

11. Demand (freight)

Overview

Target

This view is intended to calculate the transport demand at the vehicle class level in case of freight transport. Most of the key variables determined in other views are gathered here to provide the main outputs on freight transport demand disaggregated by mode and by vehicle class. In particular, this is the case of the vehicle stock, the vkm and tkm targeted over time.

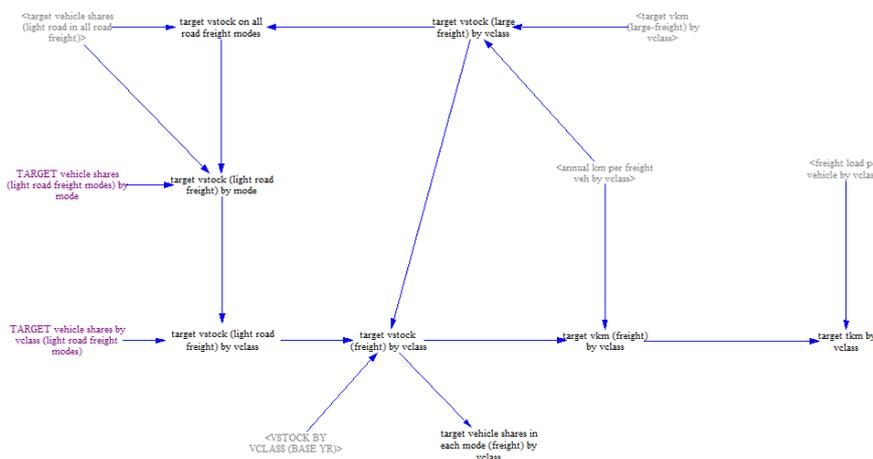
Structure

The target vkm by vehicle class for large-freight transport modes is the starting point to a number of calculations.

The calculations flow draws a kind of square initialized on the top right corner by the variable "target vkm (large-freight) by vclass" and finishing at the bottom right with the "target tkm by vclass" (Figure 11.1). The number of vehicles in the fleet, split only by mode and by vehicle class, is evaluated as part of the calculation flow.

Inputs from other views concern annual travel per vehicle and vehicle load. They are also detailed at the vehicle class level. They are instrumental to deduce the vkm and tkm in freight transport.

Figure 11.1 Demand (freight) – Vensim sketch



Detailed description of the view

Inputs

The vkm for large-freight modes are forecasted in the view "load (freight)" by means of data on tkm and vehicle load. Vkm on large-freight modes, combined with data on annual travel per vehicle and information on vehicle shares (left side of the view) lead to the target vehicle stock.

The light vehicles share in total road freight is projected in the view "demand (light road freight veh shares)" as function of the GDP per capita. This variable enables to separate the total number of vehicles in those belonging to light- and large-freight.

The exogenous shares from the user (User inputs (over time)) allocate the light-freight vehicles across the different light-freight modes and its vehicle classes.

The annual travel per freight vehicle is estimated in the view "travel per vehicle (freight)" and is the connecting element between the vkm and vehicle stock variables.

The load per freight vehicle is an endogenous input from "load (freight)" and is used to convert vkm into tkm as last step of the view.

Outputs

The quotient of target vkm for large-freight service and the annual travel per vehicle results in the target large-freight vehicle stock disaggregated by mode and vehicle class. This includes the number of vehicles under LARGE ROAD mode which are the only large-freight road vehicles.

The total number of freight vehicles expected in the stock, as well as those belonging to the light-freight service, is derived from the projected LARGE ROAD vehicles and the share of light-freight in total road freight. Relevant equations are reported below.

$$\text{Total freight vehicles (over time)} = \frac{\text{Large – freight road vehicles (LARGE ROAD mode)}}{1 - \text{light vehicles share in total road freight}}$$

$$\text{Total light – freight vehicles} = \text{Total freight vehicles} - \text{LARGE ROAD vehicles}$$

The exogenous shares, entered as inputs by the user, distribute the total forecasted light-freight vehicles across the different light-freight modes (TWO WHEELERS, THREE WHEELERS and LDVS) and between vehicle classes within each of these modes.

$$\text{Target stock by light – freight mode} = \text{Total light – freight vehicles} \times \text{Shares by mode}$$

$$\text{Target stock by vclass} = \text{Targetstock by light – freight mode} \times \text{Shares by vclass}$$

The variable "TARGET VSTOCK (FREIGHT) BY VCLASS" gathers the information concerning the projected number of vehicles in the fleet for light- and large-freight. Subsequently, the target vehicle stock by vehicle class is converted into vkm and tkm through inputs on travel and load per vehicle.

The target vehicle stock by vehicle class is especially important in the view "vehicles by age" to determine the new vehicle registrations over time. The target tkm and vkm (freight) by vehicle class both enable to calculate the load per vehicle at the mode level in the view "demand (freight, travel and load by mode)".