

Category		Title
NFR:	5.E	Other waste
SNAP:	Not applicable	Car and building fires
ISIC:		
Version	Guidebook 2023	

Coordinator

Céline Guéguen

Contributing authors (including to earlier versions of this chapter)

Carlo Trozzi, Katja Hjelgaard, Marc Deslauriers, David R. Niemi and Mike Woodfield, Adriana Gomez Sanabria

Contents

1	Overview	3
2	Description of sources.....	3
2.1	Process description.....	3
2.2	Techniques.....	3
2.3	Emissions	3
2.4	Controls.....	3
3	Methods.....	4
3.1	Choice of method.....	4
3.2	Tier 1 default approach.....	5
3.3	Tier 2 technology-specific approach.....	5
3.4	Tier 3 emission modelling and use of facility data.....	8
4	Data quality	8
5	References	8
6	Point of enquiry.....	9

1 Overview

This chapter covers the emissions from other waste. The following activities are included in this category:

- car fires;
- building fires.

Note: Sludge spreading has been moved to agricultural chapter 3D (in terms of methodological description and allocation).

2 Description of sources

2.1 Process description

Car and building fires

This activity includes mostly unwanted fires in cars and various types of buildings.

2.2 Techniques

Not relevant.

2.3 Emissions

Car and building fires

Emissions from fires include emissions of particulates, possibly heavy metals and main pollutants like NO_x, SO₂, CO, non-methane volatile organic compounds (NMVOC), dioxins and other HAP, depending on the type of material burned. This chapter proposes a methodology to estimate particulate (TSP, PM₁₀, PM_{2.5}) and PCDD/F emissions.

2.4 Controls

No specific information available for this source category.

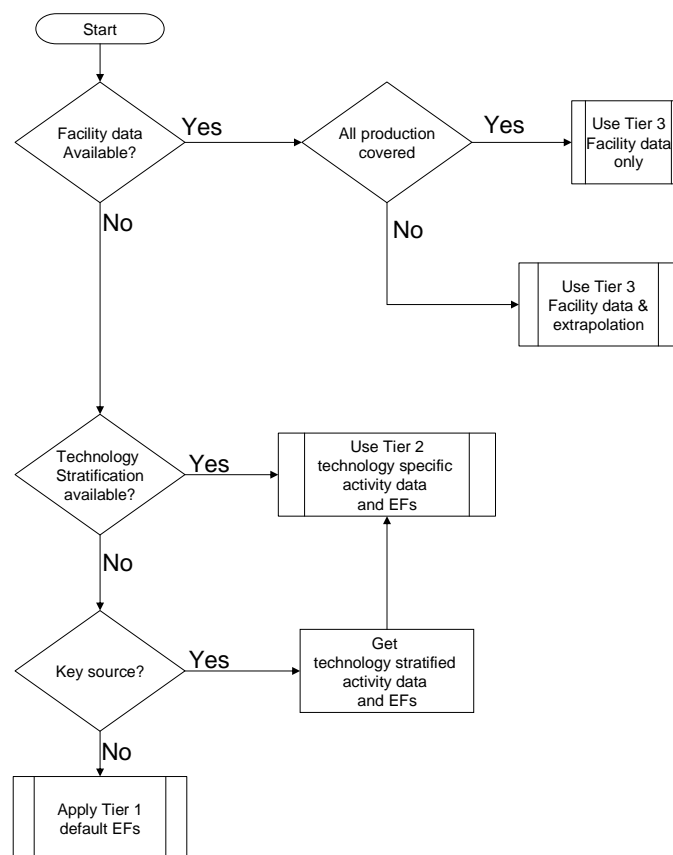
3 Methods

3.1 Choice of method

Figure 3-1 presents the procedure to select the methods for estimating emissions from this source category. The basic idea is:

- if detailed information is available; use it;
- if the source category is a key category, a Tier 2 or better method must be applied and detailed input data must be collected. The decision tree directs the user in such cases to the Tier 2 method, since it is expected that it is easier to obtain the necessary input data for this approach than to collect 'facility level' data needed for a Tier 3 estimate;
- the alternative of applying a Tier 3 method, using detailed process modelling, is not explicitly included in this decision tree. However, detailed modelling will always be done at facility level and results of such modelling could be seen as 'facility data' in the decision tree.

Figure 3-1 Decision tree for source category 5.E Other waste



3.2 Tier 1 default approach

Car and building fires

No Tier 1 approach could be provided for car and building fires.

3.3 Tier 2 technology-specific approach

3.3.1 Algorithm

Car and building fires

Emissions from cars and building fires are estimated following Eq. 1:

$$E_p = \sum AD_i * EF_{i,p} \quad (1)$$

where:

AD_i = Number of fires of category i

i = Fire category (Car fire; Detached house fire; Undetached house fire; Apartment building fire; Industrial building fire)

EF_p = Emission Factor for fire category i and pollutant p

3.3.2 Technology-specific emission factors

This section presents Tier 2 technology-specific emission factors for car and building fires.

Table 3-1 Tier 2 emission factors for source category 5.E Other waste, car fire

Tier 2 emission factors					
	Code	Name			
NFR source category	5.E	Other waste			
Fuel	NA				
SNAP (if applicable)					
Technologies/Practices	Car fire				
Region or regional conditions					
Abatement technologies					
Not applicable	HCH				
Not estimated	SO ₂ , NO _x , NMVOC, CO, NH ₃ , BC, As, Cd, Cr, Cu, Hg, Ni, Pb, Se, Zn, HCB, Benzo(a)pyrene, Benzo(b)fluoranthene, benzo(k)fluoranthene, Indeno(1,2,3-cd)pyrene, PCBs				
Pollutant	Value	Unit	95 % confidence interval		Reference
			Lower	Upper	
TSP	2.3	kg/fire	1	5	Aasestad (2007)
PM ₁₀	2.3	kg/fire	1	5	Aasestad (2007)
PM _{2.5}	2.3	kg/fire	1	5	Aasestad (2007)
PCDD/F	0.048	mg/fire	0.02	0.1	Hansen (2000)

Table 3-2 Tier 2 emission factors for source category 5.E Other waste, detached house fire

Tier 2 emission factors					
	Code	Name			
NFR Source Category	5.E	Other waste			
Fuel	NA				
SNAP (if applicable)					
Technologies/Practices	Detached house fire				
Region or regional conditions					
Abatement technologies					
Not applicable	NH ₃ , HCH				
Not estimated	NO _x , CO, NMVOC, SO ₂ , BC, Ni, Se, Zn, PCBs, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Indeno(1,2,3-cd)pyrene, HCB				
Pollutant	Value	Unit	95% confidence interval		Reference
			Lower	Upper	
TSP	143.82	kg/fire	71.9	287.6	Aasestad (2007)*
PM ₁₀	143.82	kg/fire	71.9	287.6	Aasestad (2007)*
PM _{2.5}	143.82	kg/fire	71.9	287.6	Aasestad (2007)*
Pb	0.42	g/fire	0.2	0.8	Aasestad (2007)*
Cd	0.85	g/fire	0.4	1.7	Aasestad (2007)*
Hg	0.85	g/fire	0.4	1.7	Aasestad (2007)*
As	1.35	g/fire	0.7	2.7	Aasestad (2007)*
Cr	1.29	g/fire	0.6	2.6	Aasestad (2007)*
Cu	2.99	g/fire	1.5	6.0	Aasestad (2007)*
PCDD/F	1.44	mg/fire	0.7	2.9	Aasestad (2007)*

*Personal contact with Kristin Aasestad has provided a correction of the units which are inaccurate in the text of Aasestad (2007)

Table 3-3 Tier 2 emission factors for source category 5.E Other waste, undetached house fire

Tier 2 emission factors					
	Code	Name			
NFR Source Category	5.E	Other waste			
Fuel	NA				
SNAP (if applicable)					
Technologies/Practices	Undetached house fire				
Region or regional conditions					
Abatement technologies					
Not applicable	NH ₃ , HCH				
Not estimated	NO _x , CO, NMVOC, SO ₂ , BC, Ni, Se, Zn, PCBs, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Indeno(1,2,3-cd)pyrene, HCB				
Pollutant	Value	Unit	95% confidence interval		Reference
			Lower	Upper	
TSP	61.62	kg/fire	30.8	123.2	Aasestad (2007)*
PM ₁₀	61.62	kg/fire	30.8	123.2	Aasestad (2007)*
PM _{2.5}	61.62	kg/fire	30.8	123.2	Aasestad (2007)*
Pb	0.18	g/fire	0.1	0.4	Aasestad (2007)*
Cd	0.36	g/fire	0.2	0.7	Aasestad (2007)*
Hg	0.36	g/fire	0.2	0.7	Aasestad (2007)*
As	0.58	g/fire	0.3	1.2	Aasestad (2007)*
Cr	0.55	g/fire	0.3	1.1	Aasestad (2007)*
Cu	1.28	g/fire	0.6	2.6	Aasestad (2007)*
PCDD/F	0.62	mg/fire	0.3	1.2	Aasestad (2007)*

*Personal contact with Kristin Aasestad has provided a correction of the units which are inaccurate in the text of Aasestad (2007)

Table 3-4 Tier 2 emission factors for source category 5.E Other waste, apartment building fire

Tier 2 emission factors					
	Code	Name			
NFR Source Category	5.E	Other waste			
Fuel	NA				
SNAP (if applicable)					
Technologies/Practices	Apartment building fire				
Region or regional conditions					
Abatement technologies					
Not applicable	NH ₃ , HCH				
Not estimated	NO _x , CO, NMVOC, SO ₂ , BC, Ni, Se, Zn, PCBs, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Indeno(1,2,3-cd)pyrene, HCB				
Pollutant	Value	Unit	95% confidence interval		Reference
			Lower	Upper	
TSP	43.78	kg/fire	21.9	87.6	Aasestad (2007)*
PM ₁₀	43.78	kg/fire	21.9	87.6	Aasestad (2007)*
PM _{2.5}	43.78	kg/fire	21.9	87.6	Aasestad (2007)*
Pb	0.13	g/fire	0.1	0.3	Aasestad (2007)*
Cd	0.26	g/fire	0.1	0.5	Aasestad (2007)*
Hg	0.26	g/fire	0.1	0.5	Aasestad (2007)*
As	0.41	g/fire	0.2	0.8	Aasestad (2007)*
Cr	0.39	g/fire	0.2	0.8	Aasestad (2007)*
Cu	0.91	g/fire	0.5	1.8	Aasestad (2007)*
PCDD/F	0.44	mg/fire	0.2	0.9	Aasestad (2007)*

*Personal contact with Kristin Aasestad has provided a correction of the units which are inaccurate in the text of Aasestad (2007)

Table 3-5 Tier 2 emission factors for source category 5.E Other waste, industrial building fire

Tier 2 emission factors					
	Code	Name			
NFR Source Category	5.E	Other waste			
Fuel	NA				
SNAP (if applicable)					
Technologies/Practices	Industrial building fire				
Region or regional conditions					
Abatement technologies					
Not applicable	NH ₃ , HCH				
Not estimated	NO _x , CO, NMVOC, SO ₂ , BC, Ni, Se, Zn, PCBs, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Indeno(1,2,3-cd)pyrene, HCB				
Pollutant	Value	Unit	95% confidence interval		Reference
			Lower	Upper	
TSP	27.23	kg/fire	13.6	54.5	Aasestad (2007)*
PM ₁₀	27.23	kg/fire	13.6	54.5	Aasestad (2007)*
PM _{2.5}	27.23	kg/fire	13.6	54.5	Aasestad (2007)*
Pb	0.08	g/fire	0.04	0.2	Aasestad (2007)*
Cd	0.16	g/fire	0.1	0.3	Aasestad (2007)*
Hg	0.16	g/fire	0.1	0.3	Aasestad (2007)*
As	0.25	g/fire	0.1	0.5	Aasestad (2007)*
Cr	0.24	g/fire	0.1	0.5	Aasestad (2007)*
Cu	0.57	g/fire	0.3	1.1	Aasestad (2007)*
PCDD/F	0.27	mg/fire	0.1	0.5	Aasestad (2007)*

*Personal contact with Kristin Aasestad has provided a correction of the units which are inaccurate in the text of Aasestad (2007)

3.3.3 Abatement

No default abatement efficiency information is available.

3.3.4 Activity data

Car and building fires:

For accidental fires, activity data can be obtained from national statistics or national emergency management agencies.

For countries where statistics are not available, a per capita ratio of fires can be derived from a similar country and be used to estimate the national activity data.

3.4 Tier 3 emission modelling and use of facility data

Not available for this source.

4 Data quality

No source specific issues are applicable to this source category.

5 References

Aasestad K. (eds.) (2007). Norwegian Emission Inventory 2007. Documentation of methodologies for estimating emissions of greenhouse gases and long-range transboundary air pollutants. Report 2007/38, Statistics Norway.

Boldrin, A., Andersen, J.K. & Christensen, T.H. LCA-report: Environmental assessment of garden waste management in Århus Kommune (Miljøvurdering af haveaffald i Århus kommune), Department of Environmental Engineering, Technical University of Denmark.

Hansen, E., Substance Flow Analysis for dioxins in Denmark, Environmental Project No. 570 2000, Miljøprojekt, the Danish Environmental Protection Agency, (In Danish), (<http://www2.mst.dk/udgiv/publications/2000/87-7944-295-1/pdf/87-7944-297-8.pdf>) accessed 23 July 2019.

Pradel, M., Pacaud, T. & Cariolle, M. (2013). Valorization of Organic Wastes Through Agricultural Fertilization: Coupling Models to Assess the Effects of Spreader Performances on Nitrogenous Emissions and Related Environmental Impacts. *Waste Biomass Valor* **4**, 851–872. <https://doi.org/10.1007/s12649-012-9162-2>

Lu, Q.; He, Z.L.; Stoffella, P.J (2012). Land Application of Biosolids in the USA: A Review. *Appl. Environ. Soil. Sci.* 2012,, 201462.

6 Point of enquiry

Enquiries concerning this chapter should be directed to the relevant leader(s) of the Task Force on Emission Inventories and Projection's expert panel on combustion and industry. Please refer to the TFEIP website (www.tfeip-secretariat.org/) for the contact details of the current expert panel leaders.