Introduction to Panel 8 Monitoring and evaluation: building confidence and enhancing practices

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Good news and bad news?

Between 2005 and 2014, gross inland energy consumption and GDP have decoupled in the EU28, with the observed reduction in energy intensity being influenced by improvements in energy efficiency, as well as by the increase of renewable energy in the power mix and by structural changes within the economy. Recent years thus show that it is in fact possible to do "more with less" – and that monitoring and evaluation is key: if absolute energy consumption shall decrease significantly, the trend needs to speed up and be constantly monitored, and thus most effective and efficient policies identified and best arguments made, based on robust evaluations.

The EU is heading for stricter limits to energy consumption: the EU Commission has recently launched its new "Winter energy package" involving an update to all main EU energy policy instruments, with a high priority for energy efficiency. The general framework is a new integrated "energy union governance"

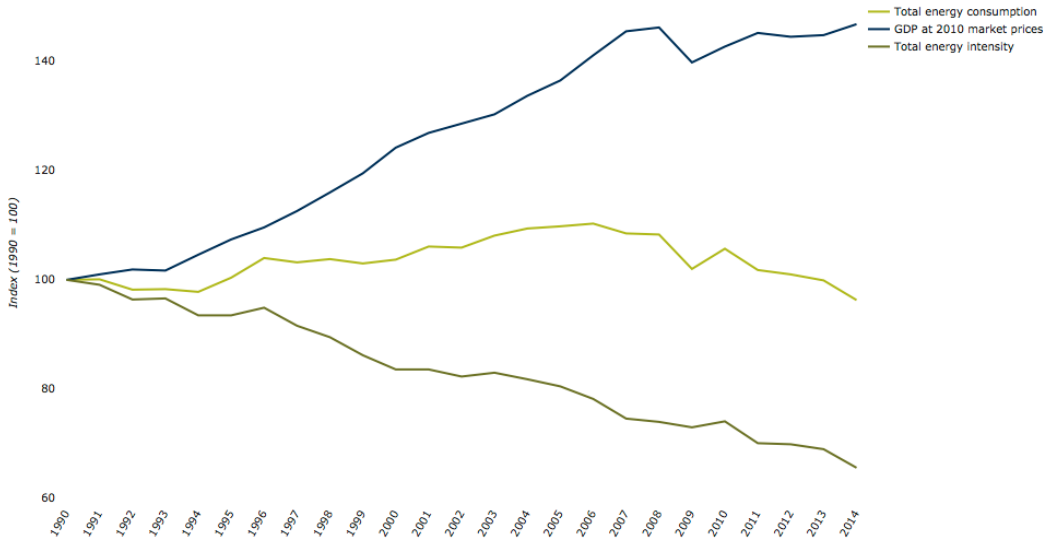

Figure 1. Trends in energy intensity, GDP and energy consumption (EEA). Source: http://www.eea.europa.eu/data-and-maps/indicators/total-primary-energy-intensity-3/assessment.

and a binding 27 % consumption reduction target. However, the European Parliament will likely keep calling for a 30 % reduction target. In the EU, monitoring and ex ante/ex post evaluation is becoming increasingly important for arguing policies also including multiple, non-energy benefits. At the same time, the US seems to be moving away from energy efficiency and renewable energy as first fuels, raising the question on "what is the right move for the future?" – many questions raised to the sessions in this panel.

Energy efficiency – a mature market?

This is about assessing energy efficiency markets. Szum et al. (8-089-17) assess data disclosure points between US and Chinese building analysis tools, developing analytical tools for municipal benchmarking and policy evaluation. Michel et al. (8-206-17) do a follow-up of their previous analyses of GfK sales data of white goods and draw conclusions for the evolution of energy efficiency levels over the past decade. Flegel et al. (8-307-17) present available data and problems of monitoring and evaluation of the energy services market in Germany and discuss the idea of an ongoing monitoring study that would allow continuous and detailed market performance evaluation.

Where are we on DSM and ICT/Behavioural response?

Evaluations and debate on Smart Metering have been around for more than a decade now. As the second generation of Smart Meters is on the market, building automation becomes increasingly important and intertwined with metering, billing, behaviour response and demand-side management. The SHOWE-IT project tests ICT services and their impacts in different public housing case studies across Europe, presented by Villot and Zoonnekindt (8-002-17). Wemyss et al. (8-176-17) conducted a study in an experimental research design setup with behaviour change interventions and analyse in their paper how participants that engage actively in the program are different from passive "participants". Sherwin et al. (8-222-17) provide us with a characterization of adoption and enrolment of different types of utility programs aimed at promoting energy efficiency, demand side management, or reducing burdens on low income households, according to geographical and demographic criteria, as well as consumption patterns, within a utility category. An investigation about the main causes associated with the decline in space heating demand in existing dwellings is presented by Ilias and Laurent (8-171-17), where the recent energy efficiency increase of existing dwellings is evaluated as a possible cause.

Transparency needs the (right!) measurement

We are evaluating energy savings of policies, programmes, individual technology improvements, behavioural actions – but how do we arrive at the savings? And do we have systematic biases involved? This group of papers looks at some methodological problems of efficiency evaluations.

Filippidou et al. (8-117-17) treat one issue that has been known for years: actual savings from building renovations are much lower than predicted by engineering models, by comparing predicted with measured energy consumption. For a similar issue but using a different approach, Hörner and Lichtmeß (8-185-17) analyse the difference between EPC ratings of new and refurbished buildings and their actual energy consumption. They find structural differences that allow for a re-calibration of EPC-based consumption calculations to reflect reality better. Much of the debate on the performance gap focuses on the use and accuracy of building energy models or on the "misbehaviour" of users and mal-operation of measures. Toupouzi et al. (8-207-17) bring us a new approach to explore this gap, focused on the design and construction phases of retrofit projects, defining a plan of work as a continuous cycle of different retrofit work stages and roles, defining the types of risks encountered by exploring evidence-based problems, concerns and "daemons" that emerge as major contributors preventing the full potential of low-carbon refurbishments from being achieved.

Huebner et al. (8-299-17) outline research methods for improved impact assessment of energy efficiency policy, including Randomized Control Trials (RCT), but also quasi-experiments and systematic reviews that go beyond the conclusions of single experiments, also presenting tools for increasing replicability.

Robust policy evaluation: key and always difficult

Several papers are dedicated to policy evaluation. One issue is how to improve evaluations. Sandin et al. (8-221-17) provide a meta-study of 30 evaluations of building sector policies done for Swedish authorities in the past decade, looking at data, methods, and judgements and find vast room for improvement. Collins and Curtis (8-008-17) analyse systematic distortions of building energy ratings (EPCs) and find evidence for "adjustments" of ratings at certain building class category boundaries, in total almost 5 % of all cases. The estimation of the energy savings associated with the eco-design and labelling measures at national level in Sweden and Denmark is the key topic of the work of Stengård et al. (8-238-17), where we find the description for the basics of the estimation tool, the energy savings estimations for several white goods groups for Sweden, and a comparison between earlier ex-ante savings estimates for white goods with the actual development.

Another perspective is given by papers that look into which policies worked well. The meta study of 13 major energy efficiency schemes by Broc et al. (8-121-17) investigates data, methods, and results and tries to develop a methodology for a comparison of different evaluations. They find however, that comparisons are in most cases very difficult.

A discussion on how scorecards have impacted or may impact policy making is provided by Eichhammer et al. (8-343-17), including a comparison of the methodologies and results between recently developed Energy Efficiency Scorecards, as well as an overview of further policy scorecards in the energy field, also looking at lessons from other fields such as innovation or educational capabilities of countries.

Monitoring governmental support for energy efficiency as well as assessing its progress is vital but often difficult in many aspects – as is the assessment of energy savings associated with these. Kimura (8-405-17) makes a case study of Japanese energy efficiency using a unique database covering all of the around 5,000 programs funded by the Japanese government and containing information about objectives, outlines, expenditures, and outcomes of each program in a standardised format.

Results of a large programme of energy audits in the residential sector are at the core of the work presented by Steinestel et al. (8-394-17), on the basis of CATI interviews with customers, where they answered a set of individualised questions based on the energy efficiency measures conducted. Consistency between three evaluation periods enables tracking of developments over time, allowing the authors to draw conclusions over issues like the preferred building components for insulation, or how the energy savings developed over time.

Multiple impacts count!

The energy efficiency community has known for many years that improvements of energy efficiency not only have effects on energy consumption and greenhouse gas emissions, but on a large set of other indicators. The IEA has termed those "multiple benefits" but, as there may also be negative impacts, others call them co-impacts or non-energy impacts. The topic is also on the panel 8 evaluation agenda. One group of papers investigates some impact categories that are not much researched yet. The paper by Ezratty et al. (8-064-17) looks at the much-researched health impact, but in a special sector of energy vulnerable populations, and explores whether a methodology from an English system could be transferred to the French case. The contribution of Nösperger et al. (8-134-17) takes a very innovative step in advancing the valuation of comfort gains from retrofitting and thus putting a value to the rebound effect. As an output of the Calculating and Operationalising the Multiple Benefits of Energy Efficiency in Europe (COMBI) project, Chatterjee and Ürge-Vorsatz (8-248-17) provide a comprehensive methodological framework which addresses the key challenges of incorporating multiple impacts, with particular emphasis on productivity, into a decision making framework, identifying the key methodological gap of multiple impacts accounting.

Some contributions do not focus on one certain impact, but on approaches for evaluating the whole set of impacts associated with energy efficiency. Reuter et al. (8-314-17) have developed a quantitative indicator approach to measure multiple benefits of energy efficiency, planned to be applied for 31 countries (EU28 plus Norway, Switzerland and Serbia) classifying them into three groups (environmental, social and economic), consisting of 20 indicators covering these different aspects, and discussing the methodological approach to the indicators set, the underlying data sources and limitations.

The COMBI project aims at calculating the energy and non-energy impacts that a realisation of the EU energy efficiency potential would have in 2030. Thema et al. (8-108-17) present here first results, describing sources and methodologies for quantification of individual impacts, most critical challenges, together with a description of caveats and uncertainties attached to the quantification, as well as giving a first impression of the order of magnitude multiple impacts of energy efficiency improvements may have in Europe.

Big data is real

This topic builds on the idea that Big Data is a crucial element to drive energy efficiency forward, providing new insights into recent data and experiences coming from different parts of the globe, as well as from different sectors of activity.

Using data from a large UK retail chain, Granell et al. (8-256-17) have used a number of different analytical methods to investigate the efficiency of Green Leases and Memorandums of Understanding. They analyse changes in energy consumption after these mechanisms have been introduced, for a number of different classes of stores, also discussing the limitations of Big Data analytics using currently available data and the need for eventual further information.

Constanzo et al. (8-295-17) present a detailed evaluation of stakeholder response to big data tools developed under the Request2Action (R2A) project which aims to drive retrofit action in the residential sector by making retrofit data available to home-owners, the supply chain and policy makers. Hundreds of stakeholders collaborate in nine different countries providing specifications, information and evaluation that are essential to guarantee the effectiveness of the data services.

The question "how much of M&V 2.0 is hype, and how much is real?" is the core of the work presented by Kupser et al. (8-413-17) presenting two different, but related, approaches to leveraging residential high frequency energy consumption data for program management and evaluation. The basis is a project which set out to better understand the true potential of emerging M&V approaches and to determine the relative benefit of these approaches in a deemed savings environment, presenting the findings of this evaluation to-date, and discussing the structure of the evaluation.