

## Travel demand

(regional & inter-regional origin-destination travel data by product | travel purpose)

Modes | vehicle types | drive-train technologies | fuels

## Consumer-specific data

(monetary budget, value of time)

Fuel prices | technology costs | fueling infrastructure costs | mode infrastructure costs | route-related/location-specific/ consumer-specific costs...

## Optimization model

- mixed-linear integer program
- system cost-minimization
- graph-based conceptualization of transport connections
- flexible allocation of charging activity
- considered dimensions: years  $y$ , products  $p$ , OD pairs  $r$ , paths  $k$ , modes  $m$  vehicle types  $v$ , technologies  $t$ , fuel types  $f$



Trips per mode | vehicle type | technology

Vehicle stock | modal shift

Fueling demand by location

Fueling infrastructure expansion

Mode infrastructure expansion