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**BEYOND SMART CITIES**



# FUNCTIONALITY OF THE MEASUREMENT AND VERIFICATION SPECIALIST

ONLINE PROFESSIONAL COURSES LED BY THE WORLD'S TOP SPECIALISTS

ONLINE TRAINING BY KRISHNAJI PAWAR

[LEARN.BEYONDSMARTCITIES.IN](http://LEARN.BEYONDSMARTCITIES.IN)

# BEYOND

SMART CITIES

MODULE

21

## Summary and Resources

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# 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



# SUMMARY

- M&V is crucial in energy efficiency programs, assessing and validating energy savings.
- M&V activities include field work, analytics, and stipulation.
- Field work involves collecting empirical data from real-world settings to support energy savings claims.
- Analytics interprets data collected during fieldwork, involving statistical analysis and modeling.
- Stipulation establishes agreed-upon methodologies and protocols for M&V activities, often outlined in an M&V plan.
- Counterfactual design estimates what would have happened without the energy efficiency intervention.
- Valuing non-energy benefits (NEBs) is essential for a comprehensive assessment of an energy efficiency project's overall impact.
- The M&V plan serves as a foundational document outlining methodology, data collection processes, and evaluation techniques used.

# Learning Objectives

- Instrument metering and calibration
- Fieldwork: formal accreditation, safety, OSHA, and NFPA
- Data accessibility, communication, and valuation
- Reporting on Measurement and Verification (M&V) Projects
- Definitions of IPMVP Options
- The future of measurement and verification
- Sample M&V Plan
- Sample M&V Report
- ESCO's Guide to Measurement and Verification
- Summary and Resources



## SUMMARY +

- M&V is a set of concepts used to account for the impact of energy management projects and programs.
- M&V methods are derived from science, engineering, issues, and economics.
- • The course aims to differentiate between different perspectives and terminology, allowing M&V professionals to access a wide range of tools and methods.
- M&V aims to establish methods where stakeholders can agree on calculated results.
- It is not a solution for quantifying the absence of energy use.
- M&V is a set of concepts that pack logical assumptions, based on measured data and repeatable analysis to obtain an estimated result.

# SUMMARY +

## Role of M&V Professionals

- The M&V professional fosters cooperation in the interest of attaining an acceptable result at an acceptable cost.
- They must communicate with lawyers, bankers, regulators, and others to establish expectations early and ensure no surprises.
- They need to understand the process and anticipate roadblocks and challenges to proactively plan for them.

## M&V Activities

- Understanding the possibilities and limitations of the general M&V toolkit.
- Working cooperatively with all stakeholders to agree on the best method to deploy for a given situation.
- Creating a cost-effective M&V plan.
- Overseeing the proper implementation of the plan.
- Verifying the proper installation of the measures.
- Implementing M&V activities in the reporting period.
- Managing communication throughout the process.
- Reporting the results, including all the relevant data and process steps.



# THE NEED FOR ADVANCED M&V

- The energy infrastructure of our planet is undergoing rapid transformation, with new sources of energy and energy demands complicating the concept of "savings."
- There is a growing community of experts who can perform advanced methods utilizing artificial intelligence, machine learning, digital twins, and Bayesian analysis.
- To fully address these challenges, the professional network must expand to include the many thousands of potential partners in their pursuits.



# RESOURCES

This training program is based on best practice in M&V. The guidance provided here is based on the following references:

1. International Performance Measurement and Verification Protocol, Energy Valuation Organization (EVO), IPMVP Core Concepts EVO 10000-1:2016.
2. M&V Guidelines: Measurement and Verification for Performance-Based Contracts Version 4.0, the Federal Energy Management Program (FEMP), U.S. Department of Energy, November 2015.
3. Industry best practice in M&V
4. Resources from <https://www.aeecenter.org>
5. Resources from <https://www.aeecenter.org>
6. <https://learn.beyondsmartcities.in/courses/>
7. <https://beyondsmartcities.in/>



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# THANK YOU

