Introduction to Panel 9 Improving energy efficiency in ICT, appliances and products

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Introduction

Considerable improvements in the energy efficiency of appliances and products have been achieved in Europe. Yet despite the long and successful tradition of Energy Labelling and Ecodesign as the two major pillars of European policy making in this area, a multitude of challenges for future improvements remain. While some are being addressed, e.g. by re-scaling energy labels back to classes A to G in the years to come, other will need further debates in the future, e.g. how to better address sufficiency.

This year's panel on energy efficiency in ICT, appliances and products offers a cross-section of topics currently under debate. It covers market trends, policy instruments as well as challenges to market surveillance. It also provides a closer look at information and communication technologies and cooling as two intensively discussed end-uses in this area. It goes beyond the traditional view on energy efficiency and reflects on how to better integrate aspects relating to resource efficiency in future discussions.

Identifying energy efficiency market trends

It is important for academia and policy makers to understand how the markets for the various products and appliances develop. The forthcoming official European Product Registry for Energy Labelling (EPREL) by the European Commission will enhance the transparency of the market situation for appliances in the EU. Relating to this database, Berwald et al. (9-034-19) provide an overview of the current 'State of product energy efficiency in Europe – market insights from the new EU product registration database for energy labelling'. Adding to the market overview, Herzog (9-283-19) presents market trends for specific appliances based on European sales data from GfK in his contribution on 'Energy efficiency in light of global trends in technical consumer goods'. And a third contribution on market trends by Mogensen et al. (9-340-19) provides insights on how the Nordic countries have cooperated on a database for market data of appliances in this region. 'NORDCRAWL – The Nordic framework for collection, analysis and surveillance of market data based on automated and frequent crawling of retail web shops' demonstrates how this webcrawler can be used by policy makers and market surveillance authorities.

Implementing policies to bring energy efficiency to the market

A key issue for policy marking is the design of policy instruments to influence the market. McCrum et al. (9-404-19) help to gain an overview of different approaches in their contribution on the 'CLASP policy database – an appliance energy efficiency tool for collaboration and innovation'. In their contribution, they describe the development of the database containing information on policies of more than 100 different on- and off-grid products in 84 economies around the world. Weiß et al. (9-200-19) contribute to the discussion of specific policy instruments by looking at the 'Evolutions of energy labelling: lessons from German energy labels for air-conditioning and ventilation'. They point out that the European energy label needs to be complemented by a 'non-label' (a so-called Quick Check) to reach the full saving potentials in the non-domestic part of the German building sector. The provision of information is also dealt with in 'Tackling energy efficiency in professional appliances' by Geilinger (9-140-19). She discusses how the Swiss government plans to improve information on energy consumption of commercial appliances and how to achieve this in the most effective way. Lopes et al.

(9-359-19) further the discussion of specific policy designs in 'Factors for enhancing the market development of energy efficient heat pumps – scaling up through European policy instruments'. They show how inter alia fiscal policy applied for a longer period and political focus in conjunction with measures at a European level can change markets. In Sweden, this has spurred an extraordinarily successful penetration of ground source (brine-to-water) heat pumps among single- and two-family houses. Combining policies on energy efficiency and those from other areas is a topic in Carreño & Taylor (9-395-19) 'Boosting African regional markets of highly efficient appliances through effective energy efficiency and trade policy'. The authors explore the possibility for establishing a joint energy efficiency and trade policy in Africa. Kelpsaite et al. (9-403-19) also address the situation in Africa in their contribution on 'Assessing testing capacity in ECOWAS and ASEAN regions to support S&L programs for cooling appliances'. They focus on the need for governmental testing labs in the Economic Community of West African States (ECOWAS) and the Association of Southeast Asian Nations (ASEAN). Building and sustaining test capacity has been a challenge for policy makers not only for on-grid appliances, but also, more recently, for off-grid products.

Ensuring efficient and effective verification and test standards

Since the majority of policy instruments use performance levels, e.g., for setting minimum energy performance standards (MEPS) or levels in labels, the availability of good verification and test standards is crucial. Such standards should reflect how the specific appliances are used in real life, but they should also be reproducible and simple. Past years of European experience show that this is not always the case. Some measurement standards can be simplified and thus become cheaper for both industry and market surveillance authorities. In other cases, test standards should be changed to better reflect the energy consumption of the appliance in real life. Palkowski & Simo (9-003-19) focus in 'Quick seasonal performance testing for heat pumps' on the measurement standard EN 14825 and similar test standards such as ISO 13256 for heat pumps. They show that by reducing the lab test points to only two, it is possible to achieve 60 % savings in cost and time with the same degree of precision as in EN 14825. Taylor & Carreño (9-394-19) take a different perspective in 'Recognizing and rewarding higher efficiency: case studies in moving to a single test metric for fixed and variable speed air conditioners'. They are looking at the test metric for air conditioners in Asia and demonstrate that potential energy savings in air conditioning are lost in Asian countries. This is, among others, because the metrics used in many MEPS and labelling programs do not convey to users whether they are based on full load only or on part loads including full load. A third contribution on test methods is given by Scholand et al. (9-392-19): Ecodesign requirements and labelling of commercial signage displays have been discussed within the EU for several years and a proposal from the European Commission for an A to G energy label for digital signage displays is on its way through the European Council and the Parliament. In the 'Development and evaluation of a test method for digital signage displays', the authors present a new test method, which could become the basis for a forthcoming EU regulation for this product group.

Making cooling more energy efficient

Though the energy efficiency of refrigeration is one of the historical bases of MEPS and labelling, the area of cooling is still subject to intensive investigations. Foster (9-120-19) analyzes 'Factors affecting the energy efficiency of cold appliances'. For this purpose, she analyzes data of approximately 1,000 cold appliances in England. The results show that almost one out of ten of the studied households has at least one appliance consuming more than twice the normal operating consumption. The main reasons for this over-consumption are identified in the paper. The contribution by Hüppe et al. (9-152-19), 'Novel method determining the degenerating insulation and age-related efficiency loss of domestic cooling appliances', points out that almost all German households own a refrigeration appliance and this type of appliance accounts for 5 % of the national electricity consumption of Germany. Yet there is limited knowledge on the technical factors that lead to an increasing power consumption of cooling appliances as they become older. The contribution focuses on the compressor refrigerant circuit, the door gasket and the thermal insulation of the cooling compartment to establish their contribution to efficiency losses.

Abagi et al. (9-326-19) deal with 'Catalysing technology innovation in the off-grid market through appropriate product performance testing in the laboratory and field'. The contribution includes an introduction of an off-grid refrigerator performance testing methodology and it explores the importance of conducting field-testing as a complement to lab-testing to assess the real-world performance of refrigerating products among the new users. Letschert et al. (9-029-19) also look at cooling in 'The manufacturer economics and national benefits of cooling efficiency of air conditioners in Brazil'. More specifically, they deal with air conditioners in Brazil where MEPS are currently set at a modest level and represent a major opportunity for energy-savings. They point out that air conditioning accounts for 14 % of electricity consumption in Brazil's residential sector with the demand growing by 5.4 % each year. In addition, its use coincides with peak load hours. More ambitious MEPS and a transition to refrigerants with low global warming potential could reduce the environmental burden. AC is also a very relevant topic for Indonesia where it is driving an unprecedented increase in electricity demand. Letschert et al. (9-030-19) detail on this in 'Accelerating cooling efficiency in Indonesia'. They show how the new purchases of air conditioners present an opportunity for large-scale high-efficiency inverter-driven ACs, which could reduce the electricity consumed of these appliances by 30 to 50 % in the years to come.

Limiting the consumption of information and communication technologies

Altamira et al. (9-093-19) point out in their introduction to 'The role of data centres in reducing energy consumption through policy measures' that data generation is increasing exponentially and that it is set to continue to grow at a fast pace. Their contribution analyses how a combined Ecodesign regulation on data centers and a 'mandatorisation' of the recommendations of Green Public Procurement can facilitate major energy savings within the EU. The paper also deals with the trade-off between energy and resource efficiency. Next to data centers, network

connected devices are projected to increase rapidly. These are analyzed in 'New energy policies to address ICT and network energy use' by Wu et al. (9-246-19). The authors underline that new policy approaches are required to address the additional energy use of network connected devices. They recommend a holistic approach to 'the system' to maximize energy savings instead of a product-focused policy. The Environmental Impact Analysis process could be a starting point of new pathways to minimize the energy use of network connected devices. Networked devices are also the subject of Ryan et al. (9-228-19) 'Worldwide energy use and savings potential of networked devices'. They see network connected energy consumption as an important contributor to the total energy consumption of ICT. The authors conclude that the opportunities for further improving energy efficiency of networks, particular wireless networks, will require increased technical research and cooperation across industry, governments and international organizations for standardization. Drawing on a sample of measurements, Ruggieri et al. (9-231-19) in 'Lessons leant from monitoring a sample of TVs and entertainment systems in northern Italy' provide insights on the energy consumption of TVs and various entertainment devices connected to the TVs.

Going beyond energy: resource efficiency

Finally, energy efficiency per se is hardly sufficient. An important debate is how resource efficiency and other environmental issues related to products can be improved beyond mere energy considerations. Brocklehurst et al. (9-135-19) focus on user behaviour and ask the question 'Can the provision of energy and resource efficiency information influence what consumers buy? A review of the evidence'. The paper presents result from research on how the provision of factual information about the environmental impact of a product influences more sustainable purchasing. Schlegel & Akkerman (9-004-19) approach the topic from a different angle and review the present legislative framework in Europe. They argue in their paper 'One step back, two steps forward – resource efficiency requirements within ecodesign' that a comprehensive methodology is missing. To improve the situation, they put forward a new five-step procedure to be conducted prior to a preparatory study and before any draft regulation is forwarded to the EU Member States for consultation.

On the basis of a review study of the Voluntary Agreement on Imaging Equipment commissioned by the European Commission, Huang et al. (9-130-19) 'Going beyond energy efficiency – method for calculating benefits of resource efficiency' studies the resource efficiency of imaging equipment's consumables like ink and toner cartridges. The authors outline a methodology for calculating the benefits of improving resource efficiency of Energy Related Products. A different perspective on resource efficiency is taken by Van Buskirk (9-132-19) who ask: 'Can efficiency be sufficient for African cooking?' They take a look at cooking in Sub-Saharan Africa, where it is the key energy use of households. On average, two to three cubic meters of wood are annually consumed per household for cooking. They conclude that efficiency is not sufficient, since efficiency as currently defined does not facilitate a highly affordable, clean and sustainable cooking energy use globally.