

Assisting countries to Monitor the Sustainable Development Goals: Vehicle Fleet Age



Key messages

- *Quality data on the age composition of road vehicle fleets and how it changes over time is important for understanding and addressing road safety and vehicle emissions challenges. **More consistent and reliable road vehicle fleet statistics by vehicle age** are thus necessary to implement evidence-based policies.*
- *Countries report important differences in the age distribution of vehicles, with part of the variation related to the economic development of countries. **Generally, ECE countries with lower GDP per capita report higher shares of older vehicles and lower share of newer vehicles.***
- *Changes in the reported age composition of passenger car fleets in ECE countries over the past decade show a **general trend of aging vehicle fleets**. This slower rate of vehicle fleet renewal is likely to have a negative impact on the short- to medium-term effectiveness of some policies improving road safety or lowering vehicle emissions.*
- *These statistics feed directly to policy questions related to **the Sustainable Development Goals, in particular targets 3.6, on decreasing road traffic fatalities, 3.9 on reducing the number of deaths attributed to ambient air pollution, and 7.3, on improving energy efficiency.***

Summary

Given the complexity of monitoring the over 240 indicators across many Sustainable Development Goals, UNECE has decided to publish a series of short articles on how our existing transport statistics can be used to monitor transport-related Sustainable Development Goal progress. This paper focuses on UNECE's **statistics on road vehicle fleets by age group**. Through the Web Common Questionnaire (WebCoQ) and in collaboration with the International Transport Forum and Eurostat, UNECE collects data on country road vehicle fleets by mode and vehicle age. This document examines the breakdown of road vehicle fleet data by age from the UNECE's transport statistics database, to identify differences across the region and ongoing trends over the past decade. Vehicle age is an important factor which can explain progress on several Sustainable Development Goals given the differences in safety and emissions between newer and older vehicles, notably that older vehicles lack recently developed safety features and typically tend to have higher emissions per kilometer when compared to newer vehicles¹. This document will focus primarily on passenger car fleet as similar trends are seen in lorries, road tractors and buses for ECE countries, and passenger cars form a substantial majority of vehicles.

Data Availability

The following summary statistics and analyses are based on data received as of January 2019 through the aforementioned WebCoQ. The data relevant for road vehicle fleet by age group are available on the UNECE statistics website under Road Vehicle Fleet (*Road vehicle fleet at 31 December by vehicle category and age group*). Supplementary data on new registrations of vehicles is also used as a cross-check for some of the changes in age composition of road vehicle fleets over time. These data are also

¹ *Remote sensing of motor vehicle emissions in London*, The Real Urban Emissions Initiative (see Figure 4). www.trueinitiative.org/media/597524/true-london-rs-report-fv-20181214.pdf

available on the UNECE statistics website under Road Vehicle Fleet (*New road vehicle registrations by vehicle category*).

Data were taken for 2017 or the latest year available (going back no further than 2015). Under this criterion 35 countries from the ECE region had at least some of the data needed to be included in the below analyses. UNECE conducts an annual outreach to all member States (most recently in February 2019) and it is hoped that continuing to engage in this way will improve the response rate in the future.

It is important to consider all metadata when contextualizing these analyses. For example, some countries reported changes in their vehicle fleet composition due in part to one-time automatic deregistration of older vehicles suspected to be out of use. Additionally, some countries do not provide detail on the number of vehicles more than 20 years old and correspondingly the category *10-20 years* refers to *greater than 10 years*. While differences in collection such as these are sometimes obvious to spot, many others that may not be documented in the reported metadata could also be present.

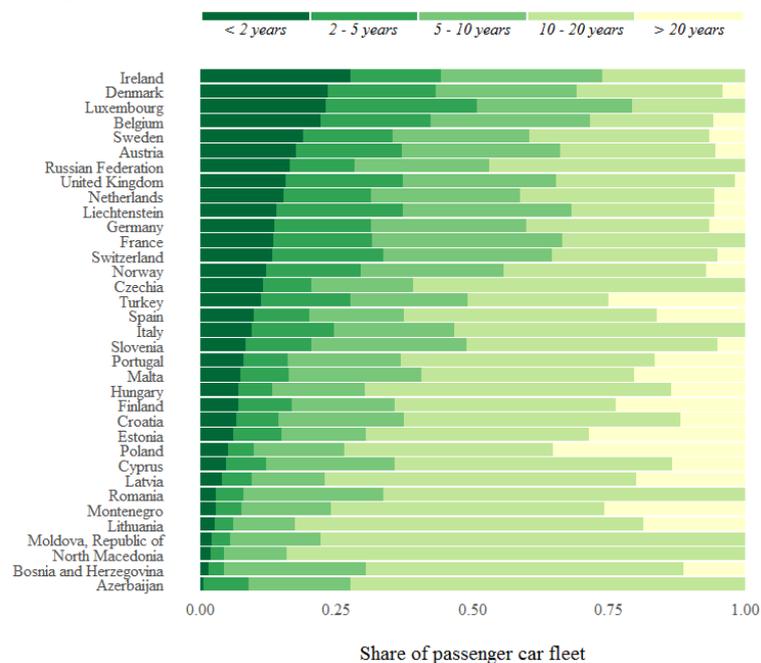
Analyses

Figure 1 shows the wide variation in age composition of passenger car fleets in the 35 ECE countries reporting data. While several countries (Luxembourg, Ireland, Denmark and Belgium) report that over 40 percent of passenger cars are five years old or less, over a quarter of reporting countries (nine) show the same share as less than 10 percent. In a related observation, 21 of the 35 reporting countries show that over 50 percent of passenger cars registered are more than 10 years old, with Montenegro, Latvia, Republic of Moldova, Lithuania and North Macedonia reporting that over three quarters of registered passenger cars are over 10 years old.

The differences between countries can be likely attributed to economic well-being of residents and affordability of new vehicles as well as policy decisions on vehicle fleet renewal.

Though lorries (light duty vehicles and lorries weighing over 3.5 tonnes) are typically driven longer distances on average per year than passenger cars, the reported age compositions of fleets in the 29 ECE countries providing data show a similar overall situation. Again, several countries (Luxembourg, Austria, Sweden, Ireland and the United Kingdom in this case) report over 40 percent of lorries in their fleets are 5 years old or less while several others (Cyprus, Romania, Azerbaijan and Portugal) show a share of lorries 5 years old or less that is below 10 percent. In 18 countries, the share of lorries older than 10 years exceeded 50 percent, with a share over 75 percent in Cyprus and Romania.

Figure 1
Share of passenger car fleet by vehicle age category and country, 2017 or most recent year



Note: 2015 data for Romania and Russian Federation. 2016 data for Austria, Denmark, Italy, Liechtenstein, Luxembourg, Portugal and Sweden. 10-20 year age group refers to greater than 10 years for Azerbaijan, Czechia, France, North Macedonia, Ireland, Italy, Luxembourg, Republic of Moldova, Romania, Russian Federation. United Kingdom refers to Great Britain.

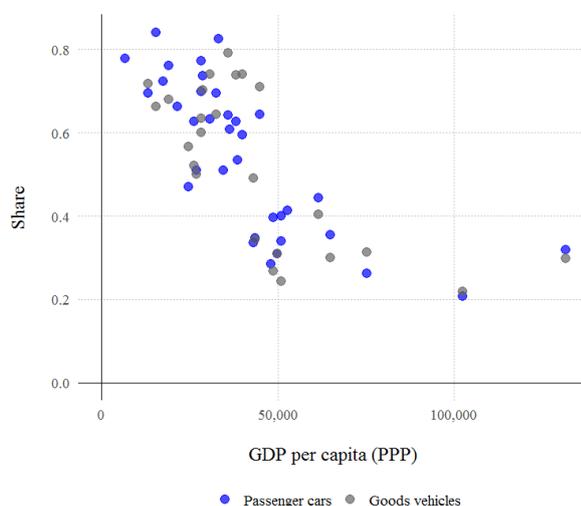
Road vehicle fleet by age group with gross domestic product (GDP)

As noted in the previous section, there is a clear relationship between economic development as the age composition of road vehicle fleets. Figure 2 shows the general tendency for the countries with higher gross domestic product (GDP) per capita to report lower shares of both passenger cars and goods vehicles greater than 10 years old in their overall fleets. This figure also clearly shows the wide differences in vehicle fleet age compositions among ECE countries.

This same relationship is seen for buses and road tractors. This has obvious policy implications and shows the interconnectivity of many of the SDGs. Policies such as implementing periodic technical inspections (PTIs) or regulating used vehicle imports to increase the rate of vehicle fleet renewal are needed to improve the safety of road users and decrease vehicle emissions. However, these policies should be assessed considering additional factors such as overall economic growth, the affordability of new vehicles and/or the feasibility of public transport alternatives for vehicle owners being encouraged to scrap older vehicles. Policymakers should also be aware that there are also environmental consequences where vehicle fleet renewal is too rapid, namely the emissions that result from the manufacturing of vehicles².

Figure 2

Shares of passenger car and goods vehicle fleet older than 10 years vs gross domestic product (GDP) by capita, 2017 or most recent year



Note: GDP in US dollars and purchasing power parity (PPP) of current year. 2015 data for Romania. 2016 data for Austria, Denmark, Italy, Luxembourg, Portugal and Sweden. United Kingdom refers to Great Britain for the share of vehicle fleet 10 years or older.

Change in composition of road vehicle fleet over time

Monitoring the change in the age composition of road vehicle fleets in ECE countries over the past decade is important to assess how quickly countries are renewing their fleets. However, collecting consistent data over this period is challenging as many countries have changed their collection methods or vehicle de-registration policies. This inconsistency in data for some countries is sometimes apparent where there are large year-to-year changes in one or more age group. Improving the quality of these time series through consistent data collection methods along with regular and accurate de-registration of unused vehicles is vital to understanding more about the policy challenges that countries face in addressing road safety, air pollution and climate change. Despite these data quality issues, there appears to be a trend toward an ageing passenger car fleet since 2007 in the majority of ECE countries. Of the 27 countries with data, 24 report an increase in the share of passenger cars greater than 10 years old and correspondingly, 20 report a decrease in the share of passenger cars five years old or less. A narrower focus on the share by age group of only passenger cars 10 years old or less allows for an analysis of changes over time with a lesser confounding effect of differences in de-registration policies across countries. This shows a somewhat different result though still more than half of countries providing data report a decrease in the share of newer passenger cars (two years old or less).

The change in the ratio of new registrations to vehicle stock over time provides another perspective on the rate of vehicle fleet renewal (see Figure 3). However, it should be considered that new registrations refer to all vehicles newly registered in the country including used vehicles.

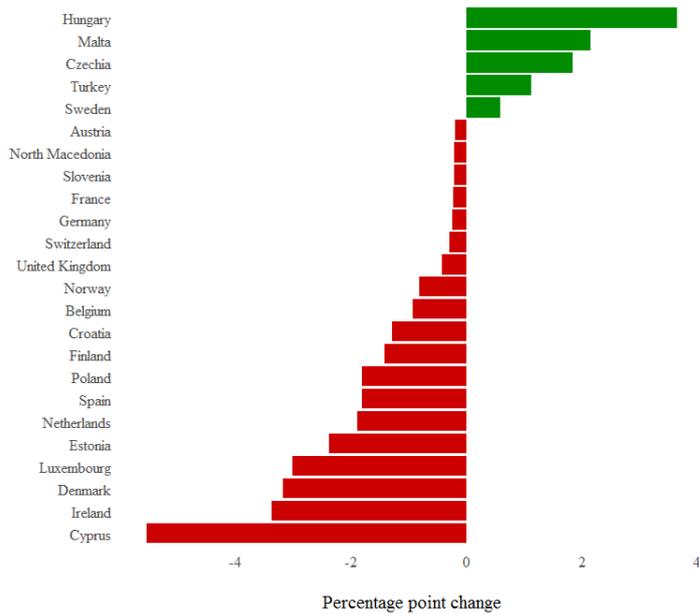
² *CO₂ Emissions from Cars: The Facts*, European Federation for Transport and Environment (see section 5.4). www.transportenvironment.org/sites/te/files/publications/2018_04_CO2_emissions_cars_The_facts_report_final_0_0.pdf

The reported ratio of new registrations to vehicle stock ranged from less than two percent (Montenegro and Azerbaijan) to over 10 percent (Lithuania and Luxembourg) in the 39 countries reporting data in 2017 (or the latest year) and the overall change in terms of percentage points between 2007 and 2017 ranges widely between countries. Of the 24 countries reporting data in both years, five reported increases in the ratio of new registrations of passenger cars to the overall stock of passenger cars while 19 countries reported decreases.

This is in line with the overall changes in the reported age composition of the passenger car fleets in the ECE region noted earlier. Both indicators point to a trend of slower fleet renewal. This results in an ageing vehicle fleet and implies slower rates of improvement in road safety and vehicle emissions. While most ECE countries implement periodic technical inspections to ensure that all vehicles on the road are up to safety and emissions standards, newer vehicles are still more likely to be safer and emit less as those standards are tightening over time. The overall trend toward slower renewal rates in ECE countries may be due to several factors including increased vehicle reliability and/or the slow economic growth in many countries during

Figure 3

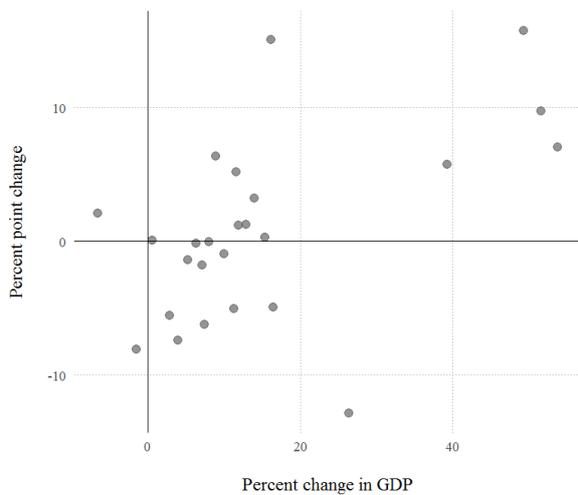
Percent point change the ratio of new passenger car registration to the passenger car fleet by country, 2007 to 2017 or most recent year



Note: Change to 2015 for Romania. Change to 2016 for Austria, Denmark, Italy, Luxembourg, Portugal, Sweden and Turkey. Data for Latvia and Lithuania between 2017 and 2007 may not be comparable due to changes in rules regarding the removal of vehicles from the register in 2010 and 2014, respectively. United Kingdom refers to Great Britain.

Figure 4

Percent point change in the share of passenger cars less or equal to two years old in passenger cars less than or equal to 10 years old vs percent change in real gross domestic product (GDP) by country, 2007 to 2017 or most recent year



Note: GDP growth in real US dollars and purchasing power parity (PPP). Change to 2016 for Austria, Denmark, Italy, Luxembourg, Sweden and Turkey. United Kingdom refers to Great Britain.

the observed period. Figure 4 shows the percentage point change in the share of passengers two years old or less as a share of passenger cars 10 years old or less against the percentage change in real GDP between 2007-2017. There is a mild level of correlation showing a tendency for higher increases in the share of newer passenger cars as GDP growth increases. A similarly weak positive relationship with GDP growth is observed for the change in the overall share of passenger cars aged five years or less and an analogous, but opposite relationship is observed for the overall share of passenger cars aged 10 years or more. This modest relationship for the latter two comparisons may be partly attributed to inconsistencies in the de-registration of vehicles for some countries.

It should be noted that the overall trend over the last decade masks a more obvious shift in several individual countries that were particularly impacted by the economic crisis. For example, each of Cyprus, Ireland and Spain show a substantial decrease in the new registration ratio from 2008 or 2009 followed by a recovery in new registration levels in the last three to four years.

This only moderate ECE-wide relationship between passenger car fleet renewal with GDP growth also shows that there are also likely to be many non-economic explanations for the slowing rate of passenger car fleet renewal in many ECE countries. Further research may be warranted to identify additional reasons for these differences in trends between countries as these factors could have relevance for policymakers seeking to improve road safety and emissions in their respective countries.

Transport-related Sustainable Development Goal Measurement

By publishing these data, UNECE hopes to provide policy-makers in member States with the necessary information on the relative share of all transport modes, to make informed decisions about how to make future transport systems safe, efficient, accessible and sustainable.

Relevance to Sustainable Development Goal 3

These data on the age composition of vehicle fleets can be combined with studies on the differences in both passive and active safety features between newer and older cars. This information can help to inform better policies needed to achieve the goal in indicator 3.6.1 of halving the number of global deaths and injuries from road traffic accidents.



Relevance to Sustainable Development Goal 7

Data on vehicle fleet compositions could be combined with any existing energy consumption data by vehicle age to generate energy efficiency indicators. Such indicators would give insights into carbon intensity, local pollution impact and other crucial policy questions based on vehicle age, allowing detailed analysis and tailored policy formulation. This may be explored in more detail in future analyses.



Other data sources to consider

Data on trends in vehicle usage by age would also allow for a better understanding of the safety and emissions impacts of ageing vehicle fleets – relevant to SDG 3 and 7. Data collection on used vehicle imports/exports would also help to identify some of the reasons for variation between countries. While neither of these data are collected on a widespread basis by official sources, many studies have been performed which could be used in future estimation.

Lastly, under the United Nations Framework Convention on Climate Change (UNFCCC) data are available on CO₂ emissions by sector. While these data are not broken down to type of road vehicle, estimations may be possible based on available vehicle kilometre data. Combining these data with differences in average vehicle age across countries could provide policymakers with information on likely reductions in emissions given more rapid renewal of vehicle fleets.

UNECE statistics and country-specific footnotes on road vehicle fleet can be viewed at <http://w3.unece.org/PXWeb/en>.

Information on UNECE's transport-related Sustainable Development Goal capacity-building activities can be viewed at unece.org/trans/transport-and-the-sustainable-development-goals.html, and general details on measurement of the Sustainable Development Goals can be found at unstats.un.org/sdgs/iaeg-sdgs/.

For further information on how to collect transport statistics or to discuss statistical collaboration, please contact Stat.Trans@un.org.