

Stocks * Mileage * Occupancy = Passenger km \swarrow or Freight tonne km & Stocks * Mileage = Travel km

Travel km / Efficiency = Energy use.

Energy use * supply side fuel share = Energy use by fuel.

New Stocks = (Vehicle sales share * New Activity) / (Mileage * Occupancy)

New Activity = Passenger km * Activity growth.

Stocks turnover = Vehicle age average * survival rate function (exponential curve, age $\rightarrow \infty$)

Stocks = Stocks - Turnover + New Stocks.

Model inputs for all years (Levers):

- Mileage - Efficiency - Supply side fuel share - Activity growth.

- Vehicle sales share - Activity growth.

- Survival rate function inputs (normally same for all economies)

- expected vehicle saturation in stocks per capita

Model inputs only for Base year:

- Stocks - Vehicle age

Calculated each year (including Base year):

- Energy by fuel

- Activity

- Stocks (except in Base year)

Complications:

- Run model twice to adjust activity growth if stocks per capita passes a limit (saturation)

- Collect good enough data for stocks + age ratio between vehicle types + drives is important

- Matching LSTO fuel use to Energy. Need to adjust input data using a kind of balancing of Stocks <=> efficiency <=> Mileage as Energy = $\frac{\text{Stocks} * \text{Mileage}}{\text{Efficiency}}$

Categories:

Vehicle types:

Passengers

- SUV

- Car

- Light truck - LCU (light commercial vehicle)

- Bus

- 2W

Drives:

- BEV (battery ev)

- PHEV (fuel cell ev)

- PHEV (Hybrid)

- ICE (int. comb. engine)

- (PHEV and ICE are split into diesel (d) and gasoline (g))

Non roads

Ship

Air

Rail

3 split into passengers & freight and then split by fuel type