# SESSION 15

## MODELING FOR UNDERSTANDING ACHIEVEMENT OF SAVINGS

*Moderator: Piet Boonekamp, ECN*

PAPERS:

**Interactions Between Energy Efficiency Policies and Emission Trading Schemes: Modelling the Effects on Carbon prices and industrial competitiveness**

Johannes Thema, Wuppertal Institute for Climate Environment Energy, Germany
Felix Suerkemper, Wuppertal Institute for Climate, Environment, Energy, Germany
Adrian Amelung, Institute for Economic Policy, Cologne University, Germany
Katharina Grave, Institute of Energy Economics, Cologne University, Germany

**The Impact of Building Energy Codes on the Energy Efficiency of Residential Space Heating in European countries – A Stochastic Frontier Approach**

Aurélien Saussay, International Energy Agency, Paris, France
Yamina Saheb, International Energy Agency, Paris, France
Philippe Quirion, Centre National de la Recherche Scientifique, Paris, France

**Using Simulation Models for Explaining Realized Energy Savings – Ex-Ante Methods for Ex-Post Evaluations**

Piet Boonekamp, Energy research Centre of the Netherlands, The Netherlands

SESSION SUMMARY:

This session will focus on modeling as an alternative tool for evaluating the achievement of energy savings. Most IEPEC sessions focus on specific issues such as sector (industry), program or policy (obligation schemes), device (smart meters), mechanism (behavioural savings) and aspect (co-benefits). The sessions on the methods themselves regard mainly the 4 (Technical), 7 (Estimate versus Actual), 8 (Top-down improvement), 9 (Improving M&E methods) and 17 (Standards for the calculation of savings). The session on modeling complements the different methodological contributions by presenting explicit modeling, mathematical or conceptual, as a tool to understand why energy savings emerge (or not) under the influence of factors that are thought to be relevant.

The first presentation deals with the interaction between emission trading schemes (ETS) and energy efficiency policies, that are two ways to reduce greenhouse gas emissions. While ETS settle a fixed sum of emissions for power stations and part of industry, energy efficiency policies aim at reducing the energy consumption of end-users. The article explores the interactions between the two types of policy instruments in the field of industrial electricity where the production is influenced by the ETS cap and the consumption by savings policy. By using the simulation model DIMENSION, possible adjustments of the emission cap and their impact on carbon prices as well as on the marginal costs of electricity generation are quantified. These results can be used to estimate the effect on industrial energy efficiency, the costs of energy and emission rights and overall costs for industry. The standard analysis shows, like many other studies, that the combination of ETS and savings policy is not very effective. However, the interesting new finding is that an effective energy efficiency policy in combination with a more stringent cap (30% of emission reductions) results in similar or even less costs to industry.

The second presentation applies an econometric model to evaluate the impact of the implementation of buildings energy codes on residential space heating energy efficiency in a number of countries, using a stochastic frontier approach. A stochastic frontier demand function is specified that contains explaining variables, such as floor space and income, and the parameters are estimated using a panel data set covering 7 European countries from 1990 to 2008. In the first step the

evolution of space heating energy efficiency over time is estimated; in a second step the impact of buildings energy codes on this evolution is assessed. In this last step the implementation of building energy codes is specified as the number of years for which they have been enacted in each country. A statistically significant effect of building energy codes on the improvement of energy efficiency is found. The paper raises many new questions, e.g. on the observed differences between countries. However, these have to wait for a follow-up study.

The third presentation is about using simulation models for ex-post evaluation of realized energy savings at country and sector level. These models are normally applied in scenario studies to explore the possibilities and consequences of stimulating energy savings. The models calculate future energy consumption in end-use sectors on the basis of factors such as growth of economic activities, energy prices and various policy measures. They also model the way energy users respond to prices and policy, including the interaction between the two, and mechanisms such as market transformation. In order to simulate the past the model inputs are set equal to known developments and the parameters are adjusted such that simulated energy trends resemble reality. When this is accomplished an extra simulation, without the introduction of new saving measures, can show the total savings realized. Extra simulations without certain policies can show the specific effect of these policy measures, including interaction and market transformation effects. The approach is demonstrated with an ex-post evaluation for the Netherlands as part of the second NEEAP reporting to the European Commission.

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