Energy
National Research Programmes 70 and 71

Project

Sharing is saving

Carsharing Helps Save Energy - But Only if Services Are Regulated

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Carsharing services have been available in Switzerland for many years, and they are widely used, especially in urban areas. Most users do not own a car and resort to these services when a vehicle is indispensable, for example when buying furniture. This project has investigated the energy-saving potential of such shared cars and bicycles in Switzerland.

Dense traffic on Universitätsstrasse in Zurich: shared vehicles not only reduce road congestion, but also help decrease greenhouse gas emissions. *Source:* iStock

At a glance

- Properly implemented, carsharing can help reduce greenhouse gas emissions in Switzerland.
- In the greater Zurich area, only 60,000 shared cars are required to cover the entire travel demand - today 250,000 private cars are registered.
- However, if these services are to be competitive, it will be imperative to set prices or to render the use of private cars unattractive by imposing mineral oil taxes.

More often than not, cars crowding the streets of Switzerland during rush hour carry only one passenger. And when not caught in heavy traffic, many of the 4.5 million cars currently (2017) registered in Switzerland are parked somewhere. This is not efficient. A vehicle used by more than one person in order to improve the ratio of operating time to parked time is much more economical. Various services attempting to relieve road traffic and to increase energy-efficiency already exist in Switzerland. They are built on a cooperation with the existing, well-developed public transport network. The idea is to offer a combination of public and individual means of transport functioning so efficiently that private individuals no longer need a personal car. Kay Axhausen, professor at the Institute for Transport Planning and Systems at the ETH Zurich, and his team sought to find out whether such shared vehicles lead to greater energy efficiency in the Swiss mobility strategy and what such systems ideally look like. Their conclusion: shared mobility systems can certainly contribute to saving energy. It is however essential to regulate the price of such services.

Estimating market potential

In order to assess how shared mobility services can be integrated into the Swiss transport system and how effectively they save energy, the researchers used a computer simulation program called MATSim. The simulations make it possible to stage various scenarios while avoiding costly field trials. Axhausen and his team limited themselves to scenarios in urban areas, in this case the greater Zurich area, for two reasons: firstly, it is easier to offer shared mobility systems in such a setting, as the density of potential users is higher. Secondly, appropriate data needed to feed the simulation model was already available for the Zurich area. For their studies, the investigators had access to data from the carsharing provider "Mobility" and the bicycle-sharing provider "Smide".

But how many cars would it take to satisfy the entire transport demand of the greater Zurich area? As no assumptions regarding this question were available, this was the first simulation carried out by the researchers. The results showed that approximately 60,000 cars in the free-floating scheme would meet the entire travel needs of the greater Zurich area. Today, approximately 250,000 privately owned cars are registered in the same area - four times more than needed. The calculation was based on the assumption that a parked car can be reached in less than 15 minutes, 60 percent of the vehicles even in under five minutes. Carrying more than one person per trip in the theoretically required 60,000 cars would result in further savings in terms of the number of journeys.

Different systems of shared vehicles

There are different carsharing models.

Station-based carsharing: a car or bicycle is rented at a fixed location, used and then returned to its initial station. For the provider, such services are easy to handle, as there is no need to redistribute vehicles.

Free-floating carsharing: a bicycle or car is picked up, used and then parked anywhere within a defined area of use in Switzerland. Subsequently, it can be rented by the next user or transferred by the provider to a location where demand is high.

Ridesharing: a person offers a ride from A to B. Other users can then buy a seat in that particular vehicle. This system improves vehicle occupancy, one car ferrying several passengers instead of just the driver.

A complement to the Swiss Federal Railways

When it comes to transporting passengers, Switzerland is a special case: its public transport network is so well developed that almost any place can be reached within a reasonable amount of time without a car. The Axhausen team also included this fact in the simulations. Sharing services were deliberately simulated as a complement to this public transport network. For more rural areas within the greater Zurich area, this means that an improved range of sharing platforms would enable more people to do without a private car altogether. In these scenarios, for example, less heavily frequented bus lines would be cancelled and people affected by this situation would be integrated into the system by means of free-floating vehicles. It is well known that city dwellers prefer to use a bicycle rather than a rental car for distances under five kilometers, which is why more bicycles should be offered in such settings.

Remote bus stops would no longer be available, but be replaced by carsharing or ridesharing locations. iStock

Regulation is imperative

But who bears the cost and who benefits from a switch to shared mobility services? These questions were also answered with the help of simulations. The researchers found that competition between different sharing platforms may lead to uncontrolled price development. In other words: as users depend on a sharing service due to a lack of alternatives, providers might continuously increase their prices. According to the investigators, it will be imperative to artificially set prices in order to prevent this development. Kay Axhausen and his team believe that political measures on a different level may also help achieve a breakthrough in the conversion of the transport system: if a mineral oil tax were to be waived for shared vehicles and increased for private individuals, private car owners would have an incentive to give up their vehicle and switch to shared services.

Produkte aus diesem Projekt

- Kick-off poster
  Date of publication: 30.11.-1
- Cost-based analysis of autonomous mobility services
  Date of publication: 06.02.19
- Comparing car-sharing schemes in Switzerland: User groups and usage patterns
  Date of publication: 06.02.19
- How Disruptive Can Shared Mobility Be? A Scenario-Based Evaluation of Shared Mobility Systems Implemented at Large Scale
  Date of publication: 06.02.19
- Modeling car-sharing membership as a mobility tool: A multivariate Probit approach with latent variables
  Date of publication: 06.02.19
- Modeling free-floating car-sharing use in Switzerland: A spatial regression and conditional logit approach
  Date of publication: 06.02.19
- Measuring the Travel Behaviour Impact of Free-Floating Car-sharing
  Date of publication: 06.02.19

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Associated projects

Virtual competition for energy-efficient mobility

Games and competitions for more sustainable mobility

All information provided on these pages corresponds to the status of knowledge as of 08.05.2019.