Course Content

Day 1 – Morning

Following the agenda for the Efficiency Valuation Organisation's (EVO) one-day introductory workshop, which introduces the concepts of Measurement & Verification and the International Performance Measurement & Verification Protocol.

Introduction
- Defining Measurement & Verification (M&V)
- M&V protocols for energy efficiency
- Background to IPMVP and Efficiency Valuation Organisation
- Rationale for M&V

Key Concepts
- Measuring energy savings
- The 4 IPMVP options
- Steps in applying M&V
- M&V cost and uncertainty
- M&V for energy performance contracts

Examples
- M&V examples with calculations
- Review advantages and disadvantages of each option
- Case studies for discussion

Day 1 – Afternoon

Building an M&V Plan – in order to equip participants with a better understanding of M&V in practice, this session concentrates on relevant case studies and examples for each stage of M&V, to a point where each section listed for the requirements of an IPMVP adherent M&V Plan are covered.

This includes:
- Possible approaches with different examples compared for the same project
- Contents required for IPMVP adherence – example content from M&V Plans
- Timing of M&V deliverables
- Key requirements:
  - Baseline data and analysis method
- Meeting the principles of IPMVP

Day 2 – Morning

The second day focusses on the practicalities of energy analysis as used to develop a method for measuring avoided energy consumption. This aims to help participants with the development of their own M&V plans, or to review the suitability of M&V Plans prepared by a technology or Energy Performance Contract (EnPC) provider.

Sources of energy data and their common levels of availability will be discussed along with examples and exercises for suitable baselines for different options.
- Energy data
  - Common formats for different types of utility – HHD, monthly readings, submeter data
  - Likely availability
  - Uses of high resolution data
- Typical analytical processes
  - Interpreting trends in data
  - Identifying routine variable data, e.g. temperature, seasonal, site specific
  - Introducing regression analysis
- Examples and exercises

Following this session, participants should have the necessary understanding to develop baselines from whole site utility data or submeter data. A number of case studies relevant to projects likely to be encountered by attendees will be discussed.

Day 2 – Afternoon

The afternoon session builds upon the morning's material covered, to enable participants to evaluate whether baselines are suitable for inclusion in an M&V Plan. The session focusses on statistics for M&V and the criteria set out in appendix B of the IPMVP with the principle aim of clarifying the requirements, either for the preparation of energy baselines, or review of suitability for those provided by a technology or EnPC provider.
- Relevant statistical concepts and their use in assessing variables and determining accuracy
  - R^2
  - p-values
  - CV
  - confidence intervals
  - standard error
- Sampling – determining sample sizes