Introduction to Panel 7 Monitoring and evaluation

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Introduction

Monitoring & evaluation (M&E) has gained more importance for the implementation, controlling and optimisation of target-orientated policies as well as for better communication and legitimisation of policies. Typical reasons to start an evaluation are: to assess impacts (estimate the change in energy usage and other targets due to policy instruments/ programs), to improve policy design (prioritize program & portfolio budgets, inform resource planning), to reduce uncertainty (provide the information necessary to make good decisions regarding policy instruments), and to account for spending (provide information to parliament/local council on results and spending).

M&E has become a broader discipline and M&E experts are very productive in providing new, complex and elaborate methods to improve monitoring and evaluation of energy efficiency policies. Issues this panel addresses are: Are the applied methods really useful? Are they understandable for non-scientific actors and are they suited for every-day policies? Are the employed methods cost-effective? How are experts dealing with uncertainty in their results? How are or can flaws in current methods be addressed?

This panel wants to encourage a discussion about the appropriateness of M&E with regard to multiple criteria: costs, effectiveness, efficiency and (non-) energy benefits, and timely communication of M&E results. Topics include:

- Effectiveness and efficiency of specific policies, programs, and M&E methods;
- Development and application of innovative M&E methods in the field of energy efficiency;
- Multi-criteria assessment of energy efficiency policies and programs;
- Comparing results of bottom-up and top-down evaluations;
- Accuracy of evaluation results vs. costs of evaluations;
- Methodological issues (e.g. actual vs. estimated savings; causality & attribution; net (additional) savings and definition of counterfactuals);
- Evaluation of energy products and services, including M&E of emerging technology programs;
- M&E of behaviour change programs and energy efficiency communication campaigns;
- Measuring demand response programs impact.

Smart metering and smart billing

Smart grids, smart metering and smart billing are often regarded as the solution for (nearly all) future problems of the energy sector: for energy efficiency, for load management, for better grid integration of renewables and as basis for new business cases for energy utilities. But is this really true? First results from pilot projects show that we need to be careful with overestimating the effects of smart metering and billing. Paper 7-018-13 "How much shift in demand? Findings from a field experiment in Germany" by Schleich and Klobasa shows that Time Of Use (TOU) pricing leads to average energy reductions in peak-demand of 6 % to 7 % and that households mainly responded to TOU tariffs by shaving peak demand, but not by shifting demand from peak peri-

ods to off-peak periods. Paper 7-377-13 "Smart gas meters: assessment of customer responses to improved information about their energy consumption" by Drozdowski and Vandamme shows the results of a field tests carried out by GrDF, focusing on 18,500 smart meters and among 400 households. The assessment points to increased impact on gas savings of the deployment of gas smart meters compared to the French Energy Regulator (CRE)'s first theory-based assessment. Paper 7-194-13 "What do we know about comparative energy usage feedback reports for residential customers?" by Agnew et al. presents findings from all publicly available large-scale, independent evaluations of comparative energy use feedback programs in the United States to assess how they have worked and the extent to which those studies validate underlying program theories. The paper e.g. shows that consumers usually save in the range of 1 %–3 %, compared to counterparts who do not receive the reports and that savings persist and often grow through concessive year of the program year. Paper 7-014-13 "Evaluation of the effects of a tariff change on the Italian residential customers subject to a mandatory time-of-use tariff" by Maggiore et al. analysed a group of 1,000 customers to evaluate the effects of the switch towards a ToU tariff. The results have shown little impact of the consumption shift and a negligible modification of consumers' habits; this is caused, in particular, by the tiny price difference between peak and off-peak hours. Paper 7-027-13 "Method for development and segmentation of load profiles for different final customers and appliances" by Morch et al. collected hourly time series of total electricity consumption from 75 households, and additional high-resolution (one minute) metered data of more than 500 different appliance-specific loads as water heaters, washing machines, television sets etc. With the help of these data typical group- and household-specific demand profiles were developed.

Obligation schemes: what do they actually deliver?

The relevance of Energy Saving Obligations (ESOs) as a key policy tool for the achievement of energy efficiency targets increased throughout last couple of years. At the European level the new Energy Efficiency Directive confirmed this recently, which demands the introduction of energy efficiency schemes at the Member State level. But what do these schemes actually contribute to energy savings and can be compared? Paper 7-084-13 "Overestimation of actual savings in supplier obligation schemes" by Moser looks into the bargaining power of suppliers and the incentives they underlie in connection with the definition and the application of standardised saving values. The researches argue that real savings with obligations schemes are probably smaller than anticipated calculated savings. Interviews suggest that the overestimation is tolerated in order to minimise administration costs. Paper 7-425-13 "How to calculate energy savings and costs of energy saving obligations in a harmonized way?" by Suna and Haas compares the schemes in place in the United Kingdom on achieved energy savings and costs using a harmonized approach. Paper 7-131-13 "Spending to Save: evaluation of the energy efficiency obligation in Denmark" by Bundgaard et al. shows that although the Danish energy distribution companies meet their overall saving obligation, the actual net savings impact are about a third of the savings reported by the obligated parties. Further it was found that while energy savings in the public and business sector have a high net impact, some subsidies given under the EEO are inappropriately high. The net impact in the residential sector, on the other hand, was found to be very low.

Evaluation of specific programs and instruments: what do they teach us?

A great variety of methods is applied to evaluate the impact of energy-efficiency programs and policy instruments across Europe. What can we learn from these evaluations to improve future programs and policy instruments? Paper 7-122-13 "From local to national: Tackling fuel poverty in Austria" by Brunner et al. present the first results of project started in late 2011, which applied varies strategies aimed at improving energy efficiency and at the same time mitigate fuel poverty in 400 to 500 Austrian households. Paper 7-192-13 "Why the light bulb is no longer a textbook example for studying price elasticity: Results from choice experiments and demand modeling research" by Stryker and Gaffney presents the results of consumer intercept surveys completed with nearly 1,000 randomly selected shoppers in 200 lighting retail stores. Data from these surveys formed the inputs to a series of choice experiments and demand models. Preliminary results suggest that while changes in light bulb purchases remain largely influenced by price, there are a number of other factors that explain customer choice – such as, whether the light bulb was a planned or "impulse" purchase, how many light bulbs are needed at the time of purchase, what type of light bulb was used prior to the purchase of a replacement, what task or application the light bulbs is being used for, and how often the light bulbs will be used. Understanding and quantifying the influence of these other factors can help inform lighting policy and program design to more effectively address non-price barriers. Paper 7-475-13 by Jakob et al. applies a detailed bottom-up model to make an "Ex-ante estimation of the EU Ecodesign Directive's impact on the long-term electricity demand of the tertiary sector". Results show that electricity demand in the EU tertiary sector will continue to grow in the coming years. However, the policies currently implemented and foreseen for implementation will mitigate this effect to a large extent and demand tends to stabilize in the long term, particularly if the Ecodesign Directive is consequently implemented and enforced based on the least lifecycle cost approach. Paper 7-033-13 "Evaluation of the German national climate initiative: Lessons learned and steps ahead" by Schumacher et al. is focused on the German National Climate Initiative (NCI), which is a cornerstone of the German Government's ambitious plans to reduce GHG emissions. NCI aims to change behaviour of consumers, local authorities and businesses towards lower GHG emissions. Around 25 very diverse projects, programs and programme components were evaluated. Authors have found distinct differences between information-based and investment-based policy instruments, and between the various information-based project approaches. In addition to that, authors conclude that some approaches reached a large number of people but had limited impact on changing behaviour while others achieved some behavioural change but had only limited effect on greenhouse

gas levels. Paper 7-224-13 "How energy efficiency programs influence energy use: an application of the theory of planned behaviour" by Lynch and Martin examines how energy efficiency programs influence participant behaviour and contributes to the emerging body of knowledge on suitable methods for evaluating the impact of energy efficiency programs and policies, and understanding their influence on participant attitudes and beliefs. The study used a non-equivalent groups design, which involved analysing electricity and survey data from a sub-sample of 542 matched intervention and control group participants. The results indicate that 5.8 % of electricity use reductions in the intervention group can be attributed to the evaluated program.

Improving and developing monitoring methods

Costs and benefits of monitoring and evaluating energy need to be well balanced. Paper 7-431-13 "Experiences with ecodesign and energy labelling market surveillance in Denmark" by Gydesen et al. focuses on the costs for market surveillance. Traditionally, market surveillance has largely been based on laboratory measurements. However measurements are quite costly and the costs per test will increase in the future due to more and more complicated test standards. This paper describes Denmark's experiences in implementing cost effective market surveillance based on inspection of the suppliers' technical documentation. Paper 7-111-13 "Monitoring the energy efficiency service market in Germany" by Offermann et al. discusses available data and problems of monitoring and evaluation of the EES market. The paper presents a concept for a systematic, regular monitoring of the EES market in Germany, which looks both at the EES supply-side as well as at the EES demand-side and discusses the transferability of this approach to other European Member States. Paper 7-305-13 "Back to reality: How domestic energy efficiency policies in four European countries can be improved by using empirical data instead of normative calculation " by Laurent et al. presents the results of comparing the differences between measured consumption and normative estimations of residential energy consumptions using national standard calculations in four European countries (United Kingdom, France, The Netherlands and Germany). The potential causes of this gap are discussed in terms of behavioural change, technological performance and the application of normative models. The paper provides examples of the potential impact that using normative as opposed to calculations grounded in empirical data may have on policy decisions. Paper 7-294-13 "Using simulated co-heating tests to understand weather driven sources of uncertainty within the co-heating test method" by Stamp et al. analyses the so-called performance gap between designed and as-built building. Field measurements to date have indicated that the measured as-built fabric heat loss of tested UK buildings is consistently higher than design values, often considerably so. The paper presents the results of a method using simulated co-heating tests to show how key weather variables influence the co-heating result and generate uncertainty and bias.

Paper 7-100-13 "The UK heat pump field trial: findings from phase 2" by Bradford and Byrne presents the results of a study that has collected performance data from 83 heat pumps – including 29 air source and 54 ground source pumps – installed in a varied range of housing conditions in the UK, with the aim to determine best practice design and installation of heat pumps.

From top-down to bottom up

Both top-down models and bottom-up models have advantages and drawbacks. But what method should be used when evaluating energy efficiency policies? Should it be top-down which is used at the aggregated level by fitting historical time series of national energy consumption based on macro-economic and social relationships. Or should it be bottom-up method requiring a detailed database of empirical data? Paper 7-402-13 "Scenario based evaluation of policies addressing the German heating and cooling sector: A bottom-up modeling approach integrating buildings, industry and district heating" by Steinbach et al. presents a variety of scenarios for the German heating and cooling sector up to 2020 using an exploratory modelling approach based on four different techno-economic bottom-up sector models. Different building and settlement types are used to calculate the potential of district heating and CHP technologies. The study assesses a wide range of different energy efficiency policies. The results suggest that current policy measures in Germany are not sufficient to reach the national 2020 targets. However, scenarios with a combination of financial support instruments, stricter regulations and measures addressing stakeholder specific barriers are able to reach targets. Paper 7-043-13 "Energy labels in Dutch dwellings – their actual energy consumption and implications for reduction targets" by Majcen et al. presents a large scale study comparing labels and theoretical energy usage with data on actual energy usage. A database of about 200,000 labels was coupled with data on actual gas and electricity consumptions provided by energy companies. Discrepancies between the actual and theoretical energy usage were analysed. The study showed that the less efficient energy labels consume much less energy than predicted by the label, but on the other hand, dwellings with labels A and B consume more than predicted. The energy saving targets are examined to demonstrate that most energy reduction goals may not be achievable if actual energy consumption is taken as the basis for future consumption calculations instead of theoretical consumptions. Paper 7-070-13 "From top-down to bottom-up: two ways to monitor energy-efficiency in Dutch voluntary agreements" by Abeelen presents evaluation results of shift from top-down method to bottom-up method used on the long-term agreements on energy-efficiency in the Netherlands industry. The resulting drop in production levels had large adverse effects on the energy-intensity, but also affected the investments by companies. This paper explains the reasons behind the change and focuses on advantages and disadvantages of both methods.

Energy savings: what are the costs and how can successes be replicated?

Energy efficiency policy planning relies on ex ante energy efficiency measure costs, savings values and program administration costs. It helps to set energy savings goals, track and evaluate progress towards such goals, assess the cost-effectiveness of programs and projects as well as plan financial resources. Are

these estimated figures reliable? Paper 7-213-13 "Methodology for screening of Intelligent Energy Europe programme projects" by Blumberga et al. provides a methodology with which the results from projects executed under the Intelligent Energy for Europe program have been replicated for the Latvian situation. Paper 7-389-13 "Measure costs – the forgotten child of energy efficiency analysis" by Ting et al. presents results of study on the measure cost development and ex ante estimation in regulatory and program design applications. Paper provides a comprehensive overview of the key analytic and data collection challenges in the context of those needs, including tradeoffs between measure granularity and data requirements, equipment price forecasting, dual baselines, interactions with codes and standards, and estimating incremental measures costs for custom and new construction programs. Authors present examples of emerging data collection and analysis approaches that address some of these challenges and provide a roadmap for measure cost research and data development going forward.