SNAP CODE: **010103**
010203
020103
020202
020302
030103

SOURCE ACTIVITY TITLE: COMBUSTION IN ENERGY & TRANSFORMATION INDUSTRIES
Particulate emissions from smaller Combustion Plants (<50MWth)

NOSE CODE: **101.03**

NFR CODE: **1 A 1 a-c**
1 A 2 a-f
1 A 4 a, bi, ci

ISIC **3510**

1 ACTIVITIES INCLUDED

This chapter covers emissions of particulate matter released from smaller combustion installations within the energy and transformation industries in boilers and furnaces with a thermal capacity $\leq$ 50 MW_{th}. Emissions of other pollutants from these sources can be found in chapter B111. Note that Chapter B216 also includes some combustion technologies relevant to the energy and transformation industries.

2 CONTRIBUTION TO TOTAL EMISSION

The contributions of PM_{10} and $PM_{2.5}$ emissions released from combustion in small combustion installations to total emissions in countries of the CORINAIR90 inventory is presented in Table 2.1.

Table 2.1 Contribution to total particulate matter emissions from 2004 EMEP database (WEBDAB)

NFR Sector	Data	PM_{10}	$PM_{2.5}$	TSP
1 A 1 a - Public Electricity and Heat Production[a]	No. of countries reporting	26	26	27
	Lowest Value	0.2%	0.2%	0.2%
	Typical Contribution	11.7%	10.1%	12.8%
	Highest Value	48.8%	47.8%	48.4%
1 A 2 - Manufacturing Industries and Construction[b]	No. of countries reporting	26	26	26
	Lowest Value	0.7%	0.6%	0.6%
	Typical Contribution	9.0%	9.5%	7.9%
	Highest Value	20.7%	22.1%	25.7%
1 A 4 a - Commercial / Institutional[c]	No. of countries reporting	23	23	23
	Lowest Value	0.1%	0.1%	0.1%
	Typical Contribution	3.9%	3.4%	4.5%
	Highest Value	19.3%	22.2%	29.5%
1 A 4 b - Residential[d]	No. of countries reporting	3	2	3
	Lowest Value	2.0%	6.5%	3.7%
	Typical Contribution	14.9%	26.2%	10.8%
	Highest Value	36.6%	45.8%	15.4%
1 A 4 b i - Residential plants[e]	No. of countries reporting	23	23	23
	Lowest Value	2.7%	5.8%	0.8%
	Typical Contribution	28.3%	33.1%	22.0%
	Highest Value	67.1%	74.6%	53.2%
1 A 5 a - Other, Stationary (including Military)[f]	No. of countries reporting	7	7	7
	Lowest Value	0.0%	0.0%	0.0%
	Typical Contribution	0.1%	0.1%	0.1%
	Highest Value	0.5%	0.4%	0.6%

[a] Includes contribution from Chapter 112

[b] Includes contributions from Chapter 112 and 316 (SNAP 030106)

[c] Includes contribution from Chapter 112 and 216 (SNAP 020205)

[d] Includes contribution from Chapter 810

[e] Includes contribution from Chapter 112

[f] Includes contribution from Chapter 112 and 216 (SNAP 020106)

3 GENERAL

3.1 Description

This chapter considers emissions of PM generated by boilers smaller than 50 MWth, this chapter covers the energy and transformation industries use of combustion plant and the devices in use are generally larger than 1 MW_{th}. Information on smaller units can be found in Chapter B216. Other emissions from this source category are considered in B111.

3.2 Definitions

See B111.

3.3 Techniques

See B111 for information on boiler types and fuels. Combustion of coal and other solid fuels present the main source for primary PM emissions.

3.4 Emissions

Particulate emissions from small combustion installations burning solid fuels are often greater than emissions from larger plants (per unit of energy input); the physical and chemical characteristics of the PM also differ. This is because different combustion and abatement techniques are applied.

Combustion of fuels will generate solid residues which may be deposited in the combustion chamber (furnace bottom ash), within the furnace, boiler surfaces or ducting (fly ash). Coal and other fuels with a significant ash content have the highest potential to emit PM. Suspended ash material in exhaust gases will be retained by particulate abatement or other emission abatement equipment (abatement residues). Material which remains in the flue gases beyond the abatement equipment and passes to the atmosphere is primary PM. Secondary PM is formed by chemical and physical processes after discharge to atmosphere and is NOT considered here.

3.5 Controls

Particulate emission reduction for smaller boilers is usually obtained applying abatement equipment. It is unlikely that solid-fuel boilers or furnaces in the size range considered in this chapter would be unabated however; some may have comparatively low technology abatement measures. Settling Chambers use gravity separation to remove particles, but the collection efficiency is low. Cyclone separators can be used or, more commonly, units with multiple cyclones are applied to improve the collection efficiency. More efficient abatement measures are electrostatic precipitators and fabric filters, although use of these on the smallest boilers may be limited due to comparatively high capital and operating costs.

Other measures to prevent or reduce particle emissions can also be implemented, such as replacing coal with other fuels, or replacing old appliances with newer, more efficient equipment.

4 SIMPLER METHODOLOGY

Emissions can be estimated at different levels of complexity; it is useful to think in terms of three tiers[1]:

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[1] The term "Tier" is used in the 2006 IPCC Guidelines for National Greenhouse Gas Inventories and adopted here for easy reference and to promote methodological harmonization.

Tier 1: a method using readily available statistical data on the intensity of processes ("activity rates") and default emission factors. These emission factors assume a linear relation between the intensity of the process and the resulting emissions. The Tier 1 default emission factors also assume an average or typical process description.

Tier 2: is similar to Tier 1 but uses more specific emission factors developed on the basis of knowledge of the types of processes and specific process conditions that apply in the country for which the inventory is being developed.

Tier 3: is any method that goes beyond the above methods. These might include the use of more detailed activity information, specific abatement strategies or other relevant technical information.

By moving from a lower to a higher Tier it is expected that the resulting emission estimate will be more precise and will have a lower uncertainty. Higher Tier methods will need more input data and therefore will require more effort to implement.

For the Tier 1 simpler methodology, where limited information is available, a default emission factor can be used together with production capacity information for the country or region of interest without further specification on the type of industrial technology or the type and efficiency of control equipment. For a Tier 2 approach an approximation to the most appropriate technology factors can be adopted with potential, if more detailed activity data are available, for use of default sector or technology factors.

Consequently the simplest methodology (Tier 1) is to combine an activity rate (AR) with a comparable, representative, value of the emissions per unit activity, the emission factors (EF). The basic equation is:

$$\text{Emission} = AR \times EF$$

In the energy sector, for example, fuel consumption would be activity data and mass of material emitted per unit of fuel consumed would be a compatible emission factor.

NOTE: The basic equation may be modified, in some circumstances, to include emission reduction efficiency (abatement factors).

The Tier 2 methodology is a modified version of this basic equation :

$$\text{Emission} = \sum((AR_1 \times EF_1) + (AR_2 \times EF_2) + \ldots.(AR_n \times EF_n))$$

Default emission factors for this purpose are provided in Sections 8.1 and 8.2.

5 DETAILED METHODOLOGY

The detailed methodology (equivalent to Tier 3) to estimate emissions of pollutants from combustion plant <50 MW_{th} is based on measurements or estimations using plant specific emission factors for the types of plant and technologies used within the country - guidance on determining plant specific emission factors is given in the Measurement Protocol Annex.

The recommended detailed methodology to estimate emissions of PM from combustion activities is based on measurements and/or estimations using technology-specific emission factors.

Information on the type of the process and activity data, for example combustion and abatement technologies, is required to assign appropriate emission factors.

Reference emission factors for comparison with users' own data are provided in Section 8.2.

6 ACTIVITY STATISTICS

Activity statistics for fuel consumption in industry sectors for estimating emissions using the simpler estimation methodology (Tiers 1 and 2) are usually derived from national statistics. However, data on fuel use by smaller combustion plant within industry sectors may not be readily available. However, fuel suppliers, regulators and individual operators may be able to provide some data and other information may be available through relevant surveys, energy modelling and other studies.

The detailed methodology (Tier 3) requires more detailed information such as the amount and types of fuel consumed and the type of installation it is used in. However, the large number of plant in most countries will be a constraint on a Tier 3 approach and these data are not always easily available.

Further guidance is provided in the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, volume 2 on energy, Chapter 1.

7 POINT SOURCE CRITERIA

The largest boilers may be considered point sources if plant specific data are available however; in general, this chapter covers area sources only.

8 EMISSION FACTORS, QUALITY CODES AND REFERENCES

8.1 Default Emission Factors For Use With Simpler Methodology (Tier 1)

Table 8.1 Default emission factors for the simple methodology for small combustion installations

Fuel	Emission factor, g GJ^{-1}			Notes[2]
	TSP	PM_{10}	$PM_{2.5}$	
Hard coal, brown coal, other solid fuels	80	60	60	From Chapter B216
Natural gas	0.9	0.9	0.9	US EPA
Derived gases	5	5	5	CEPMEIP worst case for derived gases
Heavy fuel oil	50	40	30	From chapter B216
Other liquid fuels	50	40	30	From Chapter B216
Biomass	50	40	40	From Chapter B216

8.2 Reference Emission Factors For Use With Tier 2 Methodology

Tables 8.2a-z contain reference particulate emission factors for fuel combustion in various technologies with different types of abatement. These are suitable for use with the Tier 2 methodology.

[2] Source: US EPA AP 42 (1996); CEPMEIP (2006)

Table 8.2a Emission factors for combustion processes burning hard coal.

Fuel	**NAPFUE**	**NFR Codes**	**Activity description**	**Activity detail**	**Emission factor**			**Notes**
Hard coal					**TSP**	**PM_{10}**	**$PM_{2.5}$**	
Bit. Coal	101	Various	Electricity, CHP, heat	FF <20 $mg.Nm^{-3}$	6	6	5	CEPMEIP 'BAT'
				ESP (or FF) <50 $mg.Nm^{-3}$	15	12	6	Scaled from CEPMEIP ESP factor. TSP scaled to a nominal 100 $mg.Nm^{-3}$ limit
				ESP <100 $mg.Nm^{-3}$	30	25	12	From CEPMEIP sub-bit coal 'high efficiency ESP', TSP scaled to a nominal 100 $mg.Nm^{-3}$ limit
				ESP Old/conventional <500 $mg. Nm^{-3}$	140	70	17	CEPMEIP
				Unit with multicyclone	100	60	35	CEPMEIP
				Unit, uncontrolled or cyclone	500	250	100	CEPMEIP (N.B. such a high emission concentration would apply to few if any plant)
Sub-bituminous coal	103	Various	Electricity, CHP, heat plant	FF <20 $mg.Nm^{-3}$	6	6	5	CEPMEIP 'BAT'
				ESP (or FF) <50 $mg.Nm^{-3}$	15	12	6	Scaled from CEPMEIP ESP factor (TSP scaled to a nominal 100 $mg.Nm^{-3}$ limit)
				ESP <100 $mg.Nm^{-3}$	30	25	12	From CEPMEIP sub-bit coal 'high efficiency ESP', TSP scaled to a nominal 100 $mg.Nm^{-3}$ limit
				ESP Old/conventional	140	70	17	CEPMEIP

Fuel	NAPFUE	NFR Codes	Activity description	Activity detail	Emission factor			Notes
				<500 mg. Nm^{-3}				
				Unit with multicyclone	100	60	35	CEPMEIP
				Unit, uncontrolled or cyclone	500	250	100	CEPMEIP (the lower of the two TSP factors, the 800 g GJ-1 for small uncontrolled plant is such a high emission concentration that would apply to few if any plant)
Coke	107	1 A 1 b	Oil refineries	Uncontrolled	500	250	100	Coke is unlikely to be burned as primary fuel, when co-fired use the factor for the principal fuel.

Table 8.2b Emission factors for combustion processes burning brown coal.

Fuel	NAPFUE	NFR Code	Activity description	Activity detail	Emission factor			Notes
					TSP	**PM_{10}**	**$PM_{2.5}$**	
Brown coal	105	Various	Electricity plant, CHP plant, heat plant	Modern FF <20 $mg.Nm^{-3}$	9	8	6	CEPMEIP 'BAT'
				High efficiency ESP (or FF)	40	30	14	CEPMEIP
				Conventional large unit with multicyclone	100	60	35	CEPMEIP
Peat	113	Various	Electricity plant, CHP plant, heat plant	Modern abatement (FF) <30 mg.Nm3	9	8	6	CEPMEIP
				Efficient abatement, <50 mg.Nm3	20	15	10	TSP Scaled from emission limit of 50 $mg.Nm^{-3}$
				Efficient abatement, <100mg.Nm3	40	30	20	TSP Scaled from emission limit of 100 $mg.Nm^{-3}$
				Conventional technology	120	40	20	CEPMEIP
				Conventional smaller, multicyclone	300	40	20	CEPMEIP

Table 8.2c Emission factors for combustion processes burning other solid fuels

Fuel	**NAPFUE**	**NFR Code**	**Activity description**	**Activity detail**	**Emission factor**			**Notes**
					TSP	**PM_{10}**	**$PM_{2.5}$**	
Municipal solid waste	114	Various	Electricity plant, CHP plant, heating plant	Effective emission control (BAT)	15	13	10	CEPMEIP, (N.B. care should be taken using this factor as waste burning is often controlled under national/international regulation to a more stringent specification)
				Conventional emission control	100	70	55	CEPMEIP (uncontrolled. optimised combustion), (N.B. care should be taken using this factor as waste burning is often controlled under national/international regulation to a more stringent specification)
Ind. waste	115	Various	Electricity, CHP, heating plant	Effective emission control (BAT)	15	13	10	CEPMEIP, (N.B. care should be taken using this factor as waste burning is often controlled under national/international regulation to a more stringent specification)
				Conventional emission control	100	70	55	CEPMEIP (uncontrolled, optimised combustion), (N.B. care should be taken using this factor as waste burning is often controlled under national/international regulation to a more stringent specification)

Fuel	NAPFUE	NFR Code	Activity description	Activity detail	Emission factor			Notes
				Older small uncontrolled	600	350	210	CEPMEIP (uncontrolled, optimised combustion), (N.B. care should be taken using this factor as waste burning is often controlled under national/international regulation to a more stringent specification)

Table 8.2d Emission factors for combustion processes burning natural gas.

Fuel	NAPFUE	NFR Code	Activity description	Activity detail	Emission factor			Notes
					TSP	PM_{10}	$PM_{2.5}$	
Natural gas	301	Various	Electricity, CHP and heating plant	Burner with optimised combustion	0.1	0.1	0.1	CEPMEIP
				Conventional installation	0.2	0.2	0.2	CEPMEIP
				Conventional installation	0.9	0.9	0.9	USEPA Filterable

Table 8.2e Emission factors for combustion of derived gases.

Fuel	NAPFUE	NFR Code	Activity description	Activity detail	Emission factor			Notes
					TSP	PM_{10}	$PM_{2.5}$	
Gas works gas	311	Various	Electricity, CHP and heating plant	Clean fuel, efficient combustion	0.1	0.1	0.1	CEPMEIP
				Clean fuel, Conventional installation	0.2	0.2	0.2	CEPMEIP (conventional installation)
				Conventional installation	5	5	5	CEPMEIP (High PM due to fuel quality)
Other gaseous fuel	314	Various	Electricity, CHP and heating plant	Clean fuel, efficient combustion	0.1	0.1	0.1	CEPMEIP
				Conventional installation	5	5	5	CEPMEIP

Fuel	**NAPFUE**	**NFR Code**	**Activity description**	**Activity detail**	**Emission factor**			**Notes**
Coke oven gas	304	Various	Electricity, CHP heating plant, coke ovens	Clean fuel, efficient combustion	0.1	0.1	0.1	CEPMEIP
				Clean fuel, conventional installation	0.2	0.2	0.2	CEPMEIP (conventional installation)
				Conventional installation	5	5	5	CEPMEIP
Blast furnace gas	305	Various	Electricity, CHP and heating plant, coke ovens	Clean fuel, efficient combustion	0.1	0.1	0.1	CEPMEIP
				Clean fuel, Conventional installation	0.2	0.2	0.2	CEPMEIP (conventional installation)
				Conventional installation	5	5	5	CEPMEIP

Table 8.2f Emission factors for combustion of heavy fuel oil.

Fuel	NAPFUE	NFR Code	Activity description	Activity detail	Emission factor			Notes
					TSP	PM_{10}	$PM_{2.5}$	
Residual fuel oil	203	Various	Electricity, CHP and heating plant	Low S fuel with optimised burner and abatement	3	3	2.5	CEPMEIP. (About 10 mg.Nm^{-3} or BAT)
				Low S fuel, efficient combustion	14	12	10	CEPMEIP (About 50 mg. Nm^{-3})
				Low-Medium S fuel, conventional installation	20	15	9	CEPMEIP (about 70 mg. Nm^{-3})
				Low-Medium S fuel, conventional installation	60	50	40	CEPMEIP (higher of two entries used. about 200 mg.N Nm^{-3})
				High S fuel	210	190	130	CEPMEIP (lower of two entries for high S used (higher entry 240 g GJ-1 for TSP). Very high emission concentration (about 750 mg. Nm^{-3})
Petroleum coke	110	1 A 1 b	Oil refineries	Conventional, multicyclone	100	60	35	CEPMEIP, *Bit. Coal factors more appropriate.*

Table 8.2g Emission factors for combustion of other liquid fuels.

Fuel	NAPFUE	NFR Code	Activity description	Activity detail	Emission factor			Notes
					TSP	PM_{10}	$PM_{2.5}$	
Gas/Diesel oil	205	Various	Electricity, CHP, heating plant	Optimised burner	2	2	2	CEPMEIP
				Conventional burner	5	5	5	CEPMEIP
Naphtha	210	1 A 1 b	Oil refineries	All units	5	5	5	CEPMEIP
Liquefied Petroleum gas	303	Various	Electricity, CHP, heating plant	Optimised burner	0.1	0.1	0.1	CEPMEIP
				Conventional burner	5	5	5	CEPMEIP
Refinery gas	308	Various	Electricity, CHP, heating plant	Optimised burner	0.1	0.1	0.1	CEPMEIP
				Conventional burner	5	5	5	CEPMEIP
Other oil	224	Various	Electricity, CHP, heating plant	Low S fuel, optimised burner	3	3	2.5	CEPMEIP
				Low S fuel, efficient combustion	14	12	10	CEPMEIP for residual oil. (About 50 mg. Nm^{-3} (LCPD limit for existing plant)
				Low-Medium S fuel, conventional installation	20	15	9	CEPMEIP. (about 70 mg. Nm^{-3})
				Low-Medium S fuel, conventional installation	60	50	40	CEPMEIP, (highest of similar entries with TSP of 35, 40, 50 and 60 used. About 200 mg.N Nm^{-3})
				High S fuel	210	190	130	CEPMEIP, lower of two entries for high S used.

Fuel	NAPFUE	NFR Code	Activity description	Activity detail	Emission factor			Notes
					TSP	PM_{10}	$PM_{2.5}$	
								(This is a very high emission concentration (about 750 mg.N Nm^{-3})

Table 8.2h Emission factors for combustion of biomass

Fuel	NAPFUE	NFR Code	Activity description	Activity detail	Emission factor			Notes
					TSP	PM_{10}	$PM_{2.5}$	
Wood	111	Various	Electricity, CHP, heating plant	Modern unit with FF, <20 mg.Nm3 TSP	7	7	6	TSP scaled from BAT benchmark, fractions applied based on Bit coal
				Older unit, <100 mg.Nm3 TSP	35	25	12	TSP scaled from emission concentration, fractions based on bit coal
				Uncontrolled conventional	100	70	55	CEPMEIP (Uncontrolled Multicyclone)
				Conventional minimal control	160	150	150	CEPMEIP for conventional installation
Charcoal	112	1 A 2 c	Chemicals	Conventional large unit with multicyclone	100	60	35	CEPMEIP, the use of charcoal is likely to be very rare.
					400	100	35	CEPMEIP, the use of charcoal is likely to be very rare. .
Black liquour	215	1 A 2 f	Textile & leather (Pulp and Paper)	Conventional installation	160	150	150	CEPMEIP (N.B. such a high emission concentration would apply to few if any

Fuel	**NAPFUE**	**NFR Code**	**Activity description**	**Activity detail**	**Emission factor**			**Notes**
					TSP	**PM_{10}**	**$PM_{2.5}$**	
								plant)
Biogas	309	Various	Electricity, CHP, heating plant	Modern optimised large installation	3	3	2.5	(CEPMEIP, clean fuel)
				Conventional burner	5	5	5	CEPMEIP
				Modern, optimised	20	15	10	CEPMEIP (gasification plant),

9 SPECIES PROFILES

The US EPA (2003) undertook a review of species profiles within $PM_{2.5}$ and reports particle size distribution data for a variety of fuels and combustion and abatement technologies. Some of these data are dated and have high uncertainty ratings. Profiles of other materials are not available.

Table 9-1 US EPA $PM_{2.5}$ species profile for combustion activities

Profile ref	Profile name	Component				
		POA	PEC	GSO4	PNO3	Other
22002	Residual Oil Combustion	0.1075	0.0869	0.5504	0.0005	0.2547
22003	Distillate Oil Combustion	0.0384	0.0770	0.3217	0.0024	0.5605
22004	Natural Gas Combustion	0.6000	0.0000	0.2000	0.0055	0.1945
22007	Liquid Waste Combustion	0.0540	0.1050	0.0680	0.0000	0.7730
22009	Solid Waste Combustion	0.0068	0.0350	0.0680	0.0000	0.8902
NCOAL	Coal Combustion	0.20	0.01	0.16	0.005	0.625
NWWAS	Wood Waste Boiler	0.39	0.14	0.08	0	0.39

Notes:
POA - Primary organic aerosol derived from organic carbon
PEC Elemental Carbon
GSO4 - Sulphate
PNO3 - Nitrate
Other – Remainder of $PM_{2.5}$ material emitted.

Note that the data for the coal combustion and some other profiles are derived from dilution tunnel measurements on large combustion plant and may not be directly comparable with primary $PM_{2.5}$ from sub-50 MW_{th} boilers.

10 UNCERTAINTY ESTIMATES

The overall 'Uncertainty' in national emission inventories may be significant – as illustrated in Table 9.1.

Table 9.1 Uncertainty estimate for selected pollutants in the UK air emission inventory (NAEI, 2005).

Pollutant	Estimated Uncertainty (%)
PM_{10}	-20 to +50
$PM_{2.5}$	-20 to +30
$PM_{1.0}$	-10 to +20
$PM_{0.1}$	+/- 10
Sulphur Dioxide	+/- 3
Oxides of Nitrogen	+/- 8
NMVOCs	+/- 10
Ammonia	+/- 20

There is uncertainty in both the aggregated emission factors and activity data used to estimate emissions i.e. the imprecision and error to be expected from the application of an 'average' emission factor or activity statistic to estimate emissions from a specific sector - an artificial grouping of 'similar' sources.

The uncertainty is partly the result of how emission factors are developed and applied. In the case of primary particulate matter, the expanded statistical uncertainty is made up of: between plant variance, within plant variance, and uncertainties associated with the measurement methodology used and the aggregation of data. The measurement data in Annex 1 illustrates the variability in emission factors that occurs from between plant variance.

Process measurements, from which emission factors are developed at individual facility level, are subject to both systematic and random errors in the determination of mass concentration, mass emission, size distribution, and analytical errors etc.

In addition bias may exist in emission factors arising from:

1. Assumptions made about the abatement used on 'typical' industrial installations. For example emission factors 'age', the factors widely used in the Guidebook and hence by many countries as default emission factors in their national inventories become out of date. Recent measurement work suggests that they may overestimate emissions from the industrial processes subject to more modern industrial emissions regulation. They may, however, still be fully representative for older plant, small plant, or for poorer fuels;
2. Assumptions about the relationship between TSP and PM10/$PM_{2.5}$. The technical literature is comprehensive for TSP and the data quality can be good if measurements

have been made using the international standard methods that are available (typically the 95% confidence limit ~10%). But a variety of methods are used for particle size fractionation and as yet there are no harmonised international standards to ensure comparability. Published measurement data for PM10 is sparse, that for $PM_{2.5}$ emissions more so. An added complication is that the methodology for the determination of TSP differs from that of PM10 and $PM_{2.5}$ and so the two need not correlate directly.

11 WEAKEST ASPECTS/PRIORITY AREAS FOR IMPROVEMENT IN CURRENT METHODOLOGY

Knowledge of combustion and abatement techniques, dust removal efficiencies and operating techniques is limited.

Further work should be invested to develop emission factors, which include technical or fuel dependent explanations concerning emission factor ranges. Emission factors also need to be generated, which specifically relate to different levels of abatement on different types of plant.

The stack emission factors described in the Guidebook, and all the PM_{10} emission factors, are based whenever possible on measurements. Particle measurements have often been made on the mass of total particulate matter and then converted to PM_{10} based either on the size distribution of the sample collected or, more usually, on size distributions given in the literature. There may be secondary sources of particulate matter, that are diffuse or fugitive in nature e.g. emissions from coke ovens, stockpiles, ash handling etc. These emissions are difficult to measure and in some cases it is likely that no entirely satisfactory measurements have ever been made, in many cases estimates of emissions from such sources are missing.

There is very little published data suitable for emission inventory compilation. I.e. representative data of known quality relating a) quantities of (particulate) material released to b) the activity associated with the release of that pollutant. Suitable data and associated information would record the determination of mass emissions rates using standardized measurement methods or calculation-based methods. Ideally such methods would cover the planning and execution of the data collection programme including: the selection of sampling methodology, choice of equipment, suitable working procedures, the calculation of representative emissions rates, the selection of matching activity data, the determination of sampling/measurement uncertainty, and the reporting of information in a form that is suitable for calculating emissions factors.

12 SPATIAL DISAGGREGATION CRITERIA FOR AREA SOURCES

Combustion plants should be considered as point sources if plant specific data are available. Otherwise national emissions should be disaggregated on the basis of plant capacity, employment, population or other relevant statistics.

13 TEMPORAL DISAGGREGATION CRITERIA

Combustion processes in most industrial sectors can be considered as a continuous process however; district and agricultural heating plants will tend to have an operational profile determined by the season. Individual combustion plant may have daily and/or seasonal temporal profiles.

14 ADDITIONAL COMMENTS

See chapters B111 and B216.

15 SUPPLEMENTARY DOCUMENTS

16 VERIFICATION PROCESSES

17 REFERENCES

EMEP/CORINAIR Emission Inventory Guidebook – 2005, EEA (European Environment Agency) Chapter B216 and B111

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18 BIBLIOGRAPHY

For a detailed bibliography the primary literature mentioned in AP 42 can be used.

19 RELEASE VERSION, DATE AND SOURCE

Version: 1

Date: Aug 2006

Source: R. Stewart
AEA Technology
The Gemini Building
Didcot,
OXON
OX11 0QR

20 POINT OF ENQUIRY

Any comments on this chapter or enquiries should be directed to:

Robert Stewart

AEA Technology Environment
The Gemini Building
Didcot
OXON
OX11 0QR

Tel: +44 870190 6575
Fax: +44 870190 6318
Email: robert.stewart@aeat.co.uk

Jozef Pacyna

NILU - Norwegian Institute of Air Research
PO Box 100
N-2027 Kjeller
Norway

Tel: +47 63 89 8155
Fax: +47 63 89 80 50
Email: JOZEF.PACYNA@NILU.NO