

# Introduction to Panel 3

## Monitoring & evaluation: Understanding change and how to deliver energy efficiency

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### Introduction

To meet the targets set out in recent national and international energy and climate policies, energy efficiency measures need to be implemented more widely (disseminating best technologies and practices), more effectively (higher and better results) and more efficiently (to a low cost). More than ever, evaluations represent a key management tool, which is required for both, monitoring the results and providing experience and feedback. This can drive forwards better policy that has the desired impacts.

### MONITORING THE RESULTS

Energy efficiency targets are increasingly defined in terms of quantified energy savings, and not in terms of money spent or the number of programmes launched. This implies a need to monitor achieved energy savings and to assess their reliability. Over 30 years of experience gained in this field provide a solid methodological basis that can be applied according to given contexts. However, some key issues remain open, and new questions arise when, for example, considering how to report energy savings at an international level. This is especially true for the implementation of the EU Energy Services Directive (2006/32/CE), where rules are needed to account for energy savings in a harmonised way among the 27 Member States.

Moreover, evaluations should be seen as a support and not as a burden complicating their implementation. The objective is therefore to find the best compromise between limiting evaluation costs and complexity on the one hand, and improving the reliability of results on the other hand. Likewise, evaluations should not favour certain kinds of actions while impeding others, which could however be more efficient. Indeed, the

Californian experience proves that considering performance as sole evaluation criterion may induce such risks. In all, the availability of good data and statistics is needed for achieving good evaluations.

### PROVIDING EXPERIENCE FEEDBACK

Evaluations should not be limited to accounting for achieved results. In fact, the main added value comes from the analysis of the observed results, especially helping to better understand how results are actually achieved, and how actions could be disseminated and improved. And this is true for all stages of an activity:

- When planning a strategy: ex-ante evaluations, based on modelling or scenario studies, help identifying potentials and prioritising actions;
- When designing a programme: experience feedback from past evaluations provide success factors and other lessons learnt as a basis for decision support;
- When implementing a programme: monitoring actions improve their management and it is the first step to know what is actually achieved, which is also necessary to offer guarantees;
- When reporting the results: making results more transparent is a key for their credibility, and drawing lessons from past activities is essential for proposing possible improvements.

## Evaluation practices: looking at methods & key issues

Several papers present results from the EMEES project discussing the implementation of the Energy Services Directive (ESD) in the EU and the need and development of harmonised calculation methods for the energy savings achieved. **Stefan Thomas et al (3170)** present the overview of the final results on EMEES' methods and discuss the importance of measurement for the effectiveness of the ESD. The paper compares the main elements of calculation needed to ensure consistent results between bottom-up and top-down methods and presents how the EU Member States can prove achievement of ESD targets by EMEES' methods. **Didier Bosseboeuf and Bruno Lapillonne (3270)** also present results from the EMEES project focusing on top down methodologies to assess the outcome of the ESD. Based on the ODYSSEE project, a theoretical scheme has been developed to calculate total energy savings adjusted to the ESD requirements. It consists of setting up an econometric model able to assess the impact of additional energy efficiency policies adjusted from the impact of factors such as hidden structural effects, energy prices, autonomous progress, rebound effects, and early actions. The limitation of using only top down approaches is discussed. In parallel, **Harry Vreuls et al (3176)** discuss the complexity of harmonised bottom-up methods and present some key elements that could be a good foundation for a harmonised approach.

The paper by **Marvin J Horowitz (3027)** provides a guide for future energy efficiency evaluation planning efforts in determining which approaches should be applied to policy analysis. Horowitz focuses on understanding the advantages and disadvantages of two distinct statistical approaches to evaluating the annual impacts of national energy efficiency policies. One of these is an econometric modeling approach in which times series, or cross section time series, regression models are used to compare actual energy use to counterfactual (business-as-usual or baseline) energy use, while the other is an index approach in which the energy efficiency portion of a multi-sector energy intensity index is isolated. Using empirical data on energy consumption within the United States, specific comparisons are made between the two approaches to show how each are constructed. **Carl Blumstein (3147)** challenges the current Californian evaluation system, where programmes are rewarded according to their performance only. Difficult to assess, this criterion may divert (in a wrong sense) efforts for both, programme implementation and evaluation. Including criteria about the efforts made (and not only the results achieved), taking account of market transformation effects and regularly reviewing the incentive mechanisms, are among the proposed changes to improve the system.

## Improving energy efficiency strategies: feedback from modelling & monitoring practices

The development of modelling and monitoring tools and practice is important to improve strategies for energy efficiency. A number of papers present interesting efforts of such modelling and monitoring improvements. **Michael A. McNeil et al (3361)** present the development of a modelling and analysis framework which can provide policy-makers with concrete

targets and achievable outcomes related to energy efficiency. In terms of energy efficiency policy, this requires coverage of the entire world, with emphasis on countries and regions with large and/or rapidly growing energy-related emissions, and analysis at the 'technology' level – building end use, transport mode or industrial process. These elements have not been fully addressed by existing modelling efforts, which usually take either a top-down approach, or concentrate on a few fully industrialized countries where energy demand is well-understood. Inclusion of details such as appliance ownership rates, use patterns and efficiency levels throughout the world allows for a deeper understanding of the demand for energy today and, more importantly, over the coming decades. This is a necessary next step for energy analysts and policy-makers in assessment of mitigation potentials. **Lena Neij et al (3285)** also discusses the need for energy models that take into account decentralised decision-making frameworks, such as household investment decisions regarding energy-efficient technologies. Lena Neij et al. argue that tools for modelling policy evaluation need to be improved to capture the factors determining the choice of technologies that affect household energy consumption and how these might be better influenced by means of energy efficiency policy instruments. The paper presents the first phase of a project analysing possible options to further improve microeconomic decision-making frameworks for evaluating energy efficiency policies and developing more realistic energy use forecasts for the household sector. The paper identifies and explores a wide range of determinants—beyond the narrow but traditional 'rational model' technology choice approach—affecting and influencing households' purchase/investment decisions regarding energy-efficient technologies. Based on an extensive literature review, the paper produces a summary of the body of evidence developed in the field.

**Marie-Hélène Laurent et al (3156)** highlight the difficulties of evaluating retrofitting actions in terms of the difficulties in choosing a method. The choice of method will most often depend on available data, and the question is how this will affect the results. The paper presents and discusses an evaluation based on 5 different methods of energy savings calculations and 5 different sources of cost data; for each retrofitting action, 5 different financial indicators are calculated. The paper provides discussion on data, methods, the choice of indicators, and how this affects the results. **Ulla Suomi et al (3266)** highlight the need for continuous evaluations. The paper presents the evaluation of the energy efficiency agreements (voluntary agreements) in Finland, and illustrates how evaluation in ongoing programs can support further development. The evaluation of the energy efficiency agreements, described in the paper, has led to important changes that support the implementation of the ESD, and continuous improvement is now one cornerstone in the energy efficiency agreement scheme. The evaluation has also resulted in strong management commitment to secure resources and commitment at all organizational levels and a new monitoring system.

**Vasco Guedes Ferreira and Paul Fleming (3183)** describe the need for metering and monitoring building water and energy consumption as a tool to improve building energy efficiency. The paper presents the results of a survey of European

local authorities on metering, monitoring and energy management practices for their municipal buildings. The paper shows that nearly all the European local authorities represented in the study are collecting data both manually and automatically. However, energy managers use relatively simple analytical and visualisation techniques to analyse the data. The survey showed that there is a demand for more automated, accurate and flexible metering, and for easy-to-use water and energy consumption monitoring tools and techniques. **Isabelle Hita et al (3126)** present EDF experience of the French Energy Efficiency Services Club (Club S2E), an organisation that supports energy efficiency. Club S2E has performed a study on Measurement and Verification (M&V) methods and chosen the IPMVP, International Performance Measurement and Verification Protocol, as its reference. Club S2E is currently working to provide a guide, including case studies, for customers on Energy Performance Contracts. The experience of EDF in developing such case studies shows the difficulties to fully adopt IPMVP in accordance with a future European standard on Energy Efficiency Services.

### Acting local: how to plan actions & monitor the results?

The number of papers related this year to the local level shows a strong dynamism, for which evaluation tools appear to be a key support. The first group of papers is related to local energy planning, either at a regional, city or building stock level.

**Endre Ottosen et al (3248)** describe how energy planning efforts of five Norwegian municipalities were coordinated at a regional level, in order to create synergies and added value compared to individual strategies. Scenarios give overviews of potentials related to local energy resources and consumption. **Peter Markus et al (3353)** look at the issues raised when changing the focus from the building to the city level. The proposed methodology aims to better understand the spatial distribution of energy demand. This is illustrated by results from a study on the case of Stuttgart, Germany. **Nicolas Houdant and Johan Schram (3383)** introduce the ENERTER tool, which simulates energy consumption of large building stocks, using a detailed typology and combining average ratios and specific data. The tool provides results per category of buildings, which makes it possible to better target actions and to assess energy savings potential.

A second group of papers deals with the monitoring and evaluation of implemented programmes, showing that evaluations can be used for different purposes: looking at local impacts beyond energy savings, comparing projects, meeting requirements and improving programme management.

**Joëlle Guennec and Stanislas Nösperger (3217)** use a new frame based on the Service Economy Theory to evaluate a refurbishment programme in a French rural area. Their analyses consider not only energy savings but also the whole service delivered (comfort, financial services, etc.) together with the impact on local development. This approach could significantly change the design and implementation of local energy efficiency projects. **Olivier Pol (3123)** presents results of CONCERTO demonstration projects. This raises the issue of comparing very different communities, from various countries, with distinct contexts (new / regeneration; urban

/ rural). The aim is also to provide benchmarks for future projects. **Katherine Johnson et al (3279)** analyse the experience feedback from twelve small Californian utilities which pooled resources to meet the evaluation requirements for their energy efficiency programmes. This approach made it possible to reach a fair balance between comprehensiveness and cost-effectiveness. Key lessons are drawn, proving that evaluation can be a very useful management tool, even for small organisations.

### New tracks for improving energy efficiency implementation & evaluation

Two papers illustrate how the support brought about by monitoring and evaluation practices can be used at the level of the implementation of the Directive, here the Energy Performance Building Directive (EPBD). **Günter Simader et al (3392)** propose new market approaches (quality and performance declarations) to fill the gap between theoretical and on-site efficiencies of boiler installations. Preliminary results from 50 pilot tests demonstrate significantly improved on-site performance, indicating that the proposed services could be efficient instruments to improve EPBD implementation. **Vibeke Kjaerbye (3068)** uses an interesting statistical approach (Propensity Score Matching) to evaluate energy savings from the Danish energy labelling scheme for houses. No significant savings were observed in their results. This tends to show that labelling would not be effective when used alone. But this conclusion needs to be complemented by more qualitative and focused analysis.

Evaluations are also valuable when targeting specific objectives. **Gilberto De Martino Jannuzzi et al (3049)** present experience from Brazilian electric utilities' investments in low-income energy efficiency programs. Since 2007, the regulator has enforced the need to provide evaluation plans for the programs delivered and this paper presents the methodology that has been developed to accommodate the characteristics of lighting and refrigerator programs that have been introduced in Brazilian urban and peri-urban slums. This methodology covers the dynamics, housing, electrical wiring and connections of the population as well as their ability to pay for the electricity and program participation.

Looking at possible future policies, **Adriaan Perrels et al (3378)** illustrate an innovative approach to households regarding the greenhouse gas intensities of their purchases and support for reducing their emissions. The approach is based on a combined use of verified carbon footprints, personalised monitoring and feedback services, a reward system (bonuses) for consumers who manage to reduce the embodied emissions, and a secondary reward system for retailers that successfully reduce the emission intensity of their sales. The paper discusses the requirements of the various information systems, their interfaces, and the need for a data strategy to assure data availability and quality.

## Posters

- **Hans Jacob Mydske (3152)** examines how indicators can be defined to monitor municipalities' activities and to help benchmarking at both levels, within a given organisation over time and between comparable cities.
- **Dominique Osso et al (3163)** discuss how the White Certificates scheme (or FWC) in France will comply with the ESD requirements of 3 different end-use actions (insulation, heating boiler, heat pump).
- **Cees Maas et al (3177)** discuss the evaluation of buildings codes. The paper highlights the need of a reference case to compare new and old houses. The paper presents several reference situations that could be used for the energy saving calculations for newly built houses and illustrates these by examples in the Netherlands.
- **Luc Bodineau and Aude Bodiguel (3274)** present early experiences of the White Certificates scheme (or FWC) in France.
- **Michaela Valentova et al (3297)** study the savings potential from using simple standby reduction devices in Central Eastern Europe, based on a large store survey.