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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 01

Functionality of the Measurement and Verification Specialist

KRISHNAJI PAWAR - CEO & FOUNDER

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

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BRIEF ABOUT ME

Krishnaji PAWAR

CEO & FOUNDER

Krishnaji Pawar is founder and CEO of Beyond Smart Cities. Before being named CEO in January 2020, Krishnaji held leadership roles at Beyond Smart Cities in both Sustainability ,Energy & Environmental Consultancy.

Specialized in developing sustainable design strategies for Green Building Certification Systems (LEED, GSAS, etc.), Energy & Water Conservation, Commissioning, Environmental Impact Assessment & Environmental Management Systems.

Currently responsible for 3,767 million square feet Green Building /Energy modeling Consulting since January 2007 in UAE, India and Qatar.

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WELCOME TO LEARN FROM BEYOND SMART CITIES

Beyond Smart Cities is the first green technology marketplace. It connects millions of sustainability, green building, energy, commissioning, health and safety, fire safety, climate change, and green product and technology manufacturers with global independent talent.

Our mission is to build and support a global community of experts with the highest professional standards in sustainability, green building, energy, commissioning, environment, health & safety, fire safety, climate change, GHG accounting, carbon auditing, and GHG emissions management.

FUNCTIONALITY OF THE MEASUREMENT AND VERIFICATION SPECIALIST

Measurement and Verification (M&V) is the process of planning, measuring, collecting and analyzing data for the purpose of verifying and reporting energy savings within an individual facility resulting from the implementation of Energy Conservation Measures (ECMs).

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

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INTRODUCTION

- M&V is the accounting system for energy management.
- Implementing M&V requires understanding of concepts, contexts, and tools for estimating energy management impacts.
- The course outlines fundamental concepts for effective communication.
- It evaluates M&V guidelines and protocols, focusing on alignment and differences.
- It teaches how to incorporate energy engineering concepts into M&V projects.
- The course emphasizes making informed decisions and communicating these decisions throughout the M&V process.
- M&V is defined as an art and a science, with the M&V professional expressing the art through their judgments.
- The course emphasizes the importance of clear and consistent communication throughout the M&V process.
- M&V professionals quantify energy savings or emissions reductions from energy conservation measures or renewable energy installations.

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

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INTRODUCTION

- The International Performance Measurement and Verification Protocol (IPMVP) outlines standardized methods for quantifying energy savings.
- M&V is essential for accountability, continuous improvement, and financial assurance.
- It provides feedback to refine energy management strategies and improve future projects.
- M&V professionals carry out various duties including project planning, data collection, analysis, reporting, documentation, and stakeholder communication.
- They collaborate with project managers and engineers to design an effective M&V plan.
- They prepare comprehensive reports documenting findings, presenting data in an understandable format, and providing recommendations for operational adjustments.
- M&V professionals must be well-versed in established methodologies and standards.
- Challenges include data quality and availability, changing conditions, and stakeholder engagement.

M&V PROCESS: APPLICATION OF JUDGMENT IN EACH STAGE

- Planning: Decision-makers must consider the goals of the project, available resources, and the specific context of the energy-saving measures implemented.
- Implementation: Decision-makers must balance the need for accuracy with practical constraints, including budget limits and available technology.
- Reporting and Verification: The final stage involves reporting findings and verifying the results.

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Judgment and Decision-Making in Measurement and Verification (M&V)

- M&V is crucial for stakeholders like project developers, investors, policymakers, and regulatory bodies as it provides the basis for financial incentives, compliance with regulations, and the credibility of energy-saving initiatives.

Key Concepts in Judgment and Decision-Making

- Decision-Making Frameworks: The rational decision-making model and boundless rationality.
- Cognitive Biases: Confirmation Bias and anchoring bias.
- The role of uncertainty: Uncertainty due to variability of energy consumption patterns, external factors, and measurement errors.

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DEFINITION AND PURPOSES OF M&V

"Measurement and Verification" (M&V) is the process of planning, measuring, collecting, and analyzing data to verify and report energy savings within a facility or facilities resulting from the implementation of EEMs or ECMs.

Define key terms: M&V, ECM, baseline, adjusted baseline model, avoided energy use, statistical model, physical model, and ESCO.

M&V: measurement and verification A process that includes a wide range of measurement, verification, and analysis techniques for quantifying the results of resource efficiency and resource management activities

Statistical models are probability models, and physical models are causal, deterministic, or mixed causal-deterministic-probability models applied to observable propositions. It is observations that turn probability into statistics. Statistical and physical models are thus verifiable, and all use statistics in their verification. All models should be verified, but most aren't.

ECM:Energy Conservation Measure

Baseline: A characterization of the energy use and operating conditions during a specified period of time prior to implementation

Adjusted baseline model: A model developed using data from the baseline period and incorporating routine and non-routine adjustments against which an energy conservation measure's actual performance is compared.

Avoided energy use: Avoided energy use means the reduction in electricity use that occurred in the performance period, relative to what would have occurred if the facility had been equipped and operated as it was in the baseline period but under performance period conditions.

A statistical model is a model that attempts to identify correlations and other patterns in actual measured data.

Physical model: Energy systems models are the mathematical models that are developed in order to represent as reliably as possible various energy-related problems. Lately, these models have become a common means to identify and solve such problems.

ESCO: Energy savings performance contracting

Judgment: Judgment refers to the cognitive process by which individuals evaluate information and make decisions based on it. In the realm of M&V, judgment is integral to interpreting data, making inferences about energy performance, and determining the credibility of energy savings claims.

Decision-making: Decision-making is the process of selecting a course of action from among multiple alternatives. In M&V, decision-making typically involves determining the methodology for measuring energy savings, interpreting results, and deciding on adjustments or corrections to future energy savings projections.

Performance Period :The evaluation of energy savings or performance improvements takes place during the performance period. This period is followed by the implementation of energy efficiency measure

Uncertainty : Uncertainty in M&V refers to the potential variability or error associated with the measurement process and the estimation of energy savings. It encompasses all factors that may affect the reliability of the results.

Adjustments : Adjustments are modifications made to the baseline or measured data to account for external factors or changes in operating conditions that could impact the assessment of energy savings.

CERTIFIED MEASUREMENT AND VERIFICATION SPECIALIST (CMVS)

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- CMVSs play a crucial role in energy efficiency, sustainability, and decarbonization.
- They are responsible for reliability, quantifying energy conservation, and substantiating energy savings.
- CMVSs are committed to performing proper measurement verification.
- The course explores concepts spanning energy measurement, verification protocols, data analysis, and industry complexities.
- Energy management involves understanding and mitigating the costs and externalities of energy use.
- Measurement and verification (M&V) determines the energy and value impacts of energy management activities.
- M&V involves a general assessment of the situation, formulation of an acceptable M&V plan, and agreement on the reported results.
- M&V includes measurements, verification, and a model representing the behavior of the existing system.
- A successful M&V professional should be aware of the context and facilitate clear communication among all parties involved.
- A "complete" M&V professional is someone who can build a team to successfully settle a specific project in a particular context.

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