

Introduction to Panel 4

Residential and commercial sectors: Delivering lower energy use in buildings

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Introduction

The residential and commercial (including public) sectors are key in energy efficiency strategies because of the high potential for energy savings in buildings and because of the many market barriers they face. A wide range of policy instruments are used, often combined to increase effectiveness.

Europe has seen many initiatives (including EU directives on buildings, energy services, labelling, etc.) in recent years that place great emphasis on implementation if expected results are to be achieved. Globally, there have been many innovative initiatives.

The papers selected in this panel address improving the effectiveness of implementation. These may study specific initiatives (e.g. the buildings directive in the EU or global initiatives such as Energy Star) or address the barriers that hinder achievement of the full potential. The papers can be sectoral or sub-sectoral. They can be international, national, regional or local. With such a wide range of issues potentially included, it is not surprising that many high quality abstracts were received and we regretted not being able to include more.

Our aim in presenting this panel is to compare and contrast some of the initiatives and to relate topics to each other. In this overview, we highlight the papers included and discuss their relationships, intending to draw out some key issues that could emerge from the panel to influence policy and practice in the near future, whether for economic or climactic reasons, or indeed for both.

Overview of the papers

It is clear that the EPBD has had a huge influence on activity in this sector in EU countries and their neighbours. The requirements for minimum standards have led to introduction and de-

velopment of Building Codes. Are they being followed and do they actually save energy? Ruggieri et al (4221) describe the development of municipal building codes in Italy's highly localised governance structure and the processes by which stakeholder involvement led to accepted changes that appear to overcome the previous failure of nationally set standards. Dodoo et al (4267) have analyzed the life-cycle primary energy use of existing wood and concrete buildings modified to meet the maximum energy use standard of the new Swedish code and finds that an electric resistance heated building has bigger life-cycle primary energy use relative to a district heated building.

Whether the requirement for energy performance certificates has driven change in the commercial sector or not, there is plenty of evidence of approaches that benchmark different types of commercial building and take action on public building energy use. Stensson et al (4118) studied building energy use in shopping malls in Norway and Sweden to provide extensive topics for discussion, including what usage can be controlled and by whom, the differences between different types and scales of retail outlets, the importance of benchmarking and, crucially, how benchmarking needs to be improved to become a viable tool. Gruber and Schломann (4184) echoed the benchmarking requirement for tertiary buildings in their paper on the electricity use in tertiary buildings (commercial, retail and public sector buildings); this reports on the development of a database in the IEE project EL-TERTIARY and is supported by the results of two broad surveys of companies in Germany. Dunn (4013) explores the impact of new information and communication technologies on energy use in commercial buildings and identifies how IT management tools can minimise that impact.

A number of specific projects provide case studies that demonstrate different routes to the same goal. Thomsen et al (4192) look at findings from an Eco-Buildings project within the FP6 EU programme. Two demonstration projects are reported; an old factory that was converted into a cultural centre (Denmark) and a school that was converted into a community centre (Norway). Wenzel (4016) reports on demonstration low and zero energy buildings in southern Mediterranean countries and compares and contrasts the drivers for reducing energy use in buildings in different cultures based on these experiences. Patrão et al (4037) present results from an IEE-project on energy efficient elevators and escalators. Results from ten audits in Portugal are reported and it shows that there exist huge energy efficiency possibilities, especially in standby mode.

Yet are case studies enough? Three papers highlight the need for management involvement, whether to drive or to implement energy conserving approaches. Jarby et al (4111) describe the Danish Curve Breaker agreement model where organisations and companies sign up for a 3-year period to reduce their electricity consumption. The paper analyses the effectiveness of initiatives and solutions in 100 different agreements. Kilgour and Pigneri (4064) examine the role of energy performance contracting as an incentive for improving the energy performance of the building envelope for buildings occupied with commercial tenants. Two case studies from New Zealand are presented. Bleyl et al (4323) look at how energy contracting can contribute to energy efficiency in the residential sector. The size of the market for energy contracting is assessed and steps to develop the market further are identified.

The size of the market is still an issue, with some countries clearly needing evidence of the potential and the benefits of energy saving in order to take action. Korytarova and Ürges-Vorsatz (4352) examine the mitigation potential from space and water heating in the Hungarian tertiary buildings and summarise its results for the public buildings, with about half the available potential being achievable at zero cost. Zhou et al (4359) provide an analysis of the residential building energy consumption in China. The current energy situation is assessed with considerations of end use, intensity, energy efficiency etc. A forecast for 2020 is also given.

The issue of energy saving potential and its benefits to building owners is equally important in social housing. Reeves (4201) discusses whether deep carbon reductions in existing UK social housing are achievable. Houses owned by a large housing association in London are assessed and two funding options are explored: increasing rents or selling properties. However, management tools to focus on specific benefits of retrofit can provide stimuli to building owners. Lacarrière et al (4229) report on the experience of two French Social Housing Operators in integrating energy into a Strategic Asset Management tool developed as part of the IEE ESAM project; the tool is now being used to make decisions on energy investment in their existing housing stock.

Some of the options for social housing operators such as community networks are generally not so easy in the owner-occupied sector. Different and diverse opinions, motivations and perceptions of affordability (and benefits) come into play. Markl et al (4218) report on the result of a project installing heating networks and other strategies on a neighbourhood ba-

sis, examining the non-technical barriers and discussing the issues of co-operation, non-co-operation and expectations that people have when seeking to reduce their energy consumption yet maintain their privacy. Peacock et al (4093) identify pathways to reduce emissions in residential dwellings by 50% in 2030 and evaluate the response of householders to the cost of these pathways. A willingness to pay survey was undertaken and the results show that more than 20% are willing to make the necessary investments.

So we know that despite barriers to co-operation, people say they are willing to act. Will they do so if they are inspired and know what to do? Hamilton and Killip (4074) have evaluated the Eco-homes open days in the UK and their achievements towards home eco-renovation and eco-new build. The open days have had on average 500 visitors per event, but do those visitors replicate what they see? We do not know, but one expects the further problem of what to do specifically to their home, and where to find reliable and knowledgeable builders and practitioners. We are introduced to two important tools to assist decision making and sourcing the necessary expertise: Wilke (4190) describes a new software tool launched in Denmark in October 2008 and Croft (4227) describes the T-Zero tool. My Home is an interactive web portal offering consumers the opportunity to calculate their household energy consumption, receive advice on possible savings, and control and monitor their indoor environments by managing their energy consumption appropriately. This approach provides interesting comparison with T-Zero, developed in the UK to provide householders and specifiers with a comparison of the economic and environmental benefits of different low and renewable energy technologies retrofitted in their homes, leading them to appropriate suppliers after a package has been selected.

Of course, having an efficient, sustainable home needs to be completed with efficient, sustainable appliances. Nielsen and Norgard (4411) offer a controversial approach to reducing household energy use by introducing new consumption classes based on total household use. The options are clear: use efficient movable appliances wisely in a larger household to deliver just the services you need, or continue to be wasteful and limit your lifestyle choices. This sufficiency approach is radically different from the rational consumer approach – a premise on which labelling policies are based, and which need campaigns to raise awareness. McNeil et al (4416) present an analysis of the potential impacts of an international appliances standard and labelling program. Schleich and Mills (4289) look at how consumer choice of buying class A household appliances is dependent on several factors like knowledge of the energy label, residence characteristics, and regional electricity prices. Lüders et al (4112) document how it is possible to promote the wider use of A-rated circulator pumps via an offensive campaign strategy to get both consumers and installers to participate actively in the choice of pump, thereby increasing the market share of A-rated pumps sold. However labelling does not just happen: Wahlstrom (4033) identifies the methodology that needs to be laid down to test hot water taps to determine the energy efficiency of delivery and discusses labelling issues. Are we in danger of duplicating effort in many parts of the globe in developing these methodologies? Skou et al (4150) introduce a proposal for a European energy labelling scheme

taking into account the energy performance of windows for all seasons. The scheme is inspired by the American Energy Star programme for windows and the methodology is developed with focus on CEN and ISO standardization.

Still thinking about energy use in the home, Fonseca et al (4032) report the findings from an IEE financed project. They conclude that IT and entertainment loads, including standby, are a key contributor to the power demand. Countermeasures are also identified, together with further policy recommendations. Jensen and Fjordbak (4115) demonstrate the validity of this finding by describing the standby power consumption from appliances in Danish homes and report on the AutoPowerOff plug bank campaign, which is producing an estimated saving of over 80 GWh of electricity and 40,000 tons of CO₂ each year. If Nielsen and Norgard's approach were adopted, consumer choice would have people reaching for these ways of reducing their use whilst still enjoying their leisure hours. Does the rational consumer exist or do we really have to have a limit to our energy use imposed upon us if we are to reduce energy use sustainably?

Conclusions

What have we learned from these papers? Your panel leaders invited you to come to the panel sessions and contribute your thoughts. However, our initial assessment includes the following themes:

- We are not very good at identifying and addressing the same issues across different countries especially non-technological barriers.
- Politicians and policy implementers have a lot to learn from best case studies. Many initiatives could and should live side by side – there are many roads leading to the same goal.
- How does economic potential resulting from modelling take account of the new global economy and the opportunities for 'green' investment in technologies and new industries?
- How do tools like My Home and T-Zero help to make actual changes in the residential sector? Do there need to be tools like this designed for homes in every country? Does each need to start from square one each time or to what extent are they replicable?
- What do we need to disseminate differently so that good practice is adopted everywhere, by everyone?

And what still needs to be done in your town, region or country before the ideas presented in these selected papers can be adopted or implemented? We aim to distill ideas from the presentations of these papers and the audience response to move towards effective delivery of sustainable energy use in buildings.

