

29. Activity, loads and stock aggregates

Overview

Target

Aggregates on transport activity (vkm, tkm, pkm), as well as aggregates on travel and load, are calculated in this view. Inputs are disaggregated by powertrain. Outputs are evaluated by vehicle class, by mode, and by area.

Structure

The top of the view (Figure 29.1) refers to the base year. The calculations flow goes from the left to the right, aggregating information at each step.

Figure 29.1 Activity, loads and stock aggregates at the base year

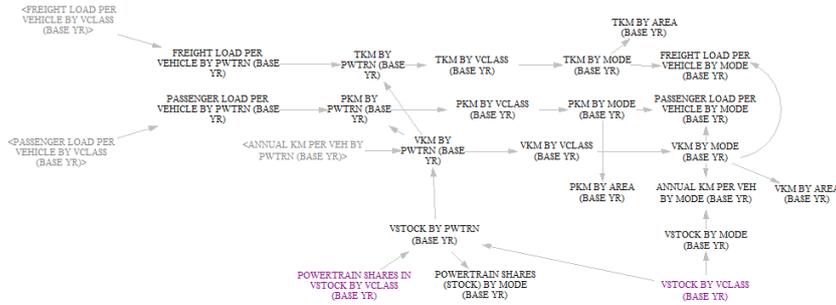
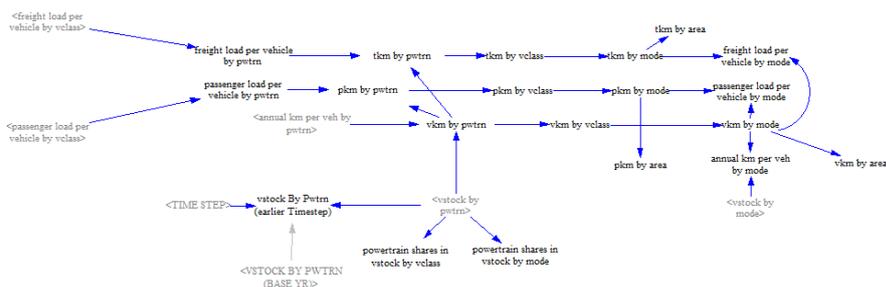


Figure 29.2 (bottom of the view) refers to variables changing over time, reproducing the same structure used for the base year calculations.

Figure 29.2 Activity, loads and stock aggregates over time



Detailed description of the view

Inputs

The inputs at the powertrain level enable to calculate the pkm, tkm and vkm by powertrain.

The variables on vehicle stock, annual travel and load per vehicle by powertrain are obtained as follows:

- Passenger/Freight load per vehicle by powertrain

Since user inputs are disaggregated by vehicle class, it is assumed that there is no difference of load between the powertrain technologies of each vehicle class. The load per vehicle over time is calculated for passenger and freight service in the views "load (passenger)" and "load (freight)" respectively. The initial values in terms of load are specified by the user ("User inputs (BASE Y)" sheet of the ForFITS Excel file).

- Vehicle stock by powertrain

The time dependant input is calculated in the view "vehicle by age". The stock at the base year derives from user inputs on the number of vehicles by vehicle class and on the powertrain shares ("User inputs (BASE Y)" sheet of the ForFITS Excel file).

- Annual travel per vehicle by powertrain

All inputs on annual travel come from the view "travel per vehicle".

Other inputs enable, along with data on transport activity, the aggregation of the information on annual travel by mode. This is the case of data on the vehicle stock by mode. The time-dependent vehicle stock by mode is calculated in the view "vehicles by age", while the vehicle stock by mode at the base year results from aggregating the user input ("VSTOCK BY VCLASS (BASE YR)") across all vehicle classes.

Outputs

The inputs by powertrain are used to define vehicle and transport activity parameters as follows:

$$vkm \text{ by powertrain} = \text{Annual travel per vehicle by powertrain} \times vstock \text{ by powertrain}$$

$$pkm \text{ by powertrain} = vkm \text{ by powertrain} \times \text{passenger load per vehicle by powertrain}$$

$$tkm \text{ by powertrain} = vkm \text{ by powertrain} \times \text{freight load per vehicle by powertrain}$$

Vehicle and transport activity aggregates are calculated summing up across different subscripts:

$$vkm/pkm/tkm \text{ by vclass} = \sum_{\text{powertrains}} vkm/pkm/tkm \text{ by powertrain}$$

$$vkm/pkm/tkm \text{ by mode} = \sum_{\text{modes}} vkm/pkm/tkm \text{ by vclass}$$

$$vkm/pkm/tkm \text{ by area} = \sum_{\text{areas}} vkm/pkm/tkm \text{ by mode}$$

The calculated aggregates on transport activity are combined with available inputs on vehicle stock to provide the annual travel and load per vehicle by mode according to the following definitions:

$$\text{Annual travel per vehicle by mode} = \frac{vkm \text{ by mode}}{vstock \text{ by mode}}$$

$$\text{passenger load per vehicle by mode} = \frac{\text{pkm by mode}}{\text{vkm by mode}}$$

$$\text{freight load per vehicle by mode} = \frac{\text{tkm by mode}}{\text{vkm by mode}}$$

Inputs on the vehicle stock over time by powertrain are used to calculate the evolution of the powertrain shares in the fleet by vehicle class and also by mode.

The outputs on transport activity aggregates are especially important in the views related to the cost of driving in order to calculate the costs per vkm, pkm and tkm for the different passenger and freight sub-modes.