MoTMo scenario data – explanatory document

The Mobility Transition Model "MoTMo" is an agent-based model of private mobility demand in Germany. Agents are persons in households representing the German population. They decide between 5 mobility choices: combustion cars, electric vehicles, public transport, car sharing, and active mobility, i.e. walking or biking (referred to as non-motorized in the model). A short description of the model's main elements and further references can be found at https://globalclimateforum.org/portfolio-item/motmo.
Simulations represent possible developments of mobility in Germany for 2005-2035.

The present data set consists of 539 files, each corresponding to output from a representative run of one scenario obtained from possible combinations of options. There are 10 available options, that each can be switched on or off for a MoTMo run. If no option is chosen, this corresponds to the so called "business as usual", or BAU scenario. If an option is switched on, the corresponding changes in model parameters are implemented from the modelled year 2018 on. The options are grouped into three categories (policies, investment, events); the number of possible combinations arises from the fact that in each of these categories, at most two out of the three or four options can be chosen at the same time. In the file names, each option is abbreviated using two letters; a "0" after these two letters means the option is switched off, a "1" means it is switched on. The following table lists the categories and all respective options, how they are their implemented in the model (again, see the above mentioned website for explanations on model elements), as well as their two letter codes.

| Category | Option | Description | label |
|---|---|---|---|
| Investment | Charging infrastructure | With BAU, charging station deployment rises linearly to 200.000 in 2035; with this option, the deployment follows a sigmoid curve to 1 mio in 2035. | CH |
| Investment | Public transport subsidy | Public transport costs are cut in half compared to the BAU case. | SP |
| Investment | Electric vehicle subsidy | The BAU case implements the 2016 environmental bonus. With this option, the amount per vehicle (and the total subsidy) doubles. | SE |
| Policy | Car weight regulation | While in the BAU case the weight of cars continues to grow according to the current trend, this option assumes constant weight from 2018. | WE |
| Policy | Bike friendliness | The convenience curve for active mobility is higher than in the BAU case. | BP |
| Policy | Urban combustion restrictions | The convenience curve for cars with internal combustion engines falls more steeply with higher population density than in the BAU case. | RE |
| Event | Higher gas price | Operating costs for internal combustion engine cars are based on fuel price data for 2005-2017. In the BAU case, they increase by 1% per year from 2018, with this option, by 3% per year | CO |
| Event | Intermodal digitalisation | ICT applications improve the convenience of the modes electric mobility, public transport, and car sharing, represented by improved convenience curves for these three modes. | DI |
| Event | EV world market growth | For BAU, the market share of electric cars grows to 10% by 2015. This option assumes higher growth to 30%. | WO |
| Event | Increased car sharing availability | In the BAU case, the supply of car sharing cars grows by 3% per year, with this option by 6% per year. | CS |

The file for each scenario contains the timeseries data written in the model runs. Every second step in runs of monthly time steps over 30 modeled years was recorded, resulting in 180 time steps. For each of these, information has been aggregated to the levels of region (16 Bundesländer, coded by numbers as listed in the first table below) and household type (coded by numbers from 1 to 11 as explained in the second table below). Here, we are interested mostly in the development of the mobility choices of agents – these values are given as "stock_x", where "x" stands for the mobility types C for combustion car, E for electric vehicle, P for public transport, S for shared mobility, and N for non-motorized.
We refer to the evolutions of these mobility choices when asking – given the structure of combinations of options underlying the 500+ scenarios: what can be said about the effects of single options and their combinations?

The file for each scenario further contains the values of electricity demand by electric vehicles (elDem) and the number of electric charging stations (nStat) per region for each time step as well as the emissions caused by each mobility type per household type and region for each time step.

| Region number | Bundesland |
|---|---|
| 942 | Schleswig-Holstein |
| 1515 | Nordrhein-Westfalen |
| 1516 | Baden-Württemberg |
| 1517 | Hessen |
| 1518 | Bremen |
| 1519 | Thüringen |
| 1520 | Hamburg |
| 2331 | Rheinland-Pfalz |
| 2332 | Saarland |
| 2333 | Bayern |
| 2334 | Berlin |
| 2335 | Sachsen-Anhalt |
| 2336 | Sachsen |
| 3312 | Mecklenburg-Vorpommern |
| 3562 | Brandenburg |
| 6321 | Niedersachsen |

| Number, i.e. hhId | Household type |
|---|---|
| 1 | Single person 18 to < 30 years |
| 2 | Single person 30 to < 60 years |
| 3 | Single person 60 years or older |
| 4 | 2 person household, youngest person 18 to < 30 years |
| 5 | 2 person household, youngest person 30 to < 60 years |
| 6 | 2 person household, youngest person 60 years or older |
| 7 | Household with three or more adults |
| 8 | Household with at least one child under 6 years |
| 9 | Household with at least one child under 14 years |
| 10 | Household with at least one child under 18 years |
| 11 | Single parents |

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