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

Short description

In sub-categories *1.A.3.b vi - Road transport: Automobile tyre and brake wear* emissions from automobile tyre and brake wear in RT are reported. Therefore, these sub-category is an important source for a) particle emissions and b) emissions of heavy metals, POPs etc. included in these particles.

Category Code	Method					AD					EF				
1.A.3.b vi	T1, T3					NS, M					CS				
	NO_x	NMVOC	SO_2	NH_3	$PM_{2.5}$	PM_{10}	TSP	BC	CO	Pb	Cd	Hg	Diox	PAH	HCB
Key Category:	-	-	-	-	L/-	L/-	L/-	L/-	-	L/-	-/-	-	-	-/-	-

Methodology

Activity data

Abrasive emissions from tyre and brake wear are estimated based on vehicle-type specific mileage data.

For detailed mileage data, please see superordinate chapter on abrasive emissions from road vehicles.

Emission factors

Table 1: Emission factors applied

		Tyre Wear						Brake Wear					
		PCs	LDVs	HDVs	Buses	Mopeds	Motorcycles	PCs	LDVs	HDVs	Buses	Mopeds	Motorcycles
BC	[mg/km]	1,07	1,69	4,50	4,50	0,55	0,55	0,75	1,17	3,27	3,27	0,44	0,44
$PM_{2.5}$		4,49	7,10	18,9	18,9	1,93	1,93	2,93	4,56	12,7	12,7	1,44	1,44
PM_{10}		6,40	10,1	27,0	24,3	2,80	2,80	7,35	11,5	32,0	28,8	3,63	3,63
TSP		10,7	16,9	45,0	45,0	4,60	4,60	7,50	11,7	32,7	32,7	3,70	3,7
Pb	[µg/km]	1,88	2,97	4,26	3,10	0,81	0,81	45,5	71,0	199	199	22,5	22,5
Hg		0	0	0	0	0	0	0	0	0	0	0	0
Cd		0,05	0,08	0,11	0,08	0,02	0,02	0,17	0,26	0,73	0,73	0,08	0,08
As		0,04	0,06	0,09	0,07	0,02	0,02	0,51	0,79	2,21	2,21	0,25	0,25
Cr		0,26	0,40	0,58	0,42	0,11	0,11	17,3	27,0	75,7	75,7	8,55	8,55
Cu		1,86	2,94	4,21	3,06	0,80	0,80	383	598	1674	1674	189	189
Ni		0,32	0,51	0,72	0,53	0,14	0,14	2,45	3,83	10,71	10,71	1,21	1,21
Se		0,21	0,34	0,48	0,35	0,09	0,09	0,15	0,23	0,66	0,66	0,07	0,07
Zn		79,5	126	180	131	34,2	34,2	65,1	102	284	284	32,1	32,1
B[a]P		0,032	0,049	0,134	0,120	0,013	0,013	NA	NA	NA	NA	NA	NA
B[b]F		0,038	0,063	0,161	0,144	0,019	0,019	NA	NA	NA	NA	NA	NA
B[k]F		0	0	0	0	0	0	NA	NA	NA	NA	NA	NA
I[..]P		0,019	0,028	0,082	0,072	0,006	0,006	NA	NA	NA	NA	NA	NA
∑ PAHs 1-4		0,090	0,140	0,379	0,336	0,038	0,038	NA	NA	NA	NA	NA	NA

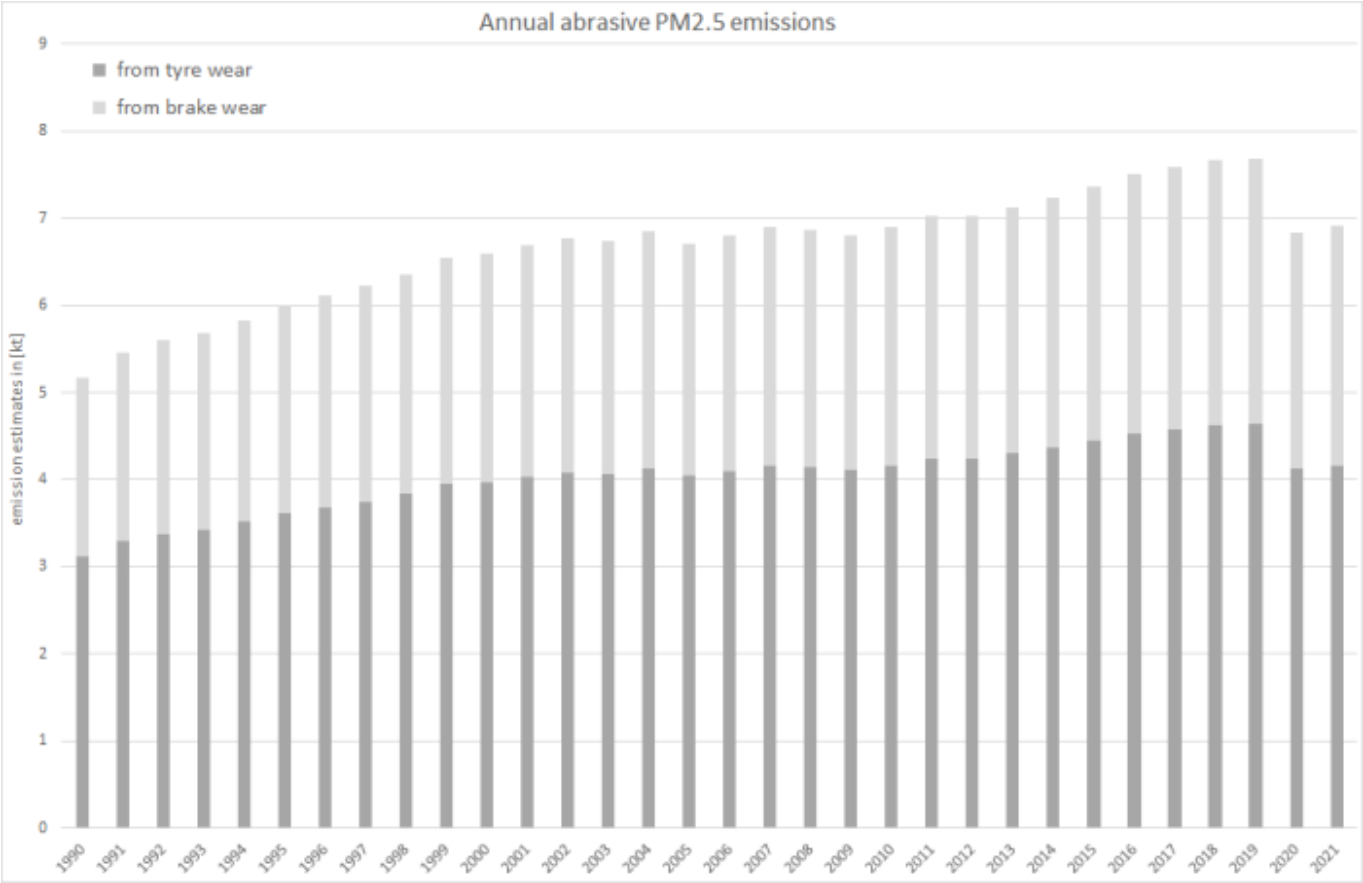
Discussion of emission trends

(emissions from wear/abrasion only; no fuel combustion included)

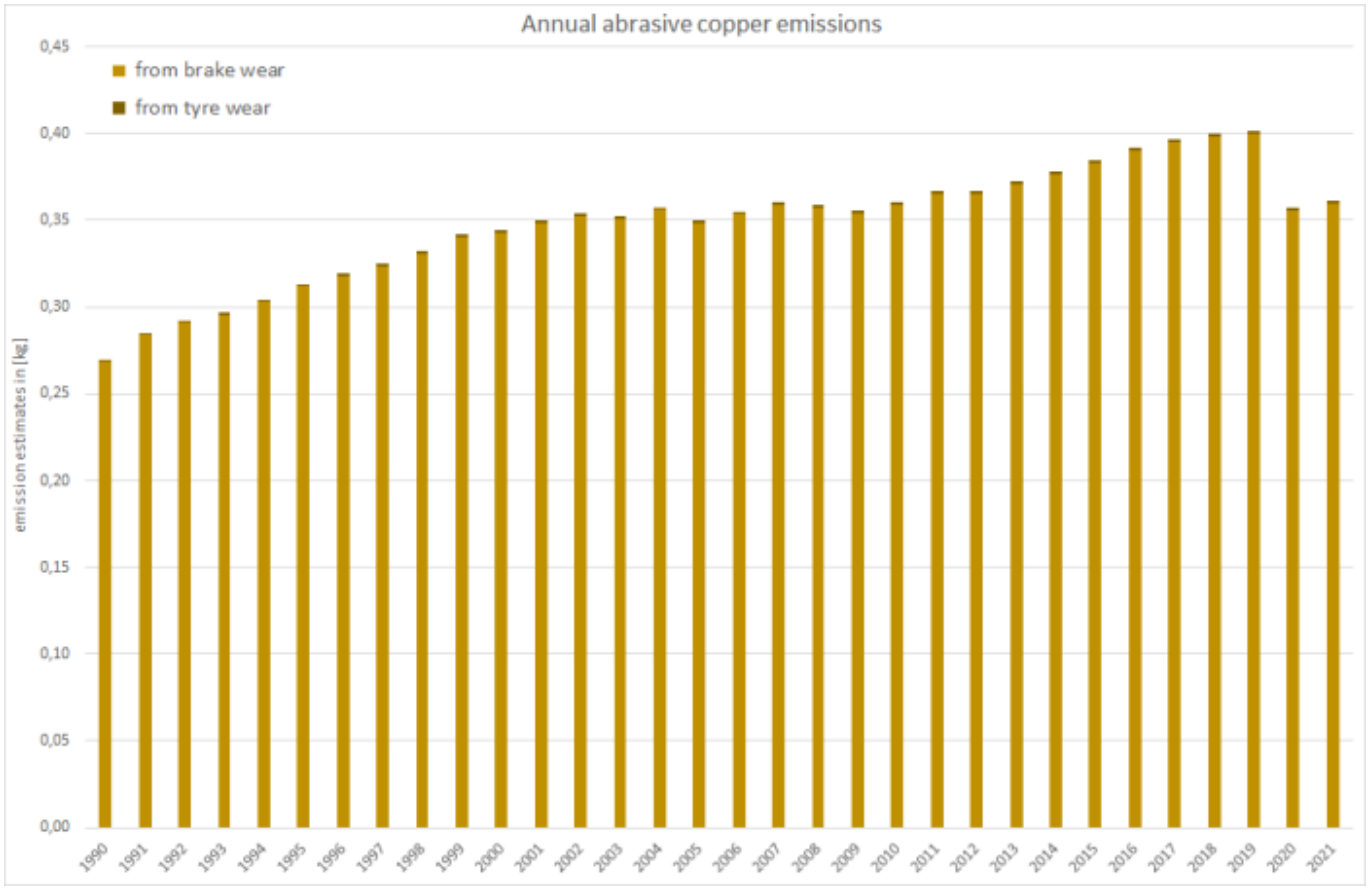
Table 2: Outcome of Key Category Analysis

for:	**BC**	**Pb**	**TSP**	**PM_{10}**	**$PM_{2.5}$**
by:	Level	L/-	L/-	Level & Trend	L/-

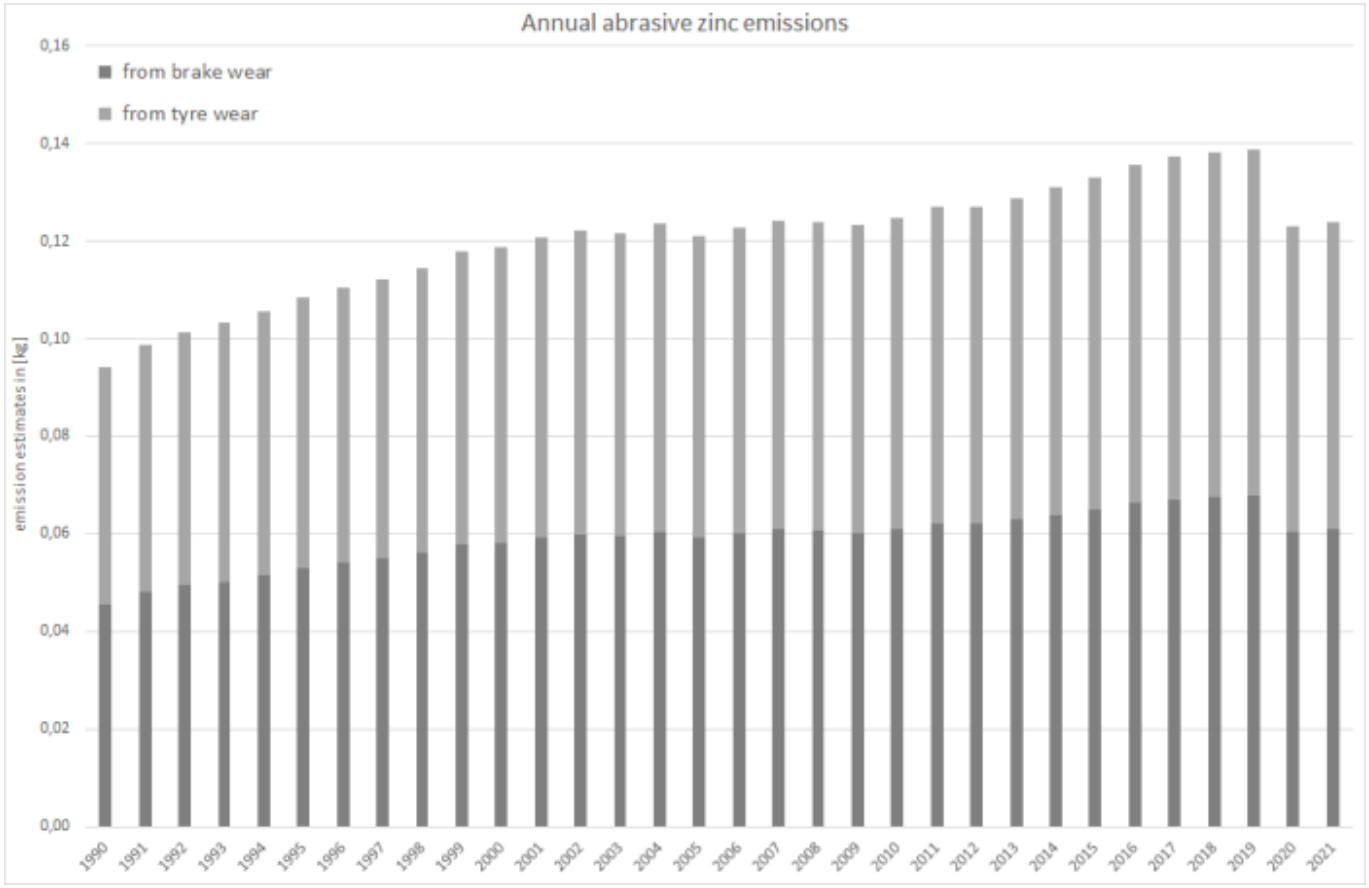
All reported emissons from tyre and brake wear are connected directly to the mileage driven by the road vehicles covered.



Whereas annual copper emissions result almost entirely from the wear of (disc) brakes...



...zinc emissions result from both tyre and brake wear with high amounts of zinc used in tyre rubber and drum brakes.



Recalculations

Compared to last year's submission, emission estimates have been revised due to updated mileage data (see super-ordinate chapter). Differences in the relative changes provided for the specific pollutants result from the different emission factors applied for the different vehicle types.

Table : Revised emission estimates for particulate matter, copper and zinc, in [kt]

	1990	1995	2000	2005	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Black Carbon (BC) - from tyre wear only															
current submission	1.27	1.47	1.62	1.65	1.69	1.73	1.72	1.75	1.78	1.81	1.84	1.87	1.88	1.89	1.68
previous submission	1.27	1.47	1.62	1.65	1.70	1.73	1.73	1.74	1.78	1.80	1.83	1.85	1.86	1.88	1.69
absolute change	0.00	0.00	0.00	0.00	-0.01	-0.01	-0.01	0.01	0.00	0.00	0.01	0.01	0.02	0.01	-0.01
relative change	0.00%	-0.13%	-0.09%	-0.03%	-0.48%	-0.43%	-0.32%	0.39%	0.15%	0.25%	0.73%	0.78%	1.06%	0.43%	-0.43%
$PM_{2.5}$															
current submission	5.16	6.00	6.59	6.70	6.89	7.02	7.02	7.13	7.24	7.36	7.50	7.59	7.66	7.68	6.84
previous submission	5.16	6.00	6.60	6.70	6.93	7.05	7.04	7.10	7.23	7.34	7.45	7.53	7.58	7.65	6.87
absolute change	0.00	-0.01	-0.01	0.00	-0.03	-0.03	-0.02	0.03	0.01	0.02	0.05	0.06	0.08	0.03	-0.03
relative change	0.00%	-0.13%	-0.09%	-0.03%	-0.48%	-0.43%	-0.32%	0.39%	0.15%	0.25%	0.73%	0.78%	1.06%	0.43%	-0.43%
PM_{10}															
current submission	9.56	11.11	12.21	12.42	12.78	13.01	13.01	13.21	13.41	13.64	13.90	14.07	14.20	14.24	12.68
previous submission	9.56	11.12	12.22	12.42	12.84	13.07	13.05	13.16	13.40	13.60	13.80	13.96	14.05	14.17	12.73
absolute change	0.00	-0.01	-0.01	0.00	-0.06	-0.06	-0.04	0.05	0.02	0.03	0.10	0.11	0.15	0.06	-0.05
relative change	0.00%	-0.13%	-0.09%	-0.03%	-0.48%	-0.43%	-0.32%	0.39%	0.14%	0.24%	0.70%	0.79%	1.07%	0.43%	-0.40%
Total Suspended Particles (TSP)															
current submission	12.67	14.71	16.17	16.45	16.91	17.23	17.23	17.49	17.76	18.06	18.40	18.63	18.79	18.85	16.78
previous submission	12.67	14.73	16.18	16.45	17.00	17.30	17.28	17.42	17.74	18.01	18.27	18.49	18.60	18.77	16.85
absolute change	0.00	-0.02	-0.01	0.00	-0.08	-0.07	-0.05	0.07	0.03	0.05	0.13	0.15	0.20	0.08	-0.07
relative change	0.00%	-0.13%	-0.09%	-0.03%	-0.48%	-0.43%	-0.32%	0.39%	0.15%	0.25%	0.73%	0.78%	1.06%	0.43%	-0.43%
Copper (Cu)															
current submission	0.27	0.31	0.34	0.35	0.36	0.37	0.37	0.37	0.38	0.38	0.39	0.40	0.40	0.40	0.36
previous submission	0.27	0.31	0.34	0.35	0.36	0.37	0.37	0.37	0.38	0.38	0.39	0.39	0.40	0.40	0.36
absolute change	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
relative change	0.00%	-0.14%	-0.09%	-0.03%	-0.48%	-0.44%	-0.32%	0.40%	0.16%	0.26%	0.74%	0.80%	1.08%	0.44%	-0.42%
Zinc (Zn)															
current submission	0.09	0.11	0.12	0.12	0.12	0.13	0.13	0.13	0.13	0.13	0.14	0.14	0.14	0.14	0.12
previous submission	0.09	0.11	0.12	0.12	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.14	0.14	0.14	0.12

	1990	1995	2000	2005	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
absolute change	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
relative change	0.00%	-0.11%	-0.07%	-0.02%	-0.39%	-0.35%	-0.26%	0.31%	0.11%	0.19%	0.56%	0.64%	0.86%	0.35%	-0.49%

For **pollutant-specific information on recalculated emission estimates for Base Year and 2020**, please see the recalculation tables following chapter 8.1 - Recalculations.

Planned improvements

Besides a routine revision of the underlying model, no specific improvements are planned.