

## 14. Vehicles, new registrations (historical)

### Overview

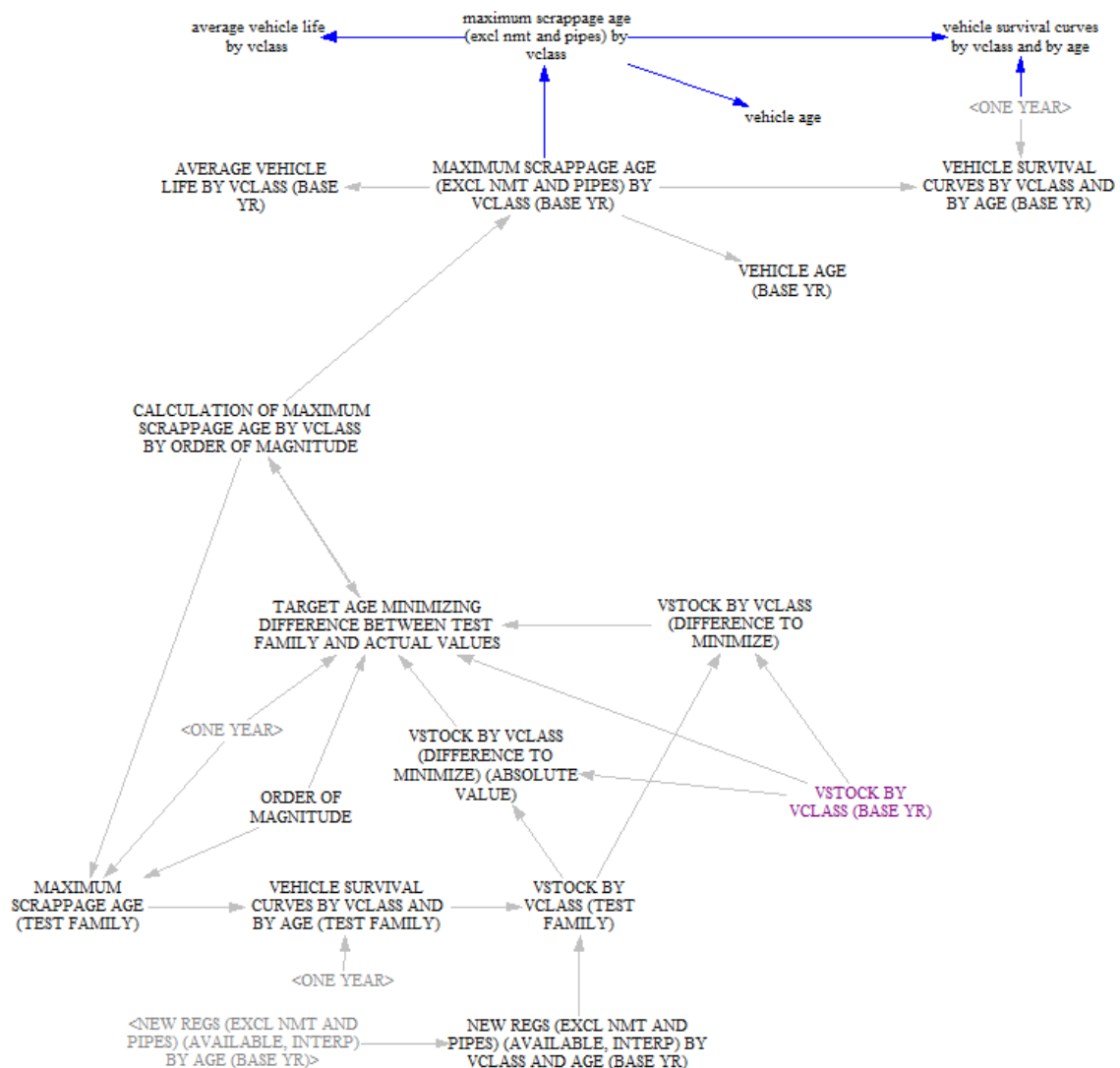
#### Target

The main purpose of the view is to calculate the maximum vehicle survival/scrappage age by means of matching information on historical new registrations, vehicle stock and vehicle survival/scrappage profiles.

#### Structure

The general appearance of the view is shown in Figure 14.1. Inputs on new vehicle registrations, the vehicle stock and the family of survival curves to test are located at the bottom of the view. The outputs, located at the top, are the vehicle survival curves and the maximum scrappage age.

Figure 14.1 Vehicles, new registrations (historical input): general appearance of the Vensim sketch



## Detailed description of the view

### Inputs and calculation flow

Data on vehicle stock by vehicle class, "VSTOCK BY VCLASS (BASE YR)", enter the model structure from the ForFITS Excel (purple variable). "NEW REGS (EXCL NMT AND PIPES) (AVAILABLE, INTERP) BY AGE (BASE YR)" contains available data on historical vehicle registrations by vehicle class and by age (at the base year), linearly interpolating the values between the base year, base year -5 and base year -10 and using the base year -10 value for earlier registrations<sup>1</sup>.

The calculations linking "VSTOCK BY VCLASS (BASE YR)", "NEW REGS (EXCL NMT AND PIPES) (AVAILABLE, INTERP) BY AGE (BASE YR)" and "CALCULATION OF MAXIMUM SCRAPPAGE AGE BY VCLASS BY ORDER OF MAGNITUDE" are conceived to test a family of possible survival/scrappage curves to the new registrations ("VEHICLE SURVIVAL CURVES BY VCLASS AND BY AGE (TEST FAMILY)"), selecting the curve of the family that is best coupling new vehicle registrations with the vehicle stock. The shape of the scrappage/survival curve is resulting from a default modelling assumption<sup>2</sup>. The current survival curves are defined in the equation below<sup>3</sup>:

$$Survival\ rate = \left(1 - \frac{(age)^2}{(age_{scrappage})^2}\right)^3$$

The maximum vehicle scrappage age ( $age_{scrappage}$ ) results from an iterative calculation and corresponds to the value that minimizes the difference between the vehicle stock calculated from the application of survival/scrappage rates to historical vehicle registrations and the user input on the vehicle stock.

### Outputs

The outputs of this view are the maximum vehicle survival/scrappage age at the base year, "MAXIMUM SCRAPPAGE AGE (EXCL NMT AND PIPES) BY VCLASS (BASE YR)", and the associated vehicle survival curve, "VEHICLE SURVIVAL CURVES BY VCLASS AND BY AGE (BASE YR)". Both these parameters are currently assumed to remain the same over time.

### References

Rogers, J. (2011), *TAMT. Transport Activity Measurement Toolkit for on-road vehicles. Practitioners' Guide*, [http://www.cleanairinstitute.org/wp/wp-content/uploads/2011/07/TAMT\\_Guide\\_Final.pdf](http://www.cleanairinstitute.org/wp/wp-content/uploads/2011/07/TAMT_Guide_Final.pdf)

---

<sup>1</sup> This is a simplification aiming to limit the amount of input data required for ForFITS users. It is justified by the fact that new registrations in the past are heavily affected by scrappage curves. The assumption introduces an approximation in the evaluation of the maximum scrappage age.

<sup>2</sup> The selection of a default shape for the scrappage/survival curve is another assumption introducing some approximations. The current choice results from similar assumptions made for models that consider the vehicle survival, such as the TAMT model of the World Bank (Rogers, 2011).

<sup>3</sup> If the maximum scrappage age of a vehicle class exceeds the number of subscripsts available for age in the model (XXV), then the value of the survival/scrappage function at age XXV is estimated to be the sum of the values from age XXV to the maximum scrappage age. In this way, the survival/scrappage curve presents a peak on its tail to include all the different mortality coefficients between age XXV and the maximum scrappage age in one particular age subscripsts (XXV).