

1.A.3.b vi-vii - Road Transport: Automobile Tyre and Brake Wear and Road Abrasion

This overview chapter provides information on emissions from automobile tyre and brake wear & road abrasion are reported reported in NFR sub-categories 1.A.3.b vi and 1.A.3.b vii. These sub-categories are important sources for a) particle emissions and b) emissions of heavy metals, POPs etc. included in these particles.

NFR-Code	Name of Category
1.A.3.b vi	Automobile Tyre and Brake Wear
1.A.3.b vii	Automobile Road Abrasion

Methodology

Activity data

Specific mileage data for all different types of road vehicles are generated within TREMOD ¹⁾. The following table provides an overview of annual mileages.

Table 1: Mileage data for road vehicles 1990-2018, in 10⁶ kilometers

	= 1990	= 1995	= 2000	= 2005	= 2006	= 2007	= 2008	= 2009	= 2010	= 2011	= 2012	= 2013	= 2014	= 2015	= 2016	= 2017	= 2018
< mileage: combustion engines																	
~ Passenger Cars	> 488,574	> 530,900	> 560,300	> 574,776	> 580,455	> 584,060	> 581,068	> 591,437	> 595,363	> 605,066	> 606,320	> 611,348	> 621,905	> 629,261	> 636,322	> 641,629	> 641,266
~ Light Duty Vehicles	> 17,964	> 27,917	> 36,585	> 41,203	> 37,802	> 38,927	> 39,282	> 39,748	> 40,218	> 40,694	> 41,165	> 41,650	> 42,033	> 45,609	> 47,709	> 49,838	> 52,157
~ Heavy Duty Vehicles	> 40,827	> 54,310	> 62,624	> 60,953	> 63,401	> 65,505	> 65,166	> 60,752	> 62,836	> 64,303	> 63,610	> 64,240	> 64,714	> 65,613	> 66,596	> 67,476	> 68,457
< thereof: Lorries & Trucks	> 36,657	> 50,362	> 58,621	> 56,877	> 59,374	> 61,483	> 61,244	> 56,751	> 58,799	> 60,312	> 59,635	> 60,191	> 60,539	> 61,394	> 62,339	> 63,296	> 64,263
< thereof: Buses	> 4,170	> 3,948	> 4,003	> 4,076	> 4,028	> 4,022	> 3,922	> 4,002	> 4,037	> 3,991	> 3,975	> 4,048	> 4,175	> 4,219	> 4,258	> 4,180	> 4,195
~ Two-wheelers	> 15,734	> 11,851	> 14,816	> 15,399	> 15,294	> 15,622	> 15,458	> 15,664	> 15,192	> 14,793	> 14,402	> 14,157	> 14,184	> 14,487	> 14,492	> 14,489	> 14,624
~ Σ from fuel combustion	~ 563,099	~ 624,978	~ 674,326	~ 692,331	~ 696,952	~ 704,114	~ 700,974	~ 707,602	~ 713,608	~ 724,856	~ 725,498	~ 731,394	~ 742,836	~ 754,969	~ 765,119	~ 773,432	~ 776,504
< mileage: electric engines																	
~ Passenger Cars	> 0	> 0	> 0	> 0	> 0	> 0	> 0	> 0	> 0	> 0	> 53	> 92	> 162	> 255	> 379	> 625	> 996
~ Light Duty Vehicles	> 0	> 0	> 0	> 0	> 0	> 0	> 0	> 0	> 0	> 0	> 13	> 19	> 23	> 30	> 43	> 74	> 119
~ Heavy Duty Vehicles	> 0	> 0	> 0	> 0	> 0	> 0	> 0	> 0	> 0	> 0	> 19	> 19	> 21	> 22	> 23	> 26	> 32
< thereof: Lorries & Trucks	> 0	> 0	> 0	> 0	> 0	> 0	> 0	> 0	> 0	> 0	> 13	> 13	> 14	> 14	> 14	> 16	> 21
< thereof: Buses	> 0	> 0	> 0	> 0	> 0	> 0	> 0	> 0	> 0	> 0	> 6	> 6	> 7	> 8	> 9	> 10	> 11
~ Two-wheelers	> 0	> 0	> 0	> 0	> 0	> 0	> 0	> 0	> 0	> 0	> 19	> 26	> 32	> 38	> 44	> 50	> 55
~ Σ from electric energy	~ 0	~ 0	~ 0	~ 0	~ 0	~ 0	~ 0	~ 0	~ 0	~ 0	~ 104	~ 156	~ 238	~ 345	~ 489	~ 775	~ 1,203
< mileage: combustion and electric engines																	
~ Passenger Cars	> 488,574	> 530,900	> 560,300	> 574,776	> 580,455	> 584,060	> 581,068	> 591,437	> 595,363	> 605,066	> 606,373	> 611,439	> 622,067	> 629,516	> 636,701	> 642,254	> 642,262
~ Light Duty Vehicles	> 17,964	> 27,917	> 36,585	> 41,203	> 37,802	> 38,927	> 39,282	> 39,748	> 40,218	> 40,694	> 41,178	> 41,669	> 42,056	> 45,639	> 47,752	> 49,912	> 52,276
~ Heavy Duty Vehicles	> 40,827	> 54,310	> 62,624	> 60,953	> 63,401	> 65,505	> 65,166	> 60,752	> 62,836	> 64,303	> 63,629	> 64,259	> 64,735	> 65,635	> 66,620	> 67,502	> 68,490

< thereof: Lorries & Trucks	> 36,657	> 50,362	> 58,621	> 56,877	> 59,374	> 61,483	> 61,244	> 56,751	> 58,799	> 60,312	> 59,648	> 60,204	> 60,553	> 61,408	> 62,353	> 63,311	> 64,284
> thereof: Buses	> 4,170	> 3,948	> 4,003	> 4,076	> 4,028	> 4,022	> 3,922	> 4,002	> 4,037	> 3,991	> 3,981	> 4,055	> 4,182	> 4,227	> 4,267	> 4,190	> 4,206
~ Two-wheelers	> 15,734	> 11,851	> 14,816	> 15,399	> 15,294	> 15,622	> 15,458	> 15,664	> 15,192	> 14,793	> 14,422	> 14,183	> 14,216	> 14,525	> 14,536	> 14,539	> 14,679
~ Σ over-all	~ 563,099	~ 624,978	~ 674,326	~ 692,331	~ 696,952	~ 704,114	~ 700,974	~ 707,602	~ 713,608	~ 724,856	~ 725,602	~ 731,550	~ 743,074	~ 755,314	~ 765,608	~ 774,207	~ 777,707

source: TREMOD 6.02 ²⁾

++ Images: Overview annual mileage for considered vehicle types [gallery size="medium"](#) : AD_Mileage.png : AD_Mileage_el.png [gallery](#)

+ [Discussion of emission trends](#)

Please see sub-category chapters [1.A.3.b vi - Tyre and Brake Wear](#)] and [1.A.3.b vii - Road Abrasion](#)].

+ [Recalculations](#)

Recalculations were carried out due to a fundamental revision of the TREMOD software.

Table 2: Revised mileage data , in 10⁶ kilometers

	= 1990	= 1995	= 2000	= 2005	= 2006	= 2007	= 2008	= 2009	= 2010	= 2011	= 2012	= 2013	= 2014	= 2015	= 2016	= 2017
= Passenger Cars																
~ Submission 2020	> 488,574	> 530,900	> 560,300	> 574,776	> 580,455	> 584,060	> 581,068	> 591,437	> 595,363	> 605,066	> 606,373	> 611,439	> 622,067	> 629,516	> 636,701	> 642,254
~ Submission 2019	> 492,280	> 535,524	> 565,345	> 580,075	> 581,651	> 585,242	> 582,199	> 592,595	> 596,536	> 606,237	> 607,522	> 612,576	> 624,573	> 637,014	> 650,866	> 659,589
~ absolute change	> -3,706	> -4,624	> -5,045	> -5,300	> -1,197	> -1,181	> -1,131	> -1,158	> -1,173	> -1,170	> -1,148	> -1,137	> -2,506	> -7,498	> -14,166	> -17,335
~ relative change	> -0,75%	> -0,86%	> -0,89%	> -0,91%	> -0,21%	> -0,20%	> -0,19%	> -0,20%	> -0,20%	> -0,19%	> -0,19%	> -0,19%	> -0,40%	> -1,18%	> -2,18%	> -2,63%
= Light Duty Vehicles																
~ Submission 2020	> 17,964	> 27,917	> 36,585	> 41,203	> 37,802	> 38,927	> 39,282	> 39,748	> 40,218	> 40,694	> 41,178	> 41,669	> 42,056	> 45,639	> 47,752	> 49,912
~ Submission 2019	> 14,259	> 21,794	> 30,941	> 36,251	> 36,855	> 37,847	> 37,461	> 37,429	> 37,583	> 38,204	> 38,732	> 38,966	> 39,343	> 40,962	> 40,938	> 41,596
~ absolute change	> 3,706	> 6,124	> 5,645	> 4,953	> 947	> 1,080	> 1,821	> 2,319	> 2,635	> 2,490	> 2,446	> 2,703	> 2,713	> 4,677	> 6,814	> 8,317
~ relative change	> 26,0%	> 28,1%	> 18,2%	> 13,7%	> 2,57%	> 2,85%	> 4,86%	> 6,20%	> 7,01%	> 6,52%	> 6,31%	> 6,94%	> 6,89%	> 11,4%	> 16,6%	> 20,0%
= HDVs: Trucks																
~ Submission 2020	> 36,657	> 50,362	> 58,621	> 56,877	> 59,374	> 61,483	> 61,244	> 56,751	> 58,799	> 60,312	> 59,648	> 60,204	> 60,553	> 61,408	> 62,353	> 63,311
~ Submission 2019	> 36,657	> 48,951	> 55,441	> 54,213	> 56,159	> 57,873	> 57,819	> 53,974	> 56,418	> 58,171	> 56,785	> 57,167	> 58,482	> 59,398	> 60,858	> 61,489
~ absolute change	> 0	> 1,412	> 3,180	> 2,664	> 3,214	> 3,610	> 3,425	> 2,776	> 2,380	> 2,141	> 2,863	> 3,038	> 2,071	> 2,010	> 1,495	> 1,822
~ relative change	> 0,00%	> 2,88%	> 5,73%	> 4,91%	> 5,72%	> 6,24%	> 5,92%	> 5,14%	> 4,22%	> 3,68%	> 5,04%	> 5,31%	> 3,54%	> 3,38%	> 2,46%	> 2,96%
= HDVs: Buses																
~ Submission 2020	> 4,170	> 3,948	> 4,003	> 4,076	> 4,028	> 4,022	> 3,922	> 4,002	> 4,037	> 3,991	> 3,981	> 4,055	> 4,182	> 4,227	> 4,267	> 4,190
~ Submission 2019	> 4,170	> 4,216	> 4,138	> 3,936	> 3,938	> 3,826	> 3,736	> 3,751	> 3,751	> 3,729	> 3,751	> 3,729	> 3,718	> 3,709	> 3,735	> 3,741
~ absolute change	> 0	> -268	> -134	> 140	> 90	> 196	> 186	> 250	> 286	> 262	> 230	> 326	> 463	> 517	> 531	> 449
~ relative change	> 0,00%	> -6,36%	> -3,25%	> 3,56%	> 2,27%	> 5,13%	> 4,98%	> 6,66%	> 7,61%	> 7,03%	> 6,12%	> 8,74%	> 12,5%	> 13,9%	> 14,2%	> 12,0%

= Motorcycles & Mopeds																
~ Submission 2020	> 15,734	> 11,851	> 14,816	> 15,399	> 15,294	> 15,622	> 15,458	> 15,664	> 15,192	> 14,793	> 14,422	> 14,183	> 14,216	> 14,525	> 14,536	> 14,539
~ Submission 2019	> 15,734	> 12,615	> 15,100	> 16,800	> 17,288	> 14,904	> 15,322	> 15,753	> 15,786	> 16,208	> 16,421	> 16,539	> 16,801	> 16,801	> 16,539	> 16,539
~ absolute change	> 0	> -764	> -284	> -1,401	> -1,994	> 718	> 136	> -89	> -594	> -1,415	> -2,000	> -2,355	> -2,585	> -2,277	> -2,003	> -1,999
~ relative change	> 0,00%	> -6,06%	> -1,88%	> -8,34%	> -11,53%	> 4,81%	> 0,88%	> -0,56%	> -3,76%	> -8,73%	> -12,2%	> -14,2%	> -15,4%	> -13,6%	> -12,1%	> -12,1%

FAQs

bibliography : 1 : Knörr et al. (2019a): Knörr, W., Heidt, C., Gores, S., & Bergk, F.: ifeu Institute for Energy and Environmental Research (Institut für Energie- und Umweltforschung Heidelberg gGmbH, ifeu): Fortschreibung des Daten- und Rechenmodells: Energieverbrauch und Schadstoffemissionen des motorisierten Verkehrs in Deutschland 1960-2030, sowie TREMOD, im Auftrag des Umweltbundesamtes, Heidelberg & Berlin, 2019. : 2 : EMEP/EEA, 2019: EMEP/EEA air pollutant emission inventory guidebook – 2019 **bibliography**

¹⁾ (bibcite 1)

²⁾ (bibcite 1)