
BEYOND
SMART CITIES
CERTIFIED MEASUREMENT & VERIFICATION SPECIALIST
CMVS
welcome to
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

BEYOND SMART CITIES

MODULE 2A

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

FUNCTIONALITY OF THE MEASUREMENT AND VERIFICATION SPECIALIST

M&V is an energy management accounting system that aims to generate credible impacts estimates and ensure stakeholder agreement. It involves technical tasks like baselining, metering, and analysis, but requires professional judgment, tradeoffs, and documenting decisions. Clear communication is crucial for achieving this goal.

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**

BEYOND SMART CITIES

INTRODUCTION

- M&V is a systematic process used to assess the performance of energy efficiency projects and programs.
- It quantifies actual energy savings achieved compared to a baseline or pre-implementation scenario.
- Energy management methods include Energy Audits, Benchmarking, and Continuous Monitoring.
- The common denominator problem arises when comparing energy savings across diverse projects or technologies.
- Lifecycle thinking emphasizes a holistic view of energy use and savings over the entire lifespan of a product or system.
- Accountability in energy management is crucial for maintaining stakeholder trust and validating energy savings claims.
- The theoretical foundation of M&V is grounded in empirical research and statistical analysis.
- Uncertainty in M&V arises from various sources, including measurement errors, variability in energy use patterns, and external factors.

UNDERSTANDING MEASUREMENT AND VERIFICATION (M&V) IN ENERGY EFFICIENCY

BEYOND SMART CITIES

- The cost of M&V activities can vary significantly depending on the complexity of the project, the methods employed, and the level of rigor required.
- M&V professionals operate in various domains, each with unique characteristics and challenges that influence the approach to M&V.
- M&V activities include field work, analytics, stipulation, counterfactual design, valuation, non-energy benefits, and the M&V plan.
- Professionals and technicians contribute to M&V at different levels of expertise and responsibility.
- Judgment is paramount in M&V, as professionals must make decisions based on incomplete data, varying conditions, and the need to balance accuracy with cost-effectiveness.
- Community is essential for successful M&V, fostering innovation and continuous improvement in M&V methodologies and practices.
- Dispute resolution in the context of M&V involves addressing conflicts that may arise regarding energy savings claims, methodologies, or outcomes.

MEASUREMENT AND VERIFICATION (M&V)

- M&V evaluates the effectiveness of energy-saving measures and technologies.
- It quantifies actual energy savings generated by energy efficiency projects and confirms alignment with projected savings.
- M&V aims to ensure accountability, provide reliable data for decision-making, and validate the economic feasibility of energy efficiency investments.
- It involves data collection, determining what measurements will be made, where, for how long, and at what cost.

ENERGY MANAGEMENT METHODS AND TYPES

- Energy management includes strategies and practices aimed at optimizing energy use within an organization.
- Four principal activities include equipment upgrades, behavior/set points, demand management/flexibility, and fuel switching.
- Each method serves different organizational needs and can be employed in various combinations to enhance overall energy performance.

THE COMMON DENOMINATOR PROBLEM

- Every energy-consuming system exists for some reason other than just to consume energy.
- When comparing energy savings from different measures or technologies, a common denominator problem arises.
- M&V professionals often convert results into a common metric, such as energy savings expressed in kilowatt-hours (kWh) per unit area or per production unit.

LIFECYCLE THINKING

- Lifecycle thinking considers the total environmental and economic impacts of a product or system throughout its entire lifespan.
- Every energy-consuming facility exists in a particular stage of its lifecycle, including design, construction, commissioning tests, operation, retrofitting/renovation, and teardown.
- Lifecycle thinking emphasizes that short-term savings may lead to long-term costs if not carefully analyzed.

JEVON'S PARADOX AND ENERGY MANAGEMENT

- Jevon's Paradox suggests that as technological improvements increase resource efficiency, overall consumption may rise, contrary to expectations.
- This paradox complicates the work of M&V professionals by challenging conventional understanding of energy conservation and efficiency measures.
- M&V professionals must be aware of this paradox when assessing the effectiveness of energy-saving initiatives and advocating for complementary strategies.

ENERGY MANAGEMENT - THE NEED FOR ACCOUNTABILITY

- Accountability in energy management is crucial for establishing trust among stakeholders and ensuring the success of energy efficiency programs.
- M&V professionals must provide stakeholders with verified data that illustrates the savings achieved, fostering transparency, encouraging continuous improvement, and potentially leading to additional funding for future projects.

COUNTERFACTUAL METHODS - MODELING VS. COMPARISON

- Performance measurement and impact analysis are the two main methods that comprise M&V.
- Cross-sectional methods apply the counterfactual method by comparing a specific project to a comparison group.
- Longitudinal methods compare an energy-using system to itself over time.
- Two primary approaches are **Modeling** and **Comparison**: Modeling involves creating predictive models based on historical data and controlling for variables that may influence energy consumption.

PERFORMANCE VERIFICATION IN ENERGY MANAGEMENT

- Performance verification ensures energy-saving measures are functioning as intended and achieving expected results.
- It involves monitoring energy consumption and operational parameters, periodic audits, and inspections.
- ISO and Other Performance Standards: ISO 50001, ISO 50006:2023, and ISO 50015:2014 are management standards addressing energy management.
- ISO 50001 provides a framework for establishing an energy management system, guiding on system development, policy formulation, and performance monitoring.
- ISO 50006:2023 focuses on evaluating energy performance using energy performance indicators and energy baselines.
- ISO 50015:2014 sets general principles and guidelines for monitoring and evaluating the impacts of energy management projects.

UNCERTAINTY IN ENERGY MANAGEMENT AND VERIFICATION (M&V)

- Uncertainty refers to the lack of precise knowledge about actual energy savings due to data variability, measurement errors, and external factors.
- M&V professionals must quantify and communicate uncertainty to stakeholders.
- Risk analysis techniques include contingency factors, probabilistic modeling, and sensitivity analysis.

COST CONSIDERATIONS IN M&V

- Cost considerations are paramount in M&V, encompassing both direct expenses of implementing energy efficiency measures and costs associated with conducting M&V activities.
- M&V professionals must balance rigorous verification with the available budget, often seeking cost-effective methods that yield reliable results.
- Measures to manage costs include prioritizing data collection based on its importance for achieving project goals and selecting appropriate tools for data collection and analysis.
- M&V professionals must also explain costs and convey the value of M&V to stakeholders.

BEYOND SMART CITIES

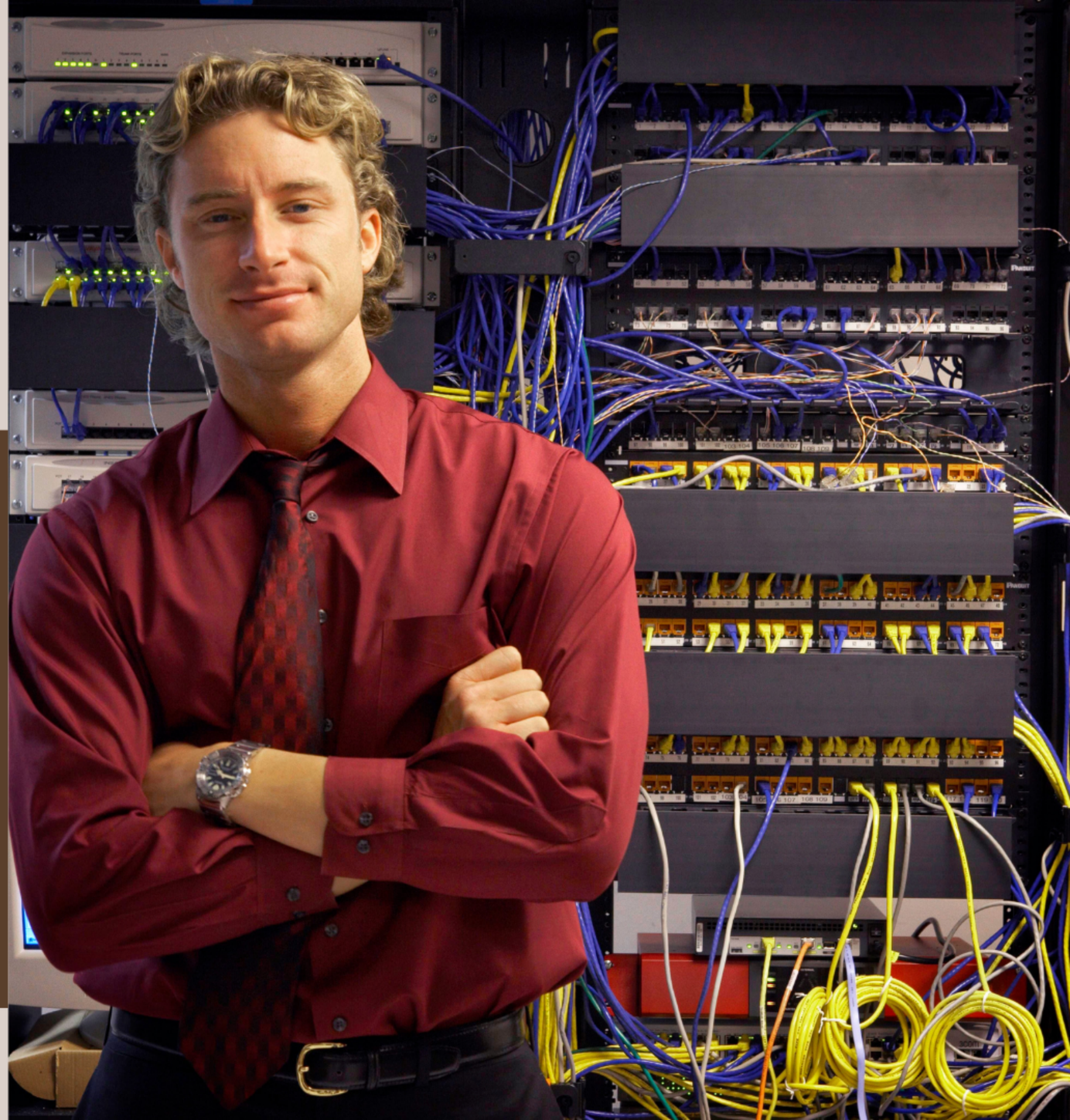
CONTACT US

+91 6363032722

info@beyondsmartcities.in

learn.beyondsmartcities.in

#55,HMR Layout ,Bengaluru ,India



BEYOND SMART CITIES

CERTIFIED MEASUREMENT & VERIFICATION SPECIALIST ★ CMVS ★

THANK YOU