

Barriers to the net zero target in personal mobility

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At the beginning, it is agreed to focus on a specific sector, namely personal mobility (local, not including aviation). So the topic is really "Barriers to the net zero target in personal mobility".

The barriers are not technological: everything needed is available and known. There are enough zero-emission options available: EV, public transportation, active mobility (bicycle, walking).

There exist different visions for a world with zero-emissions mobility (ZEM), except may be for low-density peripheries.

Note that ZEM implies a ban on internal-combustion-engine (ICE) cars, i.e. zero gCO₂/km asap for new vehicles and possibly an anticipated elimination of existing ICE cars. This implies stranded assets for their owners or costly compensation, a first **barrier** for the transition to ZEM.

Most likely, ZEM would not be simply 1:1 replacement of ICE cars by EV, the current forms of mobility simply electrified. So, it is not only about replacing ICE cars with EV. Indeed, full electrification raises a chicken-egg problem: a high rate of electrification is needed to make a dense network of charging stations profitable, while such a dense network is needed to encourage the acquisition of plug-in EV. Furthermore, 1:1 electrification does not resolve the congestion problems while it raises new electricity supply and material flow problems.

So, changes in mobility behavior are needed for full ZEM. That will also require investments in all sorts of areas: public transportation, bicycle lanes, urban densification, etc. It is not clear, though, how to ensure adequate and affordable ZEM for low-density peripheries. This is both a knowledge gap and a **barrier** for the transition to ZEM. A further knowledge gap and **barrier** is related to foreign visitors and transit traffic: how to make it participate in ZEM?

If more investment is needed into the mobility infrastructure, this raises the question of dimensioning it. If it is dimensioned for peak demand, as is usually the case, this is very costly. Hence the proposition of mobility pricing with peak shaving also in public transportation. It is noted, however, that introducing mobility pricing at the same time as ICE cars are banned is certainly coherent but also certain to gather maximum opposition from all sides. A high political **barrier**. In any case, mobility pricing in public transport would have to address the paradox that it should be expensive to avoid congestion but cheap to encourage modal change.

In the absence of mobility pricing with sufficient incentives, other means to change lifestyles and mobility practices are needed. Here is a list:

- Strong support for ZEM, to attract users away from ICE cars, would be very costly. Furthermore, mobility should not be subsidized (small external benefits), particularly if it leads to more congestion and other nuisances (external costs).
- A cheaper solution is to facilitate ZEM through travel planning apps. This is certainly important, but not sufficient in itself to guarantee the transition to ZEM.
- A further instrument is an information campaign in favor of ZEM. The problem here is that the proponents of individual mobility, particularly ICE cars, would enter an information war with much larger resources than public bodies could mobilize. This freedom of information is a further **barrier** for the transition to ZEM.
- If a ban of ICE is problematic, another route could be a ban on passive inhalation of car exhausts, just as it is now accepted that passive smoking is banned...

The attempt to alter lifestyles, in particular mobility practices, is confronted with a set of 'axioms':

- Very affordable individual mobility with any type of vehicle is seen by many as a human right
- Many draw satisfaction, self-fulfillment and even imagined prestige from their ICE car
- The status quo is well known and attractive (is it really?). ICE cars are perceived as fast, safe, cheap, flexible, private; there is thus a somewhat romantic picture, obliterating the accidents, noise and air pollution

These axioms lead to a psychological lock-in, which adds to the material and economic lock-in of the existing infrastructure and vehicle parc. More **barriers** on the path to ZEM.