Introduction to Panel 5 Evaluation and monitoring

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MONITORING AND EVALUATION of energy savings has gained considerable new interest, as appears from the title of the Summer Study "What works and who delivers?". Realized energy savings and the contribution of policy and programmes have earlier been the subject of many ECEEE-papers. However, for the first time the issue is dealt with so broadly in a separate panel, and not without reason. International policy developments have lead to increasing obligations to report about the national efforts and achievements, for instance the coming into force of the Kyoto agreement. The nearly finalized Energy Service Directive (ESD) of the EU, with its obligatory target for energy efficiency, forms a new challenge for the monitoring and evaluation community. At the national level the introduction of White Certificate schemes will also contribute to the need for sound evaluations.

When speaking about monitoring and evaluation it must be clear what the subject is. Often the focus will be at the achieved total energy savings, or the contribution of policy instruments for energy savings. But the subject could also be the costs and effectiveness of stimulation, as climate policy has to "compete" increasingly with other societal problems. More and more it is acknowledged that realizing a more energy efficient society is a complex process. Therefore the process and the role of actors and institutions becomes an important issue in this field.

Despite the development of many new methods in the past decade the determination of realized energy savings still remains a problem. Energy savings represent energy that has not been used, and is therefore not directly visible, contrary to production from renewable sources. Most methods try, in one way or another, to answer the question: "what should energy use have been without the saving activities?". Then savings follow from comparison of this reference use with actual use. The ESD mentioned earlier has started a discussion on the best method, bottom-up evaluation of savings from specific policy instruments or top-down monitoring of total savings per sector, using indicators. Also the interaction between the effects of different measures has become a methodological issue.

The papers in panel 5 show a great variety on subject, scope and methodology. The presentations on methodology will be split into sector or national level and programme evaluations. The other papers are also grouped according to their scope: specific applications or the broader picture.

METHODOLOGICAL ISSUES AT SECTOR OR NATIONAL LEVEL

The paper of R. Bowie and H. Malvik (5,087) is closely connected to the new ESD that demands minimum energy savings of 1% per year from EU-countries. The EU has to take account of the great differences in availability of data and skills in monitoring when realized savings have to be calculated. Therefore Bowie and Malvik propose a mix of bottom-up and top-down evaluation. The bottom-up evaluation regards the effect of all relevant policy measures in a country, but not the effect of general measures, like energy taxes. The top-down evaluation method calculates total energy savings, but does not provide information on the contribution of policy measures. An example of sophisticated bottom-up monitoring is presented by S. Faberi & W. Eichhammer (5,092). In their paper they illustrate the use of the MURE-simulation tool to show the saving effects of various policy measures for Italian households. Another example of an evaluation per policy measure is provided by L. Shorrock (5,001). This analysis for UK housing stock

regards a very long period (30 years) compared to most evaluation studies. The top-down method used for ESD-evaluations will be the aggregated energy efficiency indicator, called ODEX, which consists of a set of 26 individual indicators for various sectors. The calculation of the ODEX-indicator is clearly described in the paper of D. Bosseboeuf *et al* (5,211). The underlying indicators come back in the paper of B. Lapillonne (5,201) that compares the energy efficiency situation in both "old" and "new" EU-countries.

METHODOLOGICAL ISSUES AT PROGRAMME LEVEL

The major evaluation problem of discerning the effects of programme efforts and that of other factors is dealt with in the paper of M. Horowitz (5,071). He stresses that the all important non-programme factors have to be taken into account to calculate the true contribution of the saving programmes. Examples of analyses, using econometric methods, are given for programmes in the building sector in the USA. The papers of M. Harmelink *et al* (5,007), L. Megdal *et al* (5,117) and G. Thijssen *et al* (5,185) all broaden the scope of programme monitoring; not only the savings found are important but also the way these savings have been realized. A systematic analysis of the implementation mechanism (programme logic) and the analysis of intermediate results could highlight why saving targets have not been met and where improvements are possible. It is interesting to see how the same method is used for respectively dwellings and buildings in the Netherlands, for air-conditioners in the USA and for the heating of Dutch dwellings. A paper that also broadens the scope of programme evaluation is that of L. Neij and K. Åstrand (5,236). Outcome indicators are used to describe the technology developments, next to the trends in realized energy savings. Other contributions with a methodological accent are provided by P. Sattler *et al* (5,157) and C. Atanasiu *et al* (5,206).

MONITORING APPLICATIONS

Three papers regard the effect of a specific policy measure. K. Dyhr-Mikkelsen *et al* (5,091) analyse the results of a free-of-charge audit programme. It is shown that more than one method should be applied to obtain reliable results. The effect of voluntary agreements is looked at in the paper of A. Persson et E. Gudbjerg (5,226), both for the past in Denmark, and for the future in Sweden. The third paper of H. Saele *et al* (5,145) does an in-depth inquiry into the causes for not implementing saving options from a free advice. D. Blumberga and V. Vitolins (5,271) describe a method to prevent such a non-compliance, by screening the possible saving projects beforehand on success-factors. Another type of monitoring regards that of technologies, as L. Nilsson *et al* do for the electric heat pump in Sweden (5,112). The description of thirty years of heat pump development shows that the simple, trend like penetration concept in analysis of saving options does not confirm reality. In the paper of J. Swisher *et al* (5,281) energy savings are not the primary goal of electricity demand shifting. However, it shows that sample measurements, although expensive, are a reliable way to monitor programme results. Other applications in the building sectors or production come from W. Smith and J. Pett (5,010), J. Flint *et al* (5,125) and O. Wagner *et al* (5,225).

THE BROADER PICTURE OF SAVINGS

As savings are only one, but important, means of reducing CO_2-emissions, it is important to look at the interplay with other options, like renewable energy, substitution between energy carriers and CO_2-sequestration. In the paper of S. Isoard and T. Wiesenthal (5,096) these issues are dealt with for a long range scenario for Europe. F. Unander also presents the broader picture for energy savings in his paper (5,243) with an overview of world wide and long term energy trends. The same is true for the paper of M. Kohlhaas *et al* (5,041) that highlights the effects of minimum tax rates according to an EU-directive.

POSTER SESSION

Panel 5 also includes three posters:

In 5,126, Anglani and Benzi propose a technical procedure to assess energy saving from variable speed drives in compressed air facilities. In 5,176, Agricola and Köhl address the issue of the energy efficiency of industrial motor driven systems. Finally, Paolo Bertoldi *et al* present the concepts and practices of efficiency valuation (5,207).