Introduction to Panel 6 Energy-efficient and low-carbon transport

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Introduction

Transport and mobility are major contributors to greenhouse gas emissions, both in Europe and globally. While the sector accounts for almost 25 % of the EU's total greenhouse gas emissions, transport is the only major sector where emissions have increased over the last decades – deviating from the objective of decarbonising transport. Within this sector, road transport alone accounts for around 72 % of total emissions. In addition to their impact on climate change, transport-related emissions pose serious health risks to the population, especially in densely populated urban areas.

Panel 6 focuses on mitigation options for transport-related greenhouse gas emissions. It critically examines policy initiatives to accelerate the electrification of transport, to promote active mobility and to integrate new mobility options into public transport systems. A key concern of the panel is 'transport poverty', an emerging concept to describe the lack of access to adequate transport options due to insufficient services – especially in rural areas – and/or the unaffordability of mobility options, especially for low-income groups.

Towards net-zero transport

Scenarios are crucial for understanding the likely effectiveness of future pathways and policy options. Christian Brand (extended abstract 6-058-24) explores the role of transport and mobility in achieving net-zero societies, using a set of four scenarios and modelling the respective impacts of changes in travel patterns, avoided demand, technology uptake and infrastructure requirements on energy use and emissions.

Reducing transport demand and shifting to smaller vehicles are at the heart of sufficiency strategies. Carina Zell-Ziegler et al. (peer-reviewed paper 6-170-24) present the European Sufficiency Policy Database and assess 74 sufficiency measures, including those related to transport, in terms of feasibility of implementation.

One specific sufficiency strategy is to shift transport activities from the car to an intermodal combination of more efficient, shared or collective vehicles. Digitalisation and electrification have driven the emergence of shared micro-vehicles in cities. While the positive contribution of shared e-scooters to sustainable mobility is often questioned, Stefan Werland and Elem Güzel Kalayci (extended abstract 6-150-24) reflect on an experiment in which e-scooters were deployed as first and last mile connections to public transport in the suburbs of Hamburg.

Granular and nuanced information on vehicle fleets and usage patterns supports the development of effective mobility policies. In a display presentation, Malcolm Morgan (extended abstract 6-112-24) explores data sources to better understand of the use of cars in the United Kingdom, linking official statistics, crowd-sourced data, and information from a website for new and second-hand car sales.

Shifting towards e-mobility: subsidies and impacts

Alongside demand reduction and modal shift, electrification of (road) transport is another key strategy to decarbonise transport. As financial support schemes to promote the uptake of electric vehicles are being phased out gradually, it is time to assess the overall effectiveness of these schemes in promoting low-carbon mobility and reducing carbon emissions, but also in terms of distributional effects. Presentations will evaluate the outcomes and impacts of premium schemes and other subsidies in three countries: the UK, Ireland and Germany. Tim Chatterton and Ivo Wengraf (extended abstract 6-017-24) present the Green Fleet Index (GFI), which assesses the proportion of vehicle miles travelled in the UK by zero-emission vehicles (at the tailpipe). Based on the information derived, combined with modelling, he argues that without a reduction in total vehicle mileage, the UK would need to achieve at least 37 % by 2030 to meet its climate change targets. Based on data from the German EV support programme and a user survey, Swaroop Rao et al. (peer-reviewed paper 6-091-24) analyse the effectiveness of the subsidy in contributing to energy and CO, savings, taking into account free rider, rebound and spillover effects. He also assesses the distributional aspects of the programme, where he finds significant inequalities and suggests that distributional aspects should be considered more broadly. Joel Franklin et al. (extended abstract 6-077-24) present the results of a study carried out in Ireland to estimate patterns of ICE vehicle replacement and EV registration and use, taking into account differences across household types and geographical areas. The results suggest that, at least at present, EVs tend to be used less intensively than average ICE vehicles.

Charging solutions for e-mobility

The limited availability of charging points is a key issue holding back the uptake of electric vehicles. Presentations will look at different use cases and approaches to providing charging infrastructure. Marvin Helferich et al (extended abstract 6-030-24) look at commercial fleets and the role of intelligent depot charging. Based on a survey of fleet managers, he analyses the challenges, opportunities and drivers for smart charging in commercial fleets. Milad Mehdizadeh and Christian Klöckner (extended abstract 6-056-24) examine instruments to increase the uptake of vehicle-to-grid technology in Norway, including financial compensation and guaranteed minimum charge schemes. Josephine Tröger and Sabine Preuß (peer-reviewed paper 6-288-24) investigate whether the provision of workplace charging facilities can reduce employees' reluctance to purchase an electric vehicle.

Raw material and infrastructures for electric mobility

Other studies examine the raw material and infrastructure requirements of electric mobility. Against the background of the new European Battery Regulation, Robin Barkhausen (peerreviewed paper 6-014-24) analyses the material flows and environmental impacts associated with lithium-ion batteries for electric vehicles. He concludes that, conditional on the average lifetime of the batteries, there may be a shortage of materials to meet the recycling criteria for batteries in the Regulation. James Dixon et al (peer-reviewed paper 6-235-24) look at the additional electricity demand from electric vehicles and the impact on local electricity grids. He found that electricity demand is expected to increase significantly compared to the current baseline, but that demand reduction and flexibility measures can significantly reduce peak loads.

Promoting active (e-)mobility

Shifting car trips to low-carbon modes of transport both reduces transport-related carbon emissions and limits the resource requirements of the mobility transition. Less car traffic reduces the need to expand electricity and charging infrastructure, and consumes less urban space that can be opened up for more sustainable uses. Frances Sprei and Devon McAslan (peer-reviewed paper 6-137-24) argue that planning for safe and convenient bike parking can reduce concerns about bike theft and increase acceptance of cycling. The presentation provides insights into bicycle parking policies in 56 Swedish cities. Noell Cass (extended abstract 6-104-24) and Ian Philips et al. (extended abstract 6-304-24) review experiments in UK cities (Leeds, Brighton and Oxford) in which electric cargo bikes were given to car-owning households for a period of time. They present estimates of the net impact on mobility-related GHG emissions and promising user groups for e-cargo bikes.

Conceptualising transport poverty

Technological innovations can help move mobility systems towards a higher level of sustainability. However, specific impacts of technological innovations are often uncertain and depend on the policy environment. Examining the case of autonomous mobility in MaaS systems, Ines Jaroudi (extended abstract 6-222-24) assesses the potential synergies and conflicts with the Sustainable Development Goals (SDGs). SDG 1.4 and SDG 11.3 refer to eradicating poverty and providing access to safe, affordable, accessible and sustainable transport systems for all, which are the main pillars of transport poverty. Financial hardship due to rising transport expenditures and lack of access to adequate transport options has recently been high on the political agenda. Lilia Karpinska et al. (extended abstract 6-194-24) explore the typical characteristics of vulnerable groups and derives profiles of energy and transport poor households.

Despite its presence in public discourse, transport poverty is not (yet) a clearly defined and operationalised concept. However, referring to transport poverty can be a strategy to denounce the acceptability of fiscal and financial measures for the mobility transition, such as fossil fuel taxes, congestion charges or road pricing. The presentations by Viktoria Noka et al. (extended abstract 6-190-24), Samuele Livarghi et al. (extended abstract 6-082-24) and Nelly Unger et al. (peer-reviewed paper 6-158-24) examine concepts of vulnerability patterns and transport poverty in order to further the discussion on the conceptualisation and measurement of transport poverty.