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MODULE

9

Implementing the baseline model and data from the reporting period

KRISHNAJI PAWAR - CEO & FOUNDER

LEED AP(BD+C), GSAS CGP, GCP, ISO 14001

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Measurement and verification (M&V) is a crucial process for assessing the performance of energy efficiency projects and interventions aimed at reducing resource consumption. A well-structured M&V process allows stakeholders to quantify energy savings or performance improvements resulting from their actions.

Learning Objectives

- Introduction and Course Outline
- Contexts and Concepts: The M&V Specialist's Function
- Standards of Practice
- Practical Considerations for M&V
- Physical and statistical models
- System boundary in M&V
- Baseline: Additional Considerations
- Special Baseline Considerations for Utility Programs
- **Implementing the baseline model and data from the reporting period**
- Granularity and load shapes
- Using Statistics to Communicate Uncertainty



INTRODUCTION

- M&V is crucial for assessing the performance and impact of energy efficiency projects.
- A "baseline" is a key component of M&V, representing the expected energy consumption of a facility or system without energy efficiency measures.
- The baseline model consists of historical data, operational characteristics, external factors, and modeling methodology.
- The choice of methodology depends on the complexity of the system and data availability.
- The baseline model is created using regression analysis to predict the expected energy consumption without the retrofit.
- Accurate and timely data collection during the reporting period is essential.
- Comparing actual energy consumption to the baseline model yields energy savings attributable to the efficiency measures.
- If the building's occupancy increased during this period, an adjustment factor might be applied to the baseline to account for the expected increase in energy use.

UNDERSTANDING THE BASELINE MODEL

- The baseline model represents the expected behavior of a system in the absence of the specific project or intervention being evaluated.
- It is constructed using historical data and other relevant factors that influence performance.

Components of a Baseline Model

- **Historical Data:** Includes data on energy consumption, operational hours, and environmental factors over a defined period before the implementation of the intervention.
- **Predictive Analytics:** Statistical methods, including regression analysis, can be used to predict future energy usage based on historical trends and influencing variables.
- **Normalization Factors:** Adjustments made to account for variations in external conditions, such as weather patterns, occupancy levels, and production schedules.





USING THE BASELINE MODEL AND INFORMATION IN THE REPORTING PERIOD

Understanding the Baseline Model

- The 'What Would Have Happened Meter' is the implementation of the 'What Would Have Happened Meter'.
- It is impossible to know precisely what would have occurred without energy management.
- Baseline data is used to build a model, and agreement from stakeholders on the model type and update process is obtained.
- A complete inventory of baseline data is needed for non-routine adjustments.



Terminology Time: Adjustments

- The term "adjustments" in M&V is not unique to M&V.
- The term "routine" and "non-routine" adjustments refer to the adjustments made to baseline energy models to account for changes in conditions.
- "Routine" adjustments are made for predictable changes in conditions identified as part of the baseline model.
- "Non-routine" adjustments are made for unexpected changes, such as equipment failures or unplanned shutdowns.

USING THE BASELINE MODEL AND INFORMATION IN THE REPORTING PERIOD + Routine Adjustments

- The M&V plan includes the details of what data will be collected and used to tweak the baseline model in the reporting period.
- The adjustment typically involves executing a simple pre-determined calculation.

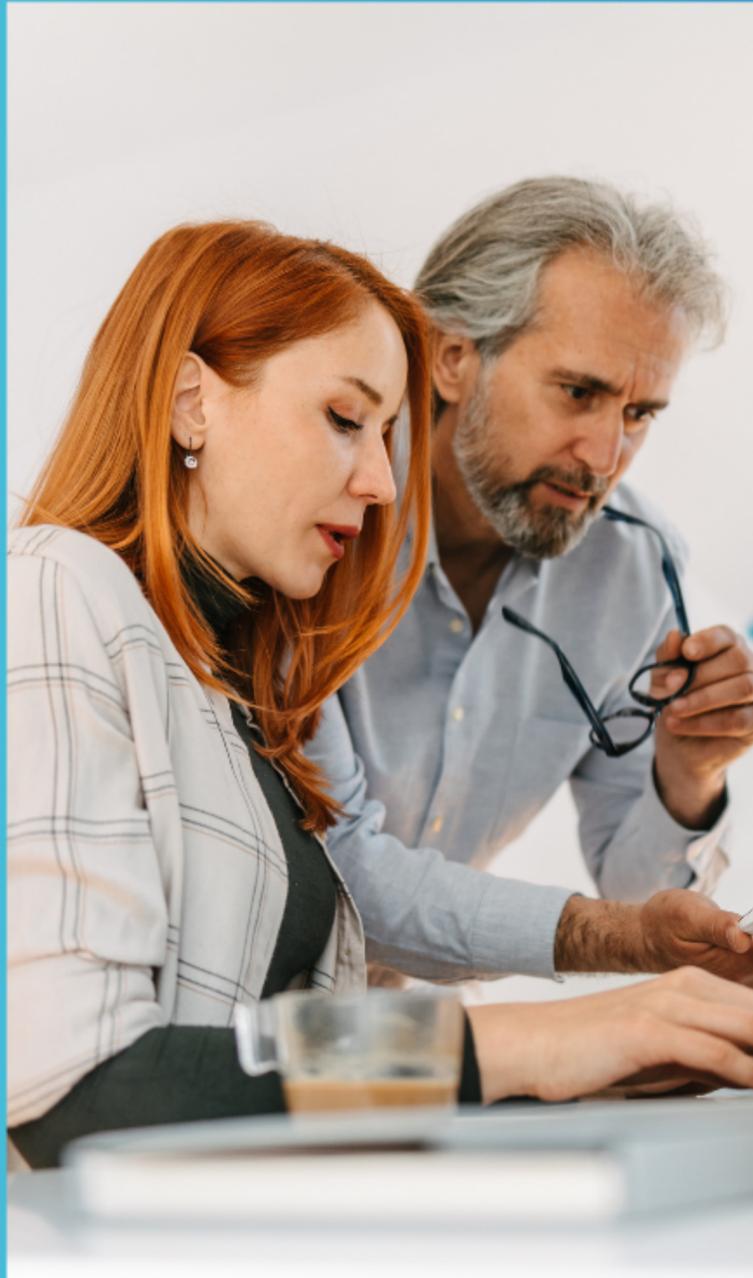
Non-routine: Unexpected and Without Previous Calculation

- Any event of sufficient magnitude (within the measurement boundary) not anticipated in the M&V plan and codified as a routine adjustment is a nonroutine event.
- Two primary ways of identifying non-routine events are by observing and analyzing energy consumption data or surveilling the facility.



DATA FROM THE REPORTING PERIOD

- Data from the reporting period—typically the duration after the implementation of the intervention—is collected.
- The collection of data during the reporting period involves continuous monitoring and regular reporting.



Ensuring Accuracy and Reliability

- The accuracy of the baseline model and the data from the reporting period is paramount in M&V.
- Stakeholders must ensure that the data collected must be accurate and representative.

NON-ROUTINE ADJUSTMENTS IN M&V PRACTICE

- Non-routine adjustments estimate the impact of an event on energy consumption.
- Methods include energy modeling, engineering calculations, and empirical data.
- Anticipated Non-routine Events (NRAs): These events can be anticipated and planned for, allowing for the estimated impact on energy consumption.
- Ad-Hoc Non-routine Events (Not Anticipated): These events can be estimated using empirical data, statistical analysis, energy modeling, and engineering calculations.
- Methods depend on the nature of the event, availability of data and resources, and the system's complexity.
- NREs in the Baseline Period: Non-routine events can occur during the baseline period.
- If these events are not expected to recur, they can be analyzed and energy consumption removed from the baseline model.
- To account for non-routine events during the baseline period, documentation and characterization of these events can be done.



CONTACT US



+91 6363032722



info@beyondsmartcities.in



learn.beyondsmartcities.in



#55,HMR Layout ,Bengaluru ,India



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