End Use Metering, Non-Intrusive Load Monitoring and M&V 2.0: When to Use What and How?

Instructors: Amit Kanungo, Jarred Metoyer and Dane Celnicker, DNV GL

Monday, August 7 | 9:00am – 5:00pm

$150 | Includes 2 breaks and lunch

Short Description:

This workshop will help participants understand how to obtain optimal results from monitoring projects. The techniques presented at this workshop will be applicable to residential, commercial and industrial facilities and measures. Key components of the workshop involve examining a wide range of experimental design and monitoring equipment options, and reviewing real world M&V examples. We will also discuss various load monitoring techniques and advanced data analytics like M&V 2.0 and Non-Intrusive Load Monitoring (NILMs). The workshop will emphasize practical solutions, and impart the knowledge needed for successful implementation of a monitoring project.

The key objectives of the workshop are:

- Review key components of a successful M&V project
- Develop monitoring plan to accomplish the study objective
- Review, respect and adhere to established protocols
- Provide exposure to various tools and techniques to perform effective M&V
- Understand the correct application of metering equipment and data acquisition/transmission/storage
- Provide an installation demo for typical metering equipment
- Learn tips, tricks, strategies and potential traps in a monitoring project
- Demonstrate the methods for compiling and analyzing large amounts of data
- Key consideration for utilizing pre/post analytics, M&V 2.0 and baselines
- Analysis techniques and insights
- Review analysis examples with end-use data
- Review Non-Intrusive Load Metering (NILM) techniques

Intended Audience: Entry level or Intermediate. Recommended attendees include managers, planners, policy makers, evaluators and researchers interested in a broader knowledge of how monitoring is used and applied in energy efficiency, baseline estimation and demand resource determination studies.

Workshop Format: Lecture; case study examples; some group activities with interactive group tasks at least twice in the session

About the Instructors:

Amit Kanungo is a Senior Engineering Consultant at DNV GL. Mr. Kanungo is currently managing the CPUC's Custom Impact Energy Efficiency Programs for the California IOUs where he has focused his skills on providing engineering insight to a wide variety of custom energy efficiency projects. As a project manager and a lead engineer for the custom evaluation project, Mr. Kanungo is responsible for developing monitoring plans, training field engineers, developing field strategy and performing metering. In this process, he has completed various complex metering projects, which required multiple and advanced instrumentation. Mr. Kanungo has worked extensively with metered data and has performed advanced analyses with interval metered data. Mr. Kanungo has keen insight and knowledge of the complex interactions of energy systems in commercial buildings and is skilled in

isolating and assessing interactive energy savings. Mr. Kanungo also has an in-depth understanding of energy usage in industrial facilities. His experiences included waste water treatment, manufacturing facilities, industrial refrigeration and wide variety of industrial facilities. Mr. Kanungo has presented various technical papers reflecting different energy efficiency technologies and methods. Mr. Kanungo holds a Master's degree in Electrical Engineering from California State University, San Francisco.

Jarred Metoyer is a Principal Engineering Consultant at DNV GL and his current responsibilities include managing EM&V studies, including leading/overseeing residential and commercial data collection; plug-load energy consumption analysis and providing technical support for energy-efficiency program planning and potential. Mr. Metoyer leads the overall evaluation of all California HVAC efficiency measures implemented by California IOUs. His recent work has consisted of significant research on measuring and modeling building HVAC energy use, for residential and non-residential construction, as well as on emerging energy-efficient technologies and efficiency programs, with an emphasis in building cooling concerns. Currently, Mr. Metoyer has been leading the effort in developing framework for M&V 2.0 for various utilities across the US. Mr. Metoyer's projects typically involve a statistical sample design and field measurement and monitoring of HVAC and other systems, such as residential and commercial plug loads for the purpose of determining energy usage and savings load shapes. Mr. Metoyer holds an M.S. in Mechanical Engineering from the University of California at Berkeley and a B.S. in Mechanical Engineering from the Louisiana State University, Baton Rouge.

Dane Celnicker is a Consultant in DNV GL's Sustainable Use Services team with six years of experience evaluating a wide variety of Demand Side Management (DSM) programs for a large Mid-Atlantic investor-owned utility. He has served as a project manager, field engineer and primary analyst for various residential and non-residential program evaluations. Much of Mr. Celnicker's experience includes installing metering equipment and providing oversight on monitoring residential and non-residential lighting and HVAC loads. Most recently, Mr. Celnicker installed metering equipment at residential electric vehicle charging stations to remotely monitor charging habits. Through these projects, Mr. Celnicker has interacted with a variety of meter types from manufacturers such as Onset and DENT that measure lighting usage, occupancy, voltage, current, and power at discrete time intervals. Mr. Celnicker's experience as a primary analyst and field engineer has given him a unique perspective on data collection and how to plan and conduct metering efforts with the end-result and analysis in mind. He will leverage his expertise to share best practices and words of caution when planning and deploying metering studies. Mr. Celnicker received a Bachelor's of Science from James Madison University in Integrated Science and Technology with a concentration in Energy.