Introduction to Panel 4 Mobility, transport, and smart and sustainable cities

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Introduction

This panel connects two fundamental topics in connection with energy efficiency: mobility and sustainable cities. Mobility – enabler of a striving society, but also the culprit in missing climate goals? While the former is undisputed, the latter is substantiated by looking at greenhouse gas emissions (in the EU a fourth stems from transport) and its trends (upward until quite recently). We are facing the question whether we can foster the energy efficiency of mobility without compromising mobility in itself. A range of options from technical solutions, taxes and subsidies to mobility management and city planning will be addressed.

City planning presents a link to smart cities. How can urban planning become a key driver for sustainable urban development and energy efficient cities? How can 'smart' technologies and the integration of infrastructures such as energy, transport and ICT contribute to the transformation of our cities? How can citizen engagement and cross-sectoral collaboration be a key driver? Which stakeholders need to be involved to achieve sustainable cities? How can we make a low-carbon future come true?

Both topics revolve around the human with its needs, and habits, but also the ability to adapt to new conditions.

The papers in the panel have been grouped in the following order to stimulate cross-cutting ideas and discussions:

- What is a smart and sustainable city?
- From urban form to an extended appreciation of mobility management
- Why do you still sit in your own conventional car? – Mobility and habits
- Alternatives to gasoline and diesel – and how we get them into the market
- The importance of local governance
- Best policy options for energy efficiency in transport
- Demand response and prosumers
- The city of the future

What is a smart and sustainable city?

Does smart only mean technical optimisation of cities? Can we engage all stakeholders to pull into the same direction? What do we dream of when thinking about smart and sustainable cities? Andreas Huber and Ines Mayer (4-154-15) present narratives of city smartness and their critical assessment. Three process-related perspectives are introduced: the instrumental perspective (ICT-based data management), the administrative perspective (rules and procedures for transversal city development) and the governance perspective (reorganizing the patterns of interaction between city stakeholders). It is concluded that the added value of Smart Cities may be the frame they provide for re-thinking the processes of urban transitions.

Transport policies, both at European, national and local level play a fundamental role for the development of smart and sustainable cities and the reduction of greenhouse gas emissions. Maria Ntovantzi et al. (4-367-15) has assessed transport policies in the European framework (related to the National Energy Efficiency Action Plans) and on the local level (related to the Covenant of Mayors initiative) and gives recommendations for the future development of policies for energy efficiency in the transport sector.

From urban form to an extended appreciation of mobility management

Urban form sets the stage for mobility patterns. But which urban form facilitates energy efficient transport? Stephanie Ohshita et al. (4-064-15) have examined this question for the case of China with the city of Jinan in Shandong province as a case study. The importance of prioritizing people, by having urban development designed for people rather than for cars, to realize low-carbon urban mobility is highlighted in the paper.

City planning in general is a potent lever in promoting energy efficient mobility. City planning, however, touches on many aspects of a society and will influence many stakeholders. It is crucial to involve these stakeholders in early stages of the planning process in order to achieve the desired goals, as concluded by Adam Mickiewicz (4-088-15) in his paper. Also an extended understanding of mobility management beyond low emission zones and speed limits is required. Björn Svensby (4-090-15) is sharing experiences on mobility management in small towns with a focus on stakeholder involvement to put good ideas to work. Also, an excursus will guide us to the open seas and the question whether we will experience a revival of sailing in commercial maritime shipping as discussed by Antoine Bonduelle et al. (4-208-15).

Why do you still sit in your own conventional car? – Mobility and habits

Is it so hard to switch from a conventional vehicle to an electric car with limited range? This question is discussed by Magali Pierre and Anne-Sophie Fulda (4-405-15) on the basis of the results from a field study conducted in France. Behavioural adaptations of the driving mode but also better anticipation of the driving distances were observed. Related to this topic, Frances Sprei and Diana Ginnebaugh (4-130-15) are exploring the idea of combining car sharing and vehicle ownership in order to change the consumer behavior of car purchases in a way that reduces energy usage, air pollution, and greenhouse gas emissions. This touches upon questions like: Why don't we replace our big car by a smaller one for the daily commute (which sees us alone surrounded by four empty seats and no luggage), and switch to car sharing or rental cars for the rare trips where the family joins us? And are we really as inflexible when it comes to multimodal and intermodal travel as common knowledge suggests? This question is asked by Jillian Anable et al. (4-160-15) in their paper about rethinking habitual travel patterns.

Alternatives to gasoline and diesel – and how we get them into the market

Electric vehicles and other forms of alternative fuels are considered as promising options for a more energy efficient and environmentally friendly mobility. Still, the uptake in the market remains rather slow in most countries. Models help us in illustrating probable future developments and the effect different policies might have on them. Not only will we learn about the need for subsidies for public charging infrastructure in order to overcome the chicken and egg problem in electric mobility in the paper by Till Gnann et al. (4-239-15), but also about different methodologies to assess scenarios for alternative vehicles in the papers by Patrik Plötz et al. (4-198-15) and by Reinhard Haas and Amela Ajanovic (4-199-15).

The importance of local governance

Local governance plays a fundamental role in shaping the new living forms in the city. The potential impact of urban planning on travel behaviour is discussed by Julia Jarass (4-029-15). On the basis of an analysis of the daily mobility of residents in Berlin it is concluded that the potential for sustainable land use and travel behaviour is not fully exploited. Simple urban planning measures, such as providing less private parking spaces and ensuring a fine mix of uses and proximity to public transport can further promote non-motorised and public transport modes and thereby reduce emissions in urban areas.

On the local level there are plenty of opportunities for the achievement of multiple benefits of energy efficiency policies. One concrete example stems from Tanzania where local utilities struggle to ensure an adequate and reliable supply of water, and face increasing pressure from a rapidly growing demand for water. High energy intensity of operations and related high energy costs for water supply systems in Tanzania further compounds these challenges. Sven Ernedal et al. (4-162-15) present this case and the potential and strong rationale for promoting energy efficiency in the water sector in Tanzania with a focus on awareness raising and capacity building among actors.

Best policy options for energy efficiency in transport

The past development of traffic and its energy consumption and emissions call for purposive government involvement if ambitious climate goals – as, for instance, outlined in the 2011 EU White Paper – are to be met. A range of measures have been installed in the past by the EC and national governments particularly addressing road traffic that enable us to look back and assess their efficiency. We will learn among other about taxes and standards, subsidies and voluntary agreements – how they interact with each other in the paper by Amela Ajanovic et al. (4-109-15) and how much of their desired effects might be consumed by undesired rebound effects in the paper by Lee Stapleton et al. (4-052-15). The situation in China is even more pressing, as will be highlighted by Nina Zheng Khanna and David Fridley (4-031-15) presenting an assessment of its energy demand and CO_2 emission outlook

Demand response and prosumers

One of the key elements of future smart cities are well integrated grids that allow demand response and the integration of renewable energy. The changes in the energy matrix, namely the increasing deployment of distributed generation based on renewable sources, the introduction of new technologies in the residential sector, including electric vehicles and storage systems, the advances in information and communication technologies (ICT) and the adoption of dynamic tariff schemes will foster new challenges regarding the design of strategies for the optimal integrated management of energy resources. How can end use flexibility contribute to energy efficiency and integra-

tion of renewable energy in this context? This is discussed by Ana Soares et al. (4-142-15).

Related to this, Pedro Miguel et al. (4-032-15) is questioning if demand response is a sustainability driver or a buzz word. He concludes that demand response is not per se a tool for reducing CO_2 emissions and that it strongly depends of the generation technologies that support the electricity system and of the generation technologies that will be used to compensate the load demand fluctuations caused by actions of demand response.

One interesting development in the context of smart and sustainable cities is when electricity consumers turn into electricity producers – or so called prosumers. What are the barriers for the consumers that want to turn into prosumers? Jurek Pyrko (4-344-15) has investigated the barriers and presents the findings and suggestions on how to overcome these barriers.

The city of the future

Citizens are at the heart of the city of the future. But for this to happen more effective collaboration models between stakeholders, a methodology for development of smart cities, connection with industry and the demonstration to society of ambitious pilot projects are needed. The concept and first results of the flagship EU smart city project City-zen, as presented by Rudy A Rooth and Yvonne Boerakker (4-056-15), highlights the actions foreseen for the selected demonstration cities Amsterdam and Grenoble in this context.