efficiency Investment Act (“KEEIA”), K.S.A. 66-1283.

2.        Evergy—joined by Staff; the Citizens’ Utility Ratepayer Board (“CURB”); and Climate + Energy Project (“CEP”), Natural Resources Defense Council (“NRDC”), Sierra Club, and Kansas Appleseed Center for Law and Justice, Inc. (“Kansas Appleseed”) (collectively, the

“Environmental Groups”)—filed a *Motion to Approve Non-Unanimous Partial Settlement Agreement on DSM Programs* (the “Initial Program Settlement”) on August 1, 2022.

3. In the Initial Program Settlement, Evergy addressed the portfolio of DSM programs Evergy should offer under KEEIA and suggests specific modifications to the portfolio as described in the Application.

4. In addition to filing the Initial Program Settlement on August 1, 2022, Evergy, CURB, and the Environmental Groups jointly filed a *Motion to Approve Non-Unanimous Partial Settlement Agreement on Financial Recovery* (the “Initial Financial Settlement”) which recommends the Commission approve the financial recovery mechanisms proposed by Evergy in its Application, consistent with specific terms related to program carrying costs, the Throughput Disincentive (the “TD”) mechanism (also referred to as, the “Lost Revenue Adjustment Mechanism” or “LRAM”), and Evergy’s Earnings Opportunity (“EO”).

5. On September 1, 2023, the Commission approved the Initial Settlements, subject to a modification and certain conditions.<sup>1</sup> First, the Commission modified the Initial Financial Settlement portion of the Initial Settlements to adjust the proposed 18% retention of net benefits EO downward to 15%.<sup>2</sup> The Commission determined that an EO of 15% is more reasonable in comparison with other states while still providing a very material incentive for Evergy to achieve savings for customers.<sup>3</sup> However, the Commission further stated that the structure and magnitude of Evergy’s EO should be revisited at the conclusion of every program cycle because as programs mature and evolve, it may be appropriate to substantially modify the EO.<sup>4</sup>

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<sup>1</sup> Order on Evergy’s Application and Settlement Agreements (the “Order on Settlement”) at 8-9, *In re Application of Evergy*, Docket No. 22-EKME-254-TAR (filed Sept. 1, 2023).

<sup>2</sup> *Id.* at 21.

<sup>3</sup> *Id.*

<sup>4</sup> Order on Settlement at 17.

6. In addition to the downward modification of Evergy’s proposed EO, the Commission imposed six conditions on the approval of the Initial Settlements, including: (1) the establishment of a robust and EM&V methodology (the “EM&V Methodology Condition”);<sup>5</sup> and (2) collaboration between Evergy and Staff to file an updated timeline for implementation, including new proposed effective tariff dates, as soon as feasible (the “Updated Timeline Condition”).<sup>6</sup>

7. On January 24, 2024, Evergy and Staff filed a *Joint Motion for Approval of Evaluation, Measurement and Verification Methodology and Updated Metrics and Timeline* (the “Motion for Approval of Methodology”) requesting expedited approval of the KEEIA EM&V Methodology, proposed changes to the Initial Settlements, and updated implementation timeline.<sup>7</sup>

8. Evergy and Staff assert that they have coordinated together to identify changes to the Initial Settlements needed to successfully implement the new EM&V Methodology.<sup>8</sup>

9. Evergy and Staff list thirteen updates that have been vetted and agreed to by the parties.<sup>9</sup> Upon review of the thirteen updates, the Commission finds that the first eleven updates relate to and satisfy the Robust and EM&V Methodology Condition.<sup>10</sup> Further, the remaining two updates related to and satisfy the Updated Timeline Condition.<sup>11</sup>

10. In addition, attached to the Motion for Approval of Methodology as Attachment 1—attached to this Order as **Attachment A** and incorporated by reference—is

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<sup>5</sup> *Id.* at 23.

<sup>6</sup> *Id.* at 27.

<sup>7</sup> Motion for Approval of Methodology at 6, *In re Application of Evergy*, Docket No. 22-EKME-254-TAR (filed Jan. 23, 2024).

<sup>8</sup> *Id.* at 2-3.

<sup>9</sup> *Id.* at 3-6.

<sup>10</sup> *Compare* Order on Settlement at 22-24 *with* Motion for Approval of Methodology at 3-5.

<sup>11</sup> *Compare* Order on Settlement at 27 *with* Motion for Approval of Methodology at 5-6.

Evergy's updated proposed *Evaluation, Measurement, and Verification (EM&V) Methodology Pursuant to Docket No. 22-EKME-254-TAR*.

11. The Commission then issued a Scheduling Order giving parties until February 9, 2024, to comment on the Motion for Approval of Methodology, and expressed the Commission's goal of issuing an order by March 1, 2024.

12. On February 9, 2024, Atmos Energy Corporation ("Atmos") and Kansas Gas Service, a division of ONE Gas, Inc. ("KGS") (together, the "Gas Utilities") jointly filed comments on Evergy's proposed KEEIA EM&V Methodology stating that they neither disagree with the generic framework of Evergy's proposed EM&V Methodology nor object to ADM Associates, Inc. serving as Evergy's EM&V consultant.<sup>12</sup> While the Gas Utilities express their concern that the proposed EM&V Methodology is too generic and vague, they do not object to the Motion for Approval of Methodology.

13. Evergy responded to the Gas Utilities' comments on February 22, 2024, to support Evergy's position by confirming that its proposed EM&V Methodology is intended to act as a framework, setting guidelines to be utilized in future reporting.<sup>13</sup> Evergy then addressed the Gas Utilities' remaining comments, ultimately asserting that such comments are premature or otherwise flawed.<sup>14</sup>

14. The Commission finds that the EM&V Methodology and updated metrics and timeline proposed by Evergy satisfy the EM&V Methodology Condition and the Updated Timeline Condition established by the Commission in the *Order on Evergy's Application and Settlement*

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<sup>12</sup> Comments of the Gas Utilities on Evergy's Proposed KEEIA Evaluation, Measurement and Verification Methodology at 2 (filed Feb. 9, 2024).

<sup>13</sup> Response to Gas Utilities' Comments on Evergy's Proposed KEEIA Evaluation, Measurement and Verification Methodology at 1, *In re Application of Evergy*, Docket No. 22-EKME-254-TAR (filed Feb. 22, 2024).

<sup>14</sup> *Id.* at 1-2, 5.

*Agreements*. The Commission also notes that the Motion for Approval of Methodology is unopposed. Therefore, the Commission approves the Motion for Approval of Methodology.

**THEREFORE, THE COMMISSION ORDERS:**

A. The *Joint Motion for Approval of Evaluation, Measurement and Verification Methodology and Updated Metrics and Timeline* is granted.

B. Any party may file and serve a petition for reconsideration pursuant to the requirements and time limits established by K.S.A. 77-529(a)(1).<sup>15</sup>

**BY THE COMMISSION IT IS SO ORDERED.**

French, Chairperson; Keen, Commissioner; Kuether, Commissioner

Dated: 02/29/2024



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Lynn M. Retz  
Executive Director

KCW

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<sup>15</sup> K.S.A. 66-118b; K.S.A. 77-503(c); K.S.A. 77-531(b).

**Evaluation, Measurement, and Verification (EM&V)  
Methodology Pursuant to  
Docket No. 22-EKME-254-TAR**

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**January 5, 2024**



**ADM Associates, Inc.**

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# 1 Introduction

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Pursuant to Docket No. 22-EKME-254-TAR regarding the Kansas Energy Efficiency Investment Act (KEEIA), the Kansas Corporation Commission (Commission) has conditionally approved Evergy's new four-year Demand-Side Management (DSM) Portfolio for Evergy's Kansas operating companies. A remaining condition<sup>1</sup> relates to Evaluation, Measurement, and Verification (EM&V) and consists of two parts:

- A. Evergy will submit to the Commission a proposed EM&V methodology that puts forth robust and modern EM&V guidelines and methods.
- B. The Commission will determine if the proposed EM&V methodology satisfies its stated requirements for transparent, robust, and modern EM&V that utilizes "measured savings" and meter-based data in every instance where it is feasible and cost-effective.

This document provides Evergy's proposed "EM&V Methodology."

## 1.1 Purpose of this EM&V Methodology Document

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This EM&V Methodology document presents and explains Evergy's position that its DSM Portfolio will be subject to transparent, robust, and modern EM&V<sup>2</sup> that utilizes rigorous measurement techniques and meter-based data. Based on the agreed upon programs and savings targets it is calculated that meter-based methodology will be used to determine 94 percent<sup>3</sup> of ex-post verified energy impacts.<sup>4</sup>

The EM&V Methodology described in this document will utilize analytical software, tools, and techniques that have been developed and optimized in multiple jurisdictions during the past ten years of widespread deployment of advanced metering infrastructure (AMI), i.e., "smart meters." Such granular reporting is made possible by the combination of AMI data and hourly energy savings curves for every evaluated measure, project, and program.

## 1.2 Background

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As stated in the Commission Order dated September 1, 2023, it is Kansas policy to provide cost-effective energy efficiency programs for Kansas residents and businesses, and to ensure that those with the greatest need to control their energy bills have options available to do so.

Evergy's four-year KEEIA DSM Portfolio consists of nine programs, including four residential programs, four business programs, and one pilot incubator program. As described in the Order, the nine KEEIA programs can be briefly summarized as follows:

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<sup>1</sup> Order, Docket No. 22-EKME-254-TAR, pgs. 22-24 (September 1, 2023).

<sup>2</sup> EM&V services for Evergy's DSM Portfolio will be performed by an independent, third-party EM&V vendor.

<sup>3</sup> The calculation of 94 percent can be found in Table 1 in section 2.8 of this EM&V Methodology document.

<sup>4</sup> Engineering analyses or "deemed savings" approaches will be utilized for less than ten percent of ex-post verified energy impacts.



1. Whole Home Efficiency Program  
*Provides rebates, discounts, and on-bill financing for HVAC and building envelope measures in single and multifamily residences; provides energy assessments at no cost to participating homeowners and provides discounted energy savings kits.*
2. Home Energy Education Program  
*Helps rural and low-income customers use energy more efficiently through marketing, outreach, and education.*
3. Home Demand Response Program  
*Helps customers reduce energy use during peak demand periods and provides thermostats and water heater controllers to residential customers at no cost to the participating homeowners.*
4. Hard-to-Reach Homes Program  
*Provides home upgrades, energy assessments, and energy savings kits for low income and rural customers at no cost to participating homeowners; also provides enhanced incentives for various measures.*
5. Whole Business Efficiency Program  
*Provides both variable and fixed incentives to help business customers install efficient equipment and building envelope improvements.*
6. Business Energy Education Program  
*Provides tools, resources, and guidance for businesses interested in saving money on energy. The program focuses on small businesses.*
7. Business Demand Response Program  
*Helps business customers decrease their energy usage during periods of peak demand.*
8. Hard-to-Reach Businesses Program  
*Offers enhanced incentives to small businesses and non-profits, including energy assessments and energy savings kits at no cost to participating customers.*
9. Pilot Incubator Program  
*Creates a pathway to identify and evaluate new DSM program concepts to meet changing customer needs and integrate evolving technologies.*

### **1.3 Overview of Proposed EM&V Methodology**

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The proposed EM&V methodology for Evergy's KEEIA DSM Portfolio will provide transparent, robust, and modern EM&V that utilizes rigorous measurement techniques and meter-based data to determine 94 percent of ex-post verified energy impacts. This EM&V methodology will utilize analytical software, tools, and techniques that have been developed and optimized in multiple jurisdictions during the past ten years of widespread deployment of AMI/smart meters.

EM&V processes and analyses will occur in real time, concurrent with program implementation, enabling annual EM&V reports to be provided ten weeks after the end of each program year.

EM&V reports will provide ex-post verified energy impacts, including hourly savings and savings per rate class for every DSM program.

EM&V transparency will ensure a collaborative approach by enabling stakeholders and the Commission to thoroughly vet the results of implementation. EM&V plans will be subject to Commission review and approval. EM&V progress updates will be provided periodically to the Commission and stakeholders. Annual EM&V reports will be accompanied by corresponding EM&V files, code, and work papers.

The following section addresses the Commission’s expectation for an EM&V methodology that requires “measured savings” and the use of meter-based data in every instance for which it is feasible and cost-effective. The Commission specifically directed the parties' attention to a recent Order of the California Public Utilities Commission (CPUC) in which the CPUC lists benefits of meter-based measurement; and in which the CPUC established a framework for a utility to justify an exception to meter-based measurement, but only when it is not feasible or cost-effective.

In its discussion of the expectation for an EM&V methodology requiring measured savings, the Commission is referring to the CPUC’s requirement for utilities to use normalized metered energy consumption (NMEC) data and/or advanced metering infrastructure (AMI) data to determine project-level and program-level energy savings. As the Commission accurately describes, the CPUC considers not-using-NMEC data and/or AMI data to be an exception that a utility must justify by providing an explanation of the reason(s) that it is not feasible and not cost-effective. Given that the CPUC’s NMEC framework provides a well-documented model for EM&V methods requiring measured savings, it will be used for the EM&V methodology proposed herein.

#### **1.4 Technical Reference Manual (TRM)**

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Evergy recommends that the Kansas TRM should be utilized for exceptions when “measured savings” and meter-based data are not feasible and cost-effective. Evergy’s independent, third-party EM&V vendor will provide annual benchmarking and updating of the Kansas TRM.

For measures for which the TRM is selected as the method of calculating savings, Evergy will explain its rationale – including specific reasons that measured savings are not practical for the given measures – to the Commission.

## 2 Evergy's Proposed EM&V Methodology

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The proposed EM&V methodology for Evergy's KEEIA DSM Portfolio will utilize the evaluation framework delineated in the CPUC "NMEC Rulebook," Version 2.0, released January 7, 2020. The following EM&V methodology description is distilled from the NMEC Rulebook and builds upon its key concepts. While the NMEC Rulebook provides the framework for the EM&V methodology for Evergy's KEEIA DSM Portfolio, it is not Evergy's recommendation to wholly adopt the NMEC Rulebook because it alone does not account for every evaluation scenario that is likely to be encountered in Kansas. EM&V methodology exceptions from, and additions to, the NMEC Rulebook will be discussed throughout this chapter.

### 2.1 Definitions Related to NMEC

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This section provides definitions for essential NMEC components and terminology.

#### 2.1.1 NMEC

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NMEC is a method used to measure gross energy savings using metered energy consumption data to compare baseline and reporting period consumption under normal operating conditions. Normalization of energy consumption is achieved using adjustment models that account for routine events,<sup>5</sup> and other adjustments to account for non-routine events<sup>6</sup> so that consumption in baseline and reporting periods can be directly compared, as if all relevant variables were the same in the two periods. Normalized baseline period and/or reporting period energy consumption are calculated using one or more adjustment models.

The CPUC's NMEC Rulebook provides detailed guidelines for utilizing NMEC methods and data to determine energy savings resulting from utility funded energy efficiency programs. NMEC-based methods may be used to calculate savings for many energy efficiency and demand response programs and treatments, including custom programs and operational, behavioral, and retro-commissioning activities.

#### 2.1.2 Normalized Energy Savings

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Normalized energy savings is the reduction in energy consumption or demand that occurs in the reporting period, relative to the baseline period, after both have been adjusted to a common set of normal operating conditions. Normalized energy savings are used for final, filed reporting of energy and demand savings claims.

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<sup>5</sup> There are standardized adjustment models for routine events such as weather variations. For example, for population-level NMEC, it is standard practice to use weather terms (i.e., weather variables) in regression analyses to determine how much of the difference between pre- and post-energy usage is statistically correlated with weather variability. Similar analytical techniques are used for site-level NMEC to calculate changes in energy consumption due to weather, and to exclude weather-related changes in energy consumption from ex-post verified energy savings.

<sup>6</sup> Adjustments for non-routine events must be thoroughly documented and explained. Examples of non-routine events include the COVID-19 pandemic and short-term changes in production or occupancy.

### 2.1.3 Site-Level NMEC

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For Site-Level NMEC for a given site and project, energy savings are determined using NMEC methods customized to site-specific conditions and drivers of savings. NMEC-determined energy savings rely on a project-specific M&V plan that is an integral component of the project design and is customized to the characteristics of the site and project.

### 2.1.4 Population-Level NMEC

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For Population-Level NMEC for a given program, energy savings are determined using an NMEC approach based on pre- and post-intervention energy usage data observed at the meter, e.g., using hourly interval data such as AMI data. Measurement methods and calculation software are set before the program starts – and not subsequently changed – and apply to all sites uniformly (as opposed to site-level NMEC measurement methods which may differ from site to site).

### 2.1.5 Evaluation, Measurement and Verification (EM&V)

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EM&V consists of activities that evaluate, monitor, measure and verify performance or other aspects of energy efficiency programs or their market environment. The Commission establishes EM&V requirements, including the Measurement and Verification (M&V) subset of EM&V.

### 2.1.6 Measurement and Verification (M&V)

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M&V is the process of using measurement to reliably determine actual energy savings by individual facilities or participants as the result of an energy efficiency intervention. Given that savings are the absence of energy consumption, which cannot be directly measured, savings are determined from the difference between measured energy consumption before the energy efficiency project and measured energy consumption after implementation of the energy efficiency project, including appropriate adjustments for changes in conditions.

## 2.2 Projects Appropriate for Site-Level NMEC

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This section provides a description of project types that are appropriate for Site-Level NMEC.

### 2.2.1 Permissible Project Types

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NMEC projects must occur in existing buildings and consist primarily of measures suitable to an existing conditions baseline. NMEC projects in industrial buildings are allowed if similar to an NMEC project that would be implemented in a commercial building.<sup>7</sup>

Behavioral, retro-commissioning, and operations and maintenance (O&M) measures are allowed if: i) the energy efficiency program includes training components in all repair and maintenance

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<sup>7</sup> Commercial typically refers to commercial office buildings, warehouses, retail, healthcare, and educational facilities. Industrial can refer to many kinds of value-added enterprises, such as manufacturing, mining, and agriculture. Depending on customer rate class and service meter configuration, an industrial site may include a commercial office building, warehouse, or other facility with primary loads that are similar to the lighting, HVAC, and information technology loads typically found in commercial office buildings.

measures to ensure participants understand the value of preventive maintenance and good operational practices; and ii) the program participant or project owners commit to a repair and maintenance plan (R/M Plan) for a minimum of three years. The R/M Plan<sup>8</sup> must include:

- a signed customer agreement requiring maintenance and repair activities to continue,
- detailed plans and specifications for operational interventions and actions that will sustain savings,
- detailed communication plans that include continuous feedback to the building operator, owner, or homeowner, and
- a detailed data tracking plan.

### 2.2.2 Projects Not Appropriate for NMEC

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NMEC is not appropriate for new construction projects or any projects lacking existing conditions.

## 2.3 Programs Appropriate for Population-Level NMEC

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This section provides a description of programs that are appropriate for Population-Level NMEC.

### 2.3.1 Permissible Programs

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Site-Level NMEC rules described above are applicable to Population-Level NMEC Programs. Further, Population-Level NMEC program sites must have similar building types, equipment, drivers of energy consumption, and levels of energy consumption; all sites in the population should have similar factors impacting annualized (i.e., over a 12-month period) energy consumption and energy savings from program interventions.

Following are examples of similar sites.

- A group of residential accounts that are in the same rate class and which have comparable energy usage characteristics.
- A group of commercial office buildings that are in the same rate class and which have comparable building characteristics and energy usage characteristics.

## 2.4 M&V Plan Requirements

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A program-level M&V Plan is required for every program. M&V Plans are subject to Commission review. The Commission may assign the review of M&V Plans to Staff. If so, Staff will review each M&V Plan to ensure that it complies with the requirements outlined in the following section (2.4.1). If Staff and Evergy are unable to reach agreement regarding contents and completeness of a given M&V Plan, either party may request Commission review and guidance.

### 2.4.1 M&V Plans Must Include the Following Components

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1. Description of the program target population and participant eligibility criteria.

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<sup>8</sup> A comprehensive description of the R/M Plan will be provided in the program-level M&V Plan.

2. Description of incentive structure, including which entity receives compensation at each stage of the project, and methods/tools used to calculate incentives or compensation.
3. Detailed documentation and supporting work papers for expected costs, baseline,<sup>9</sup> baseline period (e.g., the 12-month period immediately preceding intervention), energy savings, peak impacts, and effective useful life (EUL) of planned measures and intervention strategies; also describe how project-level EUL will be calculated.
4. Description of methodology, analytical methods, and software employed for calculating NMEC, gross savings, and net savings resulting from the energy efficiency measures installed and not influenced by unrelated changes in energy consumption.
5. Description of methodology must address weather normalization, calculation of hourly load shape impacts, and other factors including adjustments for non-routine events.
6. Detailed Sampling Plan.
7. For any program design targeting large treatment groups, the M&V Plan must provide a detailed explanation of the selection process for treatment and representative control groups; this requirement also applies to Randomized Controlled Trials (RCTs).
8. Detailed Data Collection Plan, including description of monitoring activities for each energy efficiency measure category that is expected to be implemented and sampled; data collection includes all AMI data, metered data, sub-metered data,<sup>10</sup> building energy management system data,<sup>11</sup> and logger data.
9. Description of methods of determining program influence through detailed data collection and analysis.
10. For programs or projects that target savings less than ten percent of annual consumption, a detailed description of rationale and methods for distinguishing savings from normal variations in consumption.
11. If targeting to-code savings, a detailed description of the following.
  - Identify the specific code that is targeted.
  - Specify the equipment types, building types, geographical locations, and/or customer segments that will provide cost-effective to-code savings.
  - Describe the specific barriers that are preventing code-compliant equipment replacements.

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<sup>9</sup> Baseline documentation includes an explanation of selection of code/normal replacement baseline, early replacement baseline, standard practice baseline, and/or conditions requiring re-baselining. When using NMEC methods, dual baseline is not required for early replacement measures.

<sup>10</sup> Submetering is permissible for all NMEC projects.

<sup>11</sup> Building energy management system data is also known as trending data.

- Describe the reasons that natural turnover is inadequate for certain markets or technologies.
  - Explain program interventions that would effectively accelerate equipment turnover.
12. Any Bid M&V Plan submitted by third-party implementers in their bids (at minimum, must include above-listed items 1, 3, 4, 5, and 8).<sup>12</sup>
  13. Detailed description of the timing of real-time M&V activities, including M&V schedules that will enable Evergy to use ex-post verified savings (as determined by the independent EM&V contractor) to determine a significant portion of customer and implementer incentives.
  14. Methods to account for interactive effects for participants in multiple programs, i.e., ensure that there is no double counting of reported savings.
  15. Methods for calculating cost effectiveness.
  16. Detailed description of M&V schedules, including a timeline for all activities, the frequency of M&V review/input to ensure adherence to the real-time M&V approach, specific real-time M&V milestones throughout the program year, and M&V reporting schedules and deadlines.
  17. Any other information required by the Commission, including (but not limited to) description of program compliance with the Commission approved Stipulations and the Commission Order in Docket 22-EKME-254-TAR.
  18. M&V Plans must describe M&V transparency, which must include (but is not limited to) discussion of the following components of transparency.
    - To demonstrate the replicability of savings calculations, the Commission will be provided all analytical methods, work papers, and data, including M&V spreadsheets, R code,<sup>13</sup> explanatory presentations (e.g., workshop presentations and tutorials), and supporting files, references, and literature.
    - M&V methods must utilize open-source software and analytical tools, if possible. Examples of software and tools include M&V spreadsheets, open-source R code, and the R application “RM&V 2.0” developed by Berkeley Lab, a leader in advanced M&V research.<sup>14</sup>

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<sup>12</sup> *Third-party implementer projects are audited if selected for M&V by Evergy's independent EM&V contractor. Given that third-party implementer projects are generally large projects, and that the larger the project, the more likely it will be selected for M&V, it is likely that Evergy's EM&V contractor will audit various third-party implementer projects.*

<sup>13</sup> *R is a free, open-source analytics software that is widely used for EM&V and NMEC. For example, RM&V 2.0 (see <https://buildings.lbl.gov/tools-guides#whole>) is an R application developed by Berkeley Lab to enable M&V practitioners to perform advanced measurement and verification (M&V 2.0) for commercial building projects. The RM&V 2.0 modeling approach is extensively documented by Berkeley Lab and fully transparent.*

<sup>14</sup> *Lawrence Berkeley National Laboratory is a U.S. DOE Office of Science national laboratory managed by the University of California. See <https://buildings.lbl.gov/emis/assessment-automated-mv-methods>.*



- Proprietary software and methods are not encouraged but are not prohibited if the Commission determines that it is satisfied with its ability to review and appropriately vet the proprietary software and methods.

## 2.5 EM&V Sampling Guidelines and Statistical Confidence and Precision

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EM&V sampling requirements depend on regulatory requirements for statistical confidence and precision. During the past 20-plus years, the requirement of “90/10 confidence” (at the program level) has been standard practice across the U.S. for EM&V sampling for energy efficiency programs in DSM portfolios.<sup>15</sup> A synonymous but more precise phrase for 90/10 confidence is “plus-or-minus ten percent relative precision at the 90 percent confidence interval.”

In practice, the requirement for 90/10 confidence means that a sample size of 68 is needed for a given energy efficiency program if the following conditions are expected:

- The sampling frame consists of a population of participants for whom energy savings is characterized by a normal probability distribution.
- For the population of the subject program, the variability of energy savings can be reasonably represented by the coefficient of variation of 0.5.
- Sample selection will be random, i.e., no selection bias.

Under those expected conditions, the sample size (i.e.,  $n_0 = 68$ ) is calculated as

$$n_0 = [1.645 \times cv \div P]^2$$

where 1.645 is the “z-score” for a 90 percent confidence interval in a normal distribution, cv is the coefficient of variation of 0.5, and P is the required relative precision of 10.0 percent. This sampling scenario, for which a sample size of 68 achieves the required statistical confidence and precision, is an example of simple random sampling.

However, what if the sampling frame is comprised of a large population of projects for which there is also large variability of savings? In other words, the population is very unlike a normal probability distribution. For such a population, such as those which are typically found in Business Efficiency Programs, simple random sampling is impractical and would be prohibitively expensive if attempted. Instead, stratified random sampling techniques are employed to achieve the required statistical confidence and precision.

Stratified random sampling is very effective when program implementers provide accurate and complete tracking data for every project. A stratified sampling plan requires multiple sampling strata to be defined – typically at least three strata – then each individual stratum is assigned a group of similar projects. Accurate tracking data enables the stratified sampling plan to minimize the coefficient of variation and thereby optimize the efficiency of the sampling design. Further, to mitigate sampling bias, samples are randomly selected from each stratum.

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<sup>15</sup> *The California Evaluation Framework (2004) referred to the 90 percent confidence level as “conventional in evaluation work” and recommended its consistent use.*



The sampling and statistical confidence and precision topics are vast, with thousands of related publications. Evergy will provide examples to the Commission and stakeholders, if desired.

In summary, for each program in the KEEIA DSM Portfolio, EM&V sampling will be optimized to ensure that sampling is cost effective and achieves required statistical confidence and precision.

## **2.6 Post-Implementation Performance Monitoring Period**

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It is important to emphasize that the NMEC requirement for 12 months of post-implementation monitoring is prudent when the overarching goal is to demonstrate the highest level of EM&V rigor for energy efficiency programs and projects.

However, 12 months of post-implementation monitoring may not be practical when balancing the goals of *rigorously measured savings* – versus – *the necessity of timely reporting of ex-post verified energy savings and timely filing of the utility’s application for financial relief associated with successful implementation of energy efficiency programs*.

When considering and balancing the alternatives of long-term monitoring versus timely reporting, many jurisdictions do not consider it to be prudent to require 12 months of post-implementation monitoring. Twelve months of monitoring typically adds significant cost but does not necessarily provide significantly better accuracy or precision than well-designed shorter-term monitoring protocols.

On the other hand, well-designed, rigorous short-term monitoring transforms EM&V processes and analyses to **real-time** activities that occur in parallel with program implementation. Real-time EM&V is crucially important for monitoring ongoing program performance and enabling (if needed) fast course corrections for implementation.

Real-time EM&V also enables annual EM&V reports to be provided ten weeks after the end of each program year. The rapidly produced EM&V reports will provide ex-post verified energy impacts, including hourly savings and savings per rate class for every DSM program.

Considering the points discussed above and given that the overarching goal in Kansas is rigorous-but-cost-effective EM&V, the most prudent alternative is a well-designed monitoring protocol with a less-than-12-month time interval.

### **2.6.1 Post-Implementation Monitoring Guidelines for Site-Level M&V**

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For Site-Level M&V, it is a generally accepted M&V method to conduct post-implementation monitoring using less-than-12-month time intervals if the following conditions are achievable:

- The monitoring period will include three subgroups of 4 weeks, 8 weeks, and 12 weeks during time intervals in which the project or measure is expected to achieve a significant fraction of its annualized energy impacts.
- Baseline hourly energy consumption (baseline load shape) is established from AMI data and/or building energy management system data, e.g., by using AMI data from a previous year, such as July-September of the previous year to establish the cooling load portion of an HVAC baseline.

- Weather-normalized annual energy savings is calculated by extrapolating monitoring data (which is analyzed together with AMI data) to a weather normalized energy savings curve that is substantially similar to the baseline load shape. For example,<sup>16</sup> if a residential program in a given service territory caused 2,000 central air conditioners (CAC) to be replaced with high efficiency air conditioners, one would expect that the first 1,000 of the 2,000 CAC would be replaced by mid-year. A sample of the first 1,000 would be monitored, using on/off loggers, for three monitoring subgroups of 4 weeks, 8 weeks, and 12 weeks during summer months. The monitoring data would establish the effective full load hours (EFLH) for the sample during the monitoring period. Total cooling degree days (CDD) during the monitoring period would be compared to the total Typical Meteorological Year (TMY)<sup>17</sup> cooling degree days for the same days of the year. Weather normalized EFLH for the sample would be calculated from the product of monitored EFLH and the ratio of TMY CDD to monitored CDD. To ensure a rigorous check and control of the EFLH analysis, a regression analysis of multiple years of AMI data for a large control group of similar premises in the service territory would prove the general (i.e., not monitored) statistical relationship between EFLH and CDD. This combination of analytical techniques will prove the weather normalized EFLH, which by extension will ensure the accuracy and precision of ex-post verified energy savings.

## 2.6.2 Post-Implementation Monitoring Guidelines for Population-Level M&V

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For Population-Level M&V, most jurisdictions do not require post-implementation monitoring for 12 months as required by NMEC. It is a generally accepted M&V method to conduct post-implementation monitoring for the maximum reasonable time interval given regulatory timelines for filing final EM&V Reports and the Company's corresponding application for financial recovery.

For example, if KEEIA Program Year One ends on December 31, 2024, and Evergy's related regulatory filing deadline is June 1, 2025, the EM&V Report will need to be finalized May 1, 2025, *after having gone through various stakeholder reviews*. The M&V analyses that are described in the EM&V Report would need to be completed by March 1, 2025. This timeline would allow for post-implementation monitoring data through the end of 2024 (and potentially including January 2025). For most program designs, this is a reasonable monitoring timeframe that allows for rigorous data collection, especially considering that post-implementation monitoring would have already been occurring throughout the 2024 program year.<sup>18</sup>

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<sup>16</sup> This hypothetical example is provided to illustrate a likely scenario for a given KEEIA program year. A more precise example cannot be provided until KEEIA program implementation is underway in the future.

<sup>17</sup> See <https://www.nrel.gov/docs/fy08osti/43156.pdf> (Users Manual for TMY3 Data Sets, National Renewable Energy Laboratory, May 2018).

<sup>18</sup> For example, for a behavioral treatment such as a Home Energy Reports program, AMI data represents post-implementation monitoring data that is collected continually, before and after the behavioral treatment.

## 2.7 Additional Industry Standards for EM&V

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As stated above, the proposed EM&V methodology for Evergy's KEEIA DSM Portfolio will utilize the NMEC evaluation framework. However, the NMEC evaluation framework is not a standalone guide, but rather was built upon and refers to EM&V protocols and guidelines that are listed in the following section (2.7.1). Therefore, it is important to take into consideration the listed (in 2.7.1) industry standards, specifications, and ongoing research that continue to guide modern EM&V activities.

When the outside-of-NMEC standards are used for EM&V on behalf of KEEIA programs, Evergy's independent, third-party EM&V vendor will document and explain the use of the other standards and exactly how they vary from NMEC Rulebook.

### 2.7.1 EM&V Protocols and Guidelines

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- EM&V protocols for DSM measures, published through the Uniform Methods Project (UMP) sponsored by the U.S. Department of Energy (DOE);<sup>19</sup>
- International Performance Measurement and Verification Protocol (IPMVP). *Core Concepts*. Efficiency Valuation Organization. March 2022;<sup>20</sup>
- *M&V Guidelines: Measurement and Verification for Performance-Based Contracts Version 4.0*, DOE Federal Energy Management Program (FEMP), November 2015; and *Supplement to M&V Guidelines: Measurement and Verification for Performance-Based Contracts Version 4.0*, FEMP, September 2023;<sup>21</sup>
- American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE). *Guideline 14-2014: Measurement of Energy, Demand and Water Savings*;<sup>22</sup>
- *National Standard Practice Manual for Assessing Cost-Effectiveness of Energy Efficiency Resources*, National Efficiency Screening Project, May 2017;<sup>23</sup>
- *Energy Efficiency Program Impact Evaluation Guide*, State and Local Energy Efficiency Action Network, December 2012;<sup>24</sup> and
- *SEE Action Guide for States: Evaluation, Measurement, and Verification Frameworks—Guidance for Energy Efficiency Portfolios Funded by Utility Customers*, State and Local Energy Efficiency Action Network, January 2018.<sup>25</sup>

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<sup>19</sup> See [www.energy.gov/eere/about-us/ump-protocols](http://www.energy.gov/eere/about-us/ump-protocols).

<sup>20</sup> IPMVP Core Concepts may be downloaded at [www.evo-world.org](http://www.evo-world.org) by establishing a free account (similar 2012 IPMVP version: [www.eepperformance.org/uploads/8/6/5/0/8650231/ipmvp\\_volume\\_i\\_\\_2012.pdf](http://www.eepperformance.org/uploads/8/6/5/0/8650231/ipmvp_volume_i__2012.pdf)).

<sup>21</sup> See [www.energy.gov/sites/prod/files/2016/01/f28/mv\\_guide\\_4\\_0.pdf](http://www.energy.gov/sites/prod/files/2016/01/f28/mv_guide_4_0.pdf) and [https://www.energy.gov/sites/default/files/2023-09/supplement-to-mv-guidelines\\_version-4.pdf](https://www.energy.gov/sites/default/files/2023-09/supplement-to-mv-guidelines_version-4.pdf).

<sup>22</sup> See [https://www.techstreet.com/ashrae/standards/guideline-14-2014-measurement-of-energy-demand-and-water-savings?gateway\\_code=ashrae&product\\_id=1888937](https://www.techstreet.com/ashrae/standards/guideline-14-2014-measurement-of-energy-demand-and-water-savings?gateway_code=ashrae&product_id=1888937).

<sup>23</sup> See [www.nationalefficiencyscreening.org/wp-content/uploads/2017/05/NSPM\\_May-2017\\_final.pdf](http://www.nationalefficiencyscreening.org/wp-content/uploads/2017/05/NSPM_May-2017_final.pdf).

<sup>24</sup> See [www4.eere.energy.gov/seeaction/system/files/documents/emv\\_ee\\_program\\_impact\\_guide\\_0.pdf](http://www4.eere.energy.gov/seeaction/system/files/documents/emv_ee_program_impact_guide_0.pdf).

<sup>25</sup> See [www7.eere.energy.gov/seeaction/system/files/documents/EMV-Framework\\_Jan2018.pdf](http://www7.eere.energy.gov/seeaction/system/files/documents/EMV-Framework_Jan2018.pdf); this EM&V guidance document succeeds and contains references to the California Public Utilities Commission's June 2004 California Evaluation Framework.

## 2.7.2 M&V 2.0

M&V 2.0, also called Advanced M&V, refers to the use of advanced data analytics and automated methods to measure and verify savings from energy efficiency projects. M&V 2.0 can achieve very accurate and near-real-time M&V results more efficiently than traditional M&V. Berkeley Lab is a leader in Advanced M&V research.<sup>26</sup> The proposed EM&V methodology for Evergy's KEEIA DSM Portfolio will utilize M&V 2.0 concepts and tools within the NMEC evaluation framework.

## 2.8 EM&V Methodology by Program

EM&V analysis and reporting will be provided for every KEEIA program every year. Table 1 provides a listing of all programs in Evergy's KEEIA DSM Portfolio. For each KEEIA program, the planned percentage of EM&V analyses that will utilize NMEC and/or AMI data is indicated in the rightmost column. As shown in Table 1, EM&V analyses will utilize NMEC and/or AMI data to determine ex-post energy impacts for approximately 94 percent of the KEEIA programs' expected energy impacts. Note that, in all of the following tables, the MWh values represent gross savings.

EM&V analyses cannot utilize NMEC and/or AMI data for 100 percent of the KEEIA programs' expected impacts because certain energy efficiency measures and projects do not provide high enough savings per project to be cost-effectively measured. For example, LED bulbs or efficient commercial kitchen devices do not provide a statistically significant savings signal in AMI data, and small devices such as those would not be cost-effective to monitor.

*Table 1. EM&V Utilization of NMEC and/or AMI Data per KEEIA Program*

<u>ALL KEEIA DSM PROGRAMS</u> KANSAS CENTRAL & KANSAS METRO	Projected Annualized Energy Savings during Program Years 2024-2027 (MWh)	Percent of Portfolio-Level MWh	Projected Peak Demand Savings during Program Years 2024-2027 (MW)	Percent of Portfolio-Level MW	Planned Percent of NMEC Analyses and/or Utilizing AMI Data (as a % of MWh savings)
Business Demand Response	-	0.0%	70.2	26.6%	100.0%
Whole Business Efficiency	144,299	48.5%	51.1	19.4%	95.9%
Business Energy Education	10,169	3.4%	2.7	1.0%	100.0%
Hard-to-Reach Businesses	53,546	18.0%	12.3	4.7%	92.6%
<b>Business Sub-total</b>	<b>208,014</b>	<b>70.0%</b>	<b>136.3</b>	<b>51.7%</b>	<b>95.2%</b>
Hard-to-Reach Homes	19,587	6.6%	10.2	3.9%	81.0%
Home Demand Response	5,441	1.8%	85.3	32.3%	100.0%
Whole Home Efficiency	38,904	13.1%	27.5	10.4%	92.7%
Home Energy Education	25,282	8.5%	4.4	1.7%	100.0%
<b>Residential Sub-total</b>	<b>89,214</b>	<b>30.0%</b>	<b>127.4</b>	<b>48.3%</b>	<b>92.6%</b>
Pilot Incubator*		0.0%		0.0%	0.0%
<b>TOTAL</b>	<b>297,228</b>	<b>100.0%</b>	<b>263.6</b>	<b>100.0%</b>	<b>94.4%</b>

<sup>26</sup> RM&V 2.0 (see <https://buildings.lbl.gov/tools-guides#whole>) is an R application developed by Berkeley Lab to enable M&V practitioners to perform M&V 2.0 for commercial building projects. An alternative URL for RM&V 2.0 information and downloads is found here: <https://lbl-eta.github.io/RMV2.0/>.

\* For the Pilot Incubator Program, values in Table 1 are zero because pilot programs or measures are not yet known.

### 2.8.1 EM&V Methodology: Whole Business Efficiency/Hard-to-Reach Businesses Programs

For the Whole Business Efficiency Program, EM&V will utilize NMEC data and/or AMI data for 95 percent of the savings that this program is expected to achieve. EM&V will include on-site metering for sample sizes that will achieve 90/10 confidence and precision (or better) per service territory.

Individually per service territory, the realization rate<sup>27</sup> from sampled participants will be applied to the whole population to determine program-level energy impacts. A stratified sampling design will be used for these programs; stratified sampling will include a component of geographic stratification for the purpose of exploring possible differences related to geography and demographics. Stratified sampling design will be delineated in program-level M&V Plans.

The following table depicts a ranking of savings for the main measure categories in the Whole Business Efficiency Program.

*Table 2. Whole Business Efficiency Program – Expected Savings per Measure Category*

Measure Category	Average MWh Savings/Year	% of Program Savings/ Year
Lighting & Controls	26,944	74.7%
Custom Projects	4,360	12.1%
HVAC	3,275	9.1%
Refrigeration	901	2.5%
Other Prescriptive Measures	595	1.6%
<b>Grand Total</b>	<b>36,075</b>	<b>100.0%</b>

For the Hard-to-Reach Businesses Program, EM&V will also utilize NMEC data and/or AMI data for 92 percent of the savings that this program is expected to achieve. EM&V will include on-site metering for sample sizes that will achieve 90/10 confidence and precision (or better) per service territory. Individually per service territory, the realization rate from sampled participants will be applied to the whole population to determine program-level energy impacts.

The following table depicts a ranking of savings for the main measure categories in the Hard-to-Reach Businesses Program.

*Table 3. Hard-to-Reach Businesses Program – Expected Savings per Measure Category*

Measure Category	Average MWh Savings/Year	% of Program Savings/ Year
Lighting & Controls	8,652	64.6%
HVAC	2,112	15.8%
Custom Projects	1,628	12.2%
Refrigeration	629	4.7%
Retro-Commissioning	330	2.5%
Other Prescriptive Measures	36	0.3%
<b>Grand Total</b>	<b>13,387</b>	<b>100.0%</b>

<sup>27</sup> Realization rate is the quotient of ex-post verified energy savings and ex-ante claimed energy savings.

Given that the same EM&V methods will be utilized for the Whole Business Efficiency and Hard-to-Reach Business Programs, the descriptions in sections 2.8.1.1 through 2.8.1.6 below represent the EM&V methods for each measure category for both of these Business Programs.

Note that M&V data collection and NMEC/AMI data analyses will be performed in real time, concurrent with program implementation. Real-time M&V, which includes weekly meetings with implementers for large programs and biweekly meetings with implementers for small programs, allows for M&V data collection and analyses to be completed within six to eight weeks following the end of the program year.

For all projects that are in the M&V sample, all available post-installation NMEC/AMI data will be utilized. A large volume of post-installation NMEC/AMI data will be available for projects completed during the first half of the program year. Sufficient quantities of post-installation NMEC/AMI data will be available for most projects completed in the third quarter. Generally, the only projects for which there may not be sufficient quantities of post-installation NMEC/AMI data are those completed in the fourth quarter (Q4). However, for any Q4 project for which the independent, third-party EM&V vendor believes there is significant uncertainty regarding ex-ante claimed energy savings, the EM&V vendor will perform expedited M&V data collection and analyses in Q1 of the succeeding year (i.e., in January and February). This could require the draft version of the EM&V Report to be corrected; however, making such a correction before finalizing the EM&V Report would not impede Evergy's timely filing as required by the Commission.

M&V sampling plans, which will be delineated in program-level M&V Plans, are designed to ensure that ex-post verified savings from each program can be statistically proven, with sampling bias eliminated or mitigated. In the event that there is a Q4 project for which the independent, third-party EM&V vendor believes there is significant uncertainty regarding the ex-ante claimed energy savings, the EM&V vendor performs expedited M&V to mitigate potential sampling bias.

#### **2.8.1.1 EM&V Methodology: Lighting and Controls Projects (and Midstream Channel if applicable)**

EM&V methodology for Lighting and Controls projects will include on-site operational verification and on-site metering consistent with International Performance Measurement & Verification Protocol (IPMVP) Option A, "Retrofit Isolation, Key Parameter Measurement." For all sampled projects for which expected energy savings represent ten percent savings (or greater) at the meter,<sup>28</sup> NMEC and AMI data will be utilized to calculate ex-post verified energy impacts.

Following are key considerations regarding the timeframe for M&V data collection and analyses:

- IPMVP Option A requires only short-term monitoring, such as the 4-week, 8-week, and 12-week monitoring subgroups described in previous sections in this proposed EM&V Methodology.

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<sup>28</sup> Given that these programs have not yet been implemented, it is difficult to predict the percentage of the sampled population that will have expected energy savings of ten percent or greater; however, this is information that will be available – and will be shared – soon after program implementation commences.



- As noted above, M&V data collection (which will be defined in program-level M&V Plans) and NMEC/AMI data analyses will be performed in real time, and for sampled projects all available post-installation NMEC/AMI data will be analyzed. Real-time data collection includes Evergy's continual collection of AMI data from customers' smart meters and the EM&V vendor's collection of site-level NMEC data for M&V sample sites. Real-time NMEC/AMI data analyses refers to the ongoing analyses by the EM&V vendor, of which some analyses occur weekly during certain parts of the program year and other analyses occur monthly throughout the program year.

### 2.8.1.2 EM&V Methodology: Heating, Ventilation, and Air Conditioning (HVAC) Projects

EM&V methodology for HVAC projects will include on-site operational verification and on-site metering consistent with IPMVP Option A, "Retrofit Isolation, Key Parameter Measurement." For all sampled projects for which expected energy savings represent ten percent savings (or greater) at the meter,<sup>29</sup> NMEC and AMI data will be utilized to calculate ex-post verified energy impacts.

Following are key considerations regarding the timeframe for M&V data collection and analyses:

- IPMVP Option A requires only short-term monitoring, such as the 4-week, 8-week, and 12-week monitoring subgroups described in previous sections of this proposed EM&V Methodology.
- As noted above, M&V data collection (which will be defined in program-level M&V Plans) and NMEC/AMI data analyses will be performed in real time, and for sampled projects all available post-installation NMEC/AMI data will be analyzed. Real-time data collection includes Evergy's continual collection of AMI data from customers' smart meters and the EM&V vendor's collection of site-level NMEC data for M&V sample sites. Real-time NMEC/AMI data analyses refers to the ongoing analyses by the EM&V vendor, of which some analyses occur weekly during certain parts of the program year and other analyses occur monthly throughout the program year.
- Air conditioning and economizer projects, if completed in Q4, are generally not viable for M&V data collection and analysis until the following spring or summer. However, this is not an impediment to timely completion of EM&V analyses and reporting *unless there is a large HVAC Project or a Custom Project for which air conditioning and/or economizer measures represent a significant component of the project's ex-ante claimed energy impacts*. Therefore, the practical solution is for Evergy and its program implementation contractor to continually remind Business Program participants that incentives may be delayed for large air conditioning/economizer projects that are not completed before Q4.

### 2.8.1.3 EM&V Methodology: Custom Projects

Custom projects may include a combination of Lighting, Lighting Controls, HVAC, HVAC Controls, and/or Building Energy Management Systems. Other custom projects may be related to agricultural or industrial process improvement.

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<sup>29</sup> *Ibid.*

EM&V methodology for Custom projects will include on-site operational verification and one of the following methods:

1. Method 1, On-site metering consistent with IPMVP Option A, “Retrofit Isolation, Key Parameter Measurement” (examples: custom lighting and HVAC projects; server room projects that are not large data center projects).
2. Method 2, M&V 2.0 regression analysis that will be consistent with NMEC and IPMVP Option C, “Whole Facility” analysis; regression analyses will utilize AMI Data (15-minute or 1-hour interval data) that is cross-checked and calibrated with monthly billing data; regression analyses will also be cross-checked and triangulated with engineering analyses<sup>30</sup> of the specific measures that the Program caused to be installed (examples: large retro-commissioning project; large retrofit project in data center).
3. Method 3, Analysis of site-specific data consistent with IPMVP Option D, “Whole Facility, Calibrated Simulation” (example: whole facility VFDs and controls project).

For all sampled projects for which expected energy savings represent ten percent savings (or greater) at the meter,<sup>31</sup> NMEC and AMI data will be utilized to calculate ex-post verified energy impacts. Key considerations regarding the timeframe for M&V data collection and analyses are identical to those mentioned above in section 2.8.1.2.

#### **2.8.1.4 EM&V Methodology: Refrigeration Projects**

EM&V methodology for Refrigeration projects will include, for sampled projects, on-site operational verification and on-site metering consistent with IPMVP Option A, “Retrofit Isolation, Key Parameter Measurement.” For sampled projects for which expected energy savings represent ten percent savings (or greater) at the meter, NMEC and AMI data will be utilized to calculate ex-post verified energy impacts. Note that Refrigeration projects for which expected energy savings are relatively large may be found within large Custom projects.

Given that the Refrigeration measure category accounts for less than five percent of expected energy savings for the Business Efficiency Programs, there are no particular concerns regarding there being adequate time to complete M&V data collection and analyses within six to eight weeks following the end of the program year.

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<sup>30</sup> *There are multiple M&V methods that can be used to analyze Custom Commercial projects. Whenever it is practical and cost effective, the independent, third-party EM&V vendor will utilize multiple M&V methods to essentially cross-check the primary M&V analysis with a supplemental analysis that uses a different technique that should reach the same answer. The use of multiple M&V methods for a given analyze Custom Commercial project is sometimes referred to as triangulation, i.e., discovering the true outcome using multiple approaches or methods.*

<sup>31</sup> *Given that these programs have not yet been implemented, it is difficult to predict the percentage of the sampled population that will have expected energy savings of ten percent or greater, or conversely, less than ten percent. However, this is information that will be available – and will be shared – soon after program implementation commences.*



### 2.8.1.5 EM&V Methodology: Retro-Commissioning Projects

EM&V methods for Retro-Commissioning projects will be the same as “Method 2” described above in the Custom project category. EM&V methods for Retro-Commissioning will include on-site operational verification and M&V 2.0 regression analysis that will be consistent with NMEC and IPMVP Option C, “Whole Facility” analysis; regression analyses will utilize AMI data (15-minute or 1-hour interval data) that is cross-checked and calibrated with monthly billing data; regression analyses will be cross-checked and triangulated with engineering analyses for installed measures.

Given that the Retro-Commissioning measure category accounts for about two percent of expected energy savings for the Business Efficiency Programs, there are no particular concerns regarding there being adequate time to complete M&V data collection and analyses within six to eight weeks following the end of the program year.

### 2.8.1.6 EM&V Methodology: Other Prescriptive Measures

EM&V methods for Other Prescriptive Measures will include on-site operational verification, will utilize Kansas TRM algorithms and deemed savings values, and will be supported by annual benchmarking and updating of the Kansas TRM.

Given that the Other Prescriptive Measures category accounts for about one percent of expected energy savings for the Business Efficiency Programs, there are no particular concerns regarding there being adequate time to complete M&V data collection and analyses within six to eight weeks following the end of the program year.

## 2.8.2 EM&V Methodology: Business Energy Education Program

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For the Business Energy Education Program, EM&V will utilize NMEC data and/or AMI data for 100 percent of the savings that this program is expected to achieve. The following table depicts a ranking of savings for measure categories in the Business Energy Education Program.

*Table 4. Business Energy Education Program – Expected Savings per Measure Category*

Measure Category	Average MWh Savings/Year	% of Program Savings/ Year
Behavioral Measures	1,460	57.4%
Strategic Energy Management	1,083	42.6%
<b>Grand Total</b>	<b>2,542</b>	<b>100.0%</b>

For both measure categories, EM&V will be performed for a census of participants using an M&V 2.0 regression analysis that will be consistent with NMEC and IPMVP Option C, “Whole Facility” analysis. The M&V 2.0 regression analysis will utilize AMI Data (15-minute or 1-hour interval data) that is cross-checked and calibrated with monthly billing data. The M&V 2.0 regression analysis will also be cross-checked and triangulated with engineering analyses of specific measures, if known, that the program caused participants to implement. Participants will be surveyed, sampling at 90/10 confidence and precision (or better) per service territory, to collect customer-reported data regarding specific energy efficiency measures and customer actions and behaviors that caused energy savings.

Participants in Behavioral Measures and Strategic Energy Management will receive treatment throughout the program year (and typically for the full year) and M&V data collection and NMEC/AMI data analyses will be performed in real time, concurrent with the full year treatment. Real-time data collection includes Evergy’s continual collection of AMI data from customers’ smart meters; real-time NMEC/AMI data analyses refers to the ongoing analyses by the EM&V vendor, which are most cost-effective if occurring monthly or quarterly during this behavioral treatment. As such, the ongoing and real-time M&V activities allow for M&V data collection and analyses to be completed within six to eight weeks following the end of the program year.

Cross-participation will be analyzed. Cross-participants, if any, are participants for whom kWh savings were also reported in another program. To ensure that cross-participants’ energy and peak demand savings do not inflate reported energy impacts for the Business Energy Education Program, cross-participants will be excluded from this program’s M&V 2.0 regression analysis.

### 2.8.3 EM&V Methodology: Business Demand Response Program

For the Business Demand Response (DR) Program, EM&V will utilize NMEC data and/or AMI data for 100 percent of the savings that this program is expected to achieve. The following table shows the expected peak demand savings from the Business DR Program.

*Table 5. Business DR Program – Expected Savings per Measure Category*

Measure Category	Average Peak kW / Year	% of Program Savings/ Year
Auto DR and Manual Direct Load Control	17,561	100.0%

For a census of the population in the Business Demand Response Program, EM&V will include an M&V 2.0 regression analysis that will be consistent with NMEC and IPMVP Option C, “Whole Facility” analysis. The M&V 2.0 regression analysis will utilize AMI Data (15-minute or 1-hour interval data) that is cross-checked and calibrated with monthly billing data. Energy impacts will be reported at any required time interval(s), e.g., hourly or sub-hourly.

Auto DR and Manual Direct Load Control (DLC) participants are subject to short-duration events that occur during adverse weather conditions and/or system emergencies. Given that DR and DLC events are short-duration events, the EM&V vendor’s real-time M&V activities allow for the vast majority of M&V data collection and analyses to be completed within the program year.

### 2.8.4 EM&V Methodology: Whole Home Efficiency and Hard-to-Reach Homes Programs

For the Whole Homes Efficiency Program, EM&V will utilize NMEC data and/or AMI data for 92 percent of the savings that this program is expected to achieve. EM&V will include on-site measurements and monitoring for sample sizes that will achieve 90/10 confidence and precision (or better) per service territory. For each service territory, the realization rate from sampled participants will be applied to the whole population to determine program-level energy impacts. The following table depicts a ranking of savings for the main measure categories in this program.

*Table 6. Whole Homes Efficiency Program – Expected Savings per Measure Category*

Measure Category	Average MWh Savings/Year	% of Program Savings/ Year
HVAC Measures	8,527	87.7%
Water Heating including HPWH	489	5.0%
Other Prescriptive Measures	384	3.9%
Shell Measures, including Windows	251	2.6%
Lighting Measures	76	0.8%
<b>Grand Total</b>	<b>9,726</b>	<b>100.0%</b>

For the Hard-to-Reach Homes Program, EM&V will also utilize NMEC data and/or AMI data for 81 percent of the savings that this program is expected to achieve. EM&V will include on-site measurements and monitoring for sample sizes that will achieve 90/10 confidence and precision (or better) per service territory. For each service territory, the realization rate from sampled participants will be applied to the whole population to determine program-level energy impacts. The following table depicts a ranking of savings for the main measure categories in this program.

*Table 7. Hard-to-Reach Homes Program – Expected Savings per Measure Category*

Measure Category	Average MWh Savings/Year	% of Program Savings/ Year
HVAC Measures	3,745	76.5%
Lighting Measures	463	9.5%
Custom Projects	221	4.5%
Other Prescriptive Measures	196	4.0%
Water Heating including HPWH	191	3.9%
Shell Measures	82	1.7%
<b>Grand Total</b>	<b>4,897</b>	<b>100.0%</b>

Given that the same EM&V methods will be utilized for the Whole Homes Efficiency and Hard-to-Reach Homes Programs, the following descriptions represent the EM&V methods for each measure category for both of these residential programs.

Note that M&V data collection and NMEC/AMI data analyses will be performed in real time, concurrent with program implementation. Real-time M&V allows for M&V data collection and analyses to be completed within six to eight weeks following the end of the program year.

For all projects that are in the M&V sample, all available post-installation NMEC/AMI data will be utilized. A large volume of post-installation NMEC/AMI data will be available for projects completed during the first half of the program year. Sufficient quantities of post-installation NMEC/AMI data will be available for most projects completed in the third quarter. Generally, the only projects for which there may not be sufficient quantities of post-installation NMEC/AMI data are those completed in the fourth quarter (Q4). However, for any Q4 project for which the independent, third-party EM&V vendor believes there is significant uncertainty regarding the ex-ante claimed energy savings, the EM&V vendor will perform expedited M&V during Q1 of the succeeding year. This could require the draft version of the EM&V Report to be corrected; however, making such a correction before finalizing the EM&V Report would not impede Evergy's timely filing as required by the Commission.

#### **2.8.4.1 EM&V Methodology: Home Comfort Component, including HVAC and Shell Measures**

For a census of projects in the Home Comfort Component, EM&V will include an M&V 2.0 regression analysis that will be consistent with NMEC and IPMVP Option C, “Whole Facility” analysis. The M&V 2.0 regression analysis will utilize AMI Data (15-minute or 1-hour interval data) that is cross-checked and calibrated with monthly billing data. The M&V 2.0 regression analysis will also be cross-checked and triangulated with engineering analyses of the specific measures that participants implemented; energy impacts will be reported at the hourly interval.

An M&V 2.0 regression analysis may also be effective for determining savings from Heat Pump Water Heaters and other Water Heating measures if those measures are installed in the same premises that installed HVAC and Shell Measures.

Following are key considerations regarding the timeframe for M&V data collection and analyses:

- M&V data collection and NMEC/AMI data analyses will be performed in real time, and for sampled projects, all available post-installation NMEC/AMI data will be analyzed.
- Air conditioning projects, if completed in Q4, are generally not viable for M&V data collection and analysis until the following spring or summer. However, this is not an impediment to timely completion of EM&V analyses and reporting *unless there is a large Q4 group of air conditioning projects that comprise the majority of the Home Comfort component’s ex-ante claimed energy impacts*.
- The practical solution is for Evergy and its program implementation contractor to remain vigilant when organizing and approving large air conditioning projects, and to aim to complete such projects before Q4.
- Assuming that most air conditioning projects will be completed before Q4 of each program year, there will be large volumes of AMI data available to enable completion of M&V 2.0 regression analyses and M&V cross-checking analyses by the end of each program year.

#### **2.8.4.2 EM&V Methodology: Home Products Component**

For lighting measures and other energy efficient products, EM&V methods will include on-site operational verification and utilizing Kansas TRM algorithms and deemed savings values; also provide annual benchmarking and updating of Kansas TRM.

The EM&V method for Appliance Recycling is described in Chapter 7: Refrigerator Recycling Evaluation Protocol of the Uniform Methods Project. Energy use for each unit at the time it was recycled will be determined by adjusting at-manufacture unit energy consumption upward to reflect degradation in efficiency over time (factors affecting degradation are appliance age and location in house). For premises that install Home Products and also participate in the Home Comfort component, Home Products savings will be deducted from the regression analysis of Home Comfort savings to ensure that there is not double counting of savings for any given premise. M&V data collection/analyses will be completed by six to eight weeks after the end of each program year.

### 2.8.5 EM&V Methodology: Home Energy Education

For the Home Energy Education Program, EM&V will utilize NMEC data and/or AMI data for 100 percent of the savings that this program is expected to achieve. The following table depicts a ranking of savings for measure categories in the Home Energy Education Program.

*Table 8. Home Energy Education Program – Expected Savings per Measure Category*

Measure Category	Average MWh Savings/Year	% of Program Savings/ Year
Behavioral Measures	6,320	100.0%

For a census of projects in the Home Energy Education Program, EM&V will include an M&V 2.0 regression analysis that will be consistent with NMEC and IPMVP Option C, “Whole Facility” analysis. The M&V 2.0 regression analysis will utilize AMI data (15-minute or 1-hour interval data) that is cross-checked and calibrated with monthly billing data. The M&V 2.0 regression analysis will also be cross-checked and triangulated with engineering analyses of specific measures, if known, that the program caused participants to implement. Participants will be surveyed, sampling at 90/10 confidence and precision (or better) per service territory, to collect customer-reported data regarding specific energy efficiency measures and customer actions and behaviors that caused energy savings.

Participants in Behavioral Measures receive treatment throughout the program year (typically for the full year). M&V data collection and NMEC/AMI data analyses will be performed in real time, concurrent with the full year treatment. Real-time data collection includes Evergy’s continual collection of AMI data from customers’ smart meters; real-time NMEC/AMI data analyses refers to the ongoing analyses by the EM&V vendor, which are most cost-effective if occurring monthly or quarterly during this behavioral treatment. As such, the ongoing and real-time M&V activities allow for data collection and analyses to be completed within six to eight weeks after the end of the program year.

Cross-participation will be analyzed. Cross-participants (if any) are the participants in this program for whom kWh savings were also reported in another program. To ensure that cross-participants’ energy and peak demand savings do not inflate the reported energy impacts for the Home Energy Education Program, cross-participants will be excluded from this program’s M&V 2.0 regression analysis.

### 2.8.6 EM&V Methodology: Home Demand Response Program

For the Home Demand Response (DR) Program, EM&V will utilize NMEC data and/or AMI data for 100 percent of the savings that this program is expected to achieve. The following table shows a ranking of the expected energy savings for measure categories in the Home DR Program.

*Table 9. Home DR Program – Expected MWh Savings per Measure Category*

Measure Category	Average MWh Savings/Year	% of Program Savings/ Year
Smart Thermostat	1,360	100.0%

The following table shows a ranking of expected peak demand savings for the Home DR Program.

*Table 10. Home DR Program – Expected kW Savings per Measure Category*

Measure Category	Average Peak kW Savings / Year	% of Program Savings/ Year
Programmable Thermostat (legacy devices with one-way communication)	25,384	51.5%
Smart Thermostat (two-way communicating thermostats with EE algorithms)	17,623	35.7%
Smart Thermostat – Bring Your Own (BYO)	4,614	9.4%
DR Water Heater Direct Load Control (DLC)	1,713	3.5%
<b>Grand Total</b>	<b>49,334</b>	<b>100.0%</b>

For a census of the population in the Home DR Program, EM&V will include an M&V 2.0 regression analysis that will be consistent with NMEC and IPMVP Option C, “Whole Facility” analysis. The M&V 2.0 regression analysis will utilize AMI Data (15-minute or 1-hour interval data) that is cross-checked and calibrated with monthly billing data. Energy impacts will be reported at any required time interval(s), e.g., hourly or sub-hourly.

Home DR Program participants are subject to short-duration events that occur during adverse weather conditions and/or system emergencies. The EM&V vendor’s real-time M&V activities will allow for the vast majority of M&V data collection and analyses to be completed within the program year. An exception is that year-end data collection is needed for Smart Thermostats, which provide energy savings throughout the program year; nonetheless, real-time M&V activities will allow for M&V data collection and analyses to be completed within six to eight weeks after the end of each program year.

## **2.9 Timing Considerations for Pre- and Post-Installation Monitoring**

The following tables provide an overview of pre- and post-installation monitoring requirements, and related timing considerations, for each measure category in Evergy’s KEEIA programs.

Table 11 provides a listing of all of the measure categories in the Business group of programs. Table 12 provides a listing of all of the measure categories in the Homes group of programs.

The specific monitoring timelines indicated in Tables 11 and 12 allow for high EM&V rigor while enabling the EM&V methodologies described above to be efficiently achieved.



Table 11. Business Programs: Pre- and Post-Installation Monitoring Requirements per Measure Category

Business Programs' Measure Categories	Is this a high-impact measure? If yes, why?	Weather-sensitive measure(s)? (Yes, no, or explain.)	How much pre- and post-installation monitoring is needed for M&V sample sites?	When must post-installation monitoring be completed?	Will AMI data and regression analyses be used?
Lighting & Controls	Yes, high impact due to more energy savings than all other Business Measures combined (i.e., 2/3 of Business Savings)	No. Not weather sensitive.	Subgroups of 4 weeks, 8 weeks, and 12 weeks pre- and post-installation	Q4 (or Q5, i.e., within 4 to 6 weeks after end of program year)	Yes, for sites that save 10% or more
HVAC	Yes, high impact due to significant quantity of expected energy savings, and EM&V rigor is necessary for identifying opportunities for improving future program designs and processes.	Yes. HVAC loads and HVAC energy-efficiency measures are highly weather sensitive.	Subgroups of 4 weeks, 8 weeks, and 12 weeks pre- and post-installation. M&V sampling will use stratified sampling so there will likely be 30+ HVAC sites sampled from 1000s of HVAC projects.	<b>HVAC:</b> end-September if weather conditions are favorable. This is statistically valid if most HVAC projects are completed before the end of the third calendar quarter.	Yes, same as above
Custom Projects	Yes, same as above	Yes. May include HVAC loads.	Yes, same as above	HVAC: end of August. Non-HVAC: end of year	Yes, same as above
Refrigeration	No, not high impact due to relatively low energy savings; however, EM&V will help identify opportunities for improving future program designs and processes.	<b>Yes, if</b> refrigeration load has outdoor condensers or is installed in unconditioned space. <b>No, if</b> refrigeration load is fully within conditioned space.	Pre- 4 wks. & Post- 4 wks.	End of year	Yes, same as above
Retro-Commissioning	No	Yes. Highly likely to include HVAC loads.	Pre- 4 wks. & Post- 4 wks.	HVAC: end of August; Non-HVAC: end of year	Yes, same as above
Other Prescriptive Measures	No	No. Most of these small measures are <u>not</u> likely to be weather sensitive.	None	N/A	No, use TRM.
Behavioral Measures; Strategic Energy Management; DR – Auto DR and Manual Direct Load Control (DR)	Yes, relatively high impact for energy savings; very high impact for peak demand savings. EM&V rigor will also help identify opportunities for improving future program designs and processes.	Yes. Includes HVAC loads.	None	N/A	Yes

Table 12. Homes Programs: Pre- and Post-Installation Monitoring Requirements per Measure Category

Business Programs' Measure Categories	Is this a high-impact measure? If yes, why?	Weather-sensitive measure(s)? (Yes, no, or explain.)	How much pre- and post-installation monitoring is needed for M&V sample sites?	When must post-installation monitoring be completed?	Will AMI data and regression analyses be used?
HVAC	Yes, due to more energy savings than all other Homes Programs' measures combined (i.e., more than half of all Homes Programs' energy savings).	Yes. HVAC loads and HVAC energy-efficiency measures are highly weather sensitive.	Subgroups of 4 weeks, 8 weeks, and 12 weeks pre- and post-installation. M&V sampling will use stratified sampling, i.e., sample about 40 HVAC sites per territory from 1000s of projects.	<b>HVAC:</b> end-September if weather conditions are favorable; this is statistically valid if most HVAC projects are completed before the end of the third calendar quarter.	Yes, regression analysis of all measures implemented in the first half of the year.
Behavioral Measures; EE Smart Thermostat (energy efficiency measure)	Yes, due to significant quantity of expected energy savings. EM&V rigor also identifies opportunities for improving future program designs and processes.	Yes. To achieve targeted energy savings for Behavioral Measures, it is essential for participants to control and reduce HVAC energy usage. ; Smart Thermostats control HVAC loads, utilizing EE optimization algorithms to define optimal schedules from occupants' preferences.	None	N/A	Yes, determine energy savings via regression analysis of full population.
DR Programmable Thermostat; DR Smart Thermostat; DR Smart Thermostat – BYO; DR Water Heater DLC	Yes, very high impact for peak demand savings. EM&V rigor also identifies opportunities for improving future program designs and processes.	Yes, DR thermostat measures control HVAC loads; DR water heater measures control water heating loads that may be in unconditioned spaces.	None	N/A	Yes, same as above.
Water Heating including HPWH	No, due to relatively low energy savings; EM&V will identify opportunities for program design and process improvements.	Yes, weather sensitive for water heaters located in unconditioned spaces.	Pre- 4 wks. & Post- 4 wks. for a small M&V sample, such as ten per territory.	End of year	Yes
Other Prescriptive Measures	No	No, most of these small measures are <u>not</u> likely to be weather sensitive.	None	N/A	No
Lighting & Controls	No	No	None	N/A	No
Shell Measures & Windows; Custom Projects	No	Shell – yes; Custom – yes for projects including HVAC loads.	None	N/A	Yes



### 3 Evergy's Proposed EM&V Timeline

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For each KEEIA program year, EM&V activities will commence at the beginning of the program year. If necessary, EM&V activities can commence before the beginning of the program year; for example, EM&V support may be needed in Q4 of the prior year to enable a given KEEIA program(s) to be ready for quick-start implementation at the beginning of the new year.<sup>32</sup>

Following is a brief description of the proposed EM&V timeline for KEEIA programs:

1. Q1 – Prepare EM&V Plans for all programs and submit each EM&V Plan to the Commission and/or Staff in accordance with instructions from the Commission. Commence regularly scheduled EM&V Check-in Meetings with Evergy managers and KEEIA program implementers. Verify that program data tracking systems and AMI data flow are organized and functioning.
2. Q2 & Q3 – Ongoing EM&V data collection; commence EM&V analyses with available data. Real-time EM&V data collection includes Evergy's continual collection of AMI data from customers smart meters and the EM&V vendor's collection of site-level NMEC data for M&V sample sites. Real-time NMEC/AMI data analyses refers to the ongoing analyses by the EM&V vendor, of which some analyses occur weekly during certain parts of the program year and other analyses occur monthly throughout the program year.
3. Q4 – Finish EM&V data collection and analyses for a select subset of measures/programs.
4. Q5 (i.e., the first quarter of the following year):
  - a. January 2 through February 28 – Finalize all EM&V data collection and analyses.
  - b. March 15 – Deliver draft EM&V Report (present to stakeholders, if required).
  - c. April 1 – Stakeholder deadline to provide written comments on EM&V Report.
  - d. April 15 – Stakeholder meeting to discuss EM&V Report recommendations.
  - e. **May 1 – Deliver final EM&V Report.**
  - f. TBD – Evergy's filing deadline will be determined by the Commission.

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<sup>32</sup> Additionally, base case data will be collected during the prior year and/or season, e.g., the prior summer for HVAC.

## CERTIFICATE OF SERVICE

22-EKME-254-TAR

I, the undersigned, certify that a true copy of the attached Order has been served to the following by means of electronic service on 02/29/2024.

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