1.A.3.b vii - Road Transport: Automobile Road Abrasion

Short description

In sub-category *1.A.3.b vii - Road Transport: Automobile Road Abrasion* emissions from road abrasion in Road Transport are reported. Therefore, this sub-category is an important source for a) particle emissions and b) emissions of heavy metals, POPs etc. included in these particles.

Method	AD	EF	Key Category
T1, T3	NS, M	CS	**L&T**: TSP, $PM_{2.5}$, PM_{10}

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

The tier1 emission factors used here have been derived from the 2019 version of the EMEP/EEA air pollutant emission inventory guidebook.

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+++ Emission factors

The tier1 emission factors used here have been derived within a literature study in 2006. During this study, average amounts of particulate wear per km (= EF,,PM,,) were derived from which annual amounts of PM emissions can be estimated as follows:

math \begin{gather} EM(PM)_\text{ annual, type of vehicle} = EF(PM)_\text{ specific, per km} \cdot Mileage_\text{ annual, type of vehicle} \end{gather} math

Table 1: Average abrasion rates [mg TSP / vehicle km] for different types of road vehicles

= **Vehicle type**	= **Ø Abrasion rate**
Passenger Cars	> 15
Motorcycles	> 6
Mopeds	> 6

Light Duty Vehicles	> 15
Heavy Duty Vehicles	> 76
thereof: Trucks	> 76
thereof: Buses	> 15

Based on average contents of heavy metals per gram of emitted particulate road surface matter (also derived during the literature study), emission factors for HM are estimated as follows:

math \begin{gather} EF(HM)_\text{ per km, type of vehicle} = EM(PM)_\text{ per km, type of vehicle} \cdot ØHMcontent_\text{ road surface} \end{gather} math

Table 2: Average heavy metal contents [mg HM / kg TSP] in abrasive particulate matter from road surface

= **HM**	= **Ø Metal content**
= Cd	> 0.21
= Pb	> 4.10
= Hg	> 0.00
= As	> 2.60
= Cr	> 72.00
= Cu	> 2.45
= Ni	> 38.00
= Se	> 0.00
= Zn	> 86.00

From these PM-based emission factors, emission estimates for HM are estimated as follows:

math \begin{gather} EM(HM)_\text{ annual, type of vehicle} = EF(HM)_\text{ per km, type of vehicle} \cdot Mileage_\text{ annual, type of vehicle} \end{gather} math

Table 1: Default tier1 emission factors applied

~ Vehicle Type	= **PCs**	= **LDVs**	= **HDVs**	= **Buses**	= **MTWs**	**1**
< **Particulate Matter**, in [mg/km]						
< BC	> 0.00	> 0.00	> 0.00	> 0.00	> 0.000	
< PM,,2.5,,	> 4.05	> 4.05	> 20.5	> 20.5	> 1.62	
< PM,,10,,	> 7.50	> 7.50	> 38.0	> 34.2	> 3.00	
< TSP	> 15.0	> 15.0	> 76.0	> 76.0	> 6.00	
< **Priority Heavy Metals**, in [µg/km]						
< Pb	> 0.062	> 0.062	> 0.312	> 0.062	> 0.025	
< Hg	> 0	> 0	> 0	> 0	> 0	
< Cd	> 0.003	> 0.003	> 0.016	> 0.003	> 0.001	
< **Other Heavy Metals**, in [µg/km]						
< As	> 0.0390	> 0.0390	> 0.198	> 0.039	> 0.016	
< Cr	> 1.08	> 1.08	> 5.47	> 1.08	> 0.432	
< Cu	> 0.037	> 0.037	> 0.186	> 0.037	> 0.015	
< Ni	> 0.570	> 0.570	> 2.89	> 0.570	> 0.228	
< Se	> 0	> 0	> 0	> 0	> 0	
< Zn	> 1.29	> 1.29	> 6.54	> 1.29	> 0.516	

Discussion of emission trends

> **NFR 1.A.3.b vii - Emissions from road abrasion** is key category for emissions of **PM,,2.5,,**, **PM,,10,,** and **TSP** regarding these emissions' level.

++ Particulate Matter - PM,,2.5,,, PM,,10,, & TSP *(from wear/abrasion only; no fuel combustion included)*

Emissions from road abrasion are directly linked to driven mileage. Thus, the overall trend of emissions from road abrasion is similar to the trend for total driven mileage.

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Recalculations

Activity data (mileage) have been revised due to the regular revision of the TREMOD model. (see superordinate chapter]).

However, the biggest changes occur in the tier1 **emission factors** that have been revised fundamentally in order to be in line with the tier1 default values provided in the EMEP/EEA Guidebook 2019. Unfortunately, the variety of old and revised emission factors cannot be compared here in a comprehendible way.

For more information on recalculated emission estimates for Base Year and 2018, please see the pollutant-specific recalculation tables following chapter 8.1 - Recalculations].

Planned improvements

Besides the **routine revision of the TREMOD model**, no specific improvements are planned.

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bibliography : 1 : EMEP/EEA, 2019: EMEP/EEA air pollutant emission inventory guidebook 2019; https://www.eea.europa.eu/publications/emep-eea-guidebook-2019; Copenhagen, 2019. bibliography