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# FUNCTIONALITY OF THE MEASUREMENT AND VERIFICATION SPECIALIST

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ONLINE TRAINING BY KRISHNAJI PAWAR

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MODULE

**2B**

## Contexts and Concepts: The M&V Specialist's Function

KRISHNAJI PAWAR - CEO & FOUNDER

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

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





# FUNCTIONALITY OF THE MEASUREMENT AND VERIFICATION SPECIALIST

The Measurement and Verification (M&V) profession is essential for energy efficiency programs to accurately assess and validate energy savings from various interventions. M&V activities span multiple domains, including field work, analytics, and stipulation, which are crucial in establishing the credibility of energy-saving claims.

# 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 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 outlines methodology, data collection processes, and evaluation techniques used.

# MEASUREMENT AND VERIFICATION (M&V) IN ENERGY EFFICIENCY AND DEMAND-SIDE MANAGEMENT

- M&V is a crucial discipline in energy efficiency and demand-side management, aiming to assess and quantify energy savings from energy efficiency measures or projects.
- Core activities of the M&V profession include fieldwork, analytics, stipulation, counterfactual design, valuation, non-energy benefits, and the development of an M&V plan.
- Understanding the context of an energy project is essential for M&V professionals to identify potential challenges and opportunities.
- Common M&V activities include baseline development/energy modeling, measurement and verification plan development, measurement and verification report development, calculations of energy management activities impacts, verification of energy management activities impacts, calibration of models and systems, review and analysis of design documents and specifications, trend analysis and statistical analysis, training and education, quality control and quality assurance, risk management, and continuous commissioning and re-commissioning.



## Common considerations in each domain

### Regulatory

- Government policies
- Market transformation
- Carbon or climate goals
- Grid impacts

### Contractual/programmatic

- Risks/responsibilities of stakeholders
- Dispute resolution
- Force majeure
- Contracts – government, private party, etc.
- Shared savings
- Guaranteed savings

### Economic

- Rates/tariffs
- Credits/certificates
- Utility incentives
- Financing incentives
- Tax incentives

### Physical

- Facility audit data
- Performance data
- Usage data
- Weather data

# FIELDWORK IN M&V

- Involves collecting data and measurements at the site where energy efficiency measures are implemented.
- Tasks include baseline measurements, post-implementation measurements, and installation verification.
- Examples include site surveys, meter installation, verification and commissioning, calibration and maintenance of meters and sensors, performance monitoring, and data management and storage.
- Common types of data used include energy consumption data, equipment performance data, weather data, occupancy data, building envelope data, and maintenance data.



# ANALYTICS IN MANAGEMENT AND VERIFICATION (M&V)

- Involves processing and interpreting collected data.
- Techniques include statistical analysis, energy modeling, and data analysis.
- Key techniques include regression analysis and energy modeling.
- Data analysis involves identifying patterns and trends in data, utility bill tracking and analysis, and energy data analysis.



## STIPULATION IN M&V

- Stipulation refers to the use of engineering estimates without field measurement.
- It refers to a predetermined agreement on the methods and protocols for M&V activities.
- Stipulation ensures transparency and consistency in M&V practices.



# M&V AS COUNTERFACTUAL DESIGN

- Counterfactual design is a concept borrowed from experimental research.
- It involves creating a "counterfactual" scenario to estimate what energy consumption would have been without the energy efficiency measures.
- To be an M&V professional, one must embrace the concept of counterfactual design.
- This design is crucial for isolating the effect of specific interventions and attributing savings accurately.



# VALUATION IN M&V: UNDERSTANDING AND IMPLICATIONS

- Rate Structures and Avoided Costs
- Rate structures determine how energy usage is billed or charged by utilities or energy providers.
- Avoided cost represents the monetary value of the energy “saved” by implementing an energy efficiency measure.
- Time of use refers to the variation in energy costs at different times of the day, influenced by supply and demand.



# NON-ENERGY BENEFITS

- Non-energy benefits (NEBs) refer to additional advantages gained from energy efficiency projects that do not directly involve energy savings.
- Examples include enhanced indoor air quality, increased equipment lifespan, enhanced occupant comfort, reduced maintenance costs, and improved asset value.



# M&V PLAN

- An M&V plan outlines the methodologies, protocols, and responsibilities associated with measuring and verifying energy savings for a specific project or program.
- Key components of an M&V plan include objectives, scope, methodologies, baseline conditions, and reporting.



# UNDERSTANDING PROFESSIONALISM IN MODERN CONTEXTS

## Definition of a Professional

- Professionals possess specialized knowledge and skills acquired through extensive education, training, and experience.
- They follow a set of standards and ethical guidelines that govern their conduct and responsibilities.
- Their professional standing is based on their adherence to confidentiality, informed consent, and the welfare of patients.

## Distinctions Between Professionals and Technicians

- Professionals typically undergo extensive formal education, often culminating in advanced degrees.
- Technicians may require less formal education, often completing vocational training or associate degrees.
- Professionals are responsible for complex decision-making and strategic planning.
- Professionals bear a higher level of responsibility for the outcomes of their decisions.
- Technicians have more defined duties and responsibilities, with their work often subject to review by professionals.
- Professionals are expected to exercise judgment in ambiguous situations.



# ROLE OF JUDGMENT IN M&V

- Judgment is a critical component of professionalism.
- It involves the ability to analyze situations, weigh options, and make informed decisions that consider ethical implications, potential outcomes, and stakeholder interests.
- For instance, a financial advisor must exercise judgment when recommending investment strategies to clients.

## Guiding Principles of Measurement and Verification (M&V)

- M&V is guided by community engagement, transparency, collaboration, and clear communication.
- Effective M&V requires collaboration among various stakeholders.

## Dispute Resolution in Professional Contexts

- Dispute resolution is a critical aspect of professional practice.
- Mechanisms include negotiation, mediation, arbitration, and litigation.
- Understanding these concepts is essential for graduate-level students as they navigate their careers and contribute to their respective professions.



# CONCLUSION

- The M&V profession encompasses a wide range of activities that ensure the accountability and effectiveness of energy efficiency initiatives.
- Understanding the various domains of M&V—from fieldwork to analytics, stipulation, counterfactual design, valuation, and non-energy benefits—is essential for the successful implementation of energy efficiency projects.



# CONTACT US



+91 6363032722



info@beyondsmartcities.in



learn.beyondsmartcities.in



#55,HMR Layout ,Bengaluru ,India



# THANK YOU

