Trends, Behaviour and System Dynamics – Guiding Principles for Transformation

Today, the transport sector is responsible for 32% of Switzerland’s CO2 emissions, making it the biggest CO2 emitter, ahead of the industry (20%) [1]. Therefore, the capacity area B2.1.2. aims at building a general understanding of the behaviour of mobility users and the Swiss mobility system with its components by developing a system dynamics based model and research about best practice. With empirical results on mobility attitudes and behaviour the model describes the interactions and feedbacks between the components of the Swiss mobility system affecting CO2 emissions. Together with the transformation framework and trends in mobility, we elaborate policy recommendations for the sustainable transformation of the Swiss mobility. The knowledge gained from this project is expected to accelerate the implementation of policies targeting the transformation of the current Swiss mobility system to a carbon-neutral and energy efficient one.

Raphael Hoerler  
ZHAW Institute for Sustainable Development (INE)  
raphael.hoerler@zhaw.ch

Dr. Merja Hoppe  
ZHAW Institute for Sustainable Development (INE)  
merja.hoppe@zhaw.ch

Approach

The socio-economic system transformation framework derived from phase one of SCCER – Mobility serves as a baseline for this study. Trend and empirical studies will feed into the Swiss transport model, enabling to quantify soft parameters such as awareness of environmental consequences, openness to new mobility systems, or willingness to consider sustainable modes of transport. The system dynamic model enables the identification of «hotspots», where a change in one component (e.g. CO2 tax, or attractiveness of sharing modes) might influence the model through feedback loops. Our focus is on the representation of socio-economic and attitudinal characteristics of the society, deriving guiding principles for sustainable mobility.

Main components and their feedback structure within the Swiss transport model

We applied a market agent approach by dividing the mobility system into five different «agents» enabling deep understanding of their role in the whole system similar to [2]. The causal loop diagram allows to track impacts from one parameter to the next by tracing the arrows, eventually leading to loops that balance the system or reinforce it. The diagram serves as a qualitative overview of the complex mobility system and is a first step in model building.

Expected impact

The study is expected to yield answers to the following questions:
- What trends need to be addressed?
- What are the components of the Swiss mobility system and how do they correlate with CO2 emissions?
- What are the technologies and mobility strategies, which can help us reach the goals of the energy strategy?
- What policy strategies or initiatives can effectively foster the transformation from the current carbon-based mobility system to a sustainable one in 2050?

References