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Assessment of the implementation of Directive 2000/53/EC on end-of life vehicles (the ELV Directive) with emphasis on the end-of life vehicles of unknown whereabouts

Assessment of current situation of ELVs of unknown whereabouts – preliminary results

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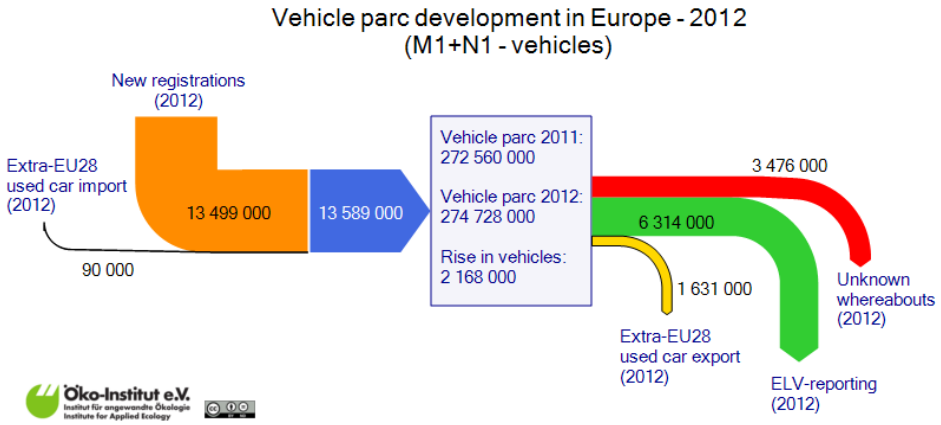
1 Background information

The consortium led by Oeko-Institute is designated by the Commission inter alia to assess if ELVs reportedly treated in the Member States of the EU cover most of the end-of life vehicles (ELVs) generated in the EU or if there is a significant share of ELVs not reported and possibly not treated according to the requirements of the ELV Directive.

One of the objectives of this study is to assess the amount of the ELVs of unknown whereabouts. The volume of "Missing vehicles" in EU is calculated on the basis of the balance between new registrations, net export and ELVs reported by the Member States.

An analysis of the European second-hand vehicle market[1], prepared for the European Commission (EC) in 2011, showed that there were more than 4.1 million missing vehicles within the EU in 2008. In 2009 a number of nearly 3.4 million vehicles of unknown whereabouts was estimated[2]. The updated numbers for the period under investigation in the current project is displayed in Figure 1 and Figure 2 below. The number of missing vehicles for the years 2012 and 2013 are more than 3.5 million and 3.6 million, respectively (Figure 1 and Figure 2).

Figure 1. Vehicle entries and exits for the EU 28 in 2012



The Sankey-diagrams (Figure 1 and Figure 2) introduce vehicle **entries and exits of the EU 28** as well as the vehicle stock (also called "vehicle parc") and its increase throughout one year in 2012 and 2013, respectively.

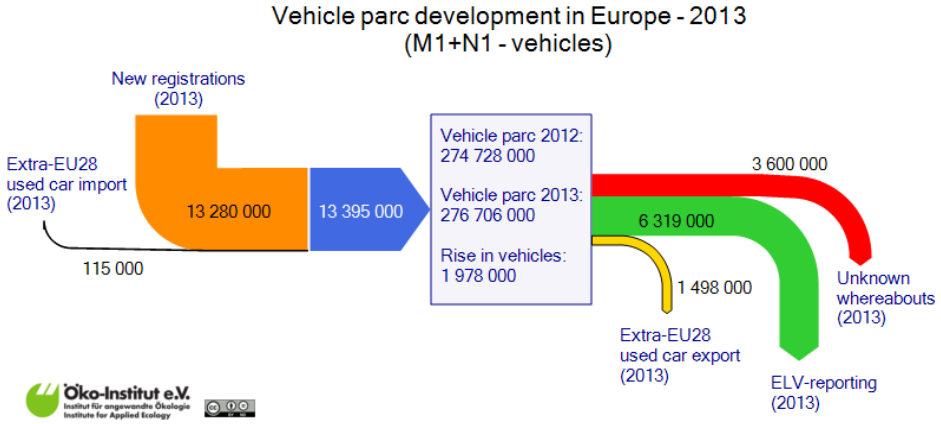
On the input side there are registrations of new vehicles in the EU and import of used vehicles into the EU. The ELVs reported by MS and export of used vehicles outside the EU are outputs[3]. Considering the increase in the total vehicle parc, there is a gap of about 3.5 million vehicles, not covered in the EU statistics.

1 European second-hand car market analysis. Oeko-Institut e.V., Transport & Mobility Leuven, COWI. European Commission – DG Environment, Directorate C: Climate Change & Air. 2011 (http://ec.europa.eu/clima/policies/transport/vehicles/docs/2010_2nd_hand_car_en.pdf)

2 Merz, C.; Mehlhart, G.: Import und Export von Gebrauchtfahrzeugen in Europa, in: Recycling und Rohstoffe - Band 5, Hrsg: K. J. Thomé-Kozmiensky, D. Goldmann, TK Verlag Karl Thomé-Kozmiensky; 2012, p. 639-658

3 Further explanations about used data and calculation approach applied in this study appear in chapter 2

Figure 2. Vehicle entries and exits for the EU 28 in 2013



Further investigations performed during the current project for the EC allow better understanding of the **cross-border trade of used vehicles** (M1+N1 vehicles) within the EU. The calculations cover 24 of the EU 28 countries, excluding Malta, Cyprus, Bulgaria and Romania. Figure 3 and Figure 4 show the net import/ export[3] patterns with a break-down into four vehicle age groups for two time periods: 2005-2009 and 2011-2014. These are presented as percentages of the vehicle parc. The negative values represent exports of vehicles. Accordingly, the positive values characterize imports.

The comparison of results obtained for these two time periods highlights that the relation of net importers to net exporters remains almost unchanged. Additionally, it can be observed that in the earlier period, the highest value for net import/ export for net importers was over 14 %. For the period 2011-2014 the highest value is slightly above 9 %.

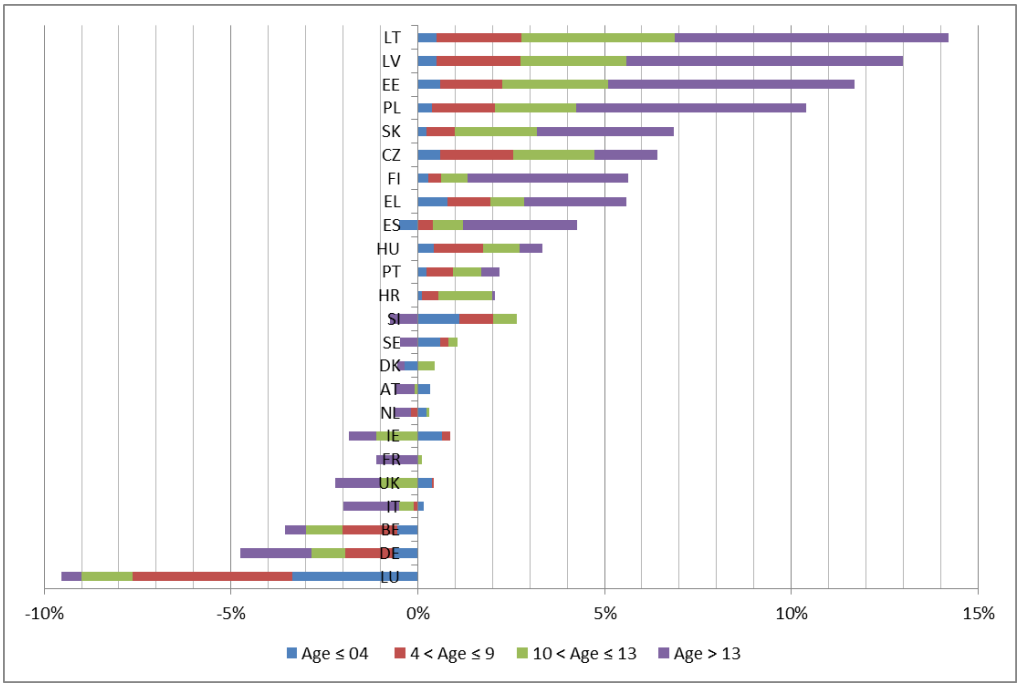
The distribution of net import/ export among age groups has changed significantly between the two analysed time periods. For instance, it seems that in the last years, net exports included mainly vehicles with an age above 14 years.

Imports and exports in absolute numbers (Figure 5 and Figure 6) show some changes in the tendency, too. Figure 5 illustrates average annual net import/ export expressed in the number of vehicles among largest net exporting Member States distributed in two time periods. The assessed average annual export of vehicles from Germany between the years 2005 and 2009 was about 2.2 million vehicles, whereas in the latest investigated time period (2011-2014) it decreased to about 0.9 million.

In the case of Poland, its position as the largest net EU importer (Figure 6) over the years is unchanged. On average the annual number of imported vehicles for the period 2005-2009 was about 1.5 million and has increased considerably over the last years (about 0.2 million on average for the period 2011-2014).

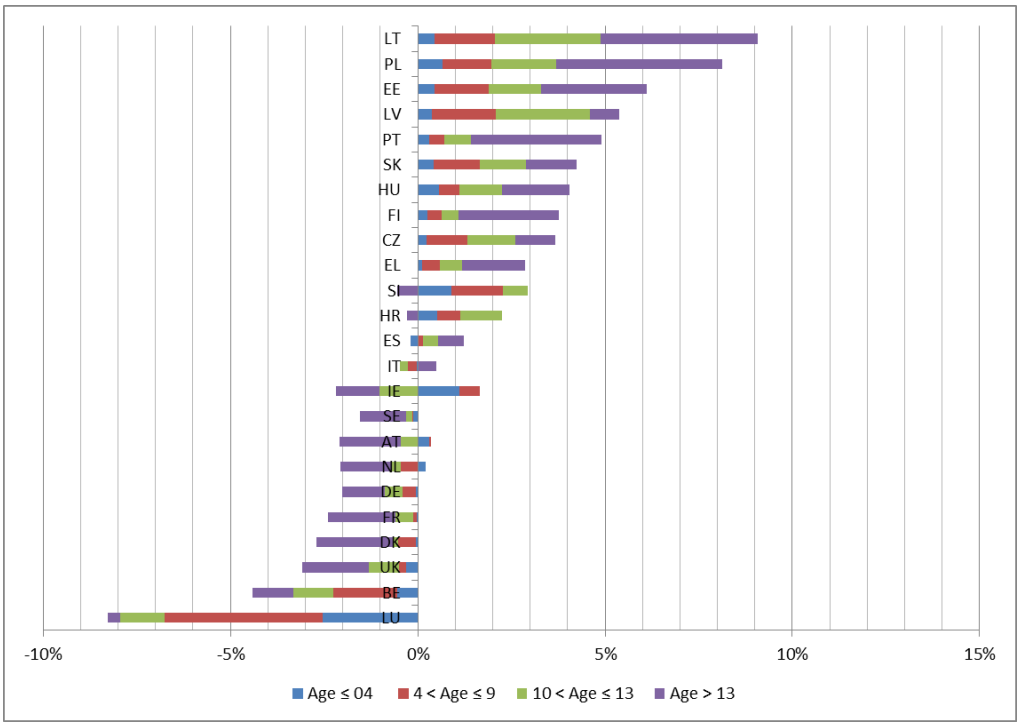
However, it is important to note that the numbers displayed in Figure 3 to Figure 6 are only estimations from a model and the national patterns might differ significantly with regard to duration of service before a vehicle becomes waste (ELV). Therefore the figures need to be considered with caution.

Figure 3. Net import/ export calculated as percentage of the national vehicle parc (average 2005-2009)



Note: Export reported as negative figures, import reported as positive figure.

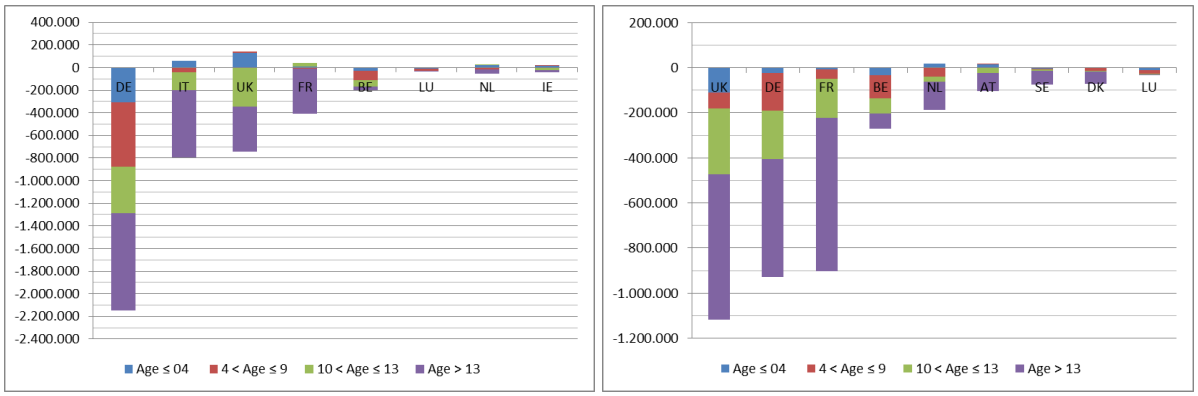
Figure 4. Net import/ export calculated as percentage of the national vehicle parc (average 2011-2014)



Note: Export reported as negative figures, import reported as positive figure.
Due to non-continuous time series (Polk 2015[4]) the average for LT is for 2011-2013 and for PT for 2012-2014;
Portugal changed to effective data in census year 2011; For Lithuania with census date 2014, counts have decreased significantly for all registration types due to a cleansing of the official vehicle register.

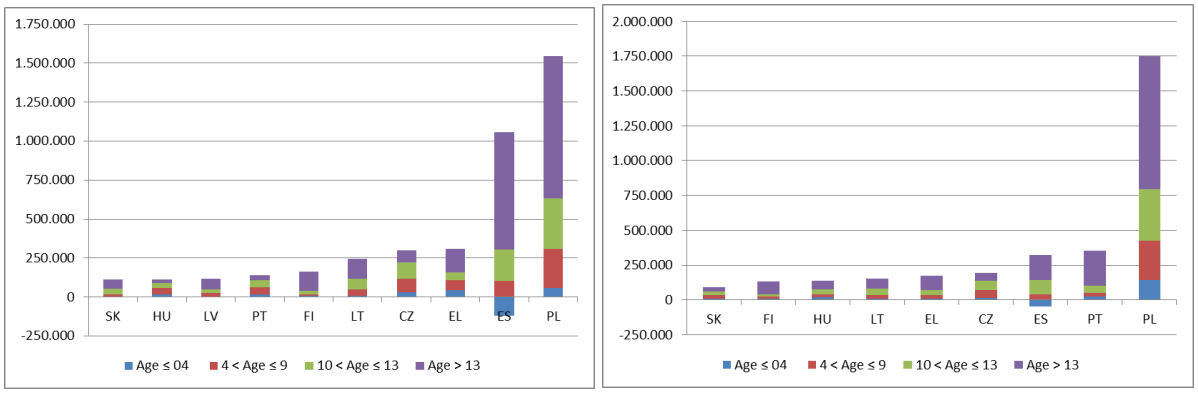
[4] POLK: Global vehicles in operation, methodology, fact and figures, January 2016; commercial source/ licence available for purchase from POLK

Figure 5. Net exporters of vehicles, average number of vehicles for 2005-2009 (on the left) and for 2011-2014 (on the right)



Note: Export reported as negative figures, import reported as positive figure.

Figure 6. Net importers of vehicles, average number of vehicles for 2005-2009 (on the left) and for 2011-2014 (on the right)



Note: Export reported as negative figures, import reported as positive figure.

2 Methodology

2.1 Data sources

For the purpose of the calculations of vehicles (M1+N1) **entries and exits of the EU 28 parc** (Figure 1 and Figure 2), data from different sources was collected:

- POLK for data on vehicle parc composition;
- European Automobile Manufacturers' Association (ACEA) for data on new registrations within EU;
- Eurostat for data on ELVs. This data is annually reported by Member States;
- Eurostat Foreign Trade Statistics (FTS) on Extra-EU trade of used cars, i.e. data on import and export of used vehicles to and from the European Union.

The quality of the data on intra-EU trade (trade between Member States) is hampered by the data collection method and, in consequence, it is unsuitable[5] to assess the **cross-border trade of used vehicles within the EU** appropriately.

That is why for the purpose of this study the methodology applied in the previous work on the second hand car market in Europe, carried out by Oeko-Institut in 2011[1], was adopted.

Data from Eurostat FTS (Extra-EU trade), ACEA, and POLK is identified as a reliable source. However, in the case of ACEA and POLK, there was some missing data, which was complemented from other sources, e.g. Eurostat. Nonetheless, these supplements are observed not to be of high relevance for the final results.

2.2 Calculation approach

In order to estimate the **number of missing vehicles** (M1+N1) in the EU the *material balance method* was applied:

$$INPUT = OUTPUT \pm \Delta\ STOCK \qquad (1)$$

The system boundaries are the EU 28 borders so:

INPUT refers to Extra-EU 28 imports and registrations of new vehicles within EU 28;

OUTPUT refers to Extra-EU 28 exports and ELVs arising within EU 28;

Δ *STOCK* refers to the change in stock, which, in the case of this study, corresponds to the change in vehicle stock (= vehicle parc) within the EU 28.

The calculations performed according to equation 1 and on the basis of data from the sources mentioned in chapter 2.1, showed that the vehicle entries and exits and changes in the vehicles stock within the EU do not balance out. Thus, the evaluation of vehicles of unknown whereabouts within the EU was done on the basis of the following equation:

$$UNKNOWN_n = N_{n-1} - N_n + IMPORTS_n + NEW\,\mathrm{Re}\,g_n - EXPORTS_n - ELV_n \qquad (2)$$

Where:

UNKNOWN Number of vehicles with unknown whereabouts (positive value = stock exit, negative value = stock entry);

N Number of vehicles in the vehicle stock;

IMPORTS Extra-EU 28 imports;

*New*Reg Registration of new vehicles within EU 28;

EXPORTS Extra-EU 28 exports;

ELV End-of life vehicles (reported);

Index *n* Reporting year.

[5] European second-hand car market analysis. Oeko-Institut e.V., Transport & Mobility Leuven, COWI. European Commission – DG Environment, Directorate C: Climate Change & Air. 2011 (http://ec.europa.eu/clima/policies/transport/vehicles/docs/2010_2nd_hand_car_en.pdf)

The aim of the methodology, which is related to the investigation of the **cross-border trade of used vehicles within the EU**, is to assess the annual net Intra-EU import/ export of M1 and N1-vehicles for all Member States both as percentage of the vehicle parc and as an absolute value.

The calculations were done by means of a model that assesses the evaluation of the vehicle parc and estimates the vehicle entries[6] and exits[7] of a certain age group into/ out of the vehicle parc.

A crucial parameter of the model is scrappage that refers to the effective scrappage only, i.e. vehicles that become ELVs due to breakdown or accident. That is why scrappage is described as a function of the vehicles age because an increasing age leads to the increased probability of breakdown. Since extra-EU imports and exports are also incorporated in the model the scrappage was obtained using the following equation:

$$SCRAPPAGE_{n,m} = N_{n-1,m-1} - N_{n,m} + IMPORTS_{n,m} - EXPORTS_{n,m} \quad (3)$$

where:

SCRAPPAGE	Vehicle parc exits due to breakdown of the vehicles (end-of life vehicles);
N	Number of vehicles of a certain age group in the vehicle parc;
IMPORTS	Extra-EU 28 imports to the national vehicle parc;
EXPORTS	Extra-EU 28 exports from the national vehicle parc;
Index *n*	Reporting year;
Index *m*	Age group of the vehicles.

The estimated vehicle entries[6] and exits[7] of a certain age group into/ out of the vehicle parc represent the differences between the evaluated vehicle parc and between the vehicle parc represented in the available statistics for the same years and age group. Figure 5 and Figure 6 show the average numbers of vehicles for consolidated age groups of vehicles and for the two time periods for the largest importers and exporters within EU.

Figure 3 and Figure 4 represent net Intra-EU import/ export as a percentage, obtained as a ratio of the number of entries/ exits of vehicles of a certain age group into/ out of the vehicle parc, to an average number of cars within the same age group of the same year.

[6] Expressed as positive value = net import

[7] Expressed as negative value = net export

3 Conclusions and challenges

It is important to note that the figures displayed in Figure 3 to Figure 6 are estimations from a model only and the national patterns might differ significantly with regard to duration of use before a vehicle is considered as ELV. Therefore the figures need to be considered with caution.

The obtained results give a general indication as to the cross-border trade, knowing that the national vehicle registration authorities are not obliged to report on export/ import of used vehicles within the EU. At the same time, the Foreign Trade Statistics (FTS) for intra-EU trade, which are based on reports of the enterprises, are hampered by high reporting thresholds and therefore not a relevant source[1]. As a result, most of the national competent authorities for the reporting on ELVs have no reliable information on Intra-EU export/ import of used vehicles at hand, despite the fact that this information should be available to the national vehicle registration authorities.

This is also demonstrated in the annual reports on ELVs[8] provided by Member States. The gathering template for these annual reports requests data on the export of used vehicles and ELVs. More than half of the Member States submit documents with no or very little information about the export of used vehicles or ELVs. In some cases Member States admit to no availability of the requested data. In fact, it would also be necessary to know the number of used vehicles imported, for the validation of the national vehicle market and for the calculation of the expected number of ELVs. As demonstrated above, several Member States import a high number of old vehicles likely to become ELVs in a relatively short time. Additionally, submitted data contains inconsistencies, like for example discrepancies between the reported number of ELVs and the certificate of destruction (CoD) issued.

Furthermore, there is no sufficient data published on the national vehicle parc. The published European data on the national vehicle parc currently covers vehicles of more than one year of age. Data aggregated in this way is not suitable for a detailed evaluation of the vehicle parc and the scrappage. Commercial data, as for instance from POLK, provides a breakdown by year into age class 0 to age class 13. However, the age class 14 combines all vehicles that are fourteen years and older. The aggregate for older vehicles (> 14 years) is not appropriate as for some countries, the majority of the imported vehicles are found in this age class.

[8] Methodology for calculating data on end-of-life vehicles for the report pursuant to Commission Decision 2005/293/EC laying down detailed rules on the monitoring of the reuse/ recovery and reuse/ recycling targets set out in Directive 2000/53/EC of the European Parliament and of the Council on end-of-life vehicles, in which MS can optionally indicate information about export of used vehicles or ELVs