Assessing and Optimizing M&V Metering Samples and Durations

Isaac, K, Wainstein, ERS

Introduction

This poster presents the results of a research project addressing accurate and efficient meter deployment approaches for program evaluation. In determining metering parameters, evaluators must make assumptions based on limited site information, while depending on engineering expertise and evaluation experience to determine which equipment to meter, metering sample sizes, and duration of logging. Our research focuses on the development of methodologies to determine optimal meter sample size and duration, as these require comprehensive knowledge of equipment operational variability. Results of this study will provide evaluators with an analytical framework for developing an accurate and cost-effective metering and verification (M&V) approach.

Sample Size

Existing statistical algorithms are appropriate for determining sample size when multiple units need to be metered. However, every sampling technique requires an estimate of variation of the equipment population. Evaluators rarely have a substantial analytical basis for this variation because gathering the necessary information requires considerable effort and project budget. For example, calculating a realistic estimate of the variation of warehouse lighting operating hours with fixture occupancy control would require extended observation times, detailed site knowledge, and an initial round of metering.

Our research will analyze metered data from past evaluations to provide applicable expected variations based on simple parameters that evaluators already have on hand. Data will include but not be limited to equipment type, facility sector, and end use. Our research will also provide the confidence of each expected variation, thereby providing evaluators with the ability to report an accurate level of error in their metering results. Absent this, stating that metered data was sampled at a confidence and precision of 90/10 can be irrelevant if there is a high percent error in the variability assumption.

Metering Duration

Regardless of whether sampling is necessary to the metering strategy, evaluators must always determine the duration of metering deployment. To determine an optimal metering duration based on weekly, monthly, and seasonal variations requires detailed and accurate knowledge of operating parameters, which is often unrealistic. For example, when evaluating the installation of a VFD on a fan, it is improbable that a site contact will have a grasp of all the parameters that affect fan speed. Without an initial metering period, an evaluator must use knowledge from similar installations to predict the variability throughout the year.

Our research will analyze metered data from past evaluations to determine how the precision and confidence of annual extrapolation vary as the metering period increases. This analysis will be based upon parameters such as equipment type, business type, and end use. Our results will enable evaluators to plan for and optimize metering durations while also facilitating implementation of unique metering durations across multiple sites.

Summary

Our paper will present analytical data and a deployment methodology for optimizing M&V meter installation samples and durations that will enable evaluators to ensure cost-effectiveness while improving the accuracy of reported results.