

Evaluation and Monitoring for the EU Directive on Energy End-Use Efficiency and Energy Services

WP5 – Top-down methods case studies: New cars

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November 2007



Top-down estimation of energy savings for new cars

➤ Indicators used to measure energy savings: change in the test specific consumption of new cars sold every year in litres/100km

➤ Change in this specific consumption can be explained by the following factors:

- Change in the average size of vehicles (in terms of weight, or horse power or engine size in cm³)
- Autonomous trend (in technical efficiency)
- Motor fuel price
- EU policy (ACEA/JAMA/KAMA agreement) and national energy policy measures (tax on motor fuels, subsidies/ tax on vehicles): after 1995/ before 1995

➔ Effect of change in the size of vehicles:

- “hidden structure effect” if trends towards larger or more powerful cars ➔ energy savings are underestimated; corrections possible if data available
- part of savings if trends towards smaller or less powerful cars as a result of policies ➔ no correction needed

Case studies in transport in EMEEES

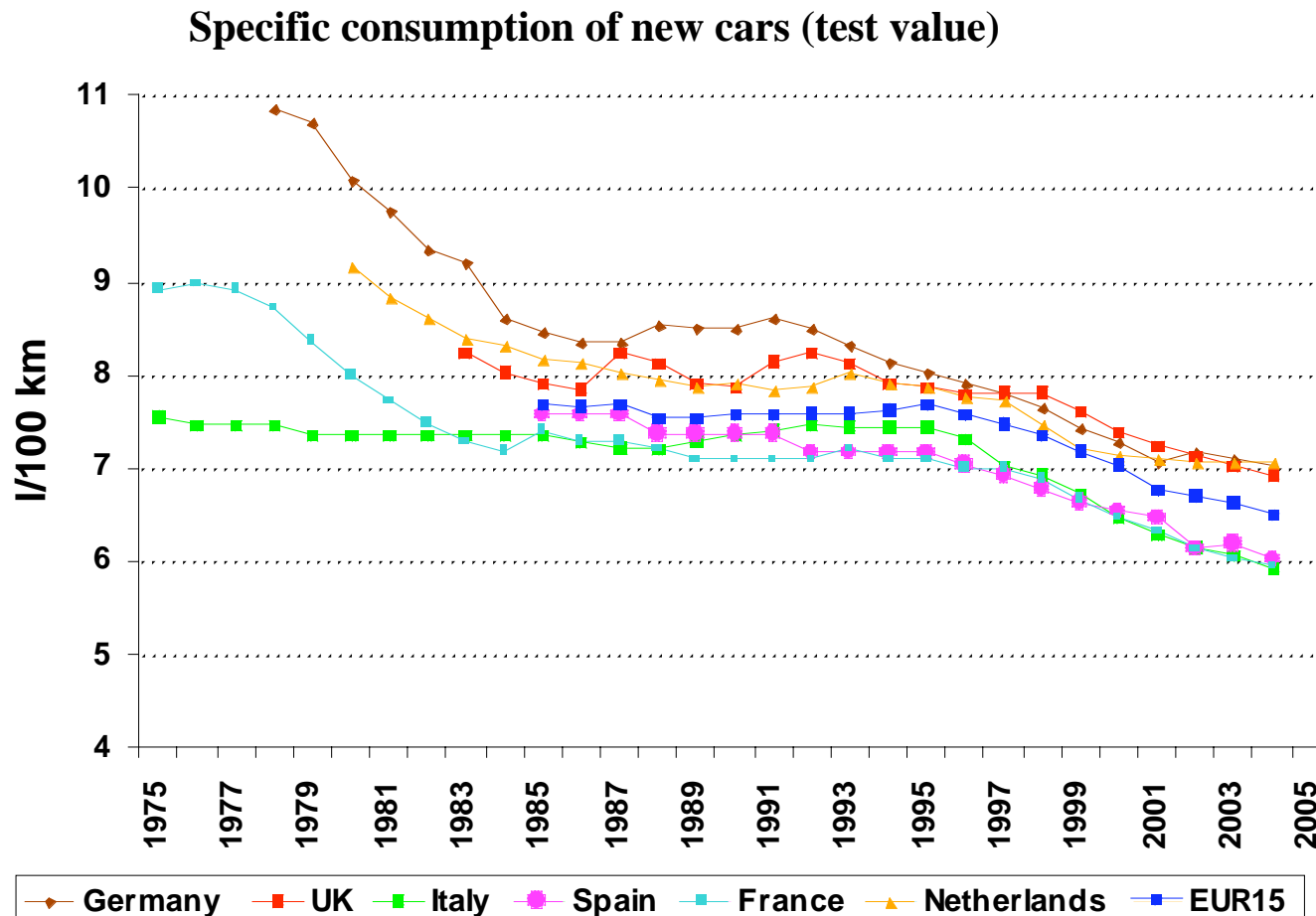
- **New cars (energy consumption indicators)**
- Stock of cars (idem)
- Modal split for passenger (penetration rate)
- Modal split for goods (idem)

Methodology for Top-down estimation of energy savings new cars

- **Step 1** : Indicators to measure savings
- **Step 2** : Energy savings explained by a set of factors/variables
- **Step 3** : Source of data and information on policy measures for new cars
- **Step 4** : Modelling of the baseline specific energy consumption of new cars
- **Step 5 and 6** : Classification of countries according to implementation of national measures
- **Step 7** : Econometric analysis methodology for new cars
- **Step 8** : Calculation of ESD savings methodology
- **Step 9** : Conclusions and issues for replication on new cars

Step 7 : Econometric analysis methodology for new cars

- Identification of the period over which policy measures either are negligible or have a limited impact so as to get the autonomous trend



- Very different trends before and after 1995, mainly as result of the ACEA/JAMA/KAMA agreement

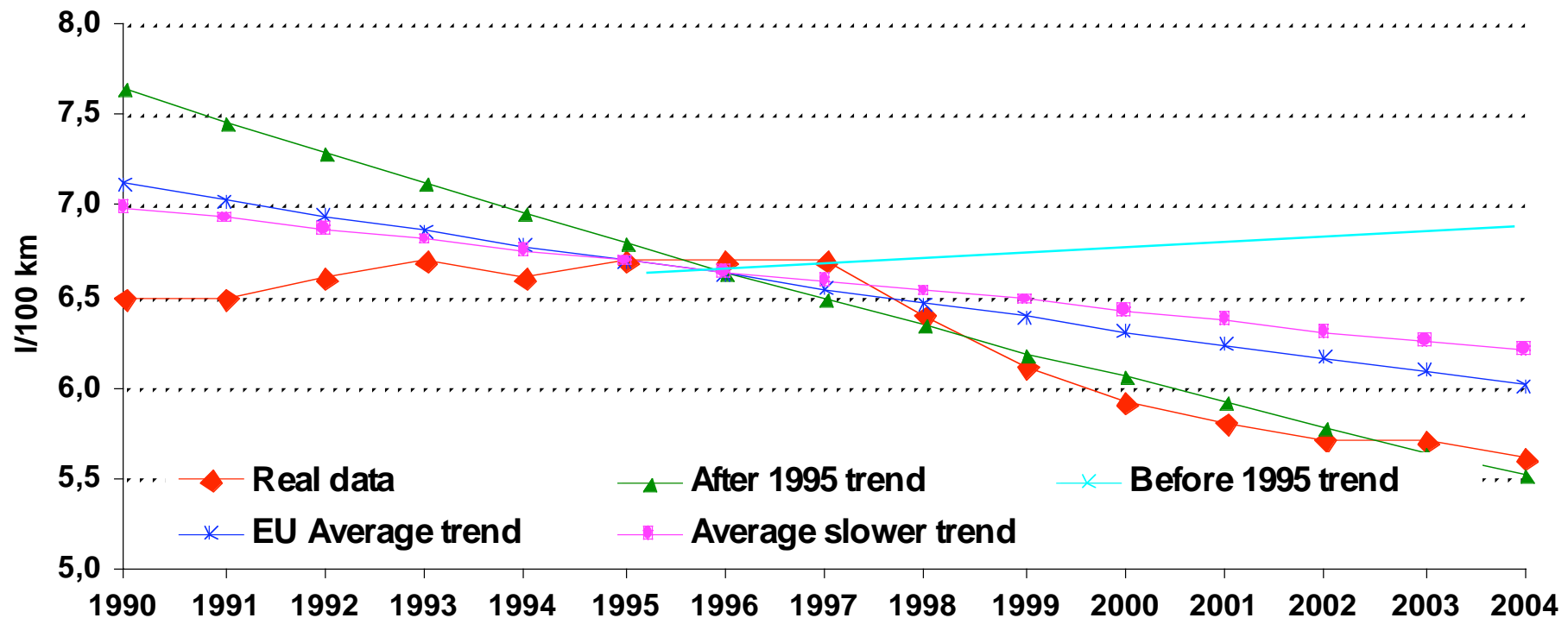
- What is the autonomous trend: before or after 1995?

Step 7 : What autonomous trends to be considered?

case of France / diesel cars

- Trend before 1995 (ie before the ACEA/JAMA/KAMA agreement) (“before 1995 trend”)
- Trend since 1995 (“after 1995 trend”) → **reference used in the following case studies**
- EU average trend = $> -1.1\%/year$ for diesel
- Trend of the average of the 3 countries with the lowest autonomous trend (“average slower trend”) $\Rightarrow -0.8\%/year$ for diesel

Specific consumption of new diesel cars (France)



Step 7 : Econometric analysis (case of countries without data on engine size) (cont'd)

➤ Example of econometric analysis of new diesel cars in Germany

➤ Regression with autonomous trend and motor fuel price between 1995 and 2003

$$\ln(\mathbf{SC}) = -0.017 \times \mathbf{t} + 0.11 \times \ln(\mathbf{P}) + 2.08$$

t-stat (1.7) (0.5)

$R^2 = 0.54 \Rightarrow$ Not bad correlation

F-stat = 4.1 \Rightarrow regression not really globally significant (F-statistic is < 4.7)

T-stat < 1.9 for time and for prices

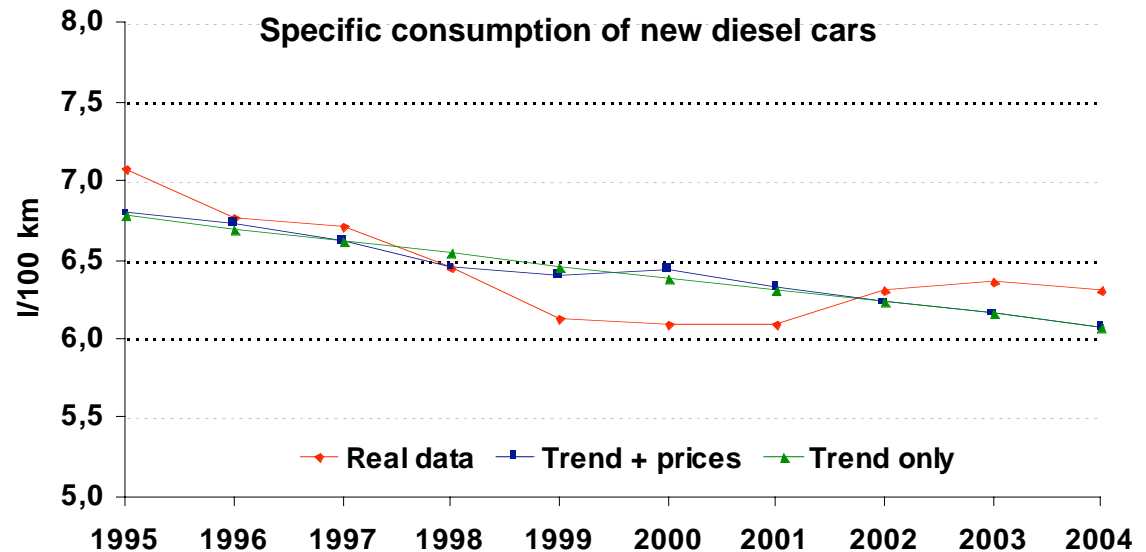
Price elasticity > 0 instead of < 0

➤ Regression with autonomous trend only between 1995 and 2003

$$\ln(\mathbf{SC}) = -0.012 \times \mathbf{t} + 1.99$$

t-stat = 2.9 , $R^2 = 0.52$, F-stat = 8.7

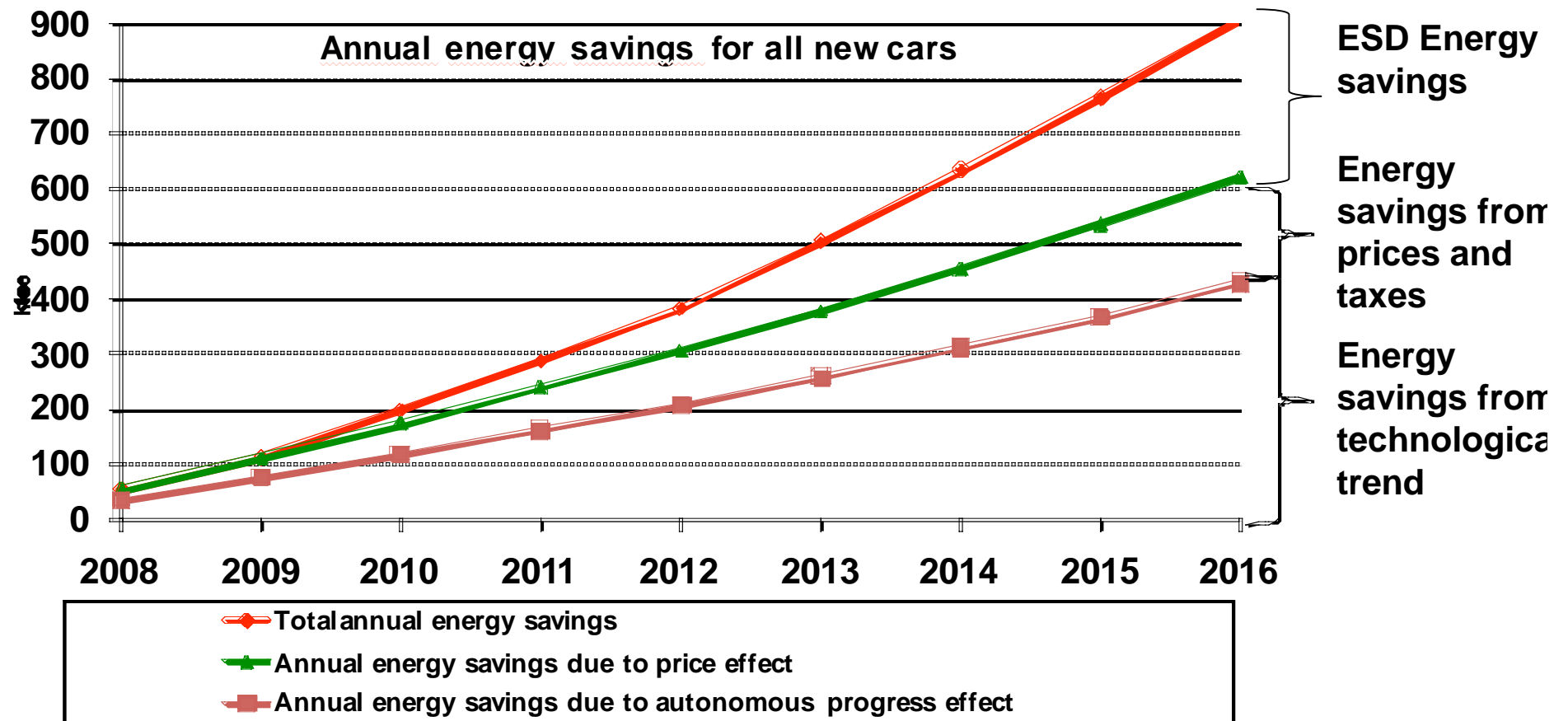
Better statistical results



Step 8 : Calculation of ESD savings

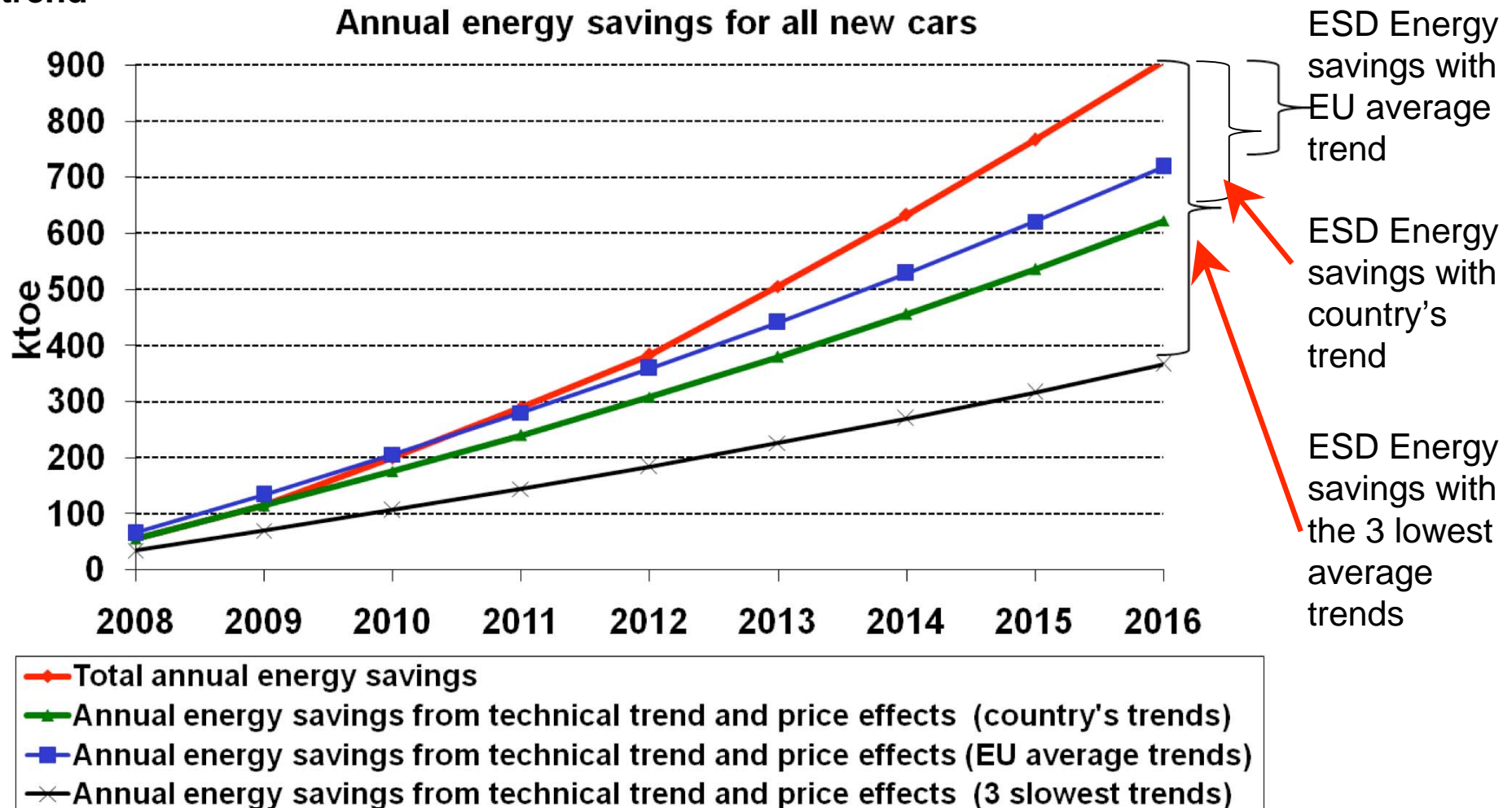
All cars - example from scenario for 2016

The total energy savings over the 2008-2016 period are about **1000 ktoe/year** in this example; ESD energy savings are about **400 ktoe/year**



Step 8 : Calculation of ESD savings Sensibility study on trend (example - 2)

When we take the EU average trend for the country under study, this divides by 2 the ESD energy savings over the 2008-2016 period and if we take the 3 slowest trends this multiplies by 2 the ESD energy savings. This of course depends in the actual country's trend



Step 9 : Conclusions and issues for replication on new cars

- Data limitations: no data for most EU New Member Countries (data not covered yet by the EU monitoring)
- Definition of trends or baseline to be decided :
 - A) National Trend before 1995 (ie before the ACEA/JAMA/KAMA agreement) (“before 1995 trend”) **OR**
 - National Trend since 1995 (“after 1995 trend”) → reference used in the case studies
 - B) EU average trend **OR**
 - Trend of the average of the 3 countries with the lowest autonomous trend (“average slower trend”) → recommended by EMEEES
- Role of energy price negligible so far
- Need to define coefficient to account for difference between test values and actual values
- Similar approach seems applicable for other case studies with energy consumption indicators, although this case study may be simpler than other end-uses