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ONLINE TRAINING BY KRISHNAJI PAWAR
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MODULE 7

Baseline: Additional Considerations

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The system boundary is a crucial concept in Measurement and Verification, ensuring the accuracy and reliability of energy savings claims. It enhances clarity, accountability, and consistency in M&V efforts, enabling stakeholders to assess the impact of energy efficiency initiatives and make informed decisions.

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

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INTRODUCTION

- Baseline model is used to evaluate performance in M&V plans.
- Key considerations include data availability and accuracy, accuracy of typical construction operations, normalization and weather adjustment, and complexity of models.
- Sensitivity analysis can identify major energy demand drivers and potential uncertainty sources in the baseline model.
- M&V professionals can select between statistical and physical models and two system boundaries.
- An adjusted baseline is used to implement the counterfactual technique in M&V, updating the model to account for non-energy management elements.
- Routine adjustments generate adjusted baseline energy based on independent variables collected throughout the reporting period.
- Non-routine adjustments refer to changes in the facility during the reporting period that were not explicitly parametrized in the baseline model.
- Static factors refer to baseline data not used for routine changes, as opposed to dynamic factors.

BASELINE MODEL IN M&V PLANS

- The baseline model is used to analyze and characterize the baseline energy use data.
- Key considerations include data availability and accuracy, representativeness of data, normalization and weather adjustment, model complexity, and sensitivity analysis.
- The M&V professional can choose between two types of models (statistical and physical) and two system boundaries (whole building and retrofit isolation).

Adjusted Baseline

- The adjusted baseline is used in the implementation of the counterfactual method in M&V.
- The adjustment process involves using statistical analysis and modeling techniques to isolate the effects of influencing factors and estimate energy use.
- The term "adjusting the baseline model" has two meanings: routine adjustments and non-routine adjustments.

BASELINE MODEL IN M&V PLANS +

Non-routine Adjustments

- Any change in the facility that was not explicitly parametrized in the baseline model is called a non-routine event (NRE).
- • Decisions must be made about when to adjust for non-routine events.

Static Factors

- The fundamental theory of M&V is that practitioners can build and update a baseline model throughout the reporting period.
- All other data collected as part of the baseline may also be subject to adjustment.

BASELINE: ADDITIONAL CONSIDERATIONS IN MEASUREMENT AND VERIFICATION

Introduction

- Baseline is a crucial step in evaluating the performance of energy efficiency projects, renewable energy initiatives, and other resource-saving strategies.
- It serves as a reference point against which actual performance is compared.

Defining Baseline

- A baseline is a quantifiable representation of energy consumption, emissions, or other relevant metrics prior to the implementation of an energy-saving measure or project.
- It is vital for performance measurement, attribution, and financial analysis.

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TYPES OF BASELINES

- Historical Baseline: Uses historical data from the facility or process prior to the implementation of the energy-saving measures.
- Projected Baseline: Uses predictive modeling to establish baselines where historical data is limited or unreliable.
- Standard Baseline: Uses industry standards or norms to establish a baseline.

ADDITIONAL CONSIDERATIONS IN BASELINE DEVELOPMENT

- Changes in Operating Conditions: Adjust the baseline accordingly to reflect changes in production levels, occupancy rates, or operational hours.
- Seasonality Effects: Consider seasonal variations in usage when establishing a baseline.
- Technological Changes: Reevaluate the baseline to account for the current state of technology.
- Behavioral Changes: Consider changes in staff behavior or operational practices that can influence energy consumption.

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BASELINE: ADDITIONAL CONSIDERATIONS FOR ENERGY MANAGEMENT

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- The baseline is a reference point for comparing the performance of a building or system to determine the impact of energy management activities.
- It is necessary to document existing conditions and collect data for adjustments in the reporting period.
- The "denominator problem" is whether the facility is meeting all applicable codes and expected service levels.
- If existing conditions do not meet required or desirable service levels, the baseline may not be fair and relevant.
- Before documenting the baseline, a thorough investigation of the facility's systems is necessary to identify any issues.
- If issues are found, they may be fixed or replaced before the baseline is established, if stakeholders agree and program guidelines allow.
- If the extent of operations in the baseline period varies, the most representative operations level should be selected.
- Specific future operating characteristics should be incorporated into the analysis through sensitivity analysis or adjustment factors.
- A valid baseline for M&V purposes is a reference point against which the performance of a building or system can be compared.

"FAIR AND RELEVANT" BASELINE CHARACTERISTICS

- Consistency: The baseline should align with historical energy consumption data and operational hours.
- Normalization: The model should consider factors outside the project's control, such as weather, occupancy, and production levels.
- Accuracy: The model should accurately predict energy consumption under normal operating conditions.
- Transparency: The model should be easily understood by all stakeholders.
- Repeatability: The model should produce consistent results across different stakeholders.
- Simplicity: The model should be easy to implement and understand.
- Sensitivity analysis: The model should be evaluated using sensitivity analysis to assess the impact of different input parameters on predicted energy consumption.

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