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Barriers to low-carbon transport

2017

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This paper was prepared by:
SOLUTIONS project
FUTURE RADAR
This project has received funding from the European Union´s Seventh Framework Programme (FP7) and Horizon 2020 under the grant agreements no 604714 (SOLUTONS) and no 723970 (FUTURE RADAR)

www.uemi.net

Layout/Design: Barbara Lah

Citation:
UEMI_SOLUTIONS, Barriers to low-carbon transport. 2017.

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About this policy paper

Shifting to a low-carbon development pathway requires substantial efforts for the transport sector. Electric mobility provides the opportunity to lower harmful emissions, improve energy security and increase economic productivity (Greene 2009). There is an immediate need to move towards low-carbon modes and energy carriers in the transport sector from an economic, societal and environmental perspective.

Doing so harbours considerable potential for co-benefits if the technology is advanced enough to be introduced cost-effectively (Leinert et al. 2013; Viguié and Hallegatte 2012). Emobility technologies are, however, substantially underutilised; while some countries have made noticeable progress in this area, others have largely failed to do so (IEA 2015). There are split incentives between societal and individual benefits that create a collective action problem, which inhibits optimal outcomes in this area. This paper will explore those barriers and emphasise the need for policy intervention.

Split incentives

The initial-cost barrier is a major problem, in particular for individuals and despite available information on the relevant payback periods (Lescaroux 2010; Giblin, S., McNabola 2009). The key factor inhibiting the uptake of electric vehicles is the split incentive between individual- cost and economy-wide benefits, which is very strong in the transport sector. Vehicle purchases are made by individuals who apply discount rates as high as 20%, while most car buyers do not account for cost-savings from fuel efficiency beyond 2-3 years (ITF 2010). As such, only a fraction of the economy-wide benefits are considered by individuals when making purchase decisions, with negative consequences on the economy-wide benefits/ costs over the roughly 15-year lifetime of the vehicle. The investment barrier is still the most prevalent obstacle to the widespread market penetration of energy efficient products (Sorell et al. 2009). A number of studies show that GHG reduction measures in transport have quite favourable abatement costs but require higher capital intensity than many measures in other sectors (McKinsey and Company 2009; Shalizi and Lecocq 2009). While these investments result in considerable economy-wide benefits over the lifetime of a vehicle, they may not create sufficient payback rates for the particular individuals responsible for vehicle purchasing decisions. Rebound effects may, however, undermine some of the efficiency gains, further complicating the collective action problem.

Rebound effects

The rebound effect refers to the tendency for total demand for energy decrease less than expected after energy efficiency improvements are introduced, due to the resultant decrease in the cost of energy services (Sorrell 2010; Gillingham et al. 2013). Ignoring or underestimating this effect whilst planning policies may lead to inaccurate forecasts and unrealistic expectations of the outcomes, which, in turn, lead to significant errors in the calculations of policies' payback periods (WEC 2008).

One of the most typical examples in the transport sector is improved vehicle efficiency failing to lead to the desired reduction in energy consumption, as efficiency gains are ‘taken back’ by increased travel. This effect is considerably less relevant from an electric vehicles perspective, at with. Provided that the energy is produced from renewable sources increased travel would not necessarily erode the efficiency gains made by the technology shift. Congestion and land-use factors may, however, be affected.

The collective action problem

Vehicles perchance decisions are made by individuals and personal motivation and societal objectives are not always aligned (Olson 1965). Individuals tend to be driven by rational behaviour and therefore favour the most cost effective choice, even though it may be morally objectionable (Diamond 2005). In the case of global climate change, individual perpetrators can be relatively certain of getting away with bad behaviour (e.g. driving a large instead of a small car) if there is no policy framework influencing individual behaviour. This represents the typical social dilemma situation, which discourages individuals from cooperating, as they can free-ride on the contributions of others. Atmospheric pollution is a reverse tragedy-of-the- commons. It is not the situation of removing something from the commons but putting something into it (the atmosphere), namely carbon dioxide. The overuse of the atmosphere as dumping ground for greenhouse gases is the result of individuals making the rational decision to maximise their gain (wealth, comfort, status etc.) by increasing their carbon footprint or at least by not to reducing it (Stern 2006). This encourages bad behaviour, as good behaviour would be punished (e.g. higher travel time by taking the bus, or higher prices through flight emissions offsetting). Energy consumers are generally rational, however each individual acts differently. Governing the commons means also coping with the different habits of its users (Dietz 2003, Stern et al. 2002).

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