



EVALUATION, MEASUREMENT & VERIFICATION: OVERVIEW OF BEST PRACTICES FOR EUROPE

IEPPEC ENERGY EVALUATION ACADEMY /
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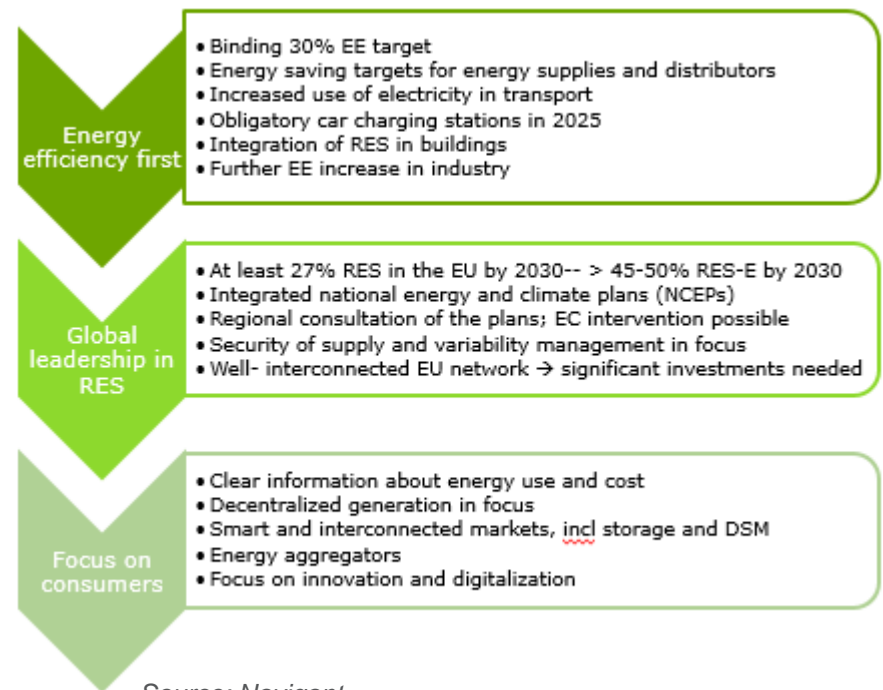
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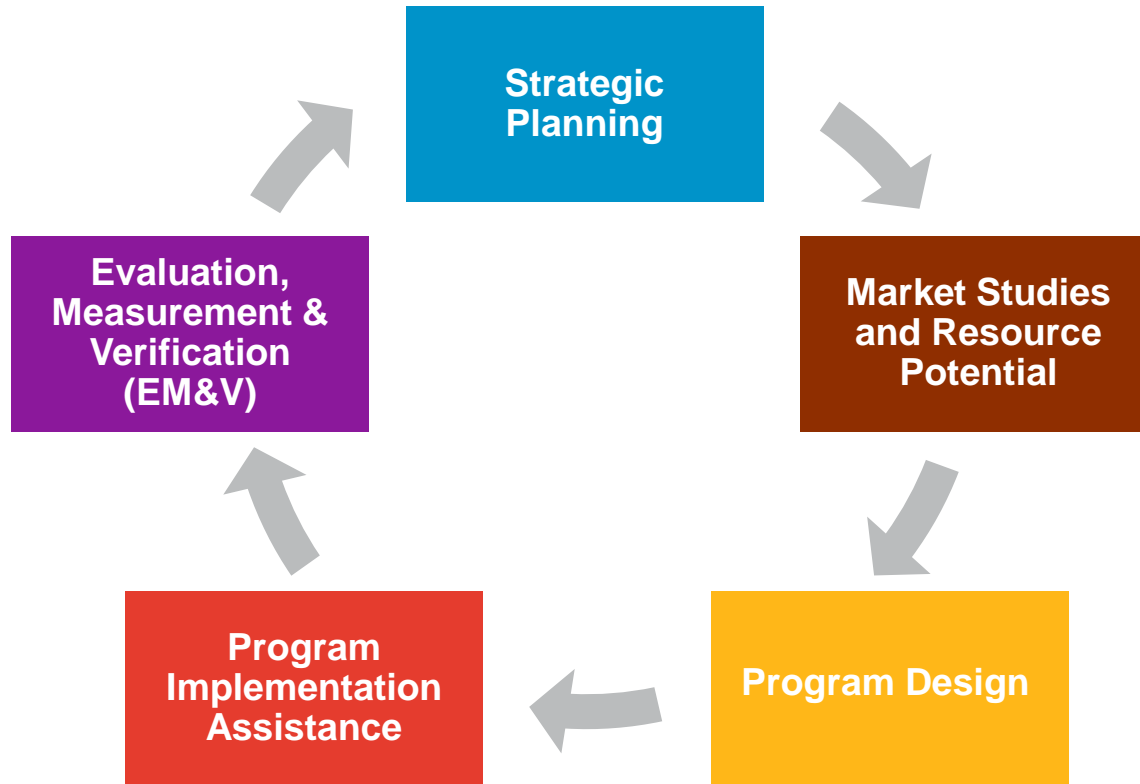
INTRODUCTION

- European Union ‘Winter Package’
 - Binding 30% energy efficiency target by 2030 (yet 40% cost-justified)
 - Governance regulation recognises role of energy efficiency but doesn’t address enforcement or penalties
- Sense of urgency
 - **The time is now to consider a radically different evaluation, measurement and verification (EM&V) scheme for Europe to ensure Member States are delivering real savings**
- Refresher course
 - Overview of basic and advanced EM&V approaches
 - European examples, including EM&V methodologies for efficiency obligation schemes and white certificate schemes



Source: Navigant

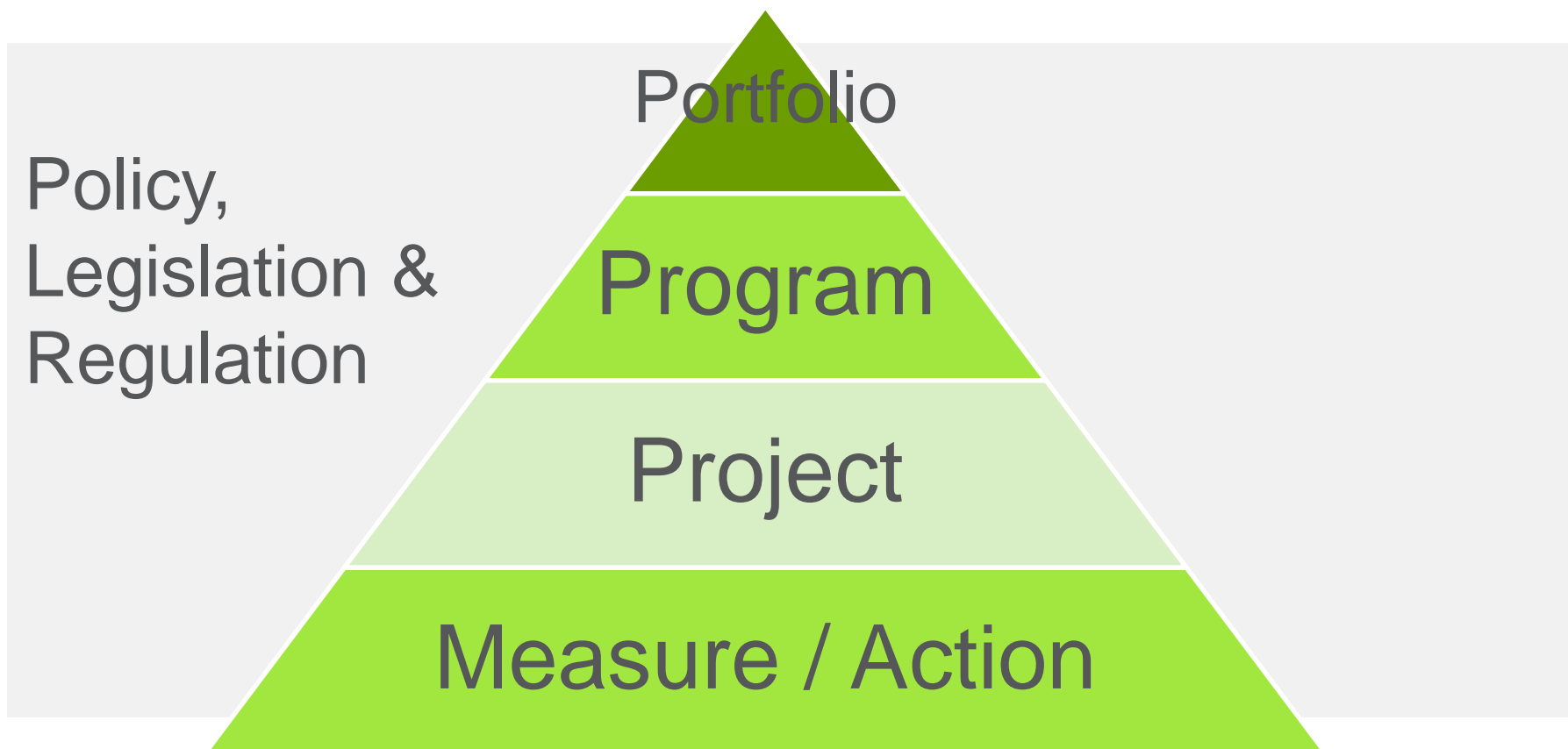
EM&V IN THE ENERGY EFFICIENCY PROGRAM LIFECYCLE



Source: Navigant



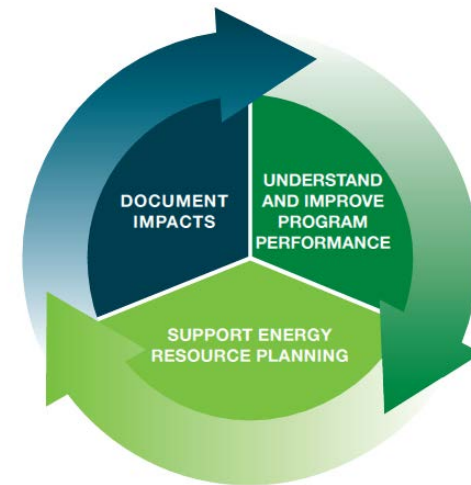
ENERGY EFFICIENCY PROGRAM EM&V IN CONTEXT



WHY EVALUATE ENERGY EFFICIENCY PROGRAMS?

- **Document the impacts** of a program and determine whether the subject program (or portfolio of programs) has met its goals
- **Identify ways to improve current and future programs** by determining why program-induced impacts occurred; attribution of program theory and logic ‘did the program induce changes in the market as planned?’
- **Support energy demand forecasting and resource planning** by understanding the historical and future resource contributions of energy efficiency compared to other energy resources

Objectives of Energy Efficiency EM&V



Source: Energy Efficiency Evaluation, Measurement, and Verification: A Regional Review of Practices in China, the European Union, India and the United States (2014)

<http://www.raonline.org/wp-content/uploads/2016/05/rap-crossleyslotesherman-globalemv-2014-mar-19.pdf>

SELECT THE RIGHT TOOLS TO ASSESS IMPACTS

Engineering

Tracking System
Review

Engineering
Review

Customer Surveys

Onsite Verification

End-use Metering

Modeling

Calibrated
Building Energy
Simulation

Site Specific
billing analysis
with Energy
Simulation
















Econometric

Billing Analysis

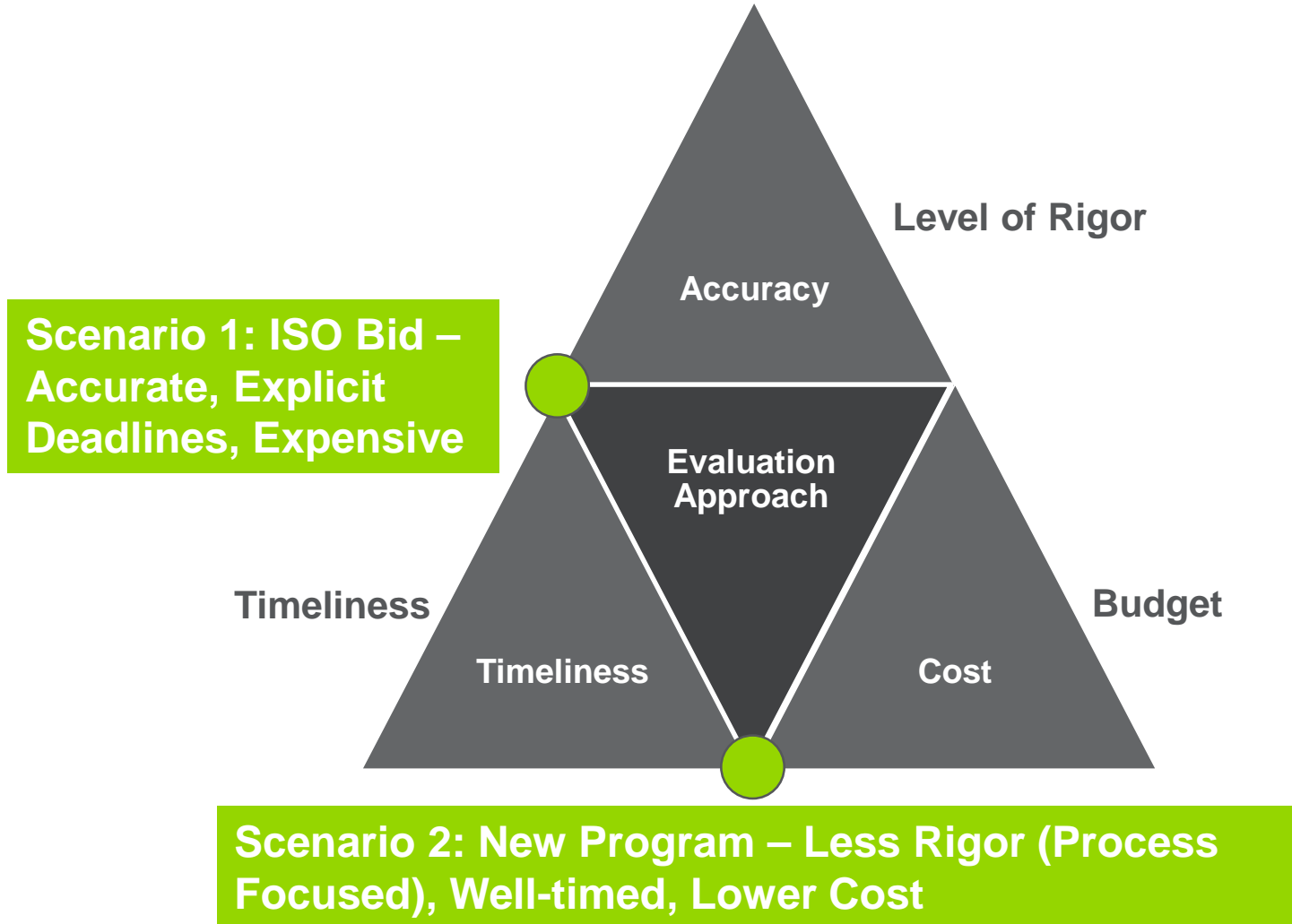
Survey Based
Approach

Source: Navigant

PROTOCOLS AND METHODS COMPARISON

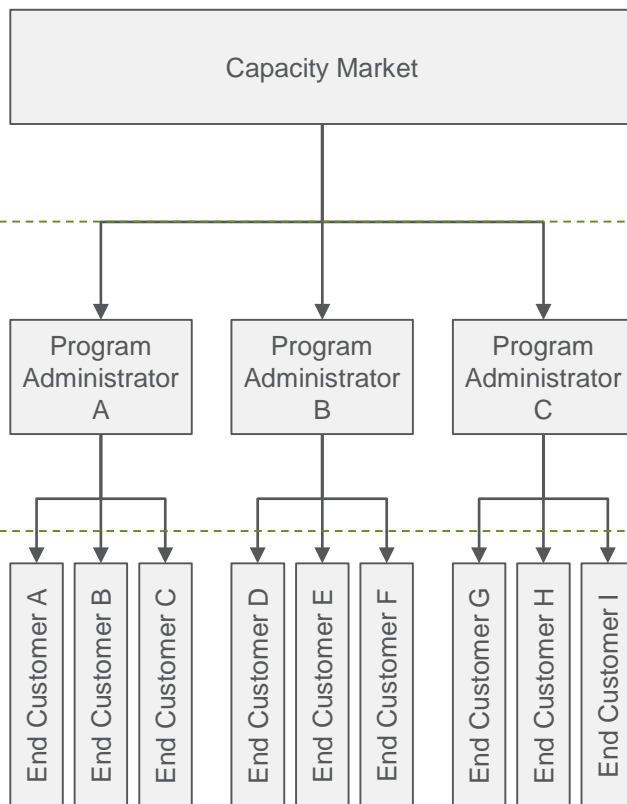
EVALUATION METHODOLOGY	ACCURATE	TIMELY	COST-EFFECTIVE
Tracking System Review			
Engineering Review			
Customer Surveys			
Onsite Verification			
End-Use Metering			
Calibrated Building Energy Simulation Modeling			
Site-Specific Energy Simulation Modeling			
Billing Analysis			
Survey-Based Approach			

PRIORITIZING EVALUATION EFFORTS: ANALYZE TRADEOFFS



EM&V VALUE CREATION: ISO NEW ENGLAND

ISO New England's Forward Capacity Market



Energy Efficiency Program Administrators

Customer-Level Energy Efficiency Measures

- ISO New England runs an **auction** process, setting a total required capacity and a floor clearing price
- **Energy efficiency** capacity competes with electricity **generation** and **demand response** capacity
- Approx. **1.8 GW** of energy efficiency resources cleared in the last auction rounds, accounting for approx. 5% of total cleared capacity

- Program administrators can **secure revenue stream** 3 years in advance for the **full expected life** of the energy efficiency measure
- Revenue from ISO-NE's Forward Capacity Market can **cover 10% of the budget** of a typical energy efficiency portfolio

- Capacity bid for by program administrators needs to be **aggregated** to reach the **minimum threshold of 100 kW** – equivalent to peak savings of 20,000 compact fluorescent lamps
- Typical **energy efficiency measures** include residential lighting, commercial lighting, efficient appliances

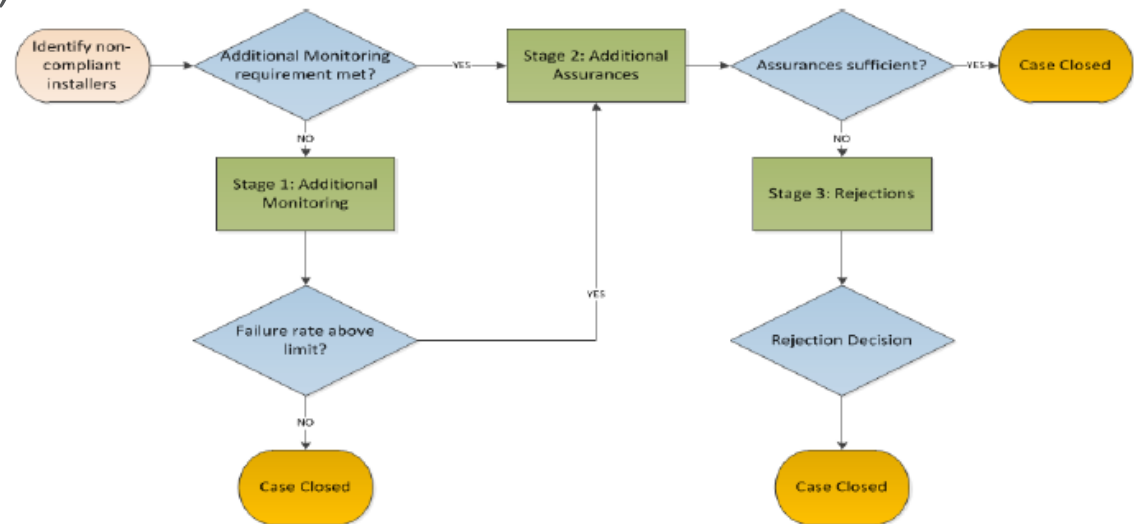
Source: Navigant's subject-matter expert interviews, Regulatory Assistance Project report, Synapse Energy Economics report, ISO-NE Energy-Efficiency Forecast Background Report, European Council for an Energy Efficient Economy report



EM&V EXAMPLES IN EUROPEAN CONTEXT: UK

• UK Energy Company Obligation (ECO) Scheme

- Monthly assessment of reported measures
- Duplication review (across different schemes)
- Compliance review
- Monitoring & inspections (QC)
- Audits (QC & savings risk)
- Support & guidance
- Reporting



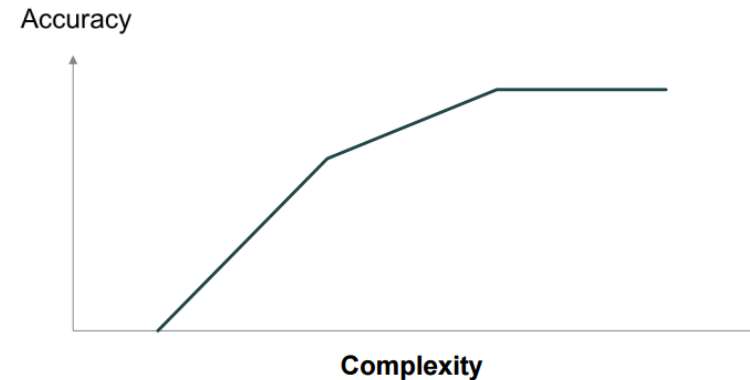
http://www.iea.org/media/workshops/2017/S5HemmesOfgem_IEA_PresentationREVISED.pdf



• Catalogue of standard measures

Annual updates taking into account changes in building code, for example

3rd parties' databases can be linked to deemed saving catalogue



1. Usability
2. Avoid cheating
3. Additionality (some deemed savings 0)
4. Technical accuracy of savings
5. Keeping cost of developing deemed savings to a minimum

<http://svk.teknologisk.dk>



Deemed savings

The method is easy to use and facilitates the evaluation.

Savings are not measured and monitoring can be complex if multiple solutions are considered.

Required documentation: choice to go easy or bureaucratic, which usually implies a failure, unless the incentive is very high.

On field controls are expensive.

Effort required to evaluate baselines, additionality, and other needed information.

High cost-effectiveness.

Possibility to pre-evaluate EE products in order to ensure the required performance.

Scaled savings

The method is easy to use and facilitates the evaluation.

Savings are measured.

Required documentation: choice to go easy or bureaucratic, which usually implies a failure, unless the incentive is very high.

On field controls are usually a viable option.

Effort required to evaluate baselines, additionality, algorithms and meters to be used, and the other needed information.

High cost-effectiveness.

Simplified monitoring plans?

Metered savings

The method is usually complex, especially if additionality or detailed adjustments are present.

Savings are measured.

Required documentation: is usually substantial, but the size of the project allows it.

On field controls are usually a viable option.

Effort required to evaluate baselines, additionality, algorithms and meters to be used, and the other needed information for both the proponents and the evaluators. Shall data be available for everybody?

Very flexible, but potentially costly and complicated (viable for high targets).

http://iet.jrc.ec.europa.eu/energyefficiency/sites/energyefficiency/files/files/documents/events/10_di_santo.pdf

SUMMARY OF EM&V ISSUES & GAPS IN EUROPEAN CONTEXT

EM&V Level	Verification schemes Deemed measures Little primary data collection Few process evaluations
EM&V Protocols	No common EU standards Top down v. project-specific focus Improve cost-effectiveness methods
Attribution	No defined EU policy Varying attitudes about importance of net savings
Understanding of Product Markets	Well developed energy performance standards & codes Need for market data, pooled commercial data
EM&V Budgets	Not sufficient Not high priority
EM&V Capacity	Lack skills and resources Scale needed Consumer decision-making



SUMMARY

- Independent EM&V of EE investments provides assurance to funders/regulators/stakeholders that the EE resource is reliable
- Common evaluation protocols help assure metrics & methods are consistent across jurisdictions, allowing for comparisons of impacts/success
 - UMP (DOE), IEPPEC (NA, Europe, and now Asia) share best practices
 - Similar programs may require different evaluation approaches depending on stakeholder needs, the EE scheme & the regulatory environment
- What else is needed to assure EE targets are being met?
 - More real-world data (to compare ex-ante assumptions to ex-poste measure, program, portfolio savings – improving estimates for next cycle)
 - Determine proper baselines in fast changing markets (e.g. LED lighting)
- Are other policy goals being considered in evaluation planning?
 - Is detail needed on additionality, societal considerations, multiple impacts?
- Governance: who needs to be at the table to determine specific evaluation requirements & to review findings?



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