

Present and future road vehicles:  
EBP's databases and simulation tools for  
energy policy forecasting and analysis



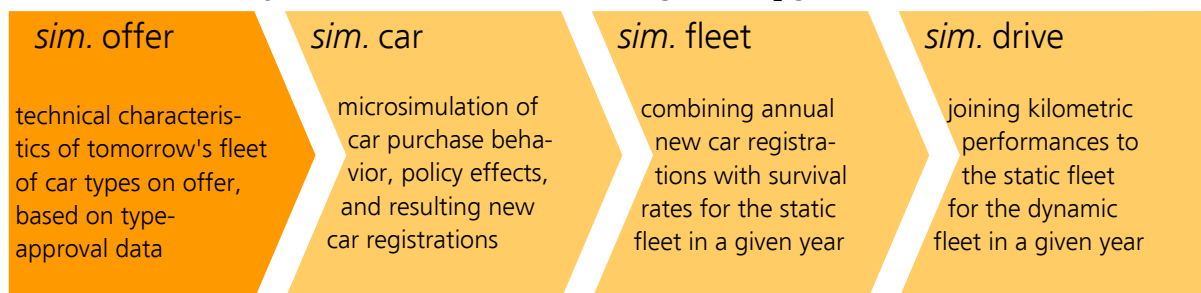
## **sim.offer**

Technical characteristics of all vehicle types being on offer in the car market for a given year

Technical description (version May 2016)

### **Purpose**

**What does the detailed car fleet being on offer look like for a given year in the future, accounting for CO<sub>2</sub> goals and electrification?**



### **Input data**

- > Type-approval data (from national road admission authority)
- > Sales price per vehicle type, for given year
- > Scenario data based on Autonomous Technical Potential, and – if present – on g CO<sub>2</sub>/km policy targets
- > Algorithms for the switch of vehicle types from fossil to electric

### **Output data**

List of 6000+ vehicle types (make, model, powertrain) incl. detailed engine configuration, g CO<sub>2</sub>/km, fuel consumption, rated power, empty weight, total weight, engine capacity; for the chosen scenario, for a given future target year; to be used as input for *sim.car*.

### **Implementation**

*sim.offer* is implemented as MS Access application; user-defined input parameters are supplied as MS Excel table.

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## **sim.car**

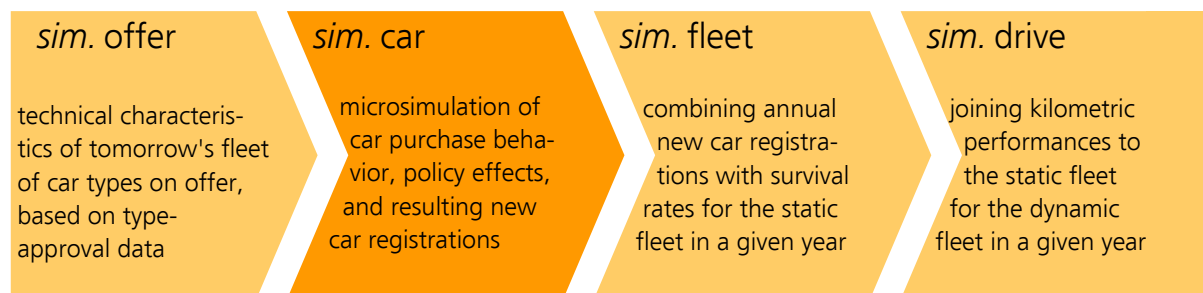
Microsimulation of car purchase behavior,  
annual new car registrations and effects  
of tax rebates or other incentive schemes

Technical description (version May 2016)



### **Purpose**

**How does car purchase behavior translate the offer side to the demand side? What is the effect of incentive schemes and taxes?**



### **Input data**

- > Sociodemographics of synthetic population
- > Fleet of currently registered vehicles (allocated to households by *sim.car*)
- > Fleet of all new vehicle types on offer in the market (from *sim.offer*)
- > Car choice model parameters for 41 consumer groups
- > User settings, if present including policy parameters of incentive scheme
- > Retention rates (from BAM survey): brand retention, size class retention, fuel type retention, gear type retention

### **Output data**

- > Detailed data on millions of car sales
- > Aggregated data (input file to *sim.fleet*) on new car registrations per year

**Implementation** Fortran2000, proprietary software (40 000 code lines)

### **Literature**

Mueller M G, de Haan P, 2009. How much do incentives affect car purchase? Agent-based microsimulation of consumer choice of new cars, part I: Model structure, simulation of bounded rationality, and model validation. *Energy Policy*, 37, 1072–1082.

de Haan P, Mueller M G, Scholz R W, 2009. How much do incentives affect car purchase? Agent-based microsimulation of consumer choice of new cars, part II: Forecasting effects of feebates based on energy-efficiency. *Energy Policy*, 37, 1083–1094.

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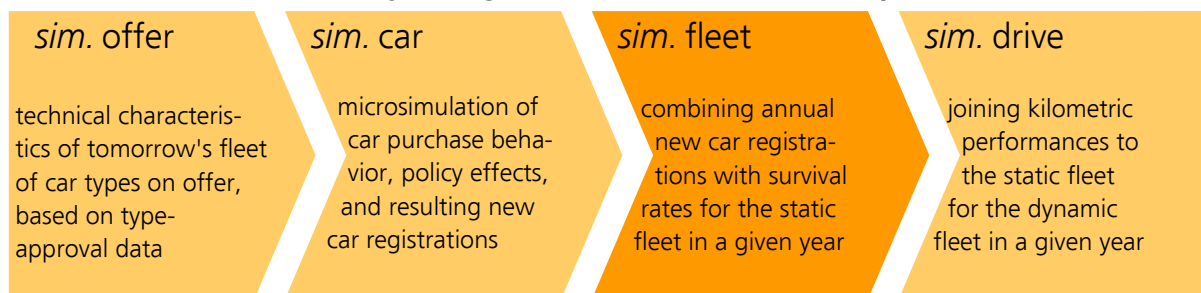
## sim.fleet

Modeling of the static fleet of registered cars for the next year, based on last year's fleet and new car registrations

Technical description (version May 2016)

### Purpose

**Which fleet of registered vehicles emerges from past new car registrations, yielding which annual car ownership tax revenues?**



### Input data

- > Annual new car registrations for subsequent years  $T+1$  to  $T+t$  (series of output files from *sim.car*)
- > Starting fleet (static) for year  $T$  (data source: national car registry)
- > Survival rates per car segment and cohort, derived from comparison of two static fleets for years  $T-1$  and  $T$  (data source: national car registry)

### Output data

Lists with static fleet share for all vehicles types (highly detailed: 6000+ vehicles types, differentiated by gearbox and powertrain configuration) for years  $T+1$  to  $T+t$ ; .All possible car ownership tax parameters are included. To be used as input file to *sim.drive*.

### Implementation

*sim.fleet* is implemented as an MS Excel application. Survival rates are derived using MS Access.

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## **sim.drive**

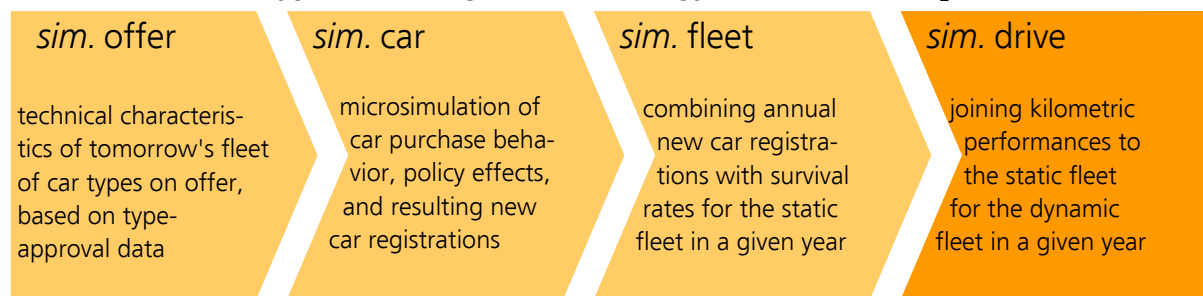
Computation of CO<sub>2</sub> emissions (and CO<sub>2</sub> reduction due to policies) using annual kilometres per car segment.

Technical description (version May 2016)



### **Purpose**

**How does total annual mileage split up to the different detailed car types, resulting in which energy demand and CO<sub>2</sub> emissions?**



### **Input data**

- > Total annual kilometric performance
- > Input parameters on relative share per car segment in km driven

### **Output data**

- > Kilometers driven for a given year, per car segment, type approval, etc.
- > Related energy demand, CO<sub>2</sub> emissions, etc.
- > Difference between BAU run and a policy run yields energy savings and CO<sub>2</sub> reduction per year, for the policy in question

### **Implementation**

*sim.drive* is implemented as MS Access application; user-defined input parameters are supplied as MS Excel tables.