Energy transition and the impacts on households â€“ a modelling approach

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The ongoing energy transition is a process of moving away from fossil fuels towards the use of sustainable, renewable energies in all sectors of the economy and answer the question to what extent households are influenced along the journey. The spectrum of the energy transition begins with energy production and ends with energy consumption. Both components will have to undergo significant changes for a successful energy transition. Private households play a significant role in this, both as labor forces and consumers. In this presentation, we will therefore look at the role of households on the path to a sustainable and resilient economy.
In the production of energy, the households appear as a workforce - and not only as electricians or for the installation of photovoltaics - development, planning, approval, maintenance and other tasks must also be considered. Energy production alone therefore leads to massive changes in the industry structure.
Private households also play an essential role in energy consumption. They account for a relevant share of energy consumption worldwide. In addition, they have to pay for the energy transition. Either directly through higher prices for energy and mobility. Or indirectly through increased prices for goods or government levies. These changes in additional energy costs affect different households in different ways. For example, energy costs play a proportionately greater role in the consumption basket of lower-income households. Ac-cordingly, these households feel changes in prices more strongly and have to adjust their consumption structure more significantly.
The need for a modelling approach arises from the consideration of these interdependent dynamics. A change in the industry structure inevitably leads to a shift in labor supply and demand. Wage trends do not remain unchanged. The income side of private households shifts. However, changes in energy prices also affect households in their consumption structure. For example, increased energy prices can lead to crowding out effects on other consumer spending due to a lack of substitution options.
The energy transition therefore affects private households in a number of ways, including in contradictory ways. A model approach is required to describe, analyze and, at best, forecast this development. One that places the necessary energy transition in the context of current economic developments (supply chains, interest rate changes, etc.).
The integration of the specific issue of the energy transition and the influence on households is conducted through interaction with the macroeconomic input-output model IN-FORGE. The name is derived from INterindustry FORecasting GErmany and provides the macroeconomic development for Germany. It takes into account circular relationships between private households, NGOs, companies and the state. Furthermore, the input-output approach makes it possible to map not only the direct effects of the energy transition. Indirect or induced effects along the value chains are also taken into account. The energy transition has a significant influence on wage setting in certain sectors. The changing wages influence prices, which in turn have an impact on the consumption structure of private households.
This sector-specific wage development is crucial for extrapolating the incomes of the various households. For this purpose, a data set from the German Federal Employment Agency is also used to allocate the sector to which the individual households belong and to extrapolate wage trends for each household.
The consumption structure is determined on the basis of the Germany Federal Statistical Office's "Income and Consumer Panel". Household expenditure is also extrapolated using the INFORGE model in order to take account of the circular relationships between transformation and macroeconomic development.

As shown, households therefore play a decisive role in many respects in enabling the transformation towards a sustainable and resilient economy. A model approach that accompanies the transformation process from the perspective of households therefore is important but has so far been largely neglected in research. The results can provide important information for giving the best possible advice to key stakeholders in the areas of politics and business.