2.A.5.b - Construction and Demolition

Short description

Category Code	Method	AD	EF
2.A.5.b	T1/T2	NS	CS

Method(s) applied	
D	Default
T1	Tier 1 / Simple Methodology *
T2	Tier 2*
T3	Tier 3 / Detailed Methodology *
C	CORINAIR
CS	Country Specific
M	Model
* as described in the EMEP/EEA Emission Inventory Guidebook - 2019, in category chapters.	
(source for) Activity Data	
NS	National Statistics
RS	Regional Statistics
IS	International Statistics
PS	Plant Specific
As	Associations, business organisations
Q	specific Questionnaires (or surveys)
M	Model / Modelled
C	Confidential
(source for) Emission Factors	
D	Default (EMEP Guidebook)
CS	Country Specific
PS	Plant Specific
M	Model / Modelled
C	Confidential

NO_x	NMVOC	SO_2	NH_3	**$PM_{2.5}$**	**PM_{10}**	**TSP**	BC	CO	Heavy Metals	POPs
NA	NA	NA	NA	-/-	**L/-**	**L/-**	NA	NA	NA	NA

L/-	key source by **L**evel only
-/T	key source by **T**rend only
L/T	key source by both **L**evel and **T**rend
-/-	no key source for this pollutant
IE	emission of specific pollutant **I**ncluded **E**lsewhere (i.e. in another category)
NE	emission of specific pollutant **N**ot **E**stimated (yet)
NA	specific pollutant not emitted from this source or activity = **N**ot **A**pplicable
*	no analysis done

With respect to particle emissions, construction is the second main emissions source in the Mineral industries.

Methodology

Since the last update of the EMEP/EEA air pollutant emission inventory guidebook, a tier1 method is applied to estimate particulate matter emissions. However, this tier1 method is applied with various adaptations to national conditions improving it to a rather higher tier, perhaps T1/T2.

The approach for uncontrolled fugitive emissions from 2.A.5.b was adapted for national circumstances within a research project by Kampffmeyer & Visschedijk (2016) [1)], partly considering existing emission-control technologies. As a result, statistical information is combined with modified default emission factors for TSP and PM.

Activity data

Activity data are determined taking into account figures for various construction activities and based on national production statistics.

According to the method applied, figures of area of land affected by construction activities per building were concluded from statistical data and multiplied with emission factors, as explained below. The common uncertainty of 3% for national statistics could be increased as a result of this alculation, but the effect has not yet been quantified.

Emission factors

The emission factors used are results of the adaptation of EMEP/EEA Guidebook defaults (EMEP/EEA, 2023) [2)].

Table 1: Overview of apllied emission factors, in [kg/m^2 * y], for roads in [tons/km^2 * y]

type of building	pollutant	EF value	EF trend
single and two-family houses	TSP	0.0638	constant over time
	PM_{10}	0.0191	constant over time
	$PM_{2.5}$	0.0019	constant over time
apartment buildings	TSP	0.329	constant over time
	PM_{10}	0.099	constant over time
	$PM_{2.5}$	0.0099	constant over time
non-residential	TSP	0.631	constant over time
	PM_{10}	0.189	constant over time
	$PM_{2.5}$	0.0189	constant over time
roads	TSP	1,674	constant over time
	PM_{10}	502	constant over time
	$PM_{2.5}$	50.2	constant over time

However, further assumptions were necessary to use the formula presented in the EMEP/EEA Guidebook:

EM = EF * B * f * m

For example, the emission factors are adapted with correction factors of (i) 0.20 for the moisture level and (ii) 2.22 for the silt content.

The assumption about the duration of the construction activity uses default values from (EMEP/EEA, 2023)[3)]:

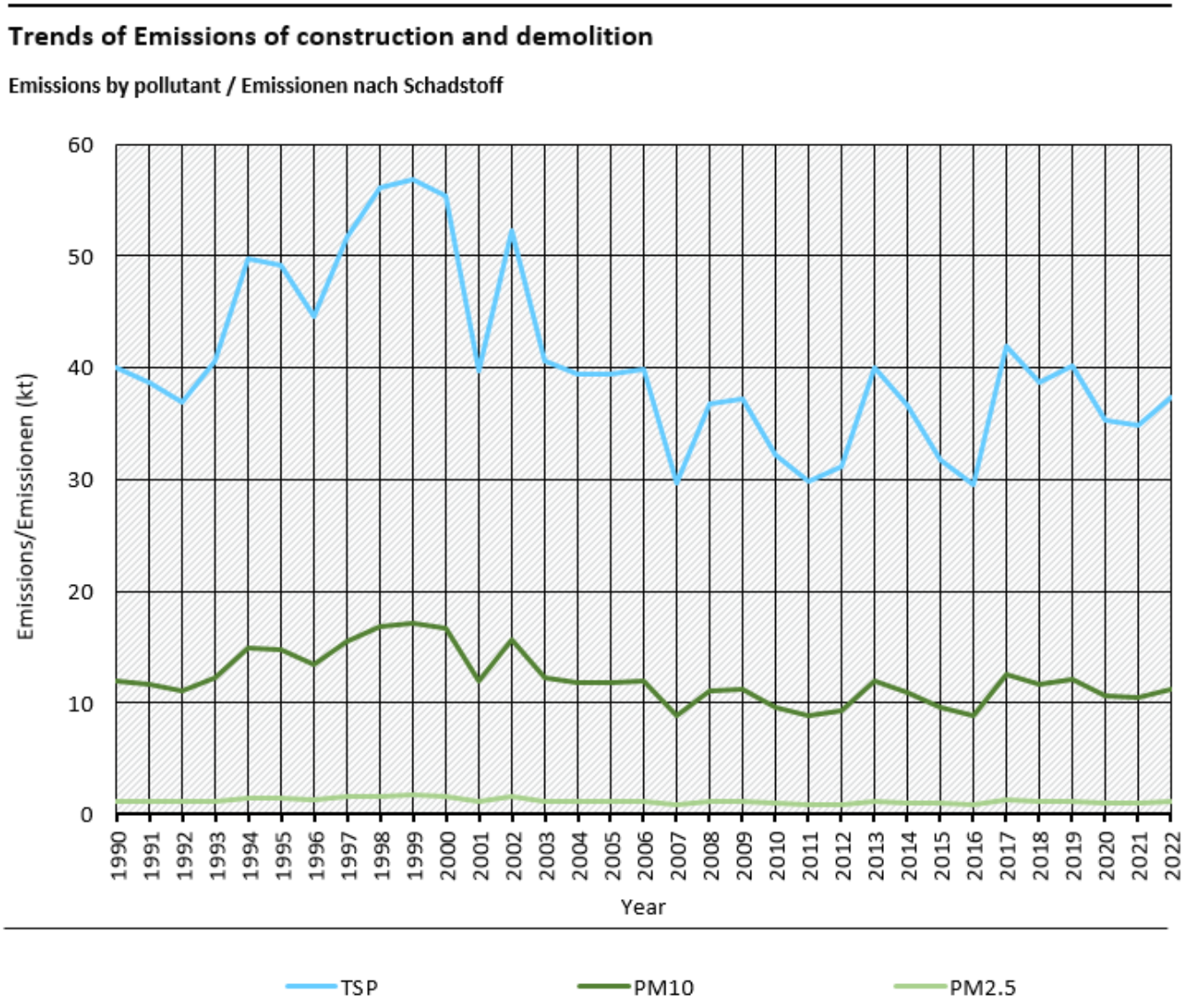
__Table 2: default duration of different construction activities, in years [y]_

Type of building	estimated duration
Construction of houses (single and two family)	0.5 (6 months)
Construction of apartments (all types)	0.75 (9 months)
Non-residential construction	0.83 (10 months)
Road construction	1 (12 months)

AD is a result of multiplying B the number of houses constructed and f the conversion factor.

Trends in emissions

All trends in emissions as product of EF and AD correspond to trends of construction activities.



Emission trends in NFR 2.A.5.b

Note for all: small change for 2023

Notes on PCB emissions from old buildings are provided in chapter 2.K - Consumption of POPs and Heavy Metals of this report.

Recalculations

Recalculations were necessary due to improvements for most recently years (2020-2022): a new data gapfilling method for construction of roads.

For **pollutant-specific information on recalculated emission estimates for Base Year and 2022**, please see the recalculation tables following chapter 8.1 - Recalculations.

Planned improvements

At the moment, no category-specific improvements are planned.

FAQs

Where can I find emissions estimation of demolition activities? - Demolishing without any significant new construction is not covered and there are no other emission factors available for demolition activities only. Nevertheless you can find Information about emissions from 5.E.2 - Other Waste: Building Fires.

Why do German EFs differ from EEA defaults? - It has to do with the default 50% reduction for non-residential buildings and roads (as a result of wetting unpaved temporary roads) that is assumed in the calculations for Germany. This is also already accounted for in the EPA emission factors. It is a result of a control measure that is nearly always taken but in principle optional. In the Guidebook a 50% reduction is advised.

[1)] Kampffmeyer, T., Visschedijk, A.: Development of Methods for the Generation of Emission Data for Air Pollutants from Building Activity and Construction Zones, https://research.ebsco.com/linkprocessor/plink?id=46c9c9e5-c6f9-3229-b7af-6585eb409115; on order of the Umweltbundesamt, Dessau-Roßlau, 2016

[2), 3)] EMEP/EEA (2023): EMEP/EEA air pollutant emission inventory guidebook 2023; https://www.eea.europa.eu/en/analysis/publications/emep-eea-guidebook-2023/part-b-sectoral-guidance-chapters/2-industrial-processes-and-product-use/2-a-mineral-products/2-a-5-b-construction/@@download/file; Copenhagen, 2023