ESTIMATION OF THE DISTANCE TRAVELLED YEARLY BY THE VEHICLE FLEET FOR THE YEAR 2023

MINISTERIO DEL INTERIOR

DGT Dirección General de Tráfico

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Introduction

Having an estimation of the kilometres travelled by the vehicle fleet allows an analysis of mobility and exposure to risk. Since 2013 The Directorate-General for Traffic (DGT) has had access to the readings of the kilometres travelled at every Roadworthiness Test (ITV) for each vehicle in the national fleet. Direct usage of these measurements raises a series of problems: to begin with, new vehicles would not yet have a mileage record; meanwhile, not all vehicles undergo a Roadworthiness Test every year (cars, for example), or do so more than once per year (buses, for example). This denies us access to current and complete mileage information.

Various methods have been employed in the academic literature in an attempt to estimate kilometres travelled. In (Hossain & Gargett, 2011), the quarterly kilometres travelled in each region of Australia are estimated by using fuel sales figures. In (Sungwoon, et al., 2017), the kilometres travelled in a city are estimated by using the traffic volume and the vehicles registered. In the case of Spain, in (Narváez-Villa, et al., 2021) the odometer reading taken at Roadworthiness Tests was used with various machine learning models to estimate the annualised figures for the kilometres travelled by cars in Spain.

In 2023, the DGT published its first study estimating kilometres for the entire vehicle fleet on the road in 2022. This report is intended as an update to the aforementioned report for 2023, and will detail the main results from the new process.

This study follows the methodological approach from the previous year, employing data from several years to adjust the relevant models and predict the annualised kilometre figure based on those years.

Construction of the Roadworthiness Test database

A database is built up using the odometer reading taken at each Roadworthiness Test. The exclusion criteria are as follows:

- All Roadworthiness Tests that are not periodic or that generate a negative result (this therefore excludes type approval Roadworthiness Tests, failed tests, etc.) (Royal Decree 920/2017, of 23 October).
- Vehicles with a sequence of readings not in ascending order (excluding vehicles with errors in the odometer reading, and vehicles that have had their odometer reset)[1].
- Trailers (vehicles in category O) (Royal Decree 2822/1998, of 23 December). Only motor vehicles are thus included.
- Vehicles for agricultural use.

1 Between 2014 and 2023, 7.4% of vehicles did not have an ascending sequence, either because of reading errors or because the odometer had been reset.

- Special vehicles, temporary transportation vehicles, vehicles with a tourist licence plate and with a reserved licence plate.

For each reading from each vehicle, the difference in days between that Roadworthiness Test and the immediately preceding favourable test is calculated. The same procedure applies to the kilometre readings. This allows the annualised kilometre indicated to be calculated for each vehicle and inspection. Where:

- ***DIF_DAYS*** the difference in days between two consecutive favourable inspections.
- ***DIF_KM*** the difference in kilometres between two consecutive favourable inspections.

The annualised kilometres, ***KM_ITV***, for each vehicle between two consecutive Roadworthiness Tests are thus calculated as:

$$KM\_ITV = \frac{DIF\_KM}{DIF\_\text{DAY}\\ \text{S}} \cdot 365.25.$$

Next, the vehicles are grouped into 8 mutually exclusive categories (page 21). Meanwhile, inspections are excluded if the interval between inspections, ***DIF_DAYS,*** lies outside a preset interval for each category. The 8 categories and their intervals are shown in Table 1.

Vehicle Category	Minimum interval (days)	Maximum interval (days)
Mopeds	60	1095 (3 years)
Motorcycles	60	1460 (4 years)
Cars	60	1460 (4 years)
Vans	60	730 (2 years)
Trucks up to 3,500 kg MAM	60	730 (2 years)
Trucks above 3,500 kg MAM	60	365 (1 year)
Buses	60	365 (1 year)
Industrial Tractors	60	730 (2 years)

Table 1. Inclusion intervals for each vehicle category.

The maximum intervals are the legal maximum intervals for a vehicle in each category to attend a roadworthiness test. For example, the 1460 days for cars correspond to the first 4 years exempt from the Roadworthiness Test. Meanwhile, the 60-day minimum interval corresponds to the maximum period permitted by law to rectify vehicle failings. Roadworthiness Tests with lower periods would indicate that the immediately preceding test was not passed.

Table 2 shows the Roadworthiness Test distribution by vehicle type after filtering by interval between inspections. As may be seen, the distribution tails, above all the upper tail, contain atypical values.

	Mopeds	Motorcycles	Cars	Vans	Trucks (<=3,500 kg MAM)	Trucks (>3,500 kg MAM)	Buses	Industrial Tractors
N	923,416	5,638,740	116,827,443	11,848,001	17,635,076	1,788,867	461,663	1,360,080
Mean	2,008	2,728	11,018	12,703	13,017	25,945	48,021	96,513
SD	10,036	8,621	18,913	28,374	31,128	68,974	104,566	105,814
CV	5.00	3.16	1.72	2.23	2.39	2.66	2.18	1.10
Minimum	0	0	0	0	0	0	0	0
P1	0	0	290	103	208	97	16	411
P5	0	108	1,411	989	1,529	1,155	4,003	5,965
P10	0	262	2,449	1,890	2,709	2,511	9,724	14,569
Q1	260	761	4,987	4,363	5,531	6,955	21,727	45,686
Median	1,087	1,824	9,029	8,871	10,131	16,975	40,326	96,945
Q3	2,574	3,566	14,342	16,038	16,718	34,059	62,268	136,380
P90	4,589	5,954	20,544	26,320	25,152	55,422	88,360	161,883
P95	6,264	7,933	25,383	35,194	31,987	72,683	109,535	181,737
P99	11,912	13,671	42,321	61,877	50,803	128,507	170,409	244,840
Maximum	5,435,267	8,566,315	13,857,808	14,003,463	18,776,961	17,205,927	28,629,245	17,718,552

Table 2. Annualised kilometres by vehicle type, for Roadworthiness Tests between 2014 and 2023, all Roadworthiness Tests.

Table 3 establishes the minimum and maximum bounds to eliminate the atypical values. The intervals are established in principle on the basis that they should be as broad as possible to include all relevant vehicles, while in turn eliminating as many erroneous data points as possible.

Vehicle Category	Lower bound (km)	Upper bound (km)
Mopeds	50	30,000
Motorcycles	50	70,000
Cars	1000	200,000
Vans	1000	300,000
Trucks up to 3,500 kg MAM	1000	300,000
Trucks above 3,500 kg MAM	1000	300,000
Buses	1000	300,000
Industrial Tractors	1000	300,000

Table 3. Inclusion intervals, in kilometres, for each vehicle category.

A further sensitivity analysis reveals no significant changes in the limits established for each vehicle category. We refer to the report on the year 2022 for greater detail as to the proposed sensitivity analysis (DGT, 2023).

Table 4 shows the distribution of annualised kilometres after eliminating the atypical data. The influence they had on the variability may be seen.

	Mopeds	Motorcycles	Cars	Vans	Trucks (<=3,500 kg MAM)	Trucks (>3,500 kg MAM)	Buses	Industrial Tractors
N	781,456	5,461,608	112,902,433	11,244,237	17,071,669	1,707,169	448,946	1,333,700
Mean	2,180	2,750	11,210	13,054	13,102	25,654	47,222	94,660
SD	2,478	3,016	9,248	13,528	11,466	25,436	33,782	55,533
CV	1.14	1.10	0.83	1.04	0.88	0.99	0.72	0.59
Minimum	50	50	1,000	1,000	1,000	1,000	1,000	1,000
P1	65	80	1,244	1,178	1,287	1,257	2,105	2,285
P5	132	199	2,091	1,857	2,265	2,290	6,960	8,231
P10	227	350	2,998	2,656	3,293	3,610	11,821	17,106
Q1	580	846	5,381	4,986	5,946	8,053	23,067	47,785
Median	1,431	1,904	9,317	9,408	10,453	18,082	41,233	97,981
Q3	2,917	3,643	14,574	16,573	17,000	35,027	62,772	136,463
P90	4,920	6,031	20,755	26,905	25,423	56,161	88,495	161,302
P95	6,585	8,010	25,595	35,809	32,239	73,130	109,023	179,612
P99	11,697	13,664	42,420	62,180	50,706	125,164	161,652	230,883
Maximum	29,998	69,917	199,998	299,979	299,980	299,916	299,948	299,981

Table 4. Annualised kilometres by vehicle category, for Roadworthiness Tests between 2014 and 2023, filtered data.

Table 5 shows the annualised kilometres by inspection year. The effect of the pandemic may be noted for various vehicle categories.

	Mopeds	Motorcycles	Cars	Vans	Lorries (<=3,500Kg MAM)	Lorries (>3,500Kg MAM)	Buses	Industrial Tractors
2014	2,614	3,376	11,660	12,762	13,993	25,217	46,819	92,265
2015	2,394	3,083	11,665	12,857	13,941	25,080	47,241	93,786
2016	2,288	2,935	11,794	13,008	13,937	24,836	48,296	93,695
2017	2,227	2,858	11,800	13,167	13,840	25,887	49,512	95,230
2018	2,160	2,822	11,693	13,317	13,574	26,627	50,022	95,312
2019	2,110	2,746	11,527	13,383	13,253	26,565	50,114	95,647
2020	2,083	2,657	10,208	11,927	11,587	24,089	39,217	93,996
2021	1,978	2,405	9,690	12,430	11,935	26,383	39,865	96,184
2022	2,088	2,556	10,809	13,475	12,341	25,666	47,241	95,944
2023	2,154	2,709	11,164	13,659	12,319	25,821	51,668	93,407

Table 5. Annualised kilometres travelled by vehicle category and year of inspection.[2]

Lastly, we will show the kernel density estimation[3] of the annualised kilometres for each type of vehicle.

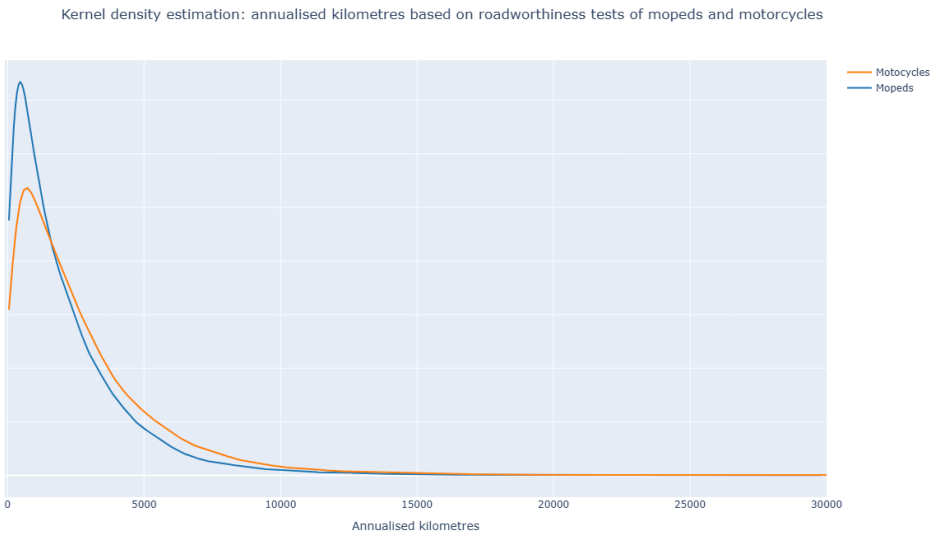

Figure 1. Kernel density estimation of annualised kilometres for mopeds and motorcycles.

[2] Since in this year the Roadworthiness Tests in the temporary deregistration period are included when generating the database, there may be slight variations compared with the average kilometres for the previous year.

[3] Gaussian kernel. The estimation is based on a random sample of 50,000 inspections for each vehicle type. Years 2020 and 2021 not included.

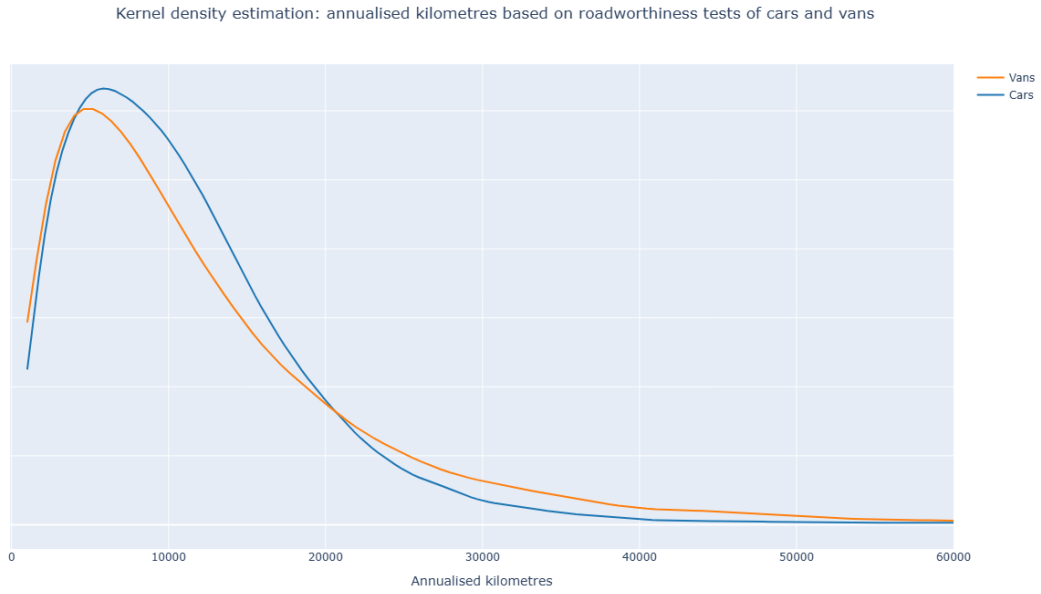

Figure 2. Kernel density estimation of annualised kilometres for cars and vans.

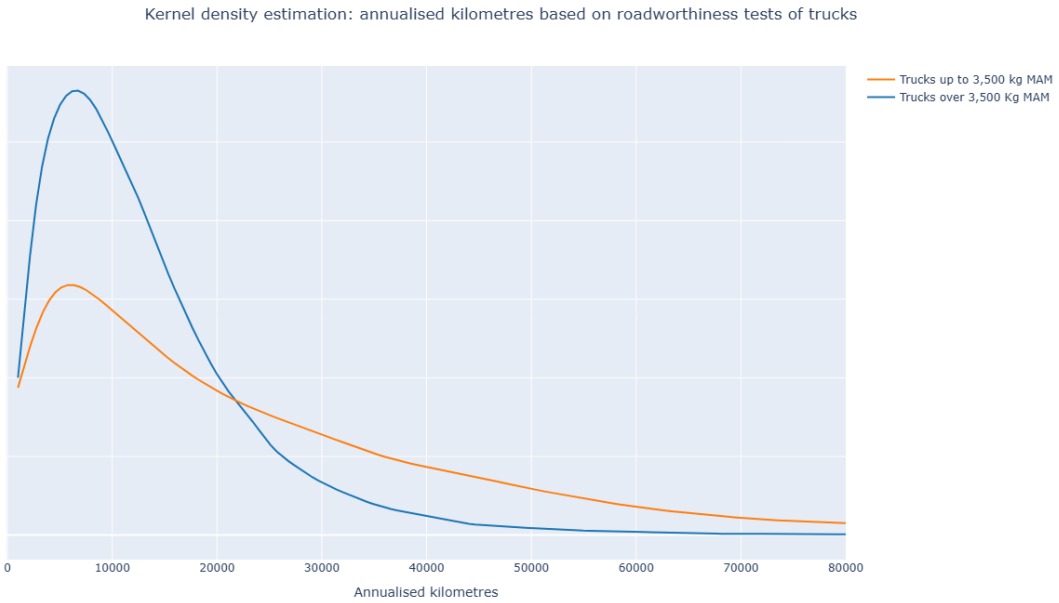

Figure 3. Kernel density estimation of annualised kilometres for trucks.

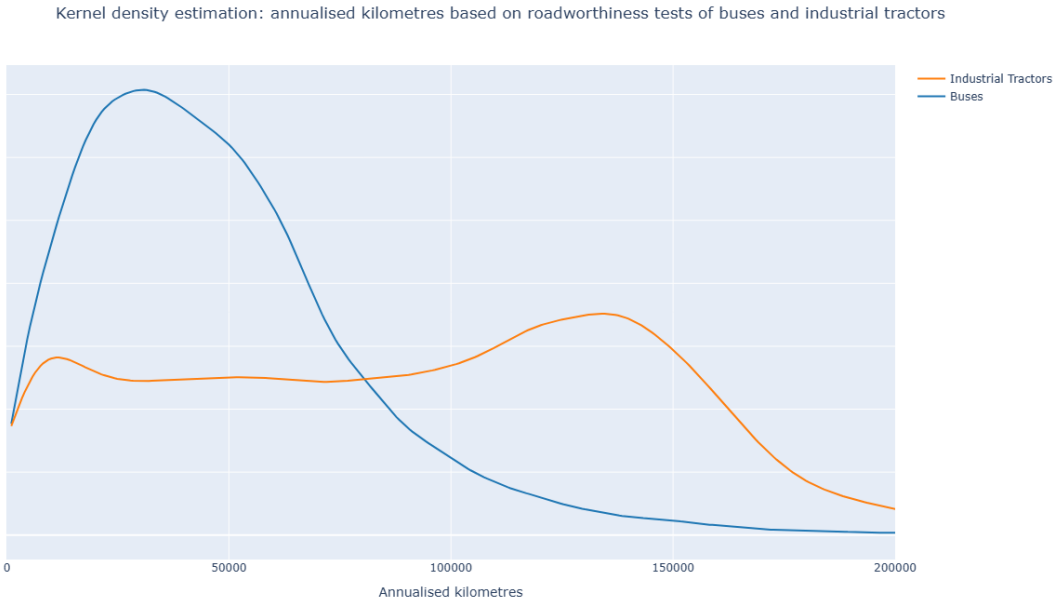

Figure 4: Kernel density estimation of annualised kilometres for buses and industrial tractors.

Kilometre imputation model

Adjustment of the models

The same standard *Gradient Boosting Decision Trees (GBDT)* (Friedman, 2001) models will be adjusted on the basis of the ITV database in order then to extrapolate for the entire fleet. For further detail with regard to the validation of the models employed, we refer to the report for the year 2022 (DGT, 2023).

The following variables were considered as predictors for the annualised kilometres in this year[4]:

- Age: Vehicle age in years.
- Owner age: Age of the registered vehicle owner, in years, if the vehicle owner is an individual.
- Owner sex: The sex of the registered vehicle owner, if the vehicle owner is an individual.
- Number of owners: Number of registered owners that the vehicle has had by the time of the inspection, including the current owner.
- Number of places: Number of places in a vehicle. For a goods vehicle, this will indicate the maximum number of places when the vehicle is equipped for goods transportation (e.g. rear seats folded down).
- Number of standing places: Number of standing places (only in the case of buses for which this figure is recorded on the Roadworthiness Test certificate.)
- Engine capacity: in cubic centimetres (for combustion vehicles only).
- Power: Fiscal horsepower of the vehicle.
- Tare: Tare weight of the vehicle, in kilogrammes.
- Load: Usable load of the vehicle, in kilogrammes (Maximum Authorised Mass - Tare).
- Province: Province where the vehicle is registered.
- Propulsion: Vehicle propulsion type (petrol, diesel, electric, LPG, CNG, hydrogen, etc.).
- Electric Category: If the vehicle is electric, indicate the type of electric propulsion (extended range electric, hybrid, plug-in hybrid or battery electric).
- Electric range.
- Service: Type of service performed by the vehicle (private, public, taxi, school bus, etc.).
- Environmental label

The variables used in each model are shown in Table 6.

[4] Maximum Authorised Mass replaced with vehicle load, and electric range and environmental label added.

	Mopeds	Motorcycles	Cars	Vans	Trucks up to 3,500 kg MAM	Trucks above 3,500 kg MAM	Buses	Industrial Tractors
Age	X	X	X	X	X	X	X	X
Age of Owner	X	X	X	X	X	X	X	X
Sex of Owner	X	X	X	X	X	X	X	X
Num. of Owners	X	X	X	X	X	X	X	X
Num. of Places		X	X	X	X	X	X	X
Num. of Standing Places							X	
Engine Capacity		X	X	X	X	X	X	X
Power	X	X	X	X	X	X	X	X
Tare		X	X	X	X	X	X	X
Load				X	X	X	X	X
Province	X	X	X	X	X	X	X	X
Propulsion	X	X	X	X	X	X	X	X
Electric Category			X	X	X			
Electric Range	X	X						
Service	X	X	X	X	X	X	X	X
Label	X	X	X	X	X	X	X	

Table 6. Variables used in adjusting the models.

Table 7 shows the years used to adjust and validate each model.

Vehicle Category	Adjustment years
Mopeds	2015-2019, 2022, 2023
Motorcycles	2015-2019, 2022, 2023
Cars	2017, 2018, 2019, 2023
Vans	2016-2019, 2022, 2023
Trucks up to 3,500 kg MAM	2016-2019, 2022, 2023
Trucks above 3,500 kg MAM	2018, 2019, 2022, 2023
Buses	2018, 2019, 2023
Industrial Tractors	2015-2019, 2022

Table 7. Years used for vehicle adjustment.

Table 8 shows the prediction capacity measurements of the models. The predictive capacity of the models for this year is equivalent to that of the previous report. The subsequent validation tests correspond to those for the previous year's report, and will be omitted.

	Mopeds	Motorcycles	Cars	Vans	Trucks up to 3,500 kg	Trucks above 3,500 kg	Buses	Industrial Tractors
RMSE	2,250	2,719	7,545	10,705	10,172	19,188	23,530	36,369
MAE	1,416	1,691	5,096	6,565	6,584	13,271	16,383	27,449
Gamma Deviance	0.9230	0.8167	0.3811	0.4663	0.4651	0.6179	0.3052	0.3149
R2	0.1710	0.2029	0.3378	0.3530	0.1727	0.4386	0.5304	0.5678
D2	0.1944	0.2040	0.2685	0.3704	0.1980	0.3478	0.4401	0.4725

Table 8. Predictive capacity measurements of the models.

Main results

This section will list the main results of the model prediction. We refer to the attached documentation for further types of breakdown.

Table 9 shows the estimated kilometres travelled by the on-road vehicle fleet[5] for the years 2022 and 2023.

Year	Mopeds	Motorcycles	Cars	Vans	Trucks (up to 3,500 kg MAM)	Trucks (above 3,500 kg MAM)	Buses	Industrial Tractors
2022	188.2	992.9	30,294.9	3,584.2	2,664.5	686.8	268.1	1,965.3
2023	187.1	1,026.4	30,537.1	3,596.1	2,608.0	694.2	283.9	2,038.9

Table 9. Kilometres travelled by the on-road vehicle fleet for the years 2022 and 2023. The values are shown per 10 million kilometres.

5 For the definition and reasoning of the on-road vehicle fleet, see page 24.

Table 10 shows the average kilometres estimated for each vehicle type in the two estimation years. Figure 5 shows the estimation for the year 2023.

Year	Mopeds	Motorcycles	Cars	Vans	Trucks (up to 3,500 kg MAM)	Trucks (over 3,500 kg MAM)	Buses	Industrial Tractors
2,022	1,759	2,831	13,073	15,815	13,642	25,235	46,607	88,291
2,023	1,807	2,805	12,950	15,410	13,360	25,050	48,226	88,600

Table 10. Average estimated kilometres travelled by the vehicle fleet for the years 2022 and 2023.

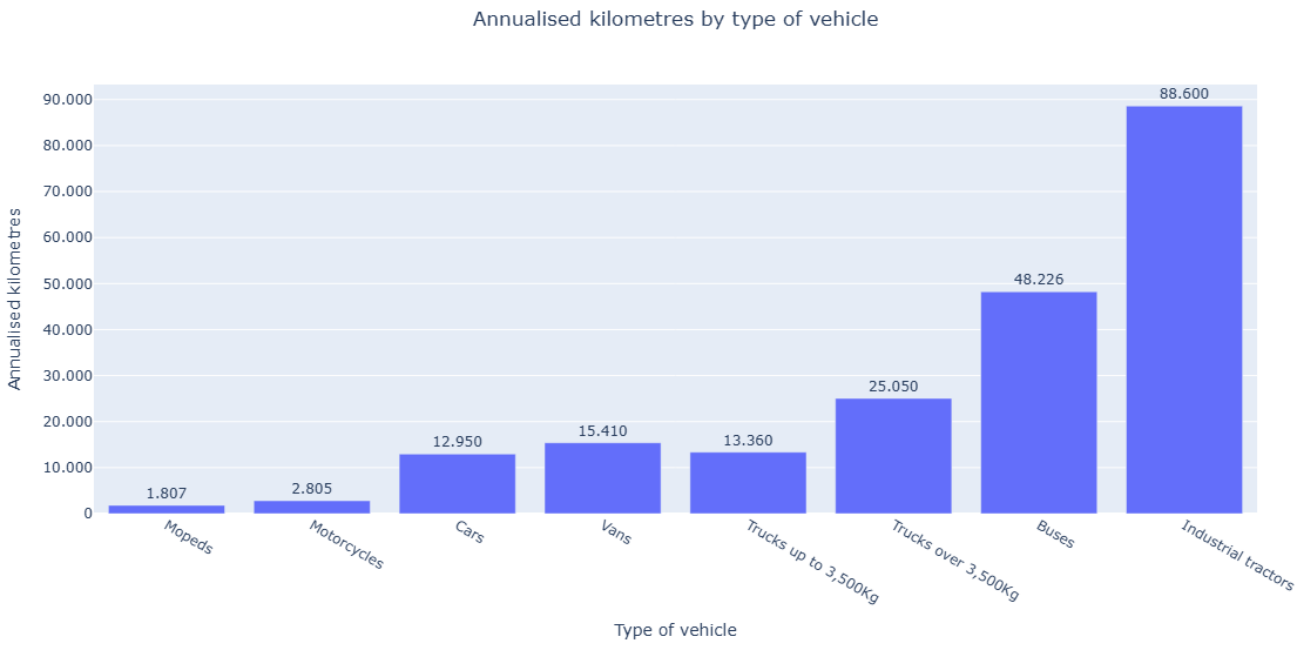

Figure 5. Annualised kilometres estimated by vehicle type, year 2023.

Table 11 shows the estimated kilometres by vehicle age. Figure 6 offers a graphical representation of the estimation for 2023, by vehicle type and age.

Year	Vehicle Age	Mopeds	Motorcycles	Cars	Vans	Trucks (up to 3,500 kg MAM)	Trucks (over 3,500 kg MAM)	Buses	Industrial Tractors
2022	0-4 years	3,602	4,909	21,646	28,730	25,014	47,042	68,357	127,229
2022	5-9 years	2,792	3,144	13,980	21,461	18,986	44,664	57,617	100,153
2022	10-14 years	1,978	2,385	11,464	14,729	14,247	29,338	39,098	65,023
2022	15-19 years	1,700	2,072	9,941	10,656	11,612	21,152	28,533	38,720
2022	20 and older	1,134	1,225	7,687	6,561	8,492	11,741	17,808	19,787
2023	0-4 years	3,358	4,931	22,470	27,641	24,572	44,869	70,599	131,460
2023	5-9 years	2,820	3,103	13,846	20,877	18,791	44,720	59,411	96,492
2023	10-14 years	2,041	2,307	11,365	14,928	14,178	30,465	40,450	66,580
2023	15-19 years	1,773	2,039	9,877	10,674	11,498	21,468	29,291	38,648
2023	20 and older	1,276	1,204	7,586	6,525	8,454	11,759	15,683	16,983

Table 11. Average kilometres estimated by vehicle type and age, years 2022 and 2023.

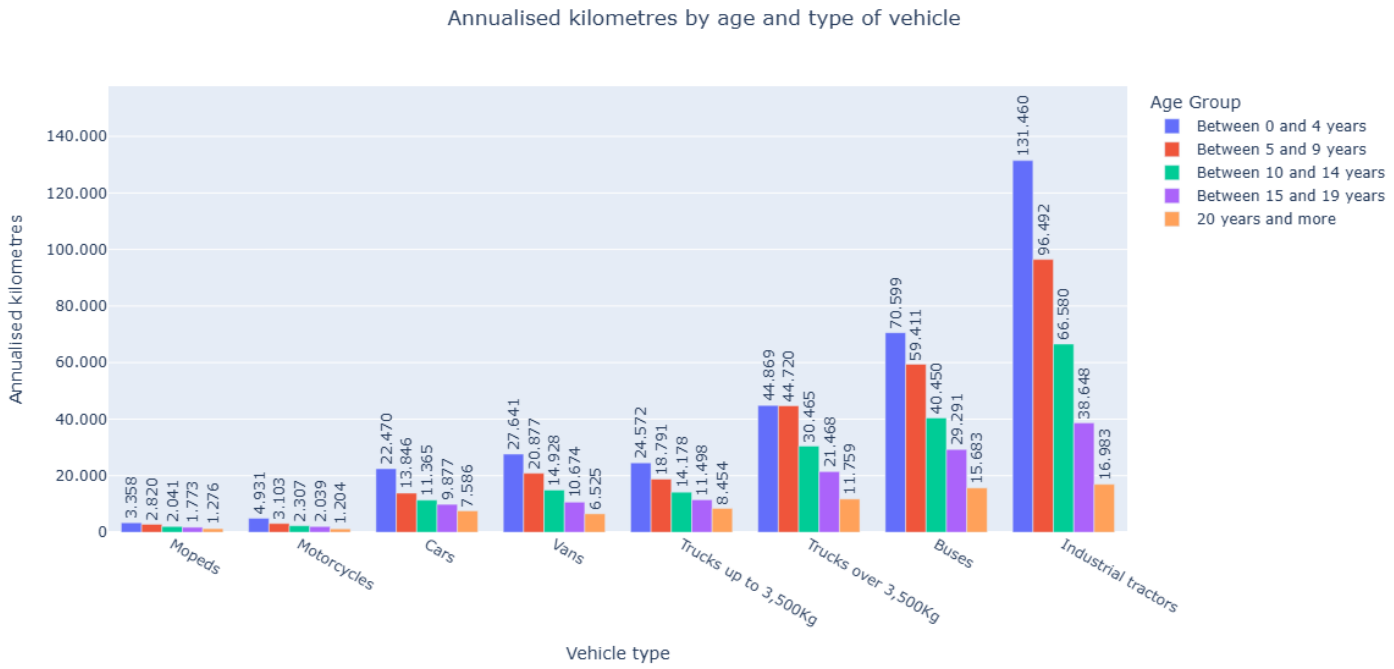

Figure 6. Average kilometres estimated by vehicle type and age, year 2023.

Table 12 below shows the result of the estimations by vehicle propulsion type. Figure 7 and Figure 8 show the graphs corresponding to the year 2023 for light and heavy vehicles, respectively.

Year	Propulsion	Mopeds	Motorcycles	Cars	Vans	Trucks (up to 3,500 kg MAM)	Trucks (over 3,500 kg MAM)	Buses	Industrial Tractors
2,022	Petrol	1,627	2,813	11,540	9,085	8,981	14,716	20,898	
2,022	Diesel	3,469	11,130	14,040	16,598	13,787	25,204	45,938	88,291
2,022	Electric	2,999	3,235	20,463	12,528	9,324	25,876	42,009	
2,022	Other/Unspecified	1,185	1,648	20,604	9,100	12,940	21,343	43,792	
2,022	Butane		2,840	24,178	12,425	12,921	20,001	36,069	
2,022	LPG	1,313	4,496	29,518	22,827	21,064	33,024	61,628	
2,022	CNG		12,683	30,506	26,795	21,067	28,535	55,930	
2,022	LNG	2,289	4,254	21,311	16,391	22,694	73,404	73,342	
2,022	Hydrogen			23,189	21,371		20,248	33,985	
2,022	Biomethane		3,818	15,598	23,489	19,033	32,607	40,560	
2,022	Ethanol			11,977					
2,022	Biodiesel		2,574	12,236	10,541	19,285		71,137	
2,023	Petrol	1,693	2,787	12,261	9,147	8,889	14,676	14,603	
2,023	Diesel	3,373	10,547	13,193	16,160	13,506	25,016	47,733	88,600
2,023	Electric	2,481	3,322	26,992	11,310	9,442	23,304	40,379	
2,023	Butane		2,618	23,839	11,783	11,289	16,534	33,413	
2,023	Liquefied Petroleum Gas	1,219	4,297	25,224	21,539	19,189	33,432	60,227	
2,023	Compressed Natural Gas		12,000	25,520	24,617	19,608	27,175	57,338	
2,023	Liquefied Natural Gas	1,926	3,711	19,693	17,075	19,588	84,490	79,729	
2,023	Hydrogen			18,602	22,306	53,565	19,923	41,556	
2,023	Biomethane		3,853	13,483	27,180	23,423	34,847	42,630	
2,023	Ethanol			11,763					
2,023	Biodiesel		2,109	13,200	32,334	20,502	33,737	81,524	
2,023	Other	1,767	1,478	18,987	8,683	10,766	18,901	39,458	

Table 12. Average kilometres estimated by vehicle type and propulsion, years 2022 and 2023.

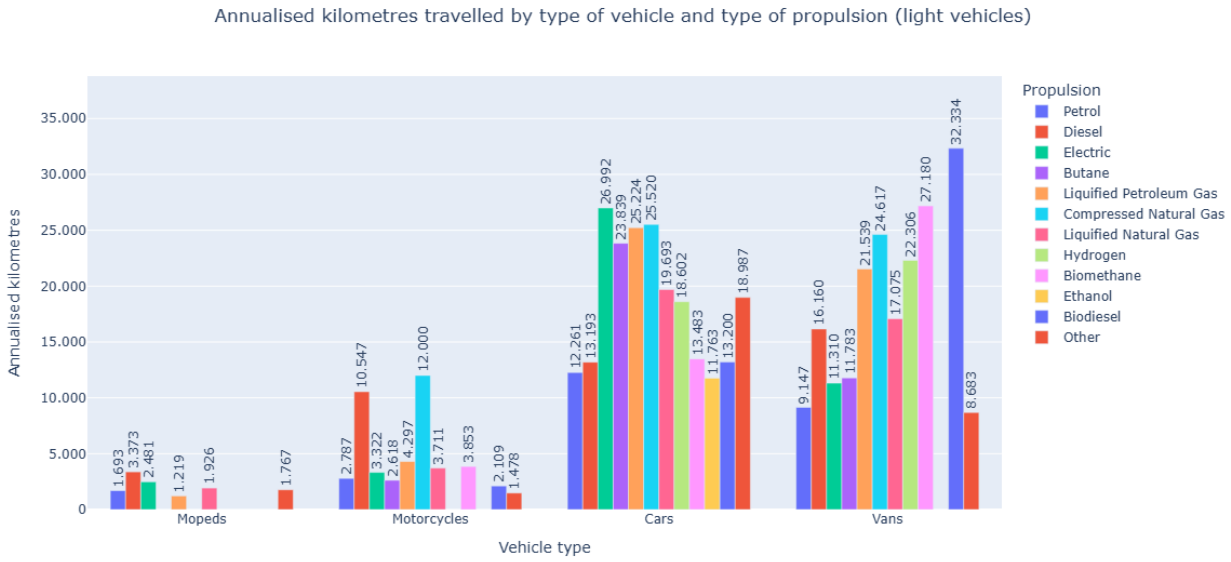

Figure 7. Average kilometres estimated by vehicle type and propulsion (light vehicles), year 2023.

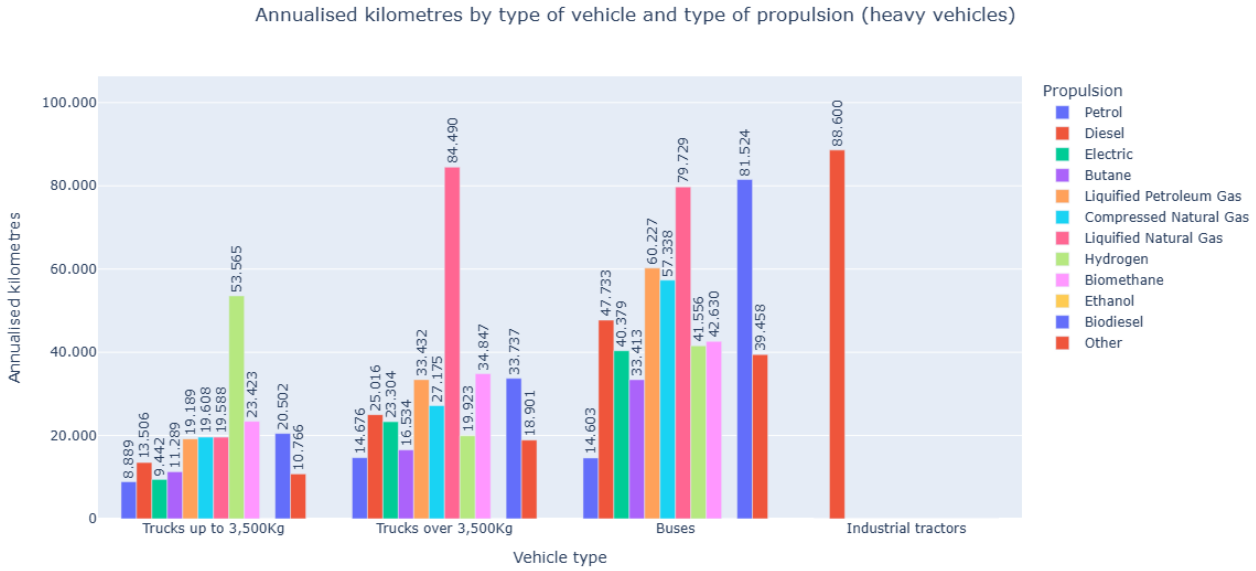

Figure 8. Average kilometres estimated by vehicle type and propulsion (heavy vehicles), year 2023.

Table 13 shows the annualised kilometres estimated for each autonomous region.

Year	Autonomous Region	Mopeds	Motorcycles	Cars	Vans	Trucks (up to 3,500 kg MAM)	Trucks (over 3,500 kg MAM)	Buses	Industrial Tractors
2,022	Andalusia	1,705	2,769	12,326	13,589	12,557	21,459	39,124	94,732
2,022	Aragon	1,346	2,283	12,165	13,938	12,312	27,601	50,934	92,852
2,022	Asturias (Principality of)	1,475	2,225	12,577	14,309	13,825	22,283	53,877	74,567
2,022	Balearic Islands	2,255	3,198	11,991	14,733	12,754	20,353	42,437	37,559
2,022	Canary Islands	2,726	3,460	12,605	13,431	13,267	17,094	43,994	31,484
2,022	Cantabria	1,663	2,374	12,992	15,107	14,253	24,681	37,949	87,677
2,022	Castile and Leon	1,069	2,068	11,921	13,538	12,370	21,248	40,197	78,167
2,022	Castile-La Mancha	1,165	2,125	12,919	13,674	12,274	25,956	40,606	87,454
2,022	Catalonia	2,058	3,145	12,589	14,924	13,679	29,758	42,673	79,219
2,022	Valencia	1,971	2,835	12,228	15,956	13,285	28,654	43,323	89,862
2,022	Extremadura	1,268	2,204	11,903	13,544	12,004	20,208	34,369	77,698
2,022	Galicia	1,595	2,186	12,360	16,005	13,416	22,997	45,331	83,206
2,022	Madrid (Region of)	1,980	3,388	16,762	21,909	18,787	30,728	59,835	108,523
2,022	Murcia (Region of)	1,815	2,535	13,095	17,219	15,512	26,517	34,859	97,053
2,022	Navarre (Devolved Region of)	1,130	2,190	12,144	13,450	12,417	27,846	46,126	88,960
2,022	Basque Country	1,568	2,427	12,056	14,801	13,263	27,331	62,817	82,002
2,022	Rioja (La)	1,185	2,038	11,489	12,860	11,461	26,277	63,280	82,413
2,022	Ceuta	2,259	2,950	9,601	10,259	10,770	14,208	28,831	64,638
2,022	Melilla	1,815	2,738	9,700	9,127	9,803	15,263	32,876	28,495
2,023	Andalusia	1,770	2,742	12,275	13,269	12,165	21,282	39,862	96,299
2,023	Aragon	1,411	2,246	12,053	13,699	12,086	27,992	51,178	94,208
2,023	Asturias (Principality of)	1,540	2,153	12,450	14,195	13,628	22,257	61,465	76,372
2,023	Balearic Islands	2,201	3,141	12,460	14,011	12,289	20,362	46,001	31,273
2,023	Canary Islands	2,849	3,493	12,855	13,099	12,868	17,030	44,597	26,209
2,023	Cantabria	1,852	2,304	12,704	14,808	14,004	24,646	38,719	87,066
2,023	Castile and Leon	1,108	1,993	11,810	13,374	12,047	21,004	41,018	79,113
2,023	Castile-La Mancha	1,204	2,004	12,885	13,743	12,174	25,521	41,606	87,769
2,023	Catalonia	2,056	3,163	12,780	14,692	13,334	29,754	43,933	80,539
2,023	Valencia Region	2,030	2,833	12,139	15,267	13,002	28,510	43,935	91,044
2,023	Extremadura	1,306	2,135	11,758	13,431	11,638	19,346	34,046	79,551
2,023	Galicia	1,683	2,124	12,186	15,590	13,167	22,587	47,848	85,171
2,023	Madrid (Region of)	1,960	3,333	16,116	21,103	18,805	30,395	61,535	102,206
2,023	Murcia (Region of)	1,890	2,452	12,806	16,890	15,272	26,080	35,132	100,299

2,023	Navarre (Devolved Region of)	1,167	2,154	11,942	12,973	12,163	27,735	46,721	94,216
2,023	Basque Country	1,665	2,393	11,818	14,101	12,807	27,431	67,392	82,841
2,023	Rioja (La)	1,251	2,016	11,312	12,518	11,082	26,341	64,142	84,914
2,023	Ceuta	2,392	2,978	9,758	8,685	9,039	9,157	25,878	36,796
2,023	Melilla	2,387	2,699	9,930	8,417	8,353	7,521	25,716	19,585

Table 13. Average kilometres estimated by vehicle type and autonomous region, years 2022 and 2023.

Lastly, we show the evolution of kilometres travelled by motorcycles and cars in the following graphs. Between the years 2014 and 2021, the average of the values observed according to the ITV odometer readings is shown, with the model-based estimations being shown from 2022 onwards. We refer to the attached documents for the graphs for the remaining vehicles.

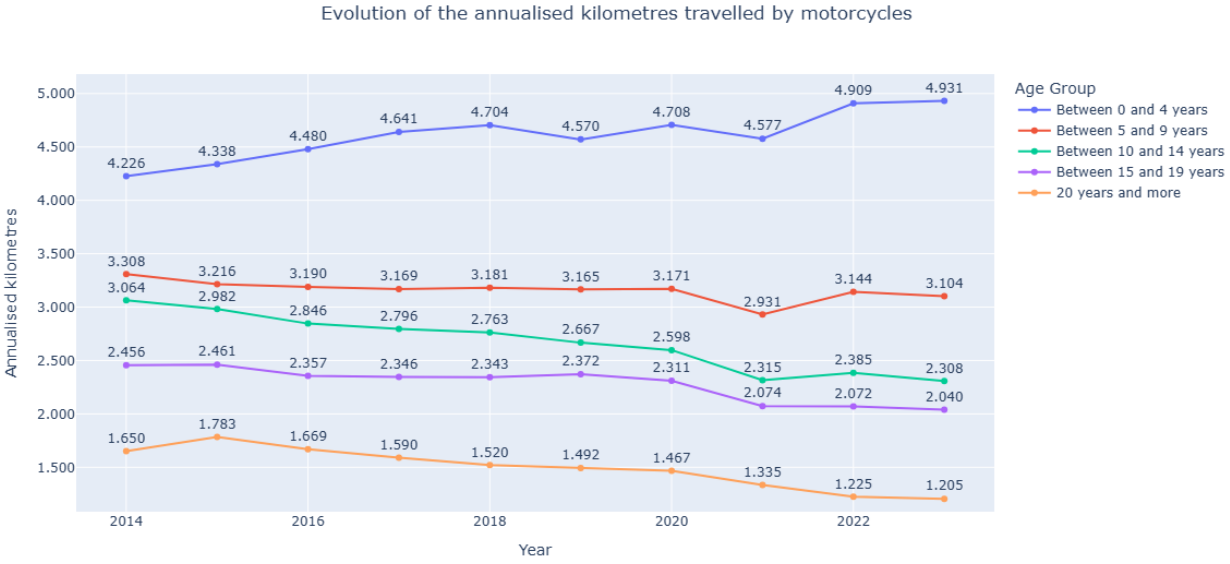

Figure 9. Evolution of the kilometres travelled by the motorcycle fleet.

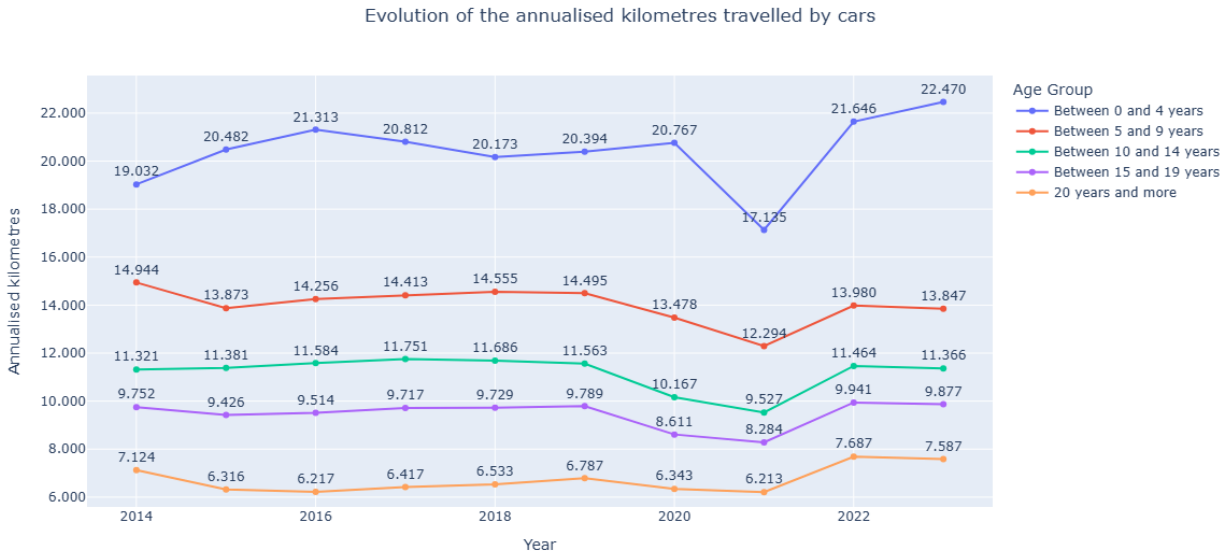

Figure 10. Evolution of the kilometres travelled by the car fleet.

Conclusions

This study constitutes the continuation of the project to estimate the kilometres travelled by the vehicle fleet for the year 2023. The model estimation was found to remain robust, thus allowing new estimations to be offered for the year 2023.

As for possible improvements to the prediction, research could address the inclusion of information as to whether the vehicle has had an accident, or the annualised kilometre reading from a previous Roadworthiness Test, as a predictor of the current kilometres. Consideration will likewise be given to periods when the vehicle is deregistered, as a possible predictor of the annual kilometres.

Annex 1: List of vehicles for each vehicle category

Mopeds

The following vehicles lie within the mopeds category:

- 2-WHEELED MOPED (L1e).
- 3-WHEELED MOPED(L2e).
- LIGHT QUADRICYCLE (L6e).

Motorcycles

The motorcycle category covers all other category L vehicles that are not mopeds:

- 2-WHEELED MOTORCYCLE WITHOUT SIDECAR (L3e).
- MOTORCYCLE WITH SIDECAR (L4e).
- MOTORISED CART (L4)
- 3-WHEELED CAR (L5).
- HEAVY QUADRICYCLE (L7e).
- DISABILITY CAR.

Cars

The car category covers vehicles in category M1. Vans

The following vehicles in category N1 make up the van category.

- VAN.
- MIXED VAN.
- AMBULANCE.
- HEARSE.
- LIGHT TRUCK.
- OFF-ROAD VEHICLE.

Trucks of up to 3,500 kg MAM

The following vehicles in category N1[6] make up the category of trucks up to 3,500 kg MAM.

- TRUCK.
- FLATBED TRUCK.
- BOX TRUCK.
- BOX TRAILER TRUCK.
- BOTTLE TRUCK.
- TANKER TRUCK.
- CAGE TRUCK.
- REFRIGERATED TRUCK.
- WORKSHOP TRUCK.
- QUARRY TRUCK.
- ARTICULATED TRUCK.
- ARTICULATED FLATBED TRUCK.
- ARTICULATED BOX TRUCK.
- ARTICULATED BOX TRAILER TRUCK.
- ARTICULATED BOTTLE TRUCK.
- ARTICULATED TANKER TRUCK.
- ARTICULATED CAGE TRUCK.
- ARTICULATED REFRIGERATED TRUCK.
- ARTICULATED WORKSHOP TRUCK.
- ARTICULATED QUARRY TRUCK.
- CAR TRANSPORTER TRUCK.
- MIXED TRUCK.
- CONTAINER TRUCK.
- GARBAGE TRUCK.
- INSULATED TRUCK.
- SILO TRUCK.
- ADAPTABLE MIXED VEHICLE.
- ARTICULATED CONCRETE MIXER TRUCK.
- ARTICULATED TIPPER TRUCK.
- ARTICULATED CRANE TRUCK.
- ARTICULATED FIREFIGHTING TRUCK.

[6] Motor vehicles designed and manufactured mainly for the transport of goods, with a maximum authorised mass no more than 3.5 tonnes.

Trucks of over 3,500 kg MAM

This category includes the vehicles listed in the category "Trucks up to 3,500 kg MAM" in categories N2[7] and N3[8].

Buses

Vehicles in categories M2[9] and M3[15]:

- BUS.
- ARTICULATED BUS.
- MIXED BUS.
- LIBRARY BUS.
- LABORATORY BUS.
- WORKSHOP BUS.
- HEALTHCARE BUS.

Industrial Tractors

The following vehicles are included from category T[10] and other agricultural vehicles[11]:

- TRACTOR.
- TRACTOR TRUCK.
- TRACTOR CART.

[7] Motor vehicles designed and manufactured mainly for the transport of goods, with a maximum authorised mass of more than 3.5 tonnes and less than 12 tonnes.
[8] Motor vehicles designed and manufactured mainly for the transport of goods, with a maximum authorised mass of more than 12 tonnes.
[9] Motor vehicles designed and manufactured mainly for the transportation of people and their luggage with more than eight places, excluding the driver.
[10] Tractors with agricultural or forestry wheels, manufactured for a maximum speed in excess of 40 km/h.
[11] Other tractors with agricultural or forestry wheels, automotive machines (except those with 1 axle), special trailers, towed machines and tractor carts.

Annex 2: On-road vehicle fleet

The on-road vehicle fleet is considered to comprise automotive vehicles for which during the last ten years there is some entry in the records of the Directorate-General for Traffic in the following spheres:

- Subjected to a technical vehicle inspection.
- With compulsory insurance.
- With change of ownership.
- Registered after temporary deregistration.
- Subject to a complaint.

The aim of these criteria is to reduce the impact of vehicles (in particular very old vehicles) that are no longer used on the road, or were previously taken off the road, without following the established administrative procedures. They are considered to be conservative criteria. Applying the preceding criterion, and depending on the vehicle type, between 5% and 45% of the active vehicle fleet corresponds to vehicles that are not in use on the road.

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